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Rās al-Miyāh Fortresses: New Discoveries at One of the Gateways to the Iron Age Copper Production District of Faynān, Jordan

Introduction

The notion of 'Crossing Jordan' and all the anthropological, archaeological and historical meanings that it conveys was recent brought together in the book '*Crossing Jordan – North American Contributions to the Archaeology of Jordan*' (Levy *et al.* 2007). The study presented here is a microcosm of this theme in that it examines the role of two Iron Age fortresses near the crossroads of the lowlands and highlands of ancient Edom. The copper ore rich Faynān district of southern Jordan played a central role in the history of the Iron Age in this part of the southern Levant, located in the northern region known as both Seir and Edom in Egyptian and Biblical texts (Avishur 2007; Bartlett 1989; Edelman 1995). Since 2002, the University of California, San Diego (UCSD) — Department of Antiquities of Jordan (DoA) has carried out intensive surveys and excavations aimed specifically at examining the relationship between Iron Age settlement and the copper ore resources that are found in the lowland Faynān district of Edom (Higham *et al.* 2005; Levy 2004; Levy *et al.* 2003; Levy *et al.* 2004a; Levy *et al.* 2004b; Levy *et al.* 2005). After carrying out excavations at the large Iron Age fortress at Khirbat an-Nuḥās, to better understand the complexities of the Iron Age settlement pattern in the lowlands, we decided to carry out a selective survey in the Faynān district aimed at identifying additional fortresses. This paper summarizes this small satellite project in relation to the larger aims of the UCSD-DoA Edom Lowlands Regional Archaeology Project (ELRAP).

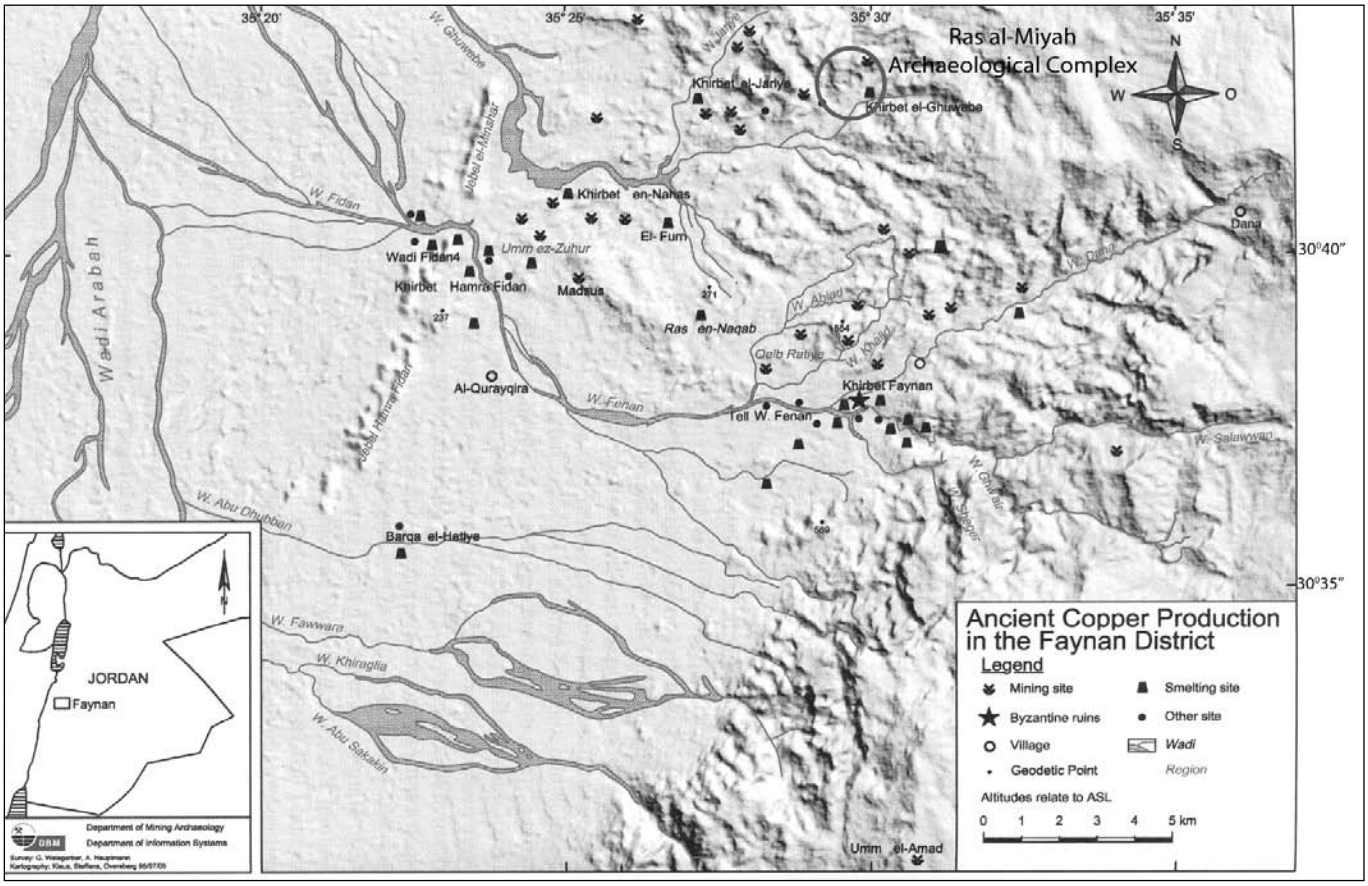
In the fall of 2006 and in the summer of 2007 we revisited the Iron Age archaeological complex of 'Ayn al-Ghuwayba, situated in the northeast edge of the copper production district of Faynān (FIG. 1) first noted by the German Mining Museum archaeometallurgy project in Faynān (Hauptmann 2000, 2007). The focus of our investigation was the two fortresses ('hill forts') mentioned briefly by Weisgerber (2006: 13) and Hauptmann (2007: 132) and the copper mines in their close vicinity. The local (Bedouin) name of these fortresses was unknown to us, thus we used the Arabic name of the region for a reference — "Rās al-Miyāh", translated as "Head of the water", derived from the nearby oasis of 'Ayn al-Ghuwayba.

The preliminary results of our detailed survey of both fortresses (Rās al-Miyāh *East* and *West*) reveal a surprisingly high density of archaeological remains. The ceramic assemblage from the survey is briefly discussed here, and indicates both fortress sites date to the late Iron Age. In addition, we report the results of a small test excavation conducted in the eastern fortress that indicates the construction of this massive structure was never finished. The recent discoveries concerning the fortresses and other archaeological features in their close vicinity stimulate new questions regarding the Iron Age human activities in Faynān, some of which are addressed below.

The surveys took place in December 2006 and July-August 2007. The sample excavation was conducted on December 4-5 2006, with the help of archaeological students from UCSD and Bedouins laborers from the village of Qurayqira.

Rās al-Miyāh Fortresses — Geographic Settings

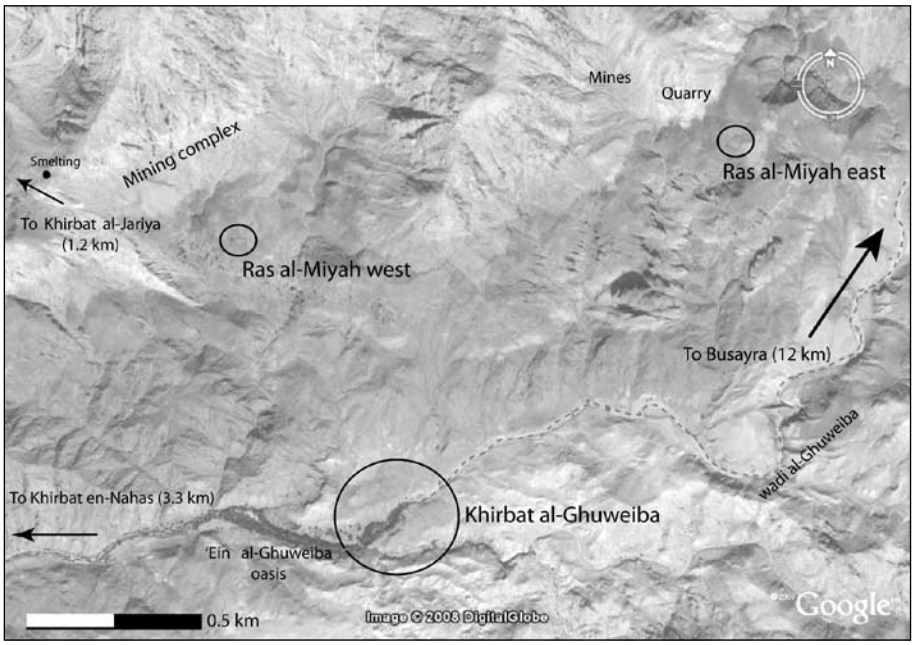
The two fortresses are located in the area of 'Ayn al-Ghuwayba, a small oasis and a the site of Khirbat al-Ghuwayba (ca. 7 hectares), an Iron Age village with some evidence of copper smelting (Khirbat al-Ghuwayba, see Hauptmann 2000: 89, 2007: 132). Together with the surrounding remains



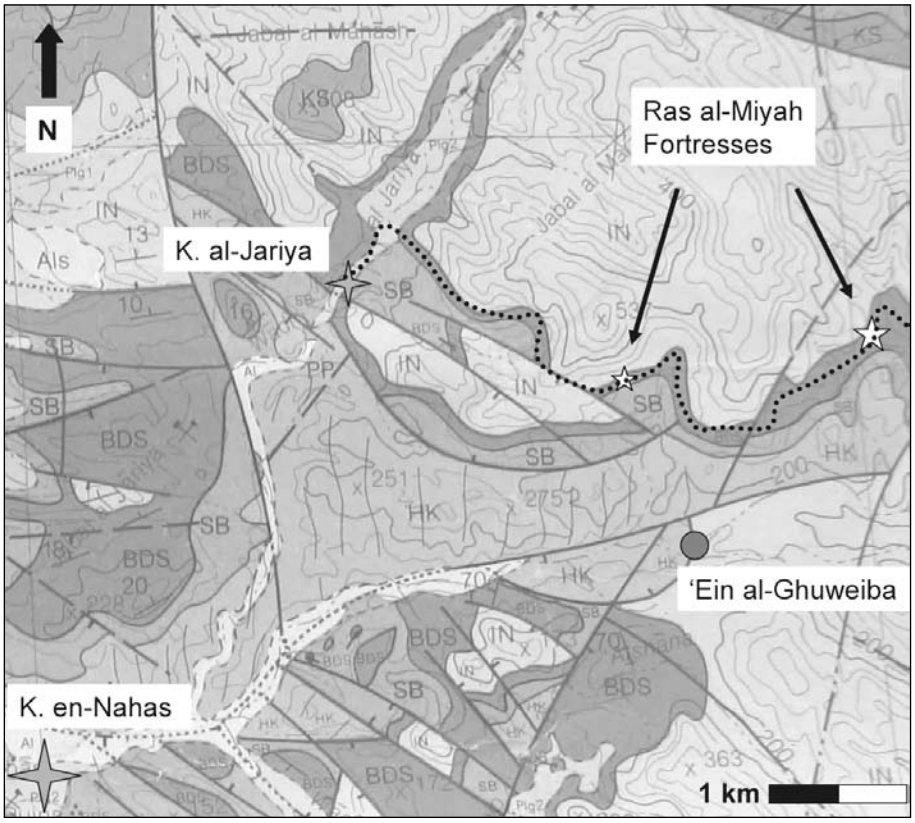
1. The copper production district of Faynān and the location of Rās al-Miyāh Archaeological Complex (after Hauptmann 2007: 86, fig. 5.1). Base map is republished by courtesy of A. Hauptmann.

of copper mines, small smelting sites, ancient road constructions, ancient encampments and numerous small installations, the area of ‘Ayn al-Ghuwayba comprises a rich archaeological complex, situated in the upper basin of Wādī al-Ghuwayba, in the northeast edge of the copper production district of Faynān (FIGS. 1 and 2). The main road connecting the region of Faynān in the lowlands of Edom with the late Iron Age administrative center of Buṣayra (Bozra and Bienkowski 2002) in the highlands passed through Wādī al-Ghuwayba, taking advantage of a relatively passable topographic path in an extremely rough terrain. The eastern fortress and its surrounding copper mines is the closest copper production related site to Buṣayra, some 12km to the northeast (as the crow flies) and is approximately 800 m higher than Rās al-Miyāh *East*. It is reasonable to assume that this distance could have been traveled in one long day, and that ‘Ayn al-Ghuwayba spring complex served as a major gateway, offering the first source of water in the severe Saharo-Arabian desert environment of the Faynān district, and an efficient control point guarding both sides of the narrow valley. For those arriving from Buṣayra, the area of ‘Ayn al-Ghuwayba also presents the first outcrops of copper bearing layers, exposed on the northern slopes of the wadi. The permanent spring still enables limited agriculture, practiced today by the Bedouins of the al-Man’ajah tribe with small orchards of olive trees and pomegranates located further downstream from the spring. This is the major water source for the entire basin of Wādī al-Ghuwayba, and probably one of the water sources for the largest Iron Age copper production site of Khirbat an-Nuḥās, located ca. 4km (as the crow flies) to the east-south-east.

The fortresses are located on a distinct plateau of the Burj Dolomite-Shale formation (for the geological settings of the region see e.g. Hauptmann 2007: 55-84; Rabba’ 1994) to the north of Wādī al-Ghuwayba (FIGS. 3 and 4). The plateau is a result of erosional processes that swept away the soft sandstone and shale of Umm-‘Ishrīn and Burj formations, thereby exposing the hard dolomite layers

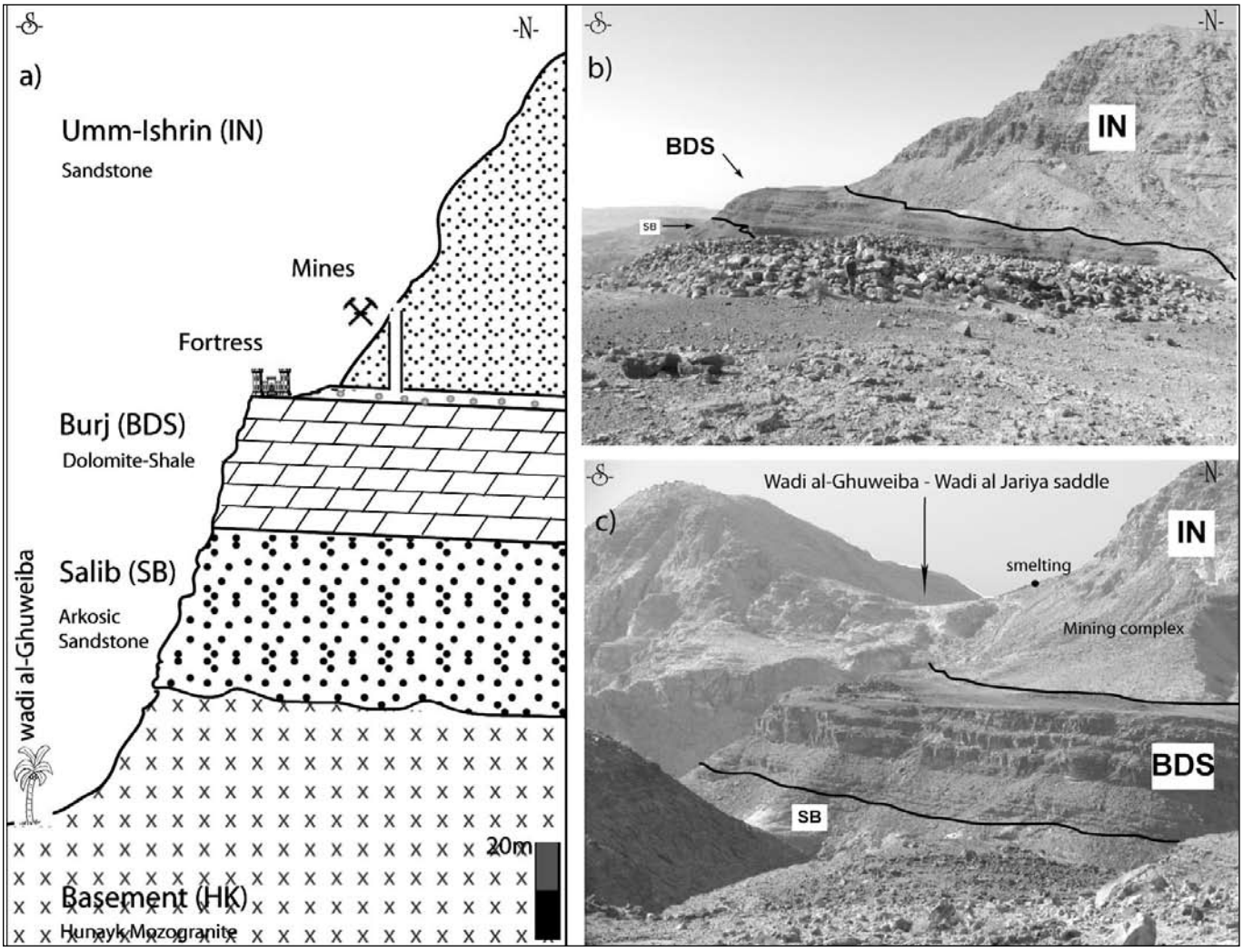


2. Rās al-Miyāh Archaeological Complex in the upper basin of Wādī al-Ghuwayba. The fortresses of Rās al-Miyāh *West* and Rās al-Miyāh *East*, as well as Khirbat al-Ghuwayba, are marked by black circles.



3. Geology map of Rās al-Miyāh Archaeological Complex (after Rabb'a 1994). HK= Hunayk Monzogranite; SB=Salib formation (arkosic sandstone); BDS=Burj formation (Dolomite-Shale; this is the main copper ore bearing formation in the Faynān district); IN=Umm-'Ishrīn formation (sandstone). Note the location of the fortresses and the local trail, which connects them on the narrow outcrop of Burj formation (see text).

and creating a well defined topographic step in the area's landscape. This step is located several meters below the contact line between Umm-'Ishrīn and Burj formations. The contact line itself, well defined by the colored shale of the upper unit of the Burj formation, forms a breaking point in the steep slopes and cliffs that enabled the construction of an Iron Age path connecting the upper Wādī al-Ghuwayba basin, the two fortresses, Wādī al-Jāriya and Khirbat al-Jāriya (FIG. 5). In close proximity to the fortresses is the copper ore rich shale unit of the Burj formation, also referred to as the Dolomite

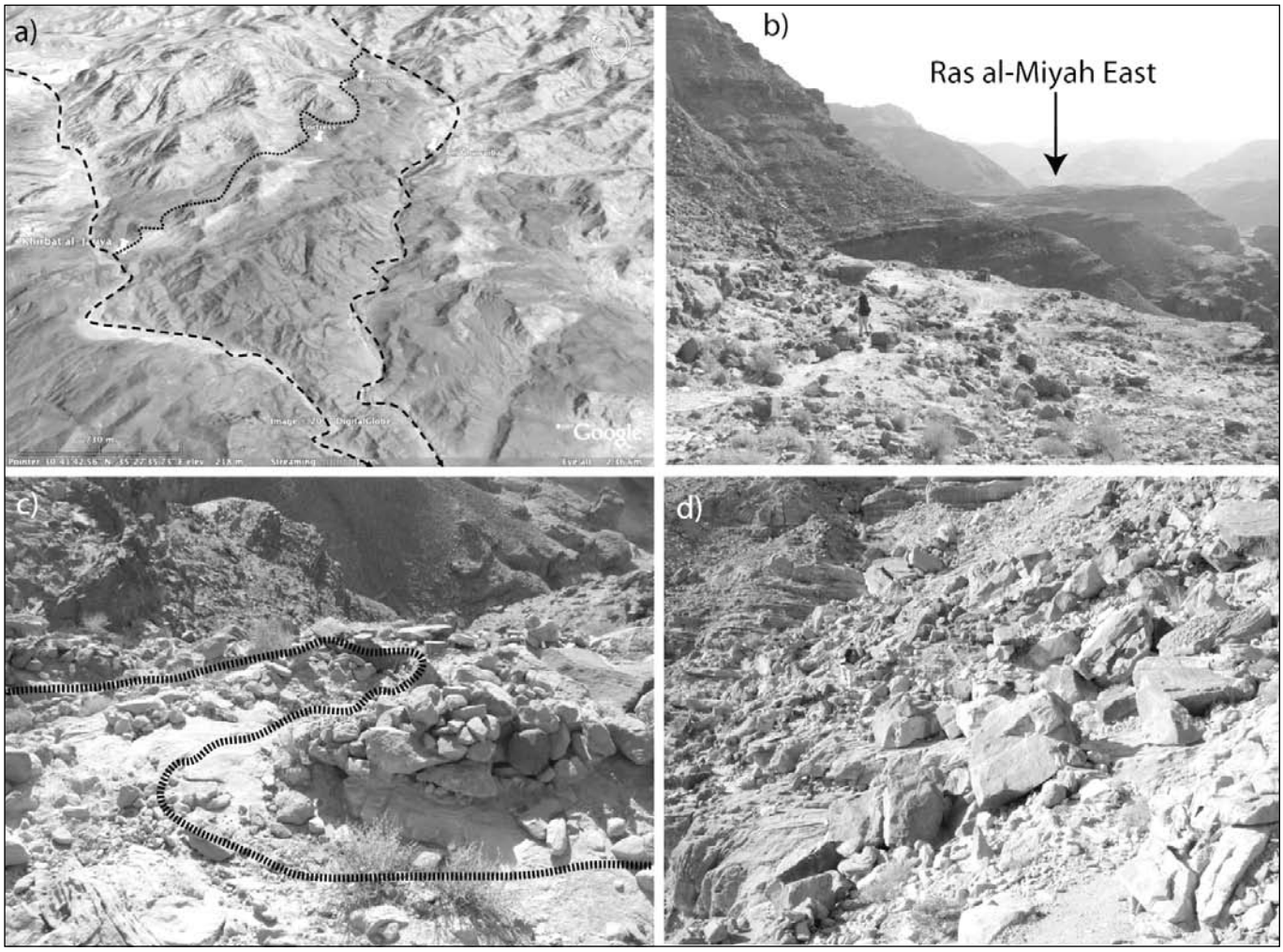


4. The geology of Rās al-Miyāh: a) a schematic section of the rock formations in the vicinity of the fortresses, looking west. Note the copper ore bearing horizon of Burj formation, the mining technique, involving shafts dug into the lower part of Umm-'Ishrīn formation and the topographic step caused by the erosion of the soft shale unit of Burj formation; b) Rās al-Miyāh *East* and the geological formations, looking west; and c) Rās al-Miyāh *West* and the geological formations, looking west.

Limestone Shale (DLS) unit (Hauptmann 2007) where we identified Iron Age mines (FIG.4a and see below).

The oasis of 'Ayn al-Ghuwayba and the main road leading towards Buṣayra along Wādī al-Ghuwayba are visible from both fortresses, as well as the wide valley connecting Khirbat Faynān and Khirbat an-Nuḥās via Rās an-Naqab. Due to the wide vista available from the elevated location of the fortresses' towers, guards could have been alerted for dealing with any unwelcome travelers or invaders approaching from the northeast or southeast. However, caravans traveling from Buṣayra to Khirbat an-Nuḥās do not have to pass through the fortresses themselves, whose location does not indicate immediate concern with the road. Rather, it seems that the main interest in building the Rās al-Miyāh fortresses had to do with the exploitation of the copper ore deposits surrounding them. The position of the western fortress is one kilometer north of Khirbat al-Ghuwayba, and a ca. 150m above the spring. The position of the east fortress is ca. 1.4km northeast of the spring and ca. 170m above it. This fortress is locally positioned for having a view towards the valleys in the west and not towards the road from Buṣayra, to the northeast.

The water supply for both fortresses was provided by the nearby oasis at 'Ayn al-Ghuwayba but demanded considerable effort to haul water from the spring up to the fortresses. An additional small water source is located ca. 3km upstream from the main spring, in a small eastern tributary of Wādī



5. Local and principle trails in the area of Rās al-Miyāh: a) a multispectral tilted satellite image of upper Wādī al-Ghuwayba basin, looking to the northeast. The main road to Buṣayra passes through ʻAyn al-Ghuwayba and Wādī al-Ghuwayba; principle road to Wādī ad-Daḥal passes through Khirbat al-Jāriya and Wādī al-Jāriya and a local road connects the two fortresses of Rās al-Miyāh with each other and with the basin of Wādī al-Jāriya (image taken from GoogleEarth); b) the local trail connecting the two fortresses takes advantage of the topographic step of Burj formation (looking to the east). This trail shows constructions, typically in difficult passages (c); and d) the boundary between the sandstone of Umm-ʻIshrīn formation and the shale unit of Burj formation is sometimes covered by sandstone talus. For scale, note the individual walking along the trail.

al-Ghuwayba (ʻThmilat al-Ghuwaybaʼ, UTM 739302/3399462). This is a small oasis with a dug pool that holds water permanently and currently has a garden consisting of fig and palm trees and local vegetation indicating the high water table. Its proximity to the fortress of Rās al-Miyāh *East* (ca. 1km ʻas the crow fliesʼ) suggests that this was the primary water source of the fortress's occupants, assuming that a same pattern of springs prevailed in the area during the Iron Age. Building cisterns in the immediate vicinity of the fortress would require the use of mortar because the local rock does not hold water. With the exception of a possible incomplete attempt to construct a water drainage system in Rās al-Miyāh *East* (see below), no signs of any cisterns were found in our surveys around the fortresses.

Rās al-Miyāh West

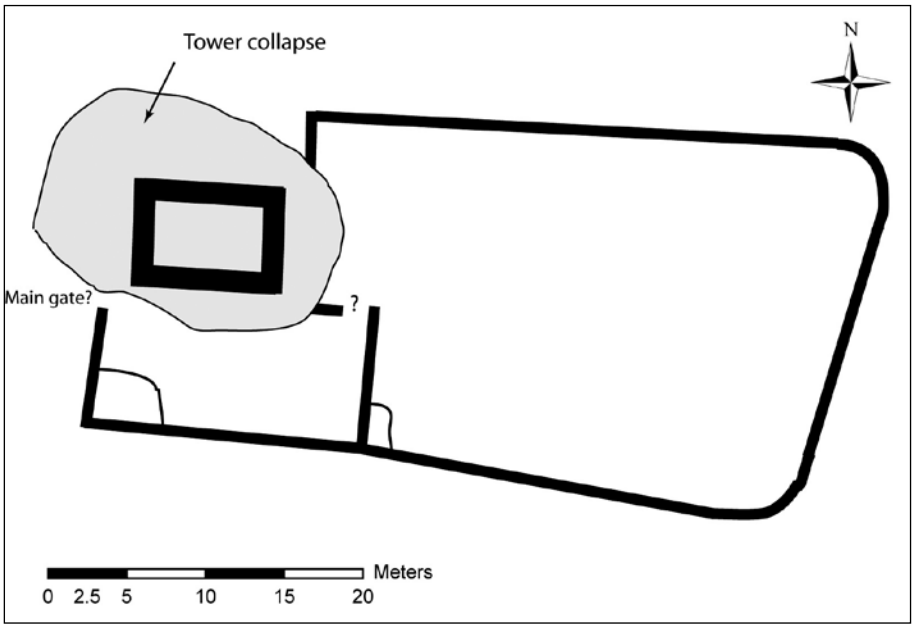
The fortress of Rās al-Miyāh *West* is located at UTM 736691/3399076, ca. 320m above sea level and 500m from the saddle separating Wādī al-Ghuwayba and Wādī al-Jāriya (FIG. 2). The fortress is built out of local black dolomite stones, roughly cut into small slabs from the layered Burj formation (FIG. 6). The structure is composed of two architecturally separate parts, a massive square tower and a rectangular enclosure divided into two main

6. The fortress of Rās al-Miyāh *West* (view towards the west).

spaces (FIG. 7). The enclosure and the tower represent distinct construction phases, as the enclosure walls abut those of the tower and do not constitute a continuous construction. The collapse walls of the tower rise ca. 4m above the ground surface, surrounded by a massive collapse that gives it a circular layout (FIG. 8a). However, some of the inner walls are still visible, revealing a rectangular chamber, ca. 4 x 8m.

The enclosure walls are preserves up to 10-12 courses of stones and to a height of more than 2m. These walls incorporate the tower forming a large rectilinear enclosure space (ca. 23 x 45m) oriented as a west-east elongated shape. The tower dominates the northwestern part of the enclosure and does not protrude out of the rectilinear layout. The area to the south of the tower is divided into small spaces and consists of the highest remaining walls in the enclosure. This part might have been roofed, indicating several small chambers adjoining the wide open enclosure to the east. The main gateway to the fortress appears to be located in the western side, between the walls of the tower and those of the enclosure (FIG. 7).

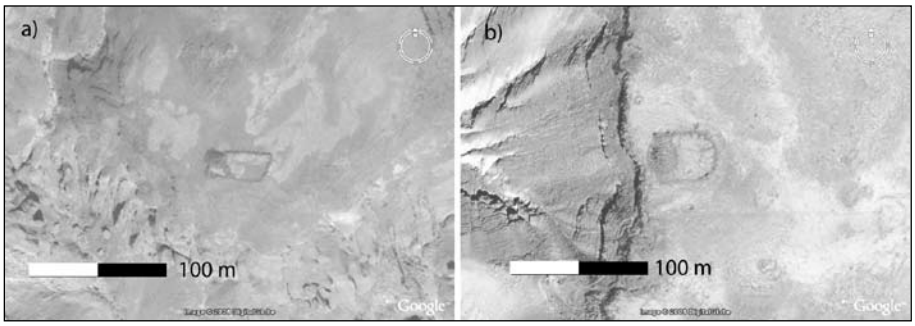
Although the fortress is roughly built from the local stones on a high and isolated plateau, it does not show similarity in its architectural plan to the other late Iron Age 'Edomite strongholds' such as Ba'ja III (Lindner and Suleiman 1987), Jabal al-Quṣayr (Lindner *et al*. 1996) and others (e.g. Ben-David 2001)[1]. An interesting parallel is found in neighboring Moab, with an Iron Age fortress reported by Parker (1987: 56, fig.25, site 232; 2006: 60, site 57) (The fortress is called by the local Bedouins 'Rujm al-'Abd') (FIG. 8)[2]. The orientation, dimensions and architectural design of both fortresses are notably similar. They are both located on a leveled plateau on the edge of a cliff; their elongate axis



7. Wall plan of Rās al-Miyāh *West*. The width of the inner walls of the tower is approximate.

[1] These 'Edomite strongholds' are typically built on isolated peaks along the western slopes of the Jordanian plateau. They show a variety of layouts and construction features according to the local terrain and rock formation (usually sandstone outcrops, but also on other types of bedrocks, see e.g. Hubner 2004), thus their common denominator is primarily their location.

[2] We thank to Chaim Ben-David for bringing this similarity to our attention. On the "Moabite" fortress and the road system in its vicinity, see Ben-David, this Volume.



8. The Edomite Iron Age fortress of Rās al-Miyāh *West* (a) and the Moabite Iron Age fortress of Rujm al-'Abd (b) show marked similarities in the architectural plan (images taken from GoogleEarth).

is in a west to east orientation; the towers are situated mostly on the northwest side of the courtyard and do not protrude from the rectilinear enclosures associated with them; the eastern side of the enclosures have somewhat rounded corners and finally, both structures are built from the local stone (in the case of Rujm al-'Abd it is roughly cut basalt stones). The "Moabite" fortress is located on a cliff above one of the on a cliff above one of the southeastern tributaries of Wādī al-Mūjib (biblical Nahal 'Arnon), far from the track of the King's highway (located to the west), the principal north – south route along the Jordanian highland plateau. The massive structure is positioned on the edge of the eastern desert, not far from the location of the Roman limes line of fortifications (Parker 2006) and probably on an ancient Iron Age road that crosses the topographic barrier of Wādī al-Mūjib through an eastern alternative to the King's highway (see Ben-David, this volume). However, there are no remains of such a road or other fortification further east and north of the fortress. This suggests that the main objective of the site was to watch over the valleys below, where more plausible paths might have been in use for transportation between both parts of Moab (see especially Ninow 2002 and Ninow this volume)[3]. This suggests that Rās al-Miyāh *West* may also be a watch tower that guarded indirect routes in the valleys below.

In close proximity to the Rās al-Miyāh *West* fortress, ca. 115m to the north and near the northern edge of the dolomite topographic step, there are two relatively well preserved small structures roughly built from the local dolomite stones (FIG. 9a). One is rectangular, ca. 7.5 x 5.5m, and the other, situated ca. 6.5m to the northeast, is a tumulus-shaped circular pile of stones. Some 20 meters to the north of the small structures is an extensive mining complex, situated on the lower slope of the Umm-'Ishrīn formation and extending over an area of ca. 1.2 hectares (FIG. 2 and 9b; for the mining technique see also FIG. 4a). Only a few of the blocked entrances to the mine shafts may be identified today, nonetheless it is clear that many are buried under the collapse of the sandstone cliff as evidence by tailings. The mine shafts were dug into the lower part of Umm-'Ishrīn formation, in order to approach the copper ore bearing layer of the upper part of Burj formation (FIG. 4a) located below. From the location of one of the shafts entrances we can reconstruct the approximate depth of the mines to be around 15-20m. Based on the extent of tailings we can presume extensive galleries were dug into the ore bearing horizon as has been documented by the German Mining team in many Iron Age locales in Faynān (Hauptmann 2007). Iron Age copper mines with similar characteristics were reported from Wādī Khālid, in the vicinity of Khirbat Faynān (Hauptmann 2007: 116-121). The depth of the mine shafts in Wādī Khālid was up to 50-60m (Weisgerber 1989), and some of the excavated mines reveal long galleries (>30m) along the copper ore bearing layer (Weisgerber 1989).

The extensive copper mining activities are recognized primarily by the distinct remains of black manganese-rich tailings that are highly visible on the bright sandstone slopes (FIG. 9b). The tailings originate from the copper ore bearing layer

3 The use of a path along the valley below the fortress (Wādī an-Nukhayla, a southern tributary of Wādī al-Mūjib) during the Iron Age as one of the alternatives to the King's highway is supported by several major Iron Age sites found along the wadi, among them the site of Khirbat Mudayna al-'Ulyā (e.g. Miller 1991) and Qaṣr Ḍab'a (Parker 2006:74, site 194), located further up the wadi basin. Although the road along the ascent from the wadi to the fortress has impressive constructions, we should consider the possibility that its main target was the fortress itself, without an additional segment towards the north or east. Alternatively, one might date the massive road constructions to the Roman period, as a secondary access to the *limes* line.

9. Archaeological features in the vicinity of Rās al-Miyāh *West*: a) small rectangular structure made of local dolomite stones; b) overview of the mining complex. Note the blackish color caused by tailings; c) horizontal line of niches, 10-15cm in diameter, located above a blocked shaft in the mining complex. A similar feature was found in the quarry area near Rās al-Miyāh *East* (d); e) open mining shaft dug into the shale unit of Burj formation; f) and g) copper slag deposit located near the saddle between Wādī al-Jāriya and Wādī al-Ghuwayba.

and were the result of removing rocks in order to create the shaft and galleries. They might also be the result of processing ore outside of the shafts after removing it from the ore body inside the hill. In addition, several small roughly built structures and installations located on the steep slope are another indication of Iron Age interest in exploiting the buried ore deposits. One particularly interesting installation is a horizontal line of rounded niches (ca. 10-15cm in diameter) carved into the sandstone cliff several meters above one of the major blocked shaft entrances (FIG. 9c). The niches might have been the base for wooden scaffolding used in the process of raising ores (and perhaps miners) through the shafts, with the help of ropes. A very similar installation appears on the sandstone cliff near the fortress of Rās al-Miyāh *East* (FIG. 9d), although there it could also be related to stone quarrying activities (see below). We do not know of any parallels for such installations in the copper mining districts of the southern Levant (constituting mainly Faynān region and Timna valley), making this particular reconstruction speculative.

Two open shallow mining shafts were dug directly into the shale unit of the Burj dolomite-shale formation close to the boundary with the Umm-'Ishrīn sandstone and in close vicinity to the mining complex of the slope. One of these was excavated by the Natural Resource Authority of Jordan (NRA) possibly in the location of an ancient shaft, and the other (the eastern) is probably a collapsed ancient mining shaft (FIG. 9e). If the date of these shafts to the Iron Age is correct, there is evidence for exploiting, or an attempt to exploit, copper ores directly from the Burj formation without the need of deep shafts. The disadvantage of mining copper directly from the outcrops of Burj formation without using the deep shafts described above is that these outcrops are startigraphically located slightly below the richest copper-bearing horizon that was eroded in the region of the topographic step.

A strikingly large quantity of ceramic fragments, many of them identifiable, were recovered from the fortress, the nearby structures and the copper min-

ing complex. The pottery sherds are scattered on the surface in a very high density relative to other Iron Age sites in the region. The large number of sherds may indicate a substantially long occupation phase and/or high intensity of activities in the last stage of the Iron Age II.

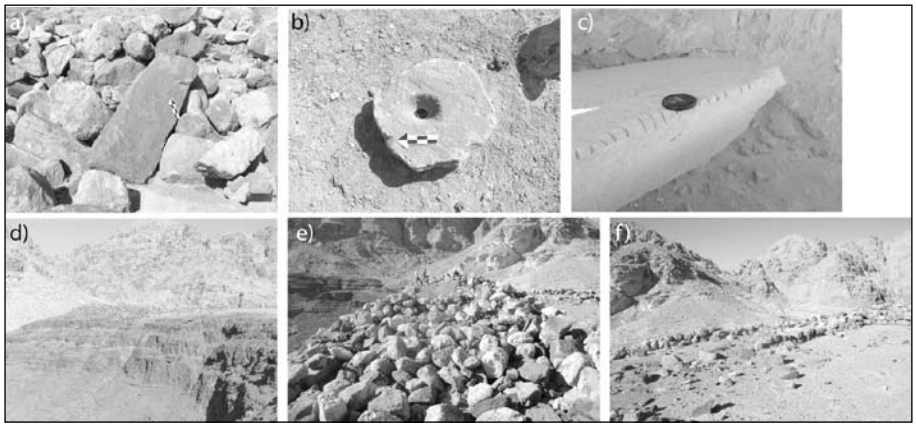
Four hundred meters to the west of the mining complex and ca. 20m above the saddle between Wādī al-Ghuwayba and Wādī al-Jāriya, there is a small deposit (ca.70 m^2) of broken slag (UTM 736190/3399275) (FIG. 9f and 9g; see also FIG. 2 for location). We could not find any ceramics associated with this site, and although the technology is relatively simple we speculate that limited copper smelting took place simultaneously with the Iron Age copper mining activities in the area of Rās al-Miyāh *West*. Technological typologies based on the slag cannot be directly used as a chronological marker (Ben-Yosef 2008) as simple industries could have been practiced even after more innovative technologies were introduced during the Iron Age. In the case of this slag deposit, its proximity to the archaeometallurgical complex of Rās al-Miyāh may indicate dating the smelting activities to the late Iron Age. The Iron Age smelters may have selected this location some distance from the Rās al-Miyāh *West* fortress and nearby mines to take advantage of the high wind in the saddle. Similar remains of small scale smelting activities were found in the close vicinity of Rās al-Miyāh *East*, there associated more directly with Iron Age ceramics (see below).

Rās al-Miyāh East

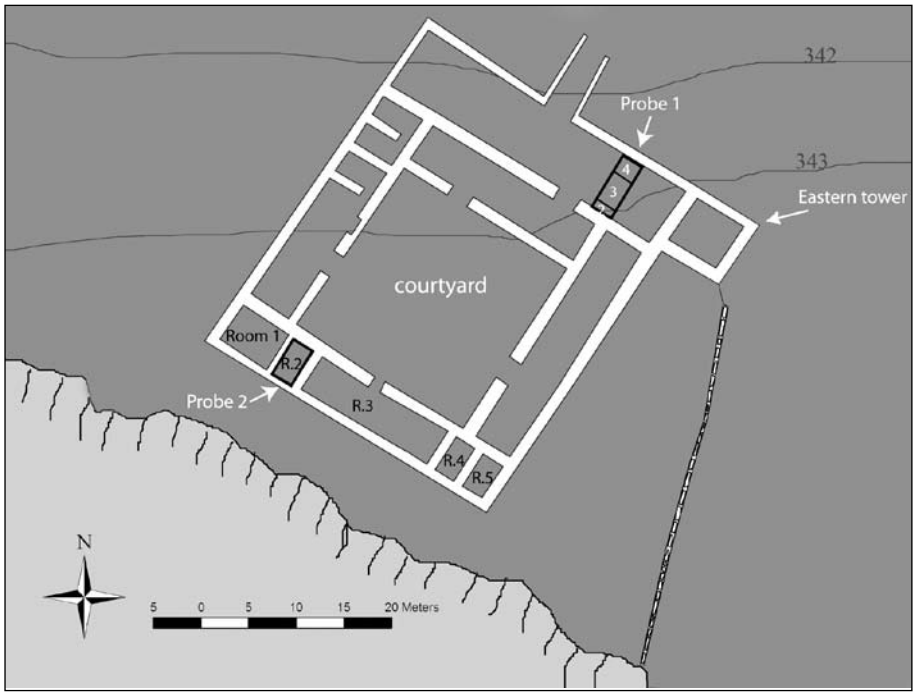
The fortress of Rās al-Miyāh *East* is located at UTM 738148/3399340, ca. 350m above sea level and ca. 100m above the stream channel of Wādī al-Ghuwayba (FIG. 2 and 10). The fortress is quite different from Rās al-Miyāh *West*, both in building material and in architectural design. Rās al-Miyāh *East* was not built out of the local dolomite stones that can provide only relatively small slab blocks. Instead, the enitre structure is built out of massive brown sandstone that originate from the nearby outcrops of the Umm-'Ishrīn formation. The thick layers of the sandstone in this formation can provide massive blocks of building stones with size limited only to transportation constraints and the architectural design. The fortress's walls and tower were built with huge, typically well cut, sandstone blocks, sometimes exceeding 1m in length (characteristic dimensions of stone blocks in the outer wall are ca. 80 x 40 x 30cm, i.e. elongated blocks of about ca. 0.1 cubic meter) (FIG. 11a). The distance to the quarry located in the sandstone cliffs to the north is relatively short (ca. 200-250m). However, moving the massive sandstone blocks had to overcome both the lower steep slope of the Umm-'Ishrīn formation (a descent of some 30m) and the moderate but longer slope of the Burj formation (an ascent of about 30m).

10. An overview of Rās al-Miyāh *East*, looking towards southeast. The fortress is located on the dark Burj formation plateau and built almost entirely of bright sandstone. Note some of the small structures and the arrangement of building stones in front of the northwestern wall of the fortress. The size of this fortress is indicated by the two people standing along the southern corner of the structure.

The outer dimensions of this fortress are ca. 42 x 35m, with a northeast to southwest elongated axis. The walls are well preserved and the architectural plan is still clear, revealing small details of rooms and passages (FIG. 12). The fortress has an inner courtyard of ca. 20 x 20m, corridors on the northwestern and southeastern sides, a semi-casemate wall on the southwestern side and a double corridor with complicated maze of passages on the northeastern side. A massive tower (ca. 8 x 8m, outer dimensions) protrudes form the fortress's eastern corner. Along the southern corner of the tower a line of small stones follows the moderate hill gradient towards the south until it reaches the edge of the cliff. An additional shorter line of small stones is located between the southern corner of the fortress and the cliff. The pattern of these installations probably implies an attempt to collect seasonal rain water, as they divert the run-off into a local



11. Details from Rās al-Miyāh *East* Fortress: a) massive sandstone ashlar is seen in the collapse of the eastern tower; b) carved hole in a sandstone found in the fortress's courtyard, probably a door socket; c) carved stone found in the nearby quarry, probably prepared the fortress; d) southwestern wall of the fortress, just above the edge of the dolomite plateau; e) southwestern wall of the fortress with semi-casemate rooms filled with rubble; and f) northwestern inner and outer walls of the fortress (view from the courtyard).

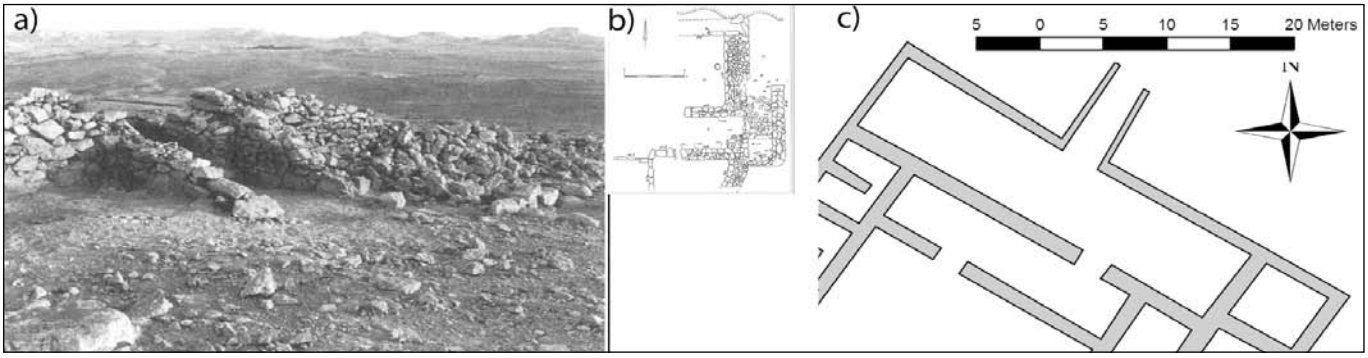


12. Wall plan of Rās al-Miyāh *East*. The location of the sample excavations is marked with black rectangles. Contour lines are approximate.

topographic drainage channel. However, there are no remains of a cistern at the end point of this system suggesting: a) an incomplete construction, b) a channel that was used by placing a jar at the end point to collect water, and/or c) a different use for these stone lines, such as diverting the run-off for protecting the foundations of the fortress walls.

The gate of the fortress is located in the middle of the northeastern wall. It has a unique shape with two protruding walls, which extend ca. 8m toward the northeast. The width of the protruding walls is significantly smaller than that of the fortress's external wall (ca. 0.5-0.8m vs. 1.2-1.7m respectively) and their height decreases gradually towards the outside. The protruding walls seem to be part of a short ramp that was constructed to overcome the elevation difference caused by the down sloping of the bedrock surface towards the north (FIG. 12). The inner width of the ramp changes from about 2.5m in the outside and 3m in the inside. A similar construction, also interpreted as a ramp used to overcome local elevation difference, is reported from the Iron Age I-IIA fortress near Quseima in the northern Sinai Peninsula (Meshel 1994). At that site, which is considered one of the so called "Israelite Fortresses" of the Negev, the ramp's walls extend towards the inner part of the structure (FIG. 13).

In the first corridor from the gate of Rās al-Miyāh *East* there are two small intrusive structures built out of small local dolomite stones. One is located in the northern part of the corridor and the other just in front of the gate area. Both of the structures have a circular, tumulus-like shape, which sug-



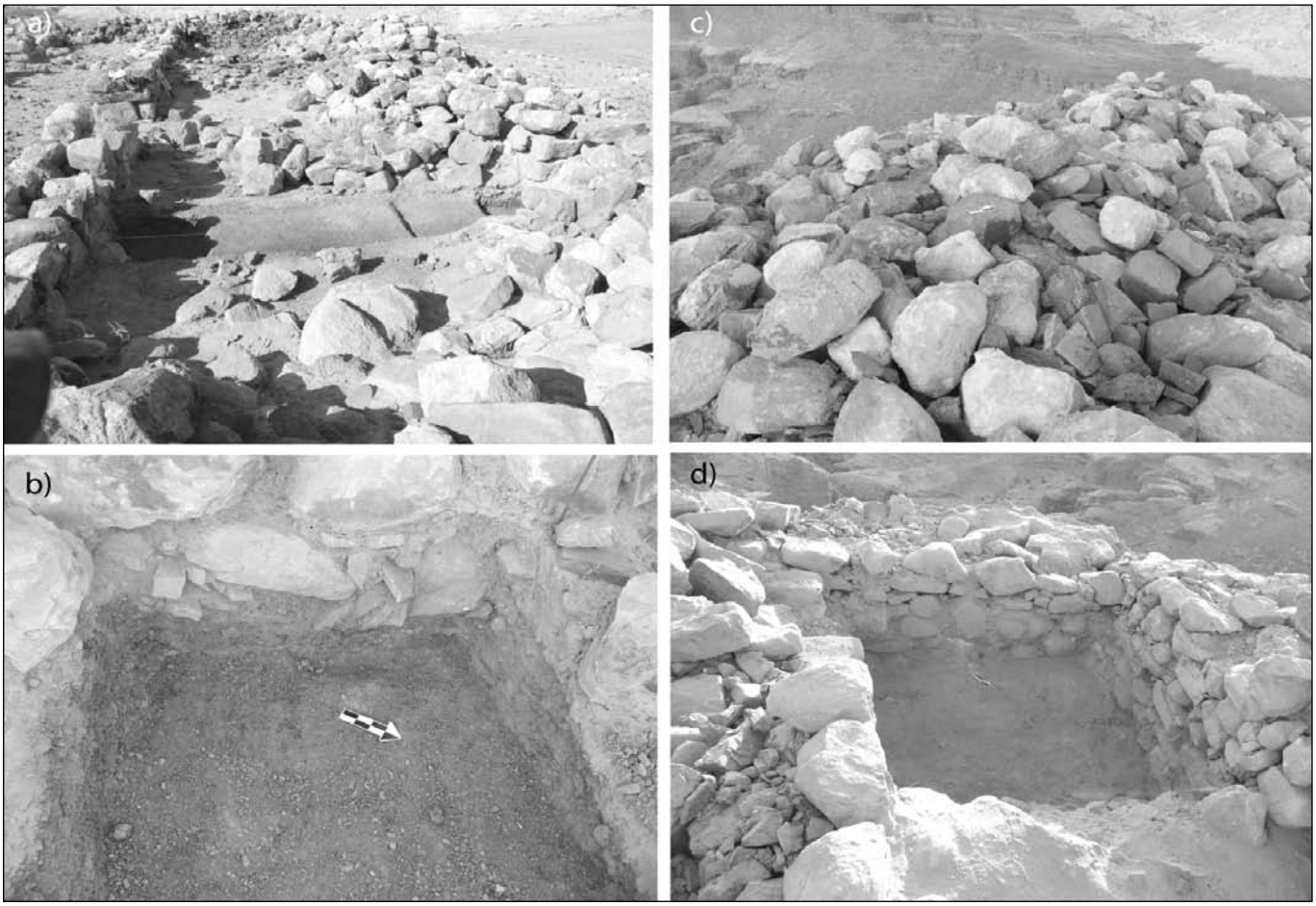
13. A picture (a) and a plan (b) of the gate complex of the so called "Israelite Fortress" of Quseima (after Meshel 1994: figures 7 and 8). The parallel walls are interpreted as being constructed for overcoming elevation difference, and are similar to in shape and purpose to those found in the fortress of Rās al-Miyāh *East*.

gests that these are later graves. The inner walls of the fortress are massive but short, consisting of to rows of stones, which stand up to a height of four courses (FIG. 11f). There are almost no remains of collapsed stones in the close vicinity of these walls (see below).

The southwestern side of the fortress is the most fortified, consisting of an aextremely wide semi-casemate wall (ca. 6.5m wide including the casemates and inner wall; FIG. 11d and e). The confined spaces within the wall (the 'casemates') are filled with a vast amount of rock and earth (excluding the central space, which has only partial remains of collapse). The fact that this side of the fortress is the most fortified is somewhat surprising giving the fact that it is the only side that is directly protected by the natural sheer cliff (dropping abruptly for more than 50m) along the edge of the dolomite plateau (FIG. 11e).

In order to gain more insights about the date and function of Rās al-Miyāh *East* we conducted two small test excavations in this fortress: Probe 1 at northeastern corridor and Probe 2 in one of the casemate room spaces along the southwestern fortified wall (FIG. 12 and 14). Probe 1 in the northeastern corridor was a narrow trench, ca. 1.5 x 6.15m, and excavated between the outer wall and one of the inner walls of the fortress (FIG. 14a and b). The higher surface elevation in this side of the corridor seemed to indicate the presence of occupational deposits and was one of the reasons for choosing this location. While excavating it became clear that the higher surface elevation was a result of the natural slope of the bedrock and that there was virtually no archaeological accumulation besides collapsed stones. We defined three loci (2, 3, 4, see FIG. 12) that represent the inner wall's collapse and wall foundation; the exposed bedrock in the center of the corridor; and the outer wall's collapse and foundation respectively (FIG. 12 and 14a). The inner wall's collapse is meager and represented in Locus 2 by only two relatively small stones. It seems that the inner wall in this location is preserved to its original height (3 courses, ca. 1.35m). Beneath the collapsed stones and directly above the bedrock was a thin layer of yellow aeolian dust with small amounts of ceramic sherds. This probe was excavated to bedrock (some Burj copper ore concentrations were found here) to expose the lower course of wall stones that was built into a shallow foundation trench (ca. 30cm deep). The bottom of the trench was filled with relatively small stones (1500 cubic centimeters or smaller) (FIG. 14b). This rough fill might indicate an intentional construction design for creating a more earthquake-resistant wall, as the small stones would give more flexibility to the heavy wall they support. We exposed a similar foundation trench (ca. 20-40cm in depth) beneath the outer wall, after removing a massive collapse of wall stones (15 large stones in an area of ca. 1.5 x 3m, Locus 4). Also here, a thin layer of yellow aeolian dust with few fragments of pottery was uncovered, and part of the trench was filled with relatively small stones. Between the collapsed stones of the two walls, as in the majority of the corridor's surface, the crumbly shale unit of the Burj formation was exposed (represented by Locus 3).

Probe 2 in the southwestern wall of the fortress was aimed at exposing one of the casemate rooms (Room 2, FIG. 12; FIG. 14c and d) to reveal a possible occupation layer beneath the collapse. Al-



14. The sample excavations in Rās al-Miyāh *East*: a) probe 1 in the northeastern corridor. An area of ca. 1.5 x 6.15m was opened between the outer and inner walls (view to the northwest); b) foundation trench beneath the inner wall. Excavations into bedrock exposed the base of the wall (note the small copper nodules and the brittle shale of the upper unit of Burj formation); c) an overview of the casemate room 2 before its excavation; and d) the excavated casemate room at the end of excavation, view towards southwest. Bedrock was not reached in this probe.

though bedrock was not reached, the result of the excavation indicates that the so-called "collapse" is probably an intentional fill as part of the fortress's construction. Thus, the divided spaces between the inner and outer southwestern walls were probably planned as a frame for constructing a massive and wide wall with the use of a fill made of sediment and roughly cut stones.

The casemate room is an elongate space perpendicular to the fortress's external wall (ca. 4.6 x 2.5m inner dimensions; see Figure 12). The outside wall of the fortress consists of two rows of stones, ca. 1.5m in width, with a sharp bulge towards the outside of the fortress that was most likely the result of the massive pressure caused by the casemate's fill. The wall stands to a preserved height of ca. 1m (the base of the wall is not exposed; FIG. 14d). A massive stone collapse is found outside of the wall, on a narrow step between the fortress and the cliff of the dolomite plateau. The inner wall of the fortress, standing to a height of ca. 2m, is made of two rows of stones, ca. 1.2m in width. It has sharp inclination towards the fortress courtyard, similarly the result of the intense pressure of the fill. The crudely built long walls of the room consist of one narrow row of roughly cut small stones (ca. 30-40cm in thickness) with at least 10 unstable courses and some gaps of missing stones (the upper 2m of these walls were exposed; FIG. 14d). The poor building quality of these walls suggests that they had never stood by themselves and that they were erected together when the fill was poured inside the confined casemate spaces. A doorway between casemate rooms 2 and 3 is represented by a gap of ca. 1m between the southeastern long wall and the outer wall of the fortress. A similar doorway is located between the

northwestern long wall and the inner wall of the fortress, connecting room 2 with room 1, although there the excavation is only 1.15m deep and the gap is less clear.

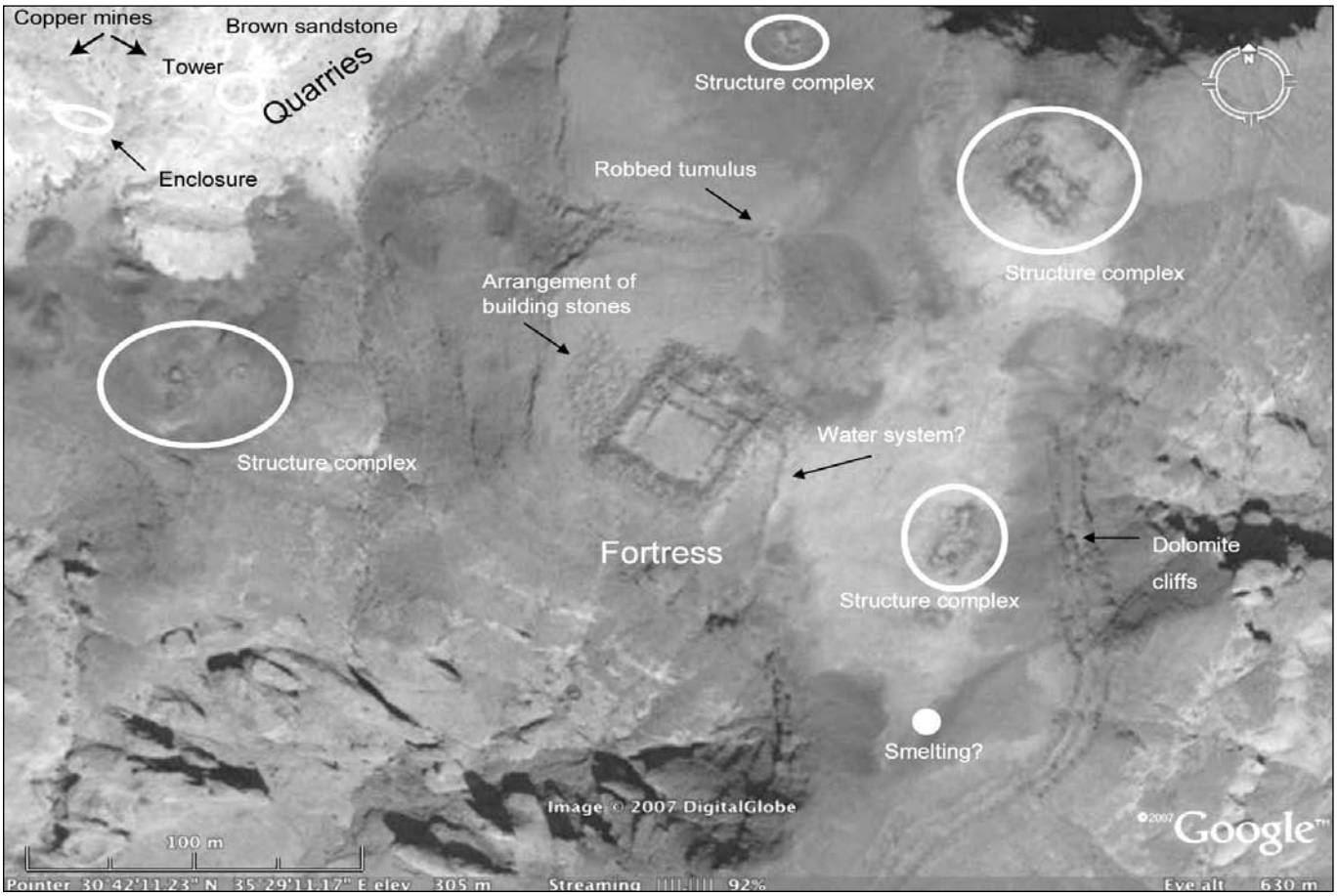
Before the excavation of Probe 2 was carried out, the long walls of the casemate were visible in only a few places. The southwest side of the fortress appeared as a continuous and massive pile of stones, confined only by the inner and outer walls of the fortress (this excludes the central space that has much less fill; FIG. 11d and 14c). The fill is a mixture of sandstone, dark dolomite stone and a large quantity of fine earth (in places more than 0.5m deep). The nature of this fill lends additional support for assuming an intentional blocking of the casemates: a) the dolomite stones do not appear elsewhere in the construction of the fortress; b) there is a mixture of two stone types, and both are roughly cut in a manner not suitable for quality building found in the rest of the fortress; and c) the large quantity of sediment excavated here does not seem to be aeolian in origin.

The evidence from Rās al-Miyāh *East* shows that the construction of the massive fortress was never finished. Although some of the indications are speculative, putting them all together presents a clear picture of an abrupt abandonment in the middle of the building process. The fortress's features that indicate unfinished construction are: 1) a possible unfinished water system; 2) a possible unfinished filling and fortifying the southwestern semi-casemate wall; 3) the well designed architectural plan of the fortress suggests a symmetric layout, especially for the northwest and southeast corridors. However, only the northwest corridor is divided into inner spaces, and even this division seems to be incomplete. The intended construction might have been two similarly arranged corridors or even two blocked semi-casemate walls as the one found in the only naturally fortified side (southwest); 4) the inner walls are short although their massiveness and foundation trench indicate an intention to build high walls, a building effort that never took place. In close proximity to these walls there are almost no indications of collapse, and there is no evidence of robbing these walls; 5) no significant occupation layer or cultural debris was found in the probe (No. 1) in the northeast corridor. In addition, the surface finds in the entire area of the fortress are scarce, including ceramic sherds. This stands in sharp contrast to the abundant surface ceramic both in the nearby copper mining complex and in the fortress's satellite small structures (see below). The latter structures may have been the dwellings of fortress's construction workers and/or the project management; and 6) an almost 'laid out' arrangement of building stones outside the northwest side of the fortress and in the direction of the quarry (FIG. 10 and 15) represents preparations for construction (that was never finished), rather than a collapse.

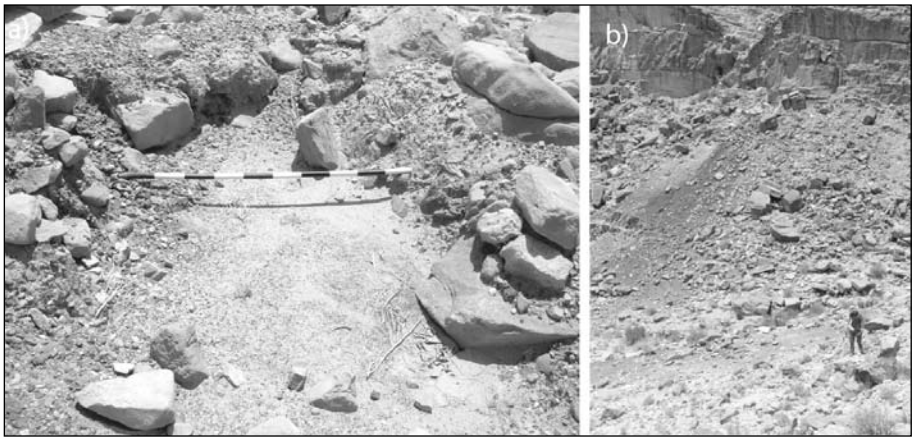
In close proximity to Rās al-Miyāh *East* fortress are abundant archaeological remains, most probably from the same period (excluding a small sandstone tumulus, ca. 40m to the north of the fortress) (FIG. 15). On the dolomite plateau five groups of small, roughly built structures are located between 30 to 120 m from the fortress. Most of the structures have rectangular shapes and some comprises several rooms. They are very similar in characteristic to the small structures near Rās al-Miyāh *West* fortress (FIG. 9a), including dimensions and building quality. These may also have been associated with the Iron Age miners and/or builders responsible for the construction of the fortress.

A deposit of small slag fragments was found near the highest point of the dolomite plateau (FIG. 15). The Iron Age II pottery fragments collected from the surface suggests a similar date for the smelting process, despite the simple technology that was practiced. Similar satellite site was found close to the Rās al-Miyāh *West* fortress (see discussion above). At both sites we did not find any remains of furnaces.

A copper mining complex was found ca. 400m northwest of the fortress, in both sides of a small valley and on the lower slope of the Umm-'Ishrīn formation (UTM 737754/ 3399525) (FIG. 16). This area is directly related to mining activities and extends over an area of ca. 500m^2. It includes several blocked mining shafts associated with black tailings that are visible from a long distance (FIG. 16b). The layout of the mining complex is similar to the one located near Rās al-Miyāh *West* and discussed above. The mining shafts of Rās al-Miyāh *East* appear to be deeper, as the distance between their entrances to the boundary between Umm-'Ishrīn and Burj formations is longer (more than 30m). In the lower part of the valley, ca. 100m southeast of the mines, a large trapezoidal enclosure was found (ca. 13 x 19 x 8m) built out of massive local sandstone (FIG. 17). The pottery in the vicinity of this



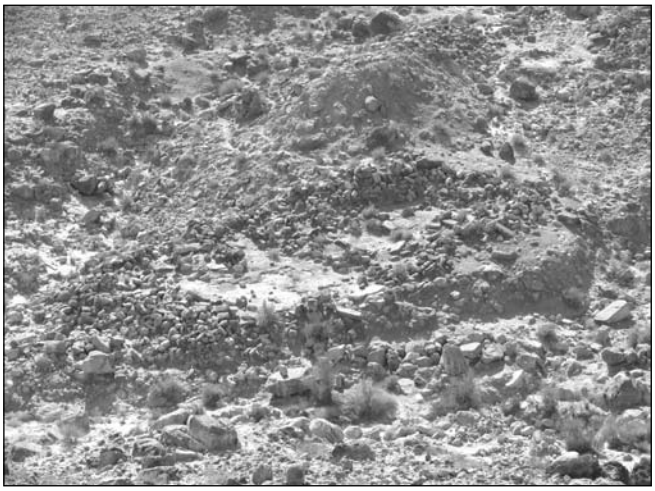
15. Multispectal satellite image of the fortress of Rās al-Miyāh *East* and its vicinity (image taken from GoogleEarth).



16. The copper mines near Rās al-Miyāh *East*: a) blocked shaft; b) black tailings, easily visible on the bright sandstone slope, indicate the location of an ancient mining shaft.

structure was scarce and its dating is insecure. It is important to note that the organization of mining activities at both fortresses is remarkably similar.

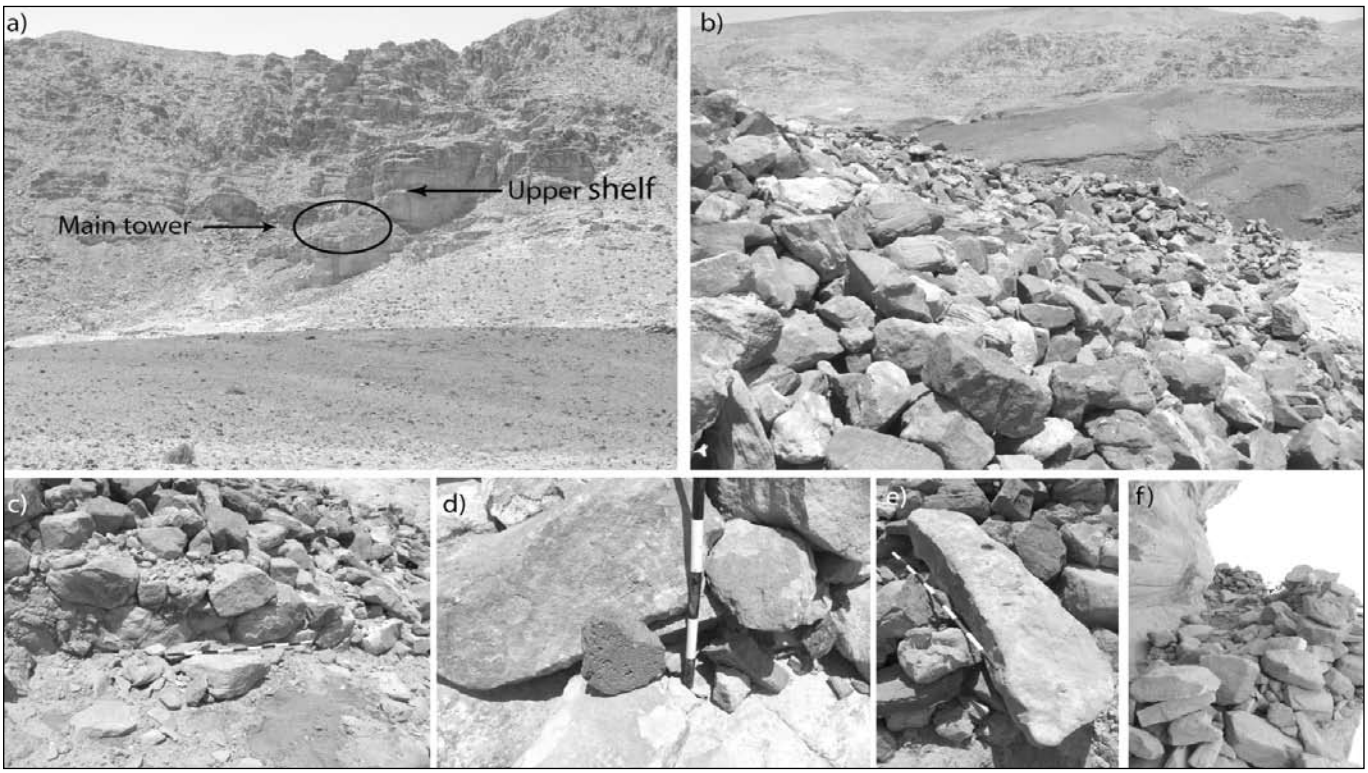
On a narrow step high in the brown sandstone cliffs of Umm-'Ishrīn formation a massive tower was found with adjacent small structures (FIG. 18). The tower is located ca. 220m ('as the crow flies') northwest of the fortress and ca. 40m above the dolomite plateau, in the vicinity of the sandstone quarry. The construction of this unique structure on the extreme location of the sandstone cliff is admirable even today. The layout of the tower, visible only in part beneath the massive collapse (FIG. 18b), is probably rectangular. The western wall constitutes a straight line that can be identified for a length of ca. 8m (FIG. 18c). Thus, the dimensions of the tower might be 8 x 8m or larger. The building stones comprise mostly the local sand-



17. A large (13 x 19 x 8m) Iron Age enclosure made of the local sandstone in the vicinity of the copper mines near the fortress of Rās al-Miyāh *East*.

stone although blocks of black dolomite stones are also part of the collapse. The tower remains include numerous fragments of pottery, many of which are identifiable. The abundant pottery sherds all over the slope below the sandstone step are derived from the archaeological remains of the tower and the adjacent small structures. Between the collapsed stones of the tower we found a fragment of a basalt grinding stone (ca. 35 x 20 x 10cm) indicating food preparation activities or initial processing of copper ores (FIG. 18d).

On a narrow shelf above the tower is a small roughly built structure in the opening of a shallow cave (FIG. 18a and f). Below the tower and ca. 15m to the northeast of its center, is a line of rounded niches (ca. 10-15cm in diameter) carved horizontally into the sandstone cliff (FIG. 9d). A similar installation was found in the copper mining complex of Rās al-Miyāh *West* (see above), although there it is associated with a copper mining shaft. We associate the niches near the tower of Rās al-Miyāh *East*, together with other remains on the slope, with the sandstone quarrying activities that were part of the fortress's construction. However, even though there are no visible remains of mining activities on this slope, we cannot completely dismiss the possibility that such remains are buried under the eroded sandstone cliffs. Small installations, such as carved mortars located on the slope further to the west of the tower, suggest copper ore related activities (crushing and grinding). Just below the line of niches we found nicely carved cornice-like



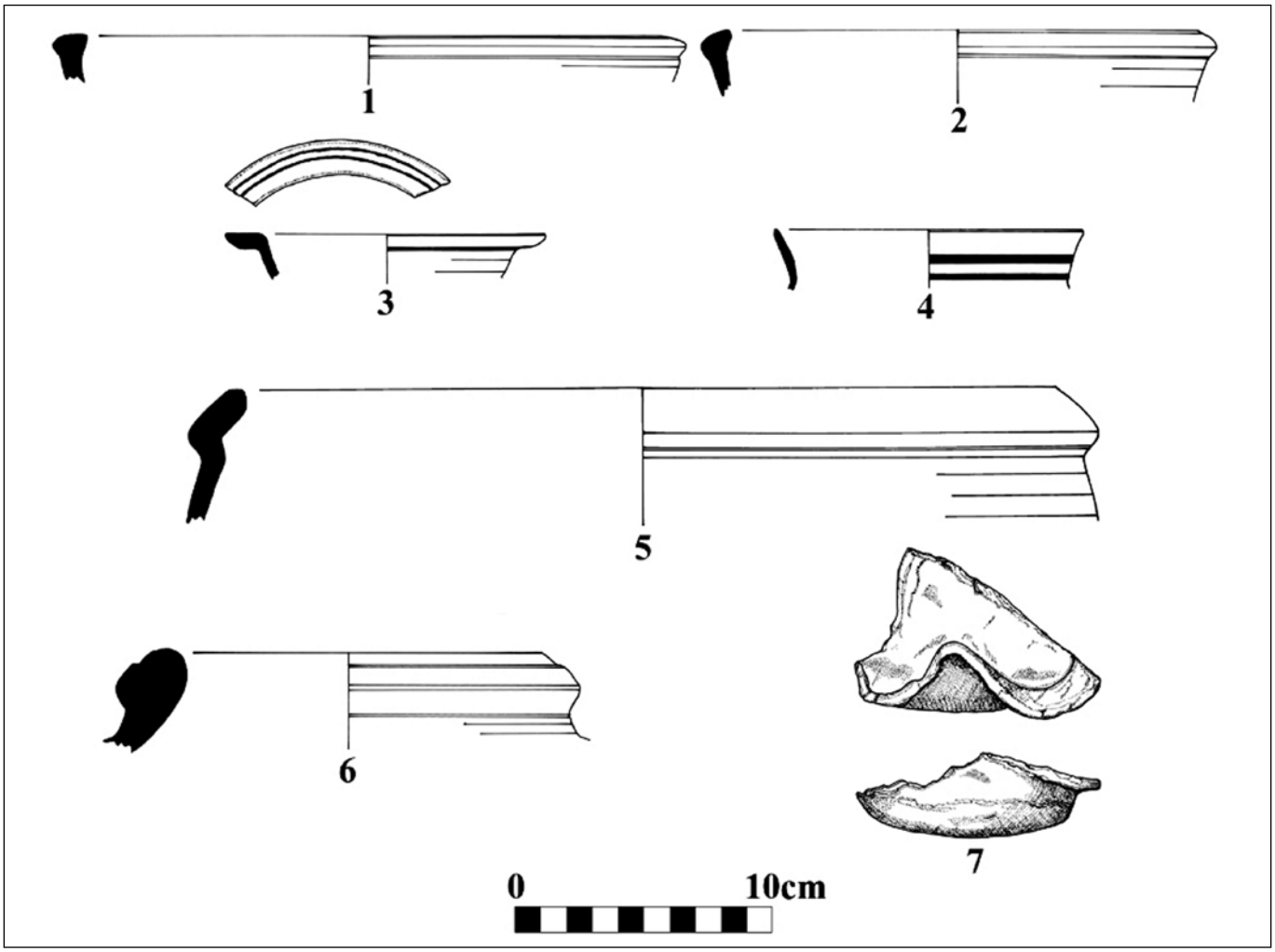
18. Rās al-Miyāh *East* - remains of a tower on the sandstone cliffs: a) overview; b) massive collapse of the main structure; c) face of the western wall of the tower; d) basalt grinding stone found in the collapse of the tower; e) massive sandstone building block in the collapse of the tower; and f) construction remains on the upper shelf.

sandstone block with a line of grooves that might have been a simple decoration (FIG. 11c).

Many ancient activities took place in the area of Rās al-Miyāh *East*. Although scant amounts of pottery fragments indicate a limited ephemeral Nabataean presence at the site, the vast majority of the pottery indicates late Iron Age II activities. However, we cannot discern whether the copper production activities (mining and small scale smelting) were done simultaneously with the project of quarrying massive sandstone and constructing the fortress or earlier (assuming that the abandonment of the fortress construction marks the end of the area's occupation). This question, together with revealing the exact function and date of the various structures and installations, awaits further research.

Dating the Fortresses

In the current stage of the research we consider the ceramic assemblage collected in both areas of Rās al-Miyāh *West* and *East* to represent one period without subtle distinction of different occupational phases[4]. The ceramic assemblage in general is typical to Edom in the seventh and sixth centuries BC (Iron Age IIB/C). A limited sample of indicative pottery sherds from the two fortresses was presented in FIG. 19. Additional discussion, including the distribution of the pottery between the different



19. Representative Iron Age ceramics from the fortresses of Rās al-Miyāh and their vicinity: 1) Bowl, Rās al-Miyāh *East* (EDM 8137, Reg. 56); 2) Bowl, Rās al-Miyāh *West* (EDM 5663, Reg. 160); 3) Bowl, copper mining complex of Rās al-Miyāh *West* (EDM 6549, Reg. 51); 4) Bowl, copper mining complex of Rās al-Miyāh *West* (EDM 6549, Reg. 268); 5) Krater, the tower on the sandstone cliff near Rās al-Miyāh *East* (EDM 11259, Reg. 73); 6) Jar, copper mining complex of Rās al-Miyāh *East*, near western shafts (EDM 11152, Reg. 211); 7) Lamp, copper mining complex of Rās al-Miyāh *West* (EDM 6549, Reg. 52).

[4] Excluding the scant Nabataean pottery collected in the area of Rās al-Miyāh East and discussed above.

sites of Rās al-Miyāh region and parallels from the Edomite highlands, is in preparation.

If the dating of the pottery sherds found at the two sites and their associated installations is correct, the Iron Age sites in the region of Rās al-Miyāh were occupied approximately one hundred years or more after the peak in early 11th – ninth century BC copper production activities in Khirbat an-Nuḥās and Khirbat al-Jāriya (Higham *et al*. 2005; Levy *et al*. 2004b; Levy *et al*. 2005). There is no large scale sophisticated copper smelting industry such as that found at Khirbat an-Nuḥās and Khirbat al-Jāriya associated with these Rās al-Miyāh fortress sites. The organization of metallurgical activities around these fortress sites is quite different form earlier Iron Age metal production. However, the interest in exploiting the copper ore in the region of Rās al-Miyāh fortresses is evident, and the question is where the smelting process took place. A good candidate is the nearby large copper smelting site of Khirbat al-Ghuwayba which is dated only generally to the 'Iron Age' (Hauptmann 2007: 132) without more precision. Although there is widespread evidence of smelting activities at Khirbat al-Ghuwayba (assumed here to date to the Iron Age IIC), judging by the thickness of slag deposits on the site surface, the scale of production was much smaller here and with relatively more simple technology, than the massive smelting work carried out more than a century earlier in the Iron IIA-B, and possibly late Iron IB periods.

Conclusions

The archaeological complex of Rās al-Miyāh is extremely rich in Iron Age remains. The two fortresses, the main focus of this paper, are associated with copper mining activities in the northern slopes of Wādī al-Ghuwayba. The fortresses were probably also connected with a defense system around the oasis of 'Ayn al-Ghuwayba, which controlled the northeastern gateway to the entire region of Faynān. The rich ceramic assemblage of the Rās al-Miyāh fortresses and associated complex of sites are probably dated to the Iron Age IIC. These complexes of Iron Age sites are situated on top of the Burj formation relatively high above the main Iron Age copper production sites of Khirbat an-Nuḥās and Khirbat al-Jāriya that date to the 11th – ninth centuries BC (Hauptmann 2007; Levy *et al*. 2005). The late Iron Age date for the newly described fortress complexes indicates perhaps the latest phase of Iron Age copper production activities in the Faynān district, which was considerably smaller in scale and simpler in technology than the industry of the Iron Age IIA in Faynān. The advanced technology of massive production displayed in Khirbat an-Nuḥās and in Khirbat al-Jāriya may have been forgotten, and/or the social organization in the Iron Age IIC was not adequate for organizing such industrial activities on a scale comparable with the earlier years of the Iron Age. Thus, the overland trade in commodities from Arabia and other regions may have been of much greater importance to late Iron Age Edom than copper production.

As the Rās al-Miyāh fortresses are located on a high plateau in a rough mountainous region, these defensive sites might be considered as part of an the late Iron Age 'Edomite pattern' of 'high places' and 'mountainous strongholds' sometimes associated with the biblical passage of Jeremiah 49:16 and sites such as Sala', Umm al-Biyāra and other highland locales (e.g. Hubner 2004; Lindner 1992; Lindner *et al*. 1996). However, besides the location and the surrounding rough terrain, the architectural similarities between the Rās al-Miyāh fortresses and other Edomite strongholds and high-places are meager.

The fortresses are distinct from each other in size, material and architectural plan. Rās al-Miyāh *West* is relatively small and has an interesting parallel in the region of Moab (Rujm al-'Abd). This parallel should be taken into consideration when estimating the differences and boundaries between the Iron Age polities of Cis-Jordan. The fortress of Rās al-Miyāh *East* is a massive, well planned fortress with no clear archaeological parallels. The huge labor effort manifested in the construction of the structure together with the details of the architectural plan suggests a centralized and well organized society in Edom during the late Iron Age. The fact that actual metal production actives was meager just when tremendous expenditures were invested in the construction of these fortresses remains a puzzle. The construction process at the Rās al-Miyāh *East* fortress was never finished. It ceased abruptly, maybe as a result of an economic crisis, a threat or a war, a failed economic policy in the Late Iron Age, external factors, or a combination of these variables. Additional excavation probes may provide the much needed answer to this question. However, it is clear that there are cycles of metal industry accompanied by changes in the intensity

of copper production through the full Iron Age sequence in Edom that researchers are now beginning to consider. The relationship between the new archaeological data presented here and the ancient texts including the Hebrew Bible will be discussed elsewhere. Taking these new data together, this report on the Rās al-Miyāh fortresses contributes to our understanding of how people 'crossed Jordan' in the copper-ore rich Faynān district of Edom.

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