ANCIENT NEAR EASTERN STUDIES

SUPPLEMENT 45

UNEARTHING THE WILDERNESS

Studies on the History and Archaeology of the Negev and Edom in the Iron Age

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CONTENTS

Preface ............................................................. vii

WILDERNESS AND BEYOND

Socio-Economic Fluctuations and Chiefdom Formation in Edom, the Negev and the Hejaz during the First Millennium BCE ................................................. 1
Juan Manuel TEBES

From Bandit to King: David’s Time in the Negev and the Transformation of a Tribal Entity into a Nation State ..................................................... 31
John S. HOLLADAY Jr. and Stanley KLASSEN

TIMNA RECONSIDERED

Timna Site 2 Revisited ............................................. 47
Tali ERICKSON-GINI

Appendix: XRF Study of Archaeological and Metallurgical Material from Copper Smelting Sites in Timna ..................................................... 85
Sana SHILSTEIN, Sariel SHALEV and Yuval YEKUTIELI

Egyptian Timna – Reconsidered .................................... 103
Uzi AVNER

STUDIES ARISING

The Symbolic and Social World of the Qurayyah Pottery Iconography .... 163
Juan Manuel TEBES

Arabian and Arabizing Epigraphic Finds from the Iron Age Southern Levant . 203
Pieter Gert VAN DER VEEN and François BRON
CONTENTS

EDOM OVER THE BORDER

The Judean Desert Frontier in the Seventh Century BCE: A View from 'Aroer . . 227
Yifat THAREANI

Edomite Pottery in Judah in the Eighth Century BCE. . . . . . . . . . . . . . . . . 267
Lily SINGER-AVITZ

Local Production of Edomite Cooking Pots in the Beersheba Valley: Petrographic Analyses from Tel Malhata, Horvat 'Uza and Horvat Qitmit . . . . . . . . . . . 283
Liora FREUD
EGYPTIAN TIMNA – RECONSIDERED’

Uzi AVNER

INTRODUCTION

The Arabah Valley is well known as a major source of copper ore in ancient times, probably beginning in the Late Neolithic period. 1 The Faynan area, in the northeastern Arabah, was the largest copper deposit, 2 Timna Valley in the southwestern Arabah was the second largest and Nahal ’Amram, south of Timna, was the third.

Ancient remains of the copper industry in Timna were first briefly published by J. Petherick 3, followed by A. Musil 4, F. Frank 5, and N. Glueck 6. In 1933, C. Phythian-Adams published the first historical-biblical scenario of copper production in the Arabah, based on an unpublished report by G. Horsfield, who visited the valley earlier. This biblical view was later extended by N. Glueck following his survey along the Arabah and his excavations at Tell el-Kheleifeh, near the head of the Gulf of Aqaba. In Glueck’s view, the copper mines along the Arabah were exploited by King Solomon and later Judaean kings, utilising slaves and forced labour. The copper ore was first roasted in the mining centres and then refined and cast into products in the large-scale metallurgic plant at Tell el-Kheleifeh. This site was the location of both biblical Eilat and Ezion Geber, which also served as a seaport. The copper products were traded for gold and other exotic goods brought from Ophir and Sheba. 7

Glueck continued his research in the Negev during the 1950s, 8 but in 1959 his team’s photographer, B. Rothenberg, commenced his own research at Timna, adding a great deal of information as to the extent and nature of the copper industry. Rothenberg 9 offered a totally different technological picture of both the mining and smelting. He also argued that
Tell el-Kheleifeh could not have been a large, industrial copper smelter. At first he followed Glueck in dating the main copper production to Solomon’s time, but he later suggested an earlier date, when the copper work was undertaken not by Israelites but by the desert tribes. He also argued that the copper plant was operated by skilled, professional workers rather than by slaves.

Rothenberg’s survey revealed a variety of mines, smelting camps, installations and other features. During the 1960s he conducted excavations in Site 2, a smelting camp in which he uncovered an industrial unit (Area D-K), four smelting furnaces (Fu I, II, IV and, later, Fu Z) and a shrine (Area A).

In 1969 Rothenberg excavated a probe within Site 200 at Timna (discovered by A. Nussbaumer in 1964), identified as a possible cult place. The probe developed into two seasons of excavations—1969 and 1974—of the site known today as the “Egyptian Temple” or the “Hathor Temple”. Some 11,000 artefacts were found at this small site, among them a number of Egyptian objects bearing cartouches of pharaohs from Seti I or Ramses II to Ramses V, ca. 1280–1145 BCE. These objects served as proof that dating the copper industry prior to Solomon was justified.

During the 1970s Rothenberg conducted a renewed study of the mines in cooperation with the Mining Museum at Bochum, Germany, as well as excavations in Smelting Camp 30. These studies greatly emphasised the Egyptian nature of the plant. Timna Valley is now considered the best example of New Kingdom Egyptian copper mining and smelting technologies (see below).

Rothenberg’s work was certainly pioneering. Today, however, we see reasons to re-examine several issues. The first is the role of both the Egyptians and the desert people in the large-scale copper industry of the Arabah Valley, focusing here on Timna. We begin with discussion on the Egyptian sanctuary, continue with the mines and smelters and then discuss the general historical-social scenario.

THE EGYPTIAN SANCTUARY

Since 1969, the Egyptian sanctuary has been described in 14 different publications, including the highly detailed final report of 1988 (followed by four additional articles). The excavation and its recording methods were presented as systematic and meticulous, fully supported by post-excavation analysis of the stratigraphy and the finds. Here is a brief, general description of the site according to the later publications.

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11 Rothenberg 1962, pp. 40–44.
15 The site is termed “temple” in all publications, but due to its small size and characteristics, I prefer here the term “sanctuary”.
16 Conrad and Rothenberg 1980.
17 For example, Rothenberg 1988a, pp. 19–26.
Three stages were distinguished in the temple itself (excluding an earlier, Chalcolithic stage below and the later Roman penetration into the site). In the initial stage (Stratum IV), the first temple was constructed in the time of Seti I or Ramses II (see below). It consisted of a courtyard, $7 \times 9$ m, of which Walls 1 and 3 have been preserved (Fig. 1). Attached to the sandstone cliff, a *naos*, $1.7 \times 2.7$ m, was built of a low frame of ashlar sandstone blocks with two square pillar bases in the front corners (Fig. 2a). In the *naos*, a vertical niche was cut for a statue of the goddess Hathor, whose head was found during the dig. Based on several remains and parallels, Rothenberg offered a reconstruction of the *naos* with two square-sectioned pillars set on the front pillar bases, bearing the face of Hathor in relief. One pillar was found in a later, secondary use; the other was broken. Additional ashlar sandstone beams (architraves) were laid on top of the pillars, leaning into two rectangular recesses cut in the rock face (Fig. 2a). This first stage was destroyed by an act of violence or by an earthquake and rock fall during the reign of Seti II or Twosret.

The second stage was a reconstruction of the sanctuary by Ramses II or III (see below). The courtyard was now enlarged to $9 \times 9$ m by moving the front wall (W. 2) outward. The *naos* was rebuilt as a closed cell using ashlar sandstone blocks and architectural remains from the first sanctuary, the first course of which remained on top of the older base (Fig. 2b). In front of the *naos* an ashlar pavement, termed *pronaos*, was laid, $3 \times 3$ m, while the courtyard area was paved with crushed and beaten white sandstone. Three stone basins were placed in the courtyard, but due to their secondary use in the later stage, their original location remains unknown. The second stage fell into ruin due to an earthquake in the time of Ramses V, abandoned and covered by a thin layer of wind-blown sand. After that, the Egyptians did not return to Timna (excluding a short period, some 250 years later).

In the third stage, occupation of the sanctuary was renewed by the Midianites, who continued to produce copper in the valley for some time. They erected a line of standing stones (massseboth) on the western side of the courtyard, incorporating older Egyptian architectural elements for some of them. They built offering benches next to Wall 2, added a cell outside Wall 1 (L. 112) and covered the courtyard with a tent. This local shrine was abandoned after a while and was gradually covered by sand. Following a later earthquake, large sandstone blocks fell onto the sanctuary from the overhanging cliff.

The description of the sanctuary’s stratigraphy and history seems consistent. However, if one reads all the publications, many difficulties and discrepancies arise between the different accounts, both in terms of factual reporting and interpretation. Ample details require critical examination, but here only a few will be addressed.

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19 Rothenberg 1972a, pls. 77, 81; 1988a, pl. 117, fig. 25.
20 Rothenberg 1972a, pl. 78; 1988a, fig. 23:1.2.
21 Rothenberg 1972a, p. 131; 1984, p. 94.
22 Rothenberg 1988a, pp. 48, 277, 275.
24 Conrad and Rothenberg 1980, p. 212; Rothenberg 1999b, p. 162.
25 Rothenberg 1972a, p. 151, fig. 44.
Fig. 1. Plan of the Timna sanctuary, from Rothenberg 1972a, p. 128, with the addition of the excavated loci and the writer’s probes (grey rectangles, P. 1–P. 3). Dotted areas indicate the white floor. With kind permission of the Institute for Archaeo-Metallurgical Studies, University College London.

Fig. 2. Sketch of the two phases of the naos, drawn by the writer following Rothenberg’s text (e.g. 1972a, pp. 130–132; 1984, pp. 93–96. For a fragment of the restored architrave in Fig. 2b see Rothenberg 1972a, fig. 74; 1988a, pl. 110:1)
The sanctuary’s general stratigraphy

In the first four publications the stratigraphy of the sanctuary itself (ignoring here the Chalcolithic and Roman phases) appears quite clear, divided into only two strata by the white floor. The two layers related well to two groups of pharaohs’ names found inscribed on offering objects and architectural remains: the first group from Seti I to Merneptah (Nineteenth Dynasty); the second, after some gap, from Ramses III to Ramses V (Twentieth Dynasty). Only Walls 1 and 3 and the first stage of the naos were attributed to the first sanctuary. Most remains were ascribed to the second sanctuary: the enlargement of the courtyard, the white floor, the new naos and pronaos, the line of standing stones, the offering benches, the three basins and the cell of L. 112. The standing stones and the offering benches were related to the Midianites, within the Egyptian sanctuary. Thousands of artefacts, both Egyptian and Midianite, found together in both strata, signified cooperation between the two peoples in the cult of Hathor as well as in copper production.

In the fifth publication, the sanctuary’s stratigraphy is still divided into two layers, but the text actually describes two phases in the upper stratum. The later phase is the Midianite, following the abandonment of the site by the Egyptians.

From the sixth publication on, the sanctuary is divided into three individual strata, IV–II, but now the stratigraphy is described as very difficult, because of the white floor. On the one hand, the white floor was described as being laid over the wind-blown sand which covered the remains of the first sanctuary. In this case, the remains of Stratum IV were supposed to have been found separated and protected from later activity. On the other hand, the white floor was also described as being laid over the massive deliberate destruction of the first sanctuary, which included levelling the architectural remains and rock falls of Stratum IV and crushing the white sandstone remains to make the floor.

Until 1984, the stratigraphic origin of only one inscribed object was reported: an arrowhead bearing the name of Ramses III found on top of the white floor. This helped to relate the two Egyptian levels of the temple to the two groups of kings’ names. However, it was also stated that no inscribed, dated object could be related to the first sanctuary. This means that all inscribed objects were actually found above the white floor, in Stratum III. The latest publication attempts to bridge these differences, saying that cartouches of the Nineteenth and Twentieth Dynasties, from Seti I to Ramses V were found in Layers III and IV.

The relationship between the sanctuary walls and the white floor is also questionable. In the first nine publications, no relations between the two were addressed, but in the final
report they were discussed extensively. For example, most remains of the sanctuary were related to Stratum III, built simultaneously with the laying of the white floor. The white floor was described as abutting most of Wall 1 (in L. 109), and therefore built later. The southeast section of Wall 1 and all of Wall 2 are described as built into the white floor but also above it. The white floor was also described as running towards and underneath Wall 2 despite being only 1–2 cm thick. One published section of the site shows the white floor running just below Wall 2, while another shows an ash layer separating the two. Additional sections show no contact between the white floor and Walls 1 and 3. In any case, it is interesting to note here that the white floor covers quite a large area outside Wall 2 and outside parts of Walls 1 and 3.

Another question is: Who built the first and the second sanctuaries? The early publications ascribed the founding of the first sanctuary to Seti I and the second to Ramses III. This was based on the first reading of the Egyptian inscriptions by Giveon. Then his reading of Seti I was annulled by Schulman, and the construction of the first sanctuary was transferred to Ramses II; nevertheless, later publications still name Ramses II as the builder of the second sanctuary. The last article restores Seti I as the founder of the first sanctuary, while Ramses II remains the builder of the second, not Ramses III, whose inscribed arrowhead was found lying on the white floor.

Stratigraphy of the naos

In the earlier publications, two phases were distinguished in the naos, related to the two levels of the sanctuary. The first included the rectangular base frame of long ashlar sandstones and the pillar bases associated with Rothenberg’s reconstruction of the two Hathor pillars in the front. The second was built of ashlar sandstone blocks as a closed “kiosk” with the addition of the paved pronaos. In the final report, the naos and pronaos are
described as one unit, attributed to Stratum III only. This means that no remains of the naos are now ascribed to the first sanctuary (Stratum IV). Also, the excavator states that he refrains from reconstruction of the naos due to insufficient information; however, he correctly describes the white sandstone blocks of the second course of the naos overriding the plaster lines remaining on top of the first course with the pillar bases, which are still visible today. Also, within this unified description he still mentions “the second building phase of the naos.” So, unavoidably we return to the division of the naos into two phases, most probably related to Strata IV and III. This can also be seen in the relation between the naos and the white floor, which runs underneath the pronaos and abuts the first course (first phase) of the naos. Hence, the white floor was at least technically later than the first naos while the pronaos (second phase) was later than both.

The later situation in the naos is also unclear. On one hand, according to the excavator, it was reused by the Midianites in Stratum II, which contained the copper serpent as a Midianite cult object. On the other hand, the detailed description of the naos does not provide any indication of a reuse or construction phase by the Midianites.

As to the interior of the naos, the first four publications mention no stratigraphy or floors. The fifth, however, states that inside the naos the existence of three hard, superimposed surfaces was clearly established. A later article returns to the first view, saying that no convincing stratigraphy was found inside the naos and it seems that no floor was ever built there. The final report describes a mixture of Roman and New Kingdom finds in the naos, resulting from a deep Roman robbery penetration, with a later refill. Still, artefacts were found lying on three hard interfaces in different levels.

Confusion also arises around the origin of the small, beautiful copper serpent. It was found in situ in the upper layer of the naos (Locus 111), but in another publication it was found in Locus 110; that is, outside and in front of the naos. Two later publications offer additional descriptions of the serpent’s origin; it is described as the only votive object found inside the Midianite naos, or the only votive object in the area of the naos.

Metallurgic installation

The metallurgic installation in the eastern side of the courtyard (L. 109) contained the remains of two furnaces, a pit for storage of charcoal, a 50 kg pile of copper and iron oxide...
ores mixed with copper offering objects, and 2–3 kg of copper slag. It was described as a Byzantine smelting and casting installation penetrating into the temple’s ruins in the third century CE (sic). Interestingly, the metalworkers refrained from reusing the old metal offerings for their own purposes. In other publications these smiths were also identified as Nabataeans, who damaged the site and left behind their distinctive Nabataean pottery. Elsewhere, they were also identified as Romans of the first century CE. From 1984 on, the metallurgic installation was ascribed to Stratum III, the second Egyptian sanctuary, safely related to the white floor and built to serve the needs of worshipers. Penetration into the site is attributed now to Roman treasure hunters in the second century CE, or from the first to third centuries CE.

A hoard of offerings

Over the eastern wall (W. 1, L. 101), a rich hoard of copper and other offering objects was found. According to the earlier publications this was carefully concealed by the Byzantine (!) smiths who penetrated the site in the third century CE, but, as mentioned, they refrained from disturbing the sacred objects or reusing them. The hoard was also related to the Midianites, having rearranged the temple for their own needs. Later, it was attributed to both the Midianites and the Romans of the Third Legion, although it was found in one layer. In the final report, the hoard is actually divided into three interfaces and suggested as a source of metal for an adjacent small Midianite casting workshop.

Although many stratigraphic and interpretive points remain to be reviewed, those noted here are enough to show that the published results of the excavations cannot serve as a base for reconstructing the site’s history. Nevertheless, an attempt to reach some understanding of the site’s significance is still required.

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68 For example, Rothenberg 1970a, pp. 33–34.
69 Rothenberg 1971, p. 22.
70 Rothenberg 1978, p. 1190.
71 Rothenberg 1984, p. 118; 1988a, pp. 60–66, 192–203, 273; 1993, p. 1483; 1999b, p. 171. The installation was interpreted first as intended for smelting copper, but later studies explained it as a melting and casting installation (Rothenberg 1999c). For metal works inside temples see, for example, Dothan 1981, pp. 76–77; Dothan and Ben-Tor 1983, p. 140; Artzy 1999; Blakely-Westover 1999; Ben-Dov 2011a, pp. 349–361; Ben-Dov 2011b, with further references.
72 Rothenberg 1984, p. 121.
73 Rothenberg 1988a, p. 278; 1999b, p. 172.
74 For example, Rothenberg 1969, p. 29; 1970a, pp. 33–34.
75 Rothenberg 1971, p. 19; 1972a, pp. 151–152.
76 Rothenberg 1984, pp. 99, 111.
77 Rothenberg 1984, p. 152.
79 Reasons for the confusion can be learned from the publications, mainly from the final report. The site was excavated following a grid of 1 × 1 m, but also in 32 probes and sections across the grid lines, while some probes are marked overlapping each other (Rothenberg 1988a, Ill. 10b). The loci were determined after the dig, with no vertical division; each locus includes all strata (Rothenberg 1988a, pp. 19–26). Also, loci are commonly crossed by the probes. Levels were measured from some high benchmark downward, but never translated to absolute levels, and errors in the levels occur in the site plans (when examined in the site). Artefacts were separated into 606 find boxes (Rothenberg 1988a, pp. 287–290), but many of them include finds from different loci and various strata. In many other find boxes, strata are not indicated (Rothenberg 1988a,
In 1984 the team at the Timna Park asked me to conduct a preservation-restoration project at the sites excavated by Rothenberg in Smelting Camp 2 and the sanctuary. Before that, I re-read all available publications and met twice with the excavator to discuss stratigraphic and other archaeological issues. Before beginning work, I also selected three points for small probes (Fig. 1), in an attempt to clarify some stratigraphic questions, and invited Rothenberg to observe the probes as we dug. The results were quite illuminating, but we differed in their interpretation.

**Probe 1**—Next to Wall 2, west of the gateway and below the offering bench (Fig. 3). The probe, 30 x 60 cm, was dug to the bedrock, 50 cm below the base of Wall 2. It revealed the following details, from bottom to top: 1) A living level, 35 cm thick, of finely laminated, undisturbed red sand, with some spots of ash and many finds: two Chalcolithic-Early Bronze pottery sherds; Negebite, Midianite and “normal”, wheel-made pottery sherds of the late second millennium BCE; fragments of decorated faience; several beads of different types; fragments of bones, ostrich eggshells and seashells. 2) A white level 1–2 cm thick, obviously the remains of the white floor. 3) A living level of light grey-coloured sand and ash, 7–15 cm thick, containing artefacts: two faience fragments; “normal”, Negebite and Midianite pottery sherds; fragments of bones and ostrich eggshells; two globular hematite nodules; and small pieces of charcoal. 4) The base of Wall 2.

The probe confirmed that the “white floor”, very thin in this section, marked a separation between the two living levels. The relation between the white floor and Wall 2 became clear now. The wall was built some time later than the white floor, after accumulations of sand, ash, dust and artefacts settled over it. From Rothenberg’s final report it is clear that the upper living level (or levels) continued to accumulate after the construction of the walls. Clearly, Wall 2 was the latest construction phase in this section. The lack of contact between the walls and the white floor explains why the white floor was found outside the site perimeter.

**Probe 2**—Between Wall 3 and the line of masseboth (Fig. 4). Since the masseboth remained on a deteriorating balk they were removed before restoration and the excavation of the probe. According to the excavator, Wall 3, as well as Wall 1, was extended southward when...
Fig. 3. Probe 1: 1. Lower living level; 2. White floor; 3. Remains of upper living level; 4. Wall 2

Fig. 4. Probe 2. Wall 3 with a *massebah* concealed in it
the courtyard was enlarged in Stratum III. Since these extensions were not clearly visible to us, the dig could help clarify this question. The southern section of the wall had been exposed since the first dig at the site (1969); now we exposed the base of the central part of the wall and dug down to the bedrock. As a result, it was observed that the wall was built on one even level, in one stage, on top of a layer of grey-to-red sand and some fallen rocks. The only reason for the different look of the two sections under the wall in Fig. 4 is that the left (southern) part experienced 15 years of gradual deterioration, while the right side is a fresh section. The conclusion is that Wall 3, as well as Walls 1 and 2, was built in one stage. The base of Wall 3 was ca. 10 cm above the base of the maseboth, 40–50 cm above bedrock. Finds from this probe were similar to those of Probe 1, but in a lower density. One faience fragment, however, bore the complete name of Hathor.

Another result of this dig was the opportunity to observe a large limestone incorporated in Wall 3 and described as a “pinning stone, obviously for wall repair.” The stone, 108 cm tall, was set vertically and perpendicularly to the wall’s axis; its base was 3 cm above the bedrock, 37 cm below the base of Wall 3 (Fig. 4). I suggest that this is another, older masebah, concealed in the wall when it was built.

Probe 3 – 50 × 120 cm, excavated into a layer of red sandstones next to a large flat rock (Fig. 5). In early publications the remains of a floor were briefly mentioned here (L. 106, 107, covered by the white floor). In oral discussions, Rothenberg asserted that these were only the result of a rock fall. The probe was made to clarify the nature of the red stone’s level and especially that of the large rock, which seemed important. The rock is 2.2 × 1.3 m, with a chisel-cut circular depression in its centre, 32 cm across and 7 cm deep. The probe showed that the rock was 25–35 cm thick and intentionally laid horizontally, supported and stabilised by several stones underneath (Fig. 5). Furthermore, three elements clearly indicate that this large stone was actually an altar: the circular depression, the adjacent broken basin, and a drainage channel behind it (Fig. 6 and see details below). The probe also showed that the adjacent “mass of red rock fall” was actually a pavement, laid on laminated red sand, containing artefacts and some rock debris.

The probe was quite rich with finds of both local and Egyptian origin (Fig. 7), among them a fragment of a faience ring base bearing parts of cartouches of Seti I, with a short formula written below. This is actually the only inscribed, datable object safely originating from the first sanctuary (Stratum IV), 7 cm below the base of the red pavement. As

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83 See in Rothenberg 1988a, fig. 31:8. On the left side there is a small fragment of the sign n, most probably the beginning of nbr “the mistress of...”; see Schulman 1988, cat. 55, fig. 35:4.
84 Rothenberg 1988a, p. 49.
85 Concealment of maseboth in a wall is known from several sites of different periods. For example, two maseboth were covered by plaster in the holy of holies of the Israelite temple at Tel Arad, while one was left exposed (Ahaaroni 1968, p. 19). An alignment of maseboth was concealed in a wall in the Early Bronze I site of Haruv (Mazar and Miroshchidi 1996, pp. 7–9). Those who did it actually refrained from discarding a sacred object, even if it went out of use, much like sacred scripts.
86 For example, Rothenberg 1972a, pp. 131, 149; 1984, p. 94.
Fig. 5. Probe 3: The altar stone stabilised by smaller rocks underneath

Fig. 6. Details next to the altar stone: 1. Red pavement; 2. Altar; 3. Remains of a large basin; 4. Drainage channel; 5. First stage of the naos; 6. Second stage of the naos; 7. Pronaos
mentioned above, the name of Seti I was first identified on another fragment by Giveon, but the reading was later annulled by Schulman. Now Seti I again became the first pharaoh mentioned at the site.87

ALTERNATIVE STRATIGRAPHY AND INTERPRETATION OF THE SITE

With careful adoption of principal elements from the excavator’s reports, combined with the remains at the site and the results of the three small probes, an alternative stratigraphy may be offered, with eight phases. Following is the bottom to top sequence (Fig. 8):

Phase 1 – The lower living level, 35 cm thick in Probe 1 and 50 cm in Probe 3 (from bedrock to the top of the red pavement). This living level contained artefacts of both local and Egyptian origin (Chalcolithic finds are ignored here). The depth of this layer indicates a long period of gradual accumulation, with some rock debris. The finding of Seti I in Phase 1 is certainly significant, but the level in which the fragment was found (38 cm above bedrock in Probe 3) is not necessarily informative as to the time when the Egyptians first arrived in Timna, nor the time span of this phase. Following Schulman,88 Ramses II is a better candidate as the pharaoh who initiated the Egyptian activity in Timna (see further below). Unfortunately, today no architectural remains can be related to this phase; however, two masseboth can. One is set into a depression cut 25 cm into the bedrock,89 75 cm below the red pavement, and therefore must be very old. The other is the massebah concealed in Wall 3 with its base just above the bedrock (Fig. 4).

Phase 2 – The first architectural remains that can be identified today are the red pavement, the large altar rock, the two basins and part of the row of standing stones. The red pavement connects all the other elements together into one unit—a shrine of clearly local nature (Fig. 9). Ample examples from the ancient Levant, especially from the desert, demonstrate the connection between these elements. Each one deserves a detailed discussion, but here they will be briefly addressed:

Masseboth are common in the Near East and very common in the desert. To date, over 450 masseboth sites have been recorded in the Negev, from the Neolithic period to the Iron Age.90 Besides those in the Timna sanctuary, two additional masseboth sites in the valley were published by Rothenberg,91 and more sites were recorded by the writer. From later

87 The first identification of Seti I in the inscription was made by myself, confirmed later by B. Brandl and B. Sass, who also read the formula below: “(granted with) life and good fortune like Re”. Together with the other finds, I handed it to Rothenberg (see n. 80), who published it with Schulman in the final report (Rothenberg 1988a, pp. 86 n. 3, 125, cat. 83a, 145, pl. 125:3, fig. 31:7).
90 Avner 1984b; 1993a; 2001; 2002, with references.
91 Rothenberg 1972a, pls. 110, 112.
Fig. 8. Stratigraphic order in the sanctuary: 1. Lower living level; 2. Local shrine; 3. First stage of the *naos*; 4. White floor; 5. Second stage of the *naos* plus *pronaos*; 6. Lower part of upper living level; 7. Wall 2

Fig. 9. The local shrine after restoration: 1. *Masseboth* alignment (the black stone was found in the basin); 2. Smaller basin; 3. Red pavement; 4. Larger basin; 5. Altar stone; 6. White floor; 7. *Pronaos*
periods, many hundreds of groups of small Nabataean masseboth are found in the Negev, and they even continued into the Byzantine and Early Islamic Periods. The number of recorded masseboth of all periods continues to grow with every excursion into the field and they demonstrate the persistence of masseboth worship, especially in the desert. In Egypt, on the other hand, masseboth (unlike stelae) are extremely rare. Masseboth had several different roles in ancient Near Eastern religions, but in the desert they were primarily an abstract representation of deities. Four of the masseboth in the Timna alignment are unshaped, including the black boulder, much like the vast majority of masseboth in the desert. Four others are combined with Egyptian offering stands in a secondary use, and one was originally one of the Hathor pillars, adopted as a massebah after being defaced. These were added to the row in a later stage, after the destruction of the Egyptian naos. Altogether the row comprises nine masseboth (excluding the concealed one), a number recurring at other sites.

The red pavement, $6.5 \times 4.5$ m, was either not mentioned in Rothenberg’s early publications, or just noted briefly with no description. In the site plans, the red pavement and the large stone appear in two different ways. In the publications of 1970, 1978, 1992, and 1993, the pavement is shown as more solid and consistent, closer to reality and to published photos. Following our work at the site and the report given to Rothenberg, he extensively discussed the red pavement and the large rock, concluding that they were only the result of rock falls from the overhanging cliff, occurring first in the Chalcolithic period. The resemblance of the “rock fall” to a pavement was explained in terms of its having being levelled before the white floor was laid over it. Fortunately, most of this area was not excavated below the level of the red rocks, so the connection between all elements remained clear and visible. Association of these elements with pavements is significant since it is paralleled in cult installations of various periods.

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92 Avner 2000.
93 Avni 2007.
94 Only four masseboth are known to me from three sites in Egypt: one at Saqara (Lauer 1936a, p. 190, fig. 212; 1936b, pl. 103), and two at Medum (Pettie 1892, p. 8; Rowe 1930, pls. 26, 27, 31) and one from Abidos (Quirke 1992, p. 63).
95 Rothenberg 1972a, fig. 78; 1988a, fig. 23:1.
96 Avner 1993a, fig 7; 2002, Table 11, 9:1–6.
98 Rothenberg 1972a, p. 132; 1984, p. 94.
99 Rothenberg 1972a, pl. 69; 1984, fig. 14; 1988a, pl. 54.
100 Rothenberg 1984.
101 Rothenberg 1988a, pp. 47–8, 53–57, 88 n. 61, 247, 275.
103 Rothenberg 1988a, Loci 106, 107, ill. 10b, no. 6.
104 Examples for pavements in cult installations, from north to south: Biblos, high place (Dunand 1958, pp. 646, 648, 657, pls. 31:1, 32:1); Hazor XI, Area B (the Bull Site: Mazar 1982, p. 34); Benei Braq (Kaplan 1963, p. 302); Givataim (Zusman and Beit-Arieich 1966, p. 32); Arad (Abatoni 1968, p. 19); Rosh Zin (Marks 1976, p. 318); Beidha (Kirkbride 1968, p. 92). Desert sites: (Avner 2002, Table 11: 1:1, 1:9, 1:12, 1:23 and fifteen others); in Sinai: Wadi Fugeia (Rothenberg 1974, pl. 13), ‘Ein Yarqa (Rothenberg 1979, p. 11).
**The altar** is the large rock with the chisel-cut circular depression, placed horizontally and stabilised ca. 15 cm above the red pavement. The depression is similar to many examples of various forms and sizes from different periods. Common to all are the context and the depression itself, logically made to hold the sacrificial blood for a later ritual use (see below).

**Basins** are often found with *maseboth*. Here at Timna, both basins were originally lime plastered to contain liquid, but their dimensions are very different. The calculated volume of the smaller basin, between the *maseboth*, is ca. 35 L while the volume of the larger, broken basin is calculated at ca. 150 L. Their roles may be interpreted as follows: The smaller basin was designed to contain the sacrificial blood for ritual use. The best-known biblical example for this custom is the ritual conducted by Moses at the foot of Mount Sinai (Exodus 24: 6–8) in which he put half of the blood in the basins, Hebrew "אגנות" (plural), and then sprinkled it on the attendants. The larger basin is the biblical "כיור", placed next to the altar (Exodus 30:18; 31:9; 35:17). It contained larger amounts of water (cf. 1 Kings 7:38; 2 Chron. 6:13), for the priest’s ablution (Exodus 30:18–21, 40:30–32; 2 Chron. 4:6), for the wash of the sacrificed animals (Exodus 29:17, Leviticus 9:14) and for rinsing the altar following the sacrifice. The functions of the larger basin are well connected to the drainage channel behind the altar (see below).

Basins, however, are very rare in Egyptian temples and are not part of the Egyptian cultic paraphernalia. When Petrie excavated the temple of Serabit al-Khadem, southwest Sinai, the discovery of basins indicated to him that Semitic cult was practised in the temple, an observation followed later by Badawy. Instead of basins, rectangular or T-shaped ponds were built for cultic purposes. Another indication for the local nature of the basins is the

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105 Examples for depressions in altars, from north to south: Hazor (Yadin 1975, pl. 124, 128, 129; 1972, pp. 86, 100; 1975, pp. 86–87); Megiddo VII (Loud 1948, p. 105, figs. 254, 257); Megiddo, *maseboth* hall (Schumacher 1908, pp. 48, 112, 117, 156–157, abb. 169, Taf. 35, 37b); Ta’anach (Sellin 1905, pp. 29–30, figs. 48, 49); Beth-Shean (Lapp 1964, pp. 30–32, figs. 16, 19; 1967, pp. 19–20, figs. 11, 12); Beit Shemesh (Grant 1931, p. 41, pl. 30); desert sites (Avner 1984b, p. 115, pls. 15:1, 16:3; 2002, Table 11: 1:6, 7:14, M:10; Anati 2001, figs. 114, 161, 162); Timna (Rothenberg 1972a, pl. 110).

106 Examples of basins next to *maseboth* from north to south: Byblos (Dunand 1958, pp. 646, 648); Tell Dan (Biran 2001); Megiddo, *maseboth* hall (Schumacher 1908 I, pp. 105–106); Megiddo, VII (Loud 1948, p. 105, figs. 254, 257); Ta’anach (Lapp 1964, pp. 30–32, figs. 16, 19; 1967, pp. 19–20, figs. 11, 12); Beth-Shan (Rowe 1930, pls. 21, 22); Tell Far‘ah (north) (de Vaux 1951, p. 428, pl. 11:1); Chambon 1984, pp. 30, 40, pls. 7–9, 27); Benei-Braq (Kaplan 1963, p. 302); Gezer (Macalister 1906, pp. 54–57; 1912, pp. 377–406); Dever 1971, pp. 120–124; 1972, pp. 68–70); Beit Shemesh (Grant 1931, p. 41, pl. 30); desert sites (Avner 1984b, p. 115, pls. 15:1, 16:3; 2002, Table 11: 1:6, 7:14, M:10; Anati 2001, figs. 114, 161, 162); Timna (Rothenberg 1972a, pl. 110).


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109 For example, Badawy 1968, pp. 491–496. The term "basin" occurs several times in Badawy’s books in connection with gardens, villa houses and temples, but the text and illustrations clearly indicate ponds (e.g., Badawy 1968, pp. 133, 138, 167, 354). In an extensive work on purification in Egypt (Blackman 1918), basins in temples are never mentioned, only pools, tanks and specific types of jars. See also Helck and Otto 1984.
lime plaster with which they were lined.\textsuperscript{112} Lime plaster was common in the Levant as early as the Pre-Pottery Neolithic,\textsuperscript{113} while in Egypt gypsum plaster was used.\textsuperscript{114} 

The drainage channel (Fig. 6) was not mentioned in Rothenberg’s publications before our work at the site, but it was later mentioned as a “trench-like space” or “rock-bench.”\textsuperscript{115} Drainage channels associated with altars are known both from the Bible (1 Kings 18:32, 35) and from archaeological remains at sites of various periods, next to altars and in temples or other cult installations for the same purposes.\textsuperscript{116}

Based on the above brief discussion, the elements mentioned should be seen as one unit: a shrine of a local, non-Egyptian nature (Fig. 9). As stated, this is the earliest architectural, cultic element now possible to identify at the site. Although the base of the red pavement is ca. 45 cm above the bedrock, it should be seen as a continuation from an older shrine with masseboth, of which two survived from Phase 1 (see above). Since some of the masseboth were set on top of the red pavement and were combined with Egyptian elements in a secondary use, it is clear that the masseboth alignment changed through time, but their older roots are significant.

Phase 3 is the first stage of the Egyptian naos. As described, it was a rectangular base frame of elongated ashlar white sandstones and pillars in the front corners (Fig. 2a). Lines of plaster indicating the position of the two square-sectioned pillars\textsuperscript{117} are still visible today. One of the pillars with a relief portrait of Hathor was found in a secondary use in a later phase as a massebah, after being defaced (see above). The western side of this naos clearly overrides the edge of the large altar stone and the red pavement (Figs. 1, 6) and therefore it was obviously built later than the local shrine. Another point demonstrates this order of phases—the gradient of the drainage channel behind the altar runs under the naos (Fig. 6).

Phase 4 is the white floor. It covered the red pavement and abutted the first stage of the naos (see above). Two sockets lined with small flagstones and built into the white floor are explained as supporting the poles for a tent, of which many pieces of thick wool were found in the courtyard.\textsuperscript{118} Here, another stratigraphic question arises. The tent remains were related by Rothenberg to Stratum II, the latest, Midianite phase, but the white floor is related to Stratum III. In any case, the white floor was laid after the construction of the first naos, on a larger area than that surrounded later by the sanctuary walls (see above).

\textsuperscript{112} Gourdin and Kingery 1975, pp. 148, 150.
\textsuperscript{113} Garfinkel 1987; Kingery et al. 1988; Haupertmann 2000.
\textsuperscript{114} Lucas and Harris 1962, pp. 74–75, 78; Kemp 2000, pp. 92–93.
\textsuperscript{115} Rothenberg 1988a, p. 54.
\textsuperscript{116} Examples of channels in cult installations, from north to south: Byblos (Dunand 1958, p. 648, fig. 1007); Hazor, Area H (Yadin 1975, p. 81); Hazor, Area F (Yadin 1975, p. 100); Megiddo, Northern Fort (Schumacher 1908, p. 139); Megiddo XII (Loud 1948, pp. 87–92); Megiddo, VIII (Loud 1948, p. 113); Megiddo, VII (Loud 1948, p. 104, fig. 251); Beth-Shan, IX (Rowe 1930, p. 11); Arad temple (Aharoni 1968, p. 19)—two channels on the altar’s top, but their continuations were not preserved.
\textsuperscript{117} Rothenberg 1972a, p. 151, fig. 44; 1988a, pp. 55, 60; Sheffer and Tidhar 1988.
Phase 5 is the second stage of the naos: a closed cell constructed of ashlar sandstone blocks and older architectural elements (Fig. 2b). As mentioned, the first course of these blocks overrides the plaster lines of the first naos. The pronaos ashlar pavement also belongs to this phase, since it was built on top of the white floor.

Phase 6 is the upper living level, Rothenberg’s Stratum III, which contained most of the finds. It was present only in our Probe 1, up to 15 cm thick but originally much thicker.

Phase 7 – The construction of Walls 1–3 surrounding the courtyard. According to my observations they were built in one stage, with the offering bench, after some time of accumulation of the upper living level. Before construction of the walls, the major elements of the site (the local shrine and the Egyptian naos) were in an open space for quite a long period of time. Walls 1–3 can be related now to Rothenberg’s Stratum II rather than IV and III. The upper living level, or levels, continued to accumulate, and included the “green-grey interface” rich with finds. The walls were built of fieldstones of different kinds and included some older Egyptian architectural elements. Rothenberg\textsuperscript{119} related these walls to the Egyptian architecture, based on the similarity to the temenos wall surrounding

\textsuperscript{119} Rothenberg 1972a, p. 149; 1984, p. 96.
the temple of Serabit al-Khadem. However, as Petrie showed,\textsuperscript{120} there were strong local elements in this temple. While parallels to fieldstone masonry in temples in Egypt are unknown, fieldstone masonry in the desert is common in all periods. Therefore, in my opinion, the walls surrounding the sanctuary were built by the locals when the Egyptians were no longer in Timna. This is the stage in which one of the two oldest \textit{maseboth} was concealed in Wall 3, and probably the time when Egyptian elements were adopted and added to the line of \textit{maseboth}.

\textit{Phase 8} is the cell added outside the courtyard (L. 112). The base of Wall 4 creating the cell is 25–35 cm higher than that of Wall 1.\textsuperscript{121} This means that quite a long period of time passed from the construction of Walls 1–3 to the time of building the cell. It also means that the site continued to be used for a long period after the Egyptians left the area.\textsuperscript{122}

Following the above description, several significant results come to light. One is that the site’s stratigraphy is more complex than the published versions, with more phases. Another is that the local component appears now as a well-established cult place, containing all necessary principal paraphernalia. Third, the Egyptian \textit{naos} was built \textit{next} to the existing local shrine—an opposite order of events than that presented by the excavator. The local complex existed long before the Egyptian \textit{naos}, it functioned contemporaneously with the \textit{naos} and it continued to be used long after the Egyptians left the area. Fourth, the history of the site was longer than that perceived by Rothenberg. One indication for its longevity is the accumulation of a 25–35 cm living level outside Wall 1 from the time it was built to the time when Wall 4 was added; another is the only retrieved $^{14}$C date from the site: \textit{ca.} 960 cal. BCE (Table 1:72); that is, about 200 years after Ramses V, the last pharaoh in the site.\textsuperscript{123}

The new observations of the sanctuary now require further discussion.

**The Timna sanctuary compared to Egyptian temples**

\textit{Sanctuary planning and design}

When the Timna sanctuary is compared to Egyptian temples or other cult buildings, the differences are striking. The first conclusion is that the Timna site should be termed a sanctuary, not a temple. For most of its existence it was an open cult place, probably covered by a tent at some stage, and still later surrounded by a low wall. Even if the site is taken as one unit with the walls, it does not accord with the criteria of Egyptian temples.

\textsuperscript{120} Petrie 1906, pp. 63–71, 97–107.
\textsuperscript{121} See Rothenberg 1988a, p. 32, and see levels in all published plans.
\textsuperscript{122} In the cell, a faience fragment was found, bearing the remains of a cartouche (Rothenberg 1988a, p. 83). It was identified as Seti II by Schulman (in Rothenberg 1988a, p. 119, cat. 26, fig. 31:3). Since only small parts of two hieroglyphs remained, the reading seems uncertain. The find-box and level of this object is not indicated so its relation to the cell is unknown. It could have been lying there long before construction of the cell.
\textsuperscript{123} A single $^{14}$C date cannot prove late use of the sanctuary; however, many additional similar dates from Timna (see below) indicate high activity of copper production into the ninth century BCE.
Egyptian temples, large and small alike, were built following rigid principles, especially during the New Kingdom: a longitudinal building with perfect symmetry, a high front, three or four courtyards descending towards the rear end, where the naos was located, dark and isolated. Nobles were permitted to enter into the first courtyard; priests entered into the inner courtyards according to their rank and to ritual needs. The high priest entered the naos every morning to serve the god, while the king entered during special events. Both architectural design and the temples’ regulations imply the aim of providing the god with maximum privacy.

In the Timna sanctuary, on the other hand, the naos with the goddess statue was easily approached and visible to all, even to those who, for some reason, were not permitted into the courtyard. No privacy at all was given to Hathor. In addition, the sanctuary is clearly asymmetric; the naos is 1.1 m away from Wall 1 but 4.6 m from Wall 3. The Egyptian mind could not have borne such disharmony. Indeed, the walls surrounding the courtyard were added late in the site’s history, but once they were built, no attempt was made to create any symmetry. If symmetry was desired, enough free space remained to the east. The walls were built of fieldstones by the locals, the same way they built everything else in the desert, but thicker, ignoring the Egyptian standard of ashlar blocks or mud bricks (for Rothenberg’s comparison of the Timna walls with the temenos wall at Serabit al-Khadem, see above).

The conclusion is that the Timna sanctuary did not obey any principle of the Egyptian temple. Instead, in the time of Egyptian presence in the site, a chapel can be seen here built against the rock face, in an open space, adjoining the existing local shrine. Chapels, or kiosks, were built in Egypt in a variety of forms and for different purposes. In some cases they were a small substitute for the real naos within the temple and the deity’s statue. They were built outside the temple for the commoners who were not permitted into the temple itself.

Religious implications

When the Egyptians first decided to build a chapel for Hathor, they had unlimited space, with magnificent red cliffs surrounding the rock formation of the “Solomon’s Pillars” and other suitable locations. So, why did they choose to attach it to an existing local shrine?

Timna is not the only place where Egyptians and locals shared a sanctuary. This was also the case at Beth-Shean, at the Lachish Fosse Temple and at Lachish VI. Canaanite cult was not unknown to the Egyptian. Although Egypt conquered Canaan, it was deeply
influenced by the Canaanite culture. Partly this involved the adoption of the defeated Canaanite gods into the Egyptians’ own pantheon (Ba’al, Reshef, Ba’alat, ‘Anat, ‘Ashtar, ‘Asherah, Qudshu). Canaanite deities were worshiped in Egypt\(^\text{130}\) and were presented on stelae, sometimes alongside Egyptian gods.\(^\text{131}\) Temples were built for them in both Egypt and Canaan.\(^\text{132}\) Egyptian children, including those of royal families, were named after Canaanite gods.\(^\text{133}\)

When Petrie excavated the temple complex of Serabit al-Khadem in 1904, he obviously saw the wealth of Egyptian materials, stelae, sculptures and inscriptions, but he also noticed local “Semitic” cultic elements: basins, animal sacrifice, “beit-el stones” (maseboth). With the support of biblical passages (1 Kings 20:23; 2 Kings 17:27) he argued that due to the ancients’ territorial perception of deities, Egyptians sought the protection of the local, foreign gods when they left Egypt. At Serabit he saw the Egyptians worshiping a local goddess, equivalent to Hathor, and predicted that when discovered, her name would be Semitic.\(^\text{134}\) This proved true when Gardiner\(^\text{135}\) deciphered her name, Ba’alat, in the Proto-Sinaitic inscriptions.\(^\text{136}\) In fact, Hathor’s title as “Ba’alat” = “the mistress of” (turquoise) was found in several Egyptian inscriptions, in Sinai, in Egypt and in Timna.\(^\text{137}\) In Canaan, Egyptian officials worshipped Canaanite gods while residing outside Egypt.\(^\text{138}\) A good example of a temple shared by both peoples is that of Beth-Shan, as described by Rowe:\(^\text{139}\) the local population worshiped the god Mekal represented by masebah, while in an adjacent cult room the Egyptians worshiped the same local god through an Egyptian stele, representing him in a human form.

A similar situation can be seen at Timna. The Egyptians built their chapel just next to the local shrine since they needed the protection of the local gods, and their Hathor was anyway the equivalent of the local Ba’alat. But there is another interesting point here. When one stands in front of both cult focuses, one sees the Hathor chapel on the right side and the

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130 Helck 1962, pp. 482–500; Stadlmann 1967.
132 Helck 1962, pp. 480–481; Giveon 1972, but see Wimmer (1998), who showed Egyptian cult elements in a number of sites in Canaan. He argued that they do not indicate the existence of Egyptian temples. Exceptional is a temple of Amun at Gaza, mentioned by Ramses III in Papyrus Harris I (9:1–3). In Wimmer’s view, the Egyptians in Canaan only supported syncretistic ambitions of the local population (1998, p. 111); however, in light of the above data, and the fact that Egyptian temples were built in Nubia, the Egyptian elements in Canaanite temples may indeed reflect their joining the Canaanite cult.
133 Pritchard 1969a, pp. 249–250; and see many examples in the Lexikon der Ägyptologie (Helck and Otto 1986) of entries with the gods’ names.
135 Gardiner 1916, p.15.
136 Gardiner et al. (1955, p. 41) accepted Petrie’s idea about the local goddess at Serabit al-Khadem, despite criticizing his general view of the dominance of Semitic cult at the site (1955, pp. 41–51).
137 Giveon 1975; Schulman 1988, p. 123, cat. 55; and see also above, Probe 2 and n. 83.
139 Rowe 1930, p. 11.
local shrine, with the *masseboth*, on the left. However, from the point of view of the gods in the *masseboth* and in the chapel, Hathor stands to the left of the local gods. In the ancient world, and still today in traditional societies, right and left bear clear and profound symbolic meaning. A senior person stands on the right side while the secondary stands to his left. In a random collection of 150 examples of pairs of deities or nobles in Near Eastern sculptures, in 75 per cent the male figure stands on the right side (*cf.* Song of Songs 2:6, 8:3). In most of the other 25 per cent, a mother was the senior and a son or a daughter was the secondary, on her left side. In tens of pairs of *masseboth* in the desert, of different types and from different periods, the right side stone is almost always the larger. Eighteen articles collected in one volume discuss the symbolism of right and left in anthropological and historical studies; they all show this universal symbolic notion.

For the Timna sanctuary this means that the Egyptian Hathor was not the “owner of the house” but a “guest”. She joined the local gods, in their territory, on their left side as a secondary figure.

**EGYPTIAN MINES AND SMELTERS IN TIMNA VALLEY**

Since the discovery of the sanctuary, much emphasis has been credited to the Egyptian masters. They were seen as those who introduced their new, advanced technologies into the Arabah Valley, and their ability to organise the work on a large scale. Other specific elements were also ascribed to the Egyptians, such as bell-shaped storage pits, rock art, and much of the “normal” wheel-made pottery. Following the above analysis of the sanctuary, the relative weight of each ethnic entity in the copper plant also requires a new examination.

***The mines***

Following Rothenberg’s publications, Timna became the key site for studying New Kingdom Egyptian copper mining technology.

Three main types of mines at Timna, of different periods, are relevant to the discussion. One, represented by Mine T, consists of a cluster of broad vertical penetrations into the white sandstone, with a system of horizontal galleries connecting them at a depth of ca. 4 m (Fig. 11).
Fig. 11. Mine T, fourth millennium BCE: wide, irregular dig connected by galleries with similar entrances
The mine is dated to the fourth millennium BCE.\(^\text{148}\) Since any penetration into the rock is at first a prospection dig, this early mine was not very efficient, for it required digging up a large volume of rock in order to discover whether there were greenish levels underneath containing the copper nodules. Another type of mine is based on a cylindrical shaft, 1.1 m in diameter, which is much more efficient than the first (Mines S10, S28\(^\text{149}\)) (Fig. 12). Two \(^{14}\)C dates on charcoal from galleries connecting this type of shaft indicated their use in the third millennium BCE (Table 1:37, 38). Both types of mines were cut using a digging axe or hammer, held with two hands and therefore not allowing the digging of narrower shafts. The third and most advanced type of mine has a narrower shaft, \textit{ca.} 80 cm in diameter, cut by means of a chisel, with two rows of steps for comfortable decent and accent. The deepest shaft of this type known to me in Timna is 42 m (Fig. 13). Over 200 of these advanced, efficient shafts were initially found during Rothenberg’s survey in the valley; they were identified first as water cisterns.\(^\text{150}\) Later, however, it was found by Cohen in 1974 that these shafts and over 8000 “plates” (shallow depressions on the surface) are actually covered mining shafts.\(^\text{151}\) These advanced shafts were safely identified as Egyptian by Rothenberg,\(^\text{152}\) and they were commonly accepted as such.\(^\text{153}\) The basis for this identification was a drawing on a potsherd from the Eighteenth Dynasty, showing a shaft tomb with steps.\(^\text{154}\)

Several comments contradict this argument: First, the steps in the Egyptian drawing are protruding into the shafts, while in Timna almost all shafts have steps cut as recesses (Fig. 13). Second, identical shafts with recessed steps were already known in the Negev, at the Chalcolithic site of Tell Abu Matar, leading from an underground space into a silo.\(^\text{155}\) Third and most important is the question how many similar mining shafts are known in Egypt or in the mining centres of the Eastern Desert? After extensive literature search and questioning of researchers well acquainted with Egyptian archaeology, the answer is none.\(^\text{156}\) Therefore, before any similar shaft is found in Egypt, the thousands of advanced shafts at Timna cannot be coined “Egyptian”. On the other hand, one can see a direct line of local development in the technology and strategy of mining from the fourth millennium BCE Mine T to the shafts of Mines S10 and then to the efficient, narrow shaft. What enabled the later development was the coming of tin bronze, around 2000 BCE, from which hard

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\(^{149}\) Conrad and Rothenberg 1980, pp. 130, abb. 140.


\(^{151}\) Cohen 1976.


\(^{153}\) See n. 147.

\(^{154}\) Badawy 1968, p. 383, fig. 201; Conrad and Rothenberg 1980, p. 78, abb. 61.

\(^{155}\) Perrot 1955, p. 27, fig. 7.

\(^{156}\) In 1995, Rothenberg himself conducted an expedition with other experts to the Eastern Desert of Egypt in an attempt to locate mines and furnaces of the Timna types, but only found horizontal penetration into the hillsides (Rothenberg 1998, and pers. comm. 1999). Only two shafts were reported from the Eastern Desert. One was from the Bakari gold mine (Rothenberg \textit{et al.} 1998, p. 7) but no description or date was suggested and no similarity to the Timna shafts was mentioned. The second was at Abu Swayel (Garenne-Marot 1984, p. 99) in a schist rock, also with no description or date that can be compared to Timna.
Fig. 12. Mine S10, third millennium BCE, cylindrical shaft
(partially excavated by Conrad and Rothenberg)
Two bronze digging picks were published from Timna (Conrad and Rothenberg 1988a, pp. 72–73), but the same objects were previously published as copper spear-butts (Rothenberg 1972a, pp. 105–106). No chemical analysis was published to justify the switch in interpretation of the objects.

For example, Rothenberg 1990, pp. 16–38. Publications on the Timna Furnaces greatly differ in details and interpretations. In order to make the discussion on the furnaces short, only the final publication on metallurgy (Rothenberg 1990) is referred to in this paper. For other related publications see Rothenberg 1971, pp. 15–16; 1972a, pp. 67–78; 1983; 1985; 1999b, pp. 153–155; 1999b; Rothenberg et al. 1986; 1988a.

Lupu and Rothenberg 1970; Merkel 1983; 1990, Bamberger 1985; Bamberger et al. 1986; 1988; Rehren 1996; Ogden 2000, pp. 149–150. In some of these publications the furnaces are not termed “Egyptian” but “Late Bronze-Early Iron Age”.

In Timna Site 2, Rothenberg excavated four smelting furnaces. With several colleagues he conducted chemical analyses on copper slag, copper ores and metallic copper, as well as undertaking smelting experiments. All four were “tapping furnaces”, ca. 45 cm in both diameter and depth, excluding the upper part which was not preserved (Fig. 14). These furnaces produced a plano-convex ingot at the bottom, while most of the slag was tapped out, creating a heavy slag “cake” or “ring” (in different publications). The furnaces were confidently identified by Rothenberg as Egyptian, followed by others.

Smelting furnaces

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Fig. 14. Furnace I in Site 2, dated by $^{14}$C to the Early Islamic Period

Fig. 15. Timna Site 2, an aerial photo from west; white ovals indicate habitation units, marked areas excavated by Rothenberg
Here again, the question is how do we know that these furnaces are indeed Egyptian? How many similar furnaces were excavated in Egypt? After a long search, the answer is that one iron-smelting furnace, dated to the Late Roman Period, is somewhat similar to the Timna furnaces.\footnote{Pouit and Castel 1999. I am grateful to P. Tallet who referred me to this article and sent me a copy.} Furthermore, two \(^{14}\)C dates sampled from inside the Timna furnaces Fu I and Fu Z were of the Early Islamic period (\textit{Table 1:76, 77}).\footnote{The dates of Fu1, FuZ were first published in footnotes in 1988 (Rothenberg 1988b, p. 4, n. 7; 1990, p. 71, n. 23) but in later publications the furnaces were still presented as Ramesside (Rothenberg 1995, pp. 24–26; 1999b, pp. 153–155) with no mention of the \(^{14}\)C dates.} One date, retrieved next to Fu IV, was of the thirteenth century BCE (\textit{Table 1:49}), but it actually dated the layers of metallicurgical refuse into which the furnace was built. Another date from the remains of a furnace excavated by Erickson-Gini (here \textit{Table 1:52}) was 100 years earlier than the Egyptian arrival in Timna.\footnote{Erickson-Gini 2014.} Additional \(^{14}\)C dates were received from two smelting sites south of Timna, one from the interior of an identical furnace at Nahal ‘Amram (\textit{Table 1:89}), the others from the smelting camp of Beer Ora, where three such furnaces were excavated. These furnaces were not dated directly, but all dates from this site were Early Islamic or later (\textit{Table 1:80–88}).\footnote{Rothenberg described small furnaces, 25–35 cm in diameter, from Timna Site 30, Strata III and II, but interpreted them as non-tapping furnaces (Conrad and Rothenberg 1980, p. 223; Rothenberg 1990, pp. 8–13). Important clay remains of the upper part of a furnace were also found in Stratum I, dated to the Twenty-Second Dynasty (late tenth century BCE; Conrad and Rothenberg 1980, pp. 221–222, abb. 242), which actually contained Early Islamic slag “rings”. Therefore, the date of this furnace is not secure.} Currently, not one tapping furnace in the southern Arabah can be identified as Egyptian or be dated to the New Kingdom, and no copper smelting furnace from this period is even known from Egypt itself. There is enough information from Egypt for copper melting and casting; for example, the famous wall painting from the Tomb of Rekhmire\footnote{For example, Pusch 1990; 1996.} and an elaborate New Kingdom installation at Qantir.\footnote{Tallet \textit{et al}. 2011. The main work on the Middle Kingdom metallurgy was published in a detailed book on ‘Ain Sukhna, on the western coast of the Gulf of Suez, an extension of the western Sinai industry (Abu al Razeq \textit{et al}. 2012). I am grateful to P. Tallet who sent to me a copy of the book.} Melting, however, is a simple task, requiring a temperature of less than 1,085°C. Smelting—that is, extracting metallic copper from rock—is a much more complex, sophisticated operation. It requires profound knowledge of the copper minerals and fluxes, other skills and a temperature above 1,200°C. In western Sinai, a French team recently discovered some 3,000 Old and Middle Kingdom Egyptian furnaces; all are totally different from those of the Arabah. Briefly, they are rectangular, built in long batteries, and their method of operation was very different.\footnote{Rothenberg described small furnaces, 25–35 cm in diameter, from Timna Site 30, Strata III and II, but interpreted them as non-tapping furnaces (Conrad and Rothenberg 1980, p. 223; Rothenberg 1990, pp. 8–13). Important clay remains of the upper part of a furnace were also found in Stratum I, dated to the Twenty-Second Dynasty (late tenth century BCE; Conrad and Rothenberg 1980, pp. 221–222, abb. 242), which actually contained Early Islamic slag “rings”. Therefore, the date of this furnace is not secure.} After 50 years of metallurgical studies at Timna, we are still in the dark in many aspects. Several different types of slag are found in the smelting camps, but the technology behind them is still unclear.\footnote{For example, Pusch 1990; 1996.}
Fig 16. Themilat Radadi, a rock engraving of Ramses III (95 cm high)
Fig. 17. An outline for a rock stele of Ramses III above the Timna sanctuary
THE CHRONOLOGY OF THE TIMNA COPPER PLANT

A collection of currently available $^{14}$C dates from Timna and related sites in the southern Arabah indicate a long sequence of activity, from the fifth millennium BCE on. Table 1 and Fig. 18 illuminate four principal points: 1) Extensive copper production activity in the Chalcolithic Period,168 2) Copper mining and smelting in the Middle Bronze II,169 a period commonly considered vacant in the Negev; 3) Extensive activity during the Late Bronze and Iron Age, also considered vacant in the rest of the Negev (besides Iron Age II); 4) High activity in the Early Islamic Period.170 One period of copper mining and production is not represented in the table, from which mines and smelting installations are known in the region.

Thirty-one dates fall within the Late Bronze and Iron Age, but only six of them roughly fit into the period of Egyptian presence at Timna, (ca. 1280–1145 BCE with a gap, ca. 1200–1180 BCE171). Most interesting is a series of eleven new dates from Site 30. Here, Conrad and Rothenberg172 excavated a section in a 2 metre-high slagheap, ascribed to Egyptian smelting. However, recently received dates from the same heap, by Ben-Yosef and Sha’ar, were all between ca. 1070 and 860 BCE.173 All these dates, in addition to five previously received from other sites, are later than the abandonment of the area by the Egyptians. Therefore, this large pile of slag does not represent an Egyptian metallurgy, but a local one. The dates are contemporary with tens of $^{14}$C dates from the Faynan area and even include the time of Kings David and Solomon.174

The unequivocal conclusion is that copper mining and smelting took place in the southern Arabah long before the coming of the Egyptians, while the most intensive production period was after they left. Since no indication is found for Egyptian mining or smelting technology, the operation of the Timna plant must be credited to the desert people, using their own experience and technologies, developed through millennia.175

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168 Timna Site 39 is dated to the Chalcolithic or even Late Neolithic (Rothenberg and Merkel 1998), as well as the metallurgic remains on the Yotvata Hill (Rothenberg et al. 2004). Mine T is dated to the Chalcolithic-Early Bronze Age (see above). Other sites in Timna dated to the Chalcolithic-Late Neolithic are questionable (see references and discussion in Avner 2002, Ch. 3). The main information for the early copper production comes from two Chalcolithic-EB I villages near Aqaba (Khalil and Schmidt 2009).

169 Avner 1993b.

170 For large scale Early Islamic copper mines at Nahal ‘Amram, south of Timna, see Willies 1990; 1991. Nahal ‘Amram is currently under a new survey conducted by U. Avner, H. Ginat and S. Shalev, with many more mines discovered. For the settlement pattern of the Early Islamic Period in the Arabah see Avner and Magness 1998. For the general settlement pattern of the region see Avner (2006; 2008), with references.

171 See n. 48.


173 Ben-Yosef 2010, pp. 567–569; Ben-Yosef et al. 2012, Table 4; and see here Table 1:61–70.


175 One exception to this scenario should be mentioned: the late tenth and early ninth century BCE. During this short period, a new technology has been identified by Ben-Yosef through chemical analyses of slag from Timna Site 30, Stratum I. Slag now indicates the use of manganese flux and the copper content is very low, due to a more efficient smelting process. The source of the new technology was probably Egypt, following the invasion of Pharaoh Shishaq into the Negev, 926 BCE (Ben-Yosef 2010, pp. 830–831, 901–903, 973–977, 986).
Pottery types and peoples

Four types of pottery found at Timna may represent different ethnic groups involved in the copper mining and production. One distinctive type is the decorated pottery from northern Hejaz, probably representing the Midianites. In the sanctuary, this type comprised 20 per cent of the total pottery sherds, but in the mines and smelting camps its proportion is much lower. In Rothenberg’s publications, the Midianites gain much emphasis as expert coppersmiths. However, the archaeological surveyors of northern Hejaz argued that copper mining and smelting operations in the region were of small scale, only “off-shoots” of other production centres in the Near East (that is, the Arabah Valley). In their view, it is hard to see the Midianites as coppersmiths; rather, they were goldsmiths.

176 A more neutral term for this type of pottery is “Qurayya Ware”, but it is often referred to as Midianite. For publications see: Parr et al. 1970; Dayton 1972; Kalsbeek and London 1978; Rothenberg and Glass 1983; Brandl 1984; Bawden and Edens 1988.

177 Rothenberg 1988a, p. 92, figs. 4–13; Tebes 2007; 2013.

178 This is my own impression based on long-term acquaintance with the Timna sites, and from the current survey at Nahal ’Amram. For previous surveys at Nahal ’Amram see Rothenberg 1967, pp. 41–50; Willies 1990; 1991.

179 Kisnawi et al. 1983, pp. 76, 80.
In this light, it would be more realistic to see the Midianites at Timna as one among several desert tribes participating in the copper production.\textsuperscript{180}

Another type of pottery is the coarse, handmade “Negev Ware”, found all over the Negev, Edom and eastern Sinai.\textsuperscript{181} In the Timna sanctuary this type comprised 10 per cent of the pottery, but in the smelting camps it occurs in larger quantities.\textsuperscript{182} Rothenberg relates this pottery to the Amalekites,\textsuperscript{183} but it could well be also the pottery of other desert groups, generally, the Shasu, the desert tribes.\textsuperscript{184}

A third type is the “normal”, wheel-made pottery. It comprised 65 per cent of the pottery in the sanctuary,\textsuperscript{185} but in the smelting camps it is even more dominant.\textsuperscript{186} There is some confusion about this group. Based on petrographic analyses, this pottery was made locally near Beer Ora (south of Timna; that is, from the “Ora Clay”); it includes magmatic particles and some crushed copper slag as a temper.\textsuperscript{187} The assemblage of “normal” pottery from the sanctuary is well supplemented by the pottery from Timna Sites 2 and 30,\textsuperscript{188} and by an important collection from the Yotvata fortress, excavated by Meshel, where complete jars and other pots were recovered.\textsuperscript{189} Together they form a distinctive repertoire.

The wheel-made pottery is ascribed to Egyptian and Midianite potters in the mining centres, using local materials.\textsuperscript{190} However, the forms are very different from both Midianite and Egyptian pottery. Indeed, they are very close to the Late Bronze-Early Iron Age pottery of Canaan, as Rothenberg also admitted;\textsuperscript{191} for example, handles are very common in this group but absent in Egyptian pottery and rare in the Midianite. It seems, therefore, that this type of pottery represents the population of southern Canaan or Canaan in general. The possible presence of Canaanites at Timna is supported by fish bones from excavations at Sites 2, 30 and 200. Out of 95 fish bones in total, 92 were of Mediterranean species, one was from the Red Sea and two were from the Nile.\textsuperscript{192} Mediterranean fish were most probably brought in by Canaanites.\textsuperscript{193} Olive pits found in the sanctuary\textsuperscript{194} were also probably brought from Canaan.

\textsuperscript{180} Rothenberg dedicated an article (1998) to the Midianites, suggesting that they were originally “Sea People” of Aegean origin. If correct, one should wonder how these people drastically altered their environment, successfully adapted to a harsh, remote desert region and quickly developed the knowledge necessary to survive there.

\textsuperscript{181} For the Negev Ware see Aharoni \textit{et al.} 1960, pp. 98–102; Haiman and Goren 1992; Meshel 2002; Cohen and Cohen-Amin 2004, pp. 135–140.

\textsuperscript{182} Rothenberg 1988a, pp. 92, 95, figs 14–15; Glass 1988, pp. 108–111.

\textsuperscript{183} Rothenberg 1972a, pp. 153–154.


\textsuperscript{185} Rothenberg 1988a, p. 95, figs. 16–20; Glass 1988, pp. 101–108.

\textsuperscript{186} See n. 178.

\textsuperscript{187} Rothenberg 1972a, p. 163, Glass 1988.


\textsuperscript{189} The pottery from the Yotvata Fortress is as yet unpublished, but it was exhibited for several years in the visitor’s centre of Yotvata. For the fortress’ excavation see Meshel 1993.

\textsuperscript{190} Rothenberg 1984, p. 104; Glass 1988, p. 108.

\textsuperscript{191} Rothenberg 1972a, p. 162.

\textsuperscript{192} Lernau 1988.

\textsuperscript{193} Lernau (1988, p. 245) suggests that Mediterranean fish were brought from the Mediterranean coast of Egypt. However, if fish were brought from Egypt, Nilotic species would be expected to dominate; this expectation is based on the finding of Nile fish bones in many Late Bronze-Iron Age sites in Israel and in other
The fourth group is the Egyptian pottery. Only a number of decorated sherds and a few undecorated ones were found in the sanctuary. Some originated in the Nile Valley, others were locally made.\(^{195}\) The only other site in Timna from which Egyptian pottery has been reported is Site 30, and no such pottery has as yet been found at Nahal ‘Amram.\(^{196}\) So, the distribution of Egyptian pottery is currently very limited. The Egyptian presence, however, is well attested by other finds in the sanctuary, by two rock inscriptions—one in Timna and one on the way to Timna (see below)—and by a scarab from Site 2.\(^{197}\)

The ceramic evidence can now be integrated with additional archaeological and historical data for the purpose of discussing the two general ethnic groups.

SOCIAL-HISTORICAL SCENARIO

Following the above discussion, here is a suggested historical-social scenario addressing the role of each ethnic group and their interrelations.

The Egyptians

The earliest indications of Egyptian interest in western Sinai are several inscriptions of the First Dynasty (late fourth to early third millennia BCE) from Wadi el-Hummur and Wadi ‘Ameyra.\(^{198}\) Their interest increased through the Old Kingdom, reached its peak in the Middle Kingdom and continued into the New Kingdom. The desire of the Egyptians for turquoise from western Sinai is well known through the studies of Petrie,\(^{199}\) Gardiner et al.,\(^{200}\) and others, but new research in recent years also demonstrates large-scale copper production during the Old and Middle Kingdom.\(^{201}\) Still, the Egyptian activity in Sinai was limited to the southwest, to the area of Serabit al-Khadem, Wadi Maghara and Wadi Nasib.

Following the establishment of the Egyptian province of Canaan, under Thutmosis III (ca. 1500 BCE), the Egyptians reached the Arabah and southern Jordan. Their interest in this remote, hyper-arid zone was most probably twofold: taking control of the copper mines of the Arabah, and of the trade routes connecting southern Arabia with the rest of the Near East, crossing southern Jordan, the Negev and northeastern Sinai.\(^{202}\) Three inscriptions

neighbouring countries (Van Neer et al. 2004, esp. pp. 119–125), indicating intensive trade with Nile fish in these periods. I thank Irit Zohar for passing this article on to me.

194 Kislev 1988, p. 239.
195 Rothenberg 1988a, p. 95, fig. 21, and see two burnished sherds here in Fig. 7.
196 Fifteen Egyptian sherds were presented (Conrad and Rothenberg 1980, abb. 211), divided between Strata III and II, and different periods. However, on different pages (pp. 192, 197), sherds nos. 7, 8, 9, and 13 are attributed to both layers.
197 Rothenberg 1972a, pl. 47.
199 Petrie 1906.
200 Gardiner et al. 1955.
201 Tallet et al. 2011; Abd el-Raziq et al. 2012.
202 Finkelstein 1995, pp. 120–122; Jasmin 2006; Tebes 2007. For the antiquity and intensity of the desert road network see Avner 2002, Ch. 6.
from Nubia and Egypt, of Amenhotep III, Ramses II and Ramses III, mentioned the conquest of the Shasu territories in the Land of Seir (that is, Edom, the Negev and Sinai as one geographic unit). Seti I defeated the Shasu in northern Sinai, while Ramses II and III announced victories over the Shasu of Seir. Ramses II mentioned the Shasu of Seir in his inscriptions many times, more than all the other pharaohs together. This may mean that he was intensively active in the desert. Seti I, on the other hand, mentioned only one victory over the Shasu, far from the Arabah. Therefore, Ramses II appears to be the better candidate to have established the Egyptian activity at Timna. According to Schulman, the occurrence of Seti’s name at the site is better understood as the consequence of his co-reigning with his son, Ramses II.

When the Egyptians first tried to exploit the copper sources, they most probably faced uprisings and guerrilla attacks from the desert tribes, the Shasu, trying to defend their precious resources. Such a scenario at Timna can be illuminated by reference to the situation in western Sinai. In Wadi Megharah, the Egyptians built a fortress on a steep hilltop in the heart of the turquoise mine. Several Egyptian stelae and rock reliefs at both Wadi Megharah and Serabit al-Khadem present various Pharaohs defeating the locals. Although they conquered the southern Arabah and the surrounding desert, the Egyptians found it too difficult, if not impossible, to extract the copper at Timna on their own. It would have required the transportation of thousands of workers from Egypt, supplying them with water and food, both limited resources in the region, running the mines and the smelting camps as well as the charcoal industry and other facilities. All this in a hostile environment ruled by foreign gods, and with persistent guerrilla attacks by the desert tribes. Instead, an agreement with the local population was essential. The presumed interest of the Egyptians in such an agreement with the local population finds support in their general policy in Canaan; namely, minimal friction and focusing on securing the main international roads.

An arrangement between the Egyptians and the desert tribes is actually indicated by the fact that they shared the sanctuary. The agreement could have worked as follows: Before each mining season (winter) Egyptian officials met with the chiefs of the desert tribes to negotiate the amount of copper to be produced by the locals for the Egyptians during the season. Whatever the locals produced beyond the agreed amount was their own profit.

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203 Altogether, seven districts are mentioned in the inscriptions. Most names are known from the Bible; one of them is "the land of the Shasu Yahw" (Giveon 1964; 1971, pp. 24–29, 74–76; Kitchen 1964, p. 66; Mazar 1981; Redford 1992, pp. 272–273).
209 Petrie 1906, pp. 41–45; Gardiner and Peet 1917, pls. 1–6; Giveon 1978, pp. 67–68. According to Giveon (1978, pp. 67–68), the rock stele presenting the kings killing the Asiatics did not necessarily reflect enmity between the two, but were mainly intended to magically prevent enmity.
211 See Gardiner et al. 1955, stelae 296, 211, 247. On Stele 90, the expedition chief announced that he managed to fulfill his mission despite reaching the mines in the third month of the winter which was not the "right season".
recurrence of the term “portion” in Egyptian inscriptions from Serabit al-Khadem may support the “norm/premium” basis for such theoretical agreement.212

Following the signing of the agreement, the Egyptians sent expeditions to the Arabah, similar to those described on the stelae of Serabit al-Khadem, including several high officials, scribes and others, and an army unit.213 The nature and the outcome of these expeditions are well illustrated in the historical section of Papyrus Harris I from the time of Ramses III:

I sent forth my messengers to the country of ’Atika (‘-ty-ka), to the great copper (hmt) mines which are in this place. Their galleys carried them; others on their land-journey were upon their asses. It has not been heard before, since kings’ reign. Their mines were found abounding in copper; it was loaded by ten thousands into their galleys. They were sent forward to Egypt and arrived safely. It was carried and made into a heap under the balcony, in many bars of copper, like hundred-thousands, being the color of gold of three times. I allowed all the people to see them, like wonders.214

According to the text, the expeditions came by both land and sea to “the land of ’Ataka” (or ’Atika), which may be identified with the southern Arabah Valley.215 The land road was naturally “Darb al-Shawi”, also known as “Darb al-Hajj”, crossing Sinai from the head of the Gulf of Suez to the head of the Gulf of Elat (Aqaba). Two inscriptions of Ramses III were found on this route, one in Wadi Abu Gada, western Sinai216 and the other at the small water source of Themilat Radadi, close to Elat, just over the Egypt-Israel border (Fig. 16).217 The inscriptions indicate the dominion of Ramses III over the road and water sources. Near Themilat Radadi is a Chalcolithic habitation sites, where “normal” pottery sherds were also collected (by the writer), probably signifying a reuse of the site as a guard station. Several trails split off from Darb al-Shawi, descending into the Arabah Valley.218

Finds from two sites are probably connected to the marine route. One is Tell el-Kheleifeh, close to the Red Sea shore between Aqaba and Elat, where a mastabah tomb was excavated by Glueck219 and another mastabah partially excavated by Mussell.220 Egyptian artefacts, similar to those from the Timna sanctuary, were found by Glueck in the tell, as well as Midianite pottery.221 Second is the “Coral Island” (Jezirat Fara’un), 13 km south of Elat,
where “normal”, Midianite and Negev pottery sherds were found by Rothenberg and by the writer. On the western side of the island is a small harbour, 35 × 65 m, well protected from the sudden southern storms that mainly occur in autumn and spring. A casematte wall with towers surrounding the entire island also protected the harbour, but its date is still unclear. Possibly at Jezerat Fara’un Egyptian galleys were provisioned with tens or hundreds of thousands of copper talents to be transported to Egypt as stated in the papyrus.

The time of Ramses III appears to have been quite important at Timna. In addition to his two inscriptions on the way to the Arabah, another inscription of his was recently discovered near Tayma, almost 400 km southeast of Aqabah. This means that Ramses III, or his army, even penetrated deep into northern Hejaz (Midian). Another rock stele, situated on a sandstone cliff 30 m above the Timna sanctuary (Fig. 17), presents Ramses III handing offerings to Hathor. The inscription below mentions “...Ramesempere, the King’s Butler...”. This high official is also known from nine stelae from Egypt. He was Canaanite in origin and named Benazen; that is, Ben-Adon, “son of master/ruler”, from Zor of Bashan. After being educated in Egypt, his career began in the palace in the seventh year of Merneptah, and he gained many key positions in the Pharaoh’s administration (quite similar to biblical Josef). According to Schulman’s calculation, he arrived in Timna in the time of Ramses III, at the age of about 70. The time of his arrival is interesting. Ramses III had resumed the Egyptian activity in the desert and in copper production after a break of some twenty years, and Ramesempere was the right person to conduct this mission for him. Besides his high position, he was well acquainted with the Semitic language and mentality, and he had the proficiency to negotiate with the desert tribes on renewing the agreement with the Pharaohs, with all its implications.

Despite the solid information on the Egyptians, the number of sites in the Arabah with Egyptian finds is very limited. No indication of Ramesside presence has been found to date at Nahal ‘Amram or in other mines in the Eilat region, nor at the major source of copper, the Faynan area in the northeast Arabah.

223 The low foundation of this wall (the rest removed for medieval construction) was first observed by T. E. Lawrence, who noted that it was 4 feet thick (Woolley and Lawrence 1915, p. 145). Indeed, this is a much thicker casement wall. According to my own measurement, the outer wall is 2.2–2.5 m thick, the casements are 2.5 m deep and the inner wall is 0.8 m thick—altogether ca. 6 m. The outer foundation of the wall, facing the water, is built of large granite and metamorphic rocks. In 1971 I participated in an excavation and water sonar survey around the island, headed by A. Flinder, E. Linder and A. Raban. In a dig inside a casement room of the wall separating the harbour from the sea, we found two sherds of Negev ware. The floor of the room was never reached since the debris was petrified like concrete and the water level was too high. Based on the physical position of the island, several scholars suggested identifying it with the Biblical Elzion Geber (Rothenberg 1967, pp. 212–213, with references to nineteenth-century explorers; Flinder 1977, 1989; Raban 1997, pp. 13–15).
224 Announced by Dr ‘Ali Ibrahim Ghaban in Nov. 2010; see Estimo 2010; Somaglino and Tallet 2012.
225 The rock stele was first discovered by A. Nussbaumer in 1972, shortly after the discovery of the Ramses III inscription at Themilat Radadi. It was published by Lipschitz and Nussbaumer (1972) and then by Rothenberg (1972a, fig. 43; Conrad and Rothenberg 1980, abb 230; 1988a, fig. 52); Schulman (1988, pp. 143–144); and Ventura (1974).
226 Schulman 1976.
228 Two Egyptian seals were found at two different sites at Faynan: one is dated to the Twenty-First Dynasty (Levy et al. 2005, pp. 471, 485); the other is dated to the Twenty-Second Dynasty (Ben-Yosef 2010, fig. 5.44). Both are later than the Egyptian presence at Timna and do not reflect Egyptian domination.
The desert people

As noted, three out of the four major groups of pottery were found in all smelting camps and on the surface of the mining areas, both at Timna and Nahal ‘Amram. This indicates that during the mining seasons people gathered there from a large geographic area, from the Negev Highlands, Canaan, Edom, Sinai and northern Hejaz. A similar picture of seasonal work migration can be seen at Serabit al-Khadem, western Sinai, from which ample written and pictorial material has been found and published. There, mainly during the Middle Kingdom, Asiatics were mentioned and depicted on several stelae. Twenty men from Retenu (Canaan) are listed on Stele 120, twenty Asiatics from hēmi (Hami/Hrmi), probably Horma in the Negev, are mentioned on Stele 110, and smaller numbers appear on other stelae. Asiatics are depicted as well dressed, carrying weapons and riding on asses. One of them was Hebded, “brother of the ruler of Retenu”, mentioned several times (Stelae 85, 87, 92, 112). Riding on an ass might be seen as humiliating, but in the Ancient Near East it was actually a sign of nobility. Some Asiatic names are interesting: one is Qni (Qeni), the name of a biblical desert clan (see below) and another is Lua, probably synonymous with the biblical Levi. Since the stelae usually mention persons of high status, in reality the small figures may actually represent larger groups of Asiatic workers in the turquoise and copper mines of western Sinai. Further indications for Canaanites in western Sinai are Late Bronze Canaanite pottery from the turquoise mines of Serabit al-Khadem, and bellows paralleled in Canaan and Syria. Asiatics are also known from the Proto-Sinaitic inscriptions of western Sinai. Although there are difficulties in reading them, it is clear that the inscriptions’ language is West Semitic, very close to Biblical Hebrew, with Canaanite/Hebrew personal names such as Shafan, ‘Aviv, Ben-Tzur, and deities’ names, Ba’alat, Ba’al and El.

As discussed above, copper mining and smelting were conducted according to the technological tradition of the desert tribes. Most probably, the work organisation was also in the hands of the desert people. In the smelting camps, habitation units were built with clusters of rooms around central courtyards. In Site 2, one unit was partially excavated by Rothenberg and others, unexcavated, are seen in an aerial photo of the site (Fig. 15). This is a common type of habitation unit in the desert, known since the fifth millennium BCE in hundreds of examples, usually accommodating one extended family. Therefore, the architectural design of habitations hints at a family-based organisation. One can imagine some hierarchy within the tribes, in which the smith families were at the top. If the technology of mining and smelting, and organisation of work were all local, then what was the role of the

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229 Petrie 1906, pp. 118; Černý 1935.
230 For Horma see Num. 21:3; Deut. 1:41 etc.; Ahituv 1984, pp. 113–114 with references.
231 Černý 1935, figs. 1–5.
232 Stadelmann 2006.
233 According to Černý (1935), the Asiatics were the citizens of Sinai and Canaan. Giveon (1978, p. 133) suggested that they came from Egypt where they were employed in various professions and ranks.
235 Gardiner 1916; Albright 1969; Sass 1988 with further bibliography.
237 For example, Haiman 1993; 1999; Cohen 1999; Avner 1998; 2002, Ch. 2.
Egyptians? In my view they were mainly important customers, who needed large amounts of copper for weaponry, monumental construction and so forth.

For the work seasons many people, probably thousands, moved to the mining centres from the Negev, Sinai, Edom, Midian and Canaan. They included professionals such as geologists, mining engineers, chiefs of mining teams ("רב נקבנם" in the Proto-Sinaitic inscriptions), miners, smiths, charcoal makers, transportation teams, and others. The division and organisation of the work was based on tradition and experience developed through millennia, and on agreements between the different tribes. Large quantities of cereal grains where brought to the mines, mainly from "Uvda Valley, a half-day walk from Timna, where an extensive area was cultivated as early as 6000 BCE, including in the Late Bronze-Iron Ages and in later periods. Water, dates and vegetables were brought mainly from the Yotvata oasis, 15 km north of Timna, where a hilltop fortress protected the oasis and a road junction. Meat and milk products were supplied by the pastoralists all around, who anyway participated the operation. Charcoal was prepared mainly from Acacia trees in the savanna around the Yotvata oasis, where large spots of ash were observed (by the writer), and along the rest of the Arabah Valley. Transportation teams carried all these supplies to the mining and smelting centres by means of ass caravans, as is indicated by large amounts of donkey dung found in the smelting camp of Timna Site 2.

Besides the Egyptian share of copper, the question arises—where was the remainder of the produced metal marketed? Knauf suggested that Assyria, as a rising power, was the main customer for the Arabah copper; however, the rise of Assyria actually occurred later than the climax of copper production in the Arabah. More pertinent are the studies of Yahalom-Mack and Segal, demonstrating through chemical analyses and lead isotopes that Timna and Faynan were the main source of copper for the metal industry in a number of sites in Canaan dated to the thirteenth to eleventh centuries BCE. Furthermore, a recent study showed that tens of submerged plano-convex copper ingots discovered along the shores of Mount Carmel, Israel, also originated at Timna and Faynan. This means that the Arabah copper was even distributed through marine trade. A fragment of a mould in the shape of an oxhide ingot, found at Timna Site 30, may also indicate that copper from Timna was circulated as part of the Mediterranean marine trade. Since the time-span of the copper objects from terrestrial and marine sites includes the period of the Egyptian presence at Timna and later, it is possible that part of the Arabah copper that reached Canaan/Israel and beyond was actually the "premium" which the desert tribes gained through their cooperation with the Egyptians, and the mass of copper they continued to produce after the Egyptians left.

238 See Conrad and Rothenberg 1980, pp. 92–94 for a calculation of numbers of miners per mine.
239 For the Egyptian personnel, see Ventura 1980.
241 Meshel 1993.
242 Rothenberg 1972a, p. 84. See also the caravans of 200, 500 and 600 asses mentioned on Stelae 100, 112, 114 at Serabit al-Khadem (Gardiner et al. 1955, p. 11).
243 Knauf and Lenzen 1987, p. 86.
244 Yahalom-Mack 2009, esp. pp. 253–273; Yahalom-Mack and Segal 2011; Yahalom-Mack and Segal in press. Also see Ben-Dov 2011b, p. 90.
245 Yahalom-Mack, Segal and Galilii lecture at the Israel Archaeological conference, Jerusalem 2 April 2012.
246 Ben-Yosef 2012.
It seems that the large scale of copper production left much revenue in the hands of the desert tribes. They apparently grew in economic strength, and consequently also in political power. In addition to the Iron Age IIA pottery which is dominant in the Negev Highlands fortresses (63.3 per cent), one cannot ignore 14C dates from three important sites, earlier than the Israelite Monarchy: cultivated terraces next to the Haluqim Fortress (six dates, ca. 1250–1000 BCE), the lower fortress of Kadesh Barnea (destroyed ca. 1150 BCE) and the Nahal Elah Fortress (ca. 1010 BCE). So, these sites, and probably others not yet dated by 14C, actually reflect an investment of resources in construction at a time when there was apparently no outside political power around to initiate this activity. The connection between the Iron Age Negev sites and the copper production centres in the Arabah is now illuminated through a new study which demonstrates that pottery of the Negev sites contains crushed copper slag as a temper. Possibly, the desert tribes reached the organisational level of a “tribal chiefdom”.

A similar scenario can be seen in the Faynan area, mainly at Khirbet en-Nahas and Khirbet al-Jariya, where very large-scale copper production was conducted by the desert tribes, the Shasu, who left behind some 70,000 tons of copper slag and a cemetery of thousands of graves. The significant extent of work here gave rise to an economical-political elite, which may have led to the rise of the Edomite kingdom.

Some desert tribes and clans also joined the emerging political framework of Israel. The wealth they accumulated from both copper production and international trade may explain the later campaign of Pharaoh Shishaq (926 BCE) who listed eighty-five settlements conquered by his army in the Negev. According to Kitchen, the main goal of the campaign was booty, in an attempt to resume monumental building in Egypt and revive the empire. According to Fantalkin and Finkelstein the campaign’s goal was to resume the Egyptian political and economical grip on the region. If these interpretations are correct, the justification for the campaign into the Negev was the accumulated wealth of the desert people, which continued to grow during the United Monarchy of Israel. This wealth may also explain why so many settlements existed in the desert and why Twenty-Second Dynasty scarabs were found at Khirbet en-Nahas.
SUMMARY

Unlike many studies in the past, it now seems that more attention should be paid to the indigenous, desert people. They were involved in developing the disciplines of mining and metallurgy from the very beginning, in the mid-fifth millennium BCE; they were the geologists, the mining engineers and the physicists behind this industry through the ages. Mining, smelting and trade in copper formed an integral part of their material culture long before the coming of the Egyptians and long after. They organised the work on a large scale on their own, not as cheap manpower but for their own economic interest. Most relevant to this point is the period from 1150 to 1000 BCE, the heyday of copper production in the Arabah Valley, a time when no “big power” existed nearby to initiate this industry.

The connection of the desert tribes to copper production brings to mind a name that runs through history: the Qenites, the biblical desert tribe, who were expert smiths. The name Qeni appeared in the early second millennium BCE on Stele 163 at Serabit al-Khadem. Later, the private name, Qini/Qinu, appears in the same region in sixty-eight Nabataean inscriptions, and the Kinuka (Qainuqa), a Jewish tribe of metal smiths lived in the northern Hejaz until the early seventh century CE. Besides the desert origin, common to all is the root “קנה”, Hebrew “create” and “smith” in Western Semitic languages. The smith was actually a magician, creating a new substance, a metal from a rock.

Today, however, ancient Egypt has returned to Timna Valley. All direction and explanation signs in the park are designed in an Egyptian artistic style. Visitors are instructed about the Egyptian mines, furnaces and temple, and a sophisticated presentation demonstrates the glory and achievements of the ancient Egyptians. The Egyptian pharaohs and gods have now been recruited for marketing the Timna Park.

POST SCRIPT

This paper was submitted shortly before the death of Beno Rothenberg (13 March 2012) at age of 98. Although his work is criticised here, he will be remembered as a pioneer in the study of archaeometallurgy of the Negev and Sinai. Unfortunately, he passed away before having the opportunity to respond to this article.

Before publication, new 14C dates were received, giving additional support to the main arguments in this article. Ten dates from Timna Site 34 are all between 1050 and 900 BCE (to be published by Ben-Yosef); again, all are later than the Egyptian presence. Three dates were retrieved from three different copper mines at Nahal Amram, and all are ca. 240 CE—the Late Roman period but with no Roman presence in the southern Negev (Avner et al. in press). Hence the mines were operated by the Nabataeans, the contemporary desert population, more than a century after the cessation of their kingdom.
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<td>Timna 30</td>
<td>&quot;</td>
<td>Bm1162</td>
<td>2480±35</td>
<td>770–416</td>
<td>580</td>
<td>Burleigh and Hewson 1979, p. 349</td>
</tr>
<tr>
<td>61</td>
<td>Timna 30</td>
<td>&quot;</td>
<td>AA86521</td>
<td>2872±34</td>
<td>1116–1003</td>
<td>1070</td>
<td>Ben-Yosef 2010, p. 567</td>
</tr>
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<td>62</td>
<td>Timna 30</td>
<td>&quot;</td>
<td>AA86517</td>
<td>2893±39</td>
<td>1129–1008</td>
<td>1070</td>
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<td>63</td>
<td>Timna 30</td>
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<td>2858±34</td>
<td>1111–943</td>
<td>1030</td>
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<td>64</td>
<td>Timna 30</td>
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<td>AA84741</td>
<td>2855±39</td>
<td>1111–939</td>
<td>1030</td>
<td>&quot;</td>
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<td>65</td>
<td>Timna 30</td>
<td>&quot;</td>
<td>AA84739</td>
<td>2852±50</td>
<td>1112–934</td>
<td>1020</td>
<td>&quot;</td>
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<td>66</td>
<td>Timna 30</td>
<td>&quot;</td>
<td>AA86518</td>
<td>2819±35</td>
<td>1101–921</td>
<td>1010</td>
<td>&quot;</td>
</tr>
<tr>
<td>67</td>
<td>Timna 30</td>
<td>&quot;</td>
<td>AA86516</td>
<td>2859±34</td>
<td>1111–946</td>
<td>1010</td>
<td>&quot;</td>
</tr>
<tr>
<td>68</td>
<td>Timna 30</td>
<td>&quot;</td>
<td>AA84740</td>
<td>2882±38</td>
<td>1124–1006</td>
<td>1010</td>
<td>&quot;</td>
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<td>69</td>
<td>Timna 30</td>
<td>&quot;</td>
<td>AA86519</td>
<td>2814±34</td>
<td>1006–921</td>
<td>910</td>
<td>&quot;</td>
</tr>
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<td>70</td>
<td>Timna 30</td>
<td>&quot;</td>
<td>AA86520</td>
<td>2705±35</td>
<td>895–816</td>
<td>860</td>
<td>&quot;</td>
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<tr>
<td>71</td>
<td>Timna S28</td>
<td>Mine</td>
<td>Bm2361</td>
<td>2780±90</td>
<td>1209–797</td>
<td>890</td>
<td>Conrad and Rothenberg 1980, p. 179</td>
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<tr>
<td>72</td>
<td>Timna 200</td>
<td>Sanctuary</td>
<td>Bm1117</td>
<td>2779±55</td>
<td>1108–811</td>
<td>960</td>
<td>Burleigh and Hewson 1979, p. 349</td>
</tr>
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<td>73</td>
<td>Timna 2</td>
<td>Tomb</td>
<td>Gm938</td>
<td>2655±65</td>
<td>979–568</td>
<td>810</td>
<td>Not found</td>
</tr>
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<td>74</td>
<td>Timna S19</td>
<td>Mine</td>
<td>Bonn2360</td>
<td>2640±60</td>
<td>968–555</td>
<td>800</td>
<td>Conrad and Rothenberg 1980, p. 179</td>
</tr>
<tr>
<td>75</td>
<td>Yotvata Hill</td>
<td>Fortress</td>
<td>Rt1550</td>
<td>2580±50</td>
<td>835–539</td>
<td>790</td>
<td>Segal and Carmi 1996, p. 98</td>
</tr>
<tr>
<td>76</td>
<td>Yotvata Hill</td>
<td>&quot;</td>
<td>Rt1549</td>
<td>2420±50</td>
<td>753–339</td>
<td>520</td>
<td>&quot;</td>
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<tr>
<td>77</td>
<td>Timna 39b</td>
<td>Furnace</td>
<td>Bm1116</td>
<td>1945±309</td>
<td>753BC–640AD</td>
<td>50 AD</td>
<td>Burleigh and Hewson 1979, p. 349</td>
</tr>
<tr>
<td>78</td>
<td>Timna 2, Fu1</td>
<td>Furnace</td>
<td>Gm4381</td>
<td>1350±50</td>
<td>640–720 AD</td>
<td>670 AD</td>
<td>Rothenberg 1990, pp. 71–72</td>
</tr>
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<td>79</td>
<td>Timna 2, FuZ</td>
<td>Furnace</td>
<td>Bm2242</td>
<td>270±100</td>
<td>425–867 AD</td>
<td>650 AD</td>
<td>&quot;</td>
</tr>
<tr>
<td>80</td>
<td>Beer Ora</td>
<td>Smelting Camp</td>
<td>Pta4117</td>
<td>1390±50</td>
<td>638–677 AD</td>
<td>660 AD</td>
<td>Rothenberg 1998, p. 4</td>
</tr>
<tr>
<td>81</td>
<td>Beer Ora</td>
<td>&quot;</td>
<td>Pta6158</td>
<td>1370±20</td>
<td>648–672 AD</td>
<td>660 AD</td>
<td>Sharon et al. 1996, p. 112</td>
</tr>
<tr>
<td>82</td>
<td>Beer Ora</td>
<td>&quot;</td>
<td>Rt1741</td>
<td>1270±55</td>
<td>662–869 AD</td>
<td>730 AD</td>
<td>&quot;</td>
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<tr>
<td>83</td>
<td>Beer Ora</td>
<td>&quot;</td>
<td>Pta6159</td>
<td>1210±40</td>
<td>687–973</td>
<td>810</td>
<td>&quot;</td>
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<tr>
<td>84</td>
<td>Beer Ora</td>
<td>&quot;</td>
<td>Rt1742</td>
<td>1115±45</td>
<td>782–1017 AD</td>
<td>970</td>
<td>&quot;</td>
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<tr>
<td>86</td>
<td>Beer Ora</td>
<td>&quot;</td>
<td>Rt1949</td>
<td>1150±45</td>
<td>773–990</td>
<td>890</td>
<td>&quot;</td>
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<tr>
<td>87</td>
<td>Beer Ora</td>
<td>&quot;</td>
<td>Rt1740</td>
<td>915±50</td>
<td>1024–1215</td>
<td>1090</td>
<td>&quot;</td>
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<tr>
<td>88</td>
<td>Beer Ora</td>
<td>&quot;</td>
<td>Rt1825</td>
<td>730±55</td>
<td>1186–1392</td>
<td>1290</td>
<td>&quot;</td>
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<tr>
<td>89</td>
<td>Timna 'Amram</td>
<td>Furnace</td>
<td>Bm1163</td>
<td>1240±36</td>
<td>683–879</td>
<td>780</td>
<td>Scharpenseel et al. 1976, p. 287</td>
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</table>

**Table 1.** Calibrated 14C Dates of Southern Arabah copper mines and production sites (rough chronological order). Calibration based on OxCal 4.10 (Bronk Ramsey 2008). Mean values were calculated for preparation of the histogram (Fig. 18) only. All dates are Cal Date (2σ) unless noted.
ABBREVIATIONS

KAI = DONNER, H. and ROLLIG, W.

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