

“A LAND WHOSE STONES ARE IRON, AND OUT OF WHOSE HILLS YOU CAN DIG COPPER”*: THE EXPLOITATION AND CIRCULATION OF COPPER IN THE IRON AGE NEGEV AND EDMOM

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Abstract

This paper reviews the archaeological data concerning the mining and circulation of copper extracted from the mines of the Arabah valley (Timna and Faynan) during the Iron Age. In addition to describing the finds, the paper presents a socioeconomic reconstruction of the exploitation and exchange of copper controlled, in the Iron Age I, by the local pastoral groups, and in the Late Iron Age II by the Edomite state.

Resumen

Este artículo examina desde un punto de vista socioeconómico los datos arqueológicos concernientes a la explotación minera y circulación del cobre en el valle de Arabá durante la Edad de Hierro por los grupos nómades de la comarca edomita.

There seems to be a general agreement that a most significant social and economic transformation occurred in the Negev and Edom (southern Jordan) during the Iron Age. For many researches, trade in Arabian aromatics is the epitome of the reasons behind the local socioeconomic development.¹ According to this view, the development of the Arabian incense trade in the Late Iron Age II marks the beginning of the Iron Age exchange networks in these areas. Although earlier dates have been proposed, unquestionable archaeological and epigraphic evidences of the Arabian trade appear only in the eighth century BC.² The importance of the Negev and Edom resided in their geographical location: throughout the Negev, and especially the Beersheba valley, crossed the route which, coming from northwestern Arabia, came into the Phil-

* Deuteronomy 8:9.

¹ E.g. E.A. Knauf, *Midian. Untersuchungen zur Geschichte Palästinas und Nordarabiens am Ende des 2. Jahrtausends v.Chr.* (Abhandlungen des Deutschen Palästinavereins; Wiesbaden: Harrassowitz, 1988); I. Finkelstein, “Arabian Trade and Socio-Political Conditions in the Negev in the Twelfth-Eleventh Centuries B.C.E.,” *JNES* 47 (1988): 241-52; idem, *Living on the Fringe. The Archaeology and History of the Negev, Sinai and Neighbouring Regions in the Bronze and Iron Ages* (Monographs in Mediterranean Archaeology 6; Sheffield: Sheffield Academic, 1995), 122; P. Bienkowski and E. van der Steen, “Tribes, Trade and Towns: A New Framework for the Late Iron Age in Southern Jordan and the Negev,” *BASOR* 323 (2001): 21-47.

² Cf. J. Retsö, “The Domestication of the Camel and the Establishment of the Fran incense Road from South Arabia,” *Orientalia Suecana* 40 (1991): 187-219; R. Byrne, “Early Assyrian Contacts with Arabs and the Impact on Levantine Vassal Tribute,” *BASOR* 331 (2003):11-25.

istine outlets in the southern coastal zone; along Edom crossed another branch, towards central Jordan, Syria and beyond.

This view seems to have been prevalent in modern scholarship until recently. But, as is widely known, the Arabian trade is one example of the exchange in “invisible” products that do not leave many traces in the archaeological record. Therefore, several questions arise. Can other models of exchange, not necessarily having the Arabian trade as the main *raison d’être*, be found in the Iron Age Negev and Edom? Are evidences of exchange totally absent in the archaeological record prior to the eighth century BC?

In my opinion, interest in this “invisible” long-distance trade has underestimated the importance of economic factors of more local character. The intention of this paper is not to question the importance of the Arabian trade in aromatics but rather to address another question that has occupied research in recent years, namely, the mining and circulation of copper extracted at the Arabah valley mines –most notably Timna and Faynan- during the Iron Age, of which I suggest there is considerable amount of archaeological evidence.

1. METALLURGY AND EXCHANGE OF COPPER IN THE IRON AGE SOUTHERN LEVANT

The strategic importance of copper resided in the fact that bronze, an artificial alloy of copper and tin, was the most important metal used for utilitarian purposes in the ancient Near East during the third and second millennia BC. While the sources of tin during this period remain to be determined –the most feasible locations being the Taurus Mountains in Anatolia, Iran and Afghanistan-, we do know that one of the most important sources of copper for the Levant was the island of Cyprus. Although the Iron Age is taken to have begun c. 1200 BC, iron replaced bronze as the main utilitarian metal in a gradual and complex process that only ended, in the southern Levant, at c. 1000 BC.³

Traditionally it was assumed that the disruption of the Mediterranean trade networks in the 12th century BC caused a considerable shortage of copper and tin, and that this was the driving force behind the increasing use of iron as a substitute of

³ J. Curtis (ed.), *Bronzeworking Centres of Western Asia c. 1000-539 B.C.* (London: Kegan Paul International, British Museum, 1988); P.M. McNutt, *The Forging of Israel: Iron Technology, Symbolism, and Tradition in Ancient Society* (JSOT Suppl. Series 108, The Social World of Biblical Antiquity Series 8; Sheffield: Almond Press, 1990), 152; S. Sherratt, “Commerce, Iron and Ideology: Metallurgical Innovation in the 12th-11th Century Cyprus,” in *Proceedings of the International Symposium: Cyprus in the 11th Century B.C.* (ed. V. Karageorghis; Nicosia: Leventis Foundation, University of Cyprus, 1994), 59-106; J.D. Muhly, “Mining and Metalwork in Ancient Western Asia,” in *Civilizations of the Ancient Near East* (ed. in chief J.M. Sasson; Vol. 3; New York: Charles Scribner’s Sons, Simon and Schuster Macmillan, 1995) 1501-21; P.R.S. Moorey, *Ancient Mesopotamian Materials and Industries: The Archaeological Evidence* (Reprint; Winona Lake: Eisenbrauns, 1999), 242-78.

bronze. More specifically, it has been claimed that the decrease or cease in the copper supplies from Cyprus encouraged the survey and exploitation of new sources of copper, most notably the Arabah valley mines.⁴ There is increasing evidence, however, that relations between the Levant and Cyprus continued during the 12th century (albeit at a low level),⁵ being well attested again in the second half of the 11th century BC,⁶ approximately the period in which the copper mining at Faynan seems to have resumed again after centuries of inactivity. Furthermore, some caution must be expressed due to the number of high-tin bronzes found at several Early Iron sites in Greece and the Levant.⁷ In fact, very few furnaces or other facilities for the production of iron have been found in Early Iron Levantine sites, and these are largely outnumbered by the evidence of bronze metallurgy.⁸ This is consistent with the archaeological evidence that indicates the continuation of bronze metallurgy in Palestine and Jordan during the Early Iron Age.⁹

- 4 M. Liverani, "The Collapse of the Near Eastern Regional System at the End of the Bronze Age: the Case of Syria," in *Centre and Periphery in the Ancient World* (eds. M. Rowlands, M. Larsen and K. Kristiansen; Cambridge: Cambridge University Press, 1987), 71; Knauf, "King Solomon's Copper Supply," in *Studia Phoenicia XI: Phoenicia and the Bible. Proceedings of the Conference held at the University of Leuven on the 15th and 16th of March 1990* (ed. E. Lipiński; Orientalia Lovaniensia Analecta 44; Leuven: Peeters, 1991), 185; idem, "The Cultural Impact of Secondary State Formation: The Cases of the Edomites and Moabites," in *Early Edom and Moab: The Beginning of the Iron Age in Southern Jordan* (ed. P. Bienkowski; Sheffield Archaeological Monographs 7; Oxford: Collis, 1992), 48.
- 5 Sherratt, "Commerce, Iron and Ideology," 69-71.
- 6 Amihai Mazar, "The 11th Century B.C. in the Land of Israel," in *Cyprus in the 11th Century B.C.* (ed. V. Karageorghis), 51.
- 7 J.C. Waldbaum, "The First Archaeological Appearance of Iron and the Transition to the Iron Age," in *The Coming of the Age of Iron* (eds. T.A. Wertime and J.D. Muhly; New Haven and London: Yale University Press, 1980), 83-87; Muhly, "Mining and Metalwork," 1515.
- 8 N.A. Mirau, "The Social Context of Early Iron Working in the Levant," in *Urbanism in Antiquity: From Mesopotamia to Crete* (eds. W.E. Aufrecht, N.A. Mirau and S.W. Gauley; JSOT Suppl. Series 244; Sheffield: Sheffield Academic Press, 1997), 105-06.
- 9 In Palestine and Jordan, indications of bronze or copper metalwork during the Iron Age I exists at Tel Mor (Stratum VI), Tell Qasile (Strata XI-X), Beth Shemesh (Stratum III), Khirbet Raddana, Beth-Shean (Level VI), Dan (Stratum V), Tel Harashim and Tell Deir ±Alla (Phase B). In addition, large amounts of bronze items, mainly utilitarian, have been found at Tel Nami, Megiddo (Locus 1739/Stratum VIA), Beth-Shean (Level VI - Tomb 90 in Northern Cemetery), Tell el-Mazar, Tel Dothan (Tomb 1/Level 1), Beth Shemesh (Tomb 2 - Strata IVb-III), Deir el-Balah (Tombs 114 and 118), Tell el-Far±ah (south) (Cemeteries 500 and 900), Gezer (Tomb 252), Lachish (cave dwelling), Tell Deir ±Alla, Madeba (Tomb A), Tell es-Sa±idiyeh (Graves 32, 101-102 and 119/Stratum XII), and Tell el-±Umayri. Cf. Mazar, *Archaeology of the Land of the Bible: 10.000-586 B.C.E.* (The Anchor Bible Reference Library; New York: Doubleday, 1990) 359; J.N. Tubb, , "The Role of the Sea Peoples in the Bronze Industry of Palestine/Transjordan in the Late Bronze-Early Iron Age Transition," in *Bronzeworking Centres* (ed. Curtis), 254, n. 5; idem, "Sea Peoples in the Jordan Valley," in *The Sea Peoples in Their World: A Reassessment* (ed. E.D. Oren; University Museum Monograph 108, University Museum Symposium Series 11; Philadelphia: The University Museum, University of Pennsylvania, 2000), 191-92; D. Wengrow, "Egyptian Taskmasters and Heavy Burdens: Highland Exploitation and the Collared-Rim Pithos of the Bronze/Iron Age Levant," *Oxford Journal of Archaeology* 15.3 (1996): 320; O. Negbi, "Were There Sea Peoples in the Central Jordan Valley at the Transition from the Bronze

Many other social factors and customs could also have had some effect on the circulation of metals in the Iron Age. There is some archaeological evidence in the Early Iron Age that may point to metallurgical activities associated with ritual contexts. The presence of cultic places at Timna (southern Arabah) may have permeated some kind of cultic significance to the copper metalworking at the site: next to the *bamah* (high place) of Site 2 remains of metallurgical operations were found; whereas at the Hathor Temple's courtyard another workshop was discovered. It is quite probable that the copper processing activities were an integral part of the ritual.¹⁰ Similarly, in Tel Masos (Beersheba valley), archaeologists unearthed a workshop for casting metals (House 314: Stratum II), which contained molded stones similar to the votive offerings found at Timna's Mining Temple, which would suggest a ritual context.¹¹ All of these data are also reinforced by the evidence from the turquoise mining operations at Serabit el-Kadim, in west-central Sinai. At Serabit, the Egyptians and the local workers built a large temple dedicated to the goddess Hathor, who among other epithets was known as the "Lady of the Turquoise."¹² To these examples we probably should add the case of Tell Deir ʿAlla (Phase B) in central Jordan, where metal workers carried out their craft among and on the ruins of a Late Bronze shrine, which they rapidly restored.¹³ Lastly, we should mention the recent discovery of cemetery Wadi Fidan 40, located at the heart of the mining region of Faynan in southern Jordan. Here, archaeologists unearthed four graves that contained metal objects (copper and iron rings, anklets, bracelets and earrings), which may have had attached some sort of symbolic value.¹⁴

Although these findings are by no means easy to interpret, we know that in ancient societies metal-making did not possess the scientific connotations that it does have in the industrial world. The various activities related to it were necessarily ritualized and symbolic. Ethnological researches on metalwork activities have shown that ritual contexts are usual in every stage of the production process; even the act of firing has ritual significance. More specifically, early metallurgy was often associated with politico-religious power and charisma.¹⁵

Age to the Iron Age?," *TA* 18 (1991): 216-22; G. London, "Central Jordanian Ceramic Traditions," in *Ancient Ammon* (eds. B. Macdonald and R.W. Younker; Studies in the History and Culture of the Ancient Near East vol. 17; Leiden: Brill, 1999), 80.

¹⁰ B. Rothenberg, "Archaeo-Metallurgical Researches in the Southern Arabah 1959-1990. Part 2: Egyptian New Kingdom (Ramesside) to Early Islam," *PEQ* 131 (1999): 158, 171-72.

¹¹ Fritz and A. Wittstock, "Areal H," in *Ergebnisse der Ausgrabungen auf der -irbert el-Mšāš (Tl Māšōš) 1972-1975* (eds. V. Fritz and A. Kempinski; Wiesbaden: Harrassowitz, 1983), 40-41.

¹² Y. Beit-Arieh, "Fifteen Years in Sinai. Israeli Archaeologists Discover a New World," *BAR* 10: 26-54.

¹³ G. van der Kooij and M.M. Ibrahim (eds.), *Picking up the Threads...A Continuing Review of Excavations at Deir Alla, Jordan* (Leiden: University of Leiden, Archaeological Centre, 1989), 80-81; McNutt, *The Forging of Israel*, 207-08.

¹⁴ T. E. Levy, R.B. Adams and R. Shafiq, "The Jebel Hamrat Fidan Project: Excavations at the Wadi Fidan 40 Cemetery, Jordan (1997)," *Levant* 31 (1999): 302.

¹⁵ P. Budd and T. Taylor, "The Faerie Smith Meets the Bronze Industry: Magic versus Science in the Interpretation of Prehistoric Metal-making," *World Archaeology* 27.1 (1995): 138-39; McNutt, *The Forging*

How many of these metal items originated from Arabah copper ores is regrettably difficult to evaluate. At the present time the discussion is incomplete because too little is known about the chemical composition of copper/bronze artifacts found in Palestine and Jordan. Few analyses have been done, and for that reason the amount of Arabah copper in southern Levantine archaeological assemblages is unknown. Fortunately, it seems that recent studies are changing this picture. Recent analyses on bronze artifacts from a tomb at Pella in the Jordan valley, dated to the late 11th or 10th centuries BC, gave lead isotope signatures consistent with the copper from Faynan deposits¹⁶ (cf. below the case of Khirbet edh-Dharrah). The evidence is insufficient, however, to judge the nature, scope, and intensity of these connections.

It has been pointed out in recent years that copper played an important role in previous periods of Negev's history, more specifically in the Chalcolithic,¹⁷ and the Early Bronze and Intermediate Bronze Ages.¹⁸ For the Early Iron Negev and Edom there is, unfortunately, limited evidence concerning the processing and circulation of copper outside the mining areas. Apart from Timna and Faynan, the technology for casting copper has been found at only a few places; and even in these cases the remains are not very impressive (see below).

However, it has been noted that the evidence of metallurgy and circulation of copper is very difficult to assess. For example, we should not expect (except in shipwrecks) to find large quantities of copper ingots –the form into which the copper was generally transformed for transport or further casting–, given that these items were expensive as well as easily portable. Instead, the less expensive stone tools, used for hammering, polishing and grinding, as well as the remains of pyrotechnical facilities (crucibles, furnaces, slag, etc.), are more frequent.¹⁹ Further to this kind of evidence, it is the case of the items used to carry the copper, consisting of packings made of organic materials, especially straw and leather. These materials are highly perishable and generally do not survive in the archaeological assemblage. It must be assumed, there-

ing of Israel, 45-46. Cf. also S. Needham, "When Expediency Broaches Ritual Intention: The Flow of Metal between Systemic and Buried Domains," *Journal of the Royal Anthropological Institute* (N.S.) 7 (2001): 275-98.

¹⁶ G. Philip, P.W. Clogg, D. Dungworth and S. Stos, "Copper Metallurgy in the Jordan Valley from the Third to the First Millennia BC: Chemical, Metallographic and Lead Isotope Analyses of Artifacts from Pella," *Levant* 35 (2003): 91.

¹⁷ J. Golden, T.E. Levy and A. Hauptmann, "Recent Discoveries Concerning Chalcolithic Metallurgy at Shiqmim, Israel," *Journal of Archaeological Science* 28 (2001): 961.

¹⁸ T. E. Levy, R.B. Adams, A. Hauptmann, M. Prange, S. Schmitt-Strecker and M. Najjar, "Early Bronze Age Metallurgy: A Newly Discovered Copper Manufactory in Southern Jordan," *Antiquity* 76 (2002): 432-33; M. Haiman, "Early Bronze Age IV Settlement Pattern of the Negev and Sinai Desert: View from Small Marginal Temporary Sites," *BASOR* 303 (1996):1-32; Y. Yekutieli, S. Shalev and S. Shilstein, "±En Yahav – A Copper Smelting Site in the ±Arava," *BASOR* 340 (2005): 1-21. But see the criticism of B.A. Sidel, *Arid Zone Pastoralists in the Early Bronze Age in the Southern Levant* (Unpublished Ph.D. Thesis; Cambridge: Harvard University, 1998), 243-63.

¹⁹ Haiman, "Early Bronze Age IV Settlement Pattern," 20; Levy et. al., "Early Bronze Age Metallurgy," Fig. 4.

fore, that the quantity of metal remains found in the Early Iron Negev and Edom may not indicate the real weight of copper in the economy of that time.

As for the possible provenance of the copper of which the objects were made, some difficulties arise too. Many of the metal artifacts were melted and alloyed again to be used later on as recycled objects, thus making difficult to know the source of the copper.²⁰ An additional difficulty lies in the mineralogical and geochemical composition of the Arabah copper ores. Because of their common origin, the ores from both sides of the Arabah valley are very much the same in the isotopic composition of their lead and in their trace element contents. Therefore, no analysis based on these parameters allows us to distinguish unambiguously between copper produced at Timna and Faynan.²¹

2. EVIDENCE OF METALWORK IN THE IRON AGE NEGEV AND EDM

A review of the survey and excavation reports reveals at least two large quarrying and metalwork centers (Timna and Faynan) and seven metal workshops in the Iron Negev and Edom (Fig. 1).

Wadi Faynan. The Wadi Faynan area, located 60 km south of the Dead Sea at the eastern foothills of the Arabah valley, has the distinction of being the largest source of copper ore in the southern Levant (Fig. 2). It contains nodules of copper ore consisting mainly of malachite, chalcocite and chrysocolla.²² Research made in the area has discovered evidence of exploitation since the Pre-Pottery Neolithic, which continued during the Chalcolithic Period, Early Bronze Age, Iron Age, and the Roman and Early Islamic Periods.²³ The mining of local copper ores during the Iron Age resumed after a hiatus in activity during the Middle and Late Bronze Ages. When and by whom the Iron Age exploitation started is, however, a matter of debate.

Most of the evidence of Iron Age occupation in the Wadi Faynan area was found - listing from south to north- at the site of Barqa el-Hetiye 2; along the banks of the Wadi Fidan (Wadi Fidan 40 cemetery); Wadi al-Ghuwayb (Khirbet en-Nahas site); and Wadi al-Jariya (Khirbet al-Jariya site).

At Barqa el-Hetiye 2, a team directed by Fritz surveyed and excavated a building - House 108-, and to its southeast numerous mounds consisting of ash mixed with

²⁰ Mazar, *Archaeology of the Land of the Bible*, 359; Haiman, op. cit., 24.

²¹ A. Hauptmann, F. Begemann, E. Heitkemper, E. Pernicka and S. Schmitt-Strecker, "Early Copper Produced at Feinan, Wadi Arabah, Jordan: The Composition of Ores and Copper," *Archaeomaterials* 6 (1992): 1-33.

²² Ibid.

²³ Hauptmann, *Zur frühen Metallurgie des Kupfers in Fenan/Jordanien* (Der Anschnitt, Beiheft 11; Bochum: Deutsches Bergbau-Museum, 2001).

earth, remains of ovens, working stones and pieces of copper. The building was radiocarbon dated to the ninth century BC.²⁴

At the bank of the Wadi Fidan, a pottery survey carried out by the Jabal Hamrat Fidan Project (JHFP) recorded, in a small sample zone, twenty-four Iron I-II sites. Interestingly, only one of these sites was associated with a settlement with architecture.²⁵ Wadi Fidan 40 cemetery, located on the bank of the Wadi Fidan, was excavated in 1997 and again in 2004.²⁶ A total of 236 graves, each containing the skeletal remains of several individuals, were dug, though it is estimated that the cemetery contains a minimum of 3,500 mortuary structures. Details of the site are available only from the 1997 season. Material goods were not very impressive and consisted mainly of beads, metal jewelry and wooden bowls. There were not pottery finds associated with these burials. Four graves contained metal objects: Grave 54 (one iron and two copper rings), Grave 92 (two copper anklets, one iron bracelet and a metal earring fragment), Grave 97 (one copper bracelet) and Grave 12 (one iron ring). According to radiocarbon results, Wadi Fidan 40 can be dated with a 95% confidence to the 1130-815 BC, thus falling roughly in the transitional period Iron I-II. The nature of the findings led the excavators to conclude that the local pastoral nomads used the cemetery, very likely the *shasu* of the New Kingdom Egyptian sources.

At the Wadi al-Ghuwayb, the JHFP survey identified nine Iron Age sites. However, the only permanent settlement was Khirbet en-Nahas, the largest site in the area, measuring c. 10 ha. The site consists of over one-hundred building complexes and over thirty-four massive slag mounds. The most prominent feature is a large square fortress with a one four-chamber gate.²⁷ In 2002 part of the gate complex of this fortress was excavated (Area A), and a sequence of four main strata (A4-A1) was established associated with evidence of copper production. Radiocarbon dates place its construction at the beginning of the 10th century and its end at the 9th century BC. Excavation and radiocarbon dates from a nearby metalwork building (Area S) revealed

²⁴ V. Fritz, "Vorbericht über die Grabungen in *Barqā el-Hetīye* im Gebit von *Fenān, Wādī el-ʿAraba* (Jordanien) 1990," *ZDPV* 110 (1994): 125-50; idem, "Copper Mining and Smelting in the Area of Feinān at the End of Iron Age I," in *Aharon Kempinski Memorial Volume: Studies in Archaeology and Related Disciplines* (eds. S. Amitiv and E.D. Oren; Studies by the Department of Bible and Ancient Near East Vol. 15; Beersheba: Ben-Gurion University of the Negev Press, 2002), 96-98.

²⁵ Levy, Adams, A.J. Witten, J.M. Anderson, Y. Arbel, S. Kuah, J. Moreno, A. Lo and M. Wagonner, "Early Metallurgy, Interaction, and Social Change: The Jabal ʿamrat Fīdīn (Jordan) Research Design and 1998 Archaeological Survey: Preliminary Report," *ADAJ* 45 (2001): 180-81.

²⁶ Levy et. al., "The Jebel Hamrat Fidan Project," 299-314; Levy, Adams, and A. Muniz, "Archaeology and the Shasu Nomads: Recent Excavations in the Jabal Hamrat Fidan, Jordan," in *Le-David Maskil. A Birthday Tribute for David Noel Freedman* (eds. R.E. Friedman and W.H. Propp; Biblical and Judaic Studies from the University of California, San Diego; Winona Lake: Eisenbrauns, 2004), 63-89; Levy and M. Najjar, "Wadi Fidan," *AJA* 109 (2005): 546-50.

²⁷ Levy, Adams, Anderson, Najjar, N. Smith, Y. Arbel, L. Soderbaum and Muniz, "An Iron Age Landscape in the Edomite Lowlands: Archaeological Surveys along Wādī al-Ghuwayb and Wādī al-Jāriya, Jabal ʿamrat Fīdīn, Jordan, 2002," *ADAJ* 47 (2003): 268-70.

a longer period of settlement, between the 12th and 9th centuries BC (strata S4-S2). Significant amounts of Negevite and Midianite pottery were found, which seem to confirm these dates.²⁸

The Wadi al-Jariya contains twenty-seven recorded Iron Age sites. The site of Khirbet al-Jariya dominates the settlement pattern, consisting of clusters of rectilinear buildings and slag mounds; there are remains of a square fortified tower.²⁹

The lack of any firm chronological anchor in the Wadi Faynan district precludes any definitive conclusion regarding the sociohistorical processes behind the resuming of exploitation in the Iron Age. In fact, the problem of the beginning of activities at Faynan is included in the broader issue of the beginning of occupation in Edom during the Iron Age.

Two decades ago, Hart and Knauf³⁰ classified the pottery of the Faynan district into three groups: (1) Late Iron II Edomite pottery (7th-6th centuries BC); (2) Negevite pottery (with no independent dating); and (3) Non-Edomite Iron Age pottery, which do not relate to any Palestinian or Jordanian equivalents. Types 1 and 3 are usually found in association, except for the Wadi Khaled mines, where Type 1 was found in isolation. Therefore, Hart and Knauf suggested that Type 3 is partially earlier than the standard Edomite pottery, although the date of these pre-Edomite wares remains uncertain. It seems that the recent pottery surveys carried out in the area point to occupation in the Iron I. The surveys in the Wadi Faynan carried out by the Wadi Faynan Project (WFP) seem to uphold the view of a pre-Edomite pottery horizon: whereas some sites yielded both Edomite and “generic” Iron Age pottery (WF4.1-4.6), at least in one site (WF424) Type 3 pottery was found in isolation.³¹ The SGNAS survey recorded Iron I-II pottery at Khirbet en-Nahas, Khirbet al-Ghuwayb and Khirbet al-

²⁸ Levy, Adams, Najjar, Hauptmann, Anderson, B. Brandl, M.A. Robinson and T. Higham, “Reassessing the Chronology of Biblical Edom: New Excavations and ¹⁴C dates from Khirbat en-Nahas (Jordan),” *Antiquity* 78 (2004): 863-76; cf. also Fritz, “Ergebnisse einer Sondage in *-irbet en-Naḥās, Wādī el-‘Arāba* (Jordanien),” *ZDPV* 112 (1996): 1-9.

²⁹ Levy et. al., “An Iron Age Landscape,” 270-71.

³⁰ “Wadi Feinan Iron Age Pottery,” *Newsletter of the Institute of Archaeology and Anthropology, Yarmuk University* 1 (1986): 9-10.

³¹ G.W. Barker, R.B. Adams, O.H. Creighton, D.D. Gilbertson, J.P. Grattan, C.O. Hunt, D.J. Mattingly, S.J. McLaren, H.A. Mohamed, P. Newson, T.E.G. Reynolds and D.C. Thomas, “Environment and Land Use in the Wadi Faynan, Southern Jordan: the Second Season of Geoarchaeology and Landscape Archaeology (1997),” *Levant* 30 (1998): 20-21; Barker, Adams, Creighton, D. Crook, Gilbertson, Grattan, Hunt, Mattingly, McLaren, Mohammed, Newson, C. Palmer, F.B. Pyatt, Reynolds and R. Tomber, “Environment and Land Use in the Wadi Faynan, Southern Jordan: the Third Season of Geoarchaeology and Landscape Archaeology (1998),” *Levant* 31 (1999): 283; Barker, Adams, Creighton, P. Daly, Gilbertson, Grattan, Hunt, Mattingly, McLaren, Newson, Palmer, Pyatt, Reynolds, H. Smith, Tomber and A.J. Truscott, “Archaeology and Desertification in the Wadi Faynan: the Fourth (1999) Season of the Wadi Faynan Landscape Survey,” *Levant* 32 (2000): 49.

Jariya.³² While the pottery found by the JHFP survey at Wadi Fidan is referred to as belonging to the "generic 'Iron I-II'",³³ the pottery recorded by the Wadi al-Ghuwayb and Wadi al-Jariya's surveys seems to belong to the last part of the Iron II.³⁴

Nonetheless, the hypothesis of Early Iron occupation at Faynan has met with strong opposition. Most notably, Bienkowski has made a case of the absence of Iron I pottery in Edom, arguing that the pottery (especially collared-rim jars, Negevite and Midianite pottery) recovered from surveys and dated to that period were misidentified, thus actually belonging to the Iron II.³⁵ It is important to note, however, that the major studies on the pottery of Edom have not been made on Faynan material, but rather on pottery found at sites in the Edomite plateau, which certainly does seem to date to c. 800 BC at the earliest.

The radiocarbon dates collected at Faynan suggest an occupation spanning a broader span of time, ranging from the 12th until the 9th century BC, then including the Iron I and the first half of the Iron II periods. However, the use of radiocarbon dates in the recent excavations at Khirbet en-Nahas have been strongly criticized by some scholars. Finkelstein³⁶ have recently pointed out that the earliest ¹⁴C dates from the fort area came from industrial waste and fills (strata A4-A3-A2b) *under* the fort, whose floors have not been preserved. Therefore, the fort was apparently constructed *later* than the copper production activity at the site. Moreover, van der Steen and Bienkowski³⁷ have strongly criticized the use of Bayesian calibrated ¹⁴C dates by Levy's team, insomuch they reach dates considerably earlier than the original calibrated radiocarbon dates.

Khirbet edh-Dharib. Located 40 km. northeast of the Faynan district, Khirbet edh-Dharib has provided evidence of metallurgical work during the Late Iron Age. The French excavations exposed, underneath the Roman level remains, metallurgical debris consisting of crucible slags, metal lumps and fragments of multiple layered refractory material, in association with fireplaces. Unfortunately, the Roman leveling greatly disturbed the earlier stratum. The pottery was found to be Late Iron II (7th-5th centuries BC). Lumps of metal analyzed turned out to be an alloy of leaded tin bronze, a confirmation that alloying and further treatment of copper to produce bronze was

³² B. MacDonald, *The Southern Ghors and Northeast ±Arabab Archaeological Survey* (Sheffield Archaeological Monographs 5; Sheffield: Collis, Department of Archaeology and Prehistory, University of Sheffield, 1992), 73-81.

³³ Levy et. al., "Early Metallurgy," 180.

³⁴ Levy et. al., "An Iron Age Landscape," 264.

³⁵ P. Bienkowski, "Iron Age Settlement in Edom: A Revised Framework," in *The World of the Aramaeans II: Studies in History and Archaeology in Honour of Paul-Eugène Dion* (eds. P.M.M. Daviau, J.W. Wevers and M. Weigl; JSOT Suppl. Series 325; Sheffield: Sheffield Academic Press, 2001), 257-69.

³⁶ I. Finkelstein, "Khirbet en-Nahas, Edom and Biblical History," *TA* 32 (2005): 122-23.

³⁷ van der Steen and Bienkowski, "Radiocarbon dates from Khirbat en-Nahas: A Methodological Critique," *Antiquity* 80 (2006) (www.antiquity.ac.uk)

carried out at the site. The studies pointed to Faynan or Timna as the most likely sources of the copper ores.³⁸

Southern Arabah valley. The southern Arabah was exploited over the centuries thanks to its rich copper ore deposits. The key place is Timna valley (*Wadi Meneziyeh*), located about 30 km. north of the Gulf of Aqaba. It is a large, semi-circular erosional formation that contains nodules of copper ore consisting of chalcocite, malachite, chrysocolla, and plancheite. The periods of occupation span the Late Pottery Neolithic, Chalcolithic, Early Bronze Age, Late Bronze/Iron I Ages, Roman and Early Islamic periods.³⁹ It was in the Late Bronze/Iron I, however, when the New Kingdom Egyptians of the 19th and 20th Dynasties carried out the first state-directed mining enterprise. Evidence of occupation has been found between pharaohs Seti I (c. 1294-1279 BC) and Ramses V (c. 1160-1156 BC).

The several surveys and excavations led by Rothenberg between 1959 and 1990 discovered several mining galleries, and at least eleven camps in which the smelting of copper took place, as well as serving for storage and habitation for workers. The expeditions excavated two of the smelting camps, Site 2 and Site 30, finding abundant evidence of the metallurgical activities that were carried out there, especially smelting furnaces, workshops and slag heaps (Fig. 3). Accumulation of windblown sand in Site 2 suggests that it may have been occupied seasonally rather than year-round.⁴⁰

The complex nature of the site is corroborated by the occurrence of cultic places in the area. In Site 2, two structures of this kind were uncovered: a small building identified as a "Semitic" shrine and, on the top of a hill, a high place (*bamah*). Next to the latter there were vestiges of casting operations. The most striking remains were found at Site 200: a "Mining Temple" dedicated to the cult of the Egyptian goddess Hathor (Fig. 4). The Egyptian activities are attested in Layers IV-III. In the courtyard of the Temple, a small casting workshop was discovered, where copper and bronze votive offerings were made. According to Rothenberg, after the Egyptians withdrew from Timna (mid-12th century BC) the Temple (Layer II) was taken over for a short time by peoples of northwestern Arabian origin, the Midianites, who re-arranged the architectural structure but probably continued the metallurgical operations of the previous period.

Four main types of pottery can be identified at Timna: Egyptian, local wheel-made, Negevite, and Midianite wares. It seems clear that the two former types represent the

³⁸ S. Klein and A. Hauptmann, "Iron Age leaded tin bronzes from Khirbet Edh-Dharih, Jordan," *Journal of Archaeological Science* 26 (1999): 1075, 1079.

³⁹ H.G. Conrad and B. Rothenberg (eds.), *Antikes Kupfer im Timna-Tal. 4000 Jahre Bergbau und Verhüttung in der Arabah (Israel)* (Der Anschnitt, Beiheft 1; Bochum: Deutsches Bergbau-Museum Bochum, 1980).

⁴⁰ Rothenberg, *Timna: Valley of the Biblical Copper Mines* (London: Thames and Hudson, 1972); idem (ed.), *The Egyptian Mining Temple at Timna* (Researches in the Arabah 1959-1984 vol. 1; London: Institute for Archaeo-Metallurgical Studies, Institute of Archaeology, University College London, 1988); idem, "Archaeo-Metallurgical Researches in the Southern Arabah," 149-75.

presence of Egyptian population in the area. Negevite and Midianite wares, on the other hand, attest the presence of a non-Egyptian population -from the Negev in the case of the Negevite pottery, from the Hejaz in the case of the Midianite pottery (see below)- at Timna, very likely working at the mines and work camps.⁴¹ What was their relationship with the Egyptians, and what was the extent of the Egyptian control over them, is still a matter of debate.

South of Timna valley, additional archaeometallurgical material associated with the above referred pottery types was found at the mines of Nahal 'Amram (*Wadi 'Amran*), and at a camping site at Nahal Shlomo (*Wadi Masr*).

Jezirat Far'aun. Jezirat Far'aun, or Coral Island, is an offshore island located 1,5 km. from the Sinai coast and 11 km. south of modern Eilat. Here, remains of a small metallurgical installation were found, as well as fayalite slag (an iron-based silicate), evidence of small scale iron-smelting activities.⁴² A number of Midianite sherds were found in the vicinity.⁴³

Yotvata (\pm Ayn el-Ghadian). In the Iron Age fortress at Yotvata archaeologists uncovered pieces of copper slag, a low-quality copper ingot, a small piece of copper, and a layer of ashes and slag. Probably related to the copper production were grinding stones and flint hammers.⁴⁴ Occurrence of Midianite pottery at the site suggests an Iron I date for this material assemblage.

Givat Hazeva (Givat Parsa). A smelting site was found on the top of Givat Haseva, a hill northwest of the Iron Age fortress of 'En Haseva.⁴⁵ The site, still unpublished, consists of three areas, of which two are important for our discussion: a) one cultic site (eastern part), with Edomite pottery similar to the cultic pottery found in the *favis-sa* (cultic pit) at the nearby 'En Haseva; b) one smelting site (western part), with Edomite and Midianite sherds (but no cultic vessels). The findings at the latter area include two furnaces for smelting copper, slag and part of a blowpipe. The pottery of the site, which includes Edomite, Negevite and Midianite wares, has been dated to the 7th-6th centuries BC.⁴⁶ However, due to the appearance of Midianite pottery, an earlier date cannot be discarded.

Tel Masos (Khirbet el-Meshash). Tel Masos, located at the heart of the Beersheba valley, was the largest and most complex site of the first wave of settlement in the Iron Age Negev.⁴⁷ At this site, House 314 (Area H)⁴⁸ as well as House 96 (Area A),⁴⁹ both

⁴¹ Rothenberg and J. Glass, "The Midianite Pottery," in *Midian, Moab and Edom: The History and Archaeology of Late Bronze and Iron Age Jordan and North-West Arabia* (eds. J.F.A. Sawyer and D.J.A. Clines; JSOT Suppl. 24; Sheffield: JSOT Press, 1983), 65-124.

⁴² A. Flinder, "Is This Solomon's Seaport?," *BAR* 15 (1989): 41.

⁴³ Rothenberg and Glass, "The Midianite Pottery," 76-77.

⁴⁴ Z. Meshel, "Yotvata," *NEAEHL*, vol. 4, 1518.

⁴⁵ R. Cohen and Y. Yisrael, "En 'aDeva -Giv'at Haparsa," *ESI* 2 (1983): 45.

⁴⁶ Y. Yisrael and S. Ben Arie, pers. comm., 2005.

⁴⁷ Cf. J.M. Tebes, "A New Analysis of the Iron Age I 'Chiefdom' of Tel Masos (Beersheba Valley)," *Aula Orientalis* 21 (2003): 63-78.

from Stratum II (dated by the archaeologists to the late-12th and mid-11th centuries BC; but most recently considered to be of 10th century BC date),⁵⁰ have been identified as metal workshops. Archaeometallurgical material discovered at these structures include copper remains, slag, crucibles, work stones (used as tools: a hammer, an anvil and a counterbalancing weight), smelting kilns and ash layers.⁵¹ House 314 may have been connected to a ritual function, as has been suggested by the appearance of molded stones reminding human figures, very similar to the offerings found at the Mining Temple of Timna. The excavators interpreted the building as the home of a high-ranking person, who controlled craft activities and had connections with the interregional trade.⁵² According to the final report of the excavations, it appears that the copper material originated in the Arabah (Timna or Faynan) and from recycled materials.⁵³ More recently, Kempinski has suggested that two pieces of copper originated in melted down vessels.⁵⁴

Eight Midianite sherds, probably part of a single vessel, were found at House 314;⁵⁵ one Negevite vessel was discovered in Area F.⁵⁶

±*En Sharuben*. In this site, at the bank of the Nahal Besor, remains of an installation with traces of fire and burnt substances were found, associated with large scatters of pottery, mainly of Iron I date. According to the excavator, the structures probably belong to a kiln related to a metal industry, similar to the furnaces found at Tell Qasile and Tell Jemmeh.⁵⁷ It was probably used by the inhabitants of Tel Far±ah (south), just on the other side of the Nahal Besor.⁵⁸

⁴⁸ Fritz and Wittstock, "Areal H," in *irbert el-Mšāš (T'ī Māšōš)* (eds. Fritz and Kempinski), 40-41.

⁴⁹ A. Kempinski, H. Rösel, E. Gilboa and Th. Stahleber, "Area A," in *irbert el-Mšāš (T'ī Māšōš)* (eds. Fritz and Kempinski), 21.

⁵⁰ E.g. Finkelstein, "The Campaign of Shoshenk I to Palestine. A Guide to the 10th. Century BCE Polity," *ZDPV* 118 (2002):109-35.

⁵¹ Cf. also F. Crüseman, "Die Kleinfunde," in *irbert el-Mšāš (T'ī Māšōš)* (eds. Fritz and Kempinski), 92.

⁵² Fritz, "Copper Mining," 95.

⁵³ H.-G. Bachmann, "Kommentar zu den Analysentabellen," in *irbert el-Mšāš (T'ī Māšōš)* (eds. Fritz and Kempinski), 200.

⁵⁴ Pers. comm., in Z. Meshel, "The 'Aharoni Fortress' Near Quseima and the 'Israelite Fortresses' in the Negev," *BASOR* 294 (1994): 63 n. 27.

⁵⁵ Fritz, "Areal H," in *irbert el-Mšāš (T'ī Māšōš)* (eds. Fritz and Kempinski), 87.

⁵⁶ Fritz, "Areale F₁ und F₂," in *irbert el-Mšāš (T'ī Māšōš)* (eds. Fritz and Kempinski), 91, Pl. 161:7.

⁵⁷ However, analysis on the large quantity of slag associated with the Iron I kiln found at Tell Jemmeh (Level GH), believed by Petrie to be for iron smelting, has failed to find any traces of iron. Cf. Tubb, "The Role of the Sea Peoples," 255-56; McNutt, *The Forging of Israel*, 187.

⁵⁸ D. Gazit, "±*En Sharuben*: An Iron Age I Site in Naḥal Besor," ±*Atiqot* 25 (1994): 41*-45*, 190 (Hebrew); idem, *Archaeological Survey of Israel: Map of Urim (125)* (Jerusalem: IAA, 1996), 42*, 69-70. Less conclusive are the finds from Nahal Besor Site 72, where remains of structures, flint tools, pottery and copper ore (1,500 sq. m.) were found. The site provided pottery from several periods (Chalcolithic, Early-Middle Bronze, Iron I, and Byzantine) (Gazit, *Map of Urim*, 43*, 43-44), and it is therefore uncertain when the metalworking took place.

Tell Abu Salima (Sheikh Zuweid). Petrie excavated this site, located in the northern Sinai coast, for three seasons in 1935-1936. At Levels N and M, Petrie found evidences of bronze metalwork: at the earliest Level N, copper slag and two crucibles with slag;⁵⁹ whereas at Level M, another crucible with slag.⁶⁰ No precise find-spot was provided. Although Petrie pointed out that Level N was destroyed by fire, the pottery evidence seems to imply that both Levels M and N overlapped. Petrie only provided a date for Level M (1275-1212 BC)⁶¹ but the occurrence of Philistine pottery at both levels suggests a date between the second half of the 12th and the 11th centuries BC.⁶²

3. COPPER AND NOMADIC PASTORALISTS IN THE EARLY IRON AGE

During the Iron Age, a society based on an economy oriented towards pastoralism, and perhaps small-scale farming, existed in the Negev and Edom. However, the above discussion showed that mining, smelting and circulation of copper were also important activities undertaken in these areas. Considering the scale of metal production at Timna and Faynan and the presence of pottery associated with mobile pastoral groups -Negevite and Midianite wares (see below)-, it seems worthwhile to check the possibility that these peoples somehow had something to do with the copper extracted there. In the following paragraphs, I would like to take the argument a bit further by suggesting that some of these groups were engaged in the mining and circulation of the local copper.

Many scholars believe that a good number of the peoples of the area were associated with the metallurgy and trade of copper. Kalsbeek and London,⁶³ who conducted a technological analysis on Midianite vessels found at Yotvata, reported that these wares were well fired, therefore suggesting "a connection between the pyrotechnology of metal-working (since metallurgy could well have been known to these peoples) and pot firing." To Rothenberg,⁶⁴ the appearance of a great deal of Midianite wares at Timna can confidently be linked with the presence of population of Arabian origin collaborating with the Egyptians in the copper-extracting processes. The archaeological association between these wares and the copper manufacture led, further, to the hypothesis that there was a relationship between the distribution of Midianite pottery and the copper trade.⁶⁵ Similar point of view was held by Bawden and Edens,⁶⁶ for

⁵⁹ W.M.F. Petrie and J.C. Ellis, *Anthedon, Sinai* (London: British School of Archaeology in Egypt and Bernard Quaritch, 1937), Pl. L-187, 198, 194.

⁶⁰ *Ibid*, Pl. L-216.

⁶¹ *Ibid*, 8.

⁶² T. Dothan, *The Philistines and their Material Culture* (Jerusalem: IES, 1982), 27.

⁶³ J. Kalsbeek and G. London, "A Late Second Millennium B.C. Potting Puzzle," *BAASOR* 232 (1978): 53.

⁶⁴ Rothenberg, *Timna*, 183.

⁶⁵ Rothenberg and Glass, "The Midianite Pottery," 100, 115.

⁶⁶ G. Bawden and C. Edens, "Tayma Painted Pottery and the Hejaz Iron Age Ceramic Tradition," *Levant* 20 (1988): 212.

whom peoples of the Hejazi region were engaged both in the extraction and the long-distance transportation of the southern Arabah copper. Knauf⁶⁷ speculated whether the Midianites, apart from their exchange of painted pottery, traded with the product of their mining enterprises. The association between Midianite pottery and copper work also led Fritz⁶⁸ to the hypothesis that the craft of metalworking was possibly related to particular ethnic groups. Finally is Finkelstein's theory that a vigorous exchange network developed from the copper mining at the Arabah by local elements after the Egyptian retreat, and from the opening of the Arabian incense trade.⁶⁹

Similar theories concerning the role of nomads in the manufacture and circulation of copper have arisen after the discovery of evidence of metallurgy at the central Jordan valley. The key site is Tell Deir ±Alla, where three furnaces for smelting bronze built on top of each other, a possible blowpipe and drops of metal were found at Phase B (Iron I), a level with no permanent architectural structures.⁷⁰ In the original publication of the site, Franken⁷¹ associated this level with a period of semi-nomadic occupation, and supported the view that itinerant metalsmiths inhabited the site in the winter months, where they could have practiced farming, animal husbandry and working in the metal furnaces, until they moved back up into the hills during the hot season. Franken's idea has gained some support, whereas the itinerant metalworkers, variously identified as Midianites or Kenites, are now related to the Arabah copper mining.⁷²

Our work fits into this wealth of archaeological information and encourages a reassessment of the socioeconomic configuration during the Iron Age. All too often the discussion of exchange patterns has been limited to the equation of certain wares with

⁶⁷ Knauf, *Midian*, 28, cf. also 25-26.

⁶⁸ Fritz, "Copper Mining," 100.

⁶⁹ Finkelstein, "Arabian Trade"; idem, *Living on the Fringe*, 103-26; idem, "The Campaign of Shoshenk I," 114-16.

⁷⁰ van der Kooij and Ibrahim, *Picking up the Threads*, 81.

⁷¹ H.J. Franken, *Excavations at Tell Deir ±Alla I: A Stratigraphical and Analytical Study of the Early Iron Age Pottery* (Documenta et Monumenta Orientis Antiqui vol. 16; Leiden: Brill, 1969), 20-21.

⁷² E.g. Tubb, "The Role of the Sea Peoples," 260; van der Kooij and Ibrahim, *Picking up the Threads*, 81; Negbi, "Were There Sea Peoples," 228; Sherratt, "Commerce, Iron and Ideology," 73. However, van der Steen is suspicious of the copper smelting function of the Tell Deir ±Alla's furnaces: their size and shape are completely different from that of local contemporary furnaces; remains of copper ore or slag, a main feature of metal industry, are absent; while the small drops of metal apparently were not used for casting bronze or smelting copper. An alternative explanation is that the furnaces were part of a casting workshop for very large objects -big bronze gates, huge vats, etc.- and therefore unique (idem, *Tribes and Territories in Transition. The Central East Jordan Valley and Surrounding regions in the Late Bronze and Early Iron Ages: A Study of the Sources* (Groningen: Rijksuniversiteit Groningen, 2002), 162-63. The combination of temporary occupation of the site (by Franken associated with pastoralists) and this very sophisticated technique is very suspicious. In addition, the seasons do not fit: pastoralists may not have done this casting very well in winter, because there would be too much rain, whereas the seasonal occupation of the place is supposed to have taken place in winter, because the summer is too hot (van der Steen, pers. comm., 2005).

ethnic groups who supposedly were engaged in the exchange of goods, because the evidence is more easily discerned. It is much more difficult to discern the social and economic mechanisms by which the commodities were transported from the mute archaeological record. The attribution of ethnic labels to pottery groups, evident in the cases of the Midianite and Edomite wares, is an indication of how the biblical text has influenced the image that archaeologists have of the Iron Age societies of the Negev and Edom. In this regard, Muhly⁷³ is correct in his assertion that behind the idea that the Midianites were skilled metalworkers is the biblical tradition that connects Midianites and Kenites through Moses' father-in-law, the latter group seen as the nomadic metalworkers *par excellence*.⁷⁴ However, I consider that, taken the archaeological evidence alone, a case can be made of the connection between pastoral groups and the extraction, work and circulation of the Arabah copper.

The major evidence of the processing and circulation of copper is, of course, the distribution of copper artifacts and metalwork. However, this evidence does not tell us who, how and why of such activities, and therefore is necessary to implement alternative methods of investigation and analysis. I believe that a comparison between the spatial distribution of pottery and metal items may provide some insights about the dynamics of the circulation of copper.

The occurrence of Midianite and Negevite wares can be taken as indicative of the presence and/or movements of the autochthonous pastoral peoples.⁷⁵ Negevite pottery, a coarse, hand-made ware manufactured with local clays, is usually associated with the semi-nomadic population of the Negev area.⁷⁶ Midianite pottery is a wheel and hand-made ware with very characteristic decorations, which according to petrographic analyses was manufactured at the Hejaz (northwestern Arabia).⁷⁷

As noted above, the large quantity of these wares at Timna and Faynan has been taken as evidence by several scholars that local groups took part in the mining and

⁷³ J.D. Muhly, "Timna and King Solomon," *Bibliotheca Orientalis* 41 (1984): 275-92.

⁷⁴ A full discussion of the biblical Midianites and Kenites, and their connection with metallurgy, is beyond the scope of this study; for discussion and relevant bibliography, cf. J.F.A. Sawyer, "Cain and Hephastus: Possible Relics of Metalworking Traditions in Genesis 4," *Abr-Nahrain* 24 (1986): 155-66; Knauf, *Midian*; McNutt, *The Forging of Israel*, 242-47; J.D. Schloen, "Caravans, Kenites, and *Casus belli*: Enmity and Alliance in the Song of Deborah," *CBQ* 55.1 (1993): 18-38. Whether the biblical allusions have anything to do with the real situation in the Early Iron is difficult to say, especially since most of these texts are viewed as late by most scholars, e.g. W.F. Albright, "Midianite Donkey Caravans," in *Translating & Understanding the Old Testament: Essays in Honor of Herbert Gordon May* (eds. H.T. Frank and W.L. Reed; New York: Abingdon, 1970), 205.

⁷⁵ Tebes, "'Edomite', 'Midianite' and 'Negevite' Pottery: Indicators of Tribal Groups in the Negev?," *Antiguo Oriente* 2 (2004): 27-49 (Spanish).

⁷⁶ M. Haiman and Y. Goren, "'Negevite' Pottery: New Aspects and Interpretations and the Role of Pastoralism in Designating Ceramic Technology," in *Pastoralism in the Levant: Archaeological Materials in Anthropological Perspectives* (eds. O. Bar-Yosef and A. Khazanov; Monographs in World Archaeology No. 10; Madison: Prehistory Press, 1992), 143-52, with relevant literature.

⁷⁷ Rothenberg and Glass, "The Midianite Pottery."

processing of the local copper. To be sure, the fall-out of Midianite and Negevite wares is not directly correlated with the distribution of metal objects and metalwork because there are other variables involved. Nevertheless, a review of the archaeological evidence shows that the inventory of bronze/copper artifacts and workshops for metal smiting at Early Iron Negev and Edom in part overlaps with the distribution of Midianite and Negevite wares, especially at the main quarrying and metalwork centers (Timna and Faynan) but also at the small workshops (Jezirat Far'aun, Yotvata, Givat Hazeva and Tel Masos). On the basis of this evidence, I would like tentatively to suggest that the circulation of copper was carried out (though not only) by local mobile pastoral groups.

One, of course, can raise the claim that the non-sedentary population was not an important part in the circulation of copper, because the Egyptians and Canaanites would have carried out this task by themselves. The involvement of Egyptians and Canaanites is, certainly, not denied, given the superb evidences of the Egyptian presence at Timna and the occurrence of ceramics of Palestinian type in the local sites. But it stands in contrast to the explicit claims for continuity in the tradition of bronzework in Palestine and Jordan during the 12th and 11th centuries BC, when Timna was being abandoned by the Egyptians and apparently occupied by Negev/Hejazi inhabitants. When the infrastructure of the Egyptian domination collapsed, the local population may have filled the succeeding political and economic vacuum. A similar picture seems to have occurred at Faynan since the resumption of activities in the Early Iron Age, given the lack of evidence that the area was controlled by either the Egyptians or a Levantine polity.⁷⁸ It is quite clear that the Egyptians and Canaanites cannot carry alone the burden of being the only mediators in the distribution of the Arabah copper in the southern Levant. In the face of the apparent persistence of the Late Bronze tradition of metalwork, this historical reconstruction would answer the question of the continuation of the copper supply during the Early Iron Age.

At Timna, the presence of local peoples working under the Ramesside tutelage is attested by the great deal of Midianite and Negevite pottery found in the workcamps and shrines. The works at the mines may have been undertaken in a seasonal basis, being constrained by the hot climate only to the winter months. This is further indicated by the layers of windblown sand accumulated at Site 2 and, if the comparison is taken at face value, the analogous situation at the Serabit el-Khadim mines in Sinai.⁷⁹ The seasonal nature of the mining enterprise at Timna, coupled with the findings of large quantities of pottery used by the autochthonous peoples, are possible indications that these groups performed seasonal movements between the southern Arabah and other areas.

⁷⁸ *Contra* Knauf ("The Cultural Impact," 49), who speculates that the Iron I mining at Faynan was controlled by a "western" polity: Tel Masos.

⁷⁹ R. Giveon, *The Impact of Egypt on Canaan* (Orbis Biblicus et Orientalis 20; Freiburg: Universitätsverlag Freiburg, 1978), 53-54.

Did the mining and circulation of copper continue in the Negev after the Iron Age I? The evidence for the Early Iron II is elusive. By the middle of the 12th century B.C. the Egyptians withdrew from Timna, while the subsequent "Midianite" occupation seems not to have been very long. The next wave of settlement, which began in the 10th century B.C., did not include the southern Arabah, and only affected the Beersheba valley and the central Negev Highlands. In the latter area, a large number of settlements, about 350, were founded.⁸⁰ Finkelstein supported years ago the hypothesis that the rise of Tel Masos as a trade center was related to the appearance of these settlements, which were the result of the sedentarization of nomads in a context of growing trade relations.⁸¹ However, the dearth of foreign pottery and the layout of these sites point to a small village community based on a subsistence economy of dry farming and animal husbandry. In addition, the metal finds seem to be negligible: one copper axe, two arrowheads, one sword and one copper needle.⁸² After the wave of settlement of the 10th century, only sparse occupation existed in the Negev Highlands during the Late Iron II.

This picture strongly contrasts with what happened in Faynan. While the data are not yet complete enough to exactly indicate when the Iron Age exploitation at Faynan began, there is little doubt, according to the pottery surveys and the radiocarbon dates that the mines operated during the Iron I and the Iron II. Then a question arises as whom managed the resource extraction, metal production and transport. Levy⁸³ has related the emergence of the Early Iron copper mining at Faynan with the formation of a complex society in Edom, and specifically the biblical kingdom of Edom. However, van der Steen and Bienkowski have fiercely contested this interpretation of the evidence,⁸⁴ by arguing that local corporate groups were equally capable of conducting and maintaining large-scale industrial activities with their infrastructure. At this point, I would suggest that the pre-Late Iron II evidence points to the second alternative. The existence of large amounts of Midianite and Negevite pottery, and the presence of the nomadic cemetery Wadi Fidan 40, attest the presence of pastoral groups in the area. Furthermore, as Finkelstein⁸⁵ has shown, the earliest ¹⁴C dates at Khirbat en-Nahas correspond to metallurgical activities *before* the fort was constructed, proba-

⁸⁰ R. Cohen and R. Cohen-Amin, *Ancient Settlements of the Negev Highlands*. Vol. 2: *The Iron Age and the Persian Periods* (IAA Reports N° 20; Jerusalem: IAA, 2004).

⁸¹ Finkelstein, "Arabian Trade"; idem, *Living on the Fringe*, 102-14.

⁸² R. Cohen, *The Settlements of the Central Negev in the Light of Archaeology and Literary Sources during the Fourth to First Millennia B.C.E.* (Unpublished Ph.D. Thesis; Hebrew; Jerusalem: Hebrew University, 1986), 395.

⁸³ Levy, "Some Theoretical Issues Concerning the Rise of the Edomite Kingdom – Searching for 'Pre-Modern Identities,'" *SHAJ* 8 (2004): 253-61; Levy et. al., "Reassessing the Chronology of Biblical Edom," 877.

⁸⁴ van der Steen and Bienkowski, "Radiocarbon dates from Khirbat en-Nahas."

⁸⁵ Finkelstein, "Khirbat en-Nahas, Edom and Biblical History."

bly at the late 8th century BC. The same applies to the nearby four-room building (Area S), under whose foundations an industrial slag layer was found.⁸⁶

For models that seek to tie copper mining to state infrastructure, the evidence from Khirbet en-Nahas is problematic. Khirbet en-Nahas is a clear counter-instance, a case of a highly-valued resource that was not exploited by a state. My hypothesis is that the pre-Late Iron II layers represent occupation by nomadic pastoral groups that carried out metallurgical activities without leaving permanent architectural structures. Later on, the buildings constructed by the Edomite state in the Late Iron Age II covered these layers. If the comparison with Timna is valid, then the local pastoralists may have operated as workforce in the mines and/or in the distribution of the local copper. That the copper production was in the range of many thousands of tons does not seem to preclude pastoral groups as the primary force behind this activity. Acephalus tribal societies are known to be able to mobilize large workforces for quarrying and mining through co-operative, consensus-driven ventures.⁸⁷ Furthermore, the lack of evidence for the presence of any Levantine polity in the area during the Iron I suggests that, at least until the establishment of the Edomite state in the 8th century BC, copper mining and processing were mainly in the hands of local pastoral groups.

4. THE FAYNAN MINES AND THE EDMITE STATE

Even though archaeological works in the Faynan district are still in progress, the pottery surveys and the radiocarbon dates suggest that the local copper mines continued operating during the Iron II. The exploitation in the Late Iron II was likely under the control of the Edomite state, though there is still no textual or epigraphical evidence of Edomite administrative or military presence in the area. Though not well attested, Edomite control of the mines in this period is very likely, given the close proximity of Faynan to the Edomite heartland and its probable capital, Bozrah (modern Buseirah). It is not clear what consequences for the pastoral groups had the development of the Edomite state. Given the non-occurrence of Midianite and Negevite wares in clear Late Iron II contexts at Faynan, it is expected that their importance decreased to a large extent.

Ironically, the absence of evidence of metalwork in the Negev during the Late Iron II is paralleled by the period of highest production at Faynan. This fact may be directly linked to three possible scenarios. It could be evidence that, either the copper was worked in Faynan and exported as a finished product, or the copper was not exported to the Negev and Palestine any more (a not unlikely scenario given the constant state of conflict between Judah and Edom). Also, and maybe more important, the highly

⁸⁶ Levy et. al., "Reassessing the Chronology of Biblical Edom," 873.

⁸⁷ J. Burton, "Quarrying in a Tribal Society," *World Archaeology* 16(2) (1984): 234-47; idem, "Repeng and the Salt-Makers: 'Ecological Trade' and Stone Axe Production in the Papua New Guinea Highlands," *Man* N.S. 24 (1989): 255-72.

profitable long-distance trade of southern Arabian commodities may have eventually surpassed in importance the exchange of regional goods, most notably copper.

Edom's demand for copper cannot explain by itself the interest in the Faynan mines, since the lack of large urban centers and the dependence on an economy based on small farming and animal husbandry would indicate that use of great quantities of copper was not necessary. The scope of the Faynan production in the Late Iron II largely surpassed the local demand for copper, and therefore most of it may have been exported out of the country. The growing production of copper at Faynan during the Late Iron II cannot be explained without reference to the emergent Assyrian influence in the southern Levant. The Assyrian empire is the most likely candidate to explain the increasing demand for copper in this period, fuelled by the Assyrian army's needs of copper.⁸⁸

Though Edomite kings are known to have paid tribute several times to the Assyrian empire, Edom was never conquered or dominated directly by the Assyrians.⁸⁹ Assyrian kings were very aware of the importance of foreign copper sources, and the Neo-Assyrian royal annals paid much attention to the booties of copper utensils, which are mentioned more frequently and in more regions than any other good, especially in tribute and booty-lists from the Mediterranean coastal region and the Upper Euphrates.⁹⁰ The army requirements and the constant royal building and rebuilding projects in palaces and temples fueled the Assyrian demand.⁹¹ Part of the Edomite copper may have been sent to Assyria through the tributary channels, together with other commodities. Admittedly, there are no textual references in the Assyrian sources to the consignments of Edomite copper. Although Edom appears paying tribute several times to the Assyrian kings, unequivocal references to copper counted as tribute are lacking.⁹² Hence the shipments of Edomite copper to Assyria as tribute remain

⁸⁸ E.A. Knauf and C. J. Lenzen, "Edomite Copper Industry," *SHAJ* 3 (1987): 86; Knauf, "The Cultural Impact," 51.

⁸⁹ P. Bienkowski, "Transjordan and Assyria," in *The Archaeology of Jordan and Beyond: Essays in Honor of James A. Sauer* (eds. L.E. Stager, J.A. Green and M.D. Coogan; Studies in the Archaeology and History of the Levant 1; Winona Lake: Eisenbrauns, 2000), 44-58.

⁹⁰ S. Dalley, "Neo-Assyrian Textual Evidence for Bronzeworking Centres," in *Bronzeworking Centres* (ed. Curtis), 97-110; C.B.F. Walker, "Further Notes on Assyrian Bronzeworking," in *Bronzeworking Centres* (ed. Curtis), 111-18.

⁹¹ Moorey, *Ancient Mesopotamian Materials and Industries*, 264.

⁹² The first mention of Edomite tribute is Assyrian king Adad-Nirari III's (810-783 BC), which unfortunately does not mention any commodity (*ANET*, 281). Tiglath-Pileser III (744-727 BC) was paid tribute by Edomite king Kaushmalaku; among the goods said to have been submitted were metals, as gold, silver, tin, iron and antimony, but not copper (*ANET*, 282). Sargon II (721-705 BC) mentions tribute from Edom, though specific references to commodities are lacking (*ANET*, 287). Sennacherib (704-681 BC) received Edomite king Aiarammu's submission, but no reference is made to metals (*ANET*, 287). A text listing tribute from Sennacherib or Esarhaddon's times includes the delivery of an unknown amount of silver by, most probably, Edom (*ANET*, 301). Esarhaddon (680-669 BC) records the consignment of building materials for his palace in Nineveh, which includes Edomite king Qaushgabri's tribute, but copper is not mentioned (*ANET*, 291). Ashurbanipal (668-632 BC)

only a likely hypothesis. However, if the comparison with the trade of Arabian aromatics is suitable, any tribute in copper sent to Assyria may have been small compared with the copper traded with Assyria through the commercial channels. In fact, it can be adduced that tribute and exchange are part of the same economic mechanism. If tribute most times is meant to pay respect to a far-stronger polity, it has also been used by the weaker state as a sort of “entrance fee” to engage in official commercial relationships, even though, certainly, the records of the core society do not share that view.⁹³ This could shed new light on why Edom’s policy towards Assyria never was of confrontation, despite the constant regional rebellions against the latter’s power. The Edomite leaders themselves may have thus taken advantage of their country’s natural resources -most notably copper- and geographical location, distant enough from the Assyrian core territories and its military enterprises.

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said to have been “brought heavy gifts” by, again, Qaushgabri of Edom (*ANET*, 294), but no additional information is provided. Tribute-lists from other southern Levantine states also lack references to copper. However, Sennacherib boasts to have received, from Judaeen king Hezekiah, vessels of iron, tin, bronze and copper as booty (Walker, “Further Notes on Assyrian Bronzeworking,” 115), and one is tempted to suggest that part of the bronze and copper originated in Edom, reaching Judah through the usual commercial channels.

⁹³ G. Dalton, “Karl Polanyi’s Analysis of Long-Distance Trade and His Wider Paradigm,” in *Ancient Civilizations and Trade* (eds. J.A. Sabloff and C.C. Lamberg-Karlovsky; School of American Research Advanced Seminar Series; Albuquerque: University of New Mexico Press, 1975), 105-06.

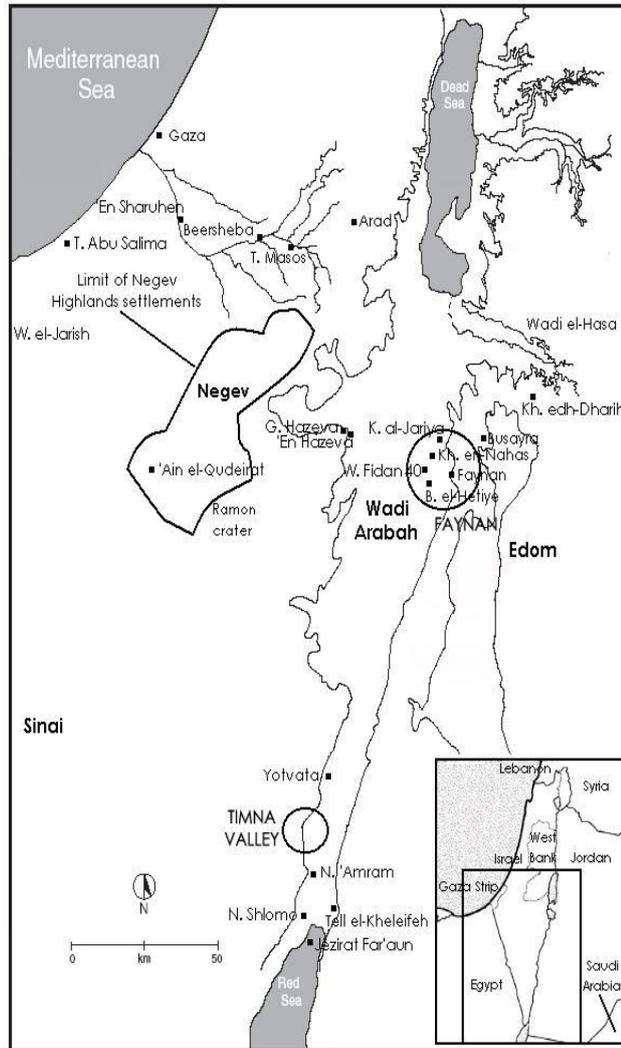


Fig. 1. Sites with evidence of mining and metalwork in the Iron Age Negev and Edom



Fig.

2. Wadi Faynan (photograph: Juan Manuel Tebes)*Fig. 3. Timna vallery: Smelting Site 2 (photograph: Juan Manuel Tebes)*



Fig. 4. Timna valley: Temple of Hathor (Site 200) (photograph: Juan Manuel Tebes)