

EXCAVATING THE NABATAEAN INCENSE ROAD

Tali Erickson-Gini

Yigal Israel

ABSTRACT

Excavations conducted along the Nabataean Incense Road, which extends from Petra to Gaza, highlight the changes and development of this historic trade route over time. Long-distance trade reached its apex following the Roman annexation of Nabataea in 106 CE, followed by a marked decline during the third century CE. Seven of these key sites were conserved between 1993 and 2000, culminating in the inscription of the Nabataean Incense Road on the UNESCO World Heritage Site list in 2005.

Far away lies India, beyond the learned Egyptians, beyond the superstitious Jews and the merchants of Nabataea, beyond the children of Arsaces in their long flowing robes, the Ituraeans, to whom the earth gives but scanty harvest, and the Arabs, whose perfumes are their wealth. . .—Apuleius *Flor.* 6 (ca. 160 CE)

Traces of ancient tracks can be seen throughout the rugged, arid region of the Negev of southern Israel. Many of the oldest roads in human history cross through this land-bridge, which linked Africa with Asia, and Arabia with the Mediterranean world. As early as the beginning of the first millennium BCE, the peoples of south Arabia

collected valuable, aromatic tree resins, frankincense, and myrrh that were in turn transported through the oases of north Arabia to the centers of many of the great civilizations.

The trade in aromatics increased throughout the first millennium BCE and enriched the producers in south Arabia and the desert peoples who engaged in their transport (Strabo *Geogr.* 16.4.3,19; Diod. Sic. 3.47.5–7, 19.94.4–6; Pliny *HN* 6.32.162). The wealth generated in the forbidding landscape of Arabia attracted the attention of the great powers of the ancient world, among them Assyria, Babylon, and Persia. Alexander the Great planned to conquer the source of Arabia's wealth, while his successors plundered the Nabataean stronghold of Petra. Ultimately they returned the stolen treasure when the Nabataean warriors forced their hand (Diod. Sic. 19.95.1–5).

By the Persian period, the Nabataeans gained control of the aromatics trade from their nomadic neighbors, the Qedarites. Petra was in a strategic location that afforded the Nabataeans ready access to the Red Sea, Egypt, the Mediterranean coast, and Syria. The Negev was the interface between Petra and Ptolemaic Egypt, and it was the most vulnerable region separating these two locations. The secret of Nabataean control of the Negev was water, which was channeled into the massive cisterns that they hewed near desert tracks. Their knowledge of the location of these artificial water sources provided them with an advantage over foreign armies who attempted to enter Arabia (Diod. Sic. 19.94.6–8). For the next two hundred

years, Nabataean control over water sources in the Negev provided the Nabataeans with security, wealth, and cultural contacts that gave rise to their remarkable culture as exemplified by Petra.

The Nabataeans maintained their autonomy until their kingdom was incorporated into the Roman Empire in 106 CE. Prior to this event the only formidable challenge to their control of the desert was their immediate neighbor: Judea. In 99 BCE, the port of Gaza, and indeed most of the southern coast of Palestine, fell to the Hasmonean king of Judea, Alexander Jannaeus (103–76 BCE; Josephus *Ant.* 13.13.2). The Hasmoneans established forts along two major tracks in the central Negev: at Horvat Ma'agurah along the Petra–Gaza Road and at Nessana on the inland road between north Sinai and Elusa. They also succeeded in conquering ancient Moab, which is located to the north of Petra. These developments effectively cut off Nabataean access to the roads that ran through both regions. Decades later, ca. 65 BCE, the Nabataeans regained control of these regions through a political deal with Hyrcanus II that was instigated by Antipater, the father of Herod the Great and the wily Idumean counselor of the Hasmonean dynasty (Josephus *Ant.* 14.1.4).

Throughout most of the first century BCE, Roman interests in the East were not an immediate threat to Nabataean sovereignty, but the extension of Roman control of Egypt under Augustus created new economic realities in the Mediterranean sphere. The demand for aromatic substances in the form of incense resins and spices in the Roman world skyrocketed. These substances had a wide array of uses, from religious and funerary functions to bathing, medicinal, and culinary purposes. Augustus wasted little time in developing Red Sea ports and roads, connecting them to the Nile. He was able to bypass the land routes of Arabia by using the trade winds, sending ships to India to bring back spices and other exotic goods (Strabo *Geogr.* 2.5.12). The race for trade with India and the Far East prompted the development of trade through Syria as well, which ultimately led to the rise of Palmyra and Antioch. Closer to Petra, Herod the Great made a fortune from his monopoly of the most expensive substance in the ancient world: Judean balsam (Pliny *HN*

3.67; 24.128). The Nabataeans reacted to these developments by producing perfumed oils in Petra itself, vastly enlarging their stakes in the economic bonanza of the *pax Romana* (Johnson 1987). Their standard of living rose as it did throughout the Roman world, especially in the Roman East. In Petra, the Nabataeans used their great wealth to build monumental tombs, palaces, and temples on a scale that rivaled those found in any city of the ancient world.

In response to the roads and ports constructed by the Romans in Egypt, the Nabataeans established a new route between Petra and Gaza in order to transport their products (Fig. 1). In the late first century CE, Pliny the Elder noted that this road included 65 stations between south Arabia and Gaza, which provided caravans with shelter, water, fodder, and other amenities (*HN* 12.32.63–65). These way stations offered welcome relief as long-distance caravan trade was fraught with dangers such as winter torrents, intense summer heat, and limited water sources, not to mention the danger of enemy raids.

The terrain northwest of Petra was particularly rugged and dangerous for caravan travel as they were forced to make their way up from one of the lowest points on earth, the Arabah Valley south of the Dead Sea, to the Negev Highlands, over 800 m above sea level. An obstacle to the caravan trade was the Ramon Crater, a deep erosion cirque, 40 km in length whose northern wall rises to a dramatic 400–500 m within a space of a mere 5 km (Scott 1977: 159, 166) (Fig. 2). Generally, this feature was bypassed by traveling along a road further north that is known in recent times as the Darb es-Sultan (the King's Way). It is one of the oldest tracks in the region, connecting the copper mines of the Faynan region of the Arabah with the lower Negev Highlands by way of prominent dry river beds and the Nahal Zin Basin. This was probably the original Petra–Gaza Road as reflected in the Arabic names of Nahal Zin and the spring of 'En Orahot: Wadi Murra (Myrrh) and 'Ain el-Gattar (the spring of the camel train).

In the Hellenistic period, the Nabataeans already had an effective army and were ruled by kings. A number of Nabataean forts discovered in the Negev date to this period: Moyat 'Awad (Fig. 3), 'En Erga, 'En Rahel,

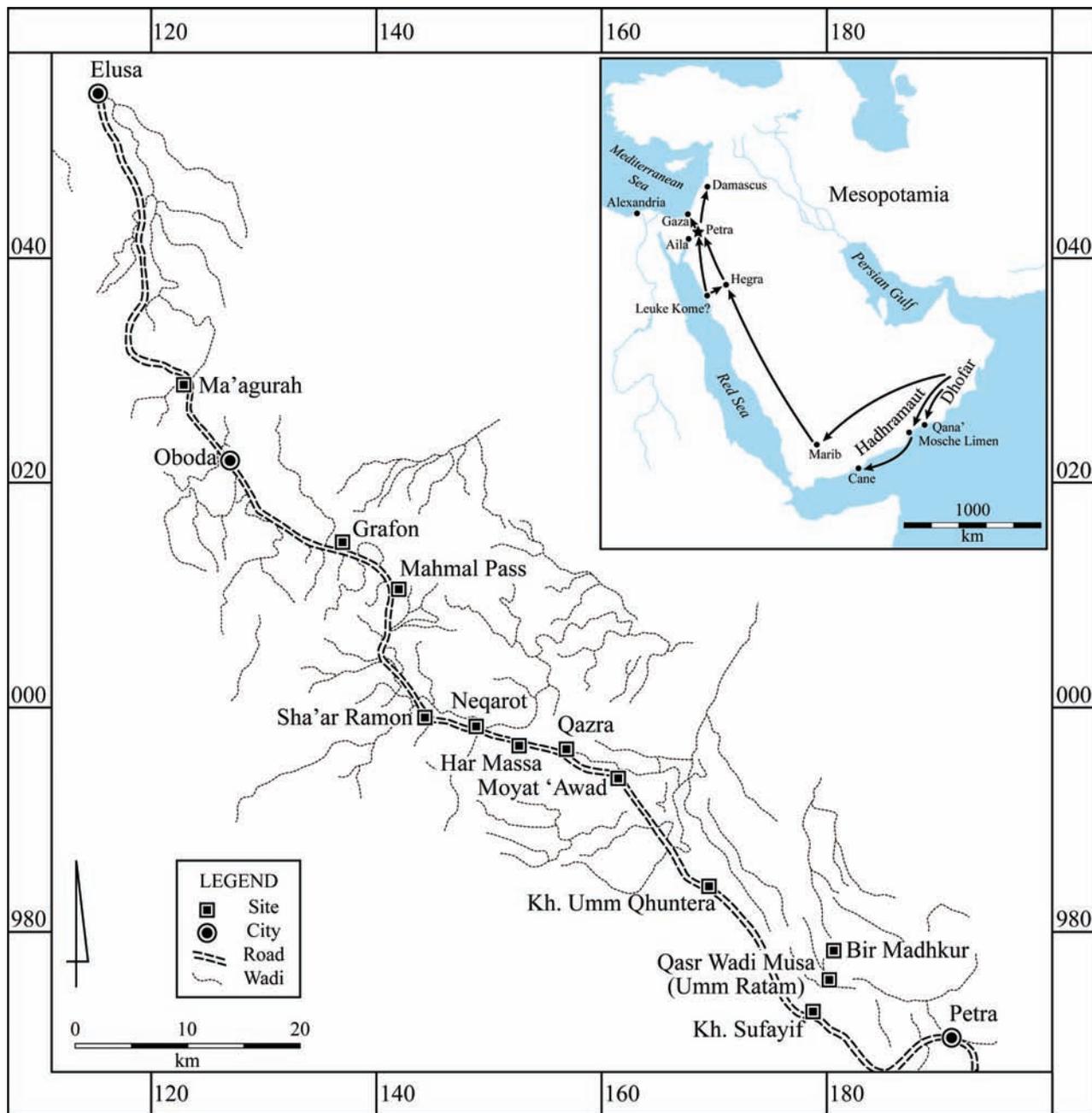


FIG. 1
 Sites along the Incense Road between Petra and Gaza with an inset of Levantine trade routes.
 (Courtesy of the Israel Antiquities Authority.)

'En Tamar, 'En Ziq, and Qasr Ruheibeh. They are all situated defensively on hilltops overlooking major tracks and next to springs and wells.

Other forts may have been located below the later ruins of the important stops at Oboda (Avdat) and Elusa

(Halutza), where evidence of seasonal occupation of the Nabataeans in the Hellenistic period has been found.

Towards the end of the first century BCE, the Nabataeans established a new track through the Ramon Crater by cutting a pass along its northwest face, known



FIG. 2
View of the Roman fort above
the Mahmal Pass, overlooking the
northwest rim of the Ramon
Crater. (Courtesy of the Israel
Antiquities Authority.)



FIG. 3
Aerial view of the Hellenistic Nabataean fort (Area B) at Moyat 'Awad located in the western Arabah. (Courtesy of the Israel Antiquities Authority.)

today as the Mahmal Pass. This new road formed a direct link between two important sites of the Hellenistic period: Moyat 'Awad in the Arabah (Fig. 4) and Oboda in the Negev Highlands (Fig. 5). One of the earliest stops on this track was a courtyard house and arched cistern situated on the banks of Nahal Neqarot (Wadi es-Siq) (Figs. 6–7). A (collapsed) cistern of a similar type is also positioned at the head of the Mahmal Pass (Erickson-Gini 2011).

A few decades later, the Nabataeans built spacious caravanserais at Moyat 'Awad and on the edge of the Ramon Crater at Sha'ar Ramon ('En Saharonim). These structures represent a phase of increased confidence and royal economic planning on the part of the Nabataeans. Unlike their Hellenistic forts, these caravanserais were constructed on open plains next to sources of high ground water (Fig. 8). They are large, at least 40 x 40 m in size and symmetrical with rooms situated around an open courtyard and walls built from dressed stones.

In 106 CE, the Roman Emperor Trajan annexed the Nabataean kingdom and established the Roman province of Arabia in its place (Fig. 9). In spite of the loss of Nabataean independence, international trade along the Incense Road continued robustly for another century (Cohen 1982: 246). Roman forts with courtyards were built, probably during the Severan period, at the sites of Nahal Neqarot and Mahmal, and at the new site of Mezd Qasra (Fig. 10) located between Moyat 'Awad and Nahal Neqarot, and possibly at Mezd Grafon on the way to Oboda.

The end of the Incense Road signaled the collapse of international trade through Petra and the Negev, coinciding with the political, military, and economic turmoil that swept through the Roman Empire during the third century CE. Attempts to revive international trade under the Emperor Diocletian ended in failure. Late Roman military presence is indicated by the construction of a major army camp at Oboda and milestones, guard posts, and

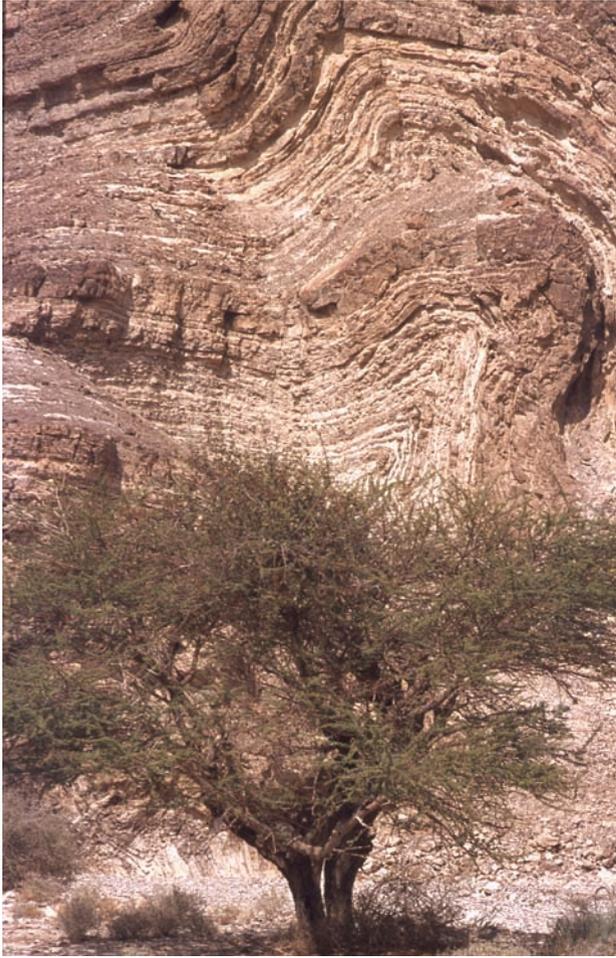


FIG. 4
 Geological formation in Nahal Omer between Moyat 'Awad and Qasra.
 (Courtesy of the Israel Antiquities Authority.)

road works as far as Sha'ar Ramon (Erickson-Gini 2002). The Incense Road continued to function as a casual link between Petra and the Negev for another century in the Early Byzantine period; however, by this time, most of its sites lay abandoned.

Early Investigations along the Petra–Gaza Road

Some sites along the Petra–Gaza Road, such as Elusa (Halutza) and Oboda (Avdat) were discovered by early explorers of the Negev in the nineteenth century; although they were mainly interested in documenting

the Late Byzantine ruins of those sites as well as the those of Ruheibeh (Rehovot in the Negev), Auja el-Hafir (Nessana), Kurnub (Mampsis) and Sobota (Shivta). The Nabataean presence at sites located in the Negev was determined almost entirely by the presence of sherds of Nabataean-painted fine ware vessels. The fact that the Nabataeans continued to produce these vessels under Roman rule has caused some confusion in determining the date of the occupational phases in sites located in the Negev and southern Jordan (Erickson-Gini 2009: 116–17).

Fritz Frank, a researcher of German origin born in Palestine, was one of the first researchers to focus on Roman forts in the Negev. These included forts and other structures located along the Incense Road between Petra and Gaza. Frank discovered the important remains at Moyat 'Awad, the first Nabataean station on the western side of the Arabah, northwest of Petra (Frank 1934: 275–76; figs. 60–61). Albrecht Alt used the results of Frank's survey to conclude that some of the sites along the Incense Road could be identified as Roman military sites listed in the *Notitia Dignatatum* of the fifth century CE (Alt 1935). The American rabbi and archaeologist Nelson Glueck discovered Nabataean pottery sherds in the same sites, prompting him to declare that the sites were initially Nabataean ones that continued in use under Roman and even Byzantine rule (Glueck 1959: 232–35). As it turned out, both Alt and Glueck were correct: Some of the sites were established by the Nabataeans, some by the Romans, and all of them functioned under Roman rule. At least two sites (the Mahmal fort and Sha'ar Ramon) were reused in the Early Byzantine period (fourth–early fifth centuries CE). Another of Glueck's early observations was also correct; when the Romans took over the Nabataean settlements and stations, they continued to make use of pottery manufactured by Nabataean craftsmen (Glueck 1935: 13–14, 141–42).

In the early 1960s Zeev Meshel and Yoram Tsafrir surveyed a segment of the Nabataean road that extended from Oboda to Sha'ar Ramon (Meshel and Tsafrir 1974). They also conducted test excavations at sites in their survey area; however, Meshel and Tsafrir were unable to clearly determine who constructed this road and the facilities located along it. In light of decades of research, it now appears that the milestones and the lined road were products of Roman army personnel



FIG. 5
Aerial view of site of Oboda (Avdat) located in the Negev Highlands: the acropolis in the foreground and Diocletian's army camp in the background. (Courtesy of the Israel Antiquities Authority.)

stationed in Sha'ar Ramon and Oboda in the Severan and Diocletianic periods.

Rudolph Cohen's Excavations along the Incense Road

Cohen excavated seven sites along the Incense Road. Six of the sites lay between the Arabah Valley and Oboda. They include (from southeast to northwest): Moyat 'Awad (tentatively identified by Cohen as the

site of Mo'a), Qasra, Har Masa, Neqarot, Sha'ar Ramon (Fig. 11), and Mahmal. Cohen also excavated the site of Horvat Ma'agurah, located northwest of Oboda, 3.5 km west of Sede Boqer.

Before Cohen passed away in 2006, Yizhar Hirschfeld (Hebrew University of Jerusalem) began to prepare the final publication of the excavations along the Incense Road. Following the untimely death of Hirschfeld in 2006, Tali Erickson-Gini (Israel Antiquities Authority), one of the authors, was appointed the task of continuing with its preparation and publication. Through processing the



FIG. 6
The Nabataean cistern with
transverse arches near Nahal
Neqarot. (Courtesy of the Israel
Antiquities Authority.)

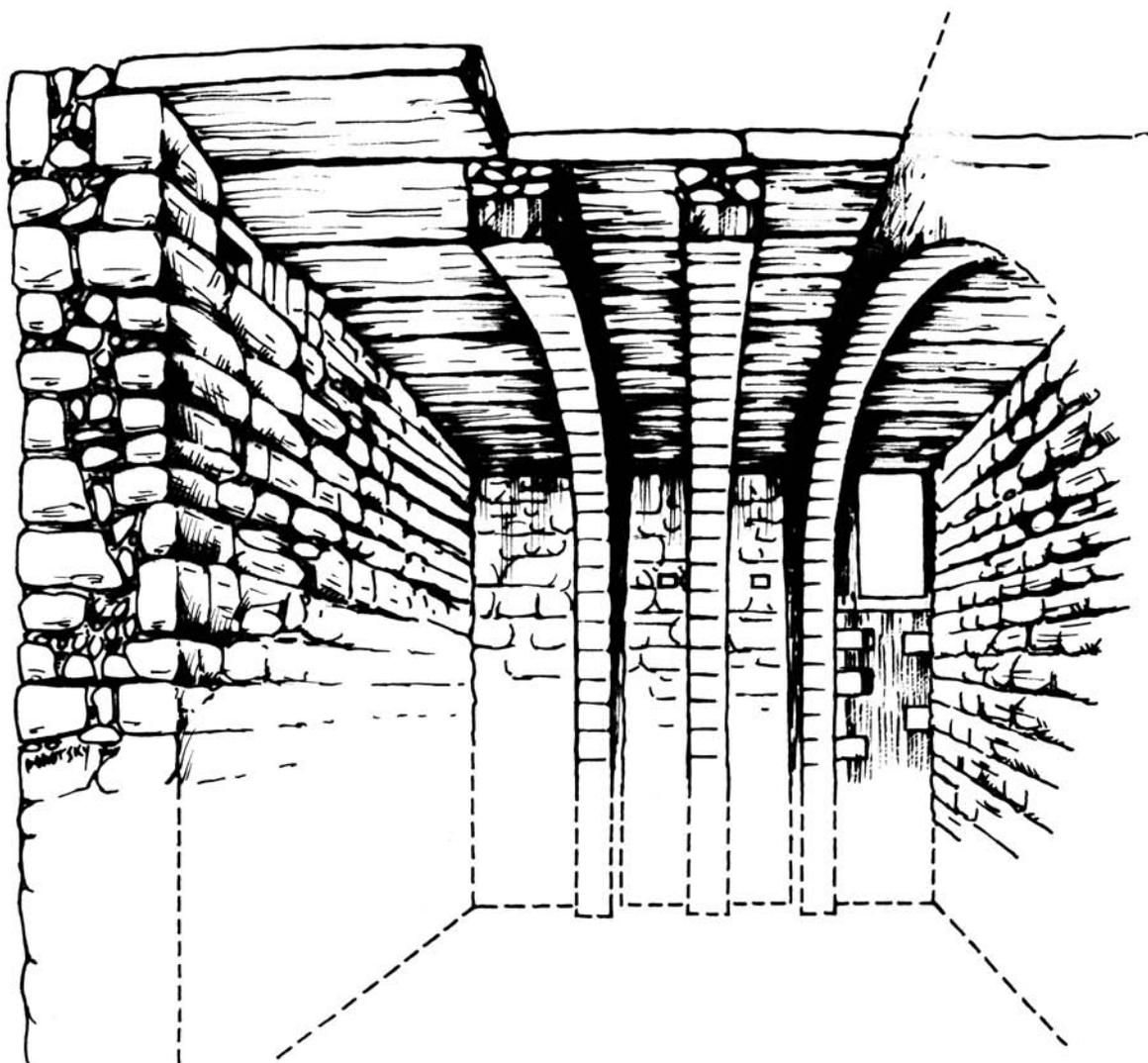


FIG. 7

Isometric drawing of the interior of the Nahal Neqarot cistern. (Courtesy of the Israel Antiquities Authority.)

finds and re-examining the results of Cohen's excavations, new and important details have emerged.

A Hasmonean Fort and Early Nabataean Caravanserai at Horvat Ma'agurah

Hyrcanus promised him, that when he had been brought thither, and had received his kingdom, he would restore that country, and those twelve cities which his father

Alexander had taken from the Arabians, which were these: Medaba, Libba, Dabaloth, Arabatha, Agalla, Athone, Zoara, Oronain, Gobolis, Arydda, Elusa, Orybda.—Josephus Ant. 14.1.4

Until recently, the history of the site of Horvat Ma'agurah was shrouded in mystery. The site is located between Oboda and Elusa (Halutza), overlooking the Incense Road where the track passes through the Nahal Besor Basin (Fig. 12). It is situated on a particularly strategic



FIG. 8
Aerial view of the Nabataean caravanserai of Sha'ar Ramon located on the eastern edge of the Ramon Crater. (Courtesy of the Israel Antiquities Authority.)



FIG. 9
Coin of Trajan, commemorating the annexation of Nabataea (*Arabia Adquista* 112–114 CE) from the fort (Area B) at Moyat 'Awad. (Courtesy of the Israel Antiquities Authority.)



FIG. 10
The Roman fort at Qasra, second to early third centuries CE. (Courtesy of the Israel Antiquities Authority.)



FIG. 11

Archaeologists and volunteers excavating the casemate rooms in the caravanserai of Sha'ar Ramon. (Courtesy of the Israel Antiquities Authority.)

point along the road where the track leaves a wide plain and enters a narrow mountain canyon that winds down to the plains of the western Negev. In the Iron II and Persian periods fortresses dotted the immediate landscape west and north of Horvat Ma'agurah, a witness to the important trade routes that passed through the Nahal Besor and Nahal Boqer Valleys before the Nabataeans entered this stage of history. Its name, Horvat Ma'agurah, refers to a massive cistern hewn in the bedrock at the site (Fig. 13). The cistern is wholly intact and identical to other cisterns of this type in the immediate area with the exception that the betyl carved in relief appears on the lintel of the cistern instead of on the column below. Massive stone-hewn cisterns were described by Hieronymus of Cardia in the earliest historical source concerning the Nabataeans in the late fourth century BCE (Diod. Sic. 2.48.2–3, 19.94.6–8). Horvat Ma'agurah was excavated by Zeev Meshel and Rudolph Cohen in

the 1970s and Cohen's team returned there again in the 1980s. The early excavations revealed the presence of a rectangular caravanserai, 22 x 40 m in size, which is among the earliest Nabataean caravanserais recorded. The caravanserai contains a large inner courtyard and casemate room situated along its inner walls. The ceramic assemblage uncovered in the excavations dated to the Hellenistic period and the earliest coins date to the second century BCE.

A second, smaller structure, 21 x 21 m in size, was built directly inside the courtyard of the caravanserai along its eastern side. Excavations in the 1980s revealed a fort with four closely engaged corner towers. One of the corner towers contained a stairway wrapped around a central pillar, which descended into a plastered room with a bathtub and an enigmatic installation (Figs. 14–16). Water was heated on the opposite side of the bathtub wall and passed through a hole in



FIG. 12

Aerial photograph of the Early Nabataean caravanserai at Horvat Ma'agurah. The Hasmonean fort sits inside the courtyard of the caravanserai. (Courtesy of the Israel Antiquities Authority.)

the wall into the room. A small triangular niche for an oil lamp was built into the central stairway pillar.

The remains of a kitchen with a clay-lined oven and low stone bench built against a wall were discovered in a second tower. Storage jars were discovered in a third tower inside an installation. Following the excavation, Cohen was apparently unsure of the date of the fort. In spite of a complete lack of Roman or Byzantine artifacts in the fort, he suggested in preliminary reports that it was a Roman fort based on

the four-corner tower plan of the structure. When its pottery assemblage was examined years later, it quickly became obvious that this was not a Roman fort, but a fort of the Late Hellenistic period. Even more surprising was the presence of Hasmonean pottery vessels in the assemblage, including a complete Early Hasmonean cooking pot discovered on the floor of the bath tower. A Late Hellenistic oil lamp was found on the stairs of the bath tower and a bowl of the same period was discovered in the foundation trench of the fort. Late

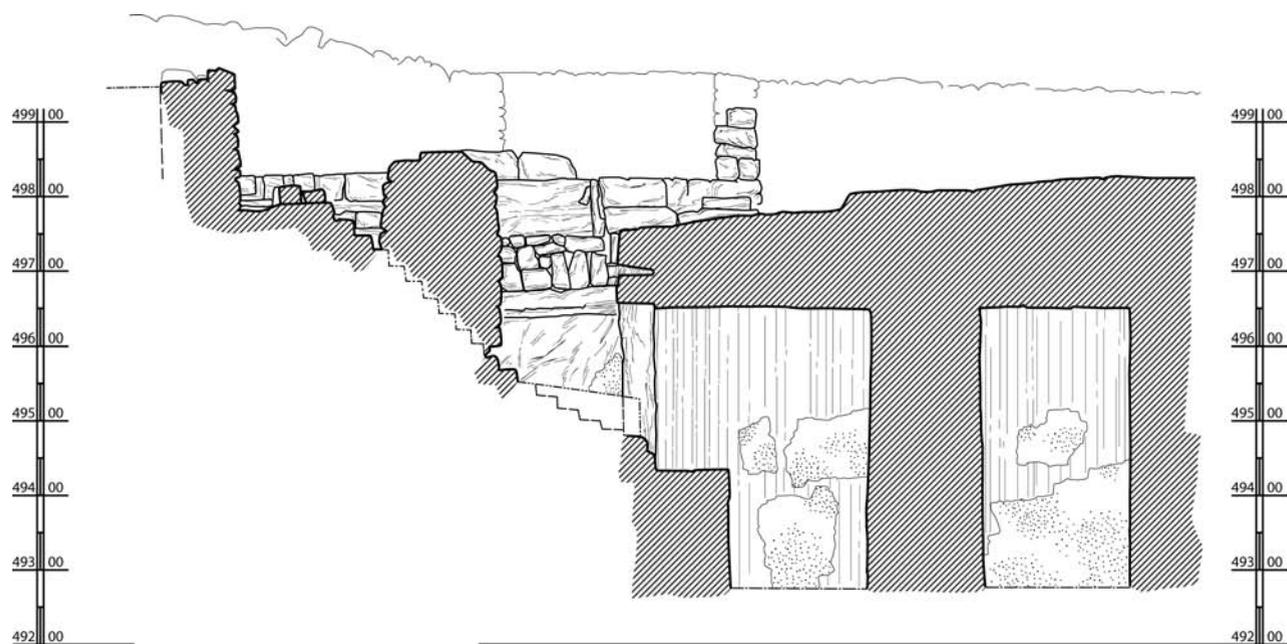


FIG. 13

Section of the Early Nabataean hewn cistern (*miqva*?) and plastered stairs at Horvat Ma'agurah. (Courtesy of the Israel Antiquities Authority.)



FIG. 14

Stairs leading down to a private bath in a tower of the Hasmonean fort at Horvat Ma'agurah. (Courtesy of the Israel Antiquities Authority.)

Hellenistic vessels and storage jars were discovered in the kitchen and also in the third tower. An examination of the features in the bath tower quickly revealed it to be nearly identical in several details to baths uncovered

in the Hasmonean Twin Palaces next to Jericho and the early Herodian bath in the Western Palace (the 'core') in Masada (Netzer 1991: 255–58, Ills. 400–404, 407–411; 2001: 33–34, Figs. 33, 35).



FIG. 15
Plastered bathtub in the private bath in the Hasmonean fort at Horvat Ma'agurah. (Courtesy of the Israel Antiquities Authority.)

It is now apparent that this was a Hasmonean fort built inside the courtyard of the Nabataean caravanse-
rai sometime after the Hasmonean conquest of Gaza in 99 BCE. The mixed assemblage in the rooms of the fort,

some vessels of which were Hasmonean, others of which were from the coastal region, reflects the preference of Alexander Jannaeus and his widow, Alexandra Salome, for foreign mercenaries in their armies (Shatzman 1991:

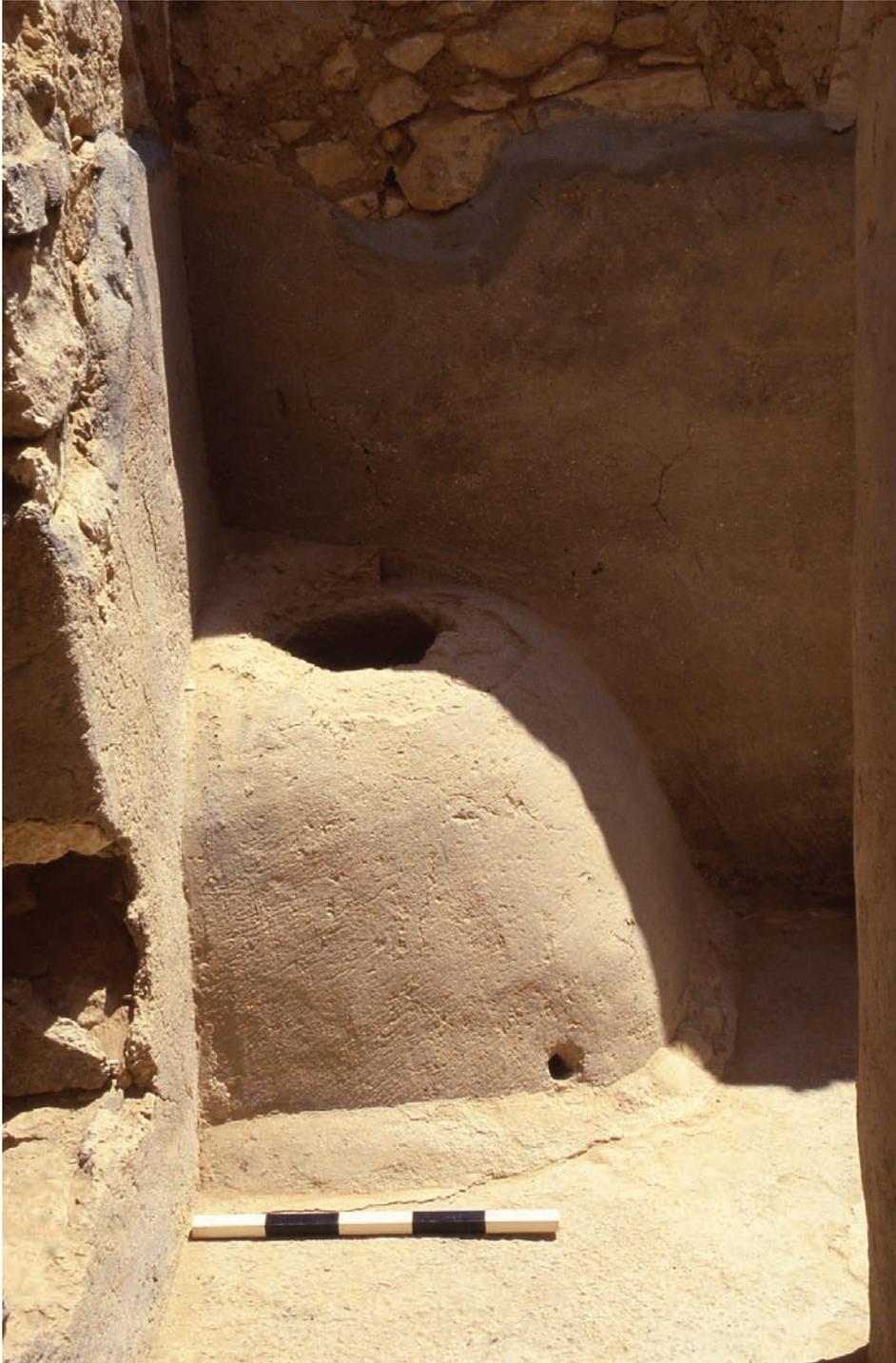


FIG. 16
Plastered installation (function unknown) in the private bath at Horvat Ma'agurah. (Courtesy of the Israel Antiquities Authority.)

124). The commanders of the unit stationed at the site were probably Jewish and there are hints that the early Nabataean cistern may have been used as a Jewish ritual bath (*miqva*). Immediately outside the fort, part of

the caravanserai was disassembled and wide plastered stairs were inserted that led down to the top of the cistern. However, the wine drunk at the site was imported, probably from the island of Cos, and parts of Koan wine

jars were found throughout the fort and in the installation of the third tower. Early examples of Eastern Sigillata fine ware bowls, probably imported from north Syria, were found among the kitchen assemblage.

The discovery of a Hasmonean fort in the Negev Highlands sheds light on the identity of a second fort, originally discovered in the 1930s by the Colt Expedition in Nessana. The remains of the fort (25 x 27 m), cautiously labeled a ‘Late Hellenistic fort,’ were revealed under the North Church of the Late Byzantine period (Colt 1962: 13–14; pl. LXIV). Coins of Alexander Jannaeus were discovered below the floors and in other parts of the site (Urman and Harpak 1994: 50; Urman 2004: 113*) along with a rather large quantity of wine jars, including numerous examples of the type imported from Cos like those found at Horvat Ma’agurah (Grace 1962: 107).

It is now clear that following the conquest of Gaza and the southern coast of Palestine, the Hasmoneans did not restrict their control solely to that region, but purposely blocked the major Nabataean trade routes running through the Negev: the Petra–Gaza Road, the Darb el-Gaza Road, and the Elusa–Nessana Road (the biblical Way of Shur). The Nabataeans were effectively cut off from the Mediterranean coast and direct routes north through Moab for several decades. In this very formative period, they expanded their influence south of Petra with the construction of Humayma (ancient Hawara) and northwards into Syria by way of the Wadi Sirhan route. According to the Jewish historian, Flavius Josephus, following the death of Jannaeus’ widow, Alexandra Salome, a dispute broke out between their sons, Aristobulus and Hyrcanus II. On the suggestion of his Idumaeen advisor, Antipater, Hyrcanus II offered to return “cities” conquered by his father to the Nabataeans in exchange for military support against Aristobulus (*Ant.* 14.1.4). Their territories in Moab and the Negev returned to Nabataean sovereignty, and within a few decades the Nabataeans re-established their presence there and built and expanded caravan stops at Elusa, Oboda, and Nessana into permanent settlements. When the Nabataean king Obodas II was deified and added to the Nabataean pantheon, an important temple was built for his worship at Oboda, which later writers claim to have been so named in his honor. The settlement of Elusa developed into a major

city and would eventually become the district capital of the Nabataean and Roman Negev. Horvat Ma’agurah was briefly reoccupied by the Nabataeans, but it was soon abandoned and never reoccupied, possibly due to the changes that took place in the volume and type of trade in the Early Roman period.

Nabataean Caravans and the Roman Army at Sha’ar Ramon

The journey is divided into 65 stages [36.6 km each], at each of which is a rest station for the camels. . . Indeed, all along the route they keep on paying, at one place for water, at another for fodder, or the charges for lodging at the halts, and the various octrois . . . —Pliny NH 12.32.63–65

The caravanserai at Sha’ar Ramon is situated near an important spring (‘En Saharonim) on the southeast edge of the Ramon Crater. The building was constructed in the Early Roman period, like that in Moyat ‘Awad described below. Its excavation has produced a number of interesting features and details. It is 42 x 42 m in size and boasts a large, inner courtyard and a series of casemate rooms against the inner walls (Fig. 17). A stairway led up to an upper floor or tower along the western wall of the structure. The excavators determined that the commander’s residence was located in rooms along the back of the building, opposite the gate. Rooms along the southeastern side of the structure were used as a service wing with a large baking oven, discovered nearly intact (Fig. 18). The oven was built on a raised platform that filled most of the room (Fig. 19). It contained cooking pots of the second to early third centuries CE and camel bones. Plastered bathtubs were revealed in the rooms next to the oven. The bathrooms and the oven were constructed in the post-annexation phase of the caravanserai when road services continued to be provided to passing camel trains. Years after the excavation, visitors to the site picked up a sandstone grave marker of a Roman soldier of the *Cohors VI Hispanorum* from a burial mound near the caravanserai. The stone was carved with a depiction of the goddess Athena and it bears a bilingual inscription in Greek and Latin. In the ashy midden

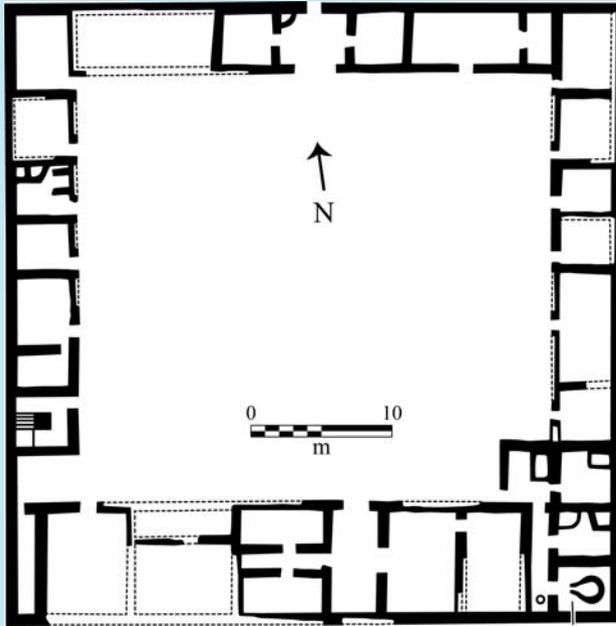


FIG. 17
Plan of the Nabataean caravanserai of Sha'ar Ramon. (Courtesy of the Israel Antiquities Authority.)

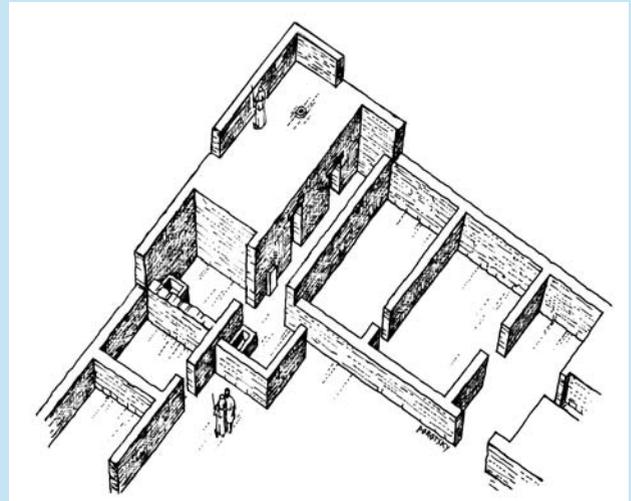


FIG. 18
Isometric sketch of the service wing of the Sha'ar Ramon caravanserai, second to early third centuries CE. (Drawing by D. Porotsky. Courtesy of the Israel Antiquities Authority.)



FIG. 19
Baking oven in the service wing of the Sha'ar Ramon caravanserai, second to early third centuries CE. (Courtesy of the Israel Antiquities Authority.)

located in front of the gate, numerous objects have been discovered including a bronze sword slide and oil lamps.

Caravanserais similar to those at Sha'ar Ramon and Moyat 'Awad continue to be discovered in surveys and excavations in the region. These include one built near the Evrona springs north of Eilat at Horvat Dafit, also excavated by Cohen (1984), as well as on the eastern edge of the Arabah at Rujm Taba and at Qa'a es-Sa'yadiyeen (Smith and Niemi 1994; Smith, Stevens, and Niemi 1997; Dolinka 2006), and on the Sinai coast near Dahab (Meshel 2000: 18–19, 45).

Like other sites along the Incense Road, Sha'ar Ramon was abandoned sometime after 222 CE and assemblages of whole Nabataean fine ware vessels of the post-annexation period were discovered in some of the rooms. Unlike the sites at Moyat 'Awad and Nahal Neqarot, which were never again occupied after the third century CE, some of the rooms in the Sha'ar Ramon caravanserai were reoccupied towards the end of the third century CE. Although the bathrooms and oven of the earlier phase went out of use, a smaller oven (*tabun*) was placed in the hallway next to the commander's quarters. The floors of the commander's quarters were re-plastered and a coin of the late third century CE was discovered trapped below its surface. The reoccupation of part of the structure in this period coincides with the construction of Diocletian's army camp in nearby Oboda as well as the construction of the military bathhouse, and two towers that guarded the town (Erickson-Gini 2002; 2010: 17–19, 88–91). Evidence for a Roman army presence in the late third through early fifth centuries CE was found in the Mahmal fort as well. Milestones and sections of the Roman road lined with stones have been found between Sha'ar Ramon and Oboda and milestones have also been discovered north of Oboda along the road to Elusa and the road to Mamphis (Meshel and Tsafrir 1974; Ben David 2012: 19–21). Some of the milestones bear illegible inscriptions painted like Diocletian's milestones discovered in the Arabah north of the Yotvata fort (Avner 1995). The Roman army road works, evident along roads leading to and from Oboda, may have been carried out in the Severan period when the forts were built and

then reused in the time of Diocletian/Early Byzantine period.

Diocletian's military presence in Oboda and Sha'ar Ramon reflects unsuccessful attempts to revive international trade between Petra and the Mediterranean. The demand for luxury goods and perfumed oils in the Roman world dried up during the third-century crisis and never recovered. In the Negev and in Petra, the Nabataeans turned to agriculture in order to survive (Erickson-Gini 2010: 81–82, 197–99). Their efforts may have been motivated by the immediate needs of Roman legions stationed in the region from the time of Diocletian. According to the Christian historian Eusebius, in this period the *Legio X Fretensis* was transferred from Jerusalem to Aila (modern Aqaba) (*Onom.* 6.17–20, 8.1–3). Other legions were placed near Petra in Udruh and in Moab at Lejjun (Parker 2006: 541–52; Kennedy and Falahat 2008). The Negev towns, which were originally established as caravan stops along the Incense Road and secondary roads, took on a rural character and increased in size. The thousands of terraced fields extant throughout the Negev Highlands evince the role that agriculture played in the economy of these towns in the Late Byzantine period when wine was produced and exported to other parts of the empire (Erickson-Gini 2012: 53).

By the fourth century CE, the glorious days of the Incense Road were past, but the road was still used as a link between Petra and the Negev towns. Although major sites like Moyat 'Awad and the Neqarot fort lay abandoned, the small, civilian site of Har Massa, located between the Qasra fort and Nahal Neqarot, came back into use. Ties between the two regions lasted until 363 CE when an earthquake caused great devastation in Petra (see Tuttle this issue, 14). By the early fifth century CE, the pagan population of the Negev began to accept Christianity *en masse*.

Roman Forts and a Nabataean Shrine

Evidence of an early second-century CE earthquake is found at other sites along the Incense Road at Nahal

Neqarot, Sha'ar Ramon, and particularly at the head of the Mahmal Pass where an Early Roman Nabataean structure collapsed (Korjenkov and Erickson-Gini 2003; Erickson-Gini 2011). There is ample evidence of the immediate reconstruction of buildings at Moyat 'Awad, Sha'ar Ramon, and Horvat Dafit. However, this does not seem to be the case with the Mahmal and Neqarot sites.

International trade continued to flow along the Incense Road after the annexation of the Nabataean kingdom and the creation of the Roman province of Arabia in 106 CE. Har Massa, a small site with a civilian character is located between Moyat 'Awad and Nahal Neqarot, and it too was occupied in the post-annexation period. This site is an outlier among those excavated by Cohen in view of its size (10 x 20 m) and construction, and also the fact that no type of water storage was found there or nearby. It is made up of a row of rooms dug out into the low hilltop next to the Petra–Gaza Road.

In the second half of the second century CE, the Romans constructed a new type of fort with adjacent courtyards along the Incense Road and along secondary roads in the Negev and Arabah. Their construction may have taken place during the reign of Septimius Severus (193–211 CE). This Roman emperor, who took the title *Arabicus* following his first war with Parthia (194–195 CE), later traveled through Arabia on his way to Egypt (Dio Cass. 76.13.1). The forts have upper stories and they are relatively small: the Mahmal fort measures 6.5 x 7 m and the Neqarot fort is 5 x 8.5 m in size. Where sites were repaired, such as Moyat 'Awad and Sha'ar Ramon, the Roman army utilized them without introducing new structures. In other cases forts were built next to earlier collapsed buildings (Mahmal and Neqarot) or, as in the case of Qasra, a whole new site was developed.

Qasra is located a few kilometers northwest of Moyat 'Awad and is situated at the top of a steep pass that winds up from Nahal Omer (Fig. 20). Water for the fort was collected in a cistern carved into the side of Nahal Omer, located far below the fort. A similar type of cistern is located next to the remains of the Grafon fort, located between Mahmal and Oboda. The Qasra

fort is 5 x 5.5 m in size and was accessed by way of a courtyard and rooms that were added to the front of the building.

The forts built in Nahal Neqarot and above the Mahmal Pass both have stairs that led to an upper story (Fig. 21). A fort of this type is extant along the Oboda–Mampsis Road at Horvat Haluqim (Cohen 1976) and at Horvat Dafit, where a small tower and courtyard were built directly in the courtyard of the earlier Nabataean caravanserai there (Cohen 1984). The fort in Nahal Neqarot obtained water from a Nabataean cistern, covered by stone slabs and supported by three transverse arches that are still intact today. In 1995 the cistern was partially cleared during conservation work in the structure. An inscribed horned altar discovered at the bottom of the cistern appears to bear the name of one of the Roman soldiers stationed in the fort (Fig. 22). A larger cistern of the same type supplied water to the Mahmal fort. The Neqarot fort consists of a tower divided into three rooms accessed by way of a courtyard. Like Moyat 'Awad, the Neqarot fort was abandoned, leaving behind an *in situ* assemblage of Nabataean vessels of the post-annexation period. Similar wares were discovered inside the Mahmal fort and in its foundation trench. The Neqarot fort has survived to a remarkable height and, following the excavations, a Latin inscription was discovered on the plaster surface of one of the inner walls.



FIG. 20
The Roman fort at Qasra above Nahal Omer. (Courtesy of the Israel Antiquities Authority.)



FIG. 21
The courtyard and stairs
inside the Nahal Neqarot fort.
(Courtesy of the Israel Antiquities
Authority.)



FIG. 22
The inscribed horned-altar discovered in the Nahal Neqarot
cistern, second to early third centuries CE. (Courtesy of the
Israel Antiquities Authority.)

Along the road leading from Moyat 'Awad past Horvat Qasra, a number of *masseboth* (aniconic betyls) can be seen. Outside of the Qasra fort, the excavators uncovered a small open shrine that contained a low platform or altar supporting two unworked stones (Fig. 23; Nabataean vessels of the post-annexation period were found buried around the altar). The *masseboth* in the shrine and along the road reflect the popularity and possible revival of the worship of standing stones in the Late Roman period during the reign of the 'Syrian' emperors, particularly Elagabalus (219–222 CE). In that period, the worship of the Nabataean god Dushara was elevated in the eastern provinces and groups of *masseboth* are depicted on imperial coins (Hill 1916: 138–39).

A third fort was built at the head of the Mahmal Pass on the northwest cliff overlooking the Ramon Crater. The fort is 6.5 x 7 m in size and obtained water from a cistern covered with transverse arches, now in a state of collapse, 540 m further north. Similar to the other sites, Nabataean vessels, including lamps and parts of painted and plain fine ware bowls were discovered in the fort. A bowl sherd of the latest type of Nabataean-painted fine ware was discovered in the foundation trench of the fort during excavations in 2004.

Roman Soldiers and Perfume Production at Moyat 'Awad

The most significant site excavated by Cohen along the Incense Road is that of Moyat 'Awad. The site is located



FIG. 23
The *motab* (cultic platform) and *massebah* in the open shrine next to the Roman fort at Horvat Qasra. (Courtesy of the Israel Antiquities Authority.)

ca. 40 km northwest of Petra on the western edge of the Arabah. The identification of the site is enigmatic. Cohen identified this as Mo'a, a site mentioned in such late Byzantine sources as the Madaba mosaic and the Beersheva tax edict. However, Moyat 'Awad was abandoned before that period and Alt's proposal (1935) that Bir Madhkur, one of Diocletian's forts located on the eastern edge of the Arabah, should be identified as Mo'a appears to be vindicated.

Moyat 'Awad has three occupational phases spanning the Hellenistic, Early and Late Roman periods, and the remains of a number of structures: a Hellenistic Nabataean fort (Area B), a Nabataean caravanserai of the Roman period (Area A), cave dwellings and industrial structures (Area C), a kiln (Area F), agricultural terraces, and a water reservoir (Fig. 24). The fort (Area B) is situated on a hilltop overlooking the springs and the Incense Road. It is 17 x 17 m and consists of an inner courtyard surrounded by casemate rooms, the remains of a bath, and stairs leading to an upper story (Figs. 25–26). Its plan is identical to that of a second Hellenistic Nabataean fort located ca. 8 km further north at the head of the Darb es-Sultan next to 'En Rahel (Israel and Nahlieli 1982). Coins and artifacts discovered over the bedrock inside the fort point to its construction and occupation sometime in the third century BCE. In the Early Roman period, the fort continued to be occupied even after the construction of a 40 x 40 m caravanserai in Area A on the plain below. The caravanserai was probably built towards the end of the reign of Aretas IV (9 BCE–40 CE). It has an inner courtyard, large enough to accommodate a train of 20–30 camels, and casemate rooms lining the inner walls. It is identical to the caravanserai constructed in the same period next to the Saharonim Spring on the edge of the Ramon Crater at Sha'ar Ramon.

On the flat hilltop above the caravanserai and opposite the fort are the remains of a small third building (Area C) with four rooms that the excavators tentatively suggest may have been a shrine. However, the excavations uncovered extensive industrial use inside the rooms. Below the structure, caves used as dwellings or for storage were carved into the hillside. In addition, the remains of a kiln were discovered north of the caravanserai.

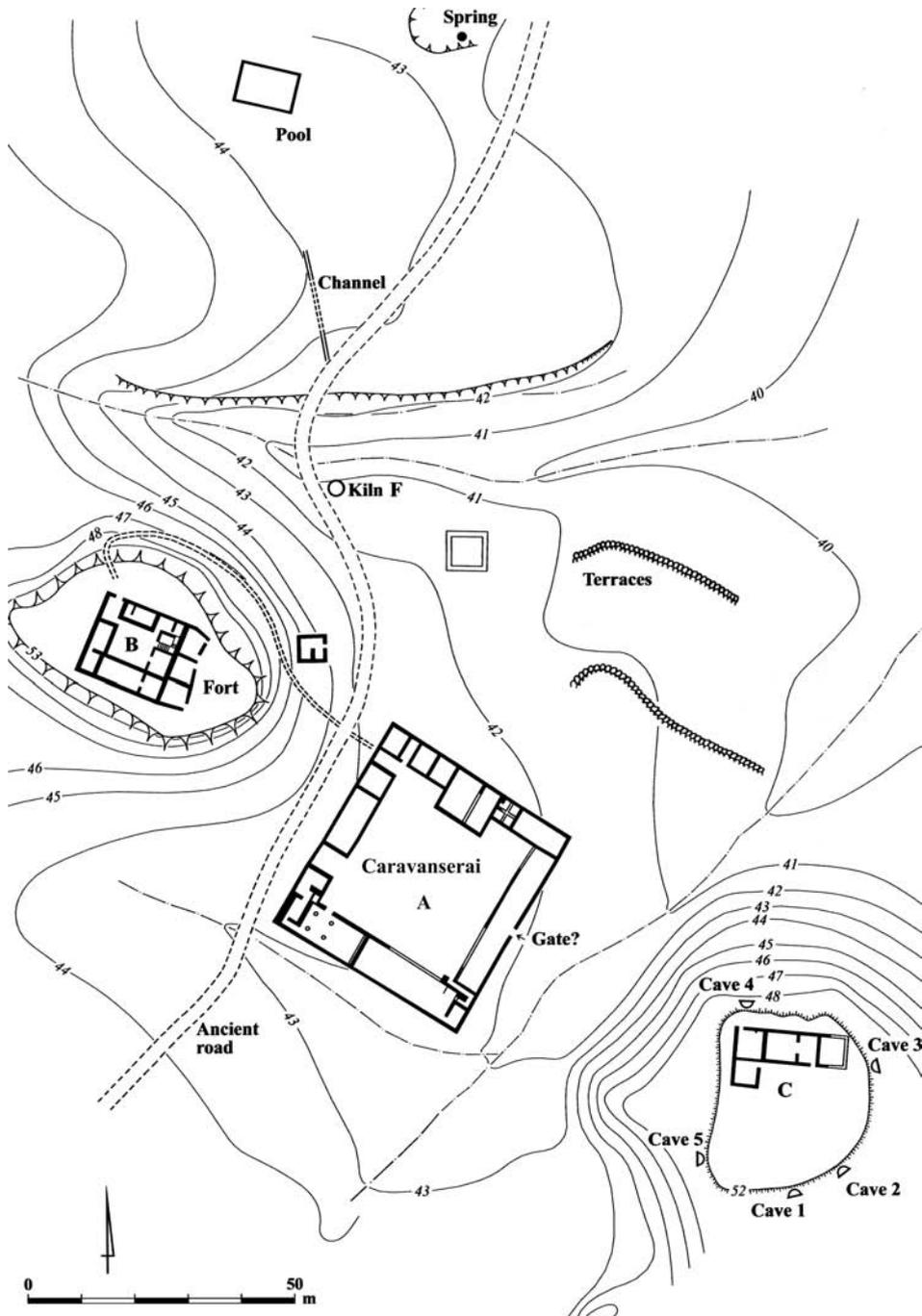


FIG. 24
Plan of the site of Moyat 'Awad in
the western Arabah. (Courtesy of
the Israel Antiquities Authority.)

The Early Roman phase of occupation in the site ended with extensive damage caused by an earthquake that took place shortly before the Roman annexation of the region in 106 CE (Korjenkov and Erickson-Gini 2003). The building in Area C and the kiln works were destroyed, and the cave dwellings were apparently

abandoned as well. Reconstruction was required in parts of the fort. At this time, deposition from its floors was removed and thrown outside of the fort and a new bath as well as heating were constructed in its interior. Along its eastern exterior and lower slope, rooms were added. Thus, the great majority of the finds from inside



FIG. 25

The entrance to the Hellenistic Nabataean fort (Area B) at Moyat 'Awad. (Courtesy of the Israel Antiquities Authority.)

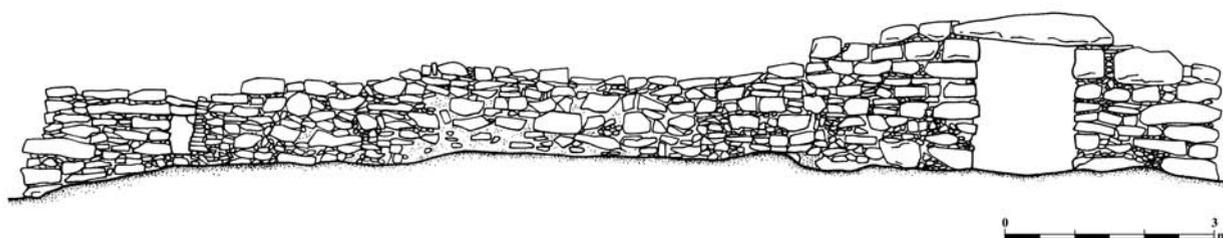


FIG. 26

Sketch of the front wall of the Hellenistic Nabataean fort. (Drawing by N. Stelzer. Courtesy of the Israel Antiquities Authority.)

the fort and its ancillary rooms date to the latest phase of its occupation in the Late Roman, post-annexation phase, the latest coins of which date to the reign of Elagabalus (219–222 CE).

Only a small part of the caravanserai was excavated. In its latest, post-annexation phase, it contained a bathhouse and adjacent rooms decorated with frescos in solid colors (mainly red and yellow)

and molded stucco decoration. Water for the bathhouse was supplied by way of an aqueduct built from hypocaust bricks that brought water from an open reservoir north of the site.

Excavation yielded an incredibly rich assemblage of pottery (Figs. 27–29) and glass vessels, organic remains, and small finds, including many bronze artifacts such as a sculptured muscle-cuirass, and bronze



FIG. 27
Nabataean-painted bowl from Room 3 in the Moyat 'Awad fort.
(Courtesy of the Israel Antiquities Authority.)



FIG. 28
Nabataean-painted bowl from Room 3 in the Moyat 'Awad fort.
(Courtesy of the Israel Antiquities Authority.)



FIG. 29
Group of vessels discovered in Rooms 1 and 3 of the Moyat 'Awad fort. (Courtesy of the Israel Antiquities Authority.)



FIG. 30
Copper-alloy 'Aucissa'-type fibula from Room 3 in the Moyat 'Awad fort.
(Courtesy of the Israel Antiquities Authority.)

and enameled-bronze fibulae (Fig. 30) that belonged to Roman soldiers who occupied the site in the Late Roman period.

Hundreds of pieces of textile woven from wool, linen, and goat hair, many of which were dyed, have been recovered from the site and from inside the fort. This in itself is not out of the ordinary. However, what is surprising was the discovery of an olive oil press and industrial features in two rooms of the fort (Fig. 31). The American volunteers who excavated much of the fort, Nellie and Ben Stelzer, immediately identified the remains as those used for the production of perfumed oils. Grinding stones and mortars were found throughout the fort, and olive pits and a nearly intact basket used in the pressing process were discovered as well.

With this discovery, many of the features in the rest of the site were clarified. Moyat 'Awad was never a village, and the rooms built on and below the fort were probably used by Roman soldiers guarding the road as well as civilians who provided services in the caravan-serai. The agricultural terraces north of the site appear to have been used to cultivate olives used in the production of perfumed oils inside the fort. This activity only



FIG. 31
An oil press and industrial installations inside the Moyat 'Awad fort. (Courtesy of the Israel Antiquities Authority.)

appears in the latest phase of its occupation. The production of perfumed oils may have taken place in the previous period on the opposite hill in Area C until its destruction in the early second century CE. The olive oil produced at the site was a particularly important feature as the manufacture of perfumed oils required fresh olive oil. Aromatic substances used in the perfumes were easily available at this caravan stop, and were measured, ground, and probably heated according to known recipes. The production of perfumed oils in such a remote site is indicative of just how lucrative

the business was in the Roman Empire. The perfumed oils produced here could have been original or more probably 'knock-offs' of expensive oils manufactured in larger centers such as Alexandria or Petra. Artifacts discovered in the fort suggest that Roman soldiers were involved in its production; however, the massive amounts of pottery vessels, produced by Nabataeans living under Roman rule in Petra, indicate they were too (Fig. 32). Coins of Emperor Elagabalus, uncovered in the fort, show that it was abandoned sometime after 222 CE.



FIG. 32
Nabataean-painted ware bowls from early third-century CE contexts at Moyat 'Awad (front left and back) and the Neqarot fort (front right). (Courtesy of the Israel Antiquities Authority.)

Old Digs, New Conclusions

Ancient historians reported the existence of the Incense Road between southern Arabia, Petra, and the Mediterranean. The ‘road’ was essentially a desert track or lines of tracks that extended between important water sources. The part of the Incense Road between Petra and Gaza was the shortest section, but it was of particular importance to the Nabataeans and the Romans as can be seen by the development of road facilities and forts along its length.

Cohen’s excavations along the Petra–Gaza section of the Incense Road have revealed the stages of the development for the road and changes in its use. The road of the Hellenistic period was not the direct route used in Roman times. The early track was guarded by some of the earliest buildings constructed by the Nabataeans: small forts like that at Moyat ‘Awad, the first station in the western Arabah. More research in the hinterland around Petra is required in order to detect similar structures. The strongest candidate in the Petra region is Site 49, surveyed by the Finnish Jabal Haroun Project (Ynnilä 2006: 62; see also Lindner 1989: 86). The structure is located above Naqb al-Ruba’i, ca. 7 km southwest of the Petra city center. It is approximately 20 x 30 m in size with a central courtyard and casemate rooms. A profusion of Nabataean sherds was discovered on the surface of the site and future excavations may reveal an earlier Hellenistic phase of construction. This is indeed suggested by some of the rough hewn stones located on its northwest edge, stones that are nearly identical to those used in the construction of the fort at Moyat ‘Awad.

North of Oboda, the early Nabataean caravanserai at Horvat Ma’agurah incorporated the earliest type of hewn cistern for which the Nabataeans were famed. Even more important was the discovery of a Hasmonean fort built inside the caravanserai in the early first century BCE. This fort is proof that the Hasmoneans actively blocked the Petra–Gaza Road for several decades, denying the Nabataeans access to the Mediterranean. According to historical sources, the Nabataeans regained control of the road and the immediate region around 65 BCE in a political arrangement with Hyrcanus II.

During the Early Roman period, the development of the direct route between Moyat ‘Awad and Oboda reflected the economic transformation of the Nabataean

kingdom as it reached its apex, which included Nabataean settlement in the Negev Highlands. The earliest Nabataean station built along the Incense Road at the Neqarot site (and possibly the Mahmal site) was somewhat crude in its construction. Recent surveys and excavations in the eastern side of the Arabah have revealed the presence of a structure with a courtyard of the same period at Khirbet Sufaysif (Khirbet es-Saysif) located between the Rubai Pass and Moyat ‘Awad (Smith 2010: 37–39; Smith and Kay 2010). In light of Smith’s excavations at Bir Madhkur (Smith 2010; Smith and Kay 2010), Glueck’s contention that it was the primary link between Petra and Moyat ‘Awad has been overturned (Ben David 2012: 21–23, figs. 5–7; *contra* Glueck 1959: 235). At present, the Nabataean Incense Road between Petra and Moyat ‘Awad appears to have been connected with Petra by way of the Rubai Pass, past Khirbet es-Saysif and Khirbet Umm-Qhuntera, located near the Jordan–Israel border (Smith 2010: 42–43, 98, 100; Ben David 2012: 21–23, figs. 5–6).

Cohen excavated large caravanserais in Moyat ‘Awad and Sha’ar Ramon. These structures lacked the defensive posture exhibited in the Nabataean forts of the Hellenistic period: the caravanserais are built on open, level ground next to the road. This reflects the level of security achieved by the Nabataeans in the early years of the first millennium BCE. Probably the most important fact revealed by the excavations is the continued use of these caravanserais and the Incense Road following the Roman annexation of Petra and the Nabataean kingdom in 106 CE.

International trade along the road was robust throughout the second century CE, and its economic importance motivated the Romans to build new forts along its length in order to ensure its security. At two sites, the Neqarot and Mahmal, the new installations appear to have replaced Nabataean structures destroyed by an earthquake that took place shortly before annexation in the early second century CE. At Moyat ‘Awad and Sha’ar Ramon, the Nabataean structures were repaired and continued to be used by Roman military personnel and evidently by Nabataean civilians supplying road services at each site. Before its abandonment sometime after 222 CE, olive oil processing took place at Moyat ‘Awad in the fort, and the artifacts and installations present therein suggest that the oil was the main ingredient of perfumes made there. The olives used in

the process were grown at the site in irrigated terrace fields. According to Theophrastus, writing in the fourth century BCE, freshly extracted olive oil was generally the prime ingredient for perfumed oils in ancient times (*Odours* 4.15) and the aromatic substances mixed with it would have been readily available along the main artery of trade with Arabia. The cultivation of olives for the manufacture of perfume at Moyat 'Awad may have been an extension of perfume production at Petra. A possible candidate for the cultivation of olives and perfume production is the site of Qasr Wadi Musa, also called Qasr Umm Ratam, located ca. 25 km southeastwards in the eastern Arabah. Further archaeological research is required to determine the nature of the type of cultivation that took place there in the Nabataean and Roman periods, but a considerable investment was made in the form of aqueducts that carried spring water to cultivated fields and the site appears to have been fortified in the post-annexation period (Lindner, Hübner, and Hübl 2000). Ancient perfumeries have been found to be relatively modest structures like the *officina* discovered next to the Dead Sea in 'En Boqeq (Fischer, Gichon, and Tal 2000: 85) and those discovered in Italy and Greece (Brun 2000).

The cessation of international trade along the Incense Road and the abandonment of stations along the Petra-Gaza section took place sometime in the early to mid-third century CE. Whole pottery assemblages and installations were discovered abandoned *in situ*, possibly in the wake of an epidemic that spread along trade routes such as the Incense Road (Erickson-Gini 2010: 63). The small fort at Moyat 'Awad was stacked full of vessels, intact mud vessels, and grinding stones and organic finds, including whole wooden beams. The same situation was uncovered in the caravanserai at Sha'ar Ramon, where a large cooking oven and cooking pots were left intact and numerous

complete pottery vessels were found in the rooms, and also in the Neqarot fort. The vast majority of the vessels discovered in third-century CE contexts at these sites were produced in Petra and included Nabataean-painted fine wares that were thought to belong to the second century CE. The discovery that they continued to be produced as late as the third century CE is surprising, but it dovetails with the contents of a kitchen pantry of a building abandoned in the same period in Oboda that was excavated in 2000 (Erickson-Gini 2010: 63).

The cessation of international trade along the Incense Road coincides with major political, military, and economic developments that took place in the eastern provinces of the Roman Empire in the third century CE. The Roman army apparently evacuated sites throughout the province of Arabia sometime following 222 CE and several decades passed before the Romans reasserted their control in the latter half of that century. By that time, new geo-political realities had taken hold: a military struggle with Sassanian Persia, galloping inflation, and a crisis in imperial leadership.

In the wake of Cohen's excavations, between 1993 and 2000 funding for the consolidation and conservation of most of the sites along the Incense Road was provided by the Negev Tourism Development Authority and the work was carried out by teams of the Conservation Department of the Israel Antiquities Authority. In 2005, the Incense Road was declared a World Heritage site on behalf of UNESCO. The sites of Oboda (Avdat) and Moyat 'Awad are accessible by car and the other sites are accessible by four-wheel drive or bicycle from the Arabah, Mizpe Ramon, and Sede Boqer. Public camping is allowed in sites designated by the Israel Nature and Parks Authority near Moyat 'Awad, in the Ramon Crater, Mizpe Ramon, near Sede Boqer, and the Avdat National Park.

TALI ERICKSON-GINI has worked extensively in the Negev and has directed excavations in a number of Nabataean sites, among them Oboda, Mampsis, Mezad Mahmal, and Horvat Hazaza. Currently she is the scientific editor of the final publication of Rudolph Cohen's excavations along the Nabataean Incense Road.

YIGAL ISRAEL has served as district archaeologist in all three Israel Antiquities Authority Southern Regional District. He has conducted extensive surveys and excavations at Jericho, Herodion, Sepphoris, 'En Rahel, Ashkelon-Barnea, Beersheva, Be'er Ora, Ma'ale Zin, Amatzia, 'En Hazeva, and at numerous sites along the Incense Road. He currently holds the position of regional director of the Israel Antiquities Authority's Southern Regional office.

Note

The map, many photographs, plans and sketches have been kindly provided by the Israel Antiquities Authority (IAA). The writers wish to thank Nahshon Sneh, who served as a photographer during the excavations, for his persistence in providing scans of many of the photographs of sites in this article. We also wish to thank a number of people who were helpful in providing information: Dr. Benjmain J. Dolinka, Dr. Haim Ben-David, Dr. Christopher A. Tuttle, Yaacov Baumgarten, and Ben Stelzer. We also wish to thank Ms. Yael Barschak for providing color photographs of finds from the photo archive of the IAA that were taken by Clara Amit. A rather large number of archaeologists and volunteers who participated in the excavations include Yigal Israel, Yeshayahu (Shaike) and Lori Lender, Ben and Nellie Stelzer, Dov Nahlieli, Yehudit Ben Michael, Pnina Shor, Yaacov Kalmon, and Margalit Hayush among others. Most of the plans and sections were drawn by Israel Vatkin and Valentine Shor. The isometric drawings were executed by Dov Porotsky and Sharon Gal. Nellie Stelzer drew the front wall of the fort at Moyat 'Awad (Area B). The coins were identified and cataloged by Donald Z. Ariel and Ariel Berman. Orit Shamir examined and conserved the textiles and Naama Sukenik, Zohar Amar, and David Iluz studied the textile dyes. Archaeobotanical finds were examined by Nili Liphshitz, seeds by Mordechai Kislev and Orit Simchoni, and zooarchaeological finds by Dalia Hakker-Orion. Wooden artifacts were studied by Yigal Sitry. Small finds from the site were examined by Tali Erickson-Gini, Shulamit Hadad, and Baruch Brandl. Tali Erickson-Gini examined the ceramic and stone finds. Finds of a military nature were examined by Guy Stiebel and Tali Erickson-Gini. The inscriptions found at the various sites were examined by Leah Di Segni. Site conservation was undertaken by Gilead Etkes (landscape architect) under the direction of Giora Solar, David Zel, and Ya'acov Schefer and carried out by Assi Shalom, Olga Finkelstein, Ariel Inbar, Oded Kalickman, Nehorai Biton, and Roi Porat among others.

References

- Alt, A. 1935. Aus der 'Araba II: Römische Kastelle und Stra'en. *Zeitschrift des deutschen Palästina-Vereins* 58:1–59.
- Avner, U. 1995. The Southern Arava—Roman Milestones. *Hadashot Arkheologiyot* 104: 120–21 (Hebrew).
- Ben David, C. 2012. Nabataean or Late Roman? Reconsidering the Date of the Built Sections and Milestones along the Petra-Gaza Road. In *The Nabataeans in Focus: Current Archaeological Research at Petra; Papers from the Special Session of the Seminar for Arabian Studies Held on 29 July 2011*, ed. L. Nehmé and L. Wadeson, 17–26. Proceedings of the Seminar for Arabian Studies Suppl. 42. Oxford: Archaeopress.
- Brun, J.-P. 2000. The Production of Perfumes in Antiquity: The Cases of Delos and Paestum. *American Journal of Archaeology* 104: 277–308.
- Cohen, R. 1976. Excavations at Horvat Haluqim. *'Atiqot* 11: 34–50.
- Cohen, R. 1982. New Light on the Petra–Gaza Road. *Biblical Archaeologist* 45: 240–47.
- Cohen, R. 1984. Horvat Dafit. *Excavations and Surveys in Israel* 3:16–17.
- Colt, H. D. 1962. *Excavations at Nessana*, Vol. 1. London: British School of Archaeology in Jerusalem.
- Dolinka, B. J. 2006. The Rujm Taba Archaeological Project (RTAP): Results of the 2001 Survey and Reconnaissance. In *Crossing the Rift: Resources, Routes, Settlement Patterns, and Interaction in the Wadi Arabah*, ed. P. Bienkowski and K. Galor, 194–214. Levant Supplementary Series 3. Oxford: Council for British Research in the Levant; Oxbow; Oakville, CT: David Brown.
- Erickson-Gini, T. 2002. Nabataean or Roman? Reconsidering the Date of the Camp at Avdat in Light of Recent Excavations. In *Limes XVIII: Proceedings of the XVIIIth International Congress of Roman Frontier Studies, Held in Amman, Jordan (September 2000)*, Vol. 1, ed. P. W. M. Freeman, J. Bennett, Z. T. Fiema, and B. Hoffmann, 113–30. BAR International Series 1084. Oxford: Archaeopress.
- Erickson-Gini, T. 2009. Review of *The World of the Nabataeans: Vol. 2 of the International Conference "The World of the Herods and the Nabataeans" Held at the British Museum, 17–19 April 2001*, ed. K. D. Politis. *Bulletin of the American Schools of Oriental Research* 353: 114–17.
- Erickson-Gini, T. 2010. *Nabataean Settlement and Self-Organized Economy in the Central Negev: Crisis and Renewal*. BAR International Series 2054. Oxford: Archaeopress.
- Erickson-Gini, T. 2011. Mezad Mahmal Final Report. *Excavations and Surveys in Israel* 123. http://www.hadashot-esi.org.il/report_detail_eng.asp?id=1675&mag_id=118 (accessed October 1, 2012).
- Erickson-Gini, T. 2012. Nabataean Agriculture: Myth and Reality. *Journal of Arid Environments* 86: 50–54.
- Fischer, M., M. Gichon, and O. Tal. 2000. *The Officina: An Early Roman Building on the Dead Sea Shore*. Vol. 2 of 'En Boqueq: Excavations in an Oasis on the Dead Sea Shore. Mainz am Rhein: Philipp von Zabern.
- Frank, F. 1934. Aus der 'Araba I: Reiseberichte. *Zeitschrift des deutschen Palästina-Vereins* 57: 191–280.
- Glueck, N. 1935. *Explorations in Eastern Palestine*, Vol. 2. Annual of the American Schools of Oriental Research 15 for 1934–1935. New Haven, CT: American Schools of Oriental Research.
- Glueck, N. 1959. *Rivers in the Desert: The Exploration of the Negev; An Adventure in Archaeology*. London: Weidenfeld & Nicolson.
- Grace, V. R. 1962. Stamped Handles of Commercial Amphoras. In *The Nessana Excavations*, Vol. 1, ed. D. H. Colt, 106–30. London: British School of Archaeology in Jerusalem.
- Hill, G. F. 1916. The Mints of Roman Arabia and Mesopotamia. *Journal of Roman Studies* 6: 135–69.
- Israel, Y., and D. Nahlieli. 1982. 'En Rahel. *Israel Exploration Journal* 32: 163.
- Johnson, D. J. 1987. *Nabataean Trade: Intensification and Culture Change*. Ann Arbor, MI: University Microfilms International.

- Kennedy, D. L., and H. Falahat. 2008. *Castra Legionis VI Ferrata: A Building Inscription for the Late Roman Legionary Fortress at Udruh, Jordan*. *Journal of Roman Archaeology* 21: 150–69.
- Korjenkov, A. M., and T. Erickson-Gini. 2003. The Seismic Origin of the Destruction of the Nabataean Forts of Ein Erga and Ein Rahel, Arava Valley, Israel. *Archäologischer Anzeiger* 2: 39–50.
- Lindner, M. 1989. South Jordan Survey. In *The Archaeology of Jordan II: Field Reports*, Vol. 1, ed. D. Homès-Fredericq and J. B. Hennessy, 84–90. Akkadica Suppl. 7. Leuven: Peeters.
- Lindner, M., U. Hübner, and J. Hübl. 2000. Nabataean and Roman Presence between Petra and Wadi 'Arabah. Survey Expedition 1997/98: Umm Ratam. *Annual of the Department of Antiquities of Jordan* 44: 535–67.
- Meshel, Z. 2000. *Sinai: Excavations and Studies*. BAR International Series 876. Oxford: Archaeopress.
- Meshel, Z., and Y. Tsafirir. 1974. *The Nabatean Road from 'Avdat to Sha'ar Ramon*. Jerusalem: Sede Boker (Hebrew).
- Netzer, E. 1991. *The Buildings, Stratigraphy and Architecture*. Vol. 3 of *Masada: The Yigael Yadin Excavations, 1963–1965; Final Reports*. Jerusalem: Israel Exploration Society / The Hebrew University of Jerusalem.
- Netzer, E. 2001. *Stratigraphy and Architecture*. Vol. 1 of *Hasmonean and Herodian Palaces at Jericho: Final Reports of the 1973–1987 Excavations*. Jerusalem: Israel Exploration Society / Institute of Archaeology, The Hebrew University of Jerusalem.
- Parker, S. T. 2006. *The Roman Frontier in Central Jordan: Final Report of the Limes Arabicus Project, 1980–1989*, Vol. 2. Dumbarton Oaks Studies 40. Washington, DC: Dumbarton Oaks Research Library and Collection.
- Scott, T. R. 1977. The Environment of the Western Negev Highlands. In *The Avdat, Aqev Area*. Vol. 3, pt. 2 of *Prehistory and Paleoenvironments in the Central Negev, Israel*, ed. A. E. Marks, 159–71. Southern Methodist University, Institute for the Study of Earth and Man Reports of Investigations 2. Dallas: Southern Methodist University Press.
- Shatzman, I. 1991. *The Armies of the Hasmonaeans and Herod: From Hellenistic to Roman Frameworks*. Texte und Studien zum antiken Judentum 25. Tübingen: Mohr.
- Smith, A. M. II. 2010. *Wadi Araba in Classical and Late Antiquity: An Historical Geography*. BAR International Series 2173. Oxford: Archaeopress.
- Smith, A. M. II, and A. Kay. 2010. *The Bir Madhkur Project: A Summary of Work from the 2008, 2009 and 2010 Field Seasons*. http://ucl.academia.edu/AndreaKay/Papers/353181/Bir_Madhkur_Project_Poster_for_ASOR_2010 (accessed on October 1, 2012).
- Smith, A. M. II, and T. M. Niemi. 1994. Results of the Southeast Araba Archaeological Reconnaissance. *Annual of the Department of Antiquities of Jordan* 38: 469–83.
- Smith, A. M. II, M. Stevens, and T. M. Niemi. 1997. The Southeast Araba Archaeological Survey: A Preliminary Report of the 1994 Season. *Bulletin of the American Schools of Oriental Research* 305: 45–71.
- Urman, D. 2004. *Nessana: Excavations and Studies*. Beer-Sheva 17. Beersheva: Ben-Gurion University of the Negev Press.
- Urman, D., and T. Harpak. 1994. Renewed Excavations in Nizzana. In *To Nizzana and the Western Border*, ed. Y. Eini and E. Orion, 49–52. Jerusalem: Sede Boqer (Hebrew).
- Ynnilä, H. 2006. *To Petra via Jabal Haroun: Nabataean–Roman Road Remains in the Finnish Jabal Haroun Project Survey Area*. MA thesis, University of Helsinki.