

LEVANT SUPPLEMENTARY SERIES

VOLUME 3

# **CROSSING THE RIFT**

**Resources, routes, settlement patterns  
and interaction in the  
Wadi Arabah**

Edited by Piotr Bienkowski  
and  
Katharina Galor

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Nakb al-Mitli (Nahr Umm Mithla), running into the Wadi Arabah  
From Alois Musil, *Arabia Petraea I* (Vienna 1907), fig. 138

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# Introduction

*Piotr Bienkowski and Katharina Galor*

Most of the papers published in this volume were first presented at a conference of the same title, organised by the two editors, held in Atlanta in November 2003. The idea for the conference grew out of discussions between the two editors and Dr Zbigniew Fiema, currently at Helsinki University, while we were together at the W.F. Albright Institute of Archaeological Research in Jerusalem early in the year 2000. Each of us was concerned with interpreting the relations between southern Jordan and the Negev, albeit in different periods. To each of us it seemed that southern Jordan and the Negev could only be properly interpreted as a single unit, as part of the same socio-economic system. Yet southern Jordan and the Negev are divided by the Wadi Arabah, which is widely – although admittedly not exclusively – regarded as a barrier and border. According to a standard reference work, the *Anchor Bible Dictionary* (1992): ‘This region is a depression in the earth, for the most part below sea level, which provided a natural barrier and a border between Israel and her neighbors Ammon, Moab, and Edom to the east’ (s.v. Arabah). On the contrary, we felt – working within our own specialist periods (Iron Age and Roman–Byzantine) – that the Wadi Arabah was more of a route and a bridge than a barrier, and through discussion we realised that this was likely to have been the case in most periods. In our view, the wadi’s supposed barrenness – more apparent than real – and the modern political border between Jordan and Israel which runs along the wadi, have been instrumental in conditioning much modern interpretation of it as a barrier, as something physically and effectively separating southern Jordan from the Negev.

Selected parts of the Wadi Arabah have of course been surveyed archaeologically and some sites have been excavated on a large scale. Nevertheless, archaeological research in the Wadi Arabah has been constrained by four factors:

- Fieldwork has inevitably been carried out completely independently on the east and west sides of the wadi, within Jordan and Israel, and no overall understanding or even map of sites had ever been produced.
- Inevitably, routes across the Wadi Arabah have not been properly investigated and surveyed, since most of them have been in restricted military zones, which until relatively recently were lined with mines.
- With certain exceptions, the wadi has in general been regarded as a barrier and as a hinterland of sites in the east or west, and especially, in the south, as the hinterland of Aqaba. Its role as a route – not only north–south but especially east–west – is still poorly understood and not properly taken into account.
- Much of the survey work in both Israel and Jordan is unpublished, accessible only as lists or databases of sites or in doctoral dissertations; or, within Israel, preliminary reports have appeared only in Hebrew and have been largely inaccessible to a non-Hebrew-reading audience.

In order to engage with these issues, to explore the nature and use of the entire Wadi Arabah in all periods, and its role in the history of southern Jordan and the Negev, we initiated the Wadi Arabah Project, whose specific aims are:

1. To achieve a comprehensive overview of how the Wadi Arabah was formed and how it developed geologically and environmentally.
2. To determine its resources in terms of routes, flora, fauna, minerals and water.
3. To establish the settlement patterns from the Palaeolithic to Ottoman periods.
4. To investigate how the Wadi Arabah was used throughout history, including ethnographic data, and to map its role clearly as a bridge between southern Jordan and the Negev.

The directors of the Wadi Arabah project are the two editors and Dr Eveline van der Steen, one of the contributors to this volume. Nevertheless, the project is expressly collaborative, bringing together scholars who have been carrying out research on both sides of the Wadi Arabah, in Israel and Jordan. The project website is available on [www.wadiarabahproject.man.ac.uk](http://www.wadiarabahproject.man.ac.uk), and provides an updated overview and bibliographical references. The first result of the project was the development of a Geographic Information System (GIS) displayed on the background of a digital terrain model of the Wadi Arabah and its ‘hinterland’ to east

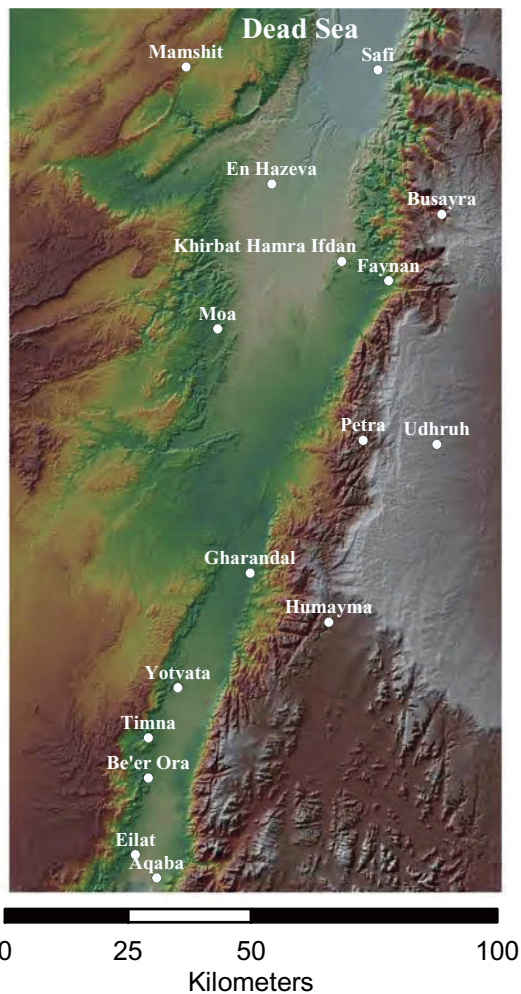


Figure 1: Topographical map of the Wadi Arabah, from the southern end of the Dead Sea to the northern tip of the Gulf of Aqaba, showing key sites.

and west, containing all archaeological sites for which data could be accessed, published and unpublished, compiled from published sources, databases supplied by colleagues, and the databases of the Israel Antiquities Authority and the Jordan Archaeological Database and Information System (JADIS). Settlement pattern maps derived from the GIS are presented in Chapter 1 in this volume.

The Atlanta conference, and this resultant publication, were from the start conceived of as an integral part of the Wadi Arabah Project. The purpose of the conference was to bring together all scholars holding primary data on the resources, archaeology and history of the Wadi Arabah to address the four objectives of the Wadi Arabah Project, listed above, as far as current evidence allowed, to identify the gaps in knowledge, and to discuss priorities and potential for further research and fieldwork.

For a project that aspires to be collaborative, by bringing together scholars working in Israel and Jordan, it may appear that the lack of a native Jordanian

contributor to this volume, compared with the many Israeli contributors, is an unfortunate omission, perhaps a 'politically incorrect' thing to do. The editors nevertheless beg some leniency from our harsh critics. For whatever reason, it is undoubtedly true that there is currently a dearth of Jordanian scholars working in the Wadi Arabah. The single shining exception, Dr Mohammad Najjar of the Department of Antiquities of Jordan, did present a paper at the Atlanta conference on his research in the Faynan region, but felt that the evidence on which it was based still required further analysis and that publication in this volume would be premature.

Nevertheless, we must confront the sad reality that the current unsettled situation in the Middle East makes it very difficult for such cooperative ventures. When the Wadi Arabah Project was first conceived in early 2000, the prospects were hopeful for collaboration and eventual joint fieldwork across the modern border in the Wadi Arabah. Initially it was planned to hold the conference in Jerusalem, an appropriately symbolic location. With the outbreak of the so-called al-Aqsa *intifada* in September 2000, everything changed. Most collaborative projects between Jordan and Israel were cancelled. It soon became quite clear that it would be impossible to hold the conference anywhere in the region – too many potential participants would be unable to attend for fear of being compromised, and it would have required only the tiniest political 'incident' before the conference to prevent it from going ahead at all. Consequently, several potential sponsors backed off, which led us to the decision to move the conference to the neutrality of the 2003 annual meeting of the American Schools of Oriental Research in Atlanta. But the political tensions remain, and archaeologists are not immune to them. While on a personal level there is a genuine desire within the Jordanian and Israeli archaeological communities to cooperate and collaborate, on an institutional and political level there are currently still severe constraints. In this sort of environment, and until the situation changes, foreign archaeologists and archaeological institutions working in both these countries have an opportunity and a responsibility to be a channel of information and to facilitate continuing dialogue and exchange of views and data.

### Summary of chapters

Our main objective in this volume is to bring together a set of focused studies that advance our understanding of the nature and use of the entire Wadi Arabah, both east and west sides, from prehistoric times to the present. Although not perhaps immediately obvious, there is logic to the order of the chapters, despite some overlap in themes: overview (Chapter 1); description of the environment and geology (Chapter 2); method-

ological issues and general, multi-period settlement patterns (Chapters 3 to 5); themes relating to particular periods (Chapters 6 to 19; Chapter 12, on the Wadi Arabah in the Hebrew scriptures, although not strictly a chronological treatment, probably fits best into a first-millennium BC context); and ethnographic evidence (Chapters 20 and 21).

Chapter 1 (Bienkowski) introduces the Wadi Arabah, and explores it as a landscape in an effort to understand its function and meaning in different periods and to different people: both landscape-as-entity or representation, which can be objectively studied and analysed through geology, archaeological surveys and excavations or GIS, and landscape-as-relationship or process, in which human beings are subjectively engaged. Bienkowski deconstructs the classic circular argument at the centre of our understanding of the Wadi Arabah. The modern experience of the political border running through the wadi encodes the landscape as barrier and conflict; this perception has often been overlaid onto antiquity, and thus the past landscape has also been interpreted as contested; the apparent longevity of this contested landscape is then used to explain and justify modern political realities; hence, the seemingly perpetual contested nature of this landscape becomes codified and symbolic, a form of (imagined) historical memory, linked to modern nationalist and religious identities: in effect it has become part of the grand narrative of the Israel–Arab conflict, with deep roots in the past. Bienkowski concludes that we must acknowledge our own perceptions and encoded values, and explore the quite different past perceptions, experiences and meanings of the Wadi Arabah, and the economic, political and social events that impacted on them.

Chapter 2 (Bruins) describes the environment and geology of the Wadi Arabah: topography, climate and climate change over time, tectonics and earthquakes, mineral and water resources, soils, vegetation and land-use. This sets a useful framework for how and why the Wadi Arabah is the way it is, how it developed in the past, and what opportunities and constraints it has offered for human use and interaction.

Chapters 3 (Haiman) and 4 (Avner) both deal with methodological issues concerning the interpretation of archaeological evidence, especially from surveys, on the western side of the Wadi Arabah. Haiman highlights the problem of creating a unified database for the 1500 or so sites known on the western side of the Wadi Arabah, since variant terminology and chronology have been employed by different surveys to define sites and installations. Often, different terms relate to one feature, making it difficult to combine the data onto a single database. The Israel Antiquities Authority is compiling a thesaurus of 200 common features, but the issue

remains of how to incorporate data from older surveys. Avner (Chapter 4) notes that archaeological remains from the desert areas of the Wadi Arabah, Negev and Sinai are often modest and less impressive than those in other regions, and consequently less well understood and frequently misdated, since datable artefacts are comparatively rare. Systematically using radiocarbon dates, he demonstrates that there were no gaps in settlement in these desert areas between the sixth and third millennia BC (Early Neolithic to Early Bronze IV, if not later), and that the sites often continued in use over very long periods.

Chapter 5 (MacDonald) focuses on the north-east Arabah and the extension to the north, the southern Ghors, along the south-east shores of the Dead Sea, an area he surveyed systematically in 1985–86. He describes the natural resources (water, plants, bitumen, salt, sulphur, copper and manganese), archaeological sites and routes, pointing out their interrelationship. He concludes that east–west and north–south passage was possible in all periods, and in particular points out the northern segment of the Wadi Arabah as a convenient place for crossing: here it is only 13 km. wide, and the route is level and easy, with water available on both sides in the Wadi Fidan on the east and 'En Hazeva on the west.

Chapter 6 (Henry) focuses on prehistoric sites in the Wadi Arabah (Palaeolithic to Chalcolithic/Early Bronze Age). In general, the numbers of prehistoric sites are low, and mostly skewed to the Chalcolithic and Early Bronze Age. Neolithic sites are more extensive in the northern Arabah than in the south, where many early sites (Pleistocene/Early Holocene, corresponding to the Palaeolithic and Neolithic periods) on the valley floor are buried by Middle and Late Holocene sediments (corresponding to the Chalcolithic and later periods). Henry's view of the factors influencing settlement of the Arabah in the prehistoric periods might be a relevant framework for all periods of human use of the area: the prevailing climate and environment, availability of surface water and food resources, accessibility of arable land, raw materials, availability of naturally sheltered settings, and how these factors influenced seasonal movements and transhumance.

Chapter 7 (Yekutieli) interprets an Early Bronze II–III site and associated road from the author's 'En Boqeq survey in the southern Judaeian desert using a landscape archaeology approach: the concept that a site's placement in and interaction with its natural setting are not coincidental, and that the whole becomes a landscape imbued with social meanings. Yekutieli interprets the combination of the site and the road, and the manner they are set in the landscape, as a deliberate control mechanism which entails the existence of some higher-level organisation responsible

for its construction and operation. He offers a valuable perspective on the dynamics of the road and the operation of power in its organisation.

Chapters 8 (Hauptmann) and 9 (Adams) concern the Wadi Arabah's key mineral resource in antiquity: copper. Hauptmann describes the common mining technologies from the Early Bronze Age to the Iron Age at Faynan and Timna, respectively on the east and west sides of the Wadi Arabah, despite their different periods of exploitation (with Early Bronze Age evidence largely lacking at Timna). Because of their geographic locations, their ore and metal export routes ran in different directions – Timna to the south and possibly to the Nile Delta, Faynan to the north-west to the Beersheba basin. Intriguingly, there is no evidence so far for the distribution of copper from the Arabah to the east. Chapter 9 (Adams) shows that, based on lead isotope analyses, the primary source of copper used in the southern Levant during the later Early Bronze Age was the Faynan region, rather than Timna, as previously assumed. These trading relationships are reflected in similarities in ceramic and architectural styles between sites in the Faynan region and the Central Negev Highlands.

Chapter 10 (Jasmin) continues the theme of trade, with a different commodity in a later period. Jasmin discusses the emergence of the so-called 'incense road', the major trade route for incense from South Arabia to the Mediterranean Sea, via the Wadi Arabah. He sees three chronological options for its emergence: the thirteenth, eleventh or ninth centuries BC, preferring the earliest, its context being Egyptian economic exploitation of the southern Negev. A decisive role was played by the domestication of the camel, which made possible the development of the arduous trade route: current isotopic analysis of camel bones suggests that camels were domesticated in the southern Levant by the end of the second millennium BC.

Chapter 11 (Bartlett) deals with a quite different category of evidence: what the writers of the Hebrew Bible, compiled some time in the mid-first millennium BC, knew about the Wadi Arabah. Although only one biblical passage (Deut. 2.8) uses the Hebrew word *ha'araba* to denote today's Wadi Arabah, referring to 'the Arabah road' that the Israelites marched away from, the Hebrew writers did refer to other places in the Arabah. Bartlett concludes that they knew about the mining activities at Faynan, routes across and along the Arabah, Elath and the port of Ezion-Geber: in general, they knew more about the northern end than the south, and nothing at all of the middle.

Chapters 12 to 15 all concern aspects of the Wadi Arabah during the Nabataean period. Chapter 12 (Erickson-Gini) looks more broadly at Nabataean settlement of the Negev Highlands, which began in the

late first century BC apparently as a result of Nabataean control and maintenance of the region's trade routes. The Roman annexation in AD 106 appears to have had a positive effect, reflected in second- and early third-century AD architecture and material culture at Negev sites. The virtual collapse of international trade through the region in the third century AD led to a new subsistence strategy of agricultural production and trade in agricultural products, especially viticulture. Nabataean religion and language continued in the Negev until the early fifth century AD, although by that time pottery produced in Petra no longer dominated the ceramic assemblages.

Chapter 13 (Hirschfeld) discusses evidence for Nabataean sites in the northern Wadi Arabah itself, reviewing what is known about Zoar, the Nabataean regional capital and later an important Christian centre, and Me'ad Gozal, which he interprets as a Nabataean fort on the border with Judaea. Hirschfeld particularly focuses on 'En Tamar (ancient Thamaro), on the south-west tip of the Dead Sea, where he excavated a Nabataean burial cave in 2001. He concludes that 'En Tamar was the second most important Nabataean settlement in the Wadi Arabah after Zoar. It was founded in the late Iron Age and continued into the Nabataean, Late Roman and Byzantine periods. Chapter 14 (Shamir) presents a report on the hundreds of organic finds from the Nabataean burial cave at 'En Tamar, which consist of textiles, basketry, cordage, leather, wood, fruits and seeds.

Chapter 15 (Dolinka) presents the results of the author's 2001 survey and reconnaissance at the Nabataean/Early Roman site of Rujm Taba in the south-east Wadi Arabah. The site has three main components: a large building, perhaps a caravanserai or fort; a village of 22 features, many of which appear to be separate structures; and a large necropolis. Dolinka concludes that Rujm Taba was established in the first century AD, with a decline in occupation and activity in the second century AD. There is some evidence for limited use in the late third/early fourth century AD.

Chapters 16 to 18 relate to the Roman period in the Wadi Arabah. Chapter 16 (Isaac) contributes to the long-standing debate concerning the existence of a north-south road through the wadi. Isaac agrees with Beno Rothenberg who, based on his survey of the Arabah in the 1960s, denied that there was a line of fourth-century Roman forts through the wadi. However, Isaac argues that there was a fourth-century north-south road. The existence of Roman milestones confirms the existence of a public road, organised in the late third century, and literary evidence refers to the main destinations along the road. A number of military positions along the road date to the same period. He interprets this as part of the measures

which accompanied the transfer of *legio X Fretensis* from Jerusalem to Aila (Aqaba), linking the new legionary base with the region of the abandoned legionary headquarters in Jerusalem.

Chapter 17 (Parker) considers the relationship between the Wadi Arabah and the city of Aila (Aqaba) on the Red Sea during the Roman period. Aila existed principally to service commercial traffic, and most commodities were imported from some distance away, mostly along the Wadi Arabah. Parker cites recent surveys that have revealed evidence for north–south roads through the Wadi Arabah, in addition to the long-known east–west routes. The Wadi Arabah was also the source of copper for Aila’s copper-processing industry. The southern end of the Wadi Arabah was probably administered by Aila as part of its *territorium*.

In an intriguing contribution, Chapter 18 (Meshel) explores the claim by Eusebius in his *Onomasticon*, written in the early fourth century AD, that there were once gold mines near the copper mines at Faynan. Meshel bases his argument on three points: the existence of three large pillar-chamber mines near copper mines at Faynan and Wadi Abu Khushaybah, which he believes may have been gold, not copper mines; the testimony of the *Onomasticon*, which is usually considered reliable; and the positive results of recent gold prospecting in Wadi Abu Khushaybah.

In a companion piece to Chapter 17 by Parker, Chapter 19 (Whitcomb) examines the relationship between the city of Ayla (Aqaba) and the Wadi Arabah during the Early Islamic period. In this period, too, theirs was an economic relationship, with everything from building stone to basic foodstuffs for the urban population of Ayla being provided by the city’s hinterland and the Wadi Arabah (food particularly coming from extensive cultivated fields in Evrona, Yotvata and the Uvda valley). Whitcomb even proposes that extensive Early Islamic copper-smelting sites in the southern Wadi Arabah may have provided seasonal occupation for the population of Ayla.

Chapters 20 (van der Steen) and 21 (Bailey) bring us up to modern times, discussing ethnographic evidence of the use of the Wadi Arabah. Van der Steen explores descriptions by nineteenth-century European travellers of bedouin tribes on both sides of the Wadi Arabah. They describe a world whose political and social organisation was determined by tribal interaction and kinship structures, and whose economy depended on agriculture, pastoralism and trade, all controlled by a small number of powerful tribes. The tribes viewed the wadi as a convenient border between their territories, but also as a bridge and a point of contact. More powerful tribes had interests on both sides, and moved around the area with relative ease; for smaller tribes whose territories

and interests were limited, the wadi was a border and a convenient barrier.

Bailey (Chapter 21) uses late twentieth-century oral traditions of Negev and Sinai bedouin to explore relations between tribes on either side of the Wadi Arabah between 1600 and 1950. Although using a different type of evidence from van der Steen, the picture is complementary: the tribes saw the Wadi Arabah as a point of orientation and differentiation, and their relations were characterised by both hostility and friendship depending on changing circumstances. The western tribes – the source of the oral accounts – regarded the tribes of the east as dangerous because of the lure of rainfall, pasture and arable land more easily accessible on the western side.

In many ways, this brings us full circle, back to the description of the environment and geology of Chapter 2 (Bruins) and the themes treated in all the other papers: the Negev and southern Jordan, divided by the Wadi Arabah, are distinct in terms of the geological landscape bordering the Arabah to the west and east, and their rainfall and ecology, and hence in terms of the economic opportunities available on either side. But the wadi itself was never a physical barrier, indeed as far as we can see it was crossed in all periods, and only in modern times has it become a fixed political border. We can probably conclude that the only real barrier to crossing the Wadi Arabah would have been the social relations between people on either side, and their knowledge and understanding of each other and each other’s motives, and that is as true today as it was in antiquity.

## Acknowledgments

The Atlanta conference was held at the Fernbank Museum of Natural History in Atlanta, Georgia, on 19 November 2003, as a pre-meeting of the American Schools of Oriental Research annual meeting. It was generously sponsored by the Watson Institute for International Studies at Brown University. The editors wish to thank the Fernbank Museum of Natural History, and particularly Professor J. Maxwell Miller and his staff, for making their wonderful facilities available for the conference at no charge and for ensuring that everything ran smoothly. Happily, only three papers delivered at the Atlanta conference were not submitted for publication in this volume. There is, however, an additional paper, by Donald Henry (Chapter 6), which was not originally presented in Atlanta.

Grateful thanks are due to Professor Sy Gitin, Director of the W.F. Albright Institute of Archaeological Research in Jerusalem, for all his support and guidance for the Wadi Arabah Project since its inception in 2000.



# The Wadi Arabah: meanings in a contested landscape

*Piotr Bienkowski*

This paper has two purposes: to provide an introductory overview of the Wadi Arabah as an overall framework for the other papers in this volume, and to explore the Wadi Arabah as a landscape with multiple meanings and functions over time.<sup>1</sup> It is divided into three parts: 1) an overview of the geology and environment of the wadi, its archaeological exploration, and the current evidence for settlement patterns from prehistoric times to the Ottoman period; 2) an exploration of the Wadi Arabah as a landscape over time, in which human beings have been subjectively engaged; 3) a description of how and why the Wadi Arabah became a political border in modern times, and an analysis of modern perceptions of its identity and purpose and how these are implicit in much of the discourse on the Wadi Arabah in antiquity, particularly in the 'foundational' biblical periods.

## Introduction: the archaeology of landscape

Within the disciplines of archaeology, anthropology and geography, there are two fundamentally distinct ways of studying landscape: as entity/image/text, or as relationship/process. In the first approach – landscape as entity/image/text – landscape is the bounded and static object of empirical investigation by a (supposedly) dispassionate observer. Humans are external to the landscape, which is passively acted upon. Although geographers in particular argue that 'reading' landscape as a text is quite distinct from treating it as representation or entity (e.g. Duncan and Duncan 1988), essentially these approaches are the same: they are all based on Cartesian rationalism, and the consequent polarisation of nature and culture, which has been the philosophical basis of the 'scientific' approach in the West since the seventeenth century (Bender 1993: 1; Hirsch 1995: 2; Layton and Ucko 1999: 3–5; for a brief review of anthropological critiques of the 'reading' metaphor, with references, see Guo 2003: 200–1). Science and the scientific approach inhabit a Cartesian world which searches for order and a single, verifiable truth, on the premise that

material things are fixed, objectifiable, and can be apprehended in an unproblematic way. Material things are defined in terms of their measurements, and are only significant if they can be measured (Thomas 2004: 40, and *passim* for archaeology as a unique product of rational modernity). Until recently, this approach – with someone 'reading' and 'interpreting' the landscape – was dominant in archaeological landscape studies (Tilley 1994: 1); indeed within Near Eastern archaeology, and specifically Levantine archaeology, it is still pre-eminent (cf. Finlayson and Dennis 2002).

In the second approach – landscape as relationship/process – people are not separate from the landscape they inhabit (or construct or imagine). People engage with and experience the landscape in many different ways, and have an emotional relationship with it that is constantly changing. They are not spectators, they are involved (Merleau-Ponty 1962: 303–4; Tilley 1994; Johnston 1998: 61–64). The landscape reveals itself to them in its meaningfulness (Thomas 2004: 198–201, 217). There is multivocality rather than a single 'truth'. Crucially, this approach does not privilege the visual over other senses: landscape can after all be experienced through sound, smell, and touch – the sensations of wind, rain, sandstorms, heat, cold, many of which might trigger greater or at least different emotional reactions than sight. The philosophical basis for this approach is the concept of Being-in-the-World (in German 'Dasein') developed by Martin Heidegger in 1927 (Heidegger 1962), which overturned the foundations of Cartesian rationalism by expressing a person's innate comprehension of and indivisible unity with the world. This essentially phenomenological approach is now the norm in landscape studies in anthropology and in much of European and New World archaeology (e.g. Tilley 1994; Ucko and Layton 1999; Ashmore and Knapp 1999; Bender 2001: 5–7), although it has yet to make an impact within Levantine archaeology.<sup>2</sup>

<sup>1</sup> This paper is a completely revised and expanded version of that presented at the Atlanta conference in November 2003, which was entitled 'The Wadi Arabah: barrier or interface?' I am grateful to the British Academy for funding my participation in the conference.

<sup>2</sup> A recent attempt by Philip (2003) at a landscape archaeology approach to the Early Bronze Age of the southern Levant is more of a modernist, almost Cartesian reading of the landscape as power (rights to land) and economics (control of resources), rather than a phenomenological approach which emphasises subjective experience. European anthropologists studying the contemporary Israeli landscape use phenomenological approaches (e.g. Selwyn 1995; 2001), but archaeo-

This preamble has two purposes. The first is to highlight the two distinct approaches to landscape archaeology, one of which – landscape as relationship/process – is not widely employed in Levantine archaeology. The second is to alert the reader that in this paper, very consciously and deliberately, I am attempting to use and integrate both approaches in order to provide as full, explicit and understandable an overview of the Wadi Arabah as possible. Clearly, the polarised distinction between the two that I have described becomes blurred in practice, since within the discipline of archaeology – as opposed, arguably, to social and cultural anthropology – it is impossible to study landscape as relationship/process without having first gathered evidence of landscape as entity. In section 1, I try to describe the Wadi Arabah objectively, with an overview of its geology, environment, exploration, and the archaeological evidence for settlement patterns. In section 2, I explore the Wadi Arabah as relationship/process.

## 1. The Wadi Arabah as entity: geology, environment, archaeology

### *Geological origin and environment*<sup>3</sup>

The Wadi Arabah is part of a continental transform plate boundary known as the Great Rift System (or the Syrian-East African Rift) which runs from the coast of the Indian Ocean in Mozambique to the Mediterranean coast of Turkey, where it meets the Eurasian Plate. Essentially, the Great Rift separates the Arabian Plate from the African Plate: the Wadi Arabah itself is the boundary between the Arabian Plate and

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logical methodologies rooted in Heideggerian philosophy are noticeably lacking in the region. Although phenomenology as an approach originated with Edmund Husserl and was further developed by Maurice Merleau-Ponty, the philosophical underpinnings of modern phenomenology owe much to Heidegger. It may well be that Heidegger's involvement with and membership of the Nazi party in Germany in the 1930s are too controversial (and too painful) for his philosophy to have wide readership and use among archaeologists in the southern Levant in general and Israel in particular. Although understandable, this would be unfortunate, since with his concepts of Being-in-the-World, 'thrownness', contingency and temporality Heidegger provides not only an alternative to Cartesian rationalism but also a major underpinning for contemporary poststructuralist and postmodern philosophy, as a key influence on Foucault, Derrida, Lyotard, Levinas and others. See Thomas 1996: 2–8, for an introduction to using Heidegger in archaeology responsibly without ignoring his dark side. For in-depth studies of Heidegger's politics in relation to his wider philosophical project, see Derrida 1989, Farias 1989, Wolin 1993.

<sup>3</sup> Bruins (Chapter 2, this volume) provides a detailed description of the geoarchaeology and environment of the Wadi Arabah. My aim in this brief overview is to highlight the main elements which impact on human use of and engagement with the area.

part of the Sinai subplate, which is an appendage of the African Plate.

About 30 million years ago Arabia started to move northwards in relation to Africa and Palestine as a result of the heating of the earth's lithosphere and its thermal expansion. This movement has been accompanied by extensive faulting, shattering, uplifting and sinking of the rocks of the earth's crust along its boundary, which led to the formation of the rift valley, including the Wadi Arabah. The two highest mountains in Africa, Mounts Kilimanjaro and Kenya, were formed as a direct result of this movement. The rift is still considered to be active, and the movement to date is about 105 km. Since the Wadi Arabah is the boundary between two geological plates which are still moving against each other, it is at risk from earthquakes. Several earthquakes are known from historical sources to have occurred in the vicinity of the southern Dead Sea, Karak, and the Wadi Arabah, including the earthquakes of 64 BC, 31 BC, AD 1212, AD 1293, AD 1834, AD 1927, AD 1995, and most recently AD 2004.

The Wadi Arabah itself extends from the south end of the Dead Sea for 178 km. to the Gulf of Aqaba. It varies in width from 8–10 km. in the south section near Eilat, to 30 km. in the central sections. It rises in altitude, going south, from about 396 m. below sea level at the Dead Sea, to 230 m. below sea level in the southern Ghors, only a few kilometres to the south, and then rises to 200 m. above sea level near Gharandal, eventually dropping to sea level at Eilat/Aqaba. On the east, the mountains of the Edom plateau rise to c. 1500 m. above sea level (maximum 1727 m. near Tayba). On the west, the much lower, dissected mountains and hills of the Negev desert, between 600 and 700 m. above sea level, are farther away from the Wadi Arabah and do not form a clear borderline. The most extensive topographic east–west connection of lowlands runs from Faynan through En Hazeva to the Zin Valley, and indeed reflects one of the main routes crossing the Arabah in antiquity (Bienkowski and van der Steen 2001: 36–37).

Once the Wadi Arabah was formed, the natural processes of erosion started to fill it with alluvial and wind-borne deposits. The floor of the Wadi Arabah is therefore covered with deep deposits of alluvium – gravels, sands and silts. The fine portions of these are continually blown about by the winds, forming sand dunes in certain areas, for example near Gharandal.

The Wadi Arabah is the driest and hottest region of the entire Negev and south-west Jordan. Since the Pleistocene, the climate has fluctuated between wetter and drier periods. Today, maximum summer daytime temperatures are c. 45 degrees C., in the winter 16–24 degrees C., falling to below zero at night. The present average rainfall is about 30 mm. per year at Aqaba, and

about 50 mm. at the Dead Sea. A high proportion of this falls in storms, and these produce high run-off from the eastern slopes, violent floods in the wadis which discharge into the Wadi Arabah, the formation of temporary lakes, and recharge of ground water. The high Edom mountain ridge receives more rainfall than the lower Negev hills; as a result, there are comparatively strong springs with good quality water on the eastern rim of the Wadi Arabah, while on the western rim the springs are generally weak and brackish. Due to high run-off from the mountains, the ground water is in some places near enough to the surface to be obtained from shallow wells. This subsurface water is reflected in the vegetation, which consists largely of acacia stands, sagebrush and camel thorns. The hyper-arid climate is not suited to rainfed agriculture, although there is evidence of runoff and irrigation agriculture in the Uvda and Moa regions respectively. The Wadi Arabah was used for pastoralism of camels and goats by bedouin from the Negev and the Edom mountains until relatively recently. Wild animals are now scarce: a few gazelles are still hunted, and there are hares, foxes, a few wolves and hyenas, and in the mountains hyrax, mouflon and ibex.

The main mineral resource of the Wadi Arabah throughout antiquity was copper, the most extensive source being the copper ore mineralisations at Timna and Faynan, respectively on the west and east sides of the wadi (see Hauptmann, Chapter 8 in this volume, for detailed description). Although their geology and mineralisations are nearly identical, today they are 105 km. apart, which is exactly the amount of transform slip movement of the Arabian Plate against the African Plate. Resetting the displacement leads to an exact alignment of Timna and Faynan, showing that originally all the mineralisations formed a coherent ore district.

### *Archaeological exploration of the Wadi Arabah*

The first western traveller to 'discover' the Wadi Arabah, and draw it on a map, was the Swiss explorer John Lewis (Johann Ludwig) Burckhardt in 1812 (Burckhardt 1822: 443; see van der Steen, Chapter 20 in this volume, for his travels and observations). Subsequent explorers who visited the Wadi Arabah in the nineteenth century (some merely crossing it at the southern end of the Dead Sea) without systematically recording archaeological information include, in chronological order: in 1817–18, Irby and Mangles (1823); in 1851, de Saulcy (1853); in 1805–6, Seetzen (1854–55); in 1863–64, Tristram (1866: 339–45); in 1864, de Luynes (1874); in 1870, Palmer (1871); in 1873, Klein (1880); in 1883, Kitchener (1884); in 1895, Hill (1896). The first deliberate recording of archaeological remains was by Alois Musil in 1898 and 1902 (Musil 1907, Teil 1: 241–310, Teil 2: 178–215). The first archaeological excavations were by W.F. Albright in 1924,

whose expedition visited the northern Wadi Arabah and dug a trench at Khirbat Shaikh 'Isa (Albright 1924; 1926; Mallon 1924; Kyle 1924; 1928; see now MacDonald 1992: 249, site 4).

Systematic archaeological surveys of the Wadi Arabah were undertaken in the 1930s by Fritz Frank and Nelson Glueck, who produced the basic framework for archaeological knowledge of the area. Frank, a German born in Wilhelma, a Templars' colony in Palestine, and suspected of being a German spy during the First World War, conducted archaeological surveys in the Arabah during the winters of 1932 and 1933–34 (Frank 1934). Glueck's work formed part of his wider survey of Eastern Palestine in 1934, followed by an aerial reconnaissance in 1937 (Glueck 1935; 1937). He found relatively few sites in the wadi itself, partly because of his survey methods, which were largely dependent on information from local inhabitants. However, he found many sites on the eastern flanks of the wadi, and his aerial reconnaissance uncovered new features in the wadi itself. In the early 1950s Glueck continued his survey activities in the Negev.

Since the creation of the modern states of Jordan (1946) and Israel (1948), archaeological work in the Wadi Arabah has been carried out independently on the two sides. The western (Israeli) side has been surveyed as part of numerous surveys in the Negev and Sinai (see Haiman, Chapter 3, and Avner, Chapter 4, in this volume). Beno Rothenberg conducted surveys in the Negev and Sinai, including the Wadi Arabah, and intensive survey and excavation at the copper-production centre of Timna, from 1959 to 1990 (e.g. Rothenberg and Cohen 1968; Rothenberg 1999a, b). The Negev Emergency Survey, conducted by Rudolph Cohen from 1979 to 1990, systematically surveyed about 5000 sq. km. of the area, in preparation for the redeployment of the Israeli army from Sinai following the peace treaty with Egypt. The survey mainly focused on the Negev Highlands, recording more than 12,000 sites (Eitan 1979). Although individual sites have been published in separate notes, and some have been incorporated into smaller, more intensive surveys, the Negev Emergency Survey as a whole has never been properly published, only in Cohen's doctoral thesis in Hebrew (Cohen 1986) and as a series of archaeological maps (cf. Avner, Chapter 4 in this volume, note 8). Individual periods are now being published as separate monographs in Hebrew with brief English summaries (Cohen 1999; Cohen and Cohen-Amin 2004). In recent years hundreds of new sites have been surveyed by Uzi Avner in the hinterland of Eilat (overview in Avner 2002; see Chapter 4 in this volume).

On the eastern (Jordanian) side of the Wadi Arabah, the first work to follow Glueck's survey was by a British engineer, Thomas Raikes, who recorded sites during the building of the new road through the Wadi

Arabah in 1967–69 and 1975–79 (Raikes 1976, 1980, 1985). In 1982 Byzantine and Islamic sites along the wadi down to Gharandal were investigated by Geoffrey King (King 1987; 1989). Most of Raikes' and King's sites have now been incorporated into later, more systematic surveys, with the exception of those in the central Arabah where no such surveys have been undertaken. The three largest surveys in the eastern Wadi Arabah itself have been the Southeast Arabah Archaeological Survey, a component of S. Thomas Parker's Roman Aqaba Project, conducted between 1994 and 1998 (preliminary report in Smith, *et al.* 1997; see Dolinka, Chapter 15 in this volume, for excavations at Rujm Taba); the Southern Ghors and Northeast 'Arabah Archaeological Survey (final report in MacDonald 1992, and Chapter 5 in this volume); and the Wadi Arabah section of the South Jordan Project, concentrating on prehistoric sites (preliminary report in Henry 2001, and Chapter 6 in this volume).

Over the past 20 years there has been a great deal of archaeological work in the Wadi Fidan and Faynan regions, which run into the Wadi Arabah. The German Mining Museum, Bochum, began a series of archaeometallurgical explorations and mining-archaeological studies in the region with a preliminary investigation in 1983. This work has resulted in a vastly increased knowledge of the periods when this area was mined, the sites used for mining and smelting activities, and the technology employed, especially during the earliest periods (Hauptmann 2000, and Chapter 8 in this volume). Thomas Levy, Russell Adams *et al.*, beginning in the 1990s, are continuing this work with emphasis on sites in the area of Jabal Hamrat Fidan and more recently Khirbat an-Nahas (Levy *et al.* 1998; 2002; 2003; 2004; and see Adams, Chapter 9 in this volume). The area of Faynan has been surveyed comprehensively by several British teams (Barker *et al.* 1997; 1998; 1999; 2000; Wright *et al.* 1998; Finlayson and Mithen 1998; Finlayson *et al.* 2000; Freeman and McEwan 1998; Findlater *et al.* 1998).

In the south-east Arabah, alongside S. Thomas Parker's Roman Aqaba Project (e.g. Parker 2002, and Chapter 17 in this volume), the Aqaba Archaeological Project, directed by Donald Whitcomb, began in 1986 as an effort to save an urban Islamic site located in the heart of the modern city (e.g. Whitcomb 1987, and Chapter 19 in this volume). Chalcolithic sites in the vicinity of Aqaba have been investigated by a German-Jordanian team (e.g. Khalil and Eichmann 1999). Nelson Glueck excavated the Iron II–Persian site of Tall al-Khalayfi in 1938–40 (Glueck 1993; Pratico 1993); renewed excavations by the late Mary-Louise Mussell began in 1999 (Mussell 1999) but were not completed.

Analysing coverage of the Wadi Arabah as a whole, the biggest gaps in archaeological survey and

excavation remain the north-west Arabah (where the paucity of recorded sites contrasts markedly with the density of sites known on the eastern side from the Southern Ghors and Northeast 'Arabah Survey), and the central Arabah on both western and eastern sides. Several small-scale surveys on the west-central side remain unpublished, while the east-central side is still known largely from the unsystematic surveys of Raikes and King.

This pattern is reflected in Figure 1.1, a GIS of all sites in the Wadi Arabah and its immediate hinterland for which data could be accessed, compiled from different sources, published and unpublished (see Introduction).<sup>4</sup> There are 1796 sites on this GIS, as of May 2005. As with any map, however, caution is advised in its interpretation:

1. A site can only be included on a GIS if its precise coordinates are known: for the Wadi Arabah, many sites (especially from older surveys) have been published with no coordinates, so they cannot be included and they do not appear on Figure 1.1. In theory, all known sites should appear, with coordinates, in the databases of the Israel Antiquities Authority (IAA) and the Department of Antiquities of Jordan (JADIS database), but in practice this is not always the case since those databases are incomplete.<sup>5</sup> The GIS map in Figure 1.1 is not a map of all known sites, therefore: it is a map of all sites for which coordinates are known.
2. The GIS has been compiled from different sources and databases. The Wadi Arabah Project compiled its own database of all published sites, with all the usual data fields that we felt we would require. Most of the other databases we used include chronological data relating to the sites, which can then

<sup>4</sup> The GIS in Figures 1.1–1.8 is displayed on the background of a digital terrain model (DTM) of the Wadi Arabah and its 'hinterland'. The data from the DTM of Israel is the copyrighted property of the Survey of Israel. It was prepared by Dr J. K. Hall and made available through the Geological Survey of Israel. For the development of the DTM, see Hall 1996. On the GIS, selected major sites outside the Wadi Arabah proper are included in order to demonstrate the connections across the wadi. In Figures 1.1–1.8, the location of Petra is shown as a convenient, central site for orientation. For location of other key sites, see Figure 1 in the Introduction in this volume.

<sup>5</sup> For example, less than half the sites surveyed in the western Arabah are on the IAA database, and only about half of the sites surveyed by the Southeast Arabah Archaeological Survey are on the JADIS database.

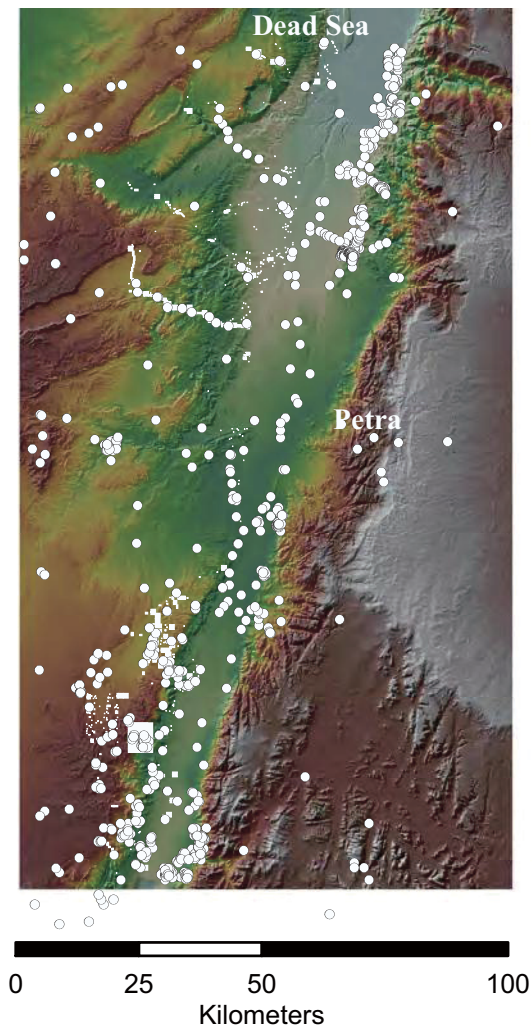


Figure 1.1: GIS of all sites in the Wadi Arabah and hinterland.

be sorted according to period to produce settlement pattern maps. However, this is not the case with the IAA database, whose purpose is essentially site management and not archaeological interpretation, and which does not include chronological data (and in any case the database is only in Hebrew). On its own, therefore, the IAA database cannot be used to sort by archaeological period; thus, where a site in the western Arabah is otherwise unpublished and is not included in data acquired from elsewhere, other than the IAA database, that site currently has no associated chronological data and is not reflected in the settlement pattern maps in Figures 1.2–1.8 discussed below. A similar issue exists with regard to the data from the still unpublished Southeast Arabah Archaeological Survey which is available on JADIS: only a very few of the chronological fields have been filled in, making it impossible to use the majority of this data for any effective sorting by archaeological

period. For that we must await the final publication of the survey.<sup>6</sup>

### Settlement patterns

A preliminary attempt at compiling settlement patterns for the entire Wadi Arabah from the Palaeolithic to Islamic periods is attempted in Figures 1.2–1.8. With the problems noted above, it must be understood that the data available is extremely incomplete: many known sites have no chronological data associated with them and so cannot be included in settlement pattern maps. The settlement pattern maps cover broad periods, since much of the available data is too blunt to be more specific in terms of sub-periods. In many ways, these settlement pattern maps are more a reflection of the current state of our knowledge and of intensive surveys undertaken than of actual patterns of sites in any period.

#### PALAEOLITHIC SITES (Figure 1.2)

Thirty sites are currently recorded for the entire Palaeolithic period.<sup>7</sup> Fifteen of these are in the Jabal Hamrat Fidan area which has been intensively surveyed (Levy *et al.* 2003): all of these are of Middle and Upper Palaeolithic date. The majority of Palaeolithic sites further south on the eastern side are from Henry's surveys and are discussed in detail in Chapter 6 (this volume). These too are of Middle and Upper Palaeolithic date, except the southernmost site which is Epipalaeolithic.

Only four Palaeolithic sites are currently recorded in the western Arabah. It may be worth noting that one (at En Hazeva) is located across from the concentration of Palaeolithic sites in the Jabal Hamrat Fidan, an area of the Wadi Arabah which in later periods became a

<sup>6</sup> The situation regarding the Southeast Arabah Archaeological Survey data available on JADIS is further complicated by the system of site numbers used. The JADIS data has two sets of site numbers: Site Number and Field Site Number. However, about half the sites have no Field Site Number. But this is the site number used to identify sites in the published preliminary report (Smith *et al.* 1997). Where possible, I have augmented the sparse chronological data available on JADIS by cross-referencing to Field Site Numbers cited in the preliminary report; however, in the preliminary report, only 53 sites were assigned a date (of 162 sites recorded), and of those only 38 can be correlated through Field Site Numbers to the JADIS data, with the result that the GIS has chronological data for less than half of the sites recorded by the survey.

<sup>7</sup> Only one Palaeolithic site (Site 48) is included from the Southern Ghors and Northeast Arabah Survey, based on the listing of sites in Appendix 1 in MacDonald 1992: 249–74, rather than the three possibly Palaeolithic but rather diffuse and uncertain lithic scatters (Sites 28, 32 and 33) noted by M.P. Neeley in MacDonald 1992: 26–27, 36–37.

**Table 1:** Table of archaeological periods and dates relating to the Wadi Arabah (but see Avner, Chapter 4 in this volume, for caution with regard to dating material remains from this region). For dating of the Islamic periods, see Whitcomb 1992: 113 table 57.

Period	Date
Lower Palaeolithic	450,000+-c. 150,000 bp
Middle Palaeolithic	c. 150,000–45,000 bp
Upper Palaeolithic	c. 45,000–20,000 bp
Epipalaeolithic	c. 20,000–10,300 bp (c. 8300 BC)
Neolithic	c. 8300–4500 BC
Chalcolithic	c. 4500–3300 BC
Early Bronze Age	c. 3300–1950 BC
EB I	c. 3300–2900 BC
EB II	c. 2900–2700 BC
EB III	c. 2700–2300 BC
EB IV	c. 2300–1950 BC
Middle Bronze Age	c. 1950–1550 BC
Late Bronze Age	c. 1550–1200 BC
Iron I	1200–1000 BC
Iron II	1000–539 BC
Persian	539–332 BC
Hellenistic	332–63 BC
Roman and Nabataean	63 BC–AD 324
Early Roman	63 BC–AD 135
Late Roman	AD 135–324
Byzantine	AD 324–640
Islamic	AD 630–1918
Early Islamic	AD 630–1000
Middle Islamic	AD 1000–1400
Late Islamic	AD 630–1918

major route. Another later crossing might be hinted at by the two southernmost sites in the western Arabah, Nahal Zofar and Nahal Paran, Middle and Upper Palaeolithic campsites respectively, opposite what was to become Petra (with the Upper Palaeolithic site of Udhruh, later a Roman legionary fort, located to the east; Gebel 1988 has noted Epipalaeolithic sites in the Petra area).

The very low incidence of Palaeolithic sites can be explained by two factors: 1) they have not been systematically identified or recorded by all surveys; 2) geomorphic factors. Henry (Chapter 6, this volume) attributes the relative lack of sites dating to the Pleistocene/Early Holocene (corresponding to the Palaeolithic and Neolithic periods) in the southern Arabah to their burial by later Middle and Late Holocene sediments (corresponding to the Chalcolithic period and later). Similarly, Neeley (in

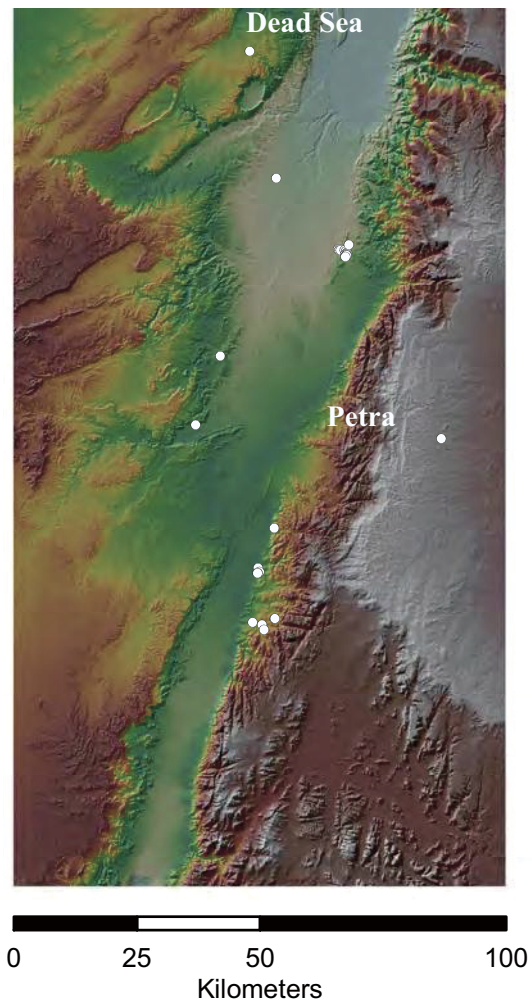


Figure 1.2: Palaeolithic sites in the Wadi Arabah and hinterland.

MacDonald 1992: 43) attributes the almost total lack of Palaeolithic sites in the north-east Arabah to the former extent of the Lisan Lake, which covered the Dead Sea Basin and the Jordan Valley from c. 70,000 BP to c. 16,000 BP if not later, thus constraining the location of sites during that whole period.

#### NEOLITHIC TO EARLY BRONZE AGE SITES (Figure 1.3)

This very broad time span currently consists of 357 sites, by far the largest number of sites for any single period. Although I recognise that it is not very useful to group together the entire Neolithic and Early Bronze Age into one settlement pattern map, given the present nature of the evidence we have no choice. Of the 357 sites, 163 are located in the western Arabah, recorded by Uzi Avner as dating generally between the sixth and third millennia BC (discussed further by Avner, Chapter 4 in this volume).<sup>8</sup> Currently, it is not possible to be more specific about their dating: thus, in

<sup>8</sup> The Wadi Arabah Project is most grateful to Uzi Avner for making available his database of sites in the western Arabah, Negev and Sinai for incorporation into the GIS.

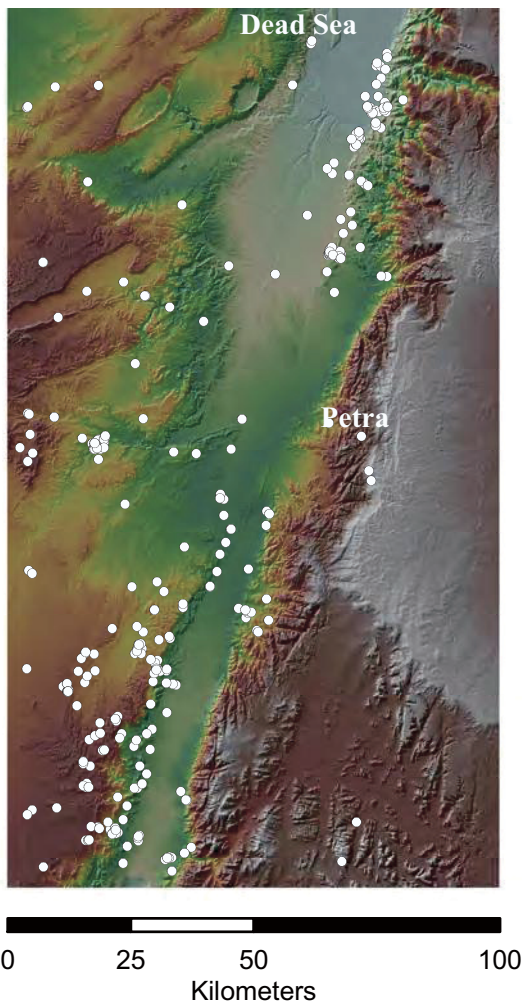


Figure 1.3: Neolithic to Early Bronze Age sites in the Wadi Arabah and hinterland.

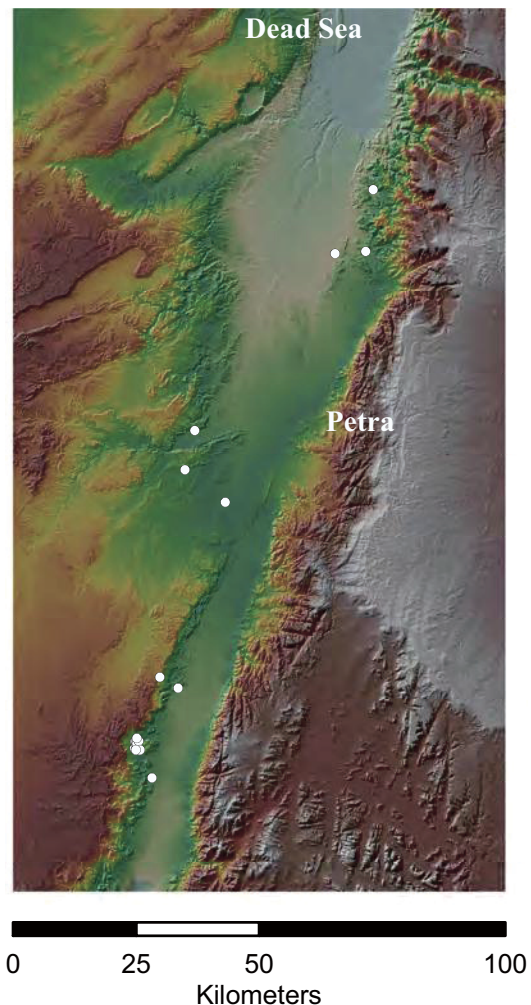


Figure 1.4: Middle to Late Bronze Age sites in the Wadi Arabah and hinterland.

order to include the western Arabah sites in a settlement pattern map, we are forced to consider the entire Neolithic and Early Bronze Age together.

It is not yet possible to say anything sensible about the overall settlement patterns in the Neolithic and Early Bronze Ages. The pattern on Figure 1.3 reflects the current state of our knowledge; the gaps are survey gaps, not (necessarily) settlement gaps. So, in the north-east Arabah, the density of sites reflects the intensive surveys in the southern Ghors and north-east Arabah and the Jabal Hamrat Fidan, while in the south-west Arabah the density reflects the sites surveyed and recorded by Avner. All of the sites in the western Arabah are 'cult sites', described by Avner as open-air sanctuaries and standing stones.

#### MIDDLE TO LATE BRONZE AGE SITES (Figure 1.4)

With only 20 sites currently attributed to the Middle–Late Bronze Age, this is the lowest incidence for any period, including the Palaeolithic (although the incidence of sites is relative, since the 'periods' are all of different length). Indeed, the real incidence may be

even lower, since some of the sites have been published as 'MB I', which probably equates to EB IV rather than the Middle Bronze Age 'proper'. In fact, if we disregard those sites, all we are left with for the entire period are sites connected with LB–Iron I copper mining and smelting: Khirbat an-Nahas in the Faynan region (LB, cf. Levy *et al.* 2004), Timna in the south-west Arabah (LB–Iron I), and Be'er Ora, the southernmost site, a multi-period smelting site with LB–Iron I activity contemporary with Timna (Rothenberg 1999b: 166–68). Current evidence from the Wadi Arabah is thus in line with our present understanding of the Middle and Late Bronze Age generally in southern Jordan and the Negev: likely occupation/use by pastoralist groups, and a lack of settlement sites, with the exception of copper-smelting sites and associated structures (cf. Bienkowski and Adams 1999: 170–71; Strange 2001: 299; Bienkowski and van der Steen 2001: 22–23). The absence of settlement sites for much of the Middle and Late Bronze Age is not evidence of lack of occupation or use of the Wadi Arabah, but lack of *settled* occupation. Historical sources prove the presence of nomadic pastoralist groups in this region in those periods (cf. Kitchen 1992).

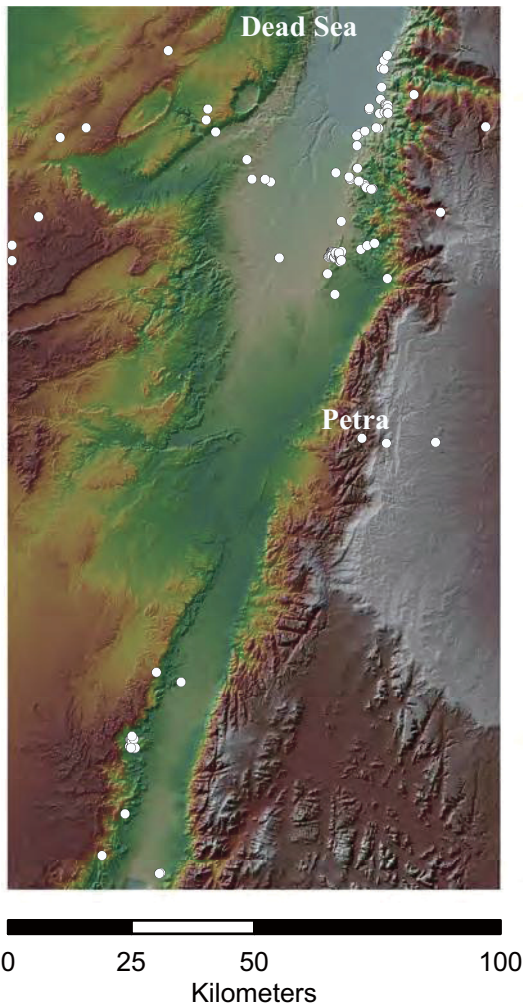


Figure 1.5: Iron Age to Persian-period sites in the Wadi Arabah and hinterland.

#### IRON AGE TO PERSIAN-PERIOD SITES (Figure 1.5)

As with the Neolithic to Early Bronze Age sites, the 121 sites currently recorded for the Iron Age to Persian periods reflect the pattern of surveys rather than a genuine settlement pattern. In the north-east is a considerable density of sites recorded by intensive surveys in the north-east Arabah and Jabal Hamrat Fidan; opposite, on the western side, are En Hazeva and a line of Iron II sites surveyed by Cohen along the known Iron Age route towards the Beersheba Valley (cf. Singer-Avitz 1999; Bienkowski and van der Steen 2001: 36–37). To the south on the eastern side of the Arabah is virtually nothing except the known Iron II sites in the Petra region and Tall al-Khalifa on the Gulf of Aqaba (although there is dense settlement on the plateau to the east, cf. Hart 1989: 83–111). This south-eastern area of the Wadi Arabah is likely to be filled out in due course with the final publication of the Southeast Araba Archaeological Survey.

The south-western side is quite different: all of the currently recorded sites are Iron I, including the fort at Yotvata, and copper-smelting sites and associated installations at Timna and Nahal Amram. Curiously,

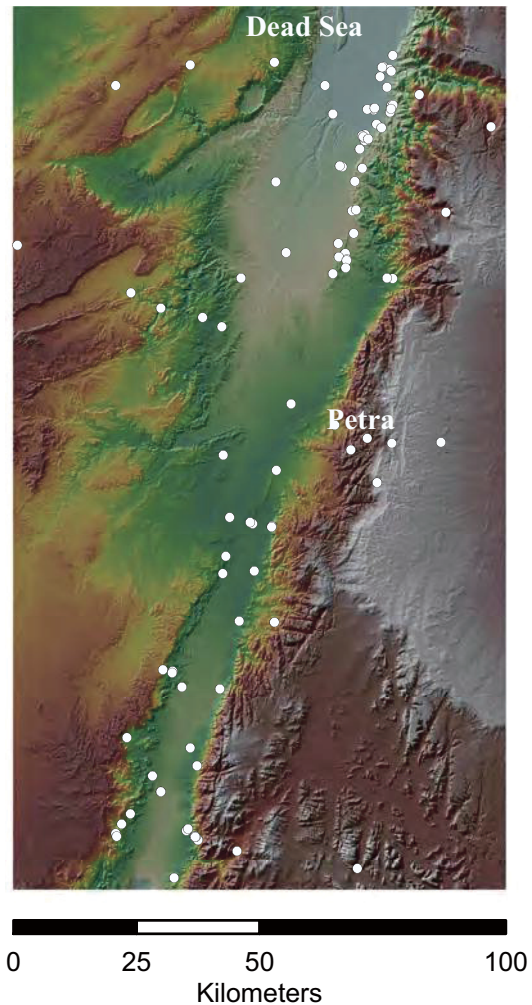


Figure 1.6: Hellenistic and Nabataean sites in the Wadi Arabah and hinterland.

no Iron II sites are apparently recorded so far from this region.

#### HELLENISTIC AND NABATAEAN SITES (Figure 1.6)

The pattern of the 110 sites currently recorded for these periods reflects four factors:

1. In the north-east Arabah, intensive survey has revealed many sherd scatters, camps, graves and occasionally caravanserais with Nabataean and (more rarely) Hellenistic pottery.
2. The density of Nabataean settlement in the Petra region, continuing down the connecting wadis into the Arabah (for the ancient road between the Wadi Arabah and Petra, see Hertell 2002).
3. In the south-east, all of the sites on the map have been identified as Nabataean by the Southeast Araba Archaeological Survey.
4. The density of Nabataean settlement across the entire western Arabah and Negev, with forts, towers, road stations and settlements, including those along the Petra–Gaza road (cf. Erickson-Gini and Israel 2003: 14, table 1).

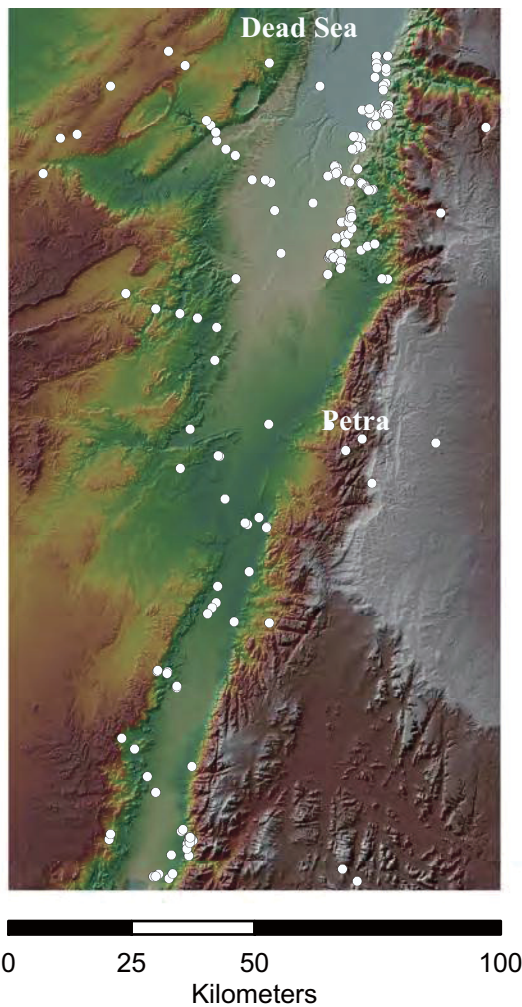


Figure 1.7: Roman and Byzantine sites in the Wadi Arabah and hinterland.

The lack of intensive survey in the west-central and north-west Arabah probably accounts for their relative lack of Nabataean sites.

#### ROMAN AND BYZANTINE SITES (Figure 1.7)

With 233 sites currently recorded, this is the second most intensive period of use of the Wadi Arabah, after the Neolithic–Early Bronze Age. The greatest density of sites is, again, in the areas most intensively surveyed: the north-east and south-east (the latter as the hinterland of Roman Aila, see Parker, Chapter 17 in this volume).

One factor stands out in comparison to current evidence from other periods: the multiplicity of clear routes in different directions (to be considered alongside the construction of the *Via Nova Traiana* to the east of the Arabah in the early second century AD). To the north-west of the Faynan region, heavily settled and exploited in these periods, is a line of Roman sites reflecting the known route to Gaza through Ma'aleh 'Aqrabbim, the so-called Scorpions' Ascent (Harel 1959). West of Petra is the Roman-period continuation of the Petra–Gaza road,

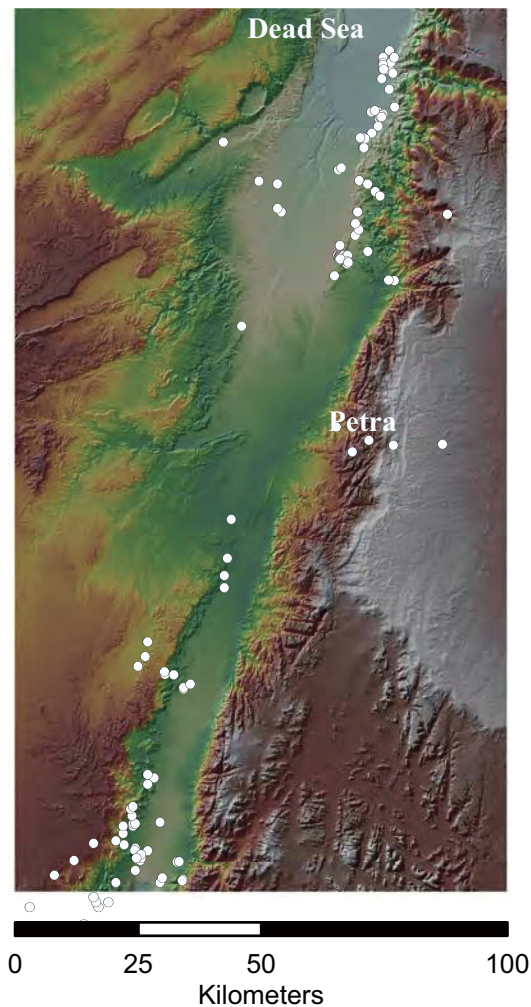


Figure 1.8: Islamic-period sites in the Wadi Arabah and hinterland.

which continued at least as late as the third century AD (Cohen 1982). South of Gharandal, along the bottom of the wadi, are portions of north–south paved road, found by Avner and Yadin (1988) and by the Southeast Araba Archaeological Survey (Smith *et al.* 1997: 59–60), and concentrations of Late Roman milestones presumably marking a north–south road (Ravel *et al.* 1995; see Isaac, Chapter 16 in this volume).

#### ISLAMIC SITES (Figure 1.8)

Although currently 146 Islamic-period sites are recorded, it must be acknowledged that the data are not very useful for an overall picture:

1. The pattern of sites in Figure 1.8 very much reflects the intensity of survey in the north-east and south-west Arabah (for the latter in the Early Islamic period, see Avner and Magness 1998).
2. The Islamic period covers a chronological span of more than a thousand years, but much of the survey data is quite blunt, often recording material as simply 'Islamic' with no further chronological subdivision. However, the survey

data from the Southern Ghors and Northeast 'Arabah Archaeological Survey (MacDonald 1992) does attempt, where possible, to refine the dating according to the Islamic dynasties. This evidence indicates that during the Early and Middle Islamic periods the north-east Arabah was a fertile region for the growing and processing of sugar cane and indigo. The Peutinger map, a thirteenth-century copy of a Roman world map (see Isaac, Chapter 16 in this volume, Figure 16.2), shows a road from Zoar (Islamic Sughar, modern Safi), round the southern end of the Dead Sea, down to En Hazeva. This is probably also the route used by Baldwin I's expedition in 1100, when the crusaders marched from Hebron, crossed the Wadi Arabah near Zoar, then marched down to Petra (Fulcher of Chartres: II, chapter 5; William of Tyre: X, 8, pp. 462–63). Baldwin IV also used this route when he went to relieve Karak in 1183 (William of Tyre: XXII, 31 (30), p. 1060). There is also ceramic and historical evidence for activity in the north-east Arabah in the Late Islamic (Ottoman) period, although the archaeological evidence suggests a decrease in population, with human presence confined to sherd scatters which represent potbusts and possibly camps, perhaps reflecting a largely pastoral nomadic population (MacDonald 1992: 125, 158–59).

3. Notwithstanding the comments at the beginning of point 2 above, virtually all the 'Islamic' sites in the western Arabah are dated to the Early Islamic period. In the south-west Arabah, the data reflects the pattern analysed by Avner and Magness (1998), while the group of sites in the north-west, apparently along the route towards the Beersheba Valley and Gaza, reflects identification of Early Islamic pottery on Roman sites. Early Islamic settlements in the hinterland of Ayla were involved in large-scale agriculture, copper and gold mining and production, stone quarrying, and the development of a road network used by merchants and pilgrims (see Whitcomb, Chapter 19 in this volume).
4. The central Arabah is still suspiciously empty of Islamic sites, with the result that it is still possible to accept King's hypothesis (1989: 208) that routes across the central Arabah declined from the Early Islamic period because of a new pattern of communications. This would support the views of Avner and Magness (1998) and Whitcomb (Chapter 19, this volume) that sites in the southern and northern Arabah functioned as a resource hinterland for Ayla and Sughar/Zoar/Safi respectively, providing agriculture, sugar, mining and metallurgy. While this picture may turn out to be correct, it is worth remembering the limitations of the evidence. The central Arabah is still to be intensively

surveyed and, although the wadi is not specifically mentioned, we might expect slightly more activity there given the agricultural importance of adjacent areas as recorded by early Islamic geographers, e.g. al-Muqaddasi, writing in c. AD 985 (cf. Schick 1997). For the Late Islamic period, too, we must take into account the evidence of bedouin relations and activity across the Wadi Arabah, as recorded by van der Steen and Bailey (Chapters 20 and 21, this volume).

## 2. The Wadi Arabah as relationship

The above discussion of the evidence for settlement patterns has reflected the standard approach within Levantine archaeology to the study of landscapes: relating environment and resources to demographic patterns, territoriality and social organisation, and producing neat, two-dimensional maps which encapsulate and bound our understanding of this past landscape (cf. Tilley 1994: 1). Clearly, as noted above, such an archaeological investigation of landscape privileges the visual and the 'viewpoint' of the archaeologist as a notionally objective observer and interpreter. Information and analysis in this format is meaningful to us as archaeologists precisely because it is 'rational', it can be measured and verified, and this is something we value above all other considerations as professional 'scientists' and 'academics'. It is obvious that such an approach has nothing to do with how landscape was experienced by those living in it: it tells us nothing about landscapes as relational webs of meaning and material (Thomas 1996: 91). Yet, to understand a landscape fully it must be *felt* (Tilley 1994: 31). Particularly for the Wadi Arabah, it is inappropriate to view it as a static representation, because here stasis is an illusion. This 'static' landscape was in so many ways a landscape of movement (cf. Bender 2001: 3) that any interpretation that does not take this experience into account is hopelessly flawed and inadequate. Here, it seems to me, we also find an inadequacy in the English language to fully express a relationship which is both an engagement *with* the landscape and a recognition of people being *in* the landscape, as an integral part of it. In a sense, the limitation of the language is a reflection of that central paradigm of Western philosophy that insists on a categorical polarisation of nature and culture, and which thus renders humanity external to the landscape (cf. Harvey 2001: 197). To move beyond this culturalist view, we are forced to mould the language to create new meanings: so, below, the use of the expression *with/in* denotes a relationship of people both with and as an indivisible part of the landscape.

Unfortunately, as Thomas has pointed out (2004: x–xi), archaeology, as an archetypal modernist discipline, is

probably the worst possible approach in attempting to understand past societies and peoples, since the modern world and its structured modes of thinking are qualitatively different from any other period of human history (cf. Foucault 1970, *passim*). Thomas further argues that in many ways modern archaeology employs, as a discipline, a very unethical approach in trying to engage with the 'otherness' of past peoples (2004: 235–43).

So how can we try to engage with the 'otherness' of the past, to think beyond our 'rational viewpoint', to explore the intertwined relationship between landscape and people which potentially has huge explanatory power? Phenomenological approaches to landscape offer no clear-cut methodology, and Tilley proposes a continuous dialectic between ideas and empirical data (1994: 11). He notes that, as contemporary subject observers, it is an illusion to claim an empathetic understanding of the significance of past landscapes and to recover meaning in ancient minds (Tilley 1994: 74). Nevertheless, experience of place is of fundamental importance in the attempt to provide an account. Thus, we need to find a means to think outside our structured, rationalist modes of thought that may give us at least some insight into the ways of emotional engagement of the peoples we are studying.

The simple answer, of course, is that we can never find an effective means of understanding past peoples, but rather than give up trying we should regard our exploration of the past as an open-ended, unresolved, messy dialogue (Thomas 2004: 242). Ideally, what we require is some insight into the nature of non-modern, non-Western emotional engagement with the landscape of the Wadi Arabah by the sorts of groups that inhabited it throughout the past, which might help us explore how ancient peoples experienced this particular landscape. We are fortunate that until the mid-twentieth century the distinctive landscape of the Wadi Arabah, Negev and Sinai had been occupied for hundreds if not thousands of years mostly by pastoralist groups with similar patterns of behaviour (Bienkowski and van der Steen 2001: 35). Clinton Bailey has demonstrated that bedouin poetry from this same region and pre-Islamic poetry are both products of the same bedouin culture, being a response to the peculiar difficulties and dangers of desert life arising from both nature and man (1991: 425). Bedouin poetry from this region – most fairly recent but some predating the nineteenth century – is a reflection of emotional responses by pastoralists to desert life, and shares a common imagery with pre-Islamic bedouin poetry (Bailey 1991: 410, 426). It seems to me, therefore, that we must grasp the opportunity of using bedouin poetry as a means of asking questions about what ancient pastoralists found meaningful in this landscape and how they engaged with it emotionally: not, I stress, as a tool to provide a closed and final explanation, but as a means of open dialogue

with past perceptions that are quite different from our modern way of thinking. In this approach, I am very conscious of Harvey's warning (2001: 197–98) that anthropological attempts to break away from the constraints of Western epistemologies tend to the ahistorical, erasing political events that characterise the passage of time, whereas the real challenge is to explore how different ideas about the landscape are made meaningful over time in changing circumstances.

Bailey notes that '[t]he entire gamut of the bedouin's emotional life lends itself to poetical expression: not as abstractions, however, but as concrete manifestations of daily life' (1991: 18). Bedouin poetry from this region is full of concrete expressions of emotional engagement with/in the landscape: the material and human landscape and the absent or invisible landscape of memory. In the poems,<sup>9</sup> the landscape is revealed as emotionally meaningful in different ways, through its

- *materiality*: the desert, mountains, wells, springs, animals, plants, the fertility and resources of the land, or the lack of them, the suitability of the land for camping
- as a *social landscape*: awareness of other individuals and tribes and their attitudes, the landscape as tribal territory and as a symbol of relationships with other tribes
- as a *sacred/symbolic landscape*: the presence of ancestors' tombs, holy men's tombs as the location of celebrations
- as a landscape of *movement*: the things that become important when moving across the landscape, such as hot winds, the presence of wells and springs, awareness of the evil eye
- as a *conceptual/socio-political landscape*: awareness of the impact of external events and of conquest, the landscape as representing freedom, rest and pasture
- as a *sensual landscape*: the desert at night altering perceptions, animals becoming wild beasts, hotness, dryness, wetness, fear of the evil eye, excitement (when smuggling at night)
- as a landscape of *memory and absence*: remembrance of a tent destroyed by a raid, memory of a landscape as a metaphor for a past life, memory of a past landscape altered by conquest.

Unsurprisingly, the boundaries between these categories are blurred and ambiguous, both because these are categories that I have distilled from the poetry and because these are things that are *felt*. As such, these are phenomenological aspects that cannot be recovered through archaeology, and they represent

<sup>9</sup> See Bailey 1991: nos 1.9, 1.10, 2.3, 2.11, 7.7, 8.4; p. 120 for plants and animals; pp. 288–89 for changed perceptions of the desert during the 'unwholesome' night.

a whole world of meaning which is effectively lost to us. Nevertheless, in trying to conceptualise how the ancient landscape might have been experienced in these ways, it is likely that some aspects of emotional engagement were always a factor, being ever-present, while others became meaningful or important according to circumstances, such as how well the landscape was known and – a crucial point – according to which direction the landscape was being approached: as Tilley notes (1994: 74), approach a landscape from a different direction and everything will change.

In many ways, we can conceive of the Palaeolithic as a natural landscape, without any of the human interventions that became an integral part of later landscapes. But ethnographies of small-scale, pre-modern, non-Western societies indicate that the natural landscape is redolent with associations and memories that link its materiality with the human senses and memory, so that every part of the landscape becomes a familiar place that gives life meaning, indeed it becomes part of one's identity (cf. Tilley 1994: 24–27; Knapp and Ashmore 1999: 20; Crumley 1999: 270). Already in the Palaeolithic the landscape would also have been experienced as a social landscape, with an awareness of the location, nature and attitudes of other human groups: for example, the location and nature of flint scatters had considerable significance for the recognition, reading and understanding not only of place but of human actions (cf. Tilley 1994: 207–8). Modern archaeologists interpret such scatters as evidence of past activities; but the contemporary hunter-gatherer would have been aware of the presence of other groups and their relationship with this territory, which made him more aware of his own position in the landscape. In this sense, already in the Palaeolithic we can begin to see the interlocking relationship between landscape, identity and power.

Between the Neolithic and Early Bronze Age, the landscape changes completely (cf. Figure 1.3). The density of cult sites in the western Arabah – open-air sanctuaries and standing stones – means that much of this region is experienced as a sacred landscape, redolent with mythic, cosmic associations. But the nature of political organisation has changed too, with more complex political entities controlling the copper trade from Faynan to the southern Levant (see Adams, Chapter 9 in this volume) as well as maintaining control, surveillance, power and ideology on other routes and at other sites (see Yekutieli, Chapter 7 in this volume; Philip 2003 for the EBA southern Levant in general). Movement across the Wadi Arabah is now evident (an aspect of use of the area that becomes the norm from now on), but how this movement is experienced is deliberately controlled. In an organised and hierarchical society that maintains a high degree of control over its members (cf. Yekutieli, Chapter 7 in

this volume), who is allowed to go where, and who stays? Trading copper from Faynan, movement across the landscape becomes a biographical encounter for individuals (Tilley 1994: 27), reading the signs, the traces of social control, and experiencing the sacred and symbolic landscape of cult sites as they travel and return. Further, we must not minimise the human nature of this experience, which involved the sensual experience of crossing the desert in day and night, and the memory of the absent landscape left behind.

A first impression of the Middle–Late Bronze Age settlement pattern map (Figure 1.4) compared with the Neolithic–Early Bronze Age (Figure 1.3) is that the entire landscape is now different. This of course is misleading, since all the cult and other sites erected during the Neolithic–Early Bronze Age – all the open-air sanctuaries and standing stones and so on – were still part of the landscape, and the pastoralist groups of the Middle–Late Bronze Age would still have experienced them as a sacred landscape and presumably attached stories to them. It is an obvious truth, but perhaps worth repeating, that what we as archaeologists interpret as 'older' monuments were an integral part of the landscape of all later periods and were experienced as part of the landscape of those periods (cf. Barrett 1999: 278); thus, in considering the experience of landscape, we must wrench ourselves away from regarding sites and monuments as belonging to just their period of construction in isolation, and consider them as part of all later landscapes.

Towards the end of the Late Bronze Age and in Iron I the Egyptian development of the Timna copper mines brought an entirely new element into the landscape. The Egyptians developed Timna as their own sacred and industrial landscape, apparently bringing in pastoralist groups from north-west Arabia as workers in the mines (if that is the correct interpretation of the presence of the so-called 'Midianite' pottery – or Qurayyah painted ware – at Timna). The indigenous pastoralist groups would certainly have been aware of these foreign incursions, which altered the physical nature of their landscape but also imported Egyptian sacred elements (for instance, the Hathor temple at Timna). The social landscape becomes quite complex, with the Timna mines representing imperial power, to which the north-west Arabian tribes are somehow connected. But it is also interesting to approach this landscape from another direction, from the point of view of the Egyptians and of the 'Midianites': what was their experience of coming into this material landscape, living in it and altering it? What was their relationship with/in the sacred and social landscape that they encountered? We can begin to get some insight from Egyptian texts, for example Papyrus Anastasi VI which contains a report on pastoralists from Edom – the first mention of 'Edom' in an Egyptian text – in the eighth year of Merneptah: the

Egyptians describe pastoralists on the move with their livestock, both deemed worthy of being helped and kept alive 'by the will of Pharaoh' (Gardiner 1937: 76–77; with notes, Caminos 1954: 293). It is noteworthy that the social/human landscape appears to take precedence over any resource implications and benefits, the latter being a rationalist/modernist interpretation. By asking these sorts of questions, we realise that there can never be a single experience or description of landscape: each group and perhaps each person experiences it in a unique way, and, as I note further below, these different experiences reflect the different power relations in any situation.

By the late Iron Age, the sites in the northern Arabah reflect the route of the Arabian incense trade as well as the intensity of copper-mining in Faynan. Although this is the period of the Iron Age kingdoms and Mesopotamian imperialism, the existence of roadside shrines catering for mixed tribal groups such as En Hazeva and, farther to the north-west, Horvat Qitmit (cf. Bienkowski and van der Steen 2001: 28) along the trade route crossing the Wadi Arabah and towards the Beersheba Valley, suggests that the wadi was experienced more as a sacred landscape than a socio-political one. The material culture reflects a landscape of movement in which social relations and negotiations with other pastoralist groups are important, rather than a landscape which functioned as any sort of formal border between bounded political entities (Bienkowski and van der Steen 2001: 39). The same is true of the first centuries BC/AD, during which the early Nabataeans used the Wadi Arabah and the Negev at first seasonally for trade but not for settlement or pasture, and later built a network of roads and caravan stops which completely changed the experience of travelling along the trade route, and materially altered the relationship with local groups (cf. Erickson-Gini, Chapter 12, this volume).

The way in which roads change relationships within a landscape is a central issue in contemporary anthropology – essentially concerning the aspects of power which emerge in the relationship between location and movement, in the sense that the powerful are those with the ability to move things around (Harvey 2001: 206–9; Selwyn 2001). This seems a fruitful way of exploring Iron Age and Nabataean routes and roads, and particularly the built Roman road(s) in the Wadi Arabah (see Isaac, Chapter 16, this volume). The stretches of road built north–south along the wadi in the fourth century seem to be connected with the transfer of *legio X Fretensis* from Jerusalem to Aila, linking the new legionary base with the region of the abandoned legionary headquarters in Jerusalem. The road was thus a visible mark of Roman power, marking one official 'imperial' route among many informal ones: the road, and the way in which it constructs the landscape, would be experienced quite

differently by a Roman legionary and by an indigenous pastoralist, who probably used a variety of routes. As with the *Via Nova Traiana*, the road was maintained only as long as it was strategically important, after which it fell into disrepair (Fiema 1993), but it continued to be present in the landscape as something to which, presumably, some sort of historical memory was attached.

Crucially, this road reflects a change in the focus of power within the Wadi Arabah and how the landscape was experienced. While in the central and northern Arabah the old east–west trade routes continued, in the south the new road led towards the Roman city of Aila, and reflected the new role of the Wadi Arabah as the conduit for commercial traffic into the city (see Parker, Chapter 17, this volume). Similar relationships seem to exist in the Islamic period with Ayla in the south and Sughar in the north. Archaeologically, the Wadi Arabah is now a 'hinterland' providing resources for the cities. How does this change the experience of the landscape? The inhabitants of the Wadi Arabah are now providers in a subordinate economic and hierarchical relationship: their landscape has meaning as a material resource rather than, as in earlier periods, mostly a sacred and social landscape of movement. But, instead of using the language of the 'objective observer', with words like 'hinterland' and its connotations of 'marginal' and 'peripheral', we should see the inhabitants of the Wadi Arabah as partners in a creative, ongoing relationship. If, as Whitcomb suggests (Chapter 19, this volume), Early Islamic copper-smelting sites in the southern Wadi Arabah provided seasonal occupation for the population of Ayla, we can imagine an interesting dynamic in terms of the social and sensual experiences and relationships between city and wadi.

Perceptions of landscapes are not constant, they shift over time according to events and personal experience (Stewart and Strathern 2003: 1). Landscape is also entwined with feelings of identity, and what comes through the analysis above is how this relationship is linked with, and perhaps is a function of, the power relations in any situation: as different aspects of the landscape become important according to circumstances and according to the direction from which one approaches, so power also shifts.<sup>10</sup> Each individual

<sup>10</sup> Power is a key issue in contemporary anthropology, and the conflict between desire and power in past western societies is a main thread in much of Foucault's later writing (see, e.g., Foucault 1980). I am fully aware that such a concept of power may well be a modern western construct that is applicable to our own competitive world but may be anachronistic with regard to the past, and in that way might contradict Foucault's own earlier analyses of epistemes of thought (Foucault 1970). For a particular, gendered critique of the validity of power as a category of

experiences and interprets the landscape from a particular direction and understands their place in it and their power with regard to other individuals and groups. Using a crude example, there is a huge power shift between a pastoralist moving across the Wadi Arabah in one direction, experiencing it as a sacred and social landscape, and the Roman legionary building and subsequently using the new imperial road to Aila. What each is emotionally engaged with/in the landscape is what they draw their identity from – how they are different from others and their place in the world – and this is integral to what they draw their power from. For each, the Wadi Arabah is a landscape of movement, but they are moving in different directions, for different purposes, within a different system of social relations, and with different potential for social negotiation. This overtly anthropological approach may be a useful way of exploring the exercise and manifestations of power in the Wadi Arabah and considering the different experiences of the landscape. As Tilley notes (1994: 67), once we start exploring the symbolic, ancestral and temporal significance of the landscape, simple considerations of an economic ‘base’ in relation to resource utilisation of the landscape seem quite restricted.

### 3. The Wadi Arabah as boundary

The relationship between landscape, identity and power in the present-day is a key issue in understanding modern archaeological perceptions of the Wadi Arabah. Today the Wadi Arabah marks the line of the modern political border between Israel and Jordan between the southern tip of the Dead Sea and the Gulf of Aqaba, and separates the Negev desert from southern Jordan. The key event in modern perceptions of the Wadi Arabah occurred on 16 September 1922, when the Council of the League of Nations approved the memorandum by the British Government relating to its application to create Transjordan as a separate entity within its overall Mandate over Palestine (originally endorsed at the San Remo conference in April 1920). For the first time in history, the Wadi Arabah became an official border between discrete political entities. The formal description of the newly created entity was:

‘...Transjordan, which comprises all territory lying to the east of a line drawn from a point

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analysis within archaeology, see the papers in Sweely 1999. My own working definition of power, as applied in this paper, is that it is not necessarily coercive, but an aspect of unequal relationships which can nevertheless be collaborative and negotiated: in this sense it is probably not too far from Foucault’s idea of ‘immanent’ power as a quality of all human relations (e.g. Foucault 1980: 99; cf. also Bourdieu 1990: 122–34 for power and its reproduction in everyday life).

two miles west of the town of Akaba on the Gulf of that name up to the centre of the Wady Araba, Dead Sea and River Jordan to its junction with the River Yarmuk: thence up the centre of that river, to the Syrian frontier’ (cf. Moore 1974: 83).<sup>11</sup>

Since then, the Wadi Arabah has remained the official border between, at first, Palestine and Transjordan, and later between Israel and Jordan.<sup>12</sup> In this paper, my contention is that the modern experience of this border has been a strong influence, consciously or unconsciously, on scholarly perceptions of the role of the Wadi Arabah in antiquity, particularly in the ‘biblical’ periods. An important question, therefore, is *why* the Wadi Arabah became the border in 1922. It seems to me that there has been an implicit assumption in archaeological writing that the wadi was already perceived at the time as a natural border area – geographically, environmentally and culturally – and so was an obvious choice for a political border. However, this was certainly not the case, as the bitter discussions regarding the location of the Palestine-Transjordan border in the early 1920s demonstrate.

Britain had acquired the Mandate over Palestine from the League of Nations based essentially on carrying out the terms of the Balfour Declaration of 1917 – to establish a national home for the Jewish people in Palestine. Regarding the ideal and expected borders of their ‘national home’, the Zionists included all the land between the Mediterranean, across the River Jordan, up to a point in the desert just west of the Hijaz railroad (citing recognition of Muslim interests in the railway) (Kimmerling 1983: 16). That was the territorial plan submitted by the Zionist Organization to the Paris Peace Conference in February 1919, which was rejected (Gilbert 1979: 11). The Twelfth Zionist Congress in Carlsbad in September 1921 re-affirmed that Transjordan was an integral part of Palestine, and this view was also supported by some British colonial officials (most notoriously Richard Meinertzhagen

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<sup>11</sup> The original decision regarding the boundary, including that along the Wadi Arabah, was taken on 1 September 1922, announced in an official Order in Council by the British High Commissioner Herbert Samuel. The British aimed to divide the Arabah into two equal parts and delimit the boundary in the centre of the valley, but the delimitation was from the start unclear to the British boundary commission. The exact line of the boundary along the Wadi Arabah was inaccurate and remained problematic (Efrat 1994: 230–32).

<sup>12</sup> The Hashemite Kingdom of Jordan gained full independence on 25 May 1946; the state of Israel was proclaimed on 14 May 1948, and was promptly recognised by the United States and the Soviet Union, although the first Arab-Israel war lasted from 15 May 1948 until January 1949, and the armistice agreements were not completed until July 1949 (Mansfield 1980: 279–80).

[1959: 61–63]). But, once it became clear that the British intended to create a separate Arab state of Transjordan, the arguments over the location of the border between Palestine and Transjordan began.

For the Zionists, there was no natural border along the Wadi Arabah or the River Jordan, and they argued for including most of Transjordan within Palestine for historical and economic reasons. In a letter dated 1 March 1921 to Winston Churchill, then British colonial secretary, Chaim Weizmann, the future first president of Israel, wrote:

‘...Gilead, Moab and Edom...are historically and geographically and economically linked to Palestine...The economic progress of Cis-Jordania itself is dependent upon the development of these Trans-Jordanian plains, for they form the natural granary of all Palestine and without them Palestine can never become a self-sustaining economic unit and a real National Home’ (Wasserstein 1977: 159–62, letter 135).

David Ben-Gurion, the future first prime minister of Israel, articulated the Zionists’ historical claim to Transjordan, setting it very firmly within a biblical framework:

‘As is known, the Jewish settlement of Trans-Jordan preceded their conquest of the western side of the Jordan’ (Ben-Gurion 1931: 41).

The British, though, felt an obligation to create a sustainable Arab entity in Transjordan, and rejected the Zionist argument for a border far to the east. For Winston Churchill, *Trans-Jordan* meant exactly that: *across* the River Jordan (see generally Shlaim 1988: 26–32). Although the term ‘Transjordan’ only came into common use at this time, its remit had been established by several explorers and geographers since its first known use in English in 1873 by H.B. Tristram (Tristram 1873: 4; see also Merrill 1881: vi; Schumacher 1890: 28; Libbey and Hoskins 1905).<sup>13</sup> Churchill accordingly drew a line through the middle of the River Jordan, straight down through the Wadi Arabah and to the Gulf of Aqaba to create the border between Palestine and Transjordan. Thus, the Wadi Arabah became a border simply because it was due south of the River Jordan, and not because it was perceived as a natural border or because any arguments were put forward in favour of it (cf. Shlaim 1988: 31). In a sense, it became a border by default: along the Wadi Arabah rather than farther east at the Hijaz railroad.

Following the proclamation of the state of Israel in 1948, the Wadi Arabah became the border between

two countries at war. Arab villages in the Negev region were depopulated and destroyed in 1948–49, and Jewish settlements took their place (Abu el-Hajj 2001: 92). Immediately, the Negev and the Wadi Arabah became the first part of the project to re-establish a connection between the new Israel and the ancient, biblical, Jewish landscape. The landscape of the Wadi Arabah on the western, Israeli side was renamed and reconfigured to give it an explicit Jewish identity, linking it to the landscapes of the Bible and Israel’s origin myth. The new Israeli government created the Committee for the Designation of Place-names in the Negev Region: its first mandate was to create a Hebrew map of the Negev and Arabah determining ‘Hebrew names for all places – mountains, valleys, springs, roads etc. in the Negev region’ (quoted in Abu el-Hajj 2001: 91 and in Benvenisti 2000: 12). The Committee started work in July 1949, only four months after the Israeli army consolidated its control of the Negev and Arabah. The urgency of the task is explained in a Committee report:

‘The foreignness of the names in the Negev evokes fear...Through these names a foreign spirit blows...With the occupation of the Negev...came the need to change this situation, to adopt Hebrew names, to abolish these foreign sounds, and to fill the map of the Negev with original names close to the heart of the Jewish defender and settler in the Negev’ (quoted in Abu el-Hajj 2001: 92–93).

Another Committee report illustrates that its members understood their work as ‘uncovering the origins of the people and its language from historical, archaeological, geographic, and natural hiding places’ (*ibid.* 93). In this initial work in the Negev and Arabah, the Committee laid out the principles that were to govern all future work of Judaizing the map of the state of Israel: preference was given to ‘historical identifications’, the term ‘historical’ indexing not Arabic names or eras but harkening back to ancient Hebrew ones. In the Negev and Arabah, there were insufficient known historical names to fill the modern map: from the Hebrew Bible came 40 identifications, with the remainder from different sources. The new prime minister, David Ben-Gurion, wrote to the chair of the Committee in 1949:

‘We are obliged to remove the Arabic names for reasons of state. Just as we do not recognize the Arabs’ political proprietorship of the land, so also we do not recognize their spiritual proprietorship and their names’ (quoted in Benvenisti 2000: 14).

This was an explicit, conscious and politically motivated process to substantiate modern political realities with the material signs of historic presence, in order to characterise the land’s Jewish identity (Abu el-Hajj 2001: 18, 281; Benvenisti 2000: 46). Abu el-Hajj

<sup>13</sup> The term ‘Transjordan-Länder’ had been used earlier in German by Seetzen (1854–55).

(2001) and Benvenisti (2000) have documented and analysed this process for Israel as a whole (thus giving us both an Arab and an Israeli perspective), and have revealed the participation of archaeology and archaeologists in the remaking of 'Palestine' into the historical 'Land of Israel', including membership of the renaming committees. The concept of the 'Land of Israel' was an ideological construct, whose purpose was to create continuity between the present and the past. The new 'flawless Hebrew map' (cf. Benvenisti 2000: 42) of the Negev and Arabah, shorn of Arabic names, was in every sense a weapon through which power could be administered, given legitimacy and codified (cf. Harley 1988; Bender 1999). The map, as a representation of the landscape, was recognised as an important tool for controlling the sense and meaning of the Negev and Arabah by claiming authority in the presentation of the historicity of the state and heralding it as 'real' and 'true' (cf. Black 1997; Harley 1989; Smith 2003: 71–72). It had a practical, immediate purpose to inform the new settlers of the names of the places they were to inhabit. The renaming of places in the Arabah invested them with a different meaning and significance: the new Hebrew names were often completely unrelated to the traditional Arabic names.<sup>14</sup> The new names acted as mnemonics for the new Israeli settlers, linking them materially to ancient Israel (cf. Tilley 1994: 18). Renaming made the western Arabah region explicitly Jewish, it reinvented it as a biblical landscape, and it created a difference from what was on the other side of the Arabah: Arabic names that inspired fear and characterised Otherness – a different language, a different script, a different history, a different culture, and a different religion.

<sup>14</sup> For example, Hebrew Timna replaced Arabic Muneiyeh, and Hebrew 'En Yahav replaced Arabic 'Ayn Weiba ('Spring of the Plague') (Benvenisti 2000: 19–20). Most 'traditional' Arabic place-names did not antedate the fourteenth to sixteenth centuries, when the bedouin tribes arrived in the Negev and Sinai, although some place-names are unintelligible in Arabic and originated in a pre-Arabic culture (Bailey 1984: 42; 1985). Bailey (1984: 42–45) notes that the bedouin would not have known most of the geographical designations used by their predecessors, so in that sense this earlier renaming was more practical than political, with the majority of new names being derived from the local vegetation and topographical features. It is these names that were recorded on the 1:125,000 map of the Negev and Arabah prepared by Captain Stewart Francis Newcombe of the Royal Engineers in 1913–14, with the assistance of the archaeologists T.E. Lawrence and C. Leonard Woolley (Newcombe 1914). The 'Newcombe' map was printed in 1915 and classified as secret, used by the British army during the First World War, and served as the basis for the Negev renaming project in 1949 (Benvenisti 2000: 17).

### *The Wadi Arabah as metaphor: modernist perceptions of 'state' and 'border' in the Iron Age*

In many ways, of course, this interrelationship between the landscape, identity and the exercise of power is a continuation of the thread I have attempted to follow above from the Palaeolithic onwards. Nor is this a unique case in the modern Middle East and elsewhere where there are many attempts to 'nationalise' the landscape, for example by Palestinians ('one who has no heritage has no national personality': 'Alkam 1991, quoted in Benvenisti 2000: 262). Indeed, the Wadi Arabah is again implicated as a great divide in the recent discourse which characterises ancient Edomites as 'Arabs' in a search for national historical depth (Abu el-Hajj 2001: 250). The danger is that these discourses become circular and polarised, and the historic landscape becomes portrayed according to the modern nationalist narrative, with no place for alternative commentaries which are regarded as 'anti-Israeli' or 'anti-Palestinian' (Benvenisti 2000: 233). The past and the present become bound up in a single metanarrative of the Arab-Israeli conflict and about the legitimacy of and relationships between discrete, bounded, mono-ethnic states.

My worry is that this is precisely the case with the portrayal of the Wadi Arabah as a formal political border between the kingdoms of Judah and Edom in the 'formative' period of the Iron Age. It really is time to challenge the implicit assumptions behind this claim. What clear evidence is there for the Wadi Arabah as a political border between Judah and Edom? The answer is: none at all. Indeed, there is no evidence for any sort of formal border. The only written source available is the Hebrew Bible, and all the relevant passages are highly ambiguous (Edelman 1995; see Bartlett, Chapter 11, this volume).

It is well known that the term 'Edom' denoted both a geographical territory and the political name for a kingdom. There is no evidence for a western border of geographical Edom (Edelman 1995: 3) – if indeed such a broad geographical term, recorded solely by outsiders, was ever conceived of in antiquity as having a recognisable 'border' as such. As regards the 'western border' of political Edom, the evidence is extremely ambiguous: not only is the Wadi Arabah neither specified nor even implied, but also the status of much of the Negev during Iron II is unclear, it not being self-evidently under Judahite control. Indeed, Edelman (1995: 6) notes that the Negev may well have been 'essentially unincorporated territory open to any group interested in it' (which echoes the Iron Age archaeological evidence presented in section 2 above). Yet, this ambiguity has been ignored, and the Wadi Arabah is widely regarded as the self-evident border between Judah and Edom (e.g. Beit-Arieh 1995a; most recently Porter 2004: 377, 388).

Archaeological evidence too does not support the idea of an Iron Age border along the wadi. As noted above, Figure 1.5 shows that at present no Iron II sites are known in the entire central and southern sections of the western Arabah (as already pointed out by Finkelstein 1995: 139), compared with the relative density of Iron II sites east of the Arabah reflecting 'Edomite' settlement. This total lack of Iron II sites to the west – even taking into account the lack of intensive survey in the west-central Arabah – makes the whole idea of a political border along the Arabah slightly ridiculous and, frankly, unacceptable. In this desert environment, with tribal groups in a heterarchical structure lacking centralised control, it is possible – even likely – that there was no border as such: perhaps no more than relatively fluid tribal territories whose crossing necessitated negotiation, but nothing that we would recognise as a formal border between (modern) nation states (cf. Bienkowski and van der Steen 2001: 38–39).

The idea of the Wadi Arabah as an Iron Age political border is therefore not a fact, but a construct, and we need to unpack the implicit assumptions behind it. One of the assumptions, of course, is that Judah and Edom were bounded nation states with formal, fixed borders in the modern sense, containing distinctly demarcated ethnic groups. This form of the nation state, a notion which permeates eastern Mediterranean archaeology and biblical exegesis, is a type of organisation which came into existence in Europe only in the mid-seventeenth century (Thomas 2004: 96–118). By reconstructing ancient kingdoms according to modern frameworks, not only are we creating a past in our own image (cf. Stevens 1999: 154–58), but also implicitly representing the modernist narrative of the nation state (i.e. the political state, its legislative powers and ambitions) as the form of (artificial) human habitat which 'naturally fits' human needs (Bauman 1997: 80).

The second major implicit assumption is the concept of the 'Land of Israel', which is used as an ideological framework to describe geographical boundaries both in the present and the past (Benvenisti 2000: 232–33). An integral part of this assumption is that the region west of the Arabah was in theory and practice part of Judah, just as today it is part of Israel (Aharoni 1979: 77; Beit-Arieh 1995a: 38; 1995b: 1 n. 1, 314).<sup>15</sup> As outlined above, the Wadi Arabah and the Negev were re-made as part of a modern Land of Israel to create ideological continuity between the past and the present – or rather,

there was an iterative relationship between past and present, one substantiating the other (cf. Abu al-Hajj 2001: 280–81; Benvenisti 2000: 46). The ancient, biblical landscape of the Negev became an important part of modern Israeli identity. As a result of this process, the Wadi Arabah was constructed as a barrier which substantiates modern political, religious and cultural realities. However, we must be very careful not to impose modern ideological frameworks onto past socio-political structures. That much of the Negev was a formal part of Judah during the Iron Age remains an assumption, no matter how important a part of modern (constructed?) historical memory it might be. As noted above, the status of the Wadi Arabah and much of the Negev during the Iron Age is not at all clear; indeed the indications are that these areas were essentially pastoralist and tribal and not under any centralised control by either Judah or Edom, however we conceive of these entities. At the very least the evidence is ambiguous, which is perhaps what we should expect in this landscape of movement and negotiation.

In a sense, in much of the archaeological writing on this topic, the Wadi Arabah seems to be a metaphor for relations between Israel and its enemies, ancient and modern (partly of course because the Hebrew Bible and its world are often understood and interpreted from the perspective of modern structures, ideologies and epistemologies: see Gottwald 2001: 1–31; cf., for example, the language used by Beit-Arieh 1995b: 314; Porter 2004; for exceptions, see LaBianca and Younker 1995; Finkelstein 1995: 139–53; Singer-Avitz 1999).<sup>16</sup> Ancient occupation in the western Arabah, especially in the foundational 'biblical' periods, is understood as self-evidently Jewish, while evidence of non-Jewish presence is self-evidently the result of invasion, aggression and expansion by enemies. No convincing substantiating argument is offered, because the historical evidence is already visible in the (re)named,

<sup>15</sup> Note Silberman's point that the reconstructions of the ancient Land of Israel by scholars such as Yadin and Aharoni were not dispassionate scholarly alternatives but implicit expressions of their own understanding of the modern processes of territorial conquest and nationhood (1993: 237).

<sup>16</sup> This is not the place for a full critique of Porter 2004, who attempts to apply the theory of segmentary states to interpret Iron Age Edom. His hypothesis can be analysed in two ways: on its own terms, and by questioning its basic assumptions. On its own terms, the elements of 'elite practice' that he cites (Porter 2004: 379) cannot be supported by the evidence. As to his inherent assumptions, his interpretation of the state is modernist and anachronistic and, in particular, his treatment of human motivations and the power of the individual (cf. Porter 2004: 390) are based on the idea of the individual constructed by modern philosophical humanism (Thomas 2004: 119–48; Fowler 2004: 11–22). The contemporary conception of the liberty, power and choices of the individual, which permeates his paper, is a modern construct, and imposing that concept on the past is 'a dangerous and potentially narcissistic exercise' (Thomas 2004: 147–48). The form of personhood within a kin-based tribal society should be explored, rather than imposing modern urban social structures.

biblical landscape: it is codified and symbolic, a form of (constructed) historical memory. It could not be otherwise, or the land could not be shown to be historically Jewish. The western and eastern parts of the Arabah are thus interpreted as culturally and historically demarcated, with the Wadi Arabah as a clear, self-evident divide. In this way the Wadi Arabah is a paradox: it was never a boundary, it became a political border by default, but now it has been renamed, reconfigured and redefined as a barrier separating two mutually exclusive historical and cultural identities, in the past as well as in the present.<sup>17</sup>

The challenge is to acknowledge modernist assumptions and preconceptions, to embrace the ambiguities of the evidence, and to attempt to explore the antiquity of the Wadi Arabah on its own terms and not as a reflection of the present.

### Concluding remarks

The implication of the title of this chapter is that the Wadi Arabah is a contested landscape. In the analysis presented, using both archaeological and historical evidence and by questioning what seem to me to be inherent assumptions, I have tried to show that the wadi's role as the modern political border between Jordan and Israel – a modern contested landscape – has been the strongest underlying influence in interpretations of the wadi in the past: indeed, that there has been a good deal of circular reasoning. In fact, there is no evidence that the wadi was a contested landscape in antiquity. By asking different questions, exploring the changing relationship of people with/in the landscape, and attempting to understand its multiple meanings in the past, it seems to me that it was more a landscape of social negotiation and movement.

Nevertheless, as the review of current evidence in section 1 demonstrates, there are still huge gaps in the evidence. In particular, much of the evidence from the western Arabah is unpublished and cannot yet be analysed chronologically, and the central and north-west Arabah have still to be surveyed intensively. It is

<sup>17</sup> A further irony is that the Wadi Arabah is now becoming a symbol of potential peace and cooperation between Jordan and Israel, for example with the Bridging the Rift Science Center, located 80 km. south of the Dead Sea, whose cornerstone was laid on 9 March 2004: a multidisciplinary science institution (a 'free academic zone') hosting researchers from Jordan and Israel (Krajick 2004). Each country has ceded 30 ha. each, so that the centre literally straddles the border. Nevertheless, Islamist groups condemn the initiative as an attempt to 'erase history' (Gillespie 2004), underlining the power of the Wadi Arabah as a historical symbol of separation.

unfortunate that political realities force archaeological work to be undertaken separately on eastern and western sides, since this is an impediment to full understanding of the nature of the Wadi Arabah as a landscape of movement, and instead underlines the exclusively modern experience of it as a barrier. Despite these constraints, we must face up to and acknowledge our modernist perceptions and encoded values, and explore the quite different past perceptions, experiences and meanings of the Wadi Arabah, and the economic, political and social events that impacted on them.

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# Desert environment and geoarchaeology of the Wadi Arabah

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## Introduction

The Wadi Arabah, situated between the Dead Sea and the Red Sea, has a length of about 178 km. The area around the Dead Sea is considered the 'navel' of the Earth, being the deepest continental depression anywhere in the world. The declining level of the Dead Sea in the last 30 years to c. -412 m. below mean ocean level has affected the extent of its shoreline. The drop in the level of the Dead Sea is mainly caused by widespread human-made water diversion in its catchment basin, particularly from the Jordan and Yarmouk rivers. The very low Dead Sea level of -412 m. would normally have left the shallow southern basin dry, as its ground surface is about -403 m., i.e. almost 10 m. higher. However, Dead Sea water is pumped to the southern basin where the Dead Sea Works Ltd (Israel) and the Arab Potash Co. (Jordan) keep evaporation pans. Therefore, the artificial southern boundary of the Dead Sea, determined by the evaporation ponds, is put at about 24 km. south of Metsada (Israel) and 16 km. south of Potash City (Jordan) in the current assessment.

The lowest part of the Wadi Arabah is at the southern margin of the Dead Sea, at about -400 m. below mean ocean level. Some 20 km. south of the Dead Sea the valley floor rises sharply at the Amatsiyahu Fault to a level of -325 m. The Wadi Arabah ascends gradually southward until its highest level of 230 m. above mean ocean level at Sheluhah Notsa, north of Yahel, just west of Jabal Gharandal, at a distance of some 112 km. south of the Dead Sea and 66 km. north of the Red Sea. This more elevated part within the Rift Valley divides the Wadi Arabah in the northern section draining towards the Dead Sea and the southern part draining towards the Red Sea.

The Wadi Arabah can be divided into three main sub-regions (Dan 1981). The northern Arabah runs from the southern shore of the Dead Sea to the area of Hazeva and the confluence of Wadi Fidan with the Wadi Arabah. The northern Wadi Arabah is about 15–20 km. wide. Deposits of the Pleistocene Lake Lisan reached their southernmost extent in the Hazeva area at -150 m. below Mediterranean Sea Level, where the highest known coastal features of the former Lake Lisan were found (Bowman and Gross 1992; Klinger *et al.* 2003).

The central Arabah is up to 30 km. wide and more heterogeneous, going from Hazeva southward to the highest part of the Wadi Arabah near Yahel and Jabal Gharandal. The Edom mountain border in this region is situated significantly more eastward, for example Jabal Ra'la in the Wadi Fidan area west of Dana. The hills in the Negev, which do not form a clear borderline in the west, are also located farther away from the Arabah. In fact, the most extensive topographic east–west connection of lowlands in the entire Arabah region runs from Faynan in the east, along the Hazeva–Ein Yahav area to the Zin Valley and Zin Canyon, along the Early Bronze–Middle Bronze Age site of Ein Ziq to the modern Sede Boker Campus in the west. Looking eastwards from the latter place on a clear day, standing on the edge of the Zin Canyon, gives a beautiful view of the Edom mountain ridge (Dana–Shaubak area) at a distance of about 80 km., occasionally capped by snow in winter.

The southern Arabah, draining towards the Red Sea, forms the most narrow part of the valley, c. 8–10 km. wide. The Edom mountains have a more westward position from Jabal Mireibid near Risha, while the Negev hills are located more to the east from Yahel southward. A rather continuous hill and mountain ridge clearly demarcates the Wadi Arabah on both sides going southward to Eilat and Aqaba. However, the Edom mountains are much higher than the Negev hills. The southern Wadi Arabah is the driest and hottest part of both Israel and Jordan.

## Climate

The Wadi Arabah is the driest and hottest area in the entire region of the Negev and south-western Jordan. The climate can be classified as hyper-arid, because the aridity index  $P/PET$  ( $P$  = average annual precipitation;  $PET$  = average annual potential evapotranspiration) is well below 0.05 (Bruins and Berliner 1998). For example, the  $P/PET$  value for Eilat and Aqaba amounts to 0.01, which is extremely hyper-arid (Kharel and Bruins 2004).

The entire region of the southern Levant has a long, hot and completely dry summer from June to September. The northern part of the northern Hadley Cell is situated over the Mediterranean region and Near East

in summer, causing general conditions of high atmospheric pressure and downward movement of air, resulting in stable atmospheric conditions. In continental terms, the air flows back to the Intertropical Convergence Zone (ITCZ), situated in summer above the Sahel and Ethiopia. Here there are strong tropical rains in summer, which feed the Blue Nile and which enabled the famous hydraulic civilisation of ancient Egypt. North-western winds prevail in the Levant in summer, due to the presence of a stable barometric low over the Persian/Arabian Gulf, which also reinforces the daily afternoon sea breeze (Orni and Efrat 1971). The topographic position of the Arabah as a deep Rift-Valley depression in between mountainous and hilly areas on both sides causes an alteration of the regional wind direction. Usually the winds in the Arabah blow rather constantly from north to south, except when a barometric low passes north of Eilat and Aqaba, which can lead to a southern storm (Orni and Efrat 1971).

The mean annual rainfall ranges from 30 mm. in the south near the Red Sea to 50 mm. in the northern Arabah towards the Dead Sea. The mean annual temperature is 23° to 24° C. Absolute maximum temperatures in the summer can reach levels around 45° C. Average minimum and maximum temperatures for Sedom, Yotvata and Eilat (Table 1) show the average temperature range in each month of the year. The absolute maximum and minimum temperatures are not shown in this table.

The lowest temperatures at night in the winter may drop below zero, particularly in the more elevated central parts of the Arabah. Frost may occur during

nights with strong radiational cooling and temperature inversion. Normally, the temperature becomes lower with increasing elevation, but during the above conditions, the coldest air accumulates at ground level in stratified layers, while the air at higher elevation is warmer. Measurements during the period 1989–1996 showed that about 14 cases of frost may be expected per year at ground level in the coolest areas of the central Arabah. The coldest temperature measured here during the above period was -4.5° C. on 2nd January 1992, near Yahel. The northern and southern parts of the Arabah are practically frost-free (Gat *et al.* 1997).

Inter-annual rainfall variability usually increases as the climate becomes drier. Both aridity and drought pose problems for society in the region, in the past as well as at present (Bruins and Berliner 1998; Bruins 2000; Bruins *et al.* 2003). Rainfall amounts in the hyper-arid Wadi Arabah do not only vary considerably from year to year, but also from place to place. The so-called spottiness of rainfall is characteristic for the area (Sharon 1979). An evaluation of rainfall days in the southernmost part of the Arabah during 1964–1968 (Table 2) clearly shows the large differences between rainfall stations in Eilat (Israel), Aqaba and Yutum (Jordan). These three stations are close to each other. The distance between Eilat and Aqaba is only 6 km., while Yutum is located some 12 km. east of Aqaba.

Some depression systems in the winter season may lead to widespread precipitation over a large area. Then the rainfall differences between the stations are

**Table 1:** Average minimum and maximum temperatures for Sedom, Yotvata and Eilat (1989–1996).

	Sedom		Yotvata		Eilat	
	Average Minimum Temp. (C)	Average Minimum Temp. (C)	Average Minimum Temp. (C)	Average Minimum Temp. (C)	Average Minimum Temp. (C)	Average Minimum Temp. (C)
January	11.4	20.0	7.2	18.7	9.2	20.8
February	13.2	22.0	8.6	20.9	11.0	23.1
March	16.2	25.3	11.6	24.6	13.9	26.3
April	19.9	29.3	15.6	30.5	17.5	30.6
May	23.6	33.8	19.0	34.0	21.1	35.2
June	26.8	37.3	22.0	37.3	23.8	38.3
July	28.2	38.9	23.7	38.3	25.2	39.4
August	28.6	38.3	23.5	37.8	25.4	39.0
September	27.2	35.8	21.9	35.0	23.7	36.4
October	23.6	32.0	18.6	31.3	20.4	33.0
November	18.3	26.6	13.2	25.7	15.6	27.4
December	13.2	21.5	9.1	20.5	10.7	22.0

Source: Gat *et al.* 1997.

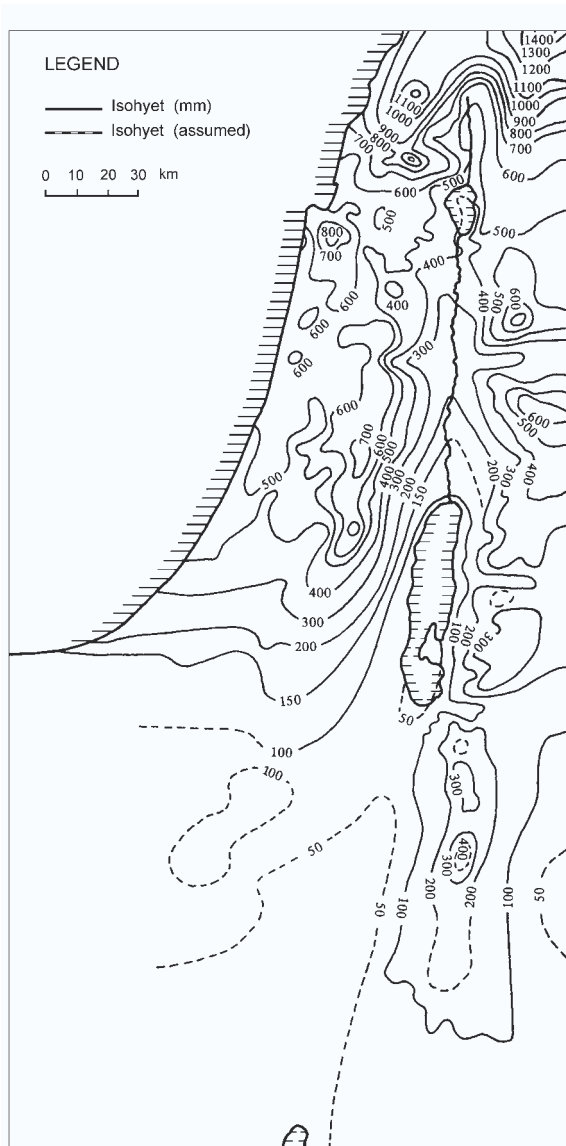


Figure 2.1: Average annual rainfall isohyets in the region (Orni and Efrat 1971: 145), showing the comparatively wet area in the northern Edom mountains, the most favourable climatic zone adjacent to the Wadi Arabah.

usually small, for example on 11th January 1965. On the other hand, convective rainfall of small aerial extent, depending on the width of the cumulonimbus clouds involved, may lead to localised rainfall in the Wadi Arabah. For example in the autumn of 1967, on 17th October, Eilat received 22.1 mm. rainfall, while nearby Aqaba remained dry. The opposite happened in the late spring of 1968, on 4th May, when Aqaba had 24.7 mm. rainfall, while Eilat remained dry (Table 2).

A study of 52 major floods in the Negev during 1965–1994 showed that such large rainfall events are generally not the result of local weather conditions but related to distinct large scale synoptic events (Kahana *et al.* 2002). The authors concluded that the most frequent cause of such major floods (38%) are Red Sea trough systems, defined as a surface trough extending

**Table 2:** Daily rainfall in the southern Arabah during the rainy seasons 1964/65, 1966/67, 1967/68. Only days are included during which the amount of rainfall was at least 3 mm. in one of the three stations.

Date	Eilat	Aqaba	Yutum
09-12-1964	2.2	6.6	0.4
10-12-1964	6.8	2.0	1.9
11-12-1964	1.7	4.7	11.5
13-12-1964	2.6	3.2	4.7
15-12-1964	7.3	1.6	0.0
10-01-1965	0.0	0.0	3.5
11-01-1965	9.2	8.0	14.7
12-01-1965	0.3	0.6	6.6
18-01-1965	13.5	18.4	19.1
26-03-1965	0.9	3.5	24.5
11-04-1965	0.9	1.8	4.8
09-11-1966	3.9	0.4	5.5
15-05-1967	4.8	0.0	0.0
17-10-1967	22.1	0.0	2.8
01-02-1968	2.9	6.1	10.2
27-03-1968	2.8	1.9	4.0
31-03-1968	0.0	0.0	3.0
25-04-1968	23.0	1.1	1.0
04-05-1968	0.0	24.7	3.2
24-05-1968	11.6	0.0	0.0
25-05-1968	0.0	3.0	

Source: Sharon 1979.

from East Africa through the Red Sea toward the eastern Mediterranean, accompanied by a prominent trough over eastern Egypt at a higher atmospheric level. The second most frequent cause for large floods (33%) is a Mediterranean depression that approaches Syria from the west, deepening considerably in its approach towards the Levant, accompanied by a distinct upper-level trough (Kahana *et al.* 2002).

Climatic changes and fluctuations have occurred in the region in the past, as indicated by the lake level changes of the Dead Sea (Klein 1982, 1986; Frumkin 1997; Klinger *et al.* 2003). The Late Pleistocene period of c. 70,000–20,000 BP was characterised by relatively high levels of Lake Lisan (Klinger *et al.* 2003), usually ranging between -200 to -300 m. below mean ocean level. Comparatively wetter conditions in the Late Pleistocene are also indicated by hydro-geological evidence and the stratigraphy and nature of loess deposits in the Negev (Issar and Bruins 1983; Bruins and Yaalon 1992). A low level of -380 m. around 17,000 BP (Begin *et al.* 1985) was apparently followed

by a dramatic rise to its highest level of -150 m. (Bowman and Gross 1992) and an even more extraordinary fall to complete desiccation around 11,000 BP. Thus the wettest and driest periods in the last 70,000 years seem to have occurred at the very end of the Pleistocene period. The extremely dry period around 11,000 BP seems to have coincided with the world-wide recorded cold spike of the Younger Dryas period. Severe erosion of the loess landscape in the north-western Negev, prior to the formation of the upper calcic paleosol (Bruins and Yaalon 1992), may also relate to this extraordinary dry period at the end of the Pleistocene.

Radiocarbon dating is essential to develop an independent chronology in archaeology, particularly for prehistoric periods, as well as the Bronze and Iron Ages. Moreover, radiocarbon dating enables time linkage across various disciplines (Bruins *et al.* 2001). Concerning the level of the Dead Sea during the Holocene, Frumkin (1997) distinguished 10 stages. The beginning of the Holocene (Stage 1, 10,000–5,800 BC) witnessed a rise in lake level to about -280 m. Although detailed Dead Sea level evidence for this long period is lacking, a relatively wet climate prevailed in the Early Holocene. Dry periods with lake levels below -403 m. and desiccation in the southern Dead Sea basin occurred during part of Late Neolithic–Chalcolithic times (Stage 2; c. 5,800–4,200 BC) and during the Early Bronze IV–Middle Bronze periods (Stage 4; c. 2,300–1,500 BC). The later Chalcolithic and most of the Early Bronze Age were accompanied by a distinctly wetter period (Stage 3; c. 4,200–2,300 BC), as the Dead Sea level may have reached values up to -280 m. Following the more arid climate at the end of the Early Bronze Age and during much of the Middle Bronze Age, the Late Bronze Age witnessed a moister period with lake levels rising to -393 m. or -363 m. (Stage 5; c. 1,500–1,200 BC).

The Iron Age and following periods were somewhat drier until about the end of Hellenistic times (Stage 6; c. 1,200–100 BC), as Dead Sea levels were in the range of -395 to -400 m. The southern basin of the Dead Sea apparently remained covered by shallow water during this long period (Frumkin 1997). A somewhat wetter period began during Late Hellenistic–Early Roman times and lasted into the Early Byzantine period. Relatively high Dead Sea levels occurred particularly in the first century BC (Klein 1982, 1986; Frumkin 1997), while Dead Sea levels fluctuated in the range of -368 to -400 m. during Stage 7 (c. 100 BC–AD 400). Part of the first and the beginning of the second centuries AD seem to have been drier with lake levels at -400 m. Much of the Byzantine and Early Islamic periods were accompanied by a rather dry climate (Stage 8; c. AD 400–900). The Dead Sea level was in the range of about -390 to -400 m., according to Klein (1982), but may have dropped as low as -436 m., as suggested by Neev

and Emery (1967) in relation to morphological features in the northern basin (Frumkin 1997).

A wetter period occurred during Stage 9 (c. AD 900–1300) with Dead Sea levels up to about -382 m. (Frumkin 1997). The last Stage 10 (c. AD 1300–1970) witnessed various fluctuations that can be reconstructed from historical evidence (Klein 1986) and morphological indications, as discussed by Frumkin (1997). Massive diversion of water by both Israel and Jordan in modern times has caused a sustained decline in the Dead Sea level, which is of course not related to climatic relationships.

Concerning the periods of settlement in the Negev highlands and the use of rainwater harvesting (runoff) agriculture (Evenari *et al.* 1982; Bruins 1986, 1990), Bruins (1994) came to the conclusion that climatic changes apparently did not have an overriding effect on the onset of settlement and runoff agriculture or their termination. Desert settlement in the Negev highlands in the Iron Age and the first use of rainwater harvesting agriculture at Horvat Haluqim (Bruins and van der Plicht 2004) did not occur in a particularly wet period, according to the palaeoclimatic signal of the Dead Sea (corresponding with Stage 6, Frumkin 1997).

In fact, the peak of desert settlement and runoff farming in the Negev highlands during the Byzantine period occurred in a comparatively dry climatic phase. The termination of urban settlement and runoff agriculture in the Early Islamic period, possibly around AD 750, may have been caused by increased aridity. However, the decline of the Umayyads and the rise of the Abbasids in AD 750, with the accompanying shift in economic and political influence from Damascus to Baghdad, seem to have been the dominant cause. In any case, the humid period that began c. 850 and lasted until about 1300, corresponding with Dead Sea level stage 9 of Frumkin (1997), did not lead to urban resettlement of the central Negev highlands. Evidently, political and economic factors appear to have been more important than climatic changes in past decision-making processes concerning desert settlement in the Negev since the Iron Age (Bruins 1994). Yet climate was and remains an important factor in many respects concerning the spatial distribution and location of settlements in arid zones.

## Geology

Fluvial and lacustrine sediments in the Wadi Arabah range from Miocene age (Hazeva Formation), Pliocene age (Arabah Formation) and Quaternary age (Sedom, Amora, Samra and Lisan Formations). Older rocks are exposed along and beyond the eastern and western borders of the Wadi Arabah. Precambrian igneous and metamorphic rocks appear west of the Wadi Arabah

**Table 3:** Correlation between geological formations in Israel and Jordan mentioned in the text.

Geological Period	Geological Formation in Israel	Geological Formation in Jordan	Significance
Upper Pleistocene	Lisan Formation	Lacustrine Deposits	Spring horizon
Lower Pleistocene	Samra Stage		
Pliocene	Aravah Conglomerate		
Miocene	Hazeva Formation	Dana Conglomerate	Spring horizon
Paleocene Maestrichtian	Taqiye Formation Ghareb Formation	Muwaqqar Chalk-Marl Formation	Spring horizon
Lower Cretaceous	Kurnub Group		Copper in Timna
Ordovician		Disi Sandstone Formation	
Cambrian	Netafim Formation	Massive Brownish Weathered Sandstone & Burj Dolomite-Shale Formation & Fine White Sandstone	Copper in Timna and Faynan
	Shehoret Formation		
	Timna Formation		
	Amudei Shelomo Formation		
Precambrian	Timna Granite	Faynan Granite	
Precambrian	Elat Conglomerate	Saramuj Conglomerate	

Sources: Bentor and Vroman 1957; Bender 1974; Wurzbürger 1979; Sneh *et al.* 1998.

only in the Timna and Eilat areas, but on the eastern side outcrops occur along most of the mountain ridge. Precambrian conglomerates of the Saramuj Formation (Bender 1974) occur south-east of the Dead Sea. These are epimetamorphic hard rocks composed of coarse clastic sediments of rounded igneous and metamorphic stones, welded together. These Precambrian deposits, overlying plutonic rocks, have only been observed in isolated exposures. They occur in Late Precambrian valleys, structurally low positions, where these epimetamorphic conglomerates were preserved from the extensive regional erosion prior to the deposition of the Cambrian sandstones (Bender 1974).

An almost straight peneplain can be observed on top of the Precambrian massif all along exposures in Sinai, southern Israel and Jordan. However, a distinctive undulation of the Precambrian basement occurs east of the Wadi Arabah in Jordan and also in Israel in the Timna area, where it has a maximum relief of 80 m. (Bentor 1966; Bender 1974). The peneplain, an ancient erosion surface, almost featureless over hundreds of kilometres, is visible at the contact between Precambrian basement rocks and sedimentary rocks. The latter clastic deposits, mainly so-called Nubian sandstones, overlie the peneplain with an angular unconformity. Nubian sandstones occur over a wide area from Ethiopia to Syria, ranging in age from Cambrian to Lower Cretaceous.

The Amudei Shelomo and Timna Formations occur in the southern Negev near Timna, as well as the Shehoret and Netafim Formations, all of Cambrian age (Sneh *et al.* 1998). These formations are mainly composed of Nubian sandstones, but also contain layers of

dolostone, limestone, mudstone and conglomerate. Sandstones of the Lower Cretaceous Kurnub Group form the westernmost ring in the Timna area, extending north along the Arabah margin as far as Yotvata. The copper-bearing layers in the Timna area (Table 3) occur in the Cambrian Timna and Shehoret Formations, as well as in the Lower Cretaceous Hatira Formation (Kurnub Group) (Rothenberg 1972; Wurzbürger 1979).

In Jordan, the oldest Lower Cambrian formation, the *basal conglomerate*, is found east of the central Wadi Arabah, overlying the Precambrian basement with an angular unconformity. The conglomerate consists of coarse granitic debris, arkose sandstones (having more than 25% feldspar besides quartz) with scattered quartz pebbles and gravels, chocolate-brown shales, and lenses of conglomerates composed of dense quartzporphyries and quartz. Sub-rounded blocks up to one metre in diameter occur in the lowest layer, but otherwise the conglomerates are well rounded and usually smaller than 20 cm. The maximum thickness of the basal conglomerate is about 50 m. in the area of Wadi Ghuweir-Seil el Ja'jar, decreasing northwards to zero at the Dead Sea and southwards to zero near Gharandal (Bender 1974).

The *bedded arkose sandstone* formation, also of Lower Cambrian age, overlies the basal conglomerate or the Precambrian basement, where the former is absent. This formation can be found from the Ram area in south Jordan along the eastern margin of the Wadi Arabah as far as the Dead Sea. The lowest layer is brown in colour and consists of bedded coarse arkose sandstones containing scattered quartz pebbles and beds with quartz and quartzporphyry pebbles. The

next layer is composed of medium to coarse sandstones, better sorted, light brown and light violet in colour, and also colour banding. The formation is 20 to 50 m. thick from south Jordan to the central Wadi Arabah, but increases in thickness to 200 m. from the Faynan area northwards to the Dead Sea (Bender 1974).

The *massive brownish weathered sandstone* formation, of continental origin, overlies the bedded arkose sandstone in south Jordan, being 250–350 m. thick. However, at the eastern side of the Wadi Arabah, the lower part of the massive brownish weathered sandstone is replaced by marine sediments going northwards, the white fine sandstone formation in the central Wadi Arabah, and the Burj dolomite-limestone-shale formation in the northern Arabah and Dead Sea area. The upper part of the massive brownish weathered sandstone can be traced continuously from the Wadi Ram area in south Jordan via Wadi Quseib (Gharandal) to Wadi Musa (Petra), Wadi Dana (Faynan) as far as the Dead Sea. However, the thickness decreases to only 40 m. south-east of the Lisan Peninsula, while the overlying 220 m. of this unit are white bedded sandstones (Bender 1974).

A transgression of the oldest Tethys Ocean during the uppermost Lower Cambrian to Middle Cambrian caused deposition of a tongue of marine calcareous-dolomitic-sandy sediments that reached from the north-west as far as the eastern side of the central Wadi Arabah, close to Petra. The marine *white fine sandstone* formation directly overlies the bedded arkose sandstone in the central Wadi Arabah. The white fine sandstone is well exposed in several locations between Gharandal in the south and the Wadi Mogatha, north-west of Petra. It has a thickness of 110 m. at the type locality near the 'Nabataean Mine' in the Wadi Abu Khushayba area. The formation grades laterally into the massive brownish weathered sandstone going eastwards and southwards, while its lower part interfingers with the Burj dolomite shale formation of Middle Cambrian age going northwards from Bir Madhkur (Wadi Mogatha). The upper part of the white fine sandstone can be traced to the Dead Sea area.

Widespread copper mineralisation is developed in the lower third of the white fine sandstone (Table 3), which decreases or is absent in the middle third of this formation. Silty argillaceous fine sandstone is dominant here, together with scattered gypsum and rock salt. The copper mineralisation reappears in the upper third of the white fine sandstone.

The *Burj Dolomite-Shale* formation directly overlies the bedded arkose sandstone in the northern Wadi Arabah, north of Bir Madhkur near Petra. This formation becomes gradually thicker going northwards. The dolomite contains copper (Table 3) and manganese in the Wadi Faynan–Wadi Dana area.

Copper mineralisation in Jordan east of the Wadi Arabah is observed in Precambrian basic dikes, in the Lower Cambrian basal conglomerate, in the white fine sandstone and dolomite (Table 3) of late Lower to early Middle Cambrian age, and in sandstones directly above the dolomite (Bender 1974). Small nodules are the dominant form of copper mineralisation, also in the Timna area in Israel, while malachite is the prevailing copper mineral (Rothenberg 1972, 1988, 1999; Bender 1974; Wurzbürger 1979; Witten *et al.* 2000; Levy *et al.* 2004).

Massive whitish weathered Ordovician sandstones (Disi Sandstone Formation), up to 300 m. thick, overlie the Cambrian massive brownish weathered sandstone south of the escarpment of Ras an-Naqb in the Ram-Qa Disa area. Nubian sandstones of Lower Cretaceous age overlie with a slight angular unconformity the Cambrian brownish weathered sandstones east of the Dead Sea and the Wadi Arabah. Sandstones of the same age are found west of the Wadi Arabah only in the Timna area and northwards as far as Yotvata, i.e. the Kurnub Formation (Bender 1974; Sneh *et al.* 1998).

Following the long interval of predominantly sandstone deposition (Cambrian to Lower Cretaceous), another epoch began dominated by the deposition of calcareous rocks (limestone, dolomite, chalk, marl), which lasted from the Middle Cretaceous to the Middle Eocene (Bentor 1966; Bender 1974; Freund 1977). Most of the area west of the Wadi Arabah in Israel is covered by these marine rocks, which also overlie the Nubian sandstones east of the Wadi Arabah in Jordan, going further eastwards. A gradual uplift of the Levant began at the end of the Middle Eocene in relation to major tectonic movements in the region at large, which led to the break-up of the African-Arabian plate and the formation of the Wadi Arabah. Subsequently, clastic sediments of Miocene, Pliocene and Quaternary age, mainly fluvial and lacustrine in origin, were deposited in the Wadi Arabah.

A lake existed in Early Pleistocene times, some 20 km. west of the highest part of the Wadi Arabah, along Nahal Zihor (Ginat *et al.* 2003). Here lake sediments appear in a tectonic valley, which developed after the deposition of the Pliocene Arabah Formation, mentioned above. The lacustrine sediments are up to 15 m. thick, composed of limestone and clay layers. Red paleosols with calcic horizons in fluvial deposits underlie and interfinger with the lake deposits. It seems the lake existed for more than 100,000 years during the Early Pleistocene. Faunal remains and rich artefact assemblages, particularly hand axes, are similar to those of the 1.4 million years old 'Ubeidiya Formation in the Jordan Valley (Ginat *et al.* 2003). The findings suggest that the Arabah–Dead Sea–Jordan Valley was an important route of migration for hominids, possibly from Africa northwards. Annual

precipitation during the existence of Lake Zihor is estimated at 150 mm., about three times the current amount. However, high groundwater levels, indicated by palustrine limestone and calcareous cementation of the gravel near the lakeshore, may also have added water to the lake. The authors suggest that the groundwater may have risen from a deep aquifer along the Zihor fault (Ginat *et al.* 2003).

### Tectonics and earthquakes

The Wadi Arabah is part of an extended linear depression that runs from the Red Sea to southern Turkey. The term *rift valley*, commonly used, is not correct from a modern geological perspective, despite clear vertical motions, downward in the valley and upward along both the western and eastern side. The Wadi Arabah is in fact part of a *continental transform plate boundary*, also known as the Levantine or Dead Sea fault. The entire transform has a length of 1,000 km., connecting the widening centre of the Red Sea, due to plate divergence, with the Taurus–Zagros mountain zone of plate convergence in southern Turkey and western Iran. The transform originated as a result of the continental break-up during the Cenozoic (Tertiary), which led to the separation of the Arabian plate from the main African plate. The Wadi Arabah constitutes the boundary between part of the Arabian plate to the east and part of the Sinai subplate to the west. The latter is an appendage of the African plate (Freund 1965; Garfunkel 1997; Niemi *et al.* 1997).

Significant left-lateral strike-slip movement has occurred along this transform, as the Arabian plate moved about 105 km. northward in comparison to the Sinai subplate. This movement began after the Eocene and is still continuing. Restoring this displacement on a map, i.e. moving the area east of the transform 105 km. southward, leads to an excellent alignment of older geological features on both sides of the Wadi Arabah (Quennel 1958; Freund *et al.* 1970; Bartov 1974; Bandel and Khouri 1981).

For example, the distance between the famous copper ore sites in the Wadi Arabah – Faynan in Jordan (Bender 1974; Hauptmann and Weisgerber 1992; Witten *et al.* 2000; Levy *et al.* 2004) and Timna in Israel (Rothenberg 1972, 1988, 1999; Wurzburg 1979) – is about 105 km. Both areas have the same geological (Table 3) and geographic origin, as they were situated next to each other before the continental break-up and subsequent post-Eocene strike-slip movement along the transform. The Faynan area became the largest copper-production centre in the Near East (Hauptmann and Weisgerber 1992; Levy *et al.* 2004). Its location is more advantageous in terms of climate, fuelwood and geography in comparison to Timna, thanks to the tectonic movement northward by c. 105 km. with respect to the latter site.

The Timna and Faynan granites are likewise of similar composition.

The central part of the Wadi Arabah was still sufficiently high in Pliocene and perhaps even in Early Pleistocene times to enable an ancient river to cross the transform from the Edom region in the east into the Negev in the west (Garfunkel and Horowitz 1966; Ginat *et al.* 1998). Deposits from this palaeo-river form part of the Arabah conglomerate, which overlie older Neogene deposits (Hazeva Formation) unconformably. The existence of ‘exotic’ gravels in the Arabah conglomerate can only be explained by supply from at least two rivers coming from the Edom region and crossing the central Wadi Arabah: the ‘Ya’alon’ tributary in the south and the ‘Edom’ tributary more to the north. Wadi Musa or Wadi Huwar were the most probable sources of the Edom river that flowed into the Negev. The range of tectonic displacement since the deposition of the Edom sediments may range, according to field observations and study of LANDSAT 5 images, from a minimum of 15 km. to a maximum of 30 km. (Ginat *et al.* 1998).

Luminescence dating in the Wadi Arabah by Porat *et al.* (1996) indicates that four large earthquakes occurred in the area during the Late Pleistocene between 37,000 and 14,000 years ago. The Wadi Arabah strike-slip fault, situated between the Gulf of Aqaba and the E–W trending Khunayzira (Amatziyahu) fault south of the Dead Sea, cut across several generations of alluvial fans in the Wadi Dahal area, following the regression of the Late Pleistocene Lake Lisan (Niemi *et al.* 2001). Geomorphic and stratigraphic evidence of active faulting yielded slip-rate data for the northern segment of the Wadi Arabah fault. Detailed geologic and topographic mapping indicate an average slip rate of  $4.7 \pm 1.3$  mm./yr during the last 15,000 years, based on three separate displacements and age estimates. Five separate offsets of 3 m. were measured, which correspond to a Mw 7 earthquake that ruptures about 49 km. of fault length. Indeed, the 1995 Nuweiba earthquake had such a magnitude. Calculating the maximum earthquake recurrence of this fault segment, based on an average slip rate of  $4.7 \pm 1.3$  mm./yr and a 3 m. slip-per-event, suggests an average time interval of 500 to 885 years (Niemi *et al.* 2001).

Research on earthquake deformations in Holocene sediments along the Dead Sea suggests a recurrence interval of about 600 years for earthquakes larger than magnitude 5.5. The youngest deformed sedimentary layer is related to the 1927 Jericho earthquake, which had a magnitude of  $M_L$  6.2 (Enzel *et al.* 2000). Studies of mixed layer seismites in lacustrine or near-shore environments in the Wadi Ze’elim area close to the current Dead Sea level revealed six seismite layers. Radiocarbon dates from 16 distinct stratigraphic layers enabled detailed dating, enabling good to reasonable correlation

with the historic earthquakes of 64 BC, 31 BC, AD 1212, AD 1293, AD 1834, AD 1927 (Ken-Tor *et al.* 2001). Nearby investigations in higher levels of the exposed Wadi Ze'elim delta revealed another kind of seismites – load structure seismites (Bowman *et al.* 2001). The presence of organic matter also enabled radiocarbon dating in this section. Thus independent chrono-stratigraphic  $^{14}\text{C}$  correlation could be established for the first time between load structure and mixed layer seismites. The historical 31 BC earthquake, mentioned by Josephus (*Antiquities* XV.5.121–147), seems to have caused deformation in both types of seismites (Ken-Tor *et al.* 2001; Bowman *et al.* 2001). This earthquake reportedly caused great damage and the death of 30,000 people in Masada, Qumran, Jericho and Jerusalem, and may also have been felt along the Wadi Arabah.

A major earthquake in the region occurred early in the morning of 22nd November 1995, with its epicentre south of the Wadi Arabah in the Red Sea, near Nuweiba. It was the largest earthquake along the Levantine fault in at least a century. The earthquake with a local magnitude  $M_L$  of 6.2 and a moment magnitude  $M_W$  of 7.2 was felt over a wide area, from Sudan in the south to Syria in the north (Klinger *et al.* 1999; Al-Tarazi 2000; Hofstetter 2003). The main quake and the many aftershocks indicate three strike-slip rupture stages, involving three different segments of the Levantine fault in the Gulf of Aqaba (Klinger *et al.* 1999).

Concerning the impact of this earthquake, about 11 people were killed and 47 injured in the region. Earthquakes rarely kill directly, but collapsing buildings do! Four people died in Nuweiba in the collapse of a three-storey hotel. Four hotels in Nuweiba and one hotel near Mount Sinai suffered structural damage. One week after the earthquake a questionnaire survey was conducted in the main cities of Jordan, with the emphasis on Aqaba, where 500 questionnaires were distributed (Al-Tarazi 2000). The aim of the survey was to assess the damage to buildings in Aqaba in relation to the modified Mercalli intensity (MMI) scale. The maximum intensity values in Aqaba amounted to VIII on the MMI scale, which were all observed in buildings along the shoreline founded on sand and gravel. Peak ground acceleration (PGA) at the Aqaba Hotel station on the beach was almost three times larger than the value recorded at the Civil Defence station located on a hilly area. Some hotels on the northern beach of Aqaba suffered serious structural damage, but did not collapse. Lower MMI values of VII and VI were observed in buildings founded on hard and soft rock. A similar picture emerged from Eilat. Therefore, it can be concluded that buildings founded on loose sand and gravel suffered most damage in the 1995 Nuweiba earthquake.

Impact damage of ancient earthquakes that affected the Wadi Arabah region is found in Petra. A large

earthquake occurred in AD 363 on 19th May, which affected large parts of the Levant (Russell 1980, 1985). In Petra a certain water pipe in the Siq was destroyed in the AD 363 earthquake and was not repaired. This part of the water supply system was abandoned following the quake (Bellwald *et al.* 2003). Large amounts of debris were found in the lower half of the Siq, probably related to the AD 363 earthquake. These extended heaps of debris were in a favourable geomorphic position, so that post-earthquake flash floods could not cause their erosion and removal. Though the above-mentioned water pipe was abandoned, post-earthquake reconstruction was carried out along the southern channel in the Petra Siq (Bellwald *et al.* 2003). During the Early Islamic era, a mid-seventh-century seismic event caused damage to the derelict church of Petra (Fiema *et al.* 2001).

For the period AD 1000–1500, five large historical earthquakes were recorded for the region between the Dead Sea and the Gulf of Aqaba (Ambraseys *et al.* 1994; Amiran *et al.* 1994; Ben Menahem 1991): AD 1068, 1202, 1212, 1293, and 1458. Two of these earthquakes – 1068 and 1212 – probably had their epicentres in the southern Wadi Arabah, as indicated by ground-rupture in the Evrona playa (Amit *et al.* 1999) and Aqaba area (Mansoor and Niemi 1999).

## Water resources

The high Edom mountain ridge east of the Wadi Arabah, rising to altitudes of 1500–1700 m., receives significantly more rainfall than the discontinuous and lower hills in the Negev to the west. Therefore, comparatively strong springs with good quality water exist on the eastern rim of the Arabah, whereas the springs on the western side are generally weak and brackish (Orni and Efrat 1971).

Precipitation in the eastern Negev hills ranges from nearly 100 mm. in the north to just 35 mm. in the south. In contrast, the northern part of the Edom mountain range, from Shawbak to Tafila, has a semi-arid Mediterranean climate, receiving about 300 mm. in normal years, 150 mm. in drought years, and 400–500 mm. in wet years (Salameh and Bannayan 1993). The Wadi Musa area near Petra has an average annual precipitation of 225 mm. (Bellwald *et al.* 2003), forming the drier southern part of the northern Edom mountains. Adjacent to the southern Wadi Arabah, which drains towards the Red Sea, rainfall in the Edom mountains drops from 200 mm. to some 40 mm. near Aqaba.

The comparatively weak springs on the western side of the Arabah are mainly situated in its northern part, from the springs south of the Dead Sea to the Nabataean caravanserai site of Moa in the central Arabah, the first station west from Petra along the famous spice road

**Table 4:** Springs in the north-western Wadi Arabah related to clayey and marly strata of Maestrichtian and Paleocene age.

Hebrew Name	Arabic Name	Israel Grid	Notes
Unnamed spring		1691/0255	Small spring north-east of 'Ein Tamid Dome.
'Ein Tamid	'Ein al-Ibveide	1690/0246	Spring east of 'Ein Tamid Dome.
'Ein Mashaq	'Ein Harrar	1678/0228	Spring south-east of 'Ein Tamid Dome, in a small wadi bed.
'Ein Shahaq	El Murei'a	1680/0150	Group of springs north-east of the Sheizaf Dome, in a broad bed of the Shahaq Valley, sustaining a large patch of green vegetation.
'Ein Rahel	'Ein Haruf	1665/0046	The largest of all springs in the north-western Arabah, situated west of the small 'Ein Rahel Dome.
'Ein Yahav	'Ein al-Weibe	1682/0032	Spring east of 'Ein Yahav Dome.
Unnamed springs, including Moa area	Khirbet Maiyat 'Awad	1654/9947	Various springs south and west of the 'Ein Yahav Dome, sustaining vegetation in large parts of the plain

Source: based on Bentor and Vroman (1957); and on Cohen (1982) concerning Moa.

**Table 5:** Springs in the north-western Wadi Arabah related to clayey strata of the Hazeva Formation of Miocene age.

Hebrew Name	Arabic Name	Israel Grid	Notes
Unnamed springs			A number of small springs west of the settlement of 'Ein Hazeva.
'Ein Hazeva	'Ein Husb	1735/0241	This spring appears on a small hill at the settlement of 'Ein Hazeva, either related to marl layers within the Hazeva Formation or to a fault.
Unnamed spring			Small spring in the bed of the Gidron (El Murei'a) Valley.
('Ein e-Zerib)	'Ein al-Zerib	1748/0099	Very small spring in the middle of the Wadi Arabah bed.

Source: largely based on Bentor and Vroman (1957).

towards the Mediterranean coast. Most of these springs are related to impervious clayey layers of different geological periods (Bentor and Vroman 1957, 1960). Clayey and marly beds of Maestrichtian (Ghareb Formation) and Paleocene (Taqiye Formation) age form the lowermost impervious layers. Seven springs or groups of springs are linked by Bentor and Vroman (1957) to these strata: 1) A small spring north-east of the 'Ein Tamid Dome; 2) 'Ein Tamid; 3) 'Ein Mashaq; 4) 'Ein Shahaq; 5) 'Ein Rahel; 6) 'Ein Yahav; 7) Unnamed springs south and west of the Ein Yahav Dome, including the Moa area.

The silt and clay beds of the Miocene Hazeva Formation form the next spring horizon, which is the poorest of the three geological strata related to springs.

An old *Ziziphus spina-christii* tree of large size grows near Hazeva, fed by a spring seeping through a north-south fault line. The outline of this linear spring is marked by halophytic vegetation along a belt 20-70 m. wide and 1,070 m. long (Danin 1983).

The geologically youngest and uppermost spring horizons are related to the boundary between the Hazeva sandstones and the overlying base of the Pleistocene Samra beds or the contact between clayey layers of the Samra Formation and the base layers of the Lisan Marls. Springs of the latter group ('Ein Hamarmar, 'Ein Admon, 'Ein Tamar and 'Ein Hakikar), situated west of the Sedom Playa, have considerable discharge (Bentor and Vroman 1957, 1960). The latter two springs arise along the Amatsiyahu Fault at an altitude of -350 m.

**Table 6:** Springs in the north-western Wadi Arabah related to Samra beds or Lisan Marls.

Hebrew Name	Arabic Name	Israel Grid	Notes
'Ein Hamarmar		1842/0509	The northernmost spring in the western Arabah, situated at an altitude of about -325 m.
'Ein Admon		1841/0480	Lowest spring, situated at a level of c. -375 m.
'Ein Tamar	'Ein al-'Arus	1835/0438	This spring along the Amatsiyahu Fault has large seasonal variations.
'Ein Hakikar	'Ein Beida	1843/0413	This spring along the Amatsiyahu Fault has a high discharge and a uniform flow throughout the year.
Unnamed springs			Large number of unnamed springs on both sides of the Amatsiyahu (El Quseib) Valley.
'Ein Amatsiyahu	'Ein al-Quseib	1760/0325	This spring rises near the base of the Lisan Marls.
'Ein Ofarim	Abu Ghuzeilat	1758/0312	This spring originates from the contact between porous oolitic limestone of the Samar Formation and an underlying layer of green clay, directly above sandstones of the Hazeva Formation.

Source: largely based on Bentor and Vroman (1957, 1960).

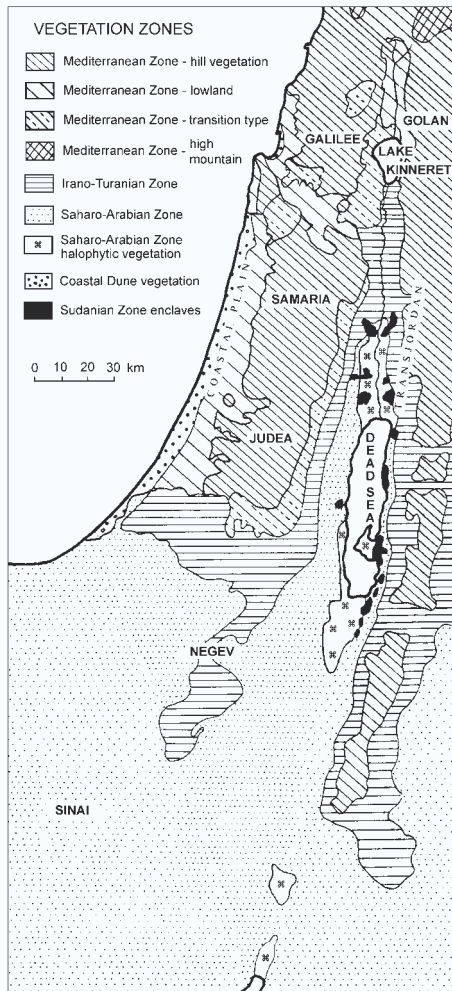


Figure 2.2: Main phytogeographic zones in the region (Orni and Efrat 1971: 164), showing the presence of Mediterranean vegetation on the northern Edom mountains, by far the most favourable area in environmental terms adjacent to the Wadi Arabah.

**Table 7:** Major wadis flowing from the northern Edom mountains into the Wadi Arabah.

	Average Annual Discharge Million Cubic Metres (MCM)
Wadi al-Hasa	34
Wadi Feifa	11
Wadi Khunayzir	4
Wadi al-Fidan	5.5
Wadi Buweirida	3

Source: Data from Salameh and Bannayan (1993).

The eastern side of the Arabah has springs of higher discharge and better quality water than on the western side, because the high Edom Mountains provide much more water than the ephemeral streams flowing from the Negev. Precipitation ranges from about 400 mm. at the highest parts of the mountains to 50 mm. in the Wadi Arabah. Potential evaporation ranges from 2800 mm./year to 3500 mm./year. Five major wadis that drain water from the Edom Mountains into the northern Wadi Arabah are Wadi al-Hasa (the biblical Zered brook), Wadi Feifa, Wadi Khunayzir, Wadi Fidan and Wadi Buweirida. Floodwaters make up only a partial contribution to the total discharge (Table 7), as the major part comes from groundwater base flow in these five wadis, sustaining a perennial flow. Also Wadi Musa near Petra is a perennial rivulet. The overall average annual discharge of all wadis from the Edom mountains into the northern Wadi Arabah, including Wadi al-Hasa, amounts to 60 million cubic metres (MCM).

**Table 8:** Water chemistry of Wadi al-Hasa and its main tributary Wadi Afra.

	Wadi al-Hasa Flood Flow	Wadi al-Hasa Base Flow	Wadi Afra Thermal Water
	20-03-1991	06-05-1991	06-05-1991
EC $\mu$ S/cm	301	1130	550
pH	8.4	7.4	7.0
NO <sub>3</sub> meq/liter	0.11	0.20	0.0
HCO <sub>3</sub> meq/liter	2.04	2.75	1.85
SO <sub>4</sub> meq/liter	0.48	1.44	1.36
Cl meq/liter	0.39	4.12	1.99
Ca meq/liter	1.60	3.00	2.32
Mg meq/liter	0.20	2.60	1.43
Na meq/liter	1.02	4.94	1.55
K meq/liter	0.09	0.36	0.06
PO <sub>4</sub> mg/liter	0.87	2.23	0.23
F mg/liter			0.25
Br mg/liter			0.76
I mg/liter			0.22
CO <sub>2</sub> mg/liter			90.00
H <sub>2</sub> S mg/liter			0.01
Fe mg/liter			0.65
Mn mg/liter			0.10
Rn nCi/liter			7.14

Source: Salameh and Bannayan (1993: 34); Curie (Ci) is a unit of radioactivity.

The catchments area of Wadi al-Hasa has a size of 2520 km.<sup>2</sup> and its average discharge amounts to 34 million cubic metres (MCM) of water per year (Table 7). Wadi al-Hasa is the main river in the Arabah region, having a permanent surface flow. Its water is used for irrigation agriculture on the Ghors of the north-easternmost part of the Wadi Arabah, just south of the Dead Sea. This is undoubtedly the best watered area in the entire region.

Most of the flow in the Wadi al-Hasa consists of groundwater discharges along its lower part. Only 2 MCM flows as flood water, having an excellent quality (Table 8). The salinity of the water increases in the lower part of the Wadi al-Hasa (Table 8), due to the discharge of thermal, partly mineralised water (Salameh and Bannayan 1993). Thermal springs issue from sandstone formations in Wadi al-Hasa and Wadi Afra, a tributary of the former. These springs are considered excellent for therapeutic uses, containing heat, radon gas and carbon dioxide (Salameh and Bannayan 1993).

The southern Wadi Arabah catchment is much more arid. Precipitation ranges from about 200 mm. in the northern mountains to 40 mm. in the southern Wadi Arabah. The potential evaporation rates range from

3300 mm./year in the north to 4100 mm./year in the south. The total annual water discharge from wadis that drain the southern Edom mountains into the southern Wadi Arabah is estimated at 2.5 MCM. The largest flow is derived from Wadi Yutum, which has a catchment area of 4,440 km.<sup>2</sup>. This wadi flows into the southernmost part of the Wadi Arabah near Aqaba. Its average annual discharge, only composed of floodwaters, is 1.5 MCM (Salameh and Bannayan 1993).

### Soils, vegetation and land-use

The soils of the Wadi Arabah are described by Dan (1981). Saline Solonchak soils related to high brackish groundwater levels are common south of the Dead Sea as far as the Amatsiyahu Fault, as well as in parts of the Yotvata and Eilat areas. Desert lithosols, reg soils and coarse desert alluvium are the dominant soil types in the Wadi Arabah (Dan *et al.* 1975; Dan 1981). There is a clear relationship between geomorphic unit, soil type, hydrology and vegetation. Danin (1983) distinguishes 10 different landscape-vegetation units:

1. Well-developed reg soils with desert pavement of dark chert in the northern and

- southern Wadi Arabah show an *Anabasis articulata* – *Acacia tortilis* vegetation sequence.
2. Well-developed regs at higher elevations of the central Wadi Arabah feature an *Anabasis articulata* – *Acacia raddiana* vegetation sequence.
  3. Flood plains of wadis that drain the neighbouring districts show a *Hammada salicornia* – *Acacia raddiana* vegetation sequence.
  4. Senonian chalk outcrops and alluvial fans composed of chalk-derived material enable a *Zygophyllum dumosum* – *Anabasis articulata* – *Reaumuria hirtella* sequence.
  5. Lisan Marl badlands in the northern Wadi Arabah show a *Salsola cyclophylla* – *Salsola baryosma* – *Salsola tetrandra* vegetation sequence.
  6. The slopes of sandy hills are characterised by *Hammada salicornia* – *Calligonum comosum* sequence.
  7. Sandy plains with diffused vegetation in large areas are dominated by a *Haloxylon persicum* sequence.
  8. Areas with springs of fresh or brackish water and surrounding saline soils feature a *Phoenix dactylifera* (date palm) – *Juncus arabicus* sequence.
  9. Salt marshes are covered by halophytic vegetation dominated by *Nitraria retusa*, *Suaeda monoica*, *Alhagi maurorum* and *Desmostachya bipinnata*.
  10. The vegetation along the channel of the Wadi Arabah is characterised by *Tamarix nilotica* and *Tamarix aphylla*.

The large catchment area of the Wadi Arabah, particularly the Edom Mountains, provides substantial amounts of subsurface water, reflected by dense *Acacia* stands. The small wadis are dominated by *Acacia tortilis*, while *Acacia raddiana* trees prevail in large wadis. An interesting phenomenon is the appearance of large *Acacia tortilis* trees in the Hazeva and Yotvata areas. The trees apparently germinated under the meagre water regime of a small wadi, but when their roots reached underground water they grew to large size under more favourable conditions.

The hyper-arid climate of the Wadi Arabah is not suited for rainfed agriculture, but only for extensive livestock rearing, particularly camels and goats. The Azazmah bedouin in the northern central Negev

highlands used to go with their herds to the Wadi Arabah in the winter season. Some of the bedouin in the Edom mountains used a similar type of 'transhumance', which is in fact a rational use of scarce grazing resources in harsh desert regions.

Rainwater harvesting (runoff) agriculture is extensively found in the northern Negev highlands (Evenari *et al.* 1982; Bruins 1986; Bruins and van der Plicht 2004) and also in parts of the Edom mountains (Huotari 2002; Lavento *et al.*, in press). However, the Wadi Arabah is generally too dry for these systems. The hyper-arid Uvda region in the southern Negev is exceptional as an area used for runoff agriculture since perhaps the Late Neolithic (Avner 1998). Geoarchaeological investigations of soils in the Uvda area will be published in the near future (Bruins, Jongmans, Avner and Porat, in preparation).

Some remnants of ancient irrigation agriculture exist in areas with springs, such as in a partially terraced wadi near Moa (Bruins, Jongmans and Erickson-Gini, in preparation), the first caravanserai on the western margin of the Wadi Arabah, on the famous spice route from Petra to the Mediterranean shore near Gaza. Excavations in a terraced field revealed most interesting soil changes, as the buried agricultural soil from the past had a darker colour, because of former additions of organic material to enhance soil fertility. The present surface soil is very saline, as desertification in the area, perhaps related to rising brackish groundwater, resulted in solonchak formation. On the other hand, the buried agricultural soil of Nabataean age, according to the ceramic inclusions, has an excellent structure that has survived until today. The Nabataean sherds found in the buried soil range in age from approximately the middle and second half of the first century AD to the first quarter of the second century AD.

It is rather striking that studies of ancient agricultural landscape systems by the Finnish Jabal Haroun Project near Petra, across the Wadi Arabah from Moa, based on runoff collection, also show Nabataean pottery from approximately the same period, i.e. AD 20 to the beginning of the second century AD (Huotari 2002; Lavento *et al.*, in press). Such an agreement in the dating of these Nabataean agricultural sites on both sides of the central Wadi Arabah cannot be a mere coincidence. Results of the Moa geoarchaeological excavation and discussion of the period of apparent agricultural activity will be presented in detail (Bruins, Jongmans and Erickson-Gini, in preparation).

A special irrigation system, the chain of wells, also known by the name qanat or foggara, was discovered at several sites in the Wadi Arabah. The relationship between large *Acacia* trees and high groundwater tables with comparatively good quality water was apparently well understood in ancient times (Danin

1983). The chain of wells system near Yotvata (Evenari *et al.* 1982) consists of one or more 'mother wells' 15–20 m. deep that were dug to the water table, indicated by *Acacia* trees. Next, a series of shafts were dug in a more or less straight line at regular intervals of 15–25 m., having a diameter of 4–6 m., in order to construct a subterranean water channel. The latter underground aqueduct conveyed the water to the surface, enabling irrigation agriculture.

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## The archaeological surveys in the Arabah reconsidered: data and metadata

*Moti Haiman*

The Israeli side of the Wadi Arabah was surveyed as part of the many surveys conducted in the Negev since the beginning of modern research, over 130 years ago. Among the surveys conducted since the 1950s are Glueck's (1955a; 1955b) and Rothenberg's extensive surveys in the Negev and Sinai, and the latter's intensive survey at Timna (Rothenberg 1967). Significant progress in the survey of the area was made during the Negev Emergency Survey (NES), conducted by Rudolph Cohen from 1979 to 1990, the purpose of which was to document the areas of the Negev to which the Israeli Army was to redeploy following the peace treaty with Egypt. Ten teams worked on the project, and systematically surveyed about 5,000 sq. km. of the area. More than 12,000 archaeological sites were recorded, compared with 1,000 known until that time. The Emergency Survey employed standard units of 100 sq. km. known as 'Survey Maps', a method developed by the Survey of Israel, first implemented in the Negev by Cohen in the survey of the Sede Boqer area during the 1970s (Cohen 1981; 1985). Some areas of the Arabah were surveyed by Nahlieli and Israel (1988). Exceptionally, U. Avner surveyed geographical units, such as Biqat Uvdah, instead of square 'maps' (Avner 1990).

Over 13,000 sites are known today in the Negev, 1,500 of them in the Arabah. It is obvious that in order to initiate a research programme on a considerable scale, it is vital to create a Geographic Information System (GIS) layer and a database from a large number of surveys conducted on both sides of the present-day border.

### Creating a GIS layer

This paper will focus on one problem with regard to GIS: terminology. The attempt to create a homogenous list of sites from all the above surveys, as well as those carried out on the Jordanian side (Rast and Schaub 1974; Schaub and Rust 1984; Khouri 1988; MacDonald 1992), is a major challenge. The obstacle that terminology presents and the way to bypass it can be demonstrated from the author's experience in attempting to create an Early Bronze IV-period map of sites based on information gleaned from surveys in southern Jordan, the Negev and Sinai.

The main characteristic of desert archaeological sites, including the Arabah, is their excellent state of preservation. Morphology, therefore, is an important tool in defining a site, sometimes more so than pottery, which is very problematic in the desert in particular.

### 1. The issue of round platforms in some EB IV sites (Figure 3.1)

In the late 1960s Rothenberg presented a large complex in Wadi al-Fauqiya in western Sinai, which he dated to the Chalcolithic period (Rothenberg 1979: 118). The site was published on several occasions, in one of which Rothenberg mentioned shallow tumuli made of one course of stones, in close proximity to the site, different from other tumuli prevalent in the area. In the 1970s Beit-Arieh and Gophna presented a similar site near Ein al-Qudeirat in the eastern Sinai, but they dated it to the EB II period (Beit-Arieh and Gophna 1981: site 1210). In the 1980s during a survey this author conducted in the western Negev, partly overlapping Beit-Arieh and Gophna's survey, round platforms were found close to the Beit-Arieh-Gophna EB II site, along with EB IV pottery (Haiman in press: site 77/8). Around that time, in a lecture, E. Anati discussed 'altars' from Har Karkom, very similar to the round platforms mentioned above, which he dated to all the periods (Anati 1986: 164, fig. 167). An aerial photograph of the site clearly revealed a structure similar to the above-mentioned structures. My opinion is that both elements constitute one site; however they were published as two different sites (Anati 1986: 315, sites 426, 427). Also during the early 1980s, Cohen conducted excavations at the EB IV site of Nitzana. Due to the similarity of that site to Rothenberg's Chalcolithic site in Sinai, Cohen assumed that both sites date to the same period, the EB IV. Five round platforms found near the site were identified as silos (Cohen 1986: 89–90).

Putting together all the information, and focusing on that which is more morphological than chronological, it is obvious that all these sites and platforms, published as eight sites of different periods and variously interpreted, are actually a group of four Negev and Sinai EB IV sites.

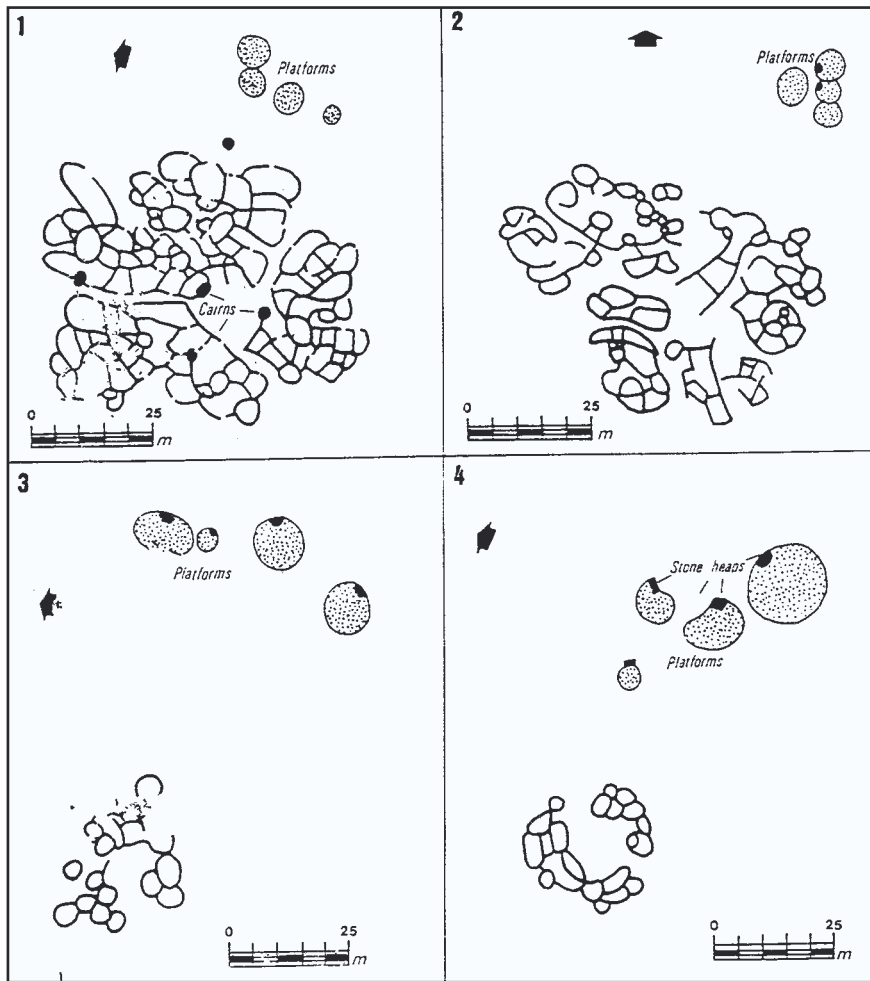


Figure 3.1: EB IV sites with round platforms: 1. The site of Nahal Nitzana (Cohen 1986: pl. 62); 2. The site of Wadi Fauqiya (Rothenberg 1979: 118); 3. The site of Har Karkom (Anati 1986: fig. 164); 4. The site of Ein al-Qudeirat (Haiman in press site 77/8).

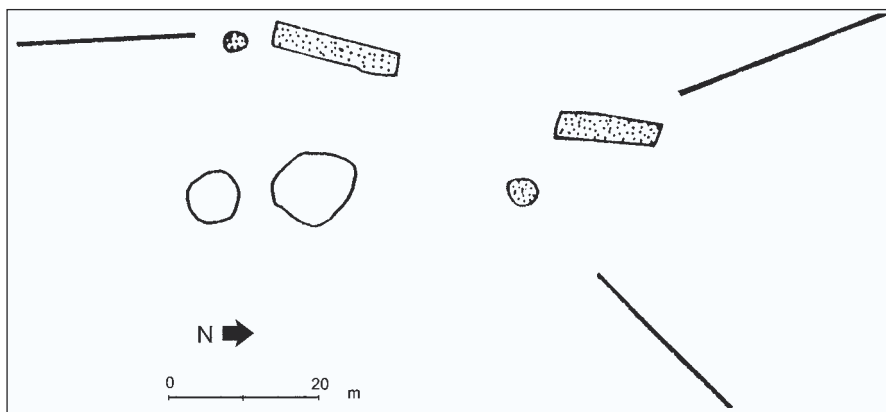


Figure 3.2: Rectangular platforms at an EB IV site (Haiman 1991: site 168).

## 2. The issue of rectangular platforms (Figure 3.2)

A number of rectangular platforms found in the vicinity of the EB IV sites were also dated to that period. The platforms measure about 20 m. long, 2 m. wide and 0.5 m. high and consist of a frame of large stones filled with earth and small stones. On some

occasions burial cairns were found on top of the platforms. The platforms were observed by many surveyors in the Negev, Sinai, and south of the Dead Sea (Woolley and Lawrence 1915: 141; Kochavi 1967: 152–67; Clamer and Saas 1977; Kloner 1980; Cohen 1981; 1985; Khouri 1988; Haiman 1991: 16\*–17\*; MacDonald 1992: site 141) (Figure 3.3). Some of the platforms in the Dead Sea area consist of a frame only,

with two shaft graves at the two ends of the rectangle (personal communication Thomas Schaub).

The surveyors' approaches to dating the platforms also demonstrates the preference for morphology over the usual approach of dating according to pottery. Almost all the surveyors noticed the proximity of the platforms to EB IV sites; however, most of them hesitated to date them to that period due to the lack of finds. Glueck discussed whether to date them to the EB IV because of their proximity to sites of that period, or to do so according to the pottery finds, if present. He preferred the second alternative, and consequently he dated them to all the periods (1955a: 11–14; 1955b: 9, 18–20).

The variety of terminology and chronology used to define the installations (Figure 3.3) can be confusing to the reader, who may not realise that all the terms relate to one feature. The Negev surveys demonstrated the close connection of the platforms to the EB IV sites. Since they are located on tops of hills, finding

them is easier than finding the site; they are almost like signs pointing to an EB IV site. The purpose of the platforms is still enigmatic; however, it was very useful to define the distribution area and the settlement pattern of the EB IV period in southern Jordan, the Negev and northern Sinai, and especially along the copper route from Faynan to Egypt (Haiman 1996: 13; Figure 3.4).

The examples above of the round and the rectangular platforms demonstrate the challenge inherent in attempting to combine data from various surveys and surveyors. Standardisation is vital in this attempt. Without it, the abundance of data results in a veritable Tower of Babel. The Israel Antiquities Authority has responded to the challenge, and is in the process of composing a thesaurus of survey findings, including about 200 common features, which can be useful in recent or future surveys. However, the problem remains of understanding the terminology of the older surveys.

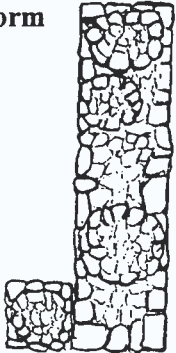

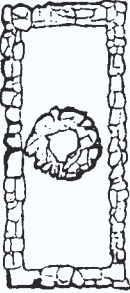
<p>CLAMER AND SASS <b>Rectangular Platform</b></p> 	<p>COHEN <b>Rectangular Structure</b></p> 	<p>WOOLEY AND LAWRENCE - <b>Rectangle and Ring</b></p> 
<p>MACDONALD <b>Structures</b></p> <p>?</p>	<p>KLONER <b>Rectangular Burial Structures - "Namus"</b></p> <p>?</p>	<p>KOCHAVI <b>Rectangle</b></p> <p>?</p>
<p>KHOURI <b>Platforms</b></p> <p>?</p>	<p>GLUECK <b>Burial Platform</b></p> <p>?</p>	<p>DEVER AND COHEN <b>Monumental Rectangular Building</b></p> <p>?</p>

Figure 3.3: Variety of interpretations of the rectangular platforms.

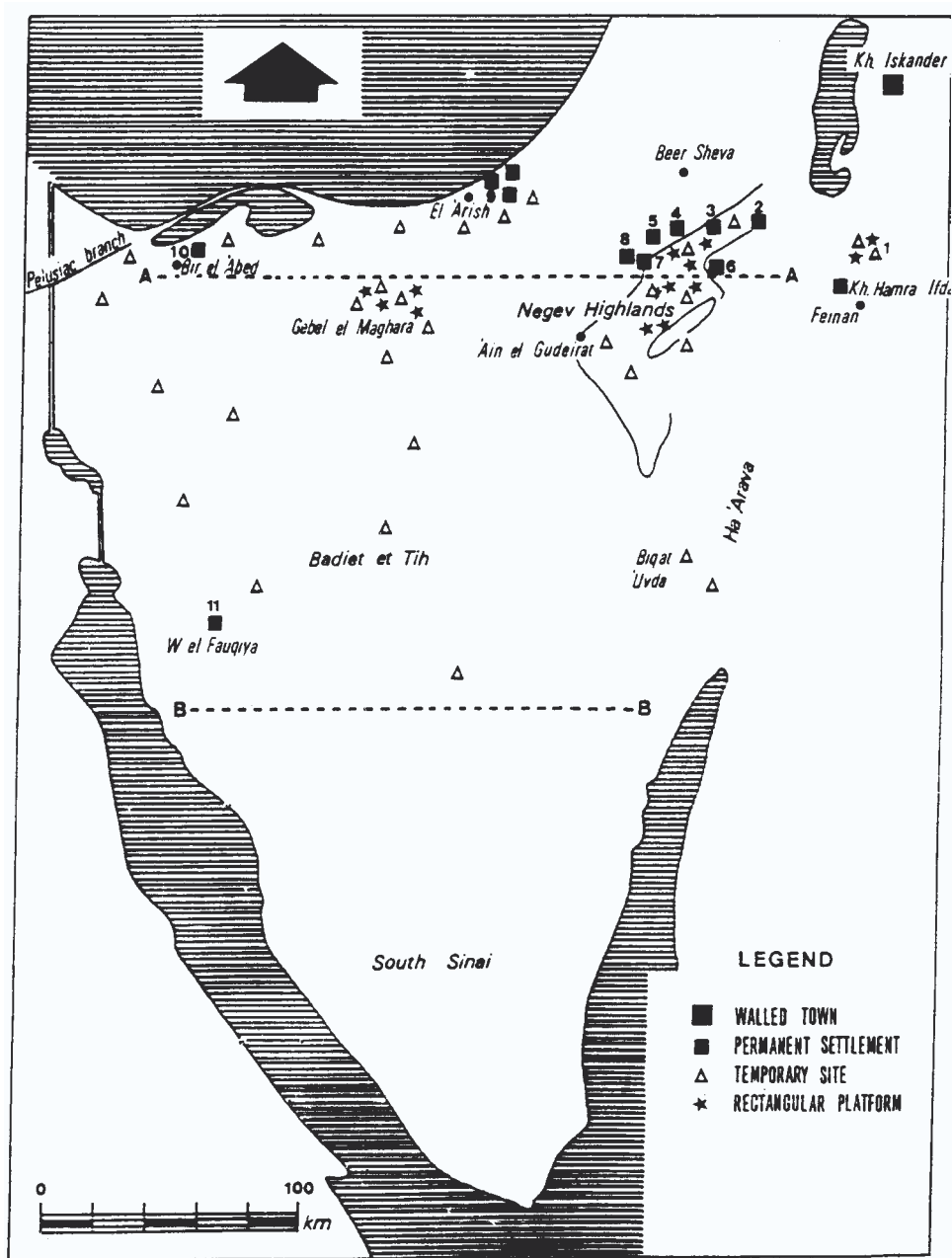


Figure 3.4: Map of the EB IV site distribution between the Dead Sea and Egypt. The stars represent rectangular platforms.

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## Settlement patterns in the Wadi Arabah and the adjacent desert areas: a view from the Eilat region

Uzi Avner

The desert environment is usually considered inhospitable, and archaeological remains are often modest and less impressive than in other regions. Accordingly, scholars have often marginalised desert cultures and their role in the history of the ancient Near East. The purpose of this article is to show that desert remains are often misconstrued, that they actually represent richer cultural complexes than have been commonly accepted, and the current view of desert history requires re-evaluation. The discussion focuses on the periods from Late Neolithic to the end of Early Bronze Age, i.e. the sixth–third millennia BC.<sup>1</sup>

### Environmental setting

The Negev, the Wadi Arabah and Sinai are characterised by an arid to hyper-arid climate. Environmental conditions vary between regions, but generally aridity increases as one travels south or lower in altitude.<sup>2</sup> In the Negev Highlands, approximately 500–1020 m. above sea level, summer mid-day temperatures usually reach 30–35°C, the average annual precipitation is 80–100 mm. and the annual average potential evaporation is approximately 2600 mm. Despite the negative water balance, the terrain and climate of the Negev Highlands enables growth of Irano-Turanian vegetation, and even some Mediterranean species. Vegetation is not limited to wadi beds alone, but is often found on the slopes as well, especially the northern ones which are less affected by solar radiation (for the flora of the Negev and Sinai, see Danin 1979, 1983). In the past, the region sustained a fairly rich fauna, including herbivores, which played an important role in human subsistence, whether game or domesticated.<sup>3</sup>

In the southern Negev (from south of the Ramon Crater to Eilat), environmental conditions are much harsher. In the Eilat region, the annual average rainfall is only 28 mm., while the potential evaporation rate rises to 4000 mm. annually (for the climate of the Eilat region see Ashbel 1963, and updated evaporation measurements in Goldreich 1998: 138, 140). As a result, the vegetation is Saharo-Arabian, with fewer species adapted to these conditions, and with the rare exception of the eastern 'Uvda Valley, totally restricted to the wadi beds. This means a lower carrying capacity for animal and man and a rarity of perennial water sources. Conditions in eastern Sinai are quite similar to those of the Eilat region, with one distinction: several major wadis drain rainwater from large areas. Thus, they support a fairly rich vegetation, some water sources and even some oases. The neighbouring Edomite Mountains of southern Jordan enjoy a better water balance, up to 400 mm. of rain per year. The vegetation is much denser than that of the Negev and even includes oak-juniper forests.<sup>4</sup> The differences in ecological conditions of the various desert zones find clear expression in the archaeological remains.

In order to understand the implication of environmental conditions, some interpretation is required. Although the high summer temperature seems formidable, it is not a significant obstacle to living in the desert for several reasons. High heat prevails only three or four months a year (June to August or September), while comfortable daytime temperatures dominate the alternate months. More important than heat alone is heat stress, which combines temperature and humidity. In the desert, relative humidity is low (15–25% in southern Negev during hot hours, and even lower in inland Sinai and in southern Jordan), perspiration evaporates well and the body's cooling mechanism is efficient (for human physiology under heat see Zohar 1977b,c; Shapira and Sheinfeld

<sup>1</sup> All dates mentioned here are based on calibrated 14C dates, following OxCal 3.4 (Ramsey 2000), including quoted dates which were previously published otherwise.

<sup>2</sup> For various definitions of desert see Evenari *et al.* 1971: 8–10, 29–37; Nir 1977; Zohar 1977a. For the Negev Highlands climate see Evenari *et al.* 1971: 29–39; Sharon 1977; Zohar 1977a; Katsnelson 1979; Goldreich 1998.

<sup>3</sup> Until the early twentieth century AD the fauna of these regions was much richer than today. The severe reduction in wildlife and extinction of species occurred during and after World War I, when guns became common among the bedouin population. For the faunal situation before the war

see Qumsiyeh 1996; Shalmon 1998; Paz 2002. Still during the 1930s, Jarvis (1941: 187–214) described a fairly rich wildlife in Sinai; he even issued orders prohibiting the hunting of several species.

<sup>4</sup> For the climate and flora of Sinai see Danin 1983; Jaffe 1987; Ganor 1987. For southern Jordan see Feinbrun and Zohary 1955; Ravaq and Schmida 2000: 70–83; MacDonald 1988: 40–47; Henry 1995: 14–19, all with references.

1977a,b). When one is protected by shade and exposed to the dry wind, heat stress is significantly reduced even when the air temperature exceeds body temperature. Summer temperatures of the Negev Highlands are only slightly higher than those of Jerusalem, but the humidity is lower. Summer temperatures of the southern Negev are only slightly higher than in the Bethshan-Dead Sea Basin, but humidity is much lower (Ganor 1987). Therefore, high temperatures alone would not prevent living in the desert, certainly not for those born there. In the southern Negev another mitigating factor is important, the constant dry northern wind, which increases perspiration and further reduces heat stress. Heat, however, increases the need for drinking water, which is not always obtainable in the desert. This is the main reason why desert societies have adopted a life style that minimises physical activity and exposure to the sun during the hot hours of summer.

Typical for the desert are low winter temperatures, especially at night. Barometric highs prevail over the desert during most of the winter, with clear skies and almost no wind. In these conditions solar radiation absorbed by the earth during the day is quickly lost soon after sunset, temperatures drop drastically and quite often frost accumulates in the low areas. The cold demands no less serious consideration than the heat, and as a result, the consumption of combustible material is high. While in the fertile lands wood is readily available, in the desert it is limited and therefore constitutes an important factor in the assessment of carrying capacity.

The negative balance between precipitation and evaporation is indeed an obstacle to life in the desert. The lower the rainfall, the higher the fluctuation from year to year, or between clusters of years, and in general rain is very unpredictable. An average annual precipitation of 30 mm. means that there are years of 60 mm. and more, and years of no rain or minimal amounts that do not influence plants and animals. In addition, rains in the desert are usually concentrated in both space and time. On the one hand, that means that different areas may receive rain in different years, and on the other hand, concentrated rains create floods, which are highly important for the ecology of the desert. By virtue of the floods, the wadi beds support vegetation, which supports animals and people. Floods were essential for agriculture in the past, since outside the limited oases agriculture was possible only on the basis of flood regime (Evenari *et al.* 1971; Avner 1998, 2002a).

Another obstacle to life in the desert is the paucity of arable land. As long as desert societies subsisted on hunting and gathering, they followed the food resources, animal and plant, and their population was in balance with the environment. Once they adopted

agriculture and grazing, they were dependent on their skill to *produce* the food. Cultivation was possible only in wadi beds, where floods run, but where the soil is usually too stony. Therefore, cultivated soil had to be 'created' by means of terracing or other methods. This was possible only where the lithology, the topography and the flood regime permitted.

Present living conditions in the desert are not necessarily identical to those of the past. Obviously, knowledge of the ancient environment is crucial for understanding the ancient settlement pattern, given the fragile nature of the desert ecological system. Although numerous palaeoclimatic studies have been published during the last half-century, there is still debate on this question. However, accumulating data do support the view that during most of the time-span discussed here (sixth–third millennia BC) the climate was somewhat moister than at present. Nevertheless the area remained a real desert (see synthesis in Avner 1998, 2002b, with references).

### Scholars' view of the desert's settlement history

Scholars working in the desert have often expressed low esteem for the desert environment, population and archaeological remains. For example, the Wadi Arabah was described as cruel, mostly impassable and a 'no man's land' (Rothenberg 1971b: 211, 220). Desert habitations are described as having 'brief life span' (Beit-Arieh 1982: 155, 1986: 51) or 'short lived and a passing phenomenon' (Haiman 1986: 16, 1989b: 185). Desert sites 'could not have existed without the support of a strong stable political and economic body' (Beit-Arieh 1984b: 22), the desert in general 'could not sustain a local population for any length of time' (Haiman 1992b: 93), and the population was 'hungry, on the verge of death' (Haiman 1992c: 304).

The first attempt to construct an overall occupational history of the desert was made by N. Glueck (1935, 1961, 1968, 1970), who recorded about a thousand sites in the Negev (compiled by Baron, 1978, 1981). His basic outline was the distinction between periods of settlement and gaps. The first was characterised by permanent settlement and agriculture, whereas during the latter only a sparse bedouin population roamed the area, destroying existing cultural remains and leaving no traces of their own (Glueck 1935: 183; 1968: 11–12, 127; 1970: 11–12, 65). The periods of settlement he identified were the Chalcolithic (almost totally restricted to the Beersheba Basin), the Middle Bronze I, the Iron Age II, and the Hellenistic-Roman-Byzantine, with some continuation into the Umayyad period. The periods of gaps in settlement were the Early Bronze, Middle Bronze II and Late Bronze Ages, Iron Age I, the Persian period and the time span from the eighth century AD to the present (Table 1).

**Table 1:** Number of sites per period in the Negev Survey of N. Glueck (after Baron 1981).

B.C./A.D. Period	Number of Sites
+1100~ Early Islamic	(?)
+630 Byzantine	311
+330~ Nabat-Roman	236
0 Nabat-Hellen	141
300~ Persian	
586 Iron Age II	112
1000 Iron Age I	32
1200 Late Bronze	
1550 Middle Bronze	
2000 Early Bronze IV	115
2300 Early Bronze III	
2650 Early Bronze II	5
3000 Early Bronze I	
3600 Chalcolithic	43
4500 Late Neolithic	
6000 Early Neolithic	11
9000	

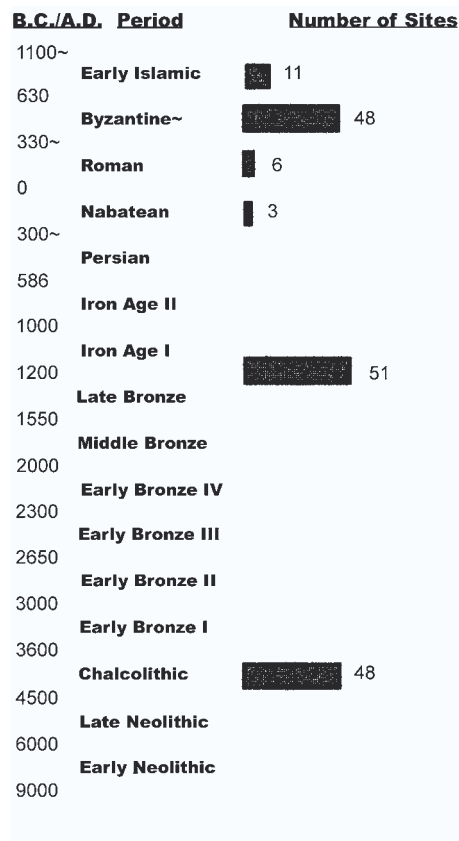
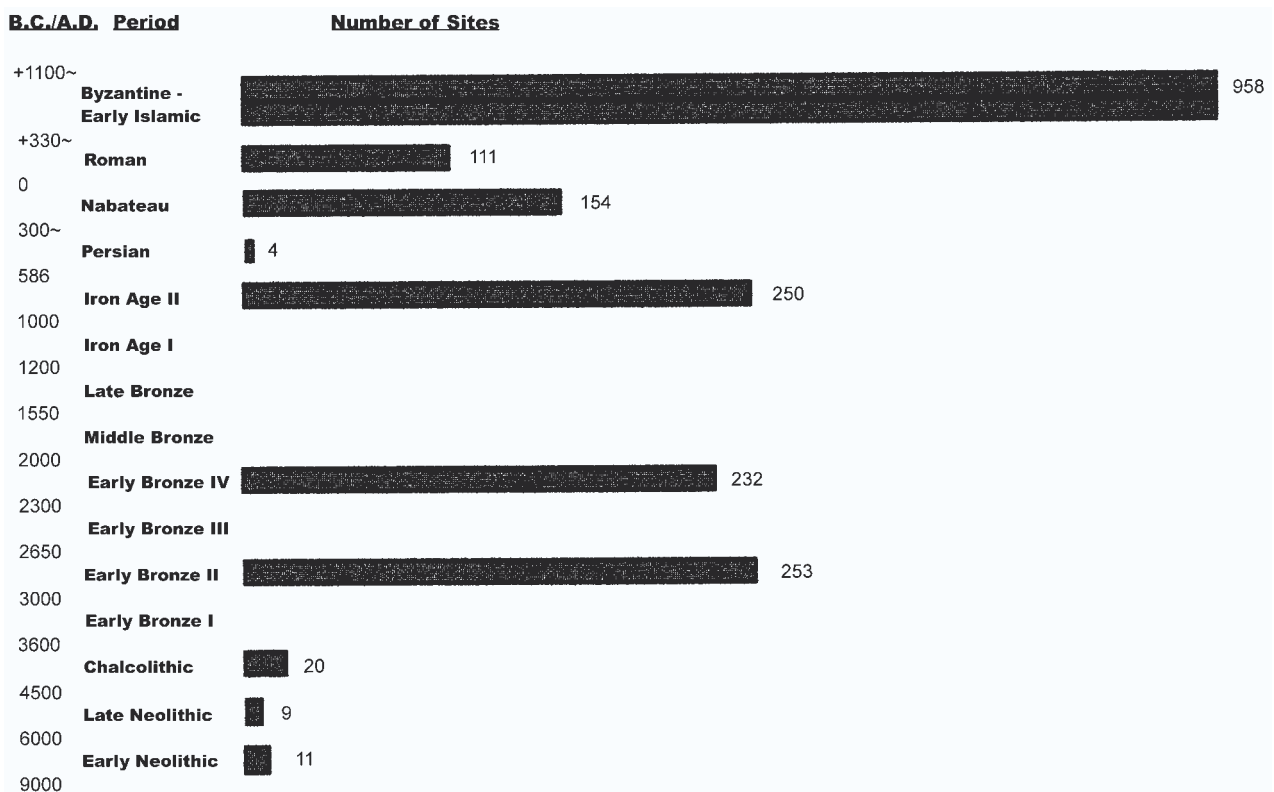
In numerous subsequent studies scholars adopted Glueck's 'up and down' pattern (e.g. Reifenberg 1955; Rothenberg 1967b; Evenari *et al.* 1971; Baron 1981). During the 1960s, Rothenberg conducted a survey along the southern Wadi Arabah and the Eilat area. He recorded 216 sites, including those discovered earlier by A. Musil, F. Frank and N. Glueck, while 41 additional sites were undated (Rothenberg 1967a, 1970: 7; Rothenberg and Cohen 1968). The periods of settlement he identified were the Chalcolithic, the Iron Age I (mainly related to copper production), the Nabataean, Roman, Byzantine and the Middle Ages, with gaps between them (Table 2). Generally, Rothenberg's pattern was similar to that of Glueck, but with four differences:

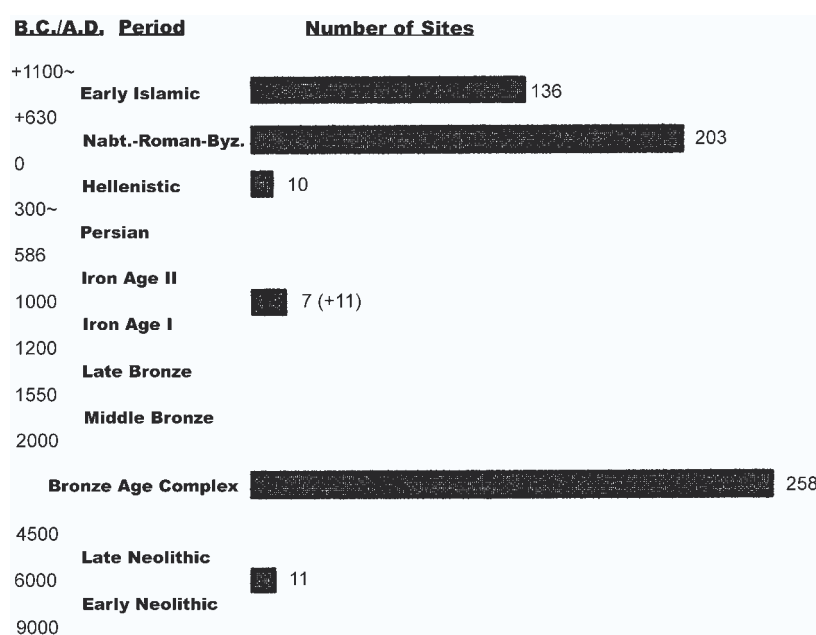
1. The Chalcolithic period, almost absent in Glueck's survey south of the Beersheba Basin, was a highly intensive settlement period in Rothenberg's survey;
2. From the MB I, one of the most intensive periods in Glueck's survey, Rothenberg found only one site (with two others questionable). Indeed, the same type of site was attributed by the two scholars to different periods;
3. The Iron Age I settlement (later found to begin in the LB II) was not identified by Glueck;

4. Rothenberg did not relate any site to the Early Islamic period, while Glueck described some continuity from the Byzantine to the Umayyad period. Rothenberg has published several corrections to his historical line (see below), but maintained that the southern Negev was uninhabited during most periods.

The Negev Emergency Survey, begun in 1979, opened a new chapter in Negev research. It was launched in preparation for the redeployment of the Israel Defence Forces from Sinai, and headed by Eitan (1979) and Cohen (1988). The survey primarily concentrated on the Negev Highlands, eventually covering only some 30% of the Negev area, but contributing some 13,000 previously unknown sites. About a hundred sites have been excavated. To date, nine maps have been published, covering 900 sq. km., some 12% of the Negev area (Avni 1992; Cohen 1985, 1986, 1988; Haiman 1986, 1991, 1993; Lender 1990; Rosen 1994). The ample new information basically confirmed Glueck's 'up and down' view, with one major difference. The EB II emerged as the most intensive settlement period in the desert, excluding the Byzantine–Early Islamic (Table 3).

Another survey was begun in 1982 by Anati in the Har Karkom area, where 821 sites were recorded in an area of 200 sq. km. (Anati 2001: 162). He termed the predominant period of settlement the 'Bronze Age Complex' (BAC), which includes the Chalcolithic and EB. Only a very few sites were identified as Neolithic,

**Table 2:** Number of sites per period in the Southern Negev Survey of B. Rothenberg (after Rothenberg 1967b).**Table 3:** Negev Highlands Emergency Survey. Compiled from: Avni 1992; Cohen 1981, 1985; Haiman 1986, 1991, 1993, 1999; Lender 1990; Rosen 1994.

**Table 4:** Number of sites per period in the Har Karkom Survey of E. Anati (after Anati 2001).

and no sites were dated to the second and first millennia BC (Table 4).<sup>5</sup>

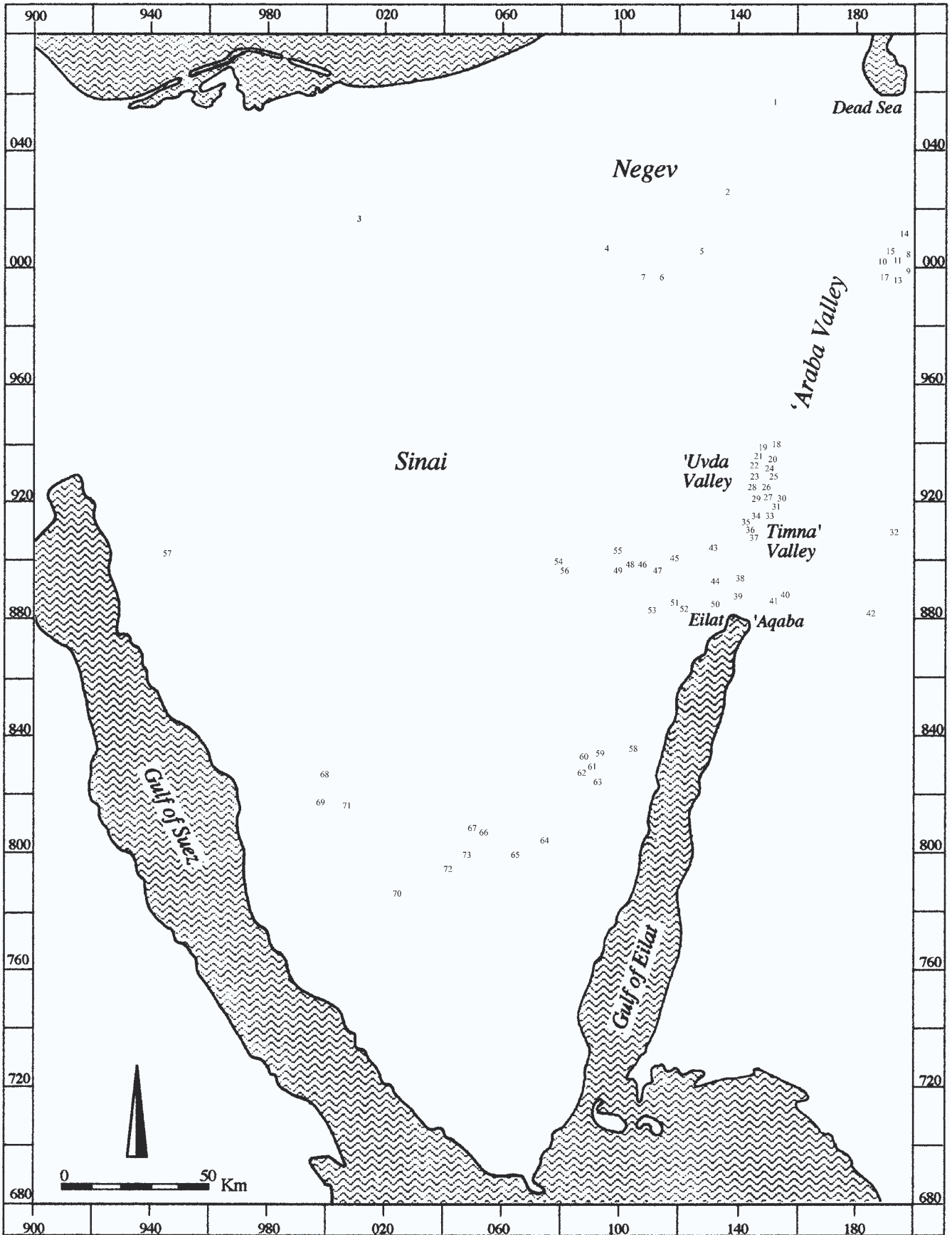
Despite differences in the survey results, most scholars agree that the desert was inhabited only in certain periods, and various explanations have been suggested for the 'up and down' phenomenon. The most popular, following Glueck, relates archaeological remains to the initiative of strong polities in the neighbouring fertile lands, or even to settlers from outside the desert (Glueck 1961, 1968, 1970; Rothenberg 1970: 21–22, etc.; Amiran *et al.* 1973; Beit-Arieh 1974, 1981b, 1983; Baron 1981; Cohen 1986: 433, 1988, 1999: 75–81; Haiman 1988, 1989a,b).

Rosen (1987; 1994: 22–24) presented the clear 'up and down' settlement pattern in the survey of the Ramon Crater, but pointed to four different factors that affected settlement history. In his analysis, the external influence was only one factor, along with climatic changes, the general developments in the Near East and internal developments. A more complex explanation for the desert's settlement history was offered by Finkelstein. Based on the concept that nomads always lived in the desert but usually did not leave any remains, he

suggested two different models. One is that the desert nomads prospered simultaneously with the prosperity in the fertile lands, combined with a political vacuum in the south. This situation enabled the desert tribes to take control of the Arabian trade and of copper production and trade, which contributed to their economy and political power. Their prosperity encouraged them to shift to sedentism, resulting in archaeological remains in the desert and causing them 'to become visible' (Finkelstein 1988; Finkelstein and Perevolotsky 1990). The other model has nomadic populations shifting to sedentism and leaving archaeological remains when the neighbouring fertile lands were in crisis. This crisis forced them to become farmers and produce the grain they usually acquired by trade with the settled populations (Finkelstein 1989; 1990). In another publication (1995) Finkelstein attempted to merge these theories.

Another common concept is that the desert populations were always migrants or intruders. Rothenberg (1969: 28–30, 1970: 15, 1971a: 62, 1973: 35) described a Chalcolithic invasion into the Arabah and Sinai from the north-eastern Fertile Crescent through southern Jordan, thus accounting for the ingenuity of the southern Sinai Chalcolithic civilisation. The EB II population of southern Sinai was assumed to have migrated from Arad (Amiran *et al.* 1973; Beit-Arieh 1974, 1981a,b, 1983), but also from Arabia (Beit-Arieh 1986: 52). Another theory moved the EB population in the opposite direction, from Sinai to Arad and to the Negev Highlands (Govrin 1990; Haiman 1992b: 102). Cohen (1999: 11–12) related the EB settlement remains to a population that arrived from the north or west, with a developed material culture and technology. The EB IV population migrated from Central Asia (e.g. Kenyon 1966: 14; Lapp 1966: 100–13; Kochavi 1967:

<sup>5</sup> The survey of the Har Karkom area is not yet published, but the principal results have appeared in many publications (e.g. Anati 1986, 1987, 1993, 2001); they mainly emphasise the identification of Har Karkom as Mount Sinai, and date the Exodus to the fourth–third millennia BC. The 'BAC' concept is briefly presented as a working hypothesis, although two pottery phases were identified (EB II and MB I), and three different peoples are assumed to have lived in the area (Anati 1986: 88–100). No discussion was published to support the 'BAC' concept and terminology.



\* Due to scale of map, not all sites are presented.

Figure 4.1: Map of the southern Levant desert, with 14C-dated sites\*. Site numbers refer to those in Table 5.

250–56; Mazar 1968: 68); Aharoni (1978: 80) described the MB I (=EB IV) population of the Negev as refugees from the north, while Cohen (1983) saw them as penetrating from Sinai.

The above theories, as we shall see, deserve serious criticism. One challenge comes from the southern Negev and the southern Wadi Arabah (south of the Ramon Crater and down to Eilat). In addition to the 216 sites surveyed by Rothenberg, my own surveys reveal a different settlement scenario.<sup>6</sup> To date, 1650 sites have been recorded in the southern Negev, and their numbers grow continuously. Surprisingly, the Eilat region (from the 'Uvda Valley to Eilat, see map in Figure 4.1) is the richest in archaeological sites in the southern Negev, despite being the most arid. Approximately 1500 sites have been recorded to date in an area of 1200 sq. km., of which only 7% have been subjected to a detailed archaeological survey (including the Timna Valley, by Rothenberg). The settlement pattern emerging from these surveys and excavations presents a continual occupational sequence covering the last 10,000 years, from PPNB to the present, with no gaps at all (e.g. Avner 1998, 2002a,b; Avner *et al.* 1994; Sebbane *et al.* 1993; Avner and Magness 1998). In this light, the question arises as to the reason for the differences in the settlement scenario that emerges from the various surveys. In my opinion, the key problem is the correct dating of sites in both surveys and excavations. This is especially crucial in the late prehistoric and early historic periods, i.e. the sixth–third millennia BC. Before entering into a discussion on the chronology of the sites, three points must be stressed concerning the nature of settlement in the desert:

1. In the areas under discussion, true nomadism was never practised. In contrast to full nomads, who relied on herding alone, the southern Levantine desert populations were basically semi-nomadic and subsisted on a complex economy. They sometimes altered their mode of life toward mobility or sedentism in response to political changes (Marx 1992, 1996; Khazanov and Bar-Yosef 1993: 461–62; cf. Helms 1982; Hanbury-Tenison 1989; Finkelstein 1995) or to climatic changes (see synthesis of palaeoclimate, with references in Avner 1998, 2002b, ch. 7). One of the preconditions for true nomadism, except

in rare cases, is a pack animal that can carry baggage hundreds of kilometres twice a year. In the Negev and Sinai deserts it could only be the camel (e.g. Khazanov 1986: 99–102) which was not yet domesticated in the sixth–third millennia BC (Retsö 1991; Köhler-Rollefson 1993; *contra* Ripinsky 1983). Semi-nomads always leave remains, and even true nomads do so (e.g. Cribb 1991; Rosen 1992), but since we are not discussing true nomadism in the southern Levantine deserts, the debate on this point is irrelevant.

2. During the sixth–fourth millennia BC (Late Neolithic through EB I) no strong polity can be envisioned in neighbouring fertile lands that could be responsible for the archaeological remains in the desert. Therefore the desert remains must have been left by the indigenous desert population. Since the theories relating desert archaeological remains to foreign initiatives are invalid for these periods, their validity for later periods is necessarily challenged (see below).
3. The available data on the palaeoclimate during the eighth–fourth millennia BC (see note 4) points to somewhat milder conditions than today. In contrast to previous theories, there was no climatic reason for any settlement gap during this time span. If indeed monsoonal trajectories occasionally penetrated the area, as several studies suggest, then a single summer rain a year could have had a significant influence on the carrying capacity of the desert. The gradual desiccation of the third millennium BC stands in sharp contrast to the contemporary peak of settlement in the desert, and even the global climatic crisis c. 2300 BC did not force the population to evacuate the desert.

### Dating of desert sites

One of the characteristics of desert remains in these periods is the rarity of diagnostic objects, mainly of flint and pottery. While PPNB sites are generally well identified by typical flint tools, with the Late Neolithic the situation changes. Yarmukian pottery is not found in the Negev, and Wadi Raba sherds are very rare. Most of the flint tools are *ad hoc* or non-standardised (Rosen 1983: 138, 2002: 27; Forenbaher 1997), while the more standardised tools had a long life-span (see below). With a few exceptions, this problem lingers into the following periods. Chalcolithic pottery of the Beersheba or Ghassul cultures is rarely found in the Negev and Sinai, and EB Canaanite pottery is also rare, with the exception of a group of sites in southern Sinai

<sup>6</sup> These surveys, aimed at areas selected for civilian development and military use, were published only briefly (Avner 1979, 1982, 1989a,b,c, 1993, 1997a,b,c, in press 5, Avner and Naor 1978; Avner and Roll 1996), but the major issues which emerged have been discussed in some depth (Avner 1983, 1984, 1987, 1998, 1999, 2000, 2001, 2002a,b; Avner and Avner 1999; Avner *et al.* 1994; Avner and Carmi 2001; Avner and Magness 1998; Sebbane and Avner 1993; Sebbane *et al.* 1993; Avner in press 1–6).

(Beit-Arieh 1974, 1977, 1978, 1981a,b, 1983). The flint industry basically continued through these periods with little change (see below). As a result, the general periodisation of Near Eastern archaeology is hardly applicable to the desert.

The first attempts to define desert cultures, rather than fixed periods, were made by Ronen (1970) and Kozloff (1974), who analysed flint assemblages collected by Rothenberg in surveyed sites of the Wadi Arabah and Sinai. Ronen examined the flint from two selected sites, one in Wadi Feiran, south-western Sinai, and the other in Wadi Sidri, west of Eilat in Sinai. Kozloff examined flint from a larger variety of sites and identified six different industries, including those of Ronen. Based on these studies, Rothenberg emphasised two industries, or cultures, the 'Eilatian' and the 'Timnian'. The former is described as continuing Palaeolithic traditions, with large, coarse tools and the 'Levallois technique', but also included tabular scrapers, adzes and others. The latter was characterised by smaller sized cores and tools, with tabular scrapers, adzes, knives and others, but lacking the Levallois technique. Some characteristics are shared by both industries, including end scrapers (dominant in both), tabular scrapers, drills and borers, and a large proportion of *ad hoc* tools (Kozloff 1974: 46–47; Rothenberg 1979: 111, 114). Although Ronen and Kozloff dated both industries to the fourth millennium BC, Rothenberg saw them as two consecutive cultures, which he also termed 'periods'. He formulated a cultural-chronological table for the desert in relation to the chronologies of Egypt and Israel. The Eilatian was dated 4500–3500 BC, followed by the Timnian period, 3500–2650 BC (Rothenberg 1979: 111–16, 283; Rothenberg and Ordentlich 1979; Conrad and Rothenberg 1980: 26). Later, Rothenberg published with Glass (1992) another cultural-chronological concept for the desert, in which the Eilatian and Timnian actually coexisted during the sixth to third millennia BC. This time-span was then divided into three different cultural phases, termed 'Sinai-Araba Copper Age Phases': Early (c. 6000–2955 BC), Middle (c. 2955–2300 BC) and Late (c. 2300–2000 BC). Unfortunately, the definitions of these cultures and their chronology are questionable.<sup>7</sup>

A somewhat similar approach was adopted by Anati (1986, 1993, 2001) in the Har Karkom survey, where he used the term 'Bronze Age Complex' (BAC) for the Chalcolithic and Early Bronze Age as one period, c.

4600–2000 BC. Unfortunately, the artefacts and architecture representing this culture are not well dated. Presently, they are supported by only one <sup>14</sup>C date (c. 2700 Cal. BC, Anati 2001: 9), and no discussion explaining the concept has been provided.

Similar difficulties have faced the teams that surveyed the north-eastern Wadi Arabah and Wadi al-Hasa, in southern Jordan (MacDonald 1988; 1992), despite the fact that diagnostic pottery sherds are more frequent in these areas. Sites were dated as Late Neolithic–Chalcolithic, Chalcolithic–EB I, and EB I–III. Also Rosen (1994: 15–16), in the survey of the Ramon Crater, did not separate the Chalcolithic from EB.

In an attempt to overcome the difficulties in typological dating of desert sites, radiometric dating is essential for desert chronology, despite limitations of the method (see below). At present, 175 <sup>14</sup>C dates are available from the time-span of the sixth to third millennia BC (see Tables 5, 6: nine dates from the Negev Highlands, 71 from the southern Negev, 31 from southern Jordan and 79 dates from Sinai) and they present a very different settlement scenario from that of the various surveys. Instead of short periods of settlement and longer gaps between them, they demonstrate a full sequence of settlement and a rich variety of activities. The only period that is not well covered by <sup>14</sup>C dated is the Late Chalcolithic (early fourth millennium BC), and in my opinion this will change with further research. Even more significant is the breakdown of the dates to number of dates per century in each period. Table 7 demonstrates that the periods that were considered 'missing' in the desert, the Chalcolithic, EB I and EB III, actually appear with high numbers of dates, that generally indicate a high intensity of human presence and activity.<sup>8</sup>

Another point that comes to light from Tables 5 and 6 is the duration of individual sites. Although series of <sup>14</sup>C dates are presently very limited, they already now indicate that desert sites are not necessarily 'brief in life-span' or a 'passing phenomenon'. In 'Uvda Site 124/IV six dates from a single room range from c. 3000 to 2650 BC, a span of 350 years (Table 5: 22, first six dates). This room intersects earlier remains that include fifth–fourth millennium material (Avner in press 6). In Site 9, six dates from the middle stratum ranges from c. 3200 to 2700 BC, a span of 500 years (Table 5: 25), while the lower stratum is dated by artefacts to the fifth–sixth millennia, and the upper stratum is dated by artefacts to the EB IV. In Site 16 three dates range from c. 3500 to 2850 BC, a span of 650 years (Table 5: 23). No occupational gaps could be identified in the sections excavated at these sites: there was continuous occupation with

<sup>7</sup> Unlike in the earlier publications (1969: 28–30, 1970: 15, 1971a: 62, 1973: 35) Rothenberg emphasised now the autochthonic nature of the desert population (Rothenberg and Glass 1992). Although I fully agree with his recent view, his data-base and analysis require a detailed criticism (see Avner 2002b, ch. 1, note 16). Besides adoption of the term Timnian by D. Henry (1995, ch. 15), the cultural-chronological scheme of Rothenberg has not been widely accepted.

<sup>8</sup> Although the breakdown of <sup>14</sup>C dates to centuries was made 'mathematically', it still generally reflects the intensity of human presence and activity in each period.

**Table 5:** Late Neolithic to EB IV <sup>14</sup>C calibrated dates from southern Jordan, the Negev and Sinai, from north to south.

No.	Site name	Type of Site	Lab No.	Material	B.P.	C. B.C.	Mean	Reference
1	Har Dimon	habitation	RT1556	charcoal	4660±55	3520-3360	3440	Segal & Carmi 1996:94
	Har Dimon	"	RT1558	"	3915±50	2470-2300	2385	"
	Har Dimon	"	RT1557	"	3845±50	2410-2200	2305	"
2	'Ein Ziq	habitation	RT885A	"	3960±90	2580-2300	2440	Cohen 1999:338
	'Ein Ziq	"	RT885B	"	3850±50	2460-2200	2330	"
	'Ein Ziq	"	RT885B1	"	3880±50	2460-2290	2265	"
	'Ein Ziq	"	RT2514	wood	3700±45	2200-1980	2090	"
3	Mushabi 103	habitation	RT447B	charcoal	3800±330	2900-1700	2300	Bar-Yosef & Philip 1977:264
4	Qadesh Barnea <sup>3</sup>	habitation	SMU 662	"	7530±80	6450-6250	6350	Bar-Yosef 1987:577
	Qadesh Barnea <sup>3</sup>	"	Pta 3662	"	7350±80	6340-6070	6205	???
5	Hagamal site	habitation	RT2043	"	4115±50	2860-2580	2720	Segal & Carmi 1996:96
6	Kvish Harif	habitation	Pta 3374	"	5260±60	4230-3980	4105	Rosen 1984
7	Har Harif E22H	habitation	Tx 1122	"	5960±100	4960-4710	4835	Forenbaher 1997:85
8	W. Fidan 8	habitation	HD17471	"	6082±44	5050-4850	4950	Hauptmann 2000:65-6
9	Faynan 9	copp. smelt.	HD 10577	"	4140±109	2880-2580	2730	"
	Faynan 9	"	HD 10993	"	3981±50	2580-2400	2490	"
	Faynan 9	"	HD 10994	"	3973±85	2620-2310	2465	"
	Faynan 9	"	HD 10584	"	3812±77	2410-2130	2270	"
10	W. Fidan 4	habitation	HD 16327	"	4718±25	3630-3380	3505	"
	W. Fidan 4	"	HD 16380	"	4702±37	3630-3370	3500	"
	W. Fidan 4	"	HD 13776	"	4654±50	3520-3360	3340	"
	W. Fidan 4	"	HD 16379	"	4576±44	3500-3120	3310	"
	W. Fidan 4	"	HD 16378	"	4424±51	3270-2920	3095	"
11	Kh. Hamra Ifdan	habitation	HD 16533	"	4044±44	2630-2470	2550	"
	Kh. Hamra Ifdan	"	HD 16534	"	3914±45	2470-2310	2390	"
12	Ras al Naqab 1	copp. smelt.	HD10574	"	3971±67	2580-2350	2465	"
13	Tel W. Faynan	habitation	HD 10567	"	6410±115	5490-5260	5375	Najjar <i>et al.</i> 1990:32
	Tel W. Faynan	"	HD 12335	"	6360±45	5470-5300	5385	"
	Tel W. Faynan	"	HD 13775	"	6312±50	5210-4950	5080	Hauptmann 2000:65-6
	Tel W. Faynan	"	HD 12338	"	6110±75	5210-4850	5030	Najjar <i>et al.</i> 1990:32
	Tel W. Faynan	"	HD 12337	"	5740±35	4680-4500	4590	"
	Tel W. Faynan	"	HD 12336	"	5375±30	4330-4110	4200	"
	Tel W. Faynan	"	TO9614	"	6370±300	5560-4960	5260	Simmons & Najjar 2002:19
	Tel W. Faynan	"	TO9615	"	6130±89	5210-5160	5185	"
	Tel W. Faynan	"	TO9616	"	6260±90	5320-5140	5230	"
14	W. Ghwair 4	copp. smelt.	HD 10573	"	4059±55	2840-2470	2655	Hauptmann 2000:65-6
15	W. Ghwair 3	copp. smelt.	HD 16529	"	3919±26	2470-2350	2410	"
16	Faynan 16	copp. smelt.	HD 10579	"	3923±61	2490-2300	2395	"

<sup>1</sup>. Calibration based on OxCal 3.4 (Ramsey 2000), 1 Sigma- 68.2% confidence. Mean values were calculated for the preparation of the histogram only. Dates from these sites, which are out of the range referred here, are not included in this list.

Sites where excavators are not mentioned in the references are as follows: Har Dimon- G. Tal; Mushabi 103- Sass & Klemer; Hagamal Site- Rosen; Feidan 8- Adams; Faynan 9- Adams; Feidan 4- Adams & Genz, Adams & Levy; Hamra Ifdan- Adams; Barqa al Hatiye- Fritz; 'Uvda 4- Eisenberg; 'Uvda 6- Yogev; 'Uvda 7- Sass & Goren; 'Uvda 16- Yogev; 'Uvda 9- Amiran, Arnon, Ilan and Avner; Yotvata Hill- Meshel; Yotvata 6- Meshel & Sass; Ras el Naqeb- Avner; Hashem el Taref XVII- Avner; Hashem el Taref 650, 317, 317a, W. Kyke 649, W. Malha 332, Themed 699- Kozloff; Ein Abu Rugum- Sass; W. Watir- Avner; 'Ein Um Ahmed- Goren; W. Zalaqa- Avner; W. Dab'yia- Goren, Avner; Serabit el Khadim- Beit Arie; J. 'Adeideh- Goren; Abu Khalil- Goren; Sinai 1130/3- Biet-Arie; Sheikh 'Awad- Beit-Arie.

Table 5 continued...

No.	Site name	Type of Site	Lab No	Material	B.P.	C. B.C.	Mean	Reference
17	Barqa al Heteiye Barqa al Heteiye	habitation "	HD 13975	"	4376±57	3090-2900	2995	"
			HD 13976	"	4267±43	2920-2780	2850	"
18	'Uvda 4	habitation	RT724D	charcoal	5400±110	4350-4040	4195	Avner <i>et al.</i> 1994
19	'Uvda 96/III	threshing fl.	RT648B	"	4250±50	2920-2700	2810	"
20	'Uvda 6 'Uvda 6 'Uvda 6 'Uvda 6	sanctuary " " "	RT628A	charcoal	6560±200	5710-5310	5510	"
			RT628B	"	6400±70	5470-5310	5390	"
			Pta 3621	"	6400±60	5470-5310	5390	"
			RT1739	ostrich-egg	6390±60	5470-5310	5390	Segal & Carmi 1996:97
21	'Uvda 7 'Uvda 7	habitation "	RT724B	charcoal	6410±120	5490-5260	5375	Avner <i>et al.</i> 1994
			RT724C	"	4540±100	3490-3040	3267	"
22	'Uvda 124/IV 'Uvda 124/IV 'Uvda 124/IV 'Uvda 124/IV 'Uvda 124/IV 'Uvda 124/IV 'Uvda 124/IV 'Uvda 124/IV 'Uvda 124/IV	habitation " " " " " " " "	RT1419	charcoal	4370±100	3310-2880	3095	Avner <i>et al.</i> 1994
			RT1452	"	4370±50	3090-2910	3000	"
			RT1449	"	4285±60	3020-2710	2865	"
			RT1451	goat dung	4280±60	3020-2700	2860	"
			RT1448	charcoal	4120±60	2870-2570	2720	"
			RT1450	"	4075±55	2860-2490	2675	"
			RT3174	goat dung	4030±45	2620-2470	2545	Avner in press 7
			RT3172	"	4015±40	2580-2470	2525	"
			RT3173	"	4010±45	2580-2460	2520	"
23	'Uvda 16 'Uvda 16 'Uvda 16	habitation " "	RT640A	charcoal	4800±70	3660-3380	3520	Avner <i>et al.</i> 1994
			RT640B	"	4400±60	3260-2910	3085	"
			RT640c	"	4280±60	3020-2700	2860	"
24	'Uvda 17 'Uvda 17 'Uvda 17	habitation " "	Pta 3341	"	4320±50	2930-3030	2980	Beit-Arieh 2001:100
			Pta 3340	"	4100±50	2860-2500	2680	"
			Pta 3342	"	3870±40	2460-2280	2370	"
25	'Uvda 9 (124/XVII) 'Uvda 9 (124/XVII) 'Uvda 9 (124/XVII) 'Uvda 9 'Uvda 9 'Uvda 9 'Uvda 9 'Uvda 9 'Uvda 9	<i>massebah</i> <sup>2</sup> " " habitation " " " " " "	Rt670D	"	7960±200	7200-6550	6875	Avner <i>et al.</i> 1994
			Pta 3646	"	6960±70	5890-5730	5810	Avner in press 7
			RT 3369	"	4130±90	2880-2580	2730	"
			RT899A	"	4530±50	3360-3100	3230	Avner <i>et al.</i> 1994
			RT889B	"	4520±60	3360-3100	3230	"
			RT864B	"	4440±180	3360-2890	3125	"
			RT1436	ostrich-egg	4440±60	3330-2920	3125	"
			RT864A	charcoal	4310±90	3110-2700	2905	"
			RT714A	ostrich-egg	4070±100	2860-2470	2665	"
26	'Uvda 151	<i>masseboth</i>	RT684A	"	5670±85	4610-4360	4485	Avner <i>et al.</i> 1994
27	Shaharut IV Shaharut IV	tombs "	RT899C	wood	3700±55	2200-1970	2085	Avner <i>et al.</i> 1994
			RT771B	"	3582±130	2140-1740	1940	"
28	'Uvda 166 'Uvda 166	habitation "	RT714B	charcoal	3850±80	2460-2200	2330	Avner <i>et al.</i> 1994
			RT1421	charcoal	3680±50	2140-1970	2055	"
29	N. 'Issaron (Uvda 14) <sup>3</sup> N. 'Issaron N. 'Issaron N. 'Issaron N. 'Issaron N. 'Issaron N. 'Issaron N. 'Issaron N. 'Issaron N. 'Issaron N. 'Issaron N. 'Issaron N. 'Issaron N. 'Issaron N. 'Issaron N. 'Issaron	habitation " " " " " " " " " " " " " " "	RT1516	charcoal	7460±95	6410-6230	6320	Carmi <i>et al.</i> 1994
			RT1640	"	7135±95	6160-5890	6025	"
			RT1691	"	7100±70	6030-5840	5935	"
			RT1606	"	6680±85	5670-5480	5575	"
			Pta 2999	"	6460±70	5480-5360	5420	"
			RT1692	"	6350±90	5470-5210	5340	"
			Pta 3486	"	6130±70	5210-4940	5075	"
			RT1663	"	5755±85	4710-4490	4600	"
			RT1608	"	5690±55	4600-4450	4525	"
			RT1506	"	5635±70	4540-4360	4450	"
			RT1630	"	5625±70	4530-4360	4445	"
			RT1513	"	5170±55	4050-3810	3930	"
			RT1518	"	4990±50	3910-3700	3805	"

<sup>2</sup>. The first two dates from the *massebah* at 'Uvda 9 (124/XVII) were retrieved from the same hearth, at the base of the *massebah*. The first and the earlier date is considered erroneous.

<sup>3</sup>. Twenty two additional dates from N. 'Issaron, stratum C, fall within the PPNB (Carmi *et al.* 1994).

Table 5 continued...

No.	Site name	Type of Site	Lab No	Material	B.P.	C. B.C.	Mean	Reference
30	Yotvata Hill	rampart	RT1548	"	5468±55	4360-4240	4300	Segal & Carmi 1996:98
	Yotvata Hill	copp. smelt.	RT1546/7	"	4650±70	3520-3360	3340	"
31	Yotvata 6	habitation	RT1439	"	3980±60	2580-2350	2565	Avner <i>et al.</i> 1994
	Yotvata 6	"	RT1438	"	3770±50	2290-2060	2175	"
32	J. Queisa (J24)	habitation	SMU 804	"	5770±40	4690-4550	4620	Henry 1995:361
33	Samar	"kite"	RT2716	"	4080±25	2840-2500	2670	Avner <i>et al.</i> 1994
	Samar	"	Pta 3627	"	3940±60	2560-2310	2435	Holzer & Avner in press
	Samar	"	RT2715	"	3775±40	2290-2130	2210	"
34	Timna' S 27	copp. mine	Bonn 2538	charcoal	7680±120	6650-6410	6530	Unpublished (Rothenberg p.c.)
35	Timna' 39a	habitation	OxA 7632	"	5485±45	4430-4250	4340	Rothenberg & Merkel 1998
36	Timna' S28/2	copp. mine	Bonn 2363	"	4000±90	2840-2340	2590	Conrad & Rothenberg 1980
	Timna' S28	"	Bonn 2632	"	3890±70	2470-2230	2350	
37	Timna' 30	copp. smelt	Ham 215	"	4020±100	2900-2350	2625	Rothenberg 1990:71-2
38	G. Shehoret	copp. smelt.	RT591	"	4010±150	2900-2300	2600	Avner <i>et al.</i> 1994
39	Eilat IV/16	<i>tumuli</i>	RT989	charcoal	6470±80	5490-5320	5405	Avner <i>et al.</i> 1994
	Eilat IV/3	"	RT926A	"	6340±60	5470-5260	5365	"
	Eilat V/27	"	RT1215	"	6400±210	5650-5050	5350	"
	Eilat V/28	"	RT1216	"	6060±65	5050-4850	4950	"
	Eilat V/22	"	RT1214	"	5980±130	5050-4710	4880	"
	Eilat V/18	"	RT1212	"	5930±80	4910-4710	4810	"
	Eilat IV/8	"	RT1210	wood	5710±75	4680-4450	4565	"
	Eilat V/16	"	RT1211	charcoal	5640±60	4550-4360	4455	"
	Eilat V/19	"	RT1213	"	5490±60	4450-4250	4350	"
	Eilat IV/1	"	RT926	"	5400±100	4340-4040	4190	"
40	Hujeirat al Ghuzlan	habit.+copp.	Bln5076	"	5186±34	4040-4020	4030	Görsdorf 2002
	Hujeirat al Ghuzlan	"	Bln5075	charcoal	4881±32	3700-3640	3670	"
41	Tell Magass	habit.+copp.	Bln5120	"	5290±33	4220-4000	4110	Görsdorf 2002
	Tell Magass	habit.+copp.	Bln5119	"	5111±37	3970-3800	3885	"
	Tell Magass	habit.+copp.	Bln5118	"	5026±34	3940-3710	3825	"
	Tell Magass	habit.+copp.	Bln5074	"	4879±32	3700-3540	3670	"
	Tell Magass	habit.+copp.	Bln5121	"	4863±39	3700-3650	3675	"
42	Risqeh	<i>masseboth</i>	K 1467	"	6010±120	5060-4720	4890	Kirkbride 1969:195
43	Sinai 10	"kite"	Gd 7948	"	4530±60	3360-3100	3235	Eddy & Wendorf 1999:280-1
	Sinai 10	"	Gd 7953	"	4420±80	3310-2910	3110	
	Sinai 10	"	Gd 11317	"	4390±80	3270-2900	2980	
44	Ras al Naqeb	sanctuary	RT1948	"	5470±70	4440-4220	4330	Segal & Carmi 1996:
45	Sinai 47	"plaza" site	DRI 3322	"	5526±89	4460-4250	4355	Eddy & Wendorf 1999:280-1
	Sinai 47	"	DRI 3323	"	5353±109	4330-4040	4185	
46	H. al Taref 713a	habitation	SMU 836	"	7037±242	6200-5650	5905	Rothenberg & Glass 1992
47	H. al Taref XVII	sanctuary	RT1947	sea-shell	6580±90	5620-5470	5545	Segal & Carmi 1996:102
	H. al Taref VII (S.18)	sanctuary	ETH17505	charcoal	6575±65	5610-5470	5540	Eddy & Wendorf 1999:280-81
	H. al Taref VII (S.18)	"	ETH17506	"	6160±85	5260-4960	5110	Eddy & Wendorf 1999:280-81
48	H. al Taref 713	habitation	SMU 641	charcoal	6403±76	5470-5310	5390	Rothenberg & Glass 1992
	H. al Taref 713	"	SMU 742	"	5654±57	4550-4360	4405	"
	H. al Taref 713	"	SMU 788	"	5523±73	4460-4250	4355	"
	H. al Taref 713	"	SMU 789	"	4237±56	2920-2690	2805	"
49	H. al Taref 650	habitation	SMU 740	charcoal	5665±119	4670-4360	4515	Rothenberg & Glass 1992
	H. al Taref 650	"	SMU 822	"	5625±115	4590-4340	4465	"
	H. al Taref 650	"	SMU 743	"	4427±68	3310-2920	3115	"
	H. al Taref 650	"	SMU 642	"	4251±64	2920-2690	2805	"
50	Sinai 32	habitation	Gd 11319	charcoal	6230±140	5340-4990	5165	Eddy & Wendorf 1999:280-1
	Sinai 32	"	Gd 9749	"	5650±250	4800-4200	4500	"
	Sinai 32	"	Gd 9742	"	5380±240	4500-3950	4225	"
	Sinai 32	"	Gd 9745	"	4210±220	3110-2450	2780	"

Table 5 continued...

No.	Site name	Type of Site	Lab No	Material	B.P.	C. B.C.	Mean	Reference
	Sinai 32	"	Gd 10603	"	3910±120	2570-2200	2385	"
	Sinai 32	"	Gd 10608	"	3900±150	2580-2140	2360	"
	Sinai 32	"	Gd 9741	"	3750±580	3000-1400	2200	"
	Sinai 32	"	Gd 10605	"	3600±140	2140-1740	1940	"
	Sinai 32	"	Gd 9751	"	3100±220	1650-1000	1325	"
51	Sinai 40	hearth	DRI 3127	charcoal	6379±126	5480-5150	5315	Eddy & Wendorf 1999:280-1
52	Sinai 25	habitation	DRI 3126	"	5721±63	4680-4460	4570	"
53	Sinai 1	habitation	DRI 3269	"	5518±121	4500-4220	4360	Eddy & Wendorf 1999:280-1
	Sinai 1	"	DRI 3272	"	4639±91	3630-3130	3380	"
	Sinai 1	"	DRI 3268	"	4470±62	3340-3020	3180	"
	Sinai 1	"	DRI 3270	"	4350±73	3090-2880	2985	"
	Sinai 1	"	DRI 3273	"	3290±78	1690-1460	1575	"
54	W. Kyke 649	habitation	SMU 821	charcoal	7174±66	6160-5920	6040	Rothenberg & Glass 1992
	W. Kyck 649	"	SMU 702	"	6843±62	5780-5640	5710	"
	W. Kyck 649	"	SMU 835	"	6594±205	5720-5340	5530	"
	W. Kyck 649	"	SMU 676	"	5210±51	4220-3960	4090	"
55	W. Malha 332	habitation	SMU 675	charcoal	5789±70	4720-4540	4630	Rothenberg & Glass 1992
	W. Malha 332	"	SMU 809	"	5708±81	4680-4450	4565	"
	W. Malha 332	"	SMU 790	"	5523±69	4460-4250	4355	"
56	B. Themed 699	habitation	SMU 701	"	4355±66	3090-2890	2990	Rothenberg & Glass 1992
	B. Themed 699	"	SMU 677	"	4267±65	3020-2690	2855	"
	B. Themed 699	"	SMU700	"	4263±55	2930-2700	2815	"
57	'Ein Abu Rugum	"	RT447A		4180±300	3350-2300	2825	Sharpenseel <i>et al.</i> 1976
58	W. Watir VIII	<i>masseboth</i>	RT1845	sea-shell	5240±55	4220-3970	4095	Segal & Carmi 1996:102
59	Ein Um Ahmad	<i>nawamis</i>	RT1856	"	5815±50	4770-4600	4685	Segal & Carmi 1996:103
	Ein Um Ahmad	"	RT1857	"	5575±50	4455-4355	4405	"
	Ein Um Ahmad	"	RT1851	"	5130±50	3990-3800	3895	"
60	Ein Um Ahmad, M80	habitation	RT1859	"	5715±70	4680-4450	4565	"
61	Ein Um Ahmad, M81	"	RT1852	"	5400±70	4340-4050	4195	"
62	'Ein Um Ahmad, M52	"	RT1858	"	5190±50	4220-3950	4085	"
63	W. Zalaqa T12	<i>tumuli</i>	Pta 3645	charcoal	5690±50	4600-4450	4525	Avner <i>et al.</i> 1994:269
	W. Zalaqa T2	"	Pta 3633	"	5590±70	4500-4350	4425	"
	W. Zalaqa T2	"	RT648 E	"	5440±80	4360-4110	4235	"
64	W. Marrah	"kite"	RT1850	"	3750±45	2280-2040	2160	Segal & Carmi 1996:103
65	W. Daba'yia	<i>masseboth</i>	RT2186	sea-shell	6045±65	5040-4810	4925	"
	W. Daba'yia	habitation	RT1855	charcoal	5355±60	4320-4040	4180	"
66	J. Guna 100	habitation	SMU 659(?)	"	4065±50	2840-2490	2665	Bar Yosef <i>et al.</i> 1986
67	J. Guna 25	habitation	SMU 659(?)	"	4055±50	2840-2470	2655	"
68	S. al Khadim	habitation	RT1807	charcoal	5250±55	4220-3970	4095	Segal & Carmi 1996:104
69	J. 'Adeideh	turq. mine	RT1849	charcoal	6770±60	5720-5630	5675	Segal & Carmi 1996:103
70	Abu Khalil	<i>nawamis</i>	RT1353	ostrich-egg	5200±70	4220-3940	4080	"
71	Sinai 1130/3	habitation	RT1811	charcoal	5350±55	4320-4040	4180	Segal & Carmi 1996:104
	Sinai 1130/3	"	RT1809	"	5230±55	4220-3960	4090	"
72	Sheikh 'Awad	"	RT1806	"	4325±55	3020-2880	2950	"
73	Sheikh Muhsein	"	HV 5296	"	4710±50	3630-3370	3500	Beit-Arieh 1977:199

some architectural changes and repairs. In Site 17, the lower stratum yielded two dates, c. 3000 and 2700 BC and the upper stratum yielded one date, c. 2400 BC.

The excavator (Beit-Arieh 1989: 195) described first a gap of settlement between the two strata, corresponding to the 'missing' EB III. At the site itself, however,

no gap in the stratigraphy is discernible, and in the recent, final publication of the site (Beit-Arieh 2002) no gap is mentioned. In two cult sites in the 'Uvda Valley a general span of 4000 years was found. One is a *massebah* shrine ('Uvda 124/XVII) adjacent to Site 9 (Avner in press 6), and the other is the open sanctuary of 'Uvda 6. In the Eilat burial ground, 10 <sup>14</sup>C dates cover a span of 1200 years, from c. 5400 to 4200 BC (Avner 1991). In eastern Sinai, several sites rendered three–five <sup>14</sup>C dates that spread over hundreds of years and even 2000 years (Table 5: 43, 48, 49, 54, 55). One site (Table 5: 50) yielded nine dates, the first three may represent an occupation period from c. 5150 to 4200 BC, the following four dates may represent another period from c. 2800 to 2200 BC, and the last two may indicate periods of settlement during the early and late second millennium BC.

It is true that <sup>14</sup>C series may represent a longer settlement span than that which occurred in reality (Buck *et al.* 1994; Gilead 1994: 3; Solow 1997). However, since in most of these sites the numbers of dates in the series are limited, it can be also claimed that they actually present only part of the true settlement sequence. A good example for this argument is the site of Nahal 'Issaron ('Uvda 14). Here, five charcoal samples were first analysed, a large number of dates for desert sites at that time, and they indicated two short periods of occupation: one c. 7000 BC for Stratum C, and the other c. 5400 BC for Stratum B (Goring-Morris and Gopher 1983: 160). However, when 30 more samples from the site were later analysed (Carmi *et al.* 1994), a range of 4500 years was received, from c. 8200 to 3700 BC, with only short gaps (Table 8). If the radiocarbon range is longer than the real life-time of a given site, the span of Nahal 'Issaron would be 'only' 3500–4000 years, still much longer than most scholars would expect to find in a desert site. I do not argue that the sites under discussion were occupied every night, or even every year throughout their lifetime. Certainly, gaps in settlement not visible in excavated sections are possible, sometimes even for several years if a long period of drought occurred. However, for the larger, historical and cultural picture, the unexpected longevity of desert sites is significant, and it must influence our notions regarding desert cultures and populations. One point still disturbs the scenario of the long duration of desert sites: the low rate of cultural sedimentation, usually not more than one metre. This question must be addressed in future excavations.

Since the <sup>14</sup>C dates from the desert sites did not match current theories, they were often questioned (orally) on the basis of three main arguments:

1. Wood is better preserved in a desert environment and an undeterminable period of time may have elapsed from the tree's death until it was burned.

2. Due to the better preservation, wood may have been repeatedly reused before burning.
3. Charcoal samples may originate from the core of tree trunks, which yield dates tens or even hundreds of years prior to the tree's death.<sup>9</sup>

In my judgment and experience, this is not necessarily the case, for the following reasons:

1. Combustible material is never common in the desert, therefore, any available wood is collected when found, and soon consumed.
2. The third argument may be valid, but at least in my own excavations I selected bush remains and twigs for <sup>14</sup>C dating.

The unavoidable preliminary conclusion is that <sup>14</sup>C dating of desert sites is presently more reliable and objective than typologically based dating, and the theories regarding the settlement pattern of the Negev and Sinai demand serious re-evaluation. One period which exemplifies the problem will be discussed below, the EB II.

### The 'EB II florescence' of the desert

The study of the Early Bronze Age in the Negev and Sinai has undergone an interesting process of evolution. During the 1970s, EB II occupation was identified among the southern Sinai sites (Amiran *et al.* 1973; Beit-Arieh 1974, 1977, 1978, 1981a, 1983, 1989), previously defined as Chalcolithic by Rothenberg (1969, 1970). Shortly afterwards, EB II finds were identified among the Chalcolithic artefacts of Tel Esdar in the north-eastern Negev, and in MB I sites (Cohen 1978, 1981: IX, 1985: IX, 1986: 119, 215). The overall distribution of sites, however, was very limited at that time. When additional sites were found in 1978 near Kadesh Barnea, in the 'Uvda Valley and elsewhere in the Negev, they were marked as isolated spots on the map and interpreted as road stations connecting the town of Arad with its related settlements in southern Sinai (Cohen 1978; Beit-Arieh and Gophna 1981; Amiran *et al.* 1980: 14; Cohen 1985: IX, 1986: 277–78).

The unique intensity of EB II settlement was first revealed through the Negev Emergency Survey, beginning in 1979, when hundreds of sites were dated to this period and many were excavated (Table 3). A comprehensive settlement picture has been constructed, explaining the phenomenal florescence of desert settlement as initiated by Arad. This town was

<sup>9</sup> For further problems in <sup>14</sup>C dating of archaeological deposits see e.g. Bar-Yosef and Kra 1994: 5–7.

described as a Canaanite polity and administrative centre that colonised southern Sinai in order to monopolise the copper resources of the region, and thereby influenced the rest of the desert area (Amiran *et al.* 1973; Beit-Arieh 1974, 1981a,b, 1983, 1984a: 39–41). Accordingly, the abandonment of desert sites was assigned to the end of EB II, after some 300 or 400 years of prosperity, as a result of the fall of Arad (Beit-Arieh 1981b: 134, 1983: 48; Amiran 1986; Haiman 1986: 16; Amiran and Gophna 1989). Alternatively, the settlement demise was related to an Egyptian conquest of Sinai (Rothenberg and Ordentlich 1979; Cohen 1986: 244), although this is only evident in south-western Sinai, in the area of the turquoise mines. The discovery of an EB III settlement at Tel 'Ira, in the Beersheba Basin, was considered the 'southernmost in the country' (Beit-Arieh 1991), and it only emphasised the void in the Negev and Sinai after the fall of Arad.

However, a closer look shows that the Negev and Sinai were not deserted at all, either before or after the EB II. In the southern Negev, several sites were defined as EB I. A habitation site south of Yotvata excavated by Meshel and Sass was ascribed to this period by pottery and a sherd of an Egyptian alabaster jar (Meshel 1990: 17–19, 1993: 1517–18). In Ma'aleh Shaharut, east of the 'Uvda Valley, a tomb with masonry similar to that of the *nawamis* tombs was excavated in a rock shelter (Avner 1986). Inside, parts of a red-slipped, well burnished jug with an incision on its shoulder were found, which have close parallels to EB I jugs of the Bab adh-Dhra tombs on the south-east edge of the Dead Sea. Two EB I jars were discovered, one in 'Uvda Valley Site 10 and another, with a cup, in a rock shelter tomb in the Nimra Valley, south of Timna, dated to the very beginning of the EB I (Sebbane and Avner 1993). This tomb is most probably related to a nearby copper production site 300 m. away. Mine T in Timna should also be mentioned as probably belonging to this period (Conrad and Rothenberg 1980: 148–70). In a habitation site near Darb Ghaza, in Sinai, 15 km. north-west of Eilat, fragments of an Egyptian jar were found (Avner and Naor 1978), dated by R. Amiran to EB I. Twenty-one <sup>14</sup>C dates from 10 different excavated sites in all regions discussed here (see Table 7) fall within the EB I time-frame. Two major sites near Aqaba, Tall Maqass, and Tall Hujayrat al-Ghuzlan, were established in the Late Chalcolithic and continued during the EB I (Khalil 1987, 1992, 1995; Khalil and Riederer 1998; Khalil and Eichmann 1999).<sup>10</sup> The former extends over 3000 sq. m. and the latter is two to three times larger. Their size, and the depth of cultural sediments (c. 5 m.), are quite

<sup>10</sup> Only some of the rich metallurgical finds from these sites have been published, but they were presented by Khalil in a lecture in Amman (17 April 2000). The first radiometric dates published from both sites (Görsdorf 2002) range from mid- to late Chalcolithic, but the upper occupation phase is still attributed to EB I (see Table 5: 40, 41).

surprising in light of the environment, indicating permanent villages. The wide range of artefacts represents subsistence on agriculture, grazing, copper industry and the manufacture of sea-shell ornaments.

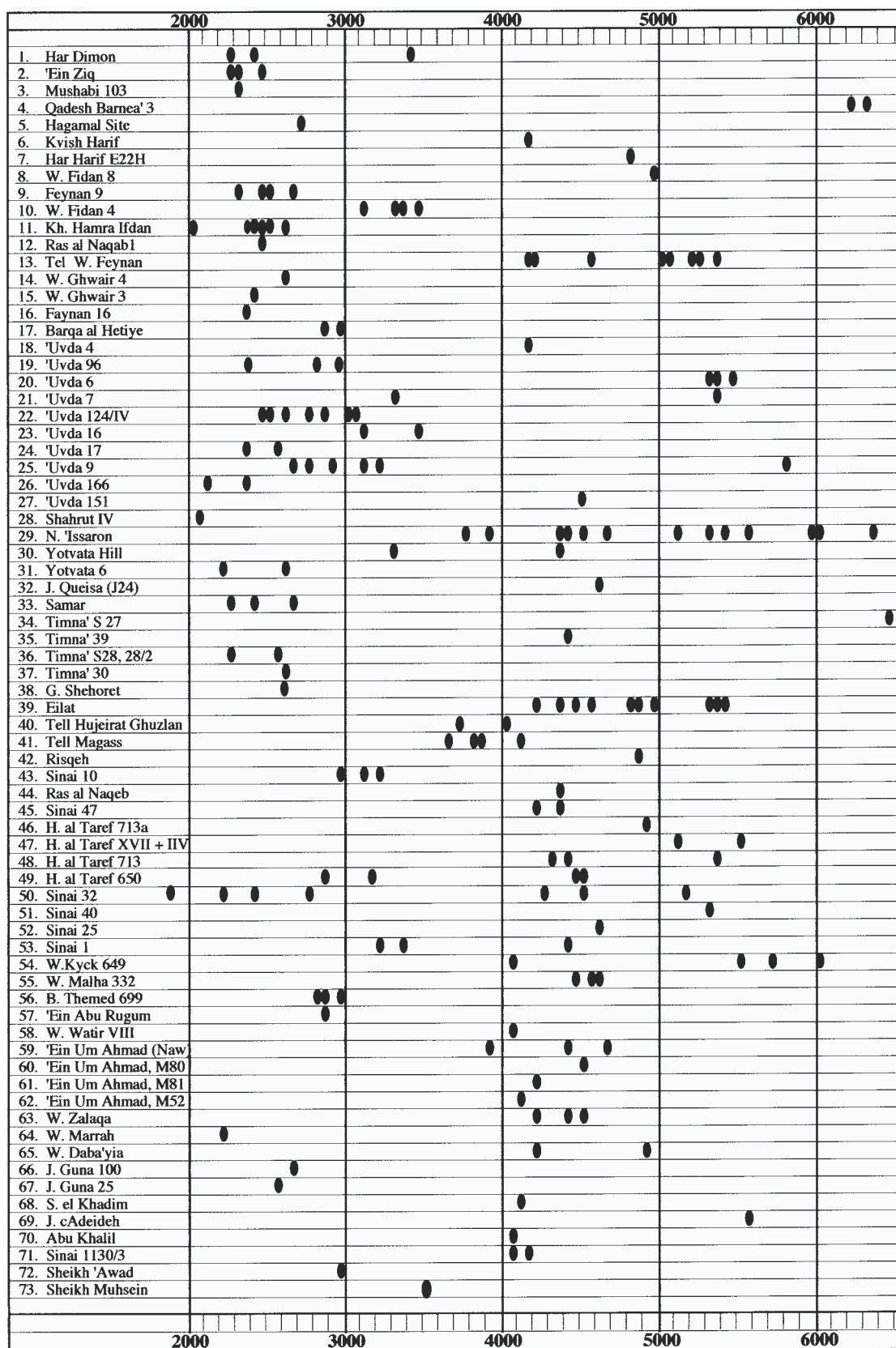
In the surveys of the Wadi Hasa and the northern Wadi Arabah, 43 sites were identified as EB I on the basis of pottery, in addition to sites which were dated as Chalcolithic–EB I or EB I–III (MacDonald 1988: 155–61, 1992: 61–66). It is now clear that the large habitation site of Fidan 4 in the Faynan area, which contains copper industry remains, should be dated to the EB I, rather than to the Chalcolithic (Genz 1997; Adams 1998: 653, 1999: 108–12, etc.).

In southern Sinai, one of the only two <sup>14</sup>C dates from the 'EB II' sites excavated by Beit-Arieh actually falls within the transition from Chalcolithic to EB I (Table 1: 73), and the Chalcolithic site near Serabit al-Khadim (Beit-Arieh 1980) also contained a Dynasty I Egyptian vessel, i.e. EB I (Braun 1989, note 56). Dynasty I Egyptian vessels were found in the *nawamis* fields at Wadi Sawawin and Wadi H'bar (Arad-Ayalon n.d.),<sup>11</sup> and a fragment of an EB I jar was found in the habitation site of Jebel Guna 25 (Bar-Yosef *et al.* 1986: 149). All these indicate that an EB human occupation in Sinai was not unique to the EB II alone.

As for the EB III, it is true that the 'classic' ceramic indicators of the period are not found in the desert, but clues for the real EB III settlement scenario are found in two main sources:

1. During this period the number of <sup>14</sup>C dates per century from desert sites exceeded that of EB II and reached its highest level (Table 7).
2. During EB III, copper production in the Faynan area also peaked (Levy *et al.* 2002; Adams 2000, 2002), and it must have influenced the rest of the surrounding desert. This is the period when the production of the copper bar ingots began in the Faynan area, at Khirbat Hamra Ifdan (*ibidem*), the same ingots which are well known from the 'EB IV' Negev sites (Kochavi 1967: 108–18; 1969; Dever and Tadmor 1976; Cohen 1999: 96–98, 118, 144–53, 205, 262–63, figs 58, 139b; Segal and Roman 1999; Saidel 2002: 57, pl. 14:10).
3. Adams (*ibid.* and Chapter 9, this volume) has shown, on the basis of pottery comparisons with Khirbat Hamra Ifdan, that the 'EB IV' sites of the Negev Highlands actually contain

<sup>11</sup> I thank M. Sebbane for the references to publications of parallel Egyptian pottery. Since the *nawamis* finds were not published (by Goren or Arad-Ayalon), the matter is not discussed further herein.

**Table 6:** Histogram of calibrated  $^{14}\text{C}$  dates, Late Neolithic to EB IV, from the Negev, Sinai and southern Jordan, from north to south.

\* Each spot represents the mean value of one or more calibrated dates, based on OxCal 3.4 (Ramsey 2000). For the location of sites see Figure 4.1.

**Table 7:** Numbers of <sup>14</sup>C dates in the Negev, Sinai and southern Jordan per century in each period (an arbitrary division, based on Table 1).

<b>B.C.</b>	<b>Period</b>	<b>Number of <sup>14</sup>C dates per century</b>
2000	Early Bronze IV	3.7
2300	Early Bronze III	8.3
2650	Early Bronze II	8.0
3000	Early Bronze I	3.7
3600	Chalcolithic	4.8
4500	Late Neolithic	3.1
6000		

EB III pottery, and should therefore be dated to both periods.

The impression is that this 'missing' period was actually the climax of settlement in the desert, and that the material culture of the EB II, including pottery, simply continued into the EB III (see below).

The unavoidable conclusion is that the cultural characteristics of the desert actually continued uninterrupted from previous periods throughout the EB, including the 'missing' EB I and EB III. Many desert sites should still be dated to the EB II (see e.g. Tables 6, 7); nevertheless, the glamour attributed to the EB II settlements of the desert is diminished by the fact that the desert was not deserted before or after. The finds and <sup>14</sup>C dates mentioned above are the results of only limited research achieved to date in both surveys and excavations. Therefore, they only hint at more intensive human presence and activity in the desert. If human societies did live in the desert during the EB I and EB III, when Arad did not exist as a town or a polity, it means that also in the EB II no external intervention was necessary to 'cause them to exist' or to 'become visible'. Moreover, Arad can be seen as a town which emerged from the desert culture, as suggested by Govrin (1990) and by Finkelstein (1991, 1995, ch. 7), and as proposed for the large EB I desert towns of Syria and eastern Jordan (Helms 1982; Hanbury-Tenison 1989).<sup>12</sup>

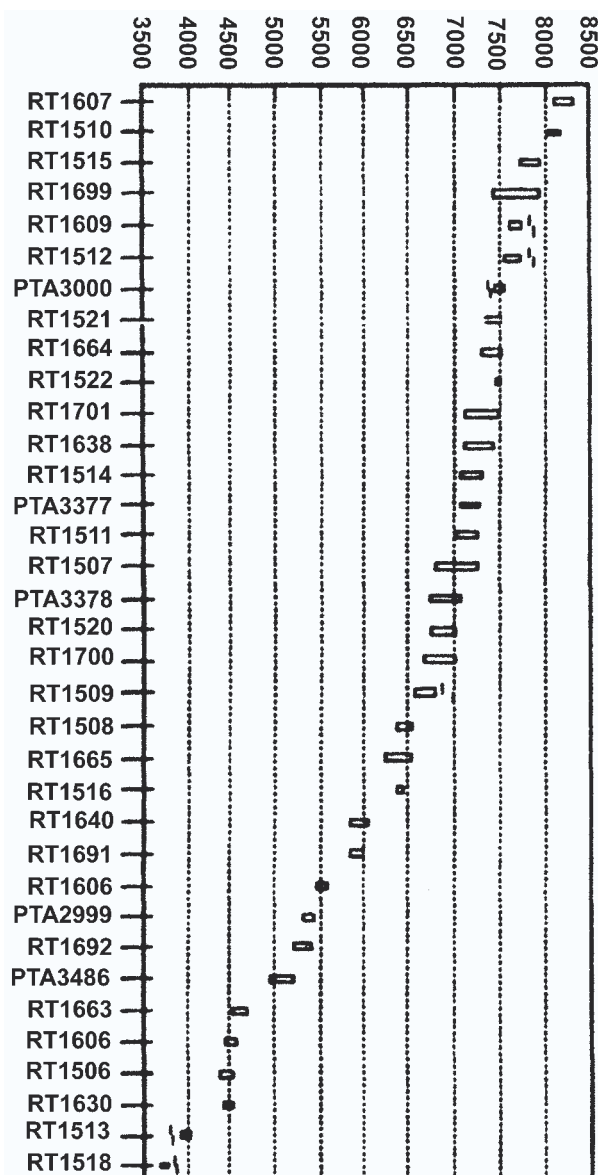
<sup>12</sup> In a recent article, Beit-Arieh (2002) responded to Finkelstein's view on the origin of Arad, by emphasising the Canaanite cultural elements of the town. However, these could have been easily adopted during a quick settlement process. Although I generally accept Finkelstein's description, one point should be revised: the development of the 'Aradian house' from the nomads' rectangular tent (Finkelstein 1995:

In my opinion, the common reconstruction of desert history, especially during the sixth to third millennia BC, is incorrect, and the question as to what misled scholars in their studies brings us back to the problem of dating.

While the dating of southern Sinai sites to EB II is considered well based on Aradian pottery, in the rest of the desert area this pottery is rarely found. The attribution of sites to the EB II was based mainly on two common finds, hole-mouth pottery sherds and tabular scrapers, even when some finds suggested other periods as well. For example, when flint adzes or basalt axes were collected, they were dated as EB II (e.g. Haiman 1986: 58, 115, 119, 178, 234, 235), despite the fact that they were never found in excavations in contexts other than Late Neolithic and Chalcolithic (Rosen 1997: 98; Barkai 2000, *passim*). Today, however, enough evidence exists to show that the two principal artefacts used for dating these sites had a much longer time range than previously believed, and therefore dating them exclusively to the EB II period is unjustified.

Hole-mouth cooking pots appear in 'Uvda Valley sites with early <sup>14</sup>C dates such as 4200 BC at Site 4 (Table 5:

82). Almost 100% of the thousands of tent remains in the desert are circular, 3–5 m. in diameter (see e.g. Avner 1998: 152–54). This is true of the earliest identified tent remains (fifth–fourth millennia BC), the Nabataean and even the Mamlukian tents. Therefore, there is no evidence for rectangular tents to serve as an archetype for the 'Aradian house'. The term 'Aradian' for this house may be misleading since all characteristics (the broad plan, sunken floor, benches and pillar bases) had already appeared during the Chalcolithic in the Near East (e.g. Porat 1987; Epstein 1998), and they only reached their final stage of evolution in the EB urban cultures.

**Table 8:** Histogram of radiometric dates from the site of Nahal 'Issaron, strata C and B (Carmi *et al.* 1994: 395).

18) and even 5370 BC at Site 7 (Table 5: 21). In the excavation of *massebah* shrine 124/XVII, next to Site 9, hole-mouth sherds were recovered in large numbers from all depths of the section (70 cm. deep), beginning only 4 cm. above a hearth dated by  $^{14}\text{C}$  to c. 5800 BC (Avner in press 6, and here Table 5: 25, first date). In another *massebah* shrine, 'Uvda 124/IV, many hole-mouth sherds were found with LN Wadi Raba sherds (Avner *ibid.*). In southern Jordan they were found in Site J 24 with  $^{14}\text{C}$  dates of 4620 BC (App. I: 32). According to the above data, it is possible that the arkose-ware hole-mouth cooking pots already appeared in the desert during the sixth millennium.<sup>13</sup>

<sup>13</sup> In 1977 B. Kozloff showed me the flint and pottery from his excavations in eastern Sinai, which included quantities of hole-mouth sherds. The excavations were never published, but the  $^{14}\text{C}$  results were published by Rothenberg and Glass

The later occurrence of the hole-mouth jars is no less interesting. The same 'EB II' rim shapes are found in an EB III context (Beit-Arieh 1991, figs 6–8) and they extended into the EB IV, sometimes with variations in the rim shapes (e.g. Cohen and Dever 1981: fig. 11). However, their petrographic composition and manufacturing technique continued, alongside the use of carbonate temper that already appears earlier (Porat 1989: 180). In 'Uvda Site 166 the same 'EB II' shaped rims of hole-mouth cooking pots have been found with  $^{14}\text{C}$  dates c. 2330 and 2050 BC (Table 5: 28), without any

(1992), and they are included in Table 1. Some of the sites are dated to the sixth and fifth millennia BC, but currently it is difficult to know whether the earlier deposits contained pottery or not. The chronological discussion of Rothenberg and Glass (1992) is not informative as to the emergence of the desert pottery.

sign of later penetration or contamination of the site.<sup>14</sup> The conclusion is that the so-called EB II hole-mouth cooking pot, as the dominant or only pottery type in desert sites, was actually in use for some 3000 years. Rarely are other types of pottery found next to hole-mouth sherds, but they demonstrate their longevity: LN Wadi Raba sherds, Chalcolithic 'Beersheba' sherds, EB 'Aradian', or EB IV 'Southern family' pottery.

The duration of tabular scrapers was even longer. They appeared as early as the beginning of LN<sup>15</sup> and all types known in the EB are already present at least in the Chalcolithic (McConaughy 1979: 216; Rosen 1983, 1986, 1997: 71–80). Tabular scrapers are found in excavated sites in conjunction with <sup>14</sup>C dates of the sixth and fifth millennium BC, for example, the burial site in Eilat where more than 40 well shaped examples were dated between 5400–4200 BC (Table 5: 39). In the Risqeh site, east of Aqaba, they are dated to c. 4900 BC (Table 5: 42) and in the southern Jordanian Site J 24 to c. 4620 BC (Table 5: 32). In Tall Sabi Abyad, northern Syria (where they are termed 'tile knives'), they first appeared in Level 6, 5900–5200 Cal. BC (Copeland 1996: 315, figs 4.9, 4.16, 4.18; Verhoeven 1999: 158). As to the late occurrence of these tools, Kozloff (1974: 40) and Rothenberg (1974: 19) saw them as typical for the MB I sites (=EB IV) of central Sinai, but basing their dating on survey alone is problematic. In 'Uvda 17, however, excavated by Beit-Arieh, four out of nine tabular scrapers were found in EB IV loci, three in EB II loci, and two on the surface (Rosen 2001: 111). Also in 'Uvda 166, tabular scrapers were found with 'typical EB II' assemblages such as crescent-shaped blades and hole-mouth sherds, but with clear EB IV <sup>14</sup>C dates (see above). These examples indicate that the typical finds in desert sites can only generally date them to the sixth–third millennia BC. For more specific dating, other methods are essential.

## Summary

The above discussion actually shows, in my opinion, how the difficulties in dating the sites lead to a false reconstruction of desert history, and to a misunderstanding of the desert as a habitat. The impression is that we do not really know yet how to read the desert remains. Nevertheless, some preliminary conclusions may be offered:

1. The desert is quite rich in archaeological remains, but despite the thousands of sites added to the region's inventory during the last 25 years, large areas are still unexplored, and many more sites are to be discovered. The multitude of remains that are presently known could not have possibly been left behind by 'nomads who did not leave remains' or by intruders. Neither do they owe their existence to the intervention of any foreign power, since no such power can be conceived of in the neighbouring regions during most of the sixth–third millennia BC time span. Instead, these sites represent the autochthonic desert population and their indigenous culture.
2. In contrast to expectations based on the environmental conditions in the area, and commonly accepted ideas, there were no gaps in settlement in the desert from the Early Neolithic through the EB IV (and beyond). To date, this uninterrupted sequence is derived mainly from sites in the southern Arabah, the Eilat region and eastern Sinai. However, it seems that the principal difference between this region on the one hand, and the surrounding desert on the other, does not lie in the settlement pattern. Rather, it lies in the different attitude towards the sites' dating, and to numbers of <sup>14</sup>C dates retrieved from the sites. With ongoing research, I believe that more of the settlement 'gaps' in these parts of the desert will be also eliminated.
3. The duration of habitation, industrial, cult and burial sites in the desert, as demonstrated by <sup>14</sup>C dates, is often far longer than expected, by hundreds and even thousands of years. Even if these sites were not inhabited each and every year, the results are still highly significant for studying desert cultures, for a better evaluation of the remains, and for reconstruction of the desert's past.
4. Since the desert was less affected by military and political events than the sown lands, at least during the periods discussed, cultural changes took place in a different mode and rhythm than in the fertile zone. It is thus difficult to apply to the desert the chronological framework commonly used in the archaeology of the Near East. Attempts to construct a separate chronology for the desert (see above) are as yet unsatisfactory. At the present state of research it would be more appropriate to use unspecified terms such as 'fourth millennium' or even 'sixth–third

<sup>14</sup> The earlier date, c. 2330 BC, was retrieved from a hearth overlain by the room's southern wall, while the later date was taken from another hearth, 30 cm. higher. Therefore the site is safely dated as EB IV. (The excavation of the site is yet unpublished.)

<sup>15</sup> Yeivin and Olami 1979: fig. 14; Noy 1977: figs 7: 12, 8: 7,8; Garrard *et al.* 1985: fig. 13a, 1987: fig. 12c; Betts 1988: fig. 15: 2; McCartney 1992: figs 14, 15; Rosen 1997: 75.

millennia BC', hoping to define cultural processes, innovations and regional sub-cultures with better precision in the future.

5. A great similarity is found in habitation, cult and burial sites over a long period of time and large desert areas, including the Sahara and the Arabian peninsula (Avner 2002b, chs 4, 5, with references). This speaks for a broad desert cultural *koine*, with local variations. At the same time, commercial and cultural exchange always existed between the desert and the sown.
6. When the nature and role of specific types of sites is studied (agricultural settlements, copper production sites, cult and burial sites, etc.), and then comprehended in an integrated way, the cultural picture of the desert appears different than expected. The desert population emerges as active and creative in both material and spiritual aspects. In the latter, they even had a significant influence on the peoples of the sown lands (see especially Avner 2001, as well as previous publications).

The desert sites still have much to tell us, but today they are rapidly disappearing due to development projects, military training and lack of care. It is not clear how many will survive into the near future for visit and study.

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# The southern Ghors and north-east Arabah: resources, sites and routes

*Burton MacDonald*

## Introduction

Explorers, excavators, geologists, surveyors and so forth have studied various aspects and segments of the Wadi Arabah. One such study, which the writer carried out in 1985–86, was an archaeological survey of its north-eastern segment and its extension to the north, namely, the southern Ghors (MacDonald *et al.* 1992) (Figure 5.1). Another study, which the writer also carried out, that has implications for this paper, was one in the Tafila-Busayra region on the plateau to the east of the Wadi Arabah (MacDonald *et al.* 2004). The purpose of these projects was to discover and date the cultural resources of the relevant areas and, on this basis, to determine their patterns of settlement from Palaeolithic to modern times. In the course of this work, survey team members not only documented the archaeological resources of the areas but, in an attempt to understand how human settlement was possible, noted their natural resources as well. Moreover, they paid attention to the various routes that traversed the Wadi Arabah from east to west and from north to south so as to determine the ways by which people travelled and brought resources to/from the areas.

The present paper builds on the writer's archaeological survey projects. It also incorporates other work done in the areas in an attempt to provide an overview of the three aspects of the Wadi Arabah that this paper addresses.

## Natural resources

The natural resources of the study area include water, plants, bitumen, salt and sulphur, and copper and manganese.

### Water

The most critical resource of the southern Ghors and north-east Arabah is water. The water supply determines the abundance and distribution of other resources such as plants and animals available for hunting-gathering cultures, the crops that can be grown by farmers, and the animals that can be reared by both farmers and pastoralists.

The primary source of water is rainfall. Secondary sources are springs, wells, flowing streams, and moisture stored in the soil. All of the secondary sources are dependent ultimately on rainfall, which generally falls in the Highlands at the Eastern Rim of the Wadi Arabah-Jordan Graben to the east of the Wadi Arabah-Dead Sea-Jordan Depression (Figure 5.2).

A 36-year record at al-Mazar, on the plateau north of Wadi al-Hasa, reports about 340 mm. annual precipitation, and a similar record at at-Tafila, immediately south of the wadi, reports about 280 mm. (Harlan 1981) (Figure 5.1). In contrast, Ghor as-Safi, at the western extremity of Wadi al-Hasa, records only about 65 mm. annual precipitation over a 26-year time range (Table 1).

**Table 1:** Rainfall at as-Safi and two adjacent highland stations (from data sheets of the Natural Resources Authority. The Hashemite Kingdom of Jordan [adapted from Harlan 1981: 156, Table 1]).

<i>Location and Recording Period</i>	<i>Range (mm.)</i>	
Al-Mazar 1937/1938–1973–1974 one season missing		
Ave. 36 seasons:	339.8	(119.8–610.0)
Ave. first 10 years:	414.6	(171.0–491.0)
Ave. last 10 years	315.7	(136.5–610.0)
At-Tafila 1937/1938–1973–1974 no missing data		
Ave. 37 seasons:	280.6	(82.7–751.1)
Ave. first 10 years:	310.8	(131.0–463.5)
Ave. last 10 years:	315.2	(82.7–751.1)
Ghawr as-Safi 1939/1940–1973–1974		
Ave. 26 seasons:	65.2	(18.0–151.5)
Ave. first 10 years:	70.3	(35.0–109.6)
Ave. last 10 years:	57.2	(18.0–151.5)

Annual rainfall in the Wadi Arabah region is less than 100 mm. Specifically, the mean annual rainfall in 1959/1960 and 1966/1967 was less than 25 mm. (Anonymous 1984: 112–14).

Rainfall on the Highlands infiltrates slowly through a chalky formation and is trapped by the hard limestone to emerge where erosion uncovers the impervious layers in the Wadi Arabah-Dead Sea-Jordan

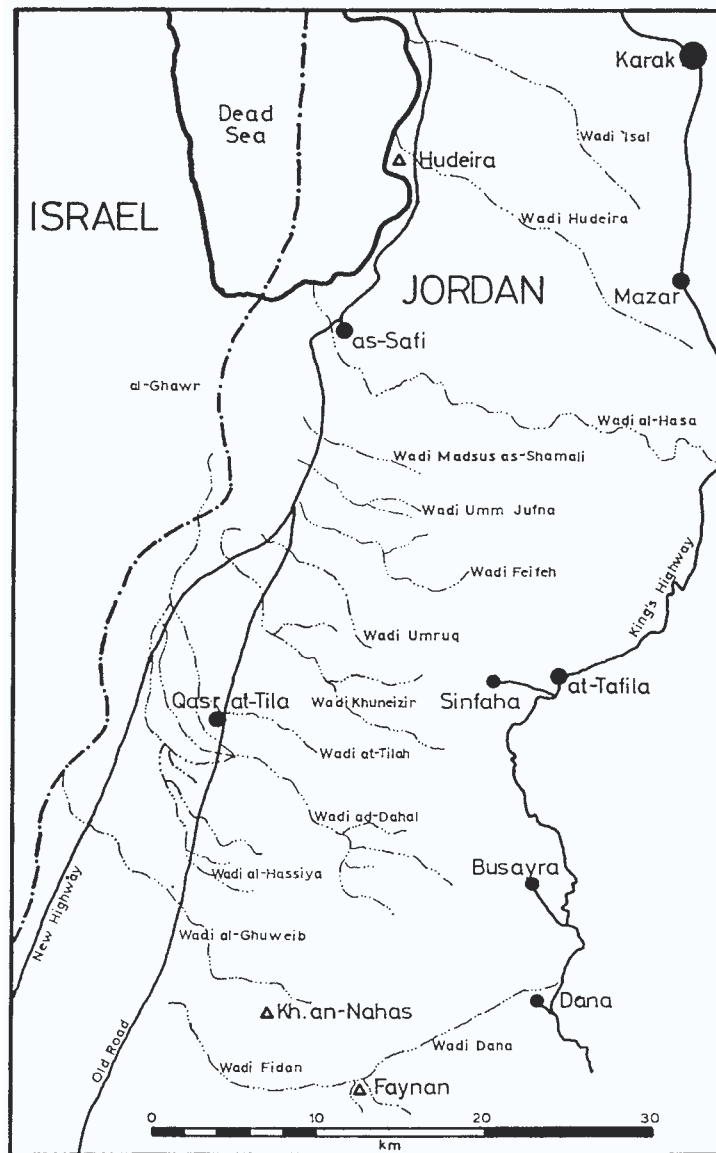


Figure 5.1: General map of the southern Ghors and north-east Arabah.

Depression. The larger springs flow all year long and tend to be more stable with less fluctuation than the rainfall. Where the impervious layers are not too deep, dug wells can tap sufficient amount of water for irrigation. These sources are usually less reliable than springs and wells often go dry. Wells that are dug on low terraces near perennial streams in the wadi bottom are more reliable and these are exploited on a limited scale.

Relative to water resources, Harlan notes that much of the life in the southern Ghors (and by extension the north-east Arabah) depends on rainfall in the Highlands (1981: 162). The ecological ties between the two zones are intimate, fragile, and sensitive. For this reason, an understanding of the natural resources of the Ghors must depend to some extent on an understanding of the ecology of the Highlands (Harlan 1981: 162). For example, water delivery in the Ghors depends not only on rain in the Highlands but on

water retention that is trapped and allowed to percolate slowly to the springs below or is released slowly from the upland soils to the perennial streams (Harlan 1981: 162–63). The distance between the two ecological zones is not great and one can presume a great deal of social contact among the people, the exchange of agricultural produce, and trading in goods (Harlan 1981: 163). In summary, the southern Ghors and north-east Arabah ought not to be considered as isolated from the Highlands.

There are several water sources, in the form of streams and springs, between Wadi 'Isal in the southern Ghors and Wadi Fidan in the north-east Arabah (a distance of c. 65 km.). The streams, in a north-to-south order, are: Wadi 'Isal; Wadi Hudeira (= an-Numeira); Wadi al-Hasa; Wadi Madsus as-Shamali; Wadi Umm Jufna; Wadi Feifeh; Wadi Umruq; Wadi Khuneizir; Wadi at-Tilah; Wadi ad-Dahal; Wadi al-Hassiya; Wadi al-Ghuweib; and Wadi Fidan (see Figure 5.1). However,

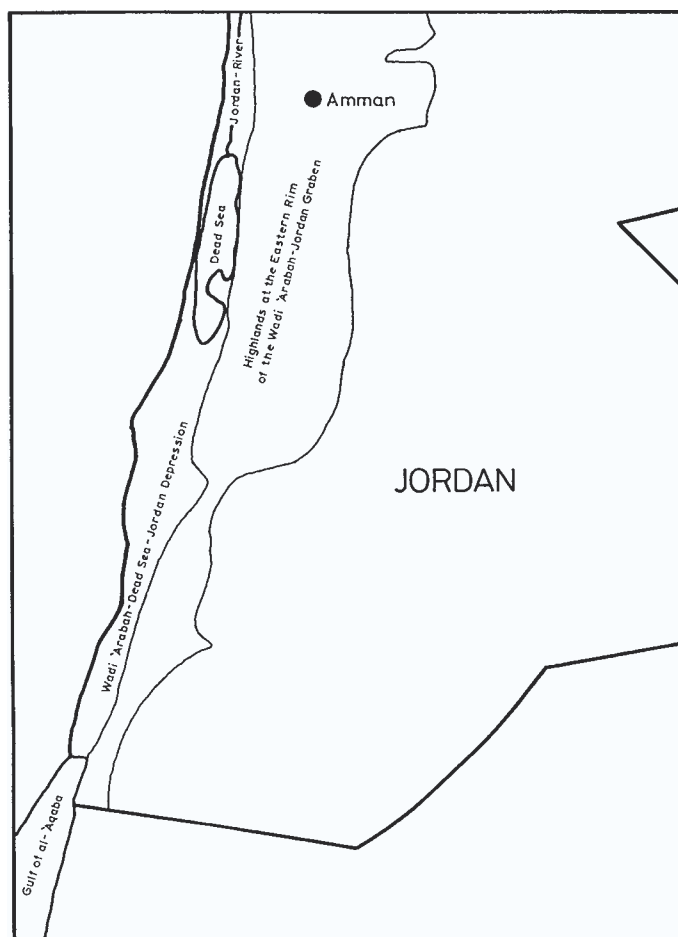


Figure 5.2. General map of the highlands at the eastern rim of the Wadi Arabah-Jordan Graben to the east of the Wadi Arabah-Dead Sea-Jordan Depression.

some of these wadis experience floods that can cause considerable damage to dams and irrigation networks. Moreover, fluctuation in stream flow is often greater than that of spring flow.

Wadi al-Hasa is a perennial stream. It is considered more stable and reliable than other wadis flowing to the Dead Sea Rift and is less subject to disastrous floods than other wadis of the eastern rift escarpment (Harlan 1988). The base flow at as-Safi, at the western end of Wadi al-Hasa, has been rated at 810 l/s based on a limited number of measurements (Harlan 1981) (Table 2).

There are presently modern dams in Wadis al-Hasa, Feifeh, and Khuneizir.<sup>1</sup> The water from these dams is used for the purpose of irrigating the fields of the southern Ghors. In addition, there are springs in most of the wadis flowing into the southern Ghors and north-east Arabah. The water from these springs is also used for irrigation purposes. For example, water from springs in Wadis Hudeira, al-Hasa, Umruq, and at-Tilah irrigates fields nearby. Farther south, team

members of the Southern Ghors and Northeast Araba Archaeological Survey (SGNAS) noted two springs near the western extremity of Wadi ad-Dahal (MacDonald *et al.* 1992: 269). And still farther to the south, ‘Ayn Fidan is located near the western extremity of Wadi Fidan while farther to the east there are springs in both Wadis Ghuwayr and Dana (Barker *et al.* 1998: 23). These springs feed into Wadi Faynan and eventually into Wadi Fidan.

**Table 2:** Sources of irrigation water for southern Ghors (adapted from Binnie Jouzy Arup Bookers Report, 1977) (adapted from Harlan 1981: 157, Table 2).

Location Irrigable	Ave. Yearly base flow (l/s)	Hectares
Wadi al-Hasa	810	1,377
Wadi Feifeh	110	187
Wadi Khuneizir	40	68

The overall pattern is one in which permanent agriculture can be developed near copious and reliable springs and at sites along the wadis that flow from the Highlands into the southern Ghors and north-east Arabah.

<sup>1</sup> Southern Ghors and Northeast Araba Archaeological Survey team members noted the remnants of dams and aqueducts in all these wadis.

It was the availability of water that made it possible for people to settle in the area. Thus, archaeological sites are found near the water sources. Moreover, because of the availability of water, these areas would be ones where travellers would stop for water, rest, and supplies. Thus, there is an association of water sources with routes/tracks.

### *Plants*

Harlan has studied the plant resources of the southern Ghors as part of his work with The Expedition to the Dead Sea Plain (1981, 1982). He provides a short list of the rich flora in the Dead Sea Rift in which a casual collection turned up representatives of 40 different families (1981: 161–62, table 4). The plant yield is low because the area is a desert zone. As indicated previously, survival of these plant species depends upon water that is provided by running streams, springs, or the infiltrating from the Highlands to the alluvial fans of the southern Ghors and north-east Arabah (Harlan 1981: 162).

### *Bitumen*

The Dead Sea was once a major source of commercial bitumen – natural asphalt – in the ancient Near East (Hammond 1959: 40; Forbes 1964: 29–30; Le Strange 1965: 64–66; Sperber 1976: 138–39). Hammond writes that ‘the appearance of bitumen in the Dead Sea is recorded by Diodorus in detail. It is said to spring forth from the center of the sea as a solid mass.... This mass floats on the surface, and is chopped up into workable size with axes and loaded into boats’ (1959: 41). Hammond concludes that Diodorus is correct in reference to the quantity of bitumen present and, thus, to the extent of the industry in the first century BC which was of some importance financially (1959: 42).

Evidence from ‘Ayn Ghazal in Jordan indicates that its inhabitants used bitumen both on their statues and in their burial practices. Rollefson specifies that bitumen was used on statues ‘as an eyeliner around a strikingly white eye bearing a circular iris of bitumen’ (1986: 46; see also Tubb 1985), and that one of the human skulls ‘bore a thin coating of black pigment, possibly bitumen’ (1986: 51). Both of these date to the end of the eighth and the first half of the seventh millennia BC (Rollefson 1986: 47).

Diodorus and Strabo (Sperber 1976: 138) indicate that bitumen was used by the Egyptians for embalming purposes.<sup>2</sup> However, it did have other important uses, for example, waterproofing for coffins and other articles among the Egyptians, as a cement or binding

agent (for example, the caulking of ships [Kurlansky 2002: 358]), for the manufacture of imitation gems, in the colouring and production of metals, and for the manufacture of masks for the preservation of mummy faces (Hammond 1959: 43–44; Forbes 1964: 56–109).

There is evidence for the use of bitumen as a building material at Jericho. Garstang found a thick wall enclosing a large area. The wall was built by cementing large bricks with bituminous earth. The wall can be dated to the Early Bronze Age (Forbes 1964: 27). Forbes cites evidence from the Ophel in Jerusalem and from Tell Beit Mirsim for the use of bitumen during the second and first millennia BC (1964: 27).

De Vaux notes the presence of bitumen in the occupation debris from the Hellenistic and/or Roman periods at both Qumran and ‘Ayn Fashkha at the north-west end of the Dead Sea (1961: 68–69).

It appears that the Nabataeans had, at least for a time, a monopoly on the bitumen industry of the Dead Sea. For them, the industry had both economic and political importance (Hammond 1959: 47; Forbes 1964: 30). However, there was also an interest in the industry on the part of the Ptolemies of Egypt and the Seleucids of Syria (Forbes 1964: 29–30).

Le Strange narrates that the natives of the Dead Sea area ‘anoint the vine plants with bitumen to keep off the worms and grubs’ (1965: 64; see also p. 65 of the same work).

### *Salt and sulphur*

The most prominent product in the Dead Sea region is salt. The salt was used as a basic seasoning in various dishes and was exported from this region to destinations around the country and to far-off lands (Amar 1998: 4). De Vaux notes the exploitation of salt by the Qumran community (1961: 68).

Various types of salt were collected and mined from the Dead Sea region. For example, there is rock salt in the vicinity of the Dead Sea. Specifically, rock salt was mined at Mount Sodom, at the south-western end of the Dead Sea, until the 1990s (Kurlansky 2002: 358). At-Tamimi, in the tenth century AD, makes special reference to the salt mined in the vicinity of the town of Zara, probably the ancient village of Callirhoe, which lay on the eastern shore of the Dead Sea (Amar 1998: 4–5). In addition, he claims that this salt was present farther south in the region of Gebalene, that is, an area to the south-east of the Dead Sea (Amar 1998: 4).

Inhabitants of the area along the east side of the Dead Sea still collect salt. They do so using an implement similar to a garden rake.

<sup>2</sup> For a contrary position see Sperber 1976: 139.

The mining of sulphuric minerals from the Dead Sea region is also mentioned in literature of the Byzantine and Arabic periods. For example, Zo'ar, at the south-eastern end of the Dead Sea, was one of the places at which it was traded (Amar 1998: 5). White sulphur is found in the vicinity of the springs on the east side of the Dead Sea (Amar 1998: 5), while black sulphur could be used for transferring fire produced from flint (Amar 1998: 5).

### *Copper and manganese*

There are two different ore horizons, namely, mixed manganese and copper ores and only copper ores, in the Faynan area (Hauptmann 1986: 415; Hauptmann and Weisgerber 1987: 421; 1992; Hauptmann *et al.* 1992). These resources and their associated technologies, during the various archaeological periods, are presently under study by a team from the German Mining Museum, Bochum, Germany (Bachmann and Hauptmann 1984; Hauptmann *et al.* 1985; Hauptmann 1986; 1989; Hauptmann and Weisgerber 1987) and by Levy *et al.*, University of California, San Diego (2002). To date, Hauptmann *et al.* have posited that copper production in the area extending from the Chalcolithic period up to the thirteenth century AD. The periods specifically posited for its production are: Chalcolithic; Early and Middle Bronze; Iron I; Iron II; Roman; and the Mamluk periods (Hauptmann and Weisgerber 1987: 421–24; for Early Bronze Age metallurgy see Levy *et al.* 2002). In the estimation of these researchers, the Faynan region may represent the oldest, large-mining area for copper in the Near East so far known (Hauptmann 1986: 416).

### *Archaeological sites*

Humans have exploited the resources of the southern Ghors and north-east Arabah for millennia. At first, hunter-gatherers probably exploited these resources on a seasonal basis. Moreover, pastoralists would have fed and watered their animals in the area at least during the winter months of the year. As humans adapted to the region's environment, they settled there permanently. As a result, the archaeological record provides evidence of human occupation down through the millennia. However, the earliest evidence of human occupation in the area under consideration comes from the north-east Arabah where Lower/Middle Palaeolithic remains are present (MacDonald *et al.* 1992; Barker *et al.* 1997; 1998). The earliest evidence for humans in the southern Ghors comes from the Neolithic period. The lack of evidence for earlier occupation in the area of the southern Ghors can be explained by the fact that this area was covered by water, in the form of the Lisan Lake, until after c. 16,000 BP (Donahue 1984; 1985; see also Neeley 1992: 24–25 and associated references).

A large number of archaeological sites are associated with the wadis of the southern Ghors and north-east Arabah. Of these sites, the major architectural ones will be treated here summarily in a north-to-south order.

### *Sites associated with Wadi 'Isal*

Jacobs' survey of the south bank of Wadi 'Isal, from Kathrabba in the east to Ghor 'Isal in the west, resulted in the identification of 90 sites ranging in date from the Palaeolithic to the Middle/Late Islamic period. The great majority of these sites are Byzantine with smaller numbers of Palaeolithic, Chalcolithic, Iron II, Nabataean, Roman, and Middle/Late Islamic period ones (Jacobs 1983: 249). Jacobs identified three springs in the upper reaches of the wadi (1983: 245, 248) and segments of a paved road (1983: 245, and figures throughout).

Three sites at the western end of the wadi may have been associated with the paved road, just mentioned (cf. Figure 5.3):

- 1) Khirbat 'Isal: Glueck describes this site as 'a large, completely ruined Byzantine structure' (1935: 6).
- 2) Qasr 'Isal: Glueck describes this site as 'a small ruined structure', measuring 16 m.<sup>2</sup> and 'probably also Byzantine in origin' (1935: 6). Jacobs proposes that the Qasr, at which she found predominantly Early Byzantine pottery, could have been used 'as a watch post or a customs or toll station' (1983: 267).
- 3) Jacobs surveyed another Early Byzantine structure, measuring 27 × 12 m., in Ghor 'Isal. It is the westernmost site in her survey area and may have been a watch post associated with the above-mentioned route (Jacobs 1983: 268).

It ought to be noted that these so-called 'watch posts' could just as well have been associated with the water and plant resources at the western extremity of this as well as other wadis located farther to the south. These 'watch posts' could have been used to guard the resources of the area.

### *Sites associated with Wadi Hudeira*

There are two main sites, namely, an-Numeira and Rujm an-Numeira, associated with Wadi Hudeira.

- 1) Numeira: Rast and Schaub explored the site in 1973 (1974: 8–9) although it appears that Glueck had noted it previously (1935: 7). It is located on an alluvial fan on the south side of Wadi Hudeira where it enters Ghor an-Numeira (Rast and Schaub 1974: 8;

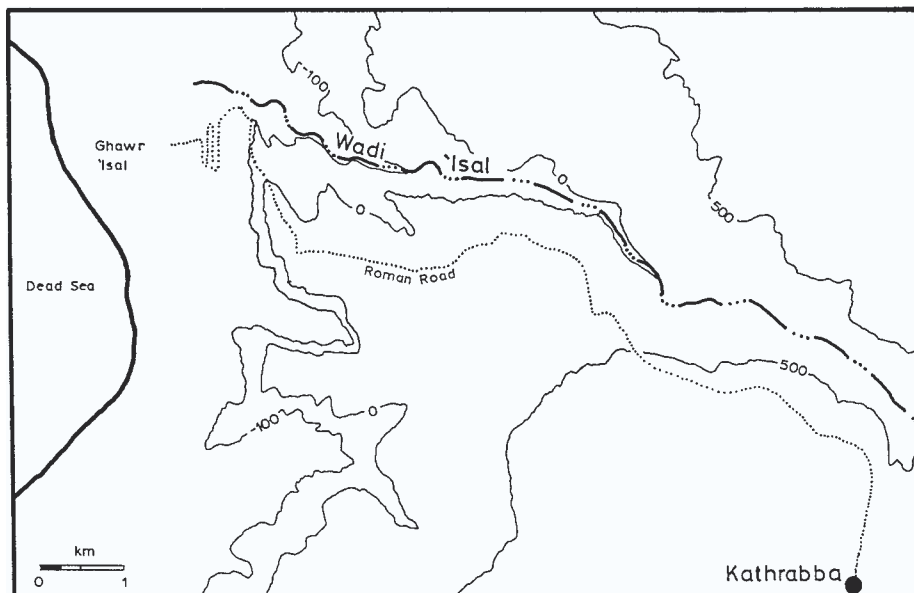


Figure 5.3: Route along the south side of Wadi 'Isal.

Donahue 1984; 1985). The Expedition to the Dead Sea Plain investigated the site during the late 1970s and early 1980s (Rast and Schaub 1980; Coogan 1984; Donahue 1984; 1985; Schaub and Rast 1984). The site is walled and is EB III in date (Rast 1981; Coogan 1984). Fire, caused by earthquakes (?), destroyed it toward the end of the EB III period and it was never settled afterward (Rast 1981: 36; Coogan 1984: 81; Donahue 1984; 1985: 139).

- 2) Rujm an-Numeira: Glueck describes the site, located c. 1 km. south of Wadi Hudeira, as measuring 17 x 19 m. and standing around 4 m. high. He found large quantities of Nabataean sherds both on the *rujm* as well as around it and he understood the site as 'an important way-station on the Nabataean track which led from 'Aqabah through the 'Arabah to Kerak' (1935: 7; see also Rast and Schaub 1974: 8).

### *Sites associated with Wadi al-Hasa*

The area where Wadi al-Hasa enters the southern Ghors has been a place of human activity and settlement from the time the waters that once formed part of the Lisan Lake receded. Extensive work in the area over the past 100 years has uncovered some of the remains of that activity in the form of cemeteries, villages and/or towns, a fortress, a hermitage, sugar mills, water reservoirs, and remnants of aqueducts. These remains date to the Chalcolithic/Early Bronze, Early Bronze I–III, Iron I–II, Nabataean, Roman, Byzantine, and all Islamic periods. A brief description of some of these sites follows.

#### AN-NAQA' / AS-SAFI:

The site, which consists predominantly of cemeteries from the Early Bronze and Byzantine periods, is located

on the south bank of Wadi al-Hasa. It is actually positioned on a ridge that at one time jutted farther to the west into what is now agricultural fields. Through time, however, the ridge has been cut by Islamic-period sugar mills, agricultural fields, and possibly earlier structures. Today, a Jordan Valley Authority town-site is located at its top. Ceramics collected at the site indicate that the site has EB I–III, Byz, Mam, and Mod remains (MacDonald *et al.* 1992: 249; Politis 1998; Jones *et al.* 2000: 524). The tombs, which number in the thousands, comprising the site have been extensively looted (Waheeb 1995). Although far less numerous than those dating to EB I, the burials from the Byzantine cemetery belonged, in the opinion of Politis (1998: 628; see also Waheeb 1995: 553–55), to one of the most interesting communities of the fourth to seventh centuries AD. Politis uncovered more than 300 funerary stelae, of which approximately 90 per cent are inscribed in Greek and the remainder in Aramaic, dating to this period (Politis 1998: 630–31).

#### TULAYLAT QASR MUSA HAMID:

Located c. 2 km. due west of Kh. Sheikh 'Isa in Ghor as-Safi, the site is a low-lying archaeological mound extending over several hundred square metres (Politis 1999: 543). Politis identified Iron Age II-period ceramics as well as two fragments of flint sling stones at the site (1999: 543). According to him, 'it is possible therefore, that Tulaylat Qasr Musa Hamid was *Old Testament Zoar*, one of the "cities of the plain"' (1999: 544).

#### UMM AL-TAWABIN / KH. LABRUSH / AL-EBROSH:

This is a predominantly Nabataean (=LHell–ERom) fortress located on a high hill to the south-east of as-Safi and to the east of the Wadi al-Hasa gorge. It provides a view of the entire southern end of the Dead Sea and the southern Ghors as well as the escarpment

leading to the north-east Arabah. Periods represented at the site are: Chal/EB; Nab (LHell-ERom); Rom; Byz; Mam; Ud (MacDonald *et al.* 1992: 249).

#### HERMITAGE:

This ecclesiastical structure is located on the north bank of Wadi al-Hasa just as the wadi opens out into Ghor as-Safi. The site consists of two adjacent, rock-cut chambers and a rock-cut cistern. The site is Byzantine (MacDonald 1992: 104; see also Frank 1934; Alt and Wickert 1935: 72–73; Canova 1954: 416; Donner and Knauf 1985; 1986).

#### KHIRBAT SHEIKH 'ISA:

This site is located about 150 m. north-west of Tawahin as-Sukkar. Apparently a once imposing mound, it has been severely damaged by agricultural activity and a new road. The tomb of the sheikh who once protected the site is now gone. The site is traditionally identified with the Byzantine Zoara (see, for example, the Madaba Mosaic Map [Saller and Bagatti 1949: 194–95; O'Callaghan 1953; Avi-Yonah 1954; 1977; Gold 1958; Donner and Cüppers 1977]). It may also be medieval Zughar (Jones *et al.* 2000: 523). Periods represented: EB I; EB; Rom; Byz; Um; LByz–Um; Abb; Fat; Ayy–Mam; Ud (MacDonald *et al.* 1992: 249; on this site see also: Tristram 1873: 62; Frank 1934: 204–5, plan 8, 9A, Taf. 24A; Glueck 1935: 8–9; King *et al.* 1987: 448, 456; and Jones *et al.* 2000).

#### TAWAHIN AS-SUKKAR/QASR AL-TUB(AH) (SUGAR MILLS):

Identification of the site as a sugar mill is based in part on the numerous sugar pots and moulds found there. However, the site's architecture also supports this identification. Periods represented: EB II–III; Nab; Byz; LByz–Um; LAbb/Fat; Mam; Mod; Ud (MacDonald *et al.* 1992: 249; see also: Tristram 1873: 63; Albright 1924: 4; 1926: 57; Mallon 1924: 438, n. 1, 439; Frank 1934: plan 8; Glueck 1935: 7 and n. 19; Rast and Schaub 1974; King *et al.* 1987: 446, 455–56; Jones *et al.* 2000; for a plan of the site see Jones *et al.* [2000: 526, fig. 4]).

#### AL-RUJUM/KH. CHEIKH 'ALI/KH. AS-SAFIEH:

This site is located about 1 km. south-west of the town of as-Safi on the south bank of Wadi al-Hasa. The mound measures c. 200 × 100 m. and is covered, especially on the eastern side, by a modern cemetery. The large collection of ceramics from the site includes sugar pots and moulds, rims of large vats and zirs. The quantity and variety of glazed wares is impressive. The site is dated to the Early Islamic 2 through Late Islamic 1 or 2 periods (Whitcomb 1992: 115–16). Periods represented: EIsl 2; MIsl 1; MIsl 2; LIsl 1 or 2 (Ott).<sup>3</sup>

<sup>3</sup> Whitcomb suggests a change from the Byz-EIsl 1 site of Kh. Sheikh 'Isa to Al-Rujum in the EIsl 2 period. The latter site existed for a period of c. 500 years. After this time, Whitcomb believes that the settlement moved to what is now the modern town of as-Safi (1992: 116). For further information on Al-Rujum see: 'el-Maqbara' in Mallon 1924: 435; and King *et al.* 1987: 448.

The area of 'Unayz is located between Wadi al-Hasa and the modern Aqaba-Dead Sea Highway. Two areas of 'Unayz have been identified as belonging to the Medieval Islamic settlement. These are: 1) Al-Ameri, an Islamic cemetery (Politis 1998: 627); and 2) al-Birkah, as the Arabic name implies, a water reservoir (Politis 1998: 627).

#### AL-MASHNAQA:

This site is located to the north of al-Naqa', the cemetery described above (p. 80). 'Traces of aqueducts and ancient mills are still visible at the surface there' (Waheeb 1995: 555).

The sites associated with Wadi al-Hasa can be easily accessed from the north, south, and south-west.

### *Sites associated with Wadi Feifeh*

The sites associated with Wadi Feifeh date somewhat earlier than those associated with Wadi al-Hasa. While those at the latter date no earlier than the Chalcolithic/Early Bronze, those at the former go back to at least the Pottery Neolithic.

#### RUJM FEIFEH – WESTERN SEGMENT:

The site is located 10 km. south of as-Safi. It is the western extremity of a ridge on which there are two distinct mounds separated by a saddle (Rast and Schaub 1974: 11–12; MacDonald *et al.* 1992: 256). This area is part of a Pottery Neolithic village, an Early Bronze cemetery, and an Iron II fortress or tower. The Expedition to the Dead Sea Plain's work at the site in the early 1990s determined that the walled structure at the site dates to the seventh century BC (Lapp 1994). However, there are remnants of the Early Bronze cemetery under the structure (Schaub 1997: 62). A wide range of periods are represented in the sherd collection from the site. Periods represented are: PNL; NL–Chal; Chal; Chal/EB; EB I; EB IIB; EB IVA; EB; Iron I–II; Iron II; Iron II–Busayra painted ware; Rom; LByz–Um; Fatt/Ayy-some glazing; Isl; Ott; and Ud (MacDonald *et al.* 1992: 256).

#### RUJM FEIFEH CEMETERY:

This is the eastern extension of what is described above. It is mainly an EB I cemetery that extends over a southern, central, and western ridge system. It covers an area of at least 1.00 × 0.50 km. Pottery Neolithic remains, probably a settlement, are within the area covered by the cemetery. Periods represented in the pottery collection are: PNL; NL–Chal; Chal; Chal/EB; EB I; EB IV; EB; Isl-painted; Ott; and Ud (MacDonald *et al.* 1992: 76).

#### FEIFEH – AQUEDUCT:

Remnants of an aqueduct and other structures are located to the south-east of Feifeh Cemetery. The features (aqueducts, buildings, and collecting pools)

appear to be associated with the use of water from Wadi Feifeh. Periods represented in the sherd collection are: EB; Isl; and Ud (MacDonald *et al.* 1992: 257).

#### QASR FEIFEH:

This site, called a Qasr, is located c. 1 km. to the west of Rujm Feifeh. It is today associated with the modern village of Feifeh. The site comprises the rectangular, mud-brick walls of a sugar mill, and collected examples of sugar moulds and pots tend to confirm this. Periods represented: Byz; EIsl 1; EIsl 2; MIsl 2 (Whitcomb 1992: 115; MacDonald *et al.* 1992: 258; see also Mallon 1924; King *et al.* 1987: 457).

#### *Sites associated with Wadi Umruq*

Only several of the sites at the western extremity of the wadi are outlined briefly here.

#### RUJM UMRUQ:

This is a tomb/tower located on an isolated 'island' along the north side of Wadi Umruq near its mouth (Raikes n.d.: 38; MacDonald *et al.* 1992: 83, 258). The tower probably initially monitored traffic entering and/or exiting the wadi especially during the Hellenistic-Byzantine periods. It was later used as a burial place. Periods represented in the sherd collection are: Hell; Nab; Nab (=ERom); LRom; Byz; Um (?); and Ud (MacDonald 1992: 258).

#### SGNAS SITE 133:

This is a very well-preserved 'domestic' cluster on a plateau south of Wadi Umruq. The ceramics collected at the site are dated to the Chalcolithic period (MacDonald *et al.* 1992: 263).

Other associated sites that SGNAS team members investigated in this wadi are cemeteries and/or graves, sherd scatters, and an enclosure. Ceramic material collected in association with these sites is dated to: PNL-Chal; Chal/EB; EB IV; Iron Age; Iron II; Hell; Nab; Rom; Byz; LIsl; and Mod (MacDonald *et al.* 1992: 160-64). Waheeb's investigation of the wadi uncovered materials from the same cultural-temporal units (Waheeb 1993).

#### *Sites associated with Wadi Khuneizir*

Wadi Khuneizir is the most southerly located wadi that enters the southern Ghors. The area in its vicinity is especially noted for its EB IV tombs.

#### RUJM KHUNEIZIR:

This site consists of a watchtower located on a high hill at the south-eastern extremity of the southern Ghors. The tower is probably Iron II in date. Thus, like the one at Rujm Feifeh, it is probably related to Edomite presence in the area. EB IV graves are eroding out of the slope of the hill on which the tower

is located. Periods represented at the site are: Chal; EB IV; Iron IA; Iron II; Iron Age; and Ud (MacDonald *et al.* 1992: 260).

There is a series of cemeteries or graves to the east and south of Rujm Khuneizir. Most of the pottery eroding out of the graves is EB IV in date (MacDonald *et al.* 1992: 260-61). (One of the most imposing of these cemeteries is Abu Ishariebeh, SGNAS Site 141 [MacDonald *et al.* 1992: 263-64].)

#### SGNAS SITE 112:

This site is an imposing and well-built aqueduct. It begins where the Jordan Valley Authority has built a modern water-collecting device in Wadi Khuneizir. It can be followed for a distance of c. 0.60 km. to a tributary wadi that enters the main wadi from the east. Its date is unknown (MacDonald 1992: 261).

#### *Sites associated with Wadi at-Tilah*

#### QASR AT-TILAH:

Qasr at-Tilah is a caravanserai at the mouth of the wadi. There are extensive agricultural fields that are associated with the reservoir and fort that comprise the site. The aqueduct that brought water to the reservoir can be followed up the north side of the wadi to a spring. It looks as if a mill was at one time positioned at the south-west corner of the reservoir. Periods represented in the ceramics that the SGNAS team members collected at the site are: Iron II; Hell; Nab-painted; Nab (=ERom); Rom; Byz; Um; Mod; and Ud (MacDonald 1992: 265 and 92-93, figs. 19 and 20 for plans of the fort, reservoir, and fields and their relationship; see also Glueck 1935: 12-17).

#### AGRICULTURAL FIELDS:

There are presently extensive agricultural fields to the north and west of Qasr at-Tilah. These fields are irrigated by water from the nearby wadi. It is not unreasonable to suggest that there were also agriculture fields associated with the fort and reservoir in various periods in the past.

#### *Sites associated with Wadi ad-Dahal*

There are no major architectural sites associated with Wadi ad-Dahal. However, the large number of camping sites, cemeteries, and lithic and sherd scatters associated with the wadi are testimony to the fact that it has been the scene of human activity for millennia. Furthermore, the location of a former Police Post at a high point where Wadi ad-Dahal enters the north-east Arabah indicates that it served as a monitoring site for traffic entering and exiting the wadi. This post is not unlike older structures at the western extremity of Wadis 'Isal, Hudeira, Feifeh, Umruq, and Khuneizir.

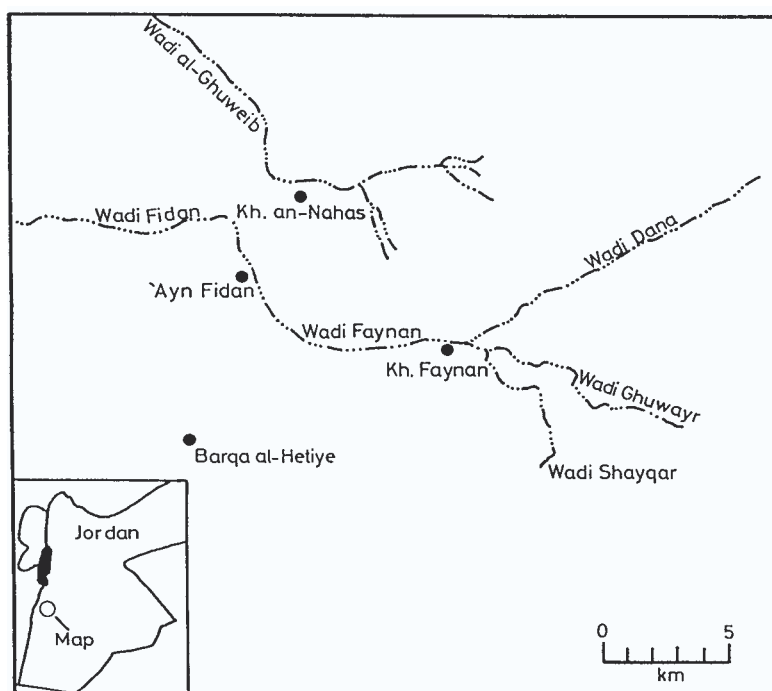


Figure 5.4: Wadis Dana, Faynan, and Fidan routes.

In 1986, SGNAS team members surveyed 41 sites (12 to the west of the 'Old Road'<sup>4</sup> and the remainder to its east) in the western extremity of Wadi ad-Dahal (MacDonald *et al.* 1992: 266–71). Periods represented in the ceramics that team members collected at these sites include: Chal/EB; EB IV; Iron Age; Iron I; Iron II; Nab; Rom; Byz; and Early and Late Islamic.

In 1999, Tafila-Busayra Archaeological Survey (TBAS) team members travelled from just south-west of Busayra along a dirt track that enters the north-east Arabah in the western segment of Wadi ad-Dahal (MacDonald *et al.* 2000: 510–11; 2004). Along this track, team members investigated 19 sites that date to: MPL; Chal/EB; Iron Age; Late Iron I; Iron II; ERom; LRom; Byz; and all Islamic periods (MacDonald *et al.* 2000: 511, table 3; 2004).

A comparison of the archaeological cultural units represented in the surveys of Wadis 'Isal, Umruq, and ad-Dahal indicates that there is consistency in the periods during which these three wadis were the scene of human activity.

#### **Sites associated with Wadis Fidan and Faynan**

There has been a great deal of archaeological work in the Wadi Fidan and Faynan regions over the past 30 years (Figure 5.4). Raikes (n.d.; 1980; 1985), in the six

years of work between 1967–69 and 1975–79 on the construction of the as-Safi to Mazra'a and the as-Safi to Aqaba highway, added a great deal to the archaeological inventory in the area. The SGNAS team members' work (1985–86) in the area of Wadi Fidan profited from Raikes' exploration (MacDonald *et al.* 1992).

Hauptmann *et al.* of the German Mining Museum, Bochum, Germany, began a series of archaeometallurgical explorations and mining-archaeological studies in the Wadi Fidan region with a preliminary investigation in 1983 (Bachmann and Hauptmann 1984). The first survey season took place in 1984 (Hauptmann *et al.* 1985), while the second (Hauptmann 1986; Hauptmann and Weisgerber 1987) and third seasons were in the field in 1986 and 1987. This work has resulted in a vastly increased knowledge of the periods when this area was mined, the sites used for mining and smelting activities, and the technology employed, especially during the earliest periods (Hauptmann 1989; 2000; Hauptmann and Weisgerber 1992; Hauptmann *et al.* 1992). Levy *et al.*, beginning in the 1990s, are continuing this work with emphasis on sites in the area of Khirbat Hamra Ifdan (Adams 1991; 1992; 1999; 2000; Adams and Genz 1995; Levy *et al.* 1999; Levy *et al.* 2002) and Khirbat an-Nahas (Levy 2002).

The work of Hauptmann *et al.* at the mining and smelting sites in the Faynan and Fidan regions indicates that copper production extends from the Chalcolithic period into the thirteenth century AD in the area (Hauptmann and Weisgerber 1992). This dating is based on pottery, mining tools, and coins (Hauptmann and Weisgerber 1987).

<sup>4</sup>The 'Old Road' appears on all 'The Hashemite Kingdom of Jordan (Archaeological Map) Sheet 2, 'Karak' (Scale 1: 250,000) maps printed prior to the 1980s. It appears as a 'track' in Sneh *et al.* 1998.

The British Institute at Amman for Archaeology and History (now the British Council for Research in the Levant) began work, farther to the east, in Wadi Faynan in the mid-1990s. This work included areas in the neighbouring wadis of Dana, Ghuwayr, and Shayqar (Barker *et al.* 1997; 1998; Findlater *et al.* 1998; Finlayson and Mithen 1998; Freeman and McEwan 1998; McQuitty 1998; Wright *et al.* 1998). As a result of this work, the British team has documented the history of events in the area from c. 150,000 years ago to the present. This evidence includes material from the Middle Palaeolithic, Epipalaeolithic, Pre-Pottery and Pottery Neolithic, Chalcolithic, Early Bronze, late Iron Age, Nabataean, Roman, and Byzantine periods (Barker *et al.* 1997: 32–38; 1998: 20–21, 23–25). In addition, Fritz's work at Barqa al-Hetiye and Khirbat an-Nahas in the Wadi Fidan area in the 1990s uncovered ceramics and architectural remains from both the Iron I and Iron II periods (Fritz 1994; 1996) (Figure 5.4). Several of the major architectural sites in the area are treated briefly.

#### KHIRBAT AN-NAHAS:

This is an important smelting site on the south side of Wadi al-Ghuweib (Musil 1907–8: 298; Frank 1934: 216, 218–19 and plan 16; Glueck 1935: 26–29 and 166, plate 4; Bachmann and Hauptmann 1984; Hauptmann *et al.* 1985; Hauptmann 1986; Knauf and Lenzen 1987; MacDonald *et al.* 1992: 76, 266; Fritz 1996). The site is an extensive complex of structures spread over a large area (MacDonald *et al.* 1992: 76, 266; Fritz 1996; Levy 2002).

#### KHIRBAT AL-JARIYEH:

This is another smelting site (Glueck 1935: 23–25 and 165, plate 3; Hauptmann *et al.* 1985; Knauf and Lenzen 1987; MacDonald *et al.* 1992: 76). It is located to the north-east of Kh. an-Nahas and to the west of Kh. al-Ghuweib. It sprawls over two high, flat areas separated from one another by Wadi al-Jariyeh. Glueck describes the site as covered with ruins of houses and smelting furnaces (1935: 23).

#### KHIRBAT AL-GHUWEIB:

This is a very large smelting and village site location on both sides of Wadi al-Ghuweib. Glueck appears to have been the first archaeological explorer to visit the site (Glueck 1935: 23–25 and 165, plate 3). It is included in the German Mining Museum's archaeometallurgical study of the region (Hauptmann *et al.* 1985; Hauptmann 1986; Knauf and Lenzen 1987). There are ruins of structures, heaps of slag, and graves, some of which are probably Bedouin, throughout the site (MacDonald *et al.* 1992: 76, 266).

#### KHIRBAT HAMRAT FIDAN:

The site is located on an 'island' on the west side of Wadi Fidan c. 1 km. north of 'Ayn Fidan (MacDonald *et al.* 1992: 252; Adams 1992; Levy *et al.* 1999; Levy *et al.* 2002). It

stands c. 25 m. above the Wadi Fidan drainage. Levy *et al.*'s work at the site demonstrates that the site 'represents the first near-complete EBA workshop in the ancient Near East' (2002: 425). Although the site was occupied during the Islamic, Byzantine, Iron, and EB IV periods, it was during the EB III period (c. 2700–2200 BC) that it was most extensively occupied (Levy *et al.* 2002: 428).

#### SGNAS SITE 12/RAIKES' SITE 'A':

This site, first documented by Raikes (n.d.; 1980), is located on a small 'island' at the mouth of Wadi Fidan. Adams excavated the site in 1989 and 1990 and preliminary indications are that the site is predominantly Pre-Pottery Neolithic B (MacDonald *et al.* 1992: 71, note 5).

#### KHIRBAT FAYNAN:

The architectural remains on the surface of this site date to the Byzantine period (MacDonald 2000: 83–84). However, the site dates much earlier, with mining and smelting activity peaking in the EB II–III periods. Nevertheless, there is also evidence for smelting activity at the site during the Middle Bronze, Iron II, Roman, Byzantine, and Middle/Late Islamic periods (Hauptmann 1997: 310).

#### BARQA AL-HETIYE:

The site is located c. 12 km. to the west of Khirbat Faynan and c. 7 km. south of 'Ayn Fidan. The structures comprising the site were associated with the mining and smelting activities in the Faynan region. Fritz dated the complex to the Early Bronze and Iron I periods (Fritz 1994), but the Iron Age occupation is now dated on radiocarbon grounds to the ninth century BC, within Iron II (Bienkowski 2001).

What a listing of the sites in the various wadis flowing east to west into the southern Ghors and north-east Arabah demonstrates, is that these wadis have been the locus of human activities for centuries. The sites, as documented above, indicate some of the periods when these wadis were used by travellers, traders, pastoralists and so forth. As the next section of the paper demonstrates, various segments of the population would have used these wadis for travel from the plateau to the east to the Wadi Arabah, and across the wadi to the west and north-west. Alternatively, these wadis could have been used to join up with a major route going north to south in the Wadi Arabah.

## Routes

It is a misconception that there was never a major roadway through Wadi Arabah from north to south (Bowersock 1983: 179; Parker 1986: 6). However, several major longitudinal roads are clearly visible on the surface, on the eastern side of the wadi (Raikes n.d.; Smith and Niemi 1994: 479). Moreover, there are a

number of east-to-west routes. These routes are the subject of this portion of the paper.

A major north–south route would have connected all the water sources and archaeological sites discussed previously. This route would have run along the eastern edge of the Wadi Arabah-Dead Sea-Jordan Depression at the foot of the Highlands at the Eastern Rim of the Wadi Arabah-Jordan Graben (Figure 5.1). It was located to the east of the modern-paved Arabah road in Jordan.<sup>5</sup>

In addition, there would have been a number of ancient routes/tracks coming from the plateau to the east into the southern Ghors and north-east Arabah. These routes, associated with Wadi ‘Isal; Wadis Hudeira and al-Hasa; Wadi Umruq; Wadi ad-Dahal; and Wadis Dana, Faynan and Fidan will be treated in a north-to-south order.

### *Wadi ‘Isal route* (Figure 5.3)

Glueck photographed a route, which he calls a Roman one, in 1936 (1939: 147 and fig. 49 a–b on p. 148) that goes from Kathrabba in the Highlands to Ghor ‘Isal along the south-east side of the Dead Sea. He observed traces of the southward extension of it along the east side of the Dead Sea leading directly to Ghor as-Safi (1939: 89, 147). As noted previously, Jacobs (1983) surveyed this route as part of her investigations of the south ridge of Wadi ‘Isal (Figure 5.3). She is not convinced that the road is Roman since ‘the great majority of sites were Byzantine, with a much fewer number of Palaeolithic, Chalcolithic, Iron II, Nabataean, Roman and Mamluk’ (Jacobs 1983: 249; see also pp. 267–68). Moreover, both Glueck (1935: 6) and Jacobs (1983: 267–68) identify the two main structures (Glueck calls them Kh. ‘Esal and Qasr ‘Esal) at the west end of the wadi and the road to be probably Byzantine.

Relative to this Wadi ‘Isal route, Glueck posits that ‘one branch of it then probably crossed to the w. side of the Dead Sea over the ford which used to be passable from the Lisan to the other side’ (1939: 89). Although they found no trace of it, King *et al.* refer to this ford while noting that it ‘does not appear to have been easy to cross because of the depth of the water’ (1987: 445; see also fig. 3, p. 444). However, Klöner (1996: 112) does not indicate a road crossing the Lisan. It is more likely that the route branched off from the main north–south road on the east side of the Dead Sea and went south-west of the Dead Sea to ‘En Tamar (Gichon 1992; 1993;

Klöner 1996: 112; Freeman-Grenville *et al.* 2003: 207, map 1; Figure 5.4).<sup>6</sup>

### *Routes between Wadi Hudeira and Wadi al-Hasa*

Ben-David recently published preliminary information on routes between Wadi Hudeira and Wadi al-Hasa (2001; 2002). Both of these routes descended from Khirbat Dubab on the plateau to the southern Ghors. On the plateau, they joined and continued east to the *Via Nova Traiana* (Ben-David 2001: 139, fig. 1). The most northerly located of these two routes, which Ben-David describes as ‘a secondary Roman road,’ exits in the southern Ghors c. 7 km. north of as-Safi (2001: 143). The second road, which Ben-David describes as ‘a paved Roman road’ (2001: 140) and an ‘imperial road’ (2001: 143), can be followed to a distance of 1.5 km. to the north of as-Safi. Ben-David assumes ‘that these roads were built along older roads on the same course’ (2001: 143).

### *Wadi Umruq route*

An asphalt road, built in the 1990s, goes along Wadi Umruq from just south of at-Tafila on the plateau to Ghor Feifeh. It follows, at least in places, a path that appears on the 1:50,000 scale map (K737 series, Sheets 3051.I and 3151.IV) as going from the southern Ghors to just south of at-Tafila. SGNAS team members (MacDonald *et al.* 1992: fig. 1) investigated the western segment of this road alignment in 1986 and Waheeb (1993) its central and eastern portion in 1991. Moreover, Tafila-Busayra Archaeological Survey (TBAS) team members surveyed in the territory along the eastern segment of this road in 1999 (MacDonald *et al.* 2000).

A site, Rujm Umruq (see above), at the western end of the Wadi Umruq route, gives the impression that it once monitored traffic entering/exiting the wadi (MacDonald *et al.* 1992: 83, 258). This site is not unlike both Khirbat and Qasr ‘Isal at the western extremity of Wadi ‘Isal and Rujm an-Numeira near the western extremity of Wadi Hudeira. However, as mentioned previously, the site could have just as well been associated with the water and plant resources of the area.

<sup>5</sup> The dirt track appears on ‘The Hashemite Kingdom of Jordan (Archaeological Map) Sheet 2, ‘Karak’ (Scale 1: 250,000) maps printed prior to the 1980s.

<sup>6</sup> There is evidence that the early explorers to the Dead Sea region used such a route. For example, Irby and Mangels (1823; 1844) passed along the south end of the Dead Sea in 1817–18, while de Saulcy (1853) used the same route in January 1851. Seetzen (1854–55) visited Syria and Transjordan in 1805 and 1806. In his travels, he passed along the north–south road in the Highlands as far as al-Karak and from there he passed around the southern extremity of the Dead Sea to Jerusalem. Likewise, Klein (1880) in January–February 1873, Hill (1896) in 1895, and in 1897–98 Brünnow and von Domaszewski (1904) journeyed from/to Jerusalem around the south end of the Dead Sea.

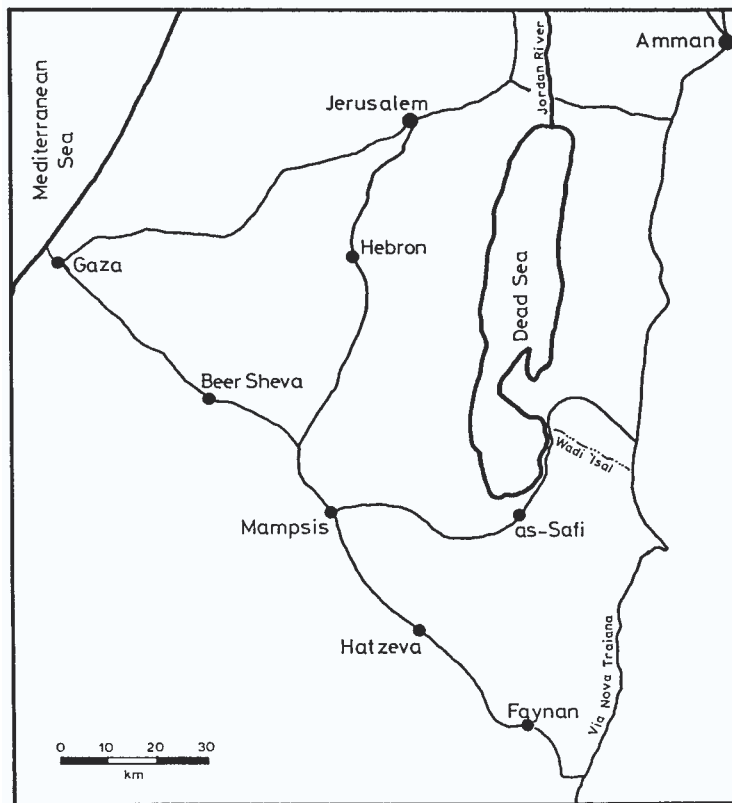


Figure 5.5: Routes from the southern Ghors and north-east Arabah to the west and north-west.

On the basis of the archaeological evidence (MacDonald *et al.* 1992: 260–64; Waheeb 1993: 135–36), it is apparent that the route along Wadi Umruq would have been in use in the past in the same periods as the one along the south side of Wadi 'Isal. Like the Wadi 'Isal route, it would have joined the north–south road in the southern Ghors. From here, it too could have branched off south-westward to 'En Tamar and then on west and north-west (Figure 5.5).

#### *Wadi ad-Dahal route*

As pointed out above, there is ample evidence for human use of the Wadi ad-Dahal from the Middle Palaeolithic to the modern period. In addition, as noted below, there is documentation for the use of this wadi as a route.

In the winter of 1918 T.E. Lawrence ('of Arabia') travelled by camel from at-Tafila to the British headquarters at Beersheba. His route passed by Busayra, down the great pass into the bottom of Wadi ad-Dahal – where he comments on its swift stream (1926: 454) – and then on across Wadi Arabah and westward to his destination (Lawrence 1926: 452–54).

In 1999, TBAS team members travelled, by means of a four-wheel drive vehicle, from just west of Busayra along a dirt track that enters the north-east Arabah in the western segment of Wadi ad-Dahal (MacDonald *et al.* 2000: 510–11; 2004). Because of the archaeological

materials associated with this route, detailed above, it could have been in use during several archaeological periods.

A comparison of the periods represented in the surveys of Wadis 'Isal, Umruq, and ad-Dahal indicates that there is great consistency in the periods during which these three routes could have been in use.

#### *Wadis Dana, Faynan and Fidan route* (Figure 5.4)

The village of Dana in the Highlands is connected to Wadis Faynan and Fidan in the north-east Arabah by means of Wadi Dana (Glueck 1934: 77–78). The walking distance from the village on the plateau to Khirbat Faynan in the wadi by the same name is 18 km. Land communication between the two areas would have taken place through this wadi (Figure 5.4). The route continued westward across the Arabah to 'En Hazeva (Glueck 1935: 20; Bienkowski and van der Steen 2001: 37, note 6; Freeman-Grenville *et al.* 2003: 207, map 1; fig. 4) (Figure 5.5). Bienkowski and van der Steen posit the probability of a separate route from Wadi Fidan to 'En Hazeva than from Wadi ad-Dahal to the same location (2001: 37, note 6).

The six east–west routes described above would have joined the main north–south road along the east side of the Dead Sea in the north and along the eastern side of the Wadi Arabah in the south. Conversely, these same

routes could have joined, to the east, with: 1) a road along the western extremity of the Highlands at the Eastern Rim of the Wadi Arabah-Jordan Graben; 2) the *Via Nova Traiana*; and 3) the Hajj route (MacDonald 2002: 52). Furthermore, the Wadi 'Isal, Wadis Hudeira and al-Hasa, and Wadi Umruq routes, after intersecting with the main, north-south route in the southern Ghors, could have gone immediately south of the Dead Sea and crossed over to 'En Tamar and then on to Mamfisis (see, for example, relative to the Wadi 'Isal route, Klöner 1996: 112, fig. 1). The east-west routes from Wadis ad-Dahal and Wadis Dana-Faynan-Fidan, after intersecting with the main north-south route, could have crossed the Wadi Arabah, possibly at separate places, joined at 'En Hazeva, and then gone on to Mamfisis. The route would have continued north-west to Beersheba and the Mediterranean or north to Hebron and Jerusalem (Klöner 1996: 112, fig. 1).

The northern segment of the Wadi Arabah is a convenient place at which to cross. The wadi here is only 13 km. wide and the route is level and easy. Moreover, there is water available in the southern Ghors, Qasr at-Tilah, Wadi ad-Dahal, and 'Ayn Fidan on the east side as well as at both 'En Tamar and 'En Hazeva on the west side (see, for example, Glueck 1935: 16-20; Harel 1959; Bienkowski 2002: 481).

The travellers on these routes, whether from north-south or east-west, would have needed a supply of water for both themselves and their pack animals. They would, thus, have travelled where such a supply was available.

Relative to distances, from the east side of the Dead Sea to Kathrabba, on the edge of the plateau, by way of Wadi 'Isal, is c. 15 km. (Jacobs 1983: 245). Another 8.5 km. to the east is the town of Mauta on the main north-south road in the western extremity of the Highlands. From the southern Ghors, by way of Wadi Umruq, to Sinfaha and on to the north-south road in the Highlands is c. 18 km. The distance from the 'Old Road' at the mouth of Wadi ad-Dahal to Busayra is c. 20 km. The distance from 'Ayn Fidan east to Khirbat Faynan is c. 10 km. Another 18 km. to the north-east is the village of Dana in the Highlands (Finlayson and Mithen 1998: 30).

A traveller could cover a distance of 30-35 km. in a day by foot while a horse or a mule could cover 40-50 km. in the same period (Dorsey 1991: 12-13). Coming from the plateau to the east, the water supply in the southern Ghors and north-east Arabah would have been both welcomed by and necessary for the traveller. Likewise, those travelling from west to east would have needed water (and rest) before beginning the arduous ascent to the Highlands.

A caravan or a person travelling from one place to another had a number of options as to which route to

take. Moreover, there were decisions regarding what route/branch to take on each section of a road. A decision would be influenced by the seasonal availability of water and pasture, the security situation at the time, relations with the local inhabitants, tolls, and so forth. Thus, the traveller always had to collect information on the current situation before making a decision as to what route to take (personal communication Uzi Avner).

## Conclusion

From the above, it is clear that there is a close association between the natural resources, archaeological sites, and routes in the southern Ghors and north-east Arabah. All these are intimately linked.

The above discussion makes it abundantly clear that humans, making use of the available resources, lived in the area as early as the Palaeolithic. Moreover, the archaeological record indicates that passage, both north to south and east to west, was very likely to have been possible in all periods.

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# Cultural and geological influences on prehistoric site distributions in the Wadi Arabah

Donald O. Henry

## Introduction

Only a few systematic archaeological surveys in the Wadi Arabah have been undertaken in which Pleistocene/Early Holocene occurrences were recorded. Yet when compared to findings from surveys in immediately adjacent areas, even the modest evidence from the research in the Arabah highlights two important contrasts. First, the overall prehistoric site densities recorded in the surveys of the Arabah are relatively low; and secondly, the time-frames of the recorded sites are strongly skewed to the Middle and Late Holocene (i.e. Chalcolithic and later periods). While we can now discount the notion that the valley was an 'abomination of desolation' (Wheeler in Rothenberg 1972: 8) with limited potential for human occupation, the scarcity of prehistoric sites of Pleistocene/Early Holocene ages remains largely unexplained.

The Wadi Arabah, extending south from the Dead Sea to the Gulf of Aqaba, is formed along a portion of the Syrian–African Rift System (Figure 6.1). Tectonic motion along this fault zone has acted to subside the valley floor and elevate the mountains that flank the Rift on the east and west. The floor rises from sea level at Aqaba to just over 200 m. above sea level (masl) near Gharandal and then falls to 397 m. below sea level (mbsl) at the Dead Sea. This drainage divide separates the southern from the northern Arabah. Given the overall aridity of the region, the low elevations of the floor of the Rift are hyper-arid, but

this harsh environment is progressively relieved at higher elevations in the flanking mountains. The western escarpment rises about 600 m. above the valley and the escarpment on the east reaches elevations of over 1,000 masl.

Archaeological exploration of the area stretches back to the early part of the last century (Musil 1907–8; Frank 1934; Glueck 1935; Raikes 1980, 1985), but only a few systematic archaeological surveys of the Wadi Arabah, in which Palaeolithic and Neolithic sites were recorded, have been carried out and these have varied widely in their methodologies. The dearth of prehistoric research in the Arabah seems especially surprising given the intensity of large, productive, multi-year surveys conducted in the immediately surrounding areas of Sinai (Eddy *et al.* 1999), the Negev (Avner *et al.* 1994; Goring-Morris 1987; Marks 1976, 1977, 1983), south-western Jordan (Henry 1982, 1995, 2003; Gebel 1988), and south-central Jordan (MacDonald 1988; Barker *et al.* 1998; Clark *et al.* 1988; Coinman *et al.* 1988). The few modern investigations undertaken in the Arabah (Figure 6.1) have targeted areas in the north-east (MacDonald 1992), the south-east (Eichmann and Khalil 1998; Henry *et al.* 2001; Smith and Niemi 1994; Smith *et al.* 1997; Smith 1996), and the south-west (Avner and Magness 1998; Kozloff 1972–73).

The three largest of the Arabah surveys include the Southeast Arabah Archaeological Survey or SAAS (Smith and Niemi 1994; Smith *et al.* 1997; Smith 1996),

**Table 1:** Site data from the three principal surveys of the Wadi Arabah that recorded Neolithic/Palaeolithic occurrences. See note 1 for procedure used in estimating the areas surveyed for the SAAS and SGNAS.

	Approximate Area Surveyed km. <sup>2</sup>	Neolithic/Palaeolithic			Chalcolithic & Younger			Total Sites	
		N	%	Site Density (N/km. <sup>2</sup> )	N	%	Site Density (N/km. <sup>2</sup> )	N	Site Density (N/km. <sup>2</sup> )
SAAS	175	15	9.3%	0.09	147	90.7%	0.84	162	0.9
SGNAS	220	6	2.5%	0.03	234	97.5%	1.06	240	1.1
SOUTH JORDAN	14	7	50.0%	0.50	7	50.0%	0.50	14	1.0

<sup>1</sup> The area (220 km.<sup>2</sup>) encompassed by the SAAS was based on the maps presented in Niemi and Smith (1999) and calculated by multiplying an average east–west distance of 5.5 km. by the north–south distance of 40 km. The area (175

km.<sup>2</sup>) encompassed by the SGNAS was based on the maps presented in MacDonald (1992) and calculated by multiplying an average east–west distance of 4.1 km. by the north–south distance of 43 km.

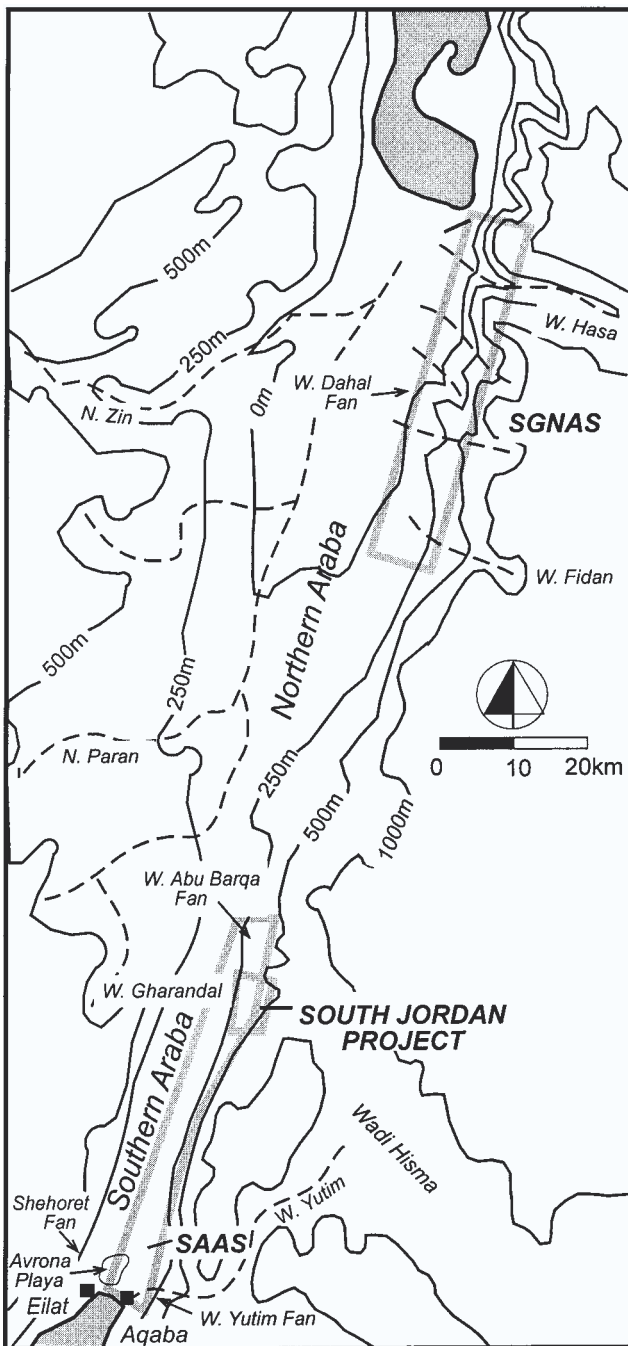


Figure 6.1: Map of the Wadi Arabah showing the locations of the three major surveys that recorded Pleistocene/Early Holocene sites (SAAS, SGNAS, South Jordan Project) and prominent landscape features discussed in the text.

the Southern Ghors and Northeast Arabah Survey or SGNAS (MacDonald 1992; Neeley 1992), and the Wadi Arabah section of the South Jordan Project (Henry *et al.* 2001). Of these, the SAAS and SGNAS stand out for the large areas studied and the number of sites recorded (Table 1). Both used various combinations of 'purposive' and 'systematic transect' approaches to investigating the landscape. The South Jordan Project employed a full coverage pedestrian survey of designated drainage systems where they joined the Arabah. Interestingly, the densities of sites calculated

for the three projects is very similar, ranging from 0.9–1.1 site/km.<sup>2</sup>, yet the proportion of sites of Neolithic/Palaeolithic age varies considerably. But even with the relatively high proportionate representation of Neolithic/Palaeolithic sites recorded in the South Jordan Project, the site density for these sites is markedly lower than that recorded for surveys in nearby surrounding areas of southern and central Jordan and the Negev.

### Explanations for biases of site density and chronology

From a cultural-ecologic perspective, prehistoric settlement strategies may have played a large role in determining site densities in the Arabah. When sites of nearby areas are plotted against elevation, both very low and very high elevational belts yield relatively low site density values regardless of time period (Henry *et al.* 2001: 14–16; Coinman *et al.* 1988). Middle range elevational belts between 1000–1100 masl yield by far the highest site density. The reasons for this are complex, but they most likely have to do with (1) the elevations in which seasonal peaks in resources took place, (2) the kinds of sites (e.g., large base-camps versus small, ephemeral camps) that were established in the context of the peaks in resources, and (3) the differences in the archaeological visibility of such sites. Given the low elevations of the Arabah, such a time-transgressive settlement bias may well have contributed to the overall paucity of prehistoric sites in the valley, but there are also other factors that may have contributed to the scarcity of sites.

Researchers have focused either upon those factors that would have influenced settlement of the Arabah or those that would have acted to bias the preservation of the residual evidence of such settlements. Niemi and Smith (1999: 791) suggest in their study, the Southeast Arabah Archaeological Survey (SAAS), that the paucity of Palaeolithic sites, in contrast to the marked dominance of Chalcolithic – Early Bronze and Nabataean/Roman – Byzantine age sites, is an expression of the wetter and cooler climates that prevailed during the late periods. This implies that the earlier periods were associated with climatic-environmental conditions that were too harsh for settlement.

In discussing the results of the Southern Ghors and Northeast Arabah Survey (SGNAS), Neeley (1992) takes a different approach. Drawing on a geological explanation, he argues that the virtual absence of Pleistocene and Early Holocene sites in the survey is a consequence of the former extent of the Lisan Lake. I made a similar, geologically based observation in my research in the south-east Arabah as part of a segment of the South Jordan Project (Henry *et al.* 2001). Although the area surveyed was much smaller than the

other Arabah surveys, several Early Holocene and Pleistocene age sites were discovered. Half of the sites recorded were of Neolithic or earlier age, but when the numbers of sites are considered against the duration of the period they represented, the overall distribution is still heavily skewed toward Chalcolithic/Early Bronze age finds. These later sites accounted for about half of the number of sites recorded, yet they represent, at most, only 2–3% of the total temporal sweep associated with all of the recorded sites. Examination of the elevations, geomorphic settings and ages of the sites indicated that scouring and subsequent filling of drainages with massive alluvial deposits in Middle Holocene times is likely to have destroyed and/or obscured Pleistocene and Early Holocene age sites at lower elevations (Henry *et al.* 2001: 14). Thus, a geomorphic bias toward the preservation and exposure of Middle Holocene sites would appear to offer the best explanation for the chrono-cultural distribution of sites in that surveyed portion of the Arabah. This still leaves the question of the extent that a geomorphic explanation of site distribution applies to the Arabah as a whole.

In order to understand the spatial and chronological distributions of prehistoric sites in the Arabah, we need to explore those factors that (1) would have influenced peripheral populations to settle in the valley and (2) would have acted to preserve/expose evidence of such settlements. In all likelihood, it is the interplay of these two factors that explains the patterned occurrences of sites in the Arabah on a time-space grid.

### Factors influencing settlement of the Arabah

The factors that would have been most significant in determining the degree to which the Arabah was exploited by prehistoric populations include the settlement strategies of prehistoric populations, the prevailing climate and environment, the availability of water, the productivity and seasonality of edible resources, the presence of knappable raw materials, the accessibility of easily tilled, arable land, and the occurrence of naturally sheltered settings.

#### *Seasonal movements and transhumance*

Another important consideration relates to how the factors listed above would have influenced the seasonally scheduled movements of the non-permanent residents of the Arabah. Given the general elevational and environmental uniformity of the Arabah's floor, coupled with the marked vertical relief and elevationally zoned environments of the valley's flanks and adjacent uplands, the area's prehistoric inhabitants would have most likely used the lower elevations of the Arabah only seasonally. Those who

relied upon foraging, pastoralism or incipient cultivation would have been drawn to nearby, more productive settings located at higher elevations as resources in adjacent settings came available. Models of prehistoric transhumance have been suggested for specific prehistoric periods for other areas of the southern Levant that display marked relief. Early Neolithic sites in the mountains of southern Sinai (Bar-Yosef 1984) and the Negev (Avner *et al.* 1994) and Upper Palaeolithic and Epipalaeolithic occupations in the highland Negev (Larson 1979; Goring-Morris 1987) are thought to have formed upland segments of transhumant cycles.

Long-term research, in the western Wadi Hisma and Ma'an Plateau, located on the eastern periphery of the Arabah, traces a time-transgressive pattern of transhumance that is also thought to have incorporated the Arabah proper (Henry 1994, 1995; Henry *et al.* 2001, 2004). The study defined a persistent dichotomy in site types as expressed in large, long-term and small, ephemeral encampments. An elevationally governed, patterned asymmetry was recorded in their occupational areas, thicknesses of cultural deposits, artefact densities, and presence of archaeological features (e.g., hearths, petroglyphs, bedrock mortars, architecture). Evidence for the seasonality of occupations was derived from cementum increment and phytolith studies (Lieberman 1995; Rosen 1995). The combined data are thought to reflect shifts in residential permanence and group size that accompanied seasonal movements of prehistoric groups through different elevational belts in following a strategy of transhumance. Given the close proximity (15–30 km.) and direct drainage connections between the Ma'an Plateau, Hisma Basin, and Wadi Arabah, it seems likely that the low elevations of the Arabah would have been attractive to prehistoric groups in the winter, especially during exceptionally cold episodes in the Pleistocene. The presence of chert varieties unique to the Arabah within Wadi Hisma artefact assemblages indicates cultural connections between the valley and the adjacent uplands (Henry *et al.* 2004). Moreover, the discovery of Middle Palaeolithic, Initial Upper Palaeolithic, Upper Palaeolithic, Epipalaeolithic and Neolithic occupations on the lower eastern flank of the Arabah (Henry *et al.* 2001) confirms, at least, episodic use of the valley by prehistoric groups stretching over most of the Late Pleistocene.

#### *Palaeoclimates and environments*

The climatic-environmental conditions that are likely to have reduced the intensity in which groups exploited the Arabah as part of a transhumant cycle would have occurred in unabated, hot-dry intervals. At these times, such as today, water sources and biota would have been scarce. During cold-moist intervals, water from upland runoff, elevated ground water, and

reduced evaporation would all have led to a richer distribution of water sources and biota. Even during cold-dry intervals, however, the Arabah is likely to have represented an attractive setting for foragers seeking seasonal refuge from the colder, higher elevations and benefiting from reduced evaporation and the attendant available water.

Climatic-environmental reconstructions for the Levant indicate significant moist intervals for the early Levantine Mousterian, early Upper Palaeolithic, early Natufian, and PPNB. Other, perhaps less enhanced, moist phases are suggested for the Geometric Kebaran/Mushabian, PPNA, and Chalcolithic. Marked dry periods are suggested for Late Levantine Mousterian, later Upper Palaeolithic, Early Epipalaeolithic and perhaps Ceramic Neolithic. Detailed climatic-environmental successions stretching from the Levantine Mousterian to the Chalcolithic have been developed for areas bordering the Arabah in the Negev (Goldberg 1994; Horowitz 1976; Goring-Morris 1987), the western Hisma (Henry 1995, 2003), and the Wadi Hasa (Schuldenrein and Clark 1994). These climatic-environmental reconstructions are largely consistent with the regional sequence. Given our understanding of the climatic-environmental successions over the last 100,000 years or so, there is no compelling reason to suspect that the paucity or absence of Palaeolithic sites dating from the Levantine Mousterian onwards stems from continuous harsh conditions in the Arabah. Avner *et al.* (1994: 287) present palaeoclimatic data to rebuff a similar notion of 'up and down settlement' in the Negev during the Holocene and argue that 'there seems to be no climatic cause for significant gaps in settlement patterns'.

### **Water sources**

The most critical resource controlling settlement of the Arabah is surface water. Springs, ephemeral streams, seeps, shallow wells and mudflats fed by upland runoff provide modern evidence of numerous water sources that would have been available in the past except under the harshest of conditions. There is also evidence of Late Pleistocene ponding formed behind choke points in drainages along the south-eastern flank of the Hisma (Henry *et al.* 2001). Thus, even during arid cycles such as today there was likely to have been adequate surface water to support at least seasonal occupation of the Arabah.

### **Human food sources**

Today, the lower flank of the valley (c. 800–300 m.) supports desert plants of Saharo-Arabian (dune fields) and Sudanian (rocky areas) varieties (El-Eisawi 1985; Zohary 1962). At lower elevations springs and seeps become more common, and these support small patches of oasis vegetation in the midst of the desert

community. In the past, even during intervals of ameliorated climate it seems doubtful that the floor of the valley would have supported other than desert vegetation. During such favourable times, however, the flanks of the Arabah may well have benefited from a downward displacement of the steppe zone. Although micro-environments close to water may have provided small areas rich in biota, the Arabah, in general, is unlikely to have ever been a setting rich in year-round, human food resources. Human prey species and plant foods would have been most abundant during the wet winter season, a time when adjacent upland settings may have been uncomfortably cold. Foragers and herders would have responded to these factors in a similar manner through seasonally scheduling their occupations at different elevations.

### **Raw materials**

When we consider the raw materials of the Arabah in an archaeological context, copper generally comes to mind given the spectacular evidence for copper exploitation during the Chalcolithic (Adams 1997; Levy 1998). But for most of prehistory, flint or chert sources, not copper, would have been the most important raw material consideration for groups inhabiting the Arabah. High quality, easily knapped chert is found in primary contexts within the Upper Cretaceous limestones that flank the valley and in stream cobbles derived from these sources and deposited in wadi beds. Chert-bearing limestones stretch for nearly the full length of the Arabah along the valley's western margin. Along the Arabah's eastern margin, however, chert is absent from roughly the southern one-third of the valley and only intermittently present to the north. But given the narrow width of the Arabah, there are few settings in which a site would not have had access to an *in situ* chert source within a 5 km. radius, the distance typically associated with defining a site catchment.

### **Naturally sheltered settings**

Although natural shelters formed by caves or rock shelters would not have been crucial for settlement of the Arabah, their presence would have certainly provided an attraction for prehistoric groups. Protected, sheltered locations for campsites appear throughout the Arabah, but substantial shelters and caves are most common in the sandstone outcrops that occur on the eastern flank of the valley from near Gharandal north.

### **Arable land**

Easily tilled, arable land is found over most of the valley floor as well as on the alluvial terraces of lateral drainages that join the Arabah. While the edaphic conditions supportive of farming abound throughout

the valley, the necessary natural water sources are uncommon. These may be found in a few areas of high water tables and around springs. During moist episodes in the past, one would expect the settings favourable for cultivation to have been more widespread.

### Summary

Two tasks are involved in the process of understanding the combination of forces that were responsible for forming specific patterns of prehistoric settlement. The first entails the examination of site distributions in an effort to discover spatial relationships which assist in distinguishing those site patterns that were created by geomorphic forces from those that were formed by cultural decisions. Until the effects of natural or geological post-depositional processes on site distributions are understood, it is unreasonable to consider settlement patterns. Once the geological bias is understood, patterns in site distribution can be explored across various contextual data (e.g., site setting, site variety, occupation seasonality, proximity to certain resources, etc.) in an effort to reconstruct the prehistoric rationale for site placement. The paucity of Pleistocene/Early Holocene sites recorded in the Arabah precludes an examination of settlement patterns, but their presence does allow for defining the extent to which geomorphic factors influenced site distribution.

### Geomorphic factors influencing site preservation and discovery

In cross-section, the Arabah can be divided into three landforms that include the valley floor, the lower flank, and the escarpment. Quaternary sediments of the valley floor consist of alluvium, drift sand, mudflats, and the Lisan marls, confined to that portion of the Rift south of the Dead Sea. Along the valley flank, sediments are associated with alluvial terraces, alluvial fans, dune fields (both active and fossil), and lacustrine deposits. Because of the different elevations of the valley floor, the transition from the valley floor to the valley flank varies from c. 100–200 masl in the southern Arabah and from around -300 to 200 masl in the northern Arabah. The valley flank displays a marked rise in elevation where it merges with the Rift's escarpments at elevations of c. 500–800 masl.

### Site distribution and geomorphology of the southern Arabah

In the southern Arabah, sites of Neolithic and earlier age are restricted to valley flank and higher settings, whereas sites of Chalcolithic and later age are located on the valley floor as well as in valley flank settings. Chalcolithic and later sites have been reported from

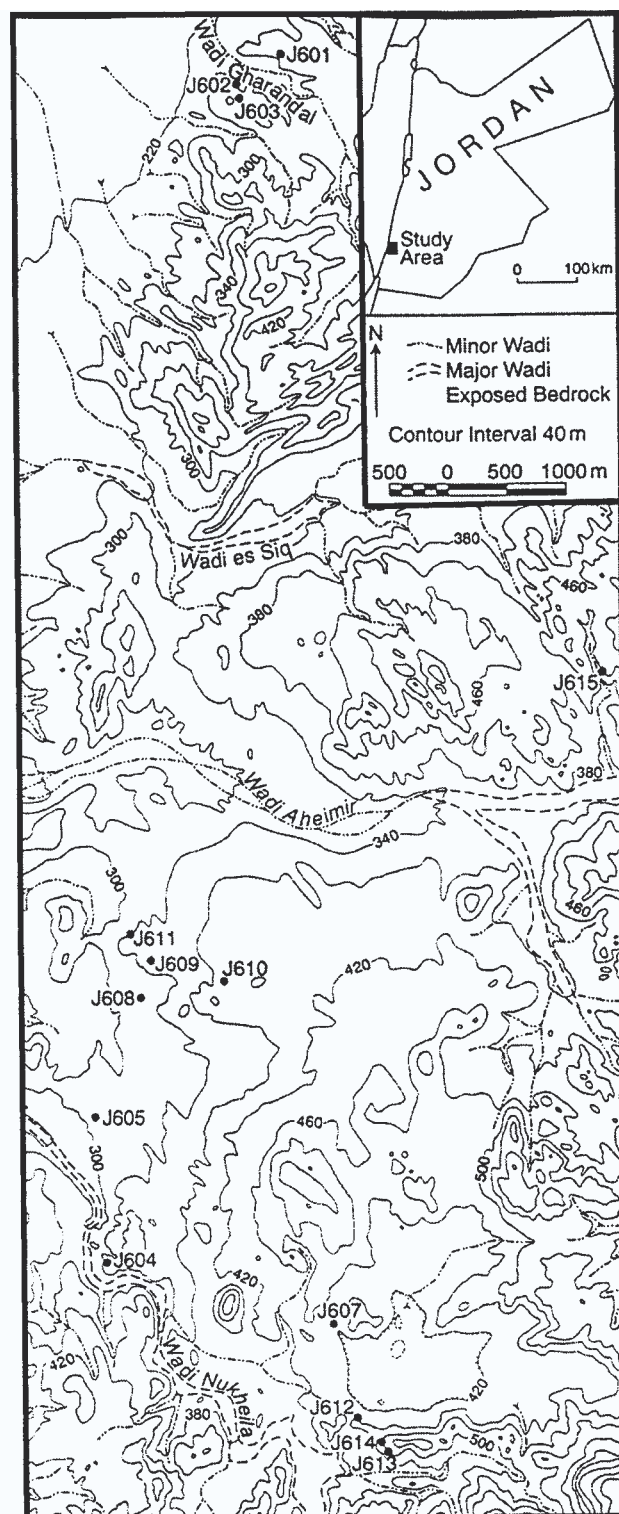


Figure 6.2: Map of the area surveyed within the Arabah Study Unit of the South Jordan Project showing the locations of the discovered sites.

valley floor positions by Avner *et al.* (1994), Eichmann and Khalil (1998), Henry *et al.* (2001), Niemi and Smith (1999), and Smith *et al.* (1997). From the perspective of landform, alluvial fan and terrace locations appear to be the most common settings for the later period sites. These tendencies, however, should be considered in light of the fact that other landforms have received less

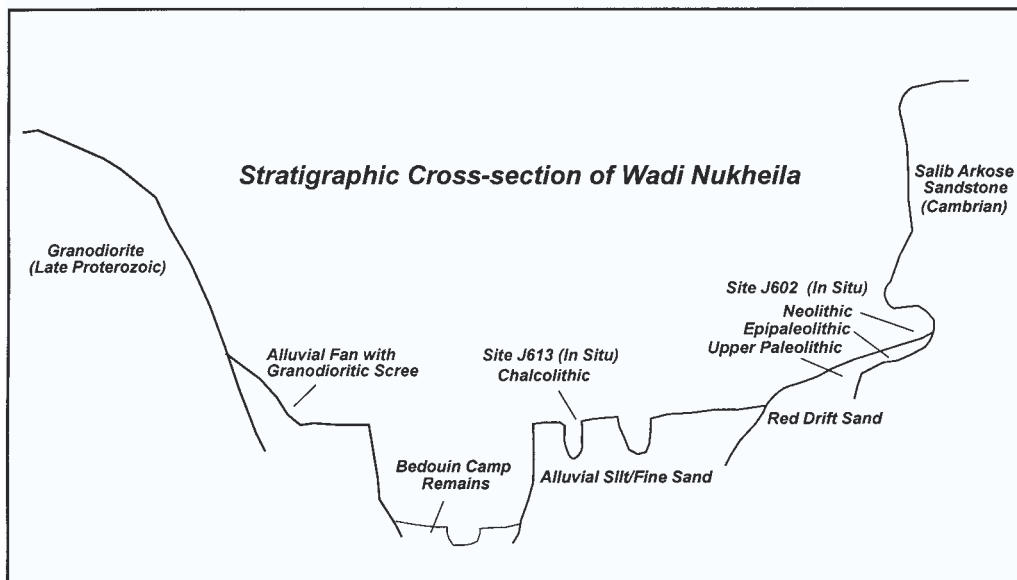


Figure 6.3: Schematic cross-section of the Wadi Nukheila showing the locations of archaeological sites and the stratigraphic succession.

attention in surveys. For example, areas of extensive drift sand and *sabhka's* (mudflats) have generally been excluded from surveys because of their close proximity to the border between Israel and Jordan. Neolithic and earlier sites have been reported for the southern Arabah by Gebel (1988), Henry *et al.* (2001), Niemi and Smith (1999) and Smith *et al.* (1997). The sites found in lower flank settings are associated with alluvial terraces, alluvial fans, rock shelter terraces, fossil dunes and lacustrine deposits.

#### VALLEY FLOOR: QA AND DRIFT SAND DEPOSITS

The absence of Pleistocene/Early Holocene age sites on the floor of the southern Arabah may be explained largely by the ages of surface sediments being limited to the Late Holocene. A morphological map of the southernmost 22 km. of the Arabah shows that most of the surfaces of the valley floor date to the Holocene or Late Pleistocene, but trenches dug in a prominent mudflat (Avrona Playa or Qa ad-Dafiya; Figure 6.1) within this section yielded  $^{14}\text{C}$  and infrared optically stimulated luminescence (IRSL) dates, which indicated that the uppermost 2 m. of sediments are less than 1,500 years old (Amit *et al.* 1999). Although sedimentation dates back to over 14,000 years ago, the Late Pleistocene/Early Holocene sediments are deeply buried to some 3–6 m. Moreover, dates of c. 700 and 1000 bp from a shoreline sand sheet (Trench T-20) indicate that the extensive fields of drift sand on the floor of the southern Arabah may be of recent age.

#### VALLEY FLANK: ALLUVIAL TERRACES, ROCK SHELTER AND AEOLIAN DEPOSITS

In the Wadi Nukheila, a prominent lateral drainage of the Arabah, a rock shelter site (J614) was found to contain a succession of Upper Palaeolithic and Epipalaeolithic (Late Natufian, Harifian) occupations (Henry *et al.* 2001; Beaver 2000). The site (500 masl) rests

within an embayment formed on a major meander of the wadi where it joins a minor drainage (Figure 6.2). The shelter and adjacent terrace contain a thick cultural deposit (>2 m.) which consists of red drift sand interspersed with layers of ash and charcoal fines. A single  $^{14}\text{C}$  date of  $9370 \pm 120$  bp (Beta – 134454) was obtained from a bulk sediment sample collected from a burnt layer at a depth of 50 cm. The aeolian sand unit extends over a large area fronting the shelter and cliff face and at a lower elevation an alluvial terrace (T-2) is set against it (Figure 6.3). A Chalcolithic site (J613) is eroding from the tread of this T-2 terrace and evidence of modern bedouin occupations is found on and within a much lower T-1 terrace. Further downstream, a Middle Palaeolithic site (J604) and a Late Neolithic site (J608) were found also eroding from rock shelter deposits at relatively high elevations, 340 masl and 320 masl, respectively. At Site J608, a single  $^{14}\text{C}$  date of  $9430 \pm 90$  bp (Beta – 129785) was obtained from a charcoal sample collected from a fire-pit at a depth of 30 cm. (White 2000). In addition to Site J613, six other Chalcolithic sites were found along the Wadi Nukheila. In contrast to the Early Holocene/Pleistocene age occurrences, the Chalcolithic sites were found at both high and low elevations, in rock shelters and in the open, and on/within the T-2 alluvial terrace. The geomorphic features of the Wadi Nukheila, as tentatively defined, are dominated by a massive 12 m.-high terrace (T-2) laid against an older aeolian unit of red sand. This older unit, displaying only limited exposure in the Wadi Nukheila, is confined to settings >320 masl. In this case, then, geomorphic factors would appear to play a major role in limiting the spatial distribution and the numbers of Early Holocene/Pleistocene sites relative to those of later times.

Niemi and Smith (1999: 804) have also described an alluvial terrace sequence containing a high Pleistocene

and lower Middle Holocene (Chalcolithic–Early Bronze Age) terrace in the Wadi Abu Barqa (Figure 6.1). The Wadi Abu Barqa is another major lateral tributary of Wadi Arabah located about 18 km. north of the Wadi Nukheila. They describe two alluvial terraces above the active drainage. The higher terrace, located 3–5 m. above the modern channel, is composed of coarse bedload, fluvial sediments deposited in graded beds and debris flows. The red colour of the terrace sediments indicates a long period of weathering and oxidation from which Niemi and Smith (1999: 804) infer a Pleistocene age. On the tread of the lower terrace, some 1–2 m. above the modern wadi bed, there are abundant enclosure walls and associated lithic and ceramic artefacts dated to the Chalcolithic–Early Bronze Age (Smith *et al.* 1997).

The discovery of an Early Neolithic (most likely Middle PPNB) site (J615) eroding from a red silt/fine sand deposit overlooking the Wadi Heimir, suggests that the elevated Pleistocene sediments, described for the Wadi Nukheila and Wadi Barqa, continued to accumulate into the Early Holocene (Henry *et al.* 2001). The Wadi Heimir is located between the two drainages about 5 km. north of the Wadi Nukheila. The deposit, resting c. 20 m. above the modern channel, consists of a thick (12–15 m.) remnant of the ancient landscape that extends from a sandstone cliff-face. The sediment lobe has been protected from erosion by a collapsed portion of the cliff, perhaps representing a former shelter. A lower inset terrace, formed against the Early Holocene deposit, displays a terrace tread some 3–5 m. above the channel of Wadi Heimir, and although undated it is most likely of Mid-Late Holocene age.

#### VALLEY FLANK: ALLUVIAL FAN DEPOSITS

Alluvial fans form the dominant land form along the lower flank of the Arabah, and three of these (Wadi Abu Barqa, Wadi Yutim, and Nahal Shehoret) have been examined in some detail (Figure 6.1). While none of the fans is associated with Early Holocene/Pleistocene age archaeological sites, Pleistocene age surfaces have been identified on the basis of strong weathering of sediments (well developed desert pavement and desert varnish). At Wadi Abu Barqa, a Pleistocene age surface and three post-Pleistocene surfaces were identified according to their relative degree of weathering and the development of desert varnish on surface clasts (Niemi and Smith 1999: 804–5). The surfaces of the Wadi Yutim Fan are also thought to include a Pleistocene age surface and three post-Pleistocene deposits, again based upon the relative degree of development of desert pavement and desert varnish on clasts (Niemi and Smith 1999: 804–5). The ages of the deposits are further supported by the presence of two Chalcolithic tells (Magass and Ghuzlan) in association with Late Holocene sediments.

An indication of the absolute ages of the fan sequence is provided by comparisons with the sequence traced for the Shehoret alluvial fan which is located on the west flank of the Arabah c. 7 km. north of Eilat. There, the oldest, most weathered, surface is dated to the Late Pleistocene (three dates ranging from c. 56–71 ±10 ka) through IRSL assays of alkali feldspars from the uppermost sediments (Amit *et al.* 1999; Enzel *et al.* 1996). Niemi and Smith (1999: 808) correlate the major aggradation phase (Qf<sub>2</sub>) of the Wadi Yutim Fan with the Shehoret Fan's Qa<sub>2,3</sub> deposits, which are dated to the Early–Middle Holocene, based upon the degree of

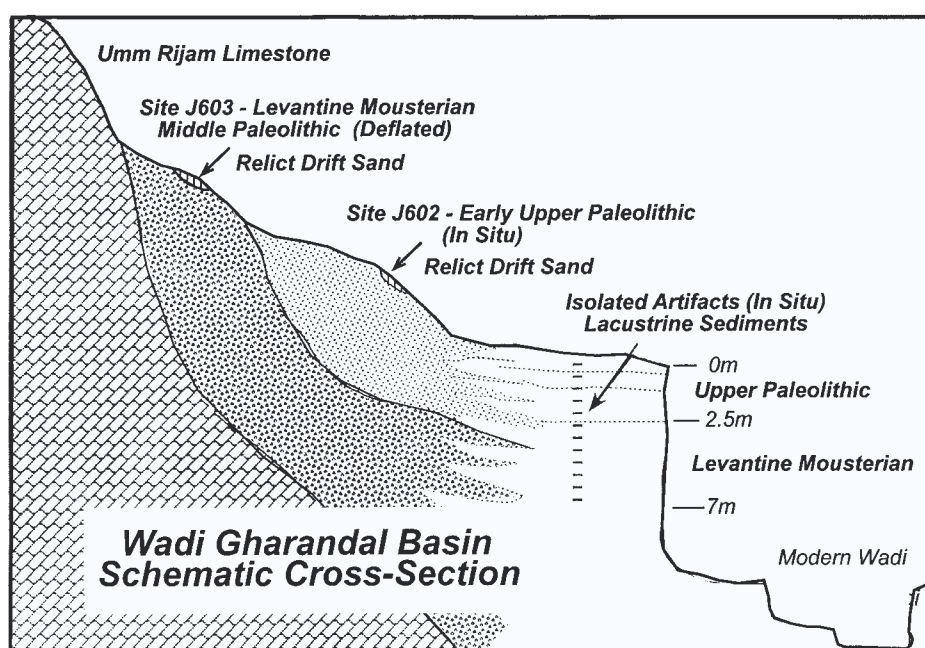


Figure 6.4: Schematic cross-section of the Wadi Gharandal Basin showing the locations of archaeological sites and the depositional sequence.

soil development (4–7 ka, Amit *et al.* 1996) and an IRSL date (13.6±2.3 ka, Amit *et al.* 1996) from the base of the deposits.

Although surfaces of Pleistocene/Early Holocene age are reported for the studied alluvial fans, these older surfaces represent <25% (Wadi Yutim Fan) to <50% (Wadi Abu Barqa Fan, Nahal Shehoret Fan) of the overall fan surfaces. The smaller areas represented by the older surfaces would thus proportionately reduce the chances of the discovery of Pleistocene/Early Holocene archaeological sites on alluvial fans. The processes involved in the development of a fan – gravity-induced mass wasting and stream flow in gullies – also create a setting in which artefacts are likely to have been disturbed, mixed and dispersed. In combination, then, these post-depositional factors would have significantly reduced the chances of finding sites of Pleistocene/Early Holocene age in alluvial fan environments.

#### VALLEY FLANK: LACUSTRINE AND FOSSIL DUNE DEPOSITS

Survey of the Wadi Gharandal (Figure 6.1) recorded Middle Palaeolithic and Early Upper Palaeolithic sites (J601, J602, J603) eroding from drift sand deposited around a Pleistocene lake (Henry *et al.* 2001; Figure 6.4). Additionally, isolated artefacts recovered *in situ* from the walls of deeply incised (12 m.) erosional gullies in the lake bed are attributed to the Upper and Middle Palaeolithic.

The Wadi Gharandal has cut a narrow gorge through conglomerates and limestone immediately before it joins the Arabah. Behind the gorge, there is evidence of lake deposits extending over an area of c. 1 km.<sup>2</sup>. Relict deposits of drift sand are also preserved between a bedrock rim and the lacustrine sediments that have accumulated at lower elevations. Although the lacustrine deposits are identified as part of the Lisan Formation on the 1988 geological map of Jordan (Wadi Gharandal 3050 III), this is not possible given that the maximum recorded extent of the ancient Lisan Lake is some 50–60 km. north of Wadi Gharandal (Horowitz 1979). More likely, the deposits represent localised ponding created behind the limestone ridge at times when the gorge was choked with coarse bed loads. Presently, the lake sediments are exposed in deeply incised gullies.

Examination of a single stratigraphic section within one of the gullies revealed a >12 m.-thick deposit that displayed 32 alternating beds of fine sand and laminated clay. The sand strata exhibit carbonate nodules and iron stains that often trace reed and root casts. Pollen and phytolith samples recovered from the sediments point to a much moister environment than exists in the area today (personal communication Scott-Cummings, 2001). Middle Palaeolithic (J603) and Early

Upper Palaeolithic (J602) occupations were discovered eroding from fossil drift sand deposits surrounding the lake deposits. In addition, numerous isolated artefacts, likely derived from such shoreline encampments, were found protruding from the walls of gullies within the lake deposit.

Unlike the lower reaches of the nearby wadis, the Wadi Gharandal lacks the dominant Middle–Late Holocene alluvial terrace. The erosion of the thick lacustrine deposits may have begun in recent times.

#### *The northern Arabah*

The results of the Southern Ghors and Northeast Arabah Survey (MacDonald 1992; Neeley 1992), the only survey to be conducted in the northern Arabah which systematically included prehistoric material, show strong parallels to site distributional patterns seen in the southern Arabah (Figure 6.1). Of the 44 lithic period sites discovered, sites of the Chalcolithic/Early Bronze periods are dominant, representing over 75% of those recorded. Of those sites ascribed to the Palaeolithic, only two to three Lower/Middle Palaeolithic ‘low density lithic scatters’ were identified, and these are somewhat problematic relative to a site designation (Neeley 1992: 36–37). Upper Palaeolithic and Epipalaeolithic sites were not found in the survey. Eight sites were identified with Neolithic components within the survey areas, and these largely were considered to fall within the later Pottery Neolithic period (Neeley 1992: 37). The Neolithic sites form two clusters, one in the southern Ghor and another near the mouth of the Wadi Fidan, and these appear to be tied to springs and stream confluences. Chalcolithic/Early Bronze period sites are not only more numerous, but they progressively show a more extensive distribution. Strong concentrations of sites were found along most wadis, especially in terrace locations (Macdonald 1992: 60).

The near absence of Pleistocene/Early Holocene age sites in the southern Ghors and north-east Arabah is attributed to the extent of the ancient Lisan Lake and to the processes of aggradation and erosion (Neeley 1992: 43). These post-depositional processes would have acted to destroy and obscure sites. In the SGNAS, the first extensive evidence of sites comes in the Middle Holocene (c. 7–4K bp) with Late Neolithic sites occurring as low as 295 mbsl.

The bulk of alluvium on the floor of the northern Arabah probably accumulated before the Lisan Lake transgression began c. 70K bp (Klinger *et al.* 2003). Through dating (<sup>14</sup>C and U-Series) off-shore, near-shore and fan-delta sediments, Bartov *et al.* (2002) have recently traced lake-level fluctuations between c. 340

and 160 mbsl. Between 55–30K bp (calibrated), the lake experienced short-term fluctuations to levels of c. 280–290 mbsl, punctuated by a drop-event at 48–43K bp (calibrated) to at least 340 mbsl. At c. 27K bp (calibrated), the lake began rising rapidly and according to Bartov *et al.* (2002) reached a maximum elevation of c. 164 mbsl at 26–23K bp (calibrated), before it began to recede to a level of c. 300 mbsl at c. 15K bp (calibrated). Klinger *et al.* (2003: 135), however, point to evidence for high lake stands of c. 150 mbsl after 18K bp, perhaps as late as 15–16Kbp (Niemi *et al.* 2001) or 12K bp (Macumber and Head 1991). During the Holocene, the lake stabilised at c. 400 mbsl, the modern level of the Dead Sea. The reconstruction of the fluctuations of Lisan Lake by Bartov *et al.* (2002) revises earlier conflicting reconstructions developed by Neev and Emory (1967) and Begin *et al.* (1974). The absolute chronology traced by Bartov *et al.* (2002) differs from that presented in the Begin *et al.* (1974) study, but the efforts offer a generally similar relative sequence of fluctuations.

The changes in the size of the Lisan Lake clearly have significance for the prehistoric archaeology of the northern Arabah because of the impact such changes would have had on the land area available for settlement in the basin. The fluctuations in the levels of the lake, however, may also have influenced the presence of archaeological sites in another way. This is related to ties between the fluctuation of lake level with changes in alluvial deposition and stream entrenchment within the basin. Klinger *et al.* (2003) correlate events of fluvial aggradation with low lake levels which they see caused by climatic shifts rather than base level controls. Following fluctuating lake levels from Younger Dryas times through the Holocene, they model six aggradational and five erosional episodes (Klinger *et al.* 2003: fig. 11), and one would suspect similar responses during the Pleistocene, perhaps c. 15K bp.

Klinger *et al.* (2003) report on studies of the Wadi Dahal alluvial fan on the eastern flank of the Arabah (Figure 6.1), two alluvial fans on the western coast of the Dead Sea, and an alluvial pediment and beach ridges in the Hazeva area along the western Dead Sea margin. In maps of the fans and shoreline settings, they show an extensive distribution of Pleistocene age surfaces, many of which are radiometrically dated. This indicates that although successive erosional-depositional cycles occurred during the Terminal Pleistocene and Holocene, substantial Pleistocene age deposits with surface exposures remain intact. Although the geomorphology is complex, especially in those areas which experienced transgressive-regressive events of the Lisan Lake, there are nevertheless extensive areas of Pleistocene age surfaces that should contain prehistoric sites.

## Summary and conclusions

Evidence obtained from the few surveys conducted in the Wadi Arabah that recorded Palaeolithic and Neolithic sites shows that the density of sites is relatively low and markedly skewed towards the Chalcolithic/Early Bronze periods. Niemi and Smith (1999) have argued that moister-than-present climatic conditions during the Middle–Late Holocene supported the extensive settlement of the southern Arabah by Chalcolithic/Bronze Age and later Roman occupants. While these periods of settlement florescence may have been prompted by episodes of climatic amelioration, this would not explain why we do not find evidence for similar peaks in settlement during favourable climatic intervals of the Early Holocene and Pleistocene.

The paucity of Neolithic and Palaeolithic sites in the southern Arabah can most likely be attributed to a combination of prehistoric settlement strategy and geomorphic bias. Surveys in immediately adjacent areas have shown that Palaeolithic and Neolithic sites are unimodally distributed by density from a peak of 8.1 sites per km.<sup>2</sup> in the 1,000–1,100 masl to c. one site per km.<sup>2</sup> in very high or very low elevations (Henry *et al.* 2001).

During the Pleistocene, the highest settings would not have been favoured for winter occupations and, given the overall aridity of the region, the lowest settings would have been unattractive during the warmest, driest part of the year. Mid-elevation settings beneath the winter freeze-line and with access to dependable water from upland runoff would have provided optimal availability to resources and creature comfort (Henry 1994). But even if the Arabah was not intensively occupied, we should still expect to see a greater number of Pleistocene/Early Holocene sites present than have been recorded. In the southern Arabah, it is clear that the paucity of Pleistocene/Early Holocene sites on the floor of the valley stems from the fact that these older surfaces are buried by Middle and Late Holocene sediments. Even in the valley flank settings, where Pleistocene age surfaces are present in alluvial fan deposits and high alluvial terraces, these older surfaces are not as extensive as those composed of younger sediments. In the northern Arabah, geological investigations of the Lisan sediments and associated alluvial fans indicate that Pleistocene/Early Holocene surfaces are more extensive than in the south, but, here as in the south, Palaeolithic sites are virtually absent. The earliest sites consist of Late Neolithic settlements that are concentrated along the valley flank on alluvial terraces within tributary valleys. Future archaeological research in the northern Arabah should focus on those geomorphic settings (alluvial fan deltas and higher surfaces, wave cut beaches and alluvial

terraces) in which Pleistocene/Early Holocene deposits are exposed.

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## Aspects of an Early Bronze Age II–III polity in the Dead Sea region

*Yuval Yekutieli*

Social meaning is an inherent quality of man-made sites. Archaeology specialises in retrieving this meaning through the analysis of the features and contents of ancient sites. Its sub-discipline, landscape archaeology, has a similar objective, which is sought after through research on the location of sites in diverse spatial spheres. One of landscape archaeology's starting points is the concept that a site's placement within the natural setting and its interaction with its surroundings are not coincidental; a site's fusion into the scenery turns it into a landscape laden with social meanings. The geographer Carl Sauer encapsulated a similar concept many years ago stating that: 'cultural landscape is fashioned out of a natural landscape by a culture group. Culture is the agent, the natural area is the medium, the cultural landscape is the result' (Sauer 1925: 46).

Elaborating on the character of landscape, the geographers James and Nancy Duncan state that it is not merely a setting for social action, rather it plays an active role in the performance of elite social identities and in framing social life and values. They assert that landscape acts as a subtle but highly effective method of social exclusion, and that it is integral to social and political processes and central to the performance of social identities (Duncan and Duncan 2001: 387–90).

James Duncan claims elsewhere that through landscape 'individuals are able to tell morally charged "stories" about themselves and the social structures of the society in which they live' (Duncan 1992: 50), and Donald Meinig believes that landscapes express 'cultural values, social behaviour, and individual actions worked upon particular localities' (Meinig 1979: 4). To summarise the huge discussion in landscapes and their interpretation in archaeology, anthropology, human geography and related disciplines (for a thorough literature survey see Knapp and Ashmore 1999), we may quote Adam Smith and Nicholas David who write: 'Thus landscapes come to represent social differentiation – of class, of gender, of hierarchy, and, ultimately, of power. Both the site and the stake of struggles over power, landscapes reflexively alter the social and physical space in which negotiation continues' (Smith and David 1995: 441).

With this awareness in hand, the question arises: what is our ability to retrieve these complex meanings? In the

late 1970s Meinig saw the landscape as a code that researchers should attempt to decipher: 'Every landscape is a code, and its study may be undertaken as deciphering meaning [...] Any landscape is so dense with evidence and so complex and cryptic that we can never be assured that we have read it all or read it right. The landscape lies all around us, ever accessible and inexhaustible' (Meinig 1979: 6).

Ten years later, following theoretical trends within the social sciences, James and Nancy Duncan (1988) suggested that landscapes should be conceptualised as 'texts' – cultural products which can be 'read' for their implications for social, cultural and political systems of power. With the passage of another 10 years, and in concordance with the dynamics of current research agendas, Denis Cosgrove has recently suggested that landscapes be viewed not as texts but as 'discourse': '[...] landscape constitutes a discourse through which identifiable social groups historically have framed themselves and their relations with both the land and other human groups' (Cosgrove 1998: xiv).

In the spirit of these concepts I attempt to describe and interpret a newly found Early Bronze Age II–III (3050–2350 BC, henceforth EB II–III) site cluster, near the south-western edge of the Dead Sea, within the confines of the 'En Boqeq Survey. I will begin by describing the survey area and methodology, continue with description of the finds, and then offer my interpretation. The final part of the paper will broaden the perspective of the inquiry from the specific complex to the whole region of the northern Arabah – Dead Sea rift valley. In this context our finds gain a much wider-ranging significance.

### **Background: survey area and methodology**

The area covered by the 'En Boqeq survey<sup>1</sup> (Figures 7.1 and 7.2) is situated on the western escarpment of

<sup>1</sup> The survey of the 'En-Boqeq Map' (Map 150 of the Israel Survey Grid) is conducted by the author on behalf of the Israel Antiquities Authority and Ben-Gurion University of the Negev, to both of which he is indebted. I am exceptionally grateful to Patrice Kaminski for drawing the maps and arranging the plates, to Helena Sokolowski who drew the objects, to Alter Fogel who photographed the finds, and to

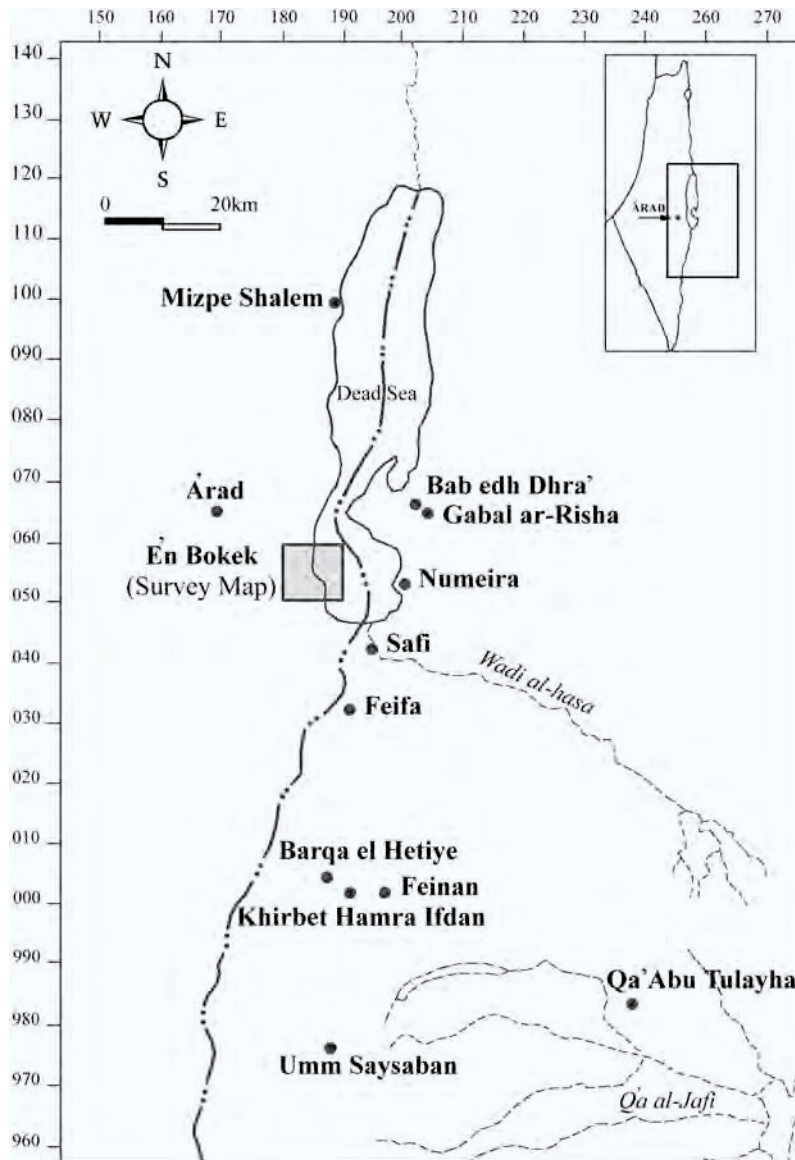


Figure 7.1: General map showing the location of the 'En Boqeq survey and sites mentioned in the text.

the Dead Sea rift valley. It includes a very narrow coastal strip on the south-western shores of the Dead Sea, and step-like scenery of horizontal plateaux and high vertical cliffs that rises in elevation moving west. A few large canyons cut this landscape, in an east-west direction, creating impressive fissures in the scenery.

The area is extremely arid with an average rainfall of 70 mm. per year, and average daytime temperature ranging from 17° C in the winter to 34° C in the summer

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Rafi Greenberg who confirmed the identification of the northern ceramic types in the assemblage. I would like to thank the students of Ben-Gurion University's Department of Bible, Archaeology and Ancient Near East who participated in the survey. In addition I am very grateful to Piotr Bienkowski for editing the manuscript and for his great enthusiasm about the Arabah projects, and to an anonymous reviewer who commented on the text.

(Yafe 1973). The only permanent water source within the survey's boundaries is the spring of 'En Boqeq. Otherwise water may be found sporadically in water holes along the channels of the large canyons, which are filled by occasional winter floods coming from the area of the Arad Valley and the southern Hebron Mountains.

No large permanent settlements were recorded in the survey. The surveyed sites include a number of small fortified structures next to main roads, a large number of seasonal camps, various markers in the scenery strewn throughout the region (e.g. tumuli) and a large number of pottery scatters. From the chronological aspect, the sites cover a wide range of dates from prehistory to the present, with some gaps in the sequence. In contrast to the situation in the survey area, adjacent regions within a day's walking distance include remains of large permanent settlements: to the east, one may find the sites of Bab adh-Dhra', Numeira, Safi, Feifa and more (Rast and Schaub 1981;

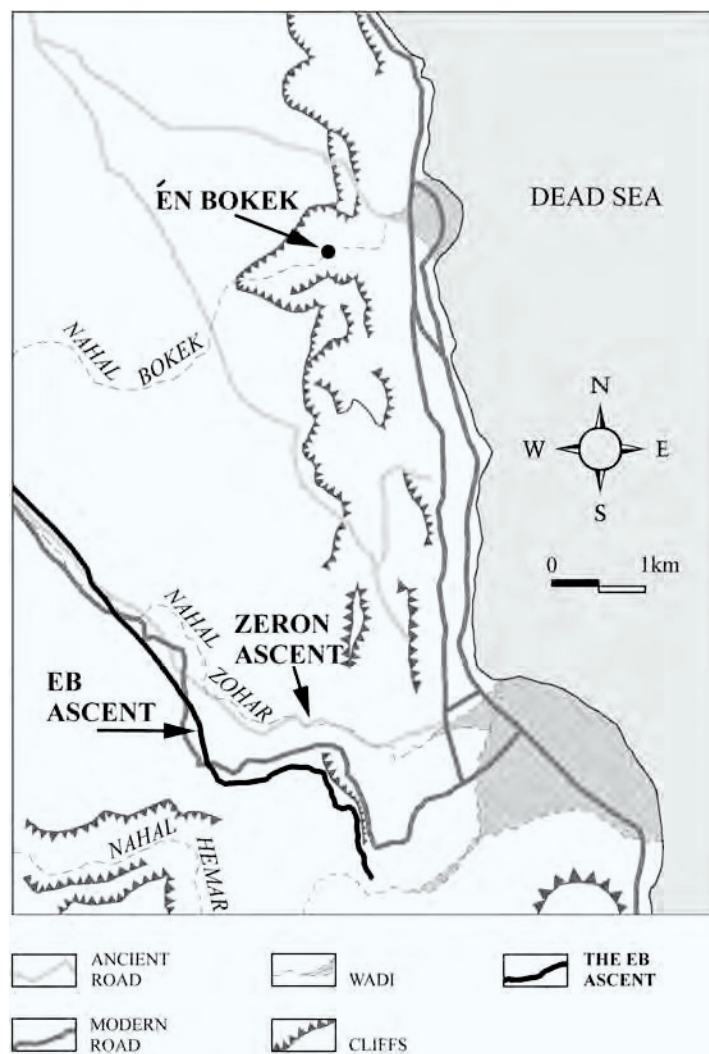


Figure 7.2: 'En Boqeq survey: topographical features and road networks.

Schaub and Rast 1989; MacDonald 1992), and to the west are sites such as Tel Arad, Tel Malḥata, Tel 'Ira and others (Amiran *et al.* 1978; Amiran and Ilan 1992; 1996; Kochavi 1992; Beit-Arieh 1999). People travelling between those two regions would have crossed the research area with its major obstacle, the exceptionally steep escarpment of the rift valley, which channelled the traffic into a limited number of ascents.

Previous investigations in this region, which paid attention to ancient routes and ascents, include works of Aharoni and Rothenberg (1960), Shalem (1967: 52–54), and Harel (1973). Their way of identifying ancient routes in the southern Judean Desert was based upon tracing physical remains such as tracks cleared from stones, retaining walls, steps, way stations and lookout towers. They analysed these data applying a Historical Geography approach, which involved a combination of field records with specific and quite often considerably biased interpretations of ancient texts (Yekutieli 2002: 80–82). In this way Aharoni and Rothenberg claimed to have identified the biblical 'Edom Route' (Aharoni and Rothenberg 1960: 13–47) within our survey area, an identification

that has become accepted and usually unquestioned ever since (e.g. Harel 1973: 32–35, 57).<sup>2</sup>

The methodology of the 'En Boqeq survey provides another method for the identification of ancient roads. According to our survey approach, any remains of ancient human activity, from a lower threshold of five sherds within a radius of 10 m., was considered as a site (Warburton and Graves 1992 used a similar definition in their work at Navajo Springs, Arizona). It should be noted that not many surveys adopt such an extensive definition. However, we believe that ignoring small sites automatically excludes significant segments of ancient human activity. As Fletcher claimed, most of the evidence created by human activity encompasses very small areas, and large activity areas rather testify to events that occur in a small proportion (Fletcher 1986: 61). In other words,

<sup>2</sup> Our survey casts serious doubts on this identification, as no Iron Age finds were found along the suggested track of the 'Edom Route', which supposedly passes through our research area.

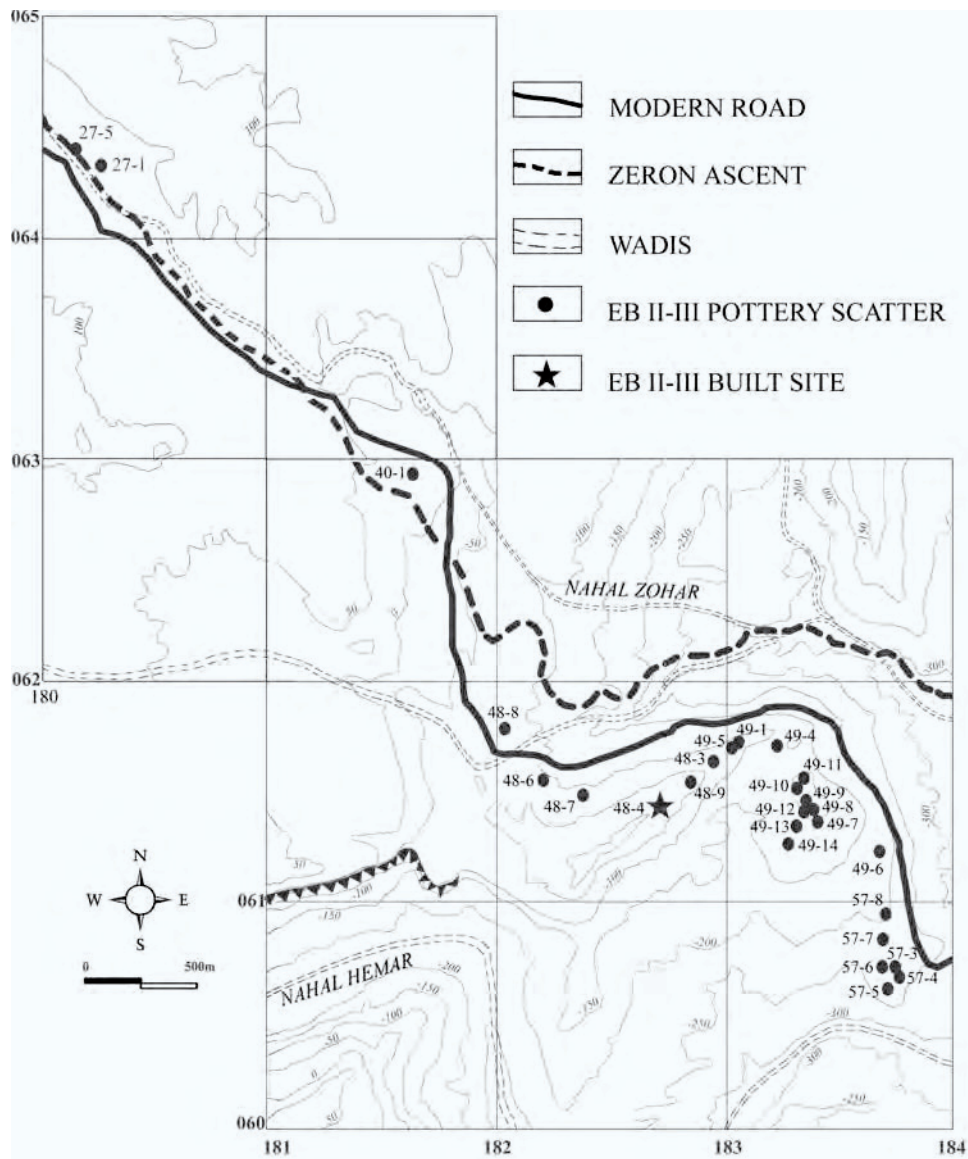


Figure 7.3: The EB ascent: location of the surveyed sites.

ignoring the smaller sites means closing our eyes to a large proportion of valuable archaeological data.

Small sites are important for understanding ancient societies everywhere, but they are of utmost significance in arid zones where sites are usually visited for short periods by groups who leave only faint archaeological remains, e.g. nomads, caravans, or occasional passers-by (Rosen and Avni 1995; Yekutieli and Gabai 1995). It is worth noting that the closest published survey to ours, MacDonald's work in the southern Ghors and north-east Arabah, adopted a similar approach. His survey: '[...] called all scatters of sherds or artifacts, and all architectural remains, which appeared to date earlier than 1918 a "site" [...]. A potbust [...] qualifies as a site' (MacDonald 1992: 9).

The insistence on recording even very small sherd scatters as sites proved in our case to be extremely beneficial, as it became a very useful method for

identifying ancient routes. After gathering sufficient data we noted that many of the recorded sherd-scatter sites are arranged on the map in linear patterns extending for long distances. Some of them are unmistakably distributed along known ancient routes, such as the Zeron-Ascent (Maa'le Zeron) (Figures 7.2–7.4). Others appear to follow a very thoughtful topographical course, and thus they are most probably the remains of hitherto unknown routes. Apparently, these sherd scatters are waste tossed by people who used the roads in the past, a phenomenon well known along routes and highways up to the present day.

An additional advantage of using alignments of sherd scatters in research on ancient routes is that it facilitates the dating of the roads. On earlier occasions Judaeen Desert roads were mainly dated according to various scholars' interpretations of ancient texts. In our case the dating is done in a much more direct way avoiding the many pitfalls of Historical Geography. Analysing

the finds from the sherd-scatter sites in our survey map revealed, for example, that the Zeron Ascent functioned during the Hellenistic, Roman and Islamic periods, and that the ascent described in detail below was used in the EB II–III.

It should be noted that, although the sherd-scatter sites' methodology for identifying routes is new in our immediate environment, it has been used before elsewhere, such as in North and South America (Earle 1991: 12; Hyslop 1991: 32).

### The sites and the EB II–III ascent

The sites presented below were encountered on the rocky ridges neighbouring the lower segment of the modern Arad–Neve Zohar road and on the plateau to

their west (Figure 7.3). Most of them were scatters of sherds with no additional built remains (Table 1), except for one, site 48-4, which will be described in detail below. The sites and the road they delineate were first published in 2001 (Yekutieli 2001), followed by a second report written as the survey progressed (Yekutieli 2004). Since then more sites have been discovered and their linear pattern has been traced, to date, to a length of 6.5 km., climbing from an elevation of -235 (below sea level) to an elevation of 95 m. above sea level.

To facilitate the discussion the route will be described in three sequential parts (demarcated as segments 1, 2, 3 in Figure 7.4):

- The ascent from Naḥal Ḥemar to the Ḥemar-Zohar watershed divide.

**Table 1:** The sites along the EB road.

Name	Coordinates		Elevation	Finds	Description
	NS	EW			
57-5	18370	6062	-235	EB sherds	Sherd scatter
57-4	18375	6068	-232	EB sherds	Sherd scatter
57-3	18375	6072	-227	EB sherds	Sherd scatter
57-6	18369	6072	-222	EB sherds	Sherd scatter
57-7	18367	6083	-210	EB sherds	Sherd scatter
57-8	18370	6095	-200	EB sherds	Sherd scatter
49-6	18367	6123	-170	EB sherds	Sherd scatter
49-13	18331	6133	-119	EB and Islamic sherds	Sherd scatter
49-4	18322	6170	-112	EB and Islamic sherds + flints	Sherd scatter
49-7	18340	6135	-102	EB sherds	Sherd scatter
48-6	18219	6154	-100	EB sherds	Sherd scatter
49-12	18334	6139	-100	EB sherds	Sherd scatter
49-8	18337	6140	-99	EB sherds	Sherd scatter
49-9	18335	6144	-99	EB sherds	Sherd scatter
49-10	18330	6149	-99	EB sherds	Sherd scatter
49-11	18333	6153	-99	EB sherds	Sherd scatter
48-7	18237	6148	-95	EB sherds	Sherd scatter
48-8	18202	6176	-85	EB and Roman sherds	Sherd scatter
49-1	18305	6170	-80	EB sherds, basalt spindle whorl, copper point, flints and Islamic sherds	Some stone installations
49-5	18302	6167	-75	EB sherds	Sherd scatter
48-3	18293	6162	-65	EB sherds	Sherd scatter
48-9	18280	6155	-45	EB sherds	Sherd scatter
48-4	18269	6143	-15	Structures, EB pottery and flint	A small built settlement
40-1	18165	6290	+25	Pottery, mostly Islamic, but also an EB ledge handle	Remains of a structure
27-1	18035	6445	+95	EB sherds	Sherd scatter
27-5	18015	6435	+85	EB sherds	Sherd scatter

- Sites on the watershed divide between the Naḥal Ḥemar and Naḥal Zohar drainage basins.
- The route within the drainage basin of Naḥal Zohar.

*Segment 1:* This segment includes 15 sites, which align in a meandering line that starts at the escarpment adjacent to the lower section of Naḥal Ḥemar, and ends in a topographic saddle (mountain pass) on the watershed divide 1,750 m. northwards (site 49-1). The lowermost site (57-5) is at an elevation of -235 m., and the saddle at -80 m. Thus the path passing through these sites climbs 155 m. in a distance of 1,750 m., a slope of 8.86 per cent.

After climbing the first 1,250 m. of this segment, the ascent reaches a flat-topped hill with an oval shaped peak that measures 200 by 100 m. On this flat and well-defined area there is a concentration of six sites (the hill is partly damaged by modern earth-works, and it is very probable that additional sherd scatters existed on that spot). The hill's topography and the sites' spread

on its summit give the impression that the place served as a resting ground before continuing the steep climb waiting ahead. From hill 49-9 (named after a site located near its centre) the route climbs northwards in a short and steep gradient to site 49-1 (Figures 7.5, 7.6), which is located in a topographic saddle. This saddle is the only possible passage along the elongated rocky ridge, which separates the Naḥal Ḥemar and Naḥal Zohar drainage basins.

*Segment 2:* This segment includes the sites on the watershed divide between the Naḥal Ḥemar and Naḥal Zohar drainage basins. It consists of five sites that string along the ridge's crest, from the saddle of site 49-1 to the built site 48-4. The path passing through segment 2 climbs 65 m. in a distance of 500 m., a slope of 7.69 per cent. The entire segment allows an excellent view both north, towards the canyon of Naḥal Zohar, and south, towards Naḥal Ḥemar's canyon and the wide scenery that opens behind it.

Segment 2 starts at site 49-1, located at a mountain pass where both the ancient route and a modern trekkers'

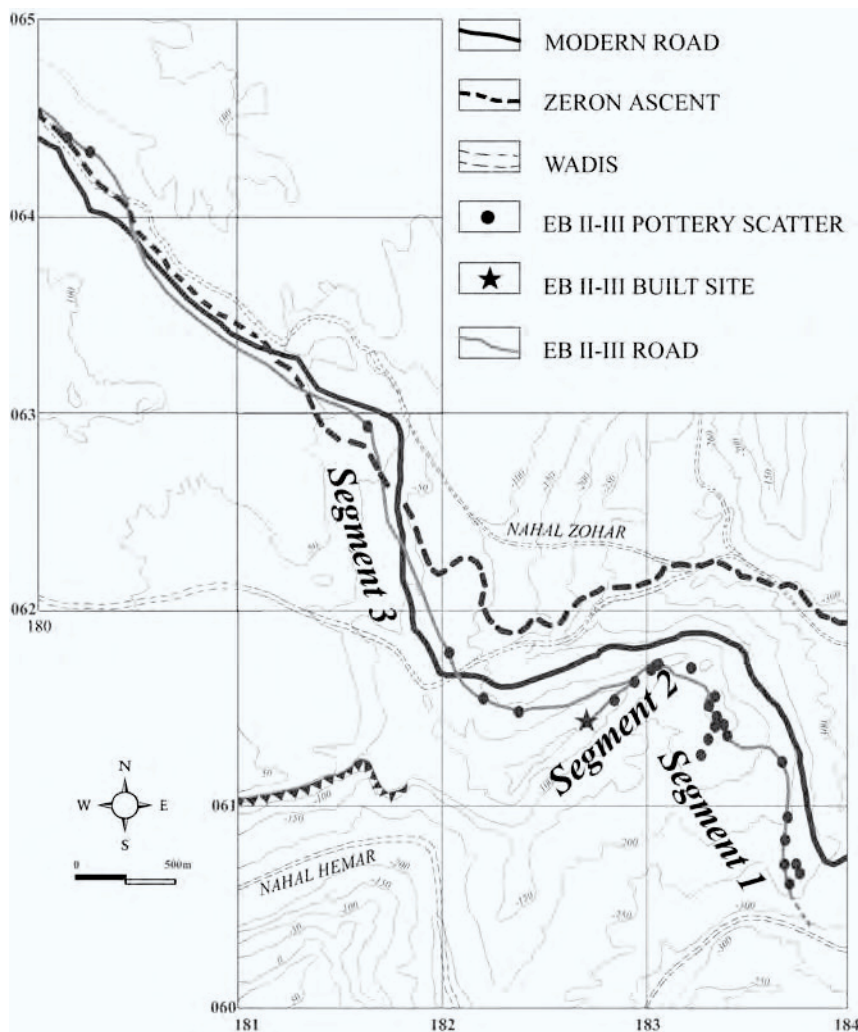


Figure 7.4: The EB ascent: general outline and subdivision.

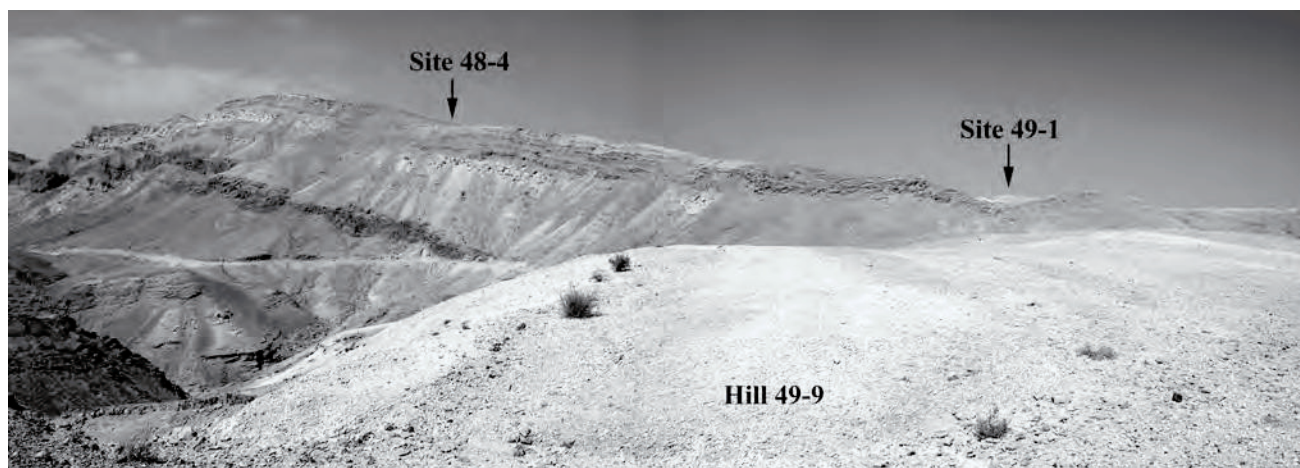


Figure 7.5: A view from hill 49-9 to the north-west. Note the mountain pass at site 49-1, and the location of site 48-4, most of which is hidden behind the ridge.



Figure 7.6: The final ascent of segment 1 towards the mountain pass of site 49-1.



Figure 7.7: Site 49-1. A view from the lookout point to the east. Note the ascent of segment 1 into the mountain pass. The canyon of Naḥal Zohar is visible on the upper left.

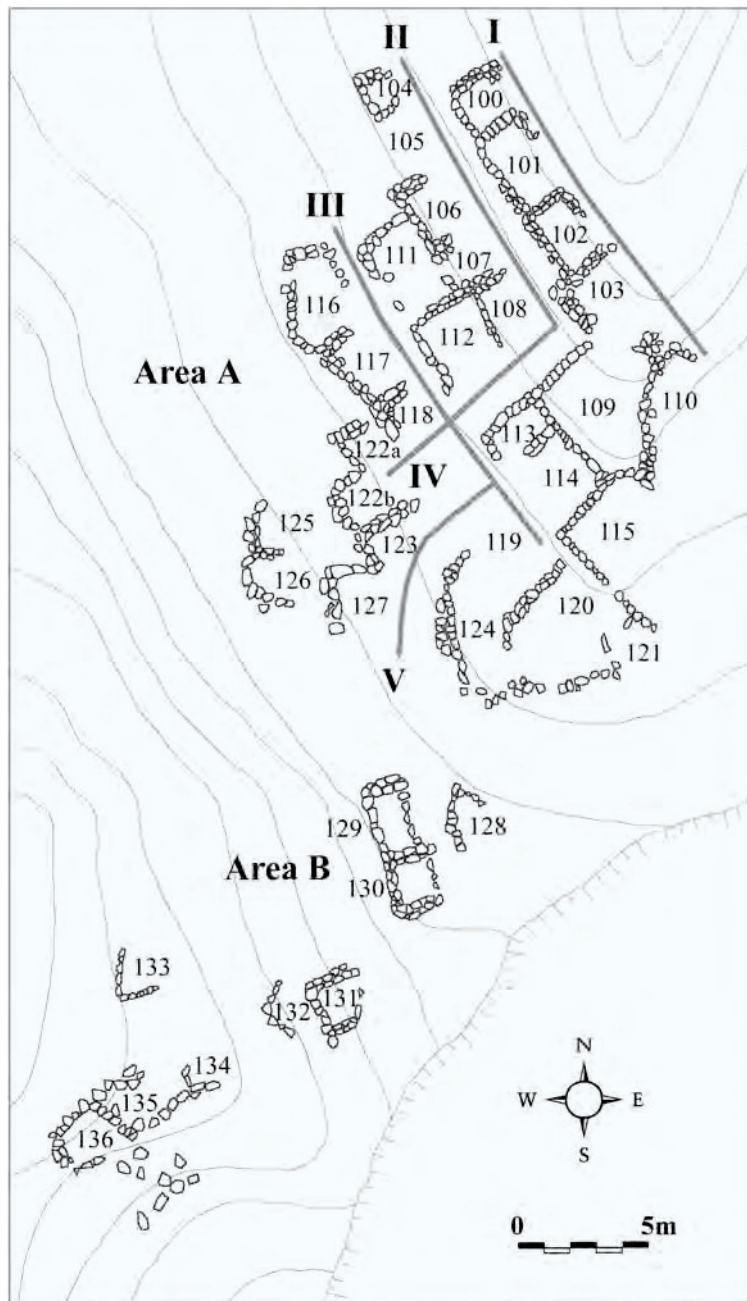


Figure 7.8: Site 48-4: general plan and main alleys.

path cross the ridge. In the centre of this site some piles of stones could be discerned as well as a modern resting ground for camels. Between and around these stones EB II–III sherds, a basalt spindle whorl and a point of a copper awl were collected as well as many pieces of a restorable Islamic jug. Another concentration of EB II–III sherds was collected on a spur 30 m. west of the site's centre. Whoever stands at this point has an excellent view, covering hill 49-9, the final ascent of segment 1 into the mountain pass, site 49-1 itself, and the continuation of segments 2 and 3 westwards (Figure 7.7). The arrangement of the site suggests that whoever controlled it could in principle intercept road travellers both as they crossed the mountain pass and as they approached or retreated from it.

The modern trekkers' path descends from site 49-1 northwards in the direction of Naḥal Zohar; however, the trail of EB II–III pottery sherds leads westwards, on the crest of the ridge along the watershed to sites 49-5 and 48-3. In this place the path bifurcates: one trail descends gradually, crossing the mountain's northern face diagonally (this part is defined as segment 3 and described below), while a second trail climbs on the ridge's spine, and passes through pottery scatter 48-9 towards the built site 48-4.

*Segment 3:* This segment includes six sites within the drainage basin of Naḥal Zohar. The path descends from site 48-3 (-65m.) to site 48-6 (-100 m.) – a descent of 35 m. along 750 m. (a slope of 4.67 per cent), crosses

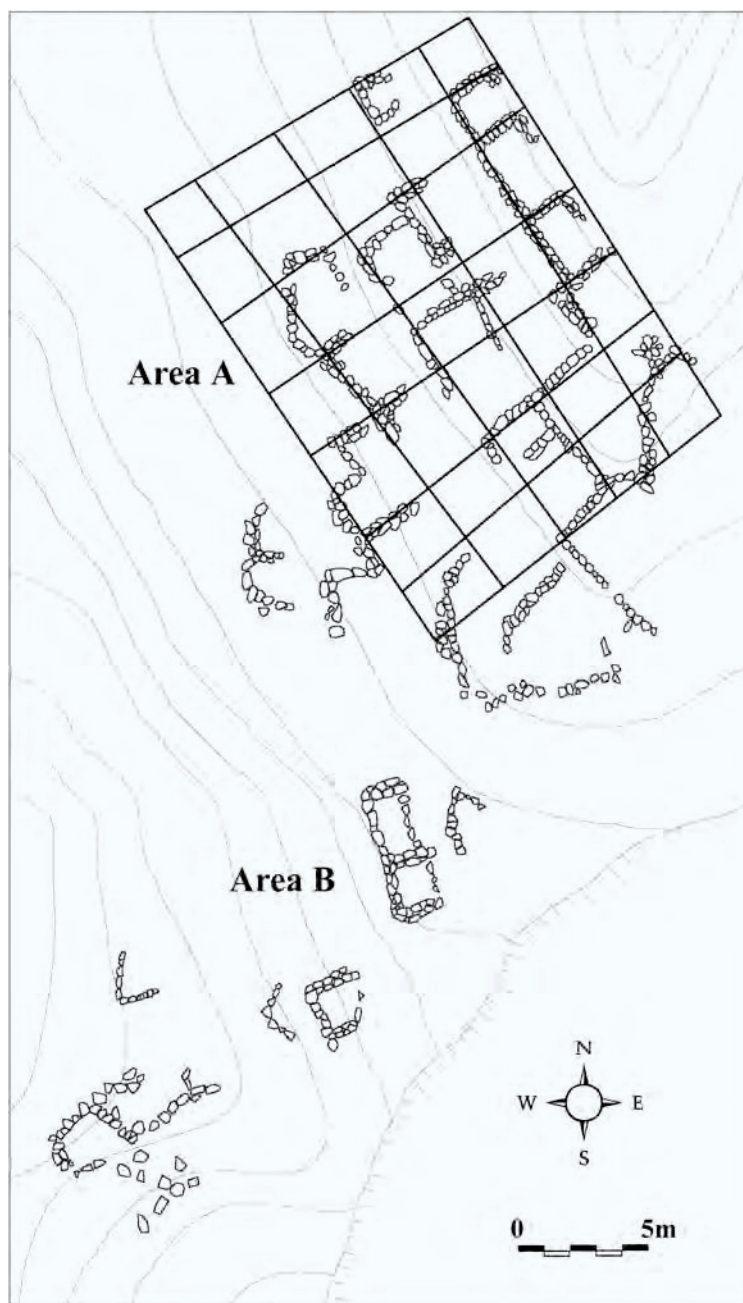


Figure 7.9: Site 48-4: a grid superimposition.

a tributary of Naḥal Zohar and then climbs up to site 40-1 at an elevation of 25 m. (a rise of 125 m. in 1,500 m., a slope of 8.33 per cent). The final part of this segment, from 40-1 to 27-5, is gentler – rising 90 m. in 2,500 m. (3.6 per cent slope).

In summary, the thread of sites described above delineates the course of an ancient ascent which climbed from the channel of Naḥal Hemar in a north-westerly direction and operated in the EB II–III. No evidence for construction or paving of any sort was found. The route is a trail, which had chosen a sensible topographic course allowing the travel of both people and pack animals. The ascent has been followed to date for a distance of 6.5 km., and additional fieldwork

might discover its continuation on both sides. The route is almost parallel to later ascents in the region in later periods, such as *Ma'ale Zeron*, with which it converges at site 40-1, and the modern highway (Figures 7.2–7.4). All these routes took advantage of the topography adjacent to Naḥal Zohar, that despite being very steep does not include any vertical cliffs, which are common in adjacent areas both south and north.

#### Site 48-4

The delineation and dating of the ancient ascent were not the only outcomes of following the pottery scatters. One of the most surprising results was that

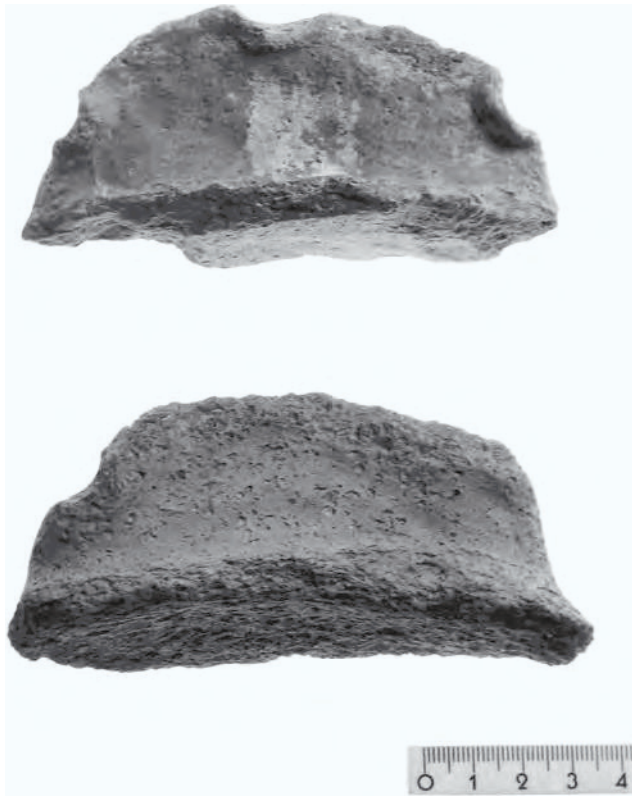


Figure 7.10: Ledge handles from sites 57-7 (below) and 49-6 (above).

the trail of sherds led directly to an exceptionally well-preserved site – site 48-4 (Figures 7.8, 7.9).

This site is a cluster of small structures constructed of local fieldstones and preserved in some places up to four courses, reaching a maximum height of 0.6 m. This built cluster is situated within a small depression, 200 m. north-east of the ridge's summit, hanging on a cliff, which drops abruptly 120 m. downhill at the southern edge of the built area, and again on the north c. 50 m. away from the structures. The route leading to the site enters from its most accessible, eastern side.

The good preservation of the site facilitated the preparation of a preliminary plan without any need of excavation (Figure 7.8). Two main areas are clearly visible at the site: a compact agglomeration of rooms in the north labelled 'Area A', and a few unconnected structures in the south, some of which are separated from area A by a small spur. This area was designated 'Area B'.

The agglomerate in area A consists of five parallel rows of rectangular rooms attached to each other and arranged along topographic lines on a north-west to south-east axis. Apparently this agglomerate was planned in a more or less 3 by 3 m. grid (Figure 7.9), to which a few additional structures were added in the south that do not align with the rest (124, 125, 126 and 127). Five main alleys (labelled in Roman digits; Figure 7.8) cross this compact built area, and allow entry to its

individual units. Alley I in the east gives access to units 100, 101, 102 and 103. Alley II leads to units 104, 105, 106, 107, and 108. Alley III shows the way to units 111, 113, 114, 116, 117, 118 and 119. In contrast to alleys I, II and III that conform to the topography, alleys IV and V intersect with it and climb to the south-east. Alley IV leads to units 108, 112, 118, 122a and 122b, while alley V gives access to units 123 and 127 and continues towards area B. The average inner size of each built unit in area A is 2.5 by 1.5 m. As currently visible (without excavation) it appears that the units are not interconnected. Each is an individual cell, which is accessed through a shared alley. There is evidence of a very late reuse (within the last decades) of rooms 100, 101 and 102, which appears as flimsy additions of stones used to raise the elevation of the stumps of the ancient walls, as well as a modern hearth.

In area B three structures of two rooms each are visible (129–130, 131–132 and 135–136). In addition there are remains of a few other installations (128, 133 and 134). The area B structures are arranged according to the topography, with their long axes parallel to the elevation lines, as common in area A.

The finds collected in the survey of the site include EB II–III sherds within the built area, and another extensive spread of sherds scattered on its north-western perimeter at a distance of 20 to 40 m. from the structures. This probably reflects patterns of garbage disposal, away from the living quarters.

### The finds

As a preliminary remark it is important to note that a relatively large number of pottery sherds collected along the ascent were partly restorable, a testimony to minimal coverage and displacement since their deposition (a common phenomenon in arid zones). This fact stresses the importance of paying attention to minute sites in our region, including small sherd scatters. It is interesting to note that MacDonald in his Southern Ghors and Northeast Arabah Archaeological Survey (SGNAS), which is geographically very close to our research area, also collected what he called 'EB potbusts' that each represented a single pot that crashed on the ground (MacDonald 1992: 69–70, sites 67, 71, 131 and 238).

The pottery collected at the sites along the ascent consists of a repeated range of EB II–III bowls, craters, jugs, holemouth jars and storage jars that strongly support the likelihood of the sites' contemporaneity.

A sample of finds is illustrated in Plates 7.1 and 7.2 (the complete assemblage is currently under study and will be fully presented elsewhere). The assemblage includes hemispherical bowls with narrow pointed rims and thin

walls (Plate 7.1: 8–9), and larger bowls with inward slanting rims (Plate 7.1: 6–7). The craters (Plate 7.1: 1–5) have thick and poorly fired bodies. Some of them are burnished, and include a strap loop handle, that in one case was incised (Plate 7.1: 1). One crater had a crescent-shaped plastic attachment on its exterior (Plate 7.1: 2).

Two types of storage jars were found. One type had flat bases, ledge handles with three spaced indentations, and occasionally a red slip (Figure 7.10; Plate 7.2: 6–7). The second type had thin, combed body sherds, flaring stylised rims, loop handles and flat bases (Plate 7.2: 1–4). These vessels were often fired to a metallic degree. Holemouth jars had thin bodies ending in a square-sectioned or ‘cut’ rim (Plate 7.2: 9).<sup>3</sup>

Storage jars of the first type, holemouth jars, jugs and most of the small bowls collected along the ascent have parallels in the large EB II–III sites in the near vicinity – Arad to the west, and Bab adh-Dhra’ to the east (Plates 7.2 and 7.3). However, two pottery types are particularly remarkable as their closest parallels are found over much longer distances. The storage jars of the second type (Plate 7.2: 1–4) belong to the so-called ‘Metallic Ware’ dated to EB II–III and common to northern Canaan (in the southern Canaanite context metallic storage jars are still considered exotic finds, such as a single metallic storage jar fragment from the EB III layer of Tel ‘Ira; Beit-Arieh 1999: 182, fig. 6.10: 3), and the closest parallels for the thick-walled and often burnished craters (Plate 7.1: 1–5) are found within another northern Canaanite assemblage, the ‘Khirbet Kerak Ware’ (henceforth KKW) (in the region described in this paper, KKW, or KKW imitations are also exotic, e.g. a bowl from Bab adh-Dhra’: Schaub and Rast 1989: 388, fig. 245: 20).

In addition to pottery, site 49-1 yielded a fragment of a basalt spindle whorl (Figure 7.11), a common item in EB sites (Amiran *et al.* 1978: pl. 76; Yekutieli 1992: 56) and a piece of a copper point with a square section (Figure 7.11). This piece is probably an edge of a copper awl, a widespread tool in the local EB sites (Yekutieli 1992: 57–58). Its square section is considered typical of the EB in contrast to a circular section popular in the Chalcolithic period (Ilan and Sebbane 1989: 144).

The picture that emerges from preliminary analysis of the finds is therefore:

- The date range of the pottery is EB II–III.<sup>4</sup>

<sup>3</sup> In a previous report (Yekutieli 2004) we stated that no holemouth jars were found, and therefore it was assumed that cooking was undertaken in the craters. In our continued survey at the site holemouth jars have been discovered, thus our preliminary observation is no longer relevant.

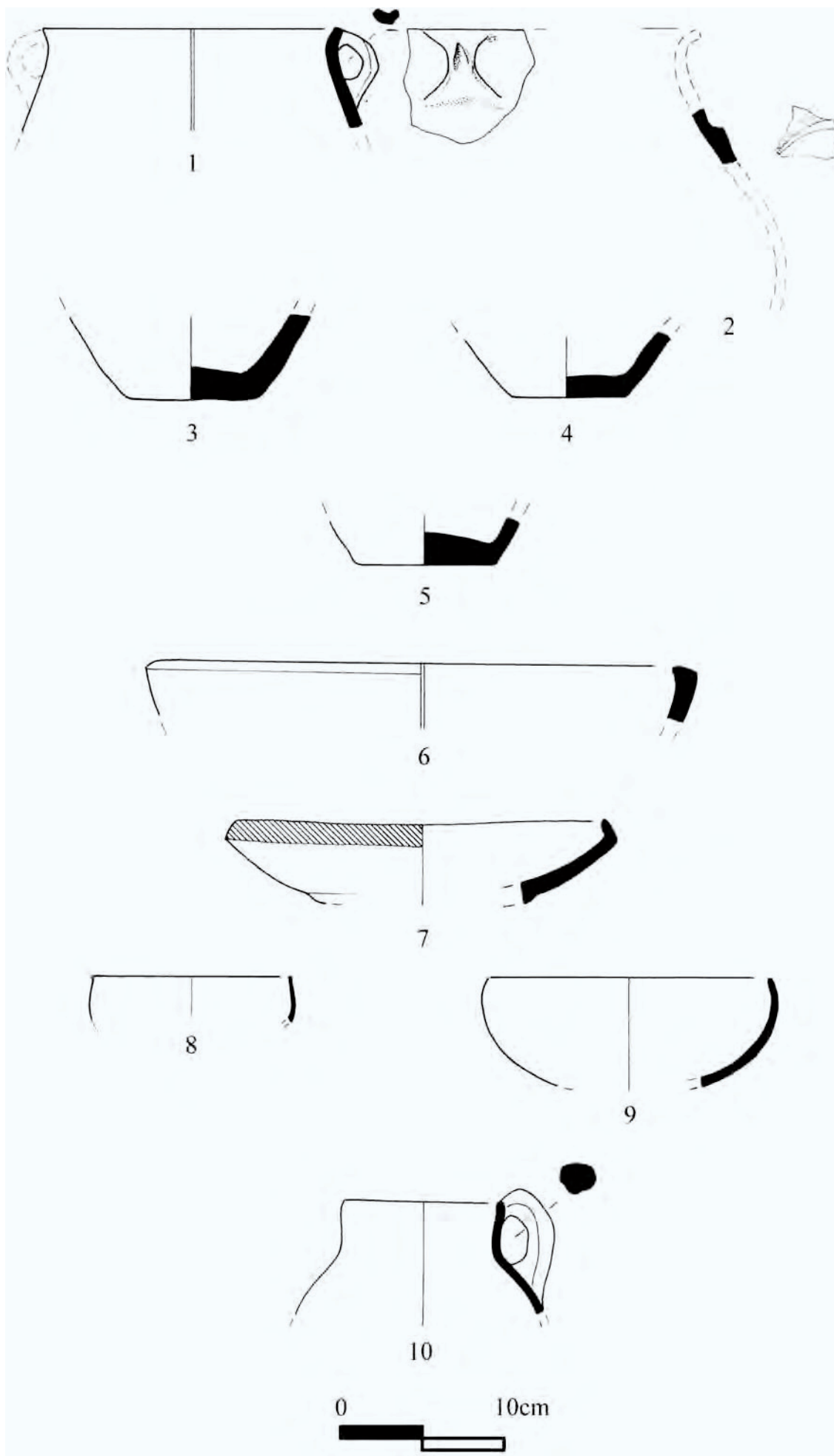
<sup>4</sup> Although the full study of the pottery is not yet finalised, it seems that the majority of the vessels belong to the EB II.

- Sites from these periods are known both east and west of the survey area, implying that the ascent was a part of their connecting network.
- The ceramic sample from the ascent, which encompasses a large functional and typological variety, is different from the common assemblages found at EB sites in the Negev Highlands that are dominated by holemouth jars (Sebbane *et al.* 1993: 43; Cohen 1999: 37, 67; Rosen 2002: 31).
- The range of pottery types hints at an operation of long-distance trade routes. Both the Metallic Ware and KKW are distinctly of northern Canaanite origin. Their occurrence at the ascent supports the notion previously suggested of a north–south trade network along the rift valley that was active during the EB (e.g. Milevski, Marder and Goring-Morris 2002: 227).

## Interpretation

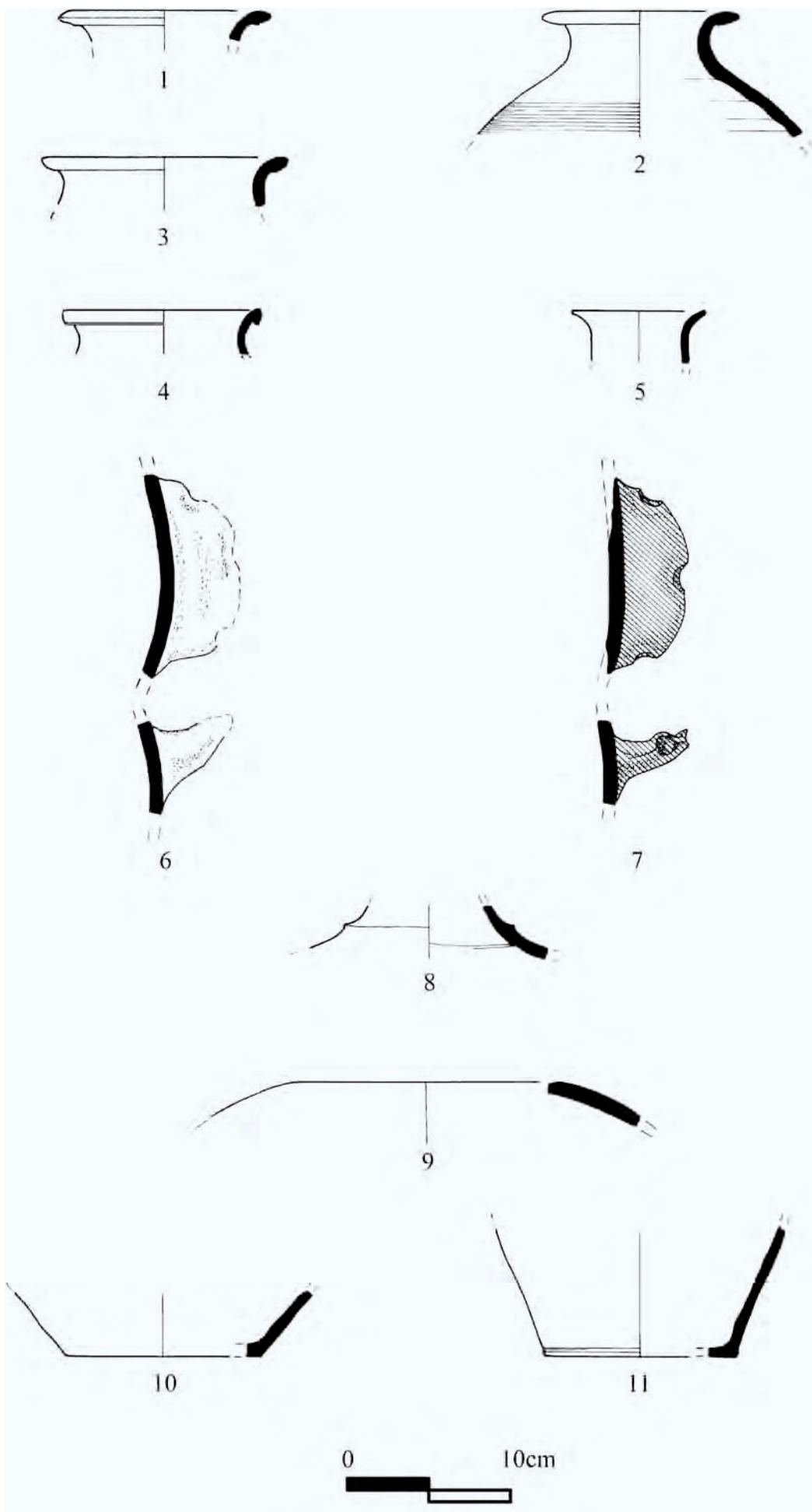
In addition to the economic aspects of the road (an obvious feature which usually comprises most of the discussion in ancient road systems), the details collected allow reflection upon the dynamics of the road and the operation of power in its organisation. The discussion will begin with an interpretation of site 48-4, and will continue with a reconstruction of a possible scenario for the road’s operational dynamics.

A comparison of site 48-4, and especially its area A, to contemporaneous sites in the region is revealing. The Negev Highlands EB sites portray a so-called ‘pen and room style’ (Rosen 2002: 31). These sites, which are mostly curvilinear in plan, usually comprise a courtyard surrounded by small rooms (Haiman 1998). These specific features are considerably different from the compact rectilinear grid plan of site 48-4. The architectural conception of site 48-4 also varies from that of the nearby EB II town of Tel Arad. The dwelling quarters there present discrete complexes composed of open courtyards and roofed rooms. Curving alleys cross the quarters and allow access into the complexes in a hierarchical way: first to central courtyards, and then through them, into the individual rooms or spaces, which otherwise are not connected to the main alleys (Ilan 2001: fig. 18.3). This hierarchic arrangement differs from the planning of site 48-4 where there is a direct access from the alleys into individual rooms. From a social point of view Tel Arad’s arrangement demarcates large private zones: courtyards and rooms separated from the public sphere of the main alleys. These zones are noticeably suitable for housing nuclear families. On the contrary the cellular grid plan of area A at site 48-4 is appropriate for the lodging of individuals, traversing from the threshold of their rooms directly into the public



## Plate 7.1

No.	Site	Reg. No.	Type	Parallels
1	48-4	/2-3	Crater	Ras Shamra level IIIA1: Contenson 1989: fig. 5: 10.
2	48-4	/5	Crater	'Affula: Sukenik 1948: pl. 11: 2
3	48-4	/6	Crater	'Affula: Sukenik 1948: pl. 10: 1 Jericho: Kenyon 1960: 119, fig. 38: 27, 28
4	48-4	/4	Crater	
5	57-7	/1	Crater	
6	48-4	/11	Bowl	Arad: Amiran <i>et al.</i> 1978: pl. 13: 41; 23: 9, 10, 17
7	27-1	/1	Bowl	Arad: Amiran <i>et al.</i> 1978: pl. 13: 38; 23: 4, 14 Bab adh-Dhra': Schaub 1981: Fig. 20: 1, 3
8	49-5	/2	Bowl	Arad: Amiran <i>et al.</i> 1978: pl. 13: 10–12, 14; pl. 22: 41, 47 Bab adh-Dhra': Schaub and Rast 1989: Table 22: 2740–2846; Table 23: 3740–3847
9	57-6	/7	Bowl	
10	49-6	/4	Jug	Bab adh-Dhra': Schaub and Rast 1989: table 22: 2424; table 23: 3443



## Plate 7.2

No.	Site	Reg. No.	Type	Parallels
1	48-4	/1	Storage jar	Tel Dan: Greenberg 2000: fig. 11.2: 1,3, fig. 11.5: 7–9 Tell Abu al-Kharaz: Fischer 2000: fig. 12.8: 2–4.
2	48-9	/1	Storage jar	
3	48-8	/1	Storage jar	
4	49-5	/1	Storage jar	Arad: Amiran <i>et al.</i> 1978: pl. 17: 2–4, 10
5	57-6	/3	Storage jar	Arad: Amiran <i>et al.</i> 1978: pl. 15: 3 Bab adh-Dhra': Schaub and Rast 1989: fig. 217
6	57-7	/2	Storage jar	Arad: Amiran <i>et al.</i> 1978: pl. 38: 1–3
7	49-6	/1	Storage jar	
8	57-6	/4	Storage jar	Tel Dan: Greenberg 2000: fig. 11.5: 9 Tel 'Ira: Beit-Arieh 1999, fig. 6.10: 18 Arad: Amiran <i>et al.</i> 1978: pl. 27: 14
9	48-4	/10	Holemouth jar	Arad: Amiran <i>et al.</i> 1978: pl.48: 23; 50: 11–16 Mitzpe Shalem: Bar-Adon 1989: Fig. Z9: 8
10	57-6	/2	Storage jar	Arad: Amiran <i>et al.</i> 1978: pl. 17: 4–9 Bab adh-Dhra': Schaub and Rast 1989: figs 194: 1–4, 216
11	57-6	/1	Storage jar	



Figure 7.11: Basalt spindle whorl and a copper awl from site 49-1.

sphere. The multiplicity of rooms of this type and their more or less identical sizes suggests that these individuals shared a common social status.

Another aspect of site 48-4 is the issue of visibility. As described earlier, this site is hanging on a cliff, which offers a spectacular view, most notably towards the EB II–III ascent climbing from Nahal Hemar. However, a walk through the site reveals that area A allows no view towards this landscape, and that the out-looking observation is confined to area B. Since visibility is a reciprocal act (interchangeable observer and observed) it is important to check what can be seen from outside while looking at site 48-4. Such an examination reveals that while climbing the ascent or standing on hill 49-9, the major part of the site – the built agglomeration of area A – is totally obscured behind a ridge (Figure 7.5), and the small isolated structures of area B blur into the escarpment background behind them, and might be recognised only by a trained eye that knows where exactly to look.

With this information in hand an interpretation of site 48-4 may be attempted: since area A is arranged in a rectilinear grid which demarcates small and comparatively similar individual spaces, each accessed only from a main alley, it is assumed that it lodged a group of equal-status individuals. The size of each room is sufficient for one or two persons at the most, and definitely cannot house a family (which in any case does not have any private zone within the area's overall arrangement). The physical detachment of area B, and its very few double-space units, hints at the existence of a social separation within the site. The smaller number of units in area B, and the fact that they are self-standing, suggests that they lodged a small group of individuals higher-ranking than those in area A.

The architectural plan and the two-tiered arrangement are suggestive of discipline operating within the site,

both in its initial construction and subsequent existence. It appears that a small number of individuals of higher position occupying area B had regimented a larger number of lower-rank people in area A. This situation recalls, in fact, small barracks, worker compounds or the like (similar concepts are evident in modern miners' camps for example; Crush 1992: 831–32).

Zooming out, site 48-4 is unmistakably connected to the EB II–III road complex, as a trail of sherds connects the two. However, the matter of visibility gives more depth to this connection. The panoramic position of area B provides its residents with another level of control: they do not have power solely over area A, but they monitor the ascent as well. The fact that this optic privilege is denied to the people in area A might have some significance in itself; however, the more important issue, in my opinion, has to do with the reciprocity of the gaze, of how the site is seen from outside. As stated above, area B might be distinguished from the ascent; however, area A is totally obscure. Bearing in mind that the centre of gravity of site 48-4, namely where most of the site's people are based, is within area A, it appears that the extent of its human resources was kept hidden from the road users. According to the theoretical guidelines of landscape archaeology, this is hardly a coincidence.

At this point of the discussion, and based on the theoretical premises mentioned at the opening of this paper, the landscape of the site and ascent complex may be further analysed. The focal area for this discussion lies within a 1 x 1 km. square, wherein segment 1 of the road crosses the ridge of segment 2 and turns into segment 3 (Figure 7.12). The central feature of this location is the rocky ridge, which the road traverses at the single possible crossing point – the mountain pass of site 49-1. As presented above, that site comprises both a passage where the road goes by and a lookout position that inspects the site and the ways

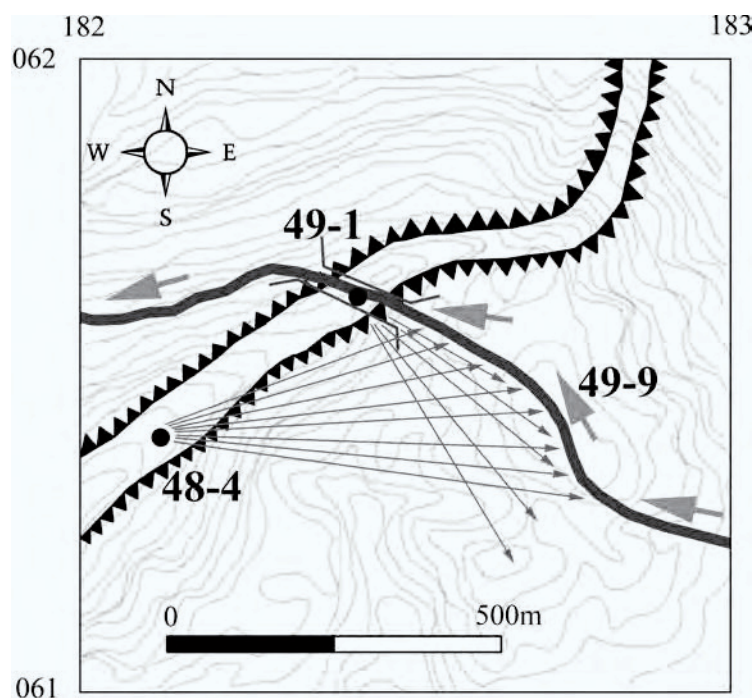


Figure 7.12. A reconstruction of the control procedure at the crossing of the Nahal Hemar – Nahal Zohar watershed divide.

leading to it (Figure 7.7). These features enable the place to serve as an excellent checkpoint on the road.<sup>5</sup>

In my opinion sites 49-1 and 48-4 operated in a concerted way to monitor the traffic on the ascent in the following way: while a group of people climbs from the direction of Nahal Hemar it pauses for breath at hill 49-9 (Figure 7.12). This flat hill is a perfect resting place after a long climb, and before the steep ascent that awaits towards pass 49-1. At this locality the group is clearly observed by guards both at 48-4 and at 49-1 (Figure 7.12), who may estimate the arriving party's size and potential power. The climbing group proceeds to mountain pass 49-1, where it is checked, taxed if necessary, and receives authorisation to proceed. In case the guards anticipate any hostility, a backup force could easily be called from site 48-4, 500 m. away.

This special arrangement gives advantages to the road controllers: as described above, people who climb segment 1 of the ascent towards the pass cannot see what is happening at the top of the ridge – area A of site 48-4, where most of the guards are based, is totally obscure from the ascent. Area B is blurred and might be seen only by those who know exactly where to look, and in addition no hint whatsoever of the operations taking place at pass 49-1 is exposed. This has two effects that work hand in hand for the benefit of the

road guards: military and psychological. On the military level, the force of the road control is secreted. Its size is unknown to the ascending group, and therefore the guards can surprise the road users, who are anyway exhausted from the climb. Psychologically, since the arriving party suspects it is continuously observed, it behaves accordingly. Even if there is only one observer, or none at all, the observed are terrorised by the chance that a powerful observer, with an unknown strength at an unknown position, watches them. In essence these are exactly the Panoptic (Foucault 1975: 201–6) or 'Big Brother' (Orwell 1949) effects that Foucault and Orwell respectively described, although here in a much earlier context than they anticipated. In our case the military and psychological effects are used as powerful mechanisms of power that may allow a small group of guards to control a large mass of road users.<sup>6</sup>

Summing up, it is proposed that site 48-4 served as an outpost that controlled and monitored the traffic on the EB II–III ascent. The outpost's leaders most likely resided in area B, which both reinforced their status towards their inferior team, and enabled surveillance of the ascent. The common staff of the outpost lived in area A in small standard units built adjacent to the

<sup>5</sup> It is interesting to note similar installations at critical points along desert routes in other places in the Middle East, such as along the Middle Kingdom Almat Tal Road, south and east of Gebel Tjauti in the Egyptian Western Desert (Darnell and Darnell n.d.).

<sup>6</sup> It is instructive to note that archaeologists working on relatively modern remains in the New World, like Delle (1998) studying plantations in Jamaica, and Romero (2002) researching nineteenth-century fortlets in Argentina, used similar theoretical concepts to examine surveillance and interrelations between space and power in their archaeological case studies. I thank Michael Given for referring me to these works.

logistic installations of the outpost such as store-spaces, and perhaps a common kitchen as well.

Obviously, before suggesting this interpretation other possible explanations of the site were considered, e.g. dwelling site, market place, caravanserai, etc., but these were rejected as each of them explained only some of the features encountered and not the whole apparatus.

The very small size of the rooms and their strict arrangement, as well as the distance to any reliable water source, excludes an explanation of site 48-4 as being primarily a dwelling site. In addition, the site's unique plan is so far unknown within the accumulating corpus of EB dwelling sites from the surrounding arid zones.

The location of the site at a fairly inapproachable position, away from any main crossroad, concurrently with the fact that its main part is hidden, argues against interpretation of the site as a marketplace. There is no reason to hide a market, which almost by definition should be accessible and located on main road intersections. In addition, the amounts of energy required for supplying the site with large reserves of food, water and fresh pack animals, compared with the relatively short distance (one walking day) to nearby inhabited regions, weakens the necessity in this location for a caravanserai.

### *Regional context*

The interpretation of site 48-4 as a command and control outpost within an EB II-III road apparatus implies the existence of a higher-level organisation that operated in the area and implemented such a system. In order to examine this possibility the regional context should be considered.

Walter Rast has already suggested, based on other arguments, that precisely such an entity existed in the south-eastern Dead Sea Ghors during the EB III, with its focus at Bab adh-Dhra' and Numeira (Rast 2001). This area is indeed in direct proximity to the Naḥal Zohar ascent apparatus, but in order to validate the link we should further ask whether there are specific features in this south-eastern Ghors entity that occur in our finds as well. Also, do they occur in other places within the zone that encompass both our sites and the south-eastern Ghors?

The answers to both these questions are positive: apparently contemporaneous parallels to our finds are located close to Bab adh-Dhra', and on the opposite Dead Sea coast, in the neighbourhood of modern Mitzpe Shalem. A short examination of these parallels illuminates the socio-cultural milieu in which the Naḥal Zohar route apparatus operated.

Carsten Körber surveyed the area next to Bab adh-Dhra'. Although so far he has published his results in only a few short notes, his descriptions highly resemble site 48-4, especially in respect to its position within the landscape. He portrays the site of Gabal ar-Risha (known earlier as Khirbet Wadi adh-Dhra South; Körber 1993: 552) in the following words:

'The mountain peak towers above both the Ghor adh-Dhra' and to the north, the mouth of Wadi adh-Dhra' (Weidha) [...] The access to the mountaintop of Gabal ar-Risha is most convenient from the south. A wide access leads from the Ghor adh-Dhra' (between 200 m. below sea level and sea level) up to Gabal ar-Risha at an altitude of 220 masl. The summit is protected to the west, north and south by steep and jagged precipices. From the east the peak is again separated by a long and wide natural saddle through which the only convenient way leads to the remains of the Early Bronze Age fortification' (Körber in Bikai and Kooring 1995: 511-13).

On the opposite side of the same wadi, Körber describes another EB II-III site:

'Khirbet Wadi adh-Dhra' North [...] towers above the northern bank of Wadi adh-Dhra'. A natural passage in the hill between 4.00-5.00 m. wide that was extended into a ramp leads from the area below to the top of the hill. In the upper part this rampart ends at a bastion. A passage into the fortification leads around the northern side of this bastion. The strongly fortified summit of the hill is about 100 m. long and 30 m. wide. The terrain gently slopes from north to south. The eastern side of the fortification is protected by a high rising rock barrier. Gaps in this natural rock barrier are carefully sealed with stone boulders [...]' (Körber 1993: 552).

These are not the only sites scattered around Bab adh-Dhra' – a third fortified EB III site, named Buleida, was discovered several kilometres along the Wadi Karak east of the Ghor el-Mazra'a (Körber 1993: 553).

Walter Rast first published an interpretation of this site-cluster. He incorporated Körber's sites into a regional picture of the Dhra' region in the EB II-III, to which he added his own data from Bab adh-Dhra' and Numeira. He stresses the fortification effort noted at all these sites, and suggests (based, as he writes, on private discussions with Körber) that Körber's sites were primarily aimed at control and overseeing the local water sources, which served as the economic base for the larger population centres at Bab adh-Dhra and Numeira (Rast 2001: 528-29). These operations were, according to Rast, clear manifestations of the state-level organization operating in the eastern Dead Sea Ghors in EB II-III (Rast 2001).

Crossing to the opposite bank of the Dead Sea, Pesach Bar-Adon has identified a large EB site (350 x 450 m.) that spreads on top of two high rising hills and an adjacent terrace, within the imposing cliffs between Wadi Muraba'at and Mtzokei Dragot (Bar-Adon 1989: 50). He divided the site, accordingly, into three main areas, labelled areas A, B, and C.

Area A, 0.05 ha in size, was full of ashes and heat-baked stones that testified to repeated fires. The ashy deposit was leaning against a wall, with an adjacent two-room structure (Bar-Adon 1989: 51). A path, with stone revetment in some places, led from area A to area B, which in itself comprised a 38 m.-long stretch of installations built on a cliff-terrace. These included burnt layers, platforms, a built installation and a scatter of hundreds of flint tools among which were more than 400 fan scrapers (Greenhut in Bar-Adon 1989: 60–78, figs 11–27), as well as many EB pottery fragments (Bar-Adon 1989: 51–54). Lastly, area C consisted of remains of hearths, ash concentrations, pottery and flint tools (Bar-Adon 1989: 55).

The pottery from the site, which is markedly similar to our finds from the Naḥal Zohar ascent, was dated by the excavator to a time range starting in late EB I and continuing through EB II into EB III (Bar-Adon 1989: 55–60).<sup>7</sup> Petrographic examination of the pottery conducted by Yuval Goren (in Bar-Adon 1989: 78–82) led him to conclude that the major part of the assemblage, and especially the smaller vessels, originated in Transjordan, most probably in areas on the east coast of the Dead Sea (Bar-Adon 1989: 81). Bar-Adon's interpretation of the site, based on the occurrence of raised platforms, repeated fires and votive objects, was that it was a cult place located within the steep slopes rising above the Dead Sea, and serving south Palestinian and Transjordanian people (Bar-Adon 1989: 8\*).

Tying the above evidence together, we may conclude that the typology of EB II–III pottery published so far from sites around the Dead Sea is similar; as the petrography indicates a substantial link between sites in the region; and due to the fact that the EB II–III road discovered by us climbs from the very edge of the Dead Sea Ghors themselves, it is safe to assume that we are dealing with an integrated regional entity.

Another common feature of the sites mentioned above is their excessive use of the rift valley's clifty landscape in order to boost social notions such as control (around Bab adh-Dhra' and in our area), and cultic symbolism (at Mitzpe Shalem). Evidently the people responsible

for the creation of the discussed sites had a profound familiarity with the seemingly threatening and challenging landscape around them, which they utilised to a great extent for practical and ideological purposes.

These indications of the existence of a regional entity around the Dead Sea, of which our sites are a part, extend beyond the entity that Rast envisaged on the south-eastern Ghors to encompass the whole southern circumference of the Dead Sea (Rast 2001).

A wider perspective that looks even beyond the Dead Sea region brings additional aspects of the Naḥal Zohar ascent into consideration, particularly the question of where the route came from and where it led. A few possibilities should be taken into account in addressing this query. A specific road might have been a part of a network of:

- Intraregional roads connecting population centres within a distinct region.
- Roads between settlements and their resource areas such as agricultural fields, water sources, grazing lands, mining areas, or places with spiritual or ceremonial significance.
- Long-distance interregional routes.

The Naḥal Zohar ascent passes through the scarcely inhabited area of the southern Judaeian Desert, which forms a physical barrier between two distinct regions: the Arad Valley to the west and the Dead Sea Ghors to the east. Therefore it is apparent that it is a route on an interregional scale, which most probably connected those provinces (as anticipated by Amiran many years ago: Amiran 1980: 24). Besides the social aspect of connecting the relevant population centres, this route had a clear economic rationale within the realm of raw materials production and distribution. Areas within one to three days' walking distance from the southern Dead Sea Basin contained raw materials that could be transported to the Arad Valley and beyond through the Naḥal Zohar ascent. The copper mines of Faynan (Figure 7.1), which operated during all the phases of the EB (Hauptmann 1989; Fritz 1994; Adams 1998; Levy *et al.* 2001), and which were the source for a large number of the copper objects discovered at Arad (Hauptmann, Begemann and Schmitt-Strecker 1999), are only 40 km. from the southern Dead Sea Basin. Supporting evidence for connections along this axis was recently discovered at sites in the Petra region, such as Umm SAYSABAN (Lindner *et al.* 1990; 2001). Another commodity valued in the EB II–III settlements of the region was the flint tabular scraper. Huge workshops producing such tools during the EB were recently discovered in the western part of Qa' al-Jafr, 80 km. south-east of the Dead Sea (Figure 7.1) (Fujii 1999; 2001). A third

<sup>7</sup> Judging from the published plates the stress should be, in my opinion, on EB II–III.

valuable raw material, asphalt, is found much closer to the route discussed (Harel 1973: 76–77; Nissenbaum *et al.* 1984; Milevski, Marder and Goring-Morris 2002: 222). It was collected on the shores of the Dead Sea, and perhaps also in natural outcrops such as at Naḥal Ḥemar – practically on the route's track itself. Asphalt was in high demand throughout the EB (Yekutieli 1992: 76; Nissenbaum *et al.* 1984; Marder, Braun and Milevski 1995: 84–87; Milevski, Marder and Goring-Morris 2002), and at the beginning of this period it was even exported as far as Lower Egypt (Rizkana and Seheer 1989: 71–72).

Further clear evidence for the long-distance traffic in goods along the route are the finds described above, which include vessels originating in northern Canaan that most probably arrived via the Jordan–Dead Sea rift valley.

## Conclusion

Our survey methodology has enabled the identification and dating of an ancient route near the south-western corner of the Dead Sea. This route operated within the EB II–III period. At least during some phases of its existence the road was under the control of a regional power, which we assume functioned across the whole southern Dead Sea region.

The analysis of the ascent and site 48-4 according to the premises of landscape archaeology reveals an organised and hierarchical society that maintained a high degree of control over its members, covering a wide territory.

This entity made comprehensive use of landscape conditions to enhance control, surveillance, power and ideology. This behaviour was noted at several scales: at the micro level in site 48-4; at a greater scale within the Naḥal Zohar ascent apparatus; and ultimately at the macro level in many places around the southern basin of the Dead Sea.

In considering the wider geographical context we must not forget that the route we discovered led to another important regional centre, Arad. Arad is considered to have been an especially substantial polity that extended its hegemony to the whole of the Negev and perhaps even as far as Sinai.

It will be extremely interesting to check in the future what the relations were between the two entities linked by this route: the Negebite polity directed from Arad, and the Dead Sea Ghors polity. Were they competing? Was there any hostility between the two? Might the intensive control of the road connecting them be suggestive in this respect?

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# Mining archaeology and archaeometallurgy in the Wadi Arabah: the mining districts of Faynan and Timna

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## Introduction

The fertile alluvial plain between the two rivers Euphrates and Tigris is known as the cradle of civilisation. This region does not have any sources of metalliferous raw materials: geological development caused the sedimentation of sand, loess and clay after the melting of the arctic ice after the last glacial. If one considers the wealth of prehistoric metal objects in this area, it becomes clear that the import of copper and other metals from adjacent regions such as the Zagros Mountains, the Iranian Plateau and the copperland of Magan (today the Sultanate of Oman) was of great importance. Mesopotamia is an example demonstrating cross-regional, perhaps intercontinental trade connections that extended from the Near and Middle East over many hundreds of kilometres. For instance, lapis lazuli, a semiprecious stone from Afghanistan, was also very much in demand and was imported into Mesopotamia, Syria and Egypt from c. 3000 BC (Weisgerber 1987). Tin was traded most probably from middle Asia. Other raw materials such as obsidian came from Anatolia and the Transcaucasus to the Levant, wood from India, silver from Anatolia, and amber possibly from the Baltic Sea.

Can this model of interaction be transferred to the region of the Wadi Arabah? In this paper we will investigate this question illustrated by two copper deposits, Timna and Faynan, located at the western and at the eastern margin of the wadi. This paper will demonstrate, with a few selected examples, the aspects and periods in which common technological and social developments are visible in both deposits. We will analyse the (cross)-regional radius of these two mining districts and show where ore and metal were exported from these ore deposits.

## Research in archaeometallurgy: case studies of Timna and Faynan

The southern Levant, like Mesopotamia, is rather poor in mineral resources with the exception of two copper deposits, Faynan and Timna. These are located at the western and at the eastern margins of the Wadi Arabah and were of major importance in antiquity. According to Stöllner's nomenclature (2003) these two

regions may be named 'mining districts'. They are among the most impressive and best preserved technical monuments known from the Middle East and Europe. They were never of major international economic importance, because their ore content was much too low. They could never compete with 'giants' such as the island of Cyprus and Ergani Maden in south-east Anatolia. Due to this limited economic importance, an extraordinary number of ancient mines, smelting sites and metal-related settlements have remained untouched by modern activities. In addition, it is of great advantage that all the remains of mining and metal production and of settlements in these districts, from different periods, do not form multi-period sites, as is the case at many tell sites, for example in the Jordan valley and Anatolia, but are distributed horizontally over the entire areas of Faynan and Timna.

All these circumstances offer(-ed) a unique possibility of investigating the history of mining and metallurgy and their impact on the cultural environment of the southern Levant. In fact, it was in Faynan and Timna where pioneering, interdisciplinary studies on early copper mining and production and basic research strategies in archaeometallurgy were developed. The teamwork of archaeologists, mining engineers and other physical scientists from a number of disciplines contributed to the elucidation of important new aspects of the metallurgical *chaîne d'opératoire* (Figure 8.1).

## Copper ore deposits in the Wadi Arabah

The location of all copper mineralisations (geologically speaking a 'copper ore district') in the Wadi Arabah is one of the few locations south of the mountain belt of the Taurus in Anatolia and the Zagros in north-west Iran. The mineralisations are embedded in a huge sequence of sedimentary rocks: in this they differ from ore deposits in the north and from those in the Sinai Peninsula and the Arabic Plate, where the overwhelming part is of hydrothermal origin.

Several mineralisations occur at the western and the eastern margins of the Wadi Arabah. The largest are Faynan and Timna (Figure 8.2). Of lesser importance are mineralisations in the Wadis Abu Kushaybah and

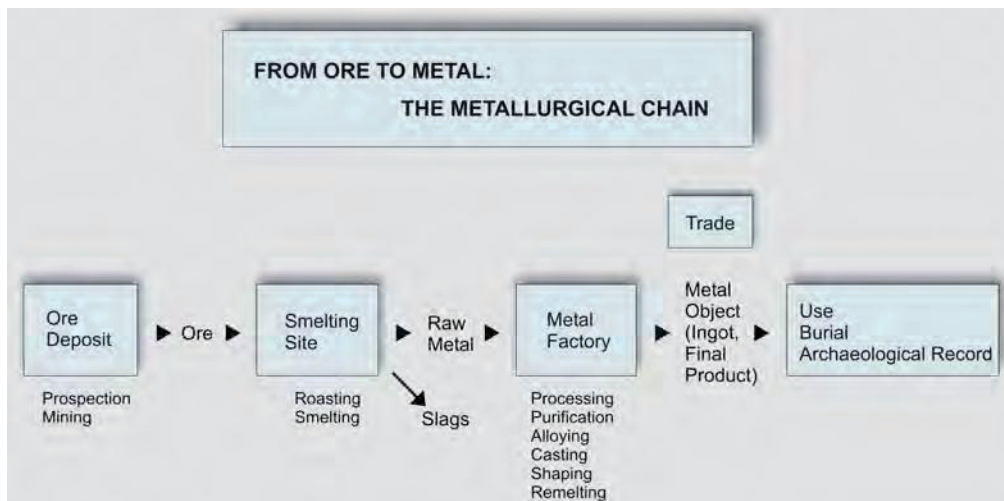


Figure 8.1: The 'chaîne d'opérateur' of mining and metallurgy. This illustrates the technology and interaction, beginning with the exploitation of an ore deposit to the production of metal objects and their incorporation into the cycle of trade. Finds from all the individual steps can be used to interpret relationships between the eastern and western sides of the Wadi Arabah in this particular field. Courtesy A. Hauptmann, Deutsches Bergbau-Museum, Bochum.

Abu Qurdiyah on the eastern side, and in the Wadis Amram and Shehoret on the western side. Originally they all formed a coherent ore district which was

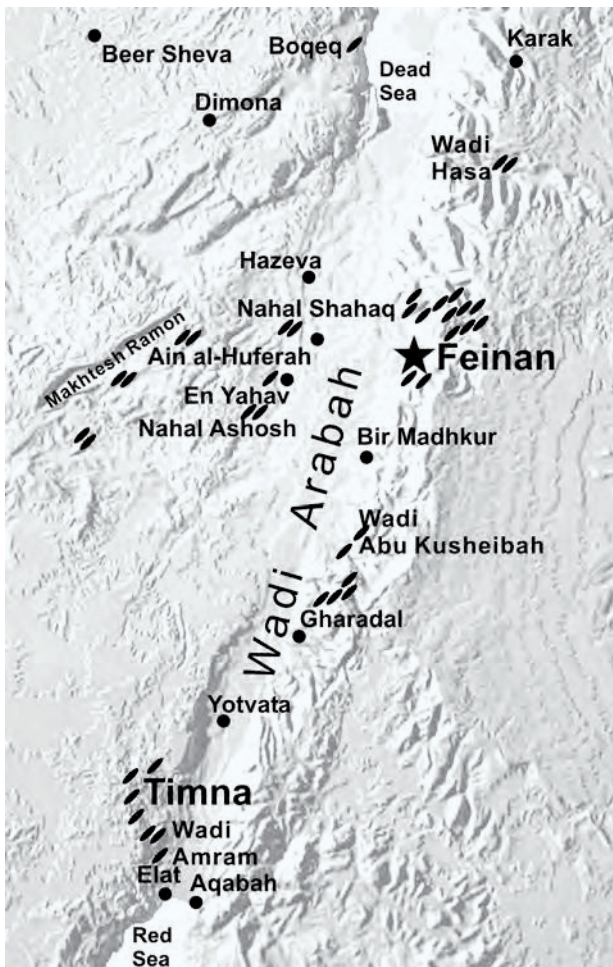


Figure 8.2: Map of the Wadi Arabah showing copper mineralisations on the eastern and western sides. Courtesy A. Hauptmann, Deutsches Bergbau-Museum, Bochum.

divided in the recent geological past by transform slip movement (Segev, Beyth and Bar-Matthews 1992). The western block was tilted down, while the eastern block was lifted up. This led to a widespread outcrop of the mineralised, stratigraphically lower Dolomite-Limestone-Shale Unit ('DLS') at Faynan (at Timna, this formation is called the Timna Formation), while at Timna it is the ore-bearing Amir/Avrona Formation which was exploited in antiquity.

Caused by the strong uplift of the eastern block in Jordan, the Precambrian crystalline basement is exposed south of the Dead Sea all along the eastern side of the Rift Valley to the Arabian Peninsula in the south. These rocks caused a steep and rough ascent from the plains of the Wadi Arabah to the Jordanian Plateau. At Faynan, for instance, the level of the Wadi Arabah is at c. 100 m. From here, a steep incline arises to a height of c. 1200 m. to the east. On the western side of the Wadi Arabah, limited outcrops of crystalline rocks occur some 100 km. to the south in the middle of the Timna Valley and in the mountains a few kilometres to the south. Due to the overall occurrence of sedimentary rocks the transition to the Negev is relatively smooth.

The copper ore deposits of Faynan and Timna are of epigenetic origin. Lead isotope analyses (Figure 8.3) show a wide range of compositions which are due to a multistage origin with repeated remobilisation of ores. Dense clusters are visible in the upper right corner which reflects the oldest ore formation during the (Pre)-Cambrian. Attention should be paid here to a gap between c. 0.847 and 0.856 on the  $^{207}\text{Pb}/^{206}\text{Pb}$  axis where only a few ore compositions were found. This gap seems to correspond roughly with a similar gap in lead isotope analyses between other ore deposits in the Mediterranean.

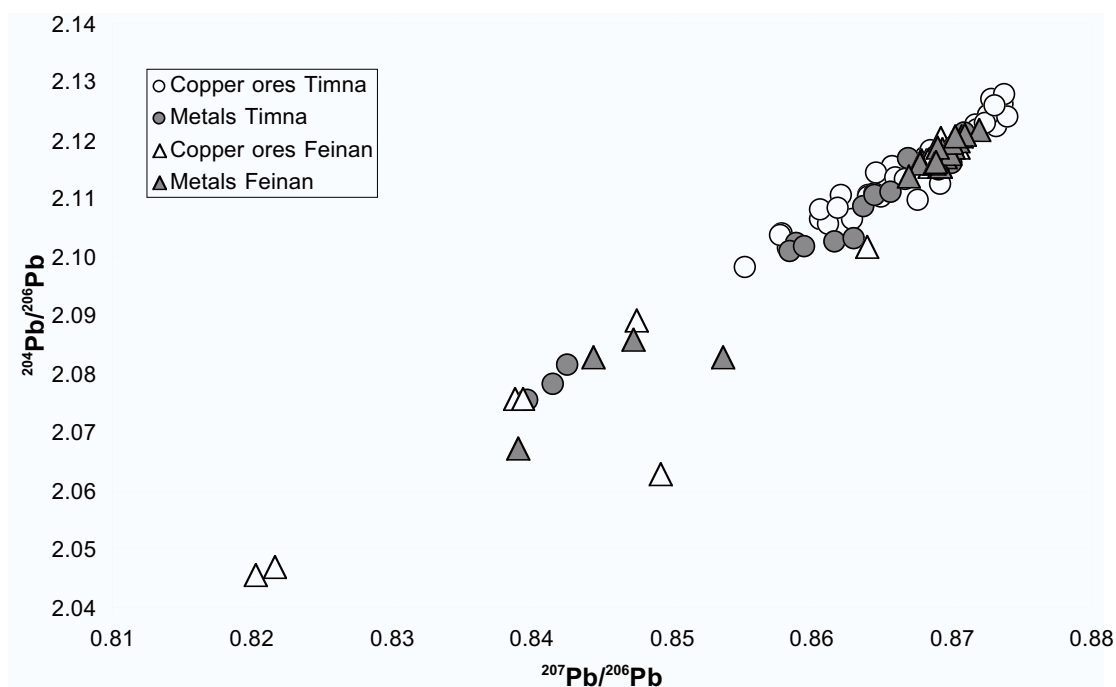


Figure 8.3: Lead isotope analyses of ores and metals from the Wadi Arabah show a wide range of compositions, but a pronounced cluster is visible at the  $^{207}\text{Pb}/^{206}\text{Pb}$  axis between 0.86 and 0.875. This shows that much of the lead in the copper has kept its composition of Precambrian Age during the formation of the ore deposits. The metal reflects the compositions of the ores. Data after Hauptmann 2000.

Klein *et al.* (2004) suggest that this would reflect two different phases of cross-regional (i.e. pan-European) ore formation between the Variscan and the precursors of the Alpine orogeny in Europe. Lead isotope compositions in the lower left are geologically young and could be connected with volcanic activities during the lower Cretaceous (Segev, Beyth and Bar-Matthews 1992).

In Timna and in the Wadis Abu Kushaybah and Qurdiya stratiform mineralisations are characteristic, embedded in flat dipping in the sandstones. In Faynan, the mineralisations are different. A 1 to 1.5 m. thick layer (comparable to a 'seam') of crumbly and brittle claystone in the hanging wall of the Dolomite-Limestone-Shale Unit is copper ore-bearing. The underlying schist consists of very hard limestone and dolomite and the overlaying of silicified arcose rocks. In higher strata, in the sandstone, a system of veins and fissures is mineralised with copper.

The copper ores are predominantly made up of secondary minerals such as malachite, chrysocolla and (par-)atacamite. Of subordinate importance are copper sulphides. These minerals may form massive nodules and chunks embedded in the DLS. Herewith, they provided a high-grade raw material ideally suited for most ancient smelting. On the other hand, ores from Faynan are frequently intergrown with manganese ores, and those from Timna with iron hydroxides. Metallurgically speaking this means in both cases that large parts of the ores were 'self-fluxing', i.e., they

could have been smelted without addition of any fluxes.

The geochemical composition of the ores shows a low level of those impurities which would end up in the copper after smelting. Hence, a typical feature of the Wadi Arabah copper, especially such copper that was produced from the mineralisations in the sandstone, was its purity. Usually the concentrations of As, Sb and Ni are far below 1 wt. % in ores and metal objects. Therefore, they cannot be considered as the source of all metal objects high in As, Sb and Ni which have been found at many Chalcolithic sites in the southern Levant (Tadmor *et al.* 1995). Furthermore, it must be pointed out that none of the mineralisations in the Arabah contains native copper. This is in contrast to the oxidation zones of many sulphidic ore deposits in southern Anatolia where abundant native copper was the stimulus for the utilisation of metal in the Pre-Pottery Neolithic period from the ninth/eighth millennium BC. At the well known site of Çayönü Tepesi dozens of small metal objects were manufactured from native copper (Maddin, Muhly and Stech 1999). Due to the absence of native copper in the southern Levant, the initial stage of metallurgy lags behind for several millennia.

### Mining archaeology

Analysis of mining technology at Timna and at Faynan superficially indicates only a few common characteris-



Figure 8.4: Many thousands of mine shafts were sunk next to each other on gravel terraces at Timna to exploit the horizontally embedded copper mineralisation a few metres below the surface.  
 Courtesy A. Hauptmann, Deutsches Bergbau-Museum, Bochum.

tics. On the one hand, this is due to the geologically different features of the copper mineralisations, and on the other hand, the peaks of copper production were in different periods in the two mining districts. For instance, there is ample evidence for Early Bronze Age (EBA) mining activities and metal production at Faynan, but at Timna only a few remains were discovered. In both regions strong activities are recorded from the Iron Age, predated at Timna by those from the Late Bronze Age.

Nevertheless, the different mineralisations at Faynan and Timna were exploited by similar techniques. This clearly indicates a joint development of technologies across the whole Wadi Arabah, which is also mirrored in metal technologies. The technology of ancient mining and smelting activities at Timna has been investigated, e.g., by Conrad and Rothenberg (1980), and at Faynan by Hauptmann (2000), Weisgerber (1996) and Weisgerber and Hauptmann (1988).

About nine thousand buried shafts, densely plotted on the gravel terraces in the Timna Valley (Figure 8.4), indicate an extraordinarily intensive exploitation of copper ore which seems to exceed by far the one at Faynan. However, this is because the horizontally bedded mineralisations, often just a few metres below the surface, were exploited by systematically digging up the entire gravel by simple methods ('Duckelbaue'). In addition, this impression of an exhaustive exploitation of the ore deposit is supported by large systems of sophisticated galleries and chamber-pillar constructions.

At Faynan the situation is different. Neither a comparable number of filled shafts nor a large number of tailings seems to indicate extensive underground mining. But this does not mean that the extent of copper exploitation was less than at Timna. The

contrary is the case. The amount of slag produced at Faynan suggests metal production on the scale of several thousand tons over the millennia. This is strong evidence for the economic importance of this mining district in antiquity. At Timna, the slag heaps indicate considerably less than this amount. There are two main reasons for the less visible evidence of ancient mining at Faynan. The first is the exploitation of ores at a greater depth, which led to more extensive underground mining activities (Figure 8.5). The second is that that exploited parts of the mineralisation were backfilled so that not much of the waste was unloaded on the surface.

The most significant regional development in mining and metallurgical techniques can be dated to the Iron Age. This is the period when deeper parts of the ore deposits at Faynan and Timna were exploited by systematically sinking shafts (Figure 8.6), sometimes to a depth of 70 m. (!), connected with large underground chamber-and-pillar-constructions to mine the ore. The circular mine shafts show remarkable similarities at both sites. They usually have a diameter of c. 0.8 m. with footholds left protruding out into the shaft or carefully cut into the rock. Also, the further treatment of ores at the smelting sites was based upon technologies which were identical in the southern Arabah. The shape of slags, the design and composition of furnace remains, and the refractories used for making tuyeres were identical at Timna 30 (layer I) and at Faynan 5 and Khirbat an-Nahas (Rothenberg 1990; Hauptmann 2000).

### Production and distribution of metal

The use of copper ores in the mining districts of the Wadi Arabah extends from the Pre-Pottery Neolithic up to the twentieth century AD. In the course of these

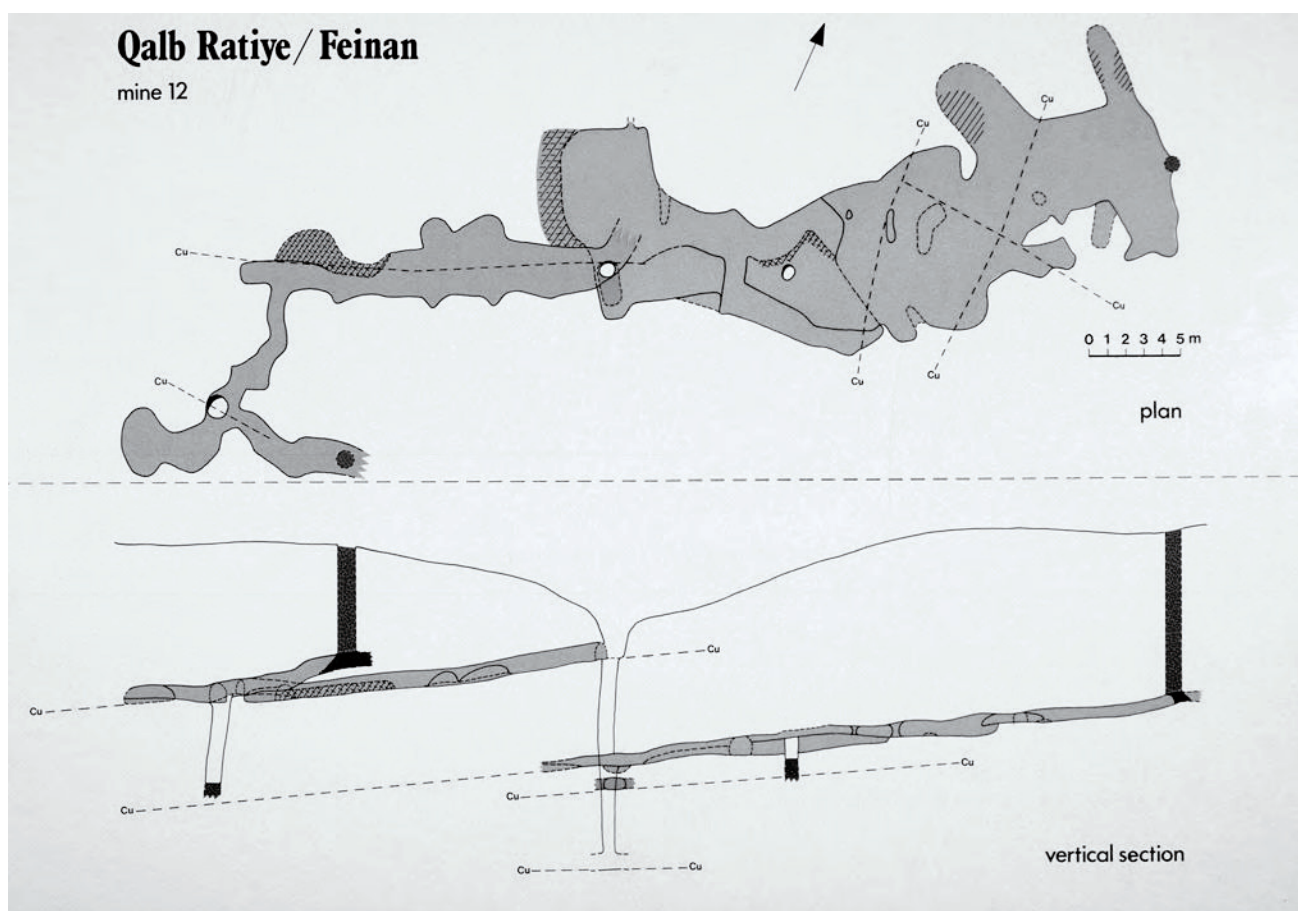


Figure 8.5: Prehistoric (Late Chalcolithic/EB I) mining followed by activities in the Roman period. Plan (above) and section (below) show the exploitation of copper ore by shaft mining and chamber-pillar construction.

Courtesy G. Weisgerber, Deutsches Bergbau-Museum, Bochum.

10,000 years, the organisation and social patterns of metal production, the techniques applied, and the nature of trade changed repeatedly, depending on political developments. Despite the distance of c. 100 km., these first two aspects developed in similar ways at both Faynan and at Timna. But due to their geographic locations, the trade routes for exporting copper ran in different directions.

In the following paragraphs we present patterns of metal production at both localities in a time window from the Late Chalcolithic to the end of the EBA.

For decades, scholars have searched for the origins of metallurgical activity (contemporary with the first trade in metals) in close proximity to ore deposits. The theory was that, as in later periods, amounts of slag would indicate the origins of metal production near the ore deposits. This is not the case. The processes from the dawn of copper production in the Late Chalcolithic persisted into the Neolithic, when 'greenstones' were exported for making beads and pendants: it was not metal that was exported, but the ore itself was traded to settlements across large distances. The craftsmanship for smelting and metal processing did not exist in the remote mining districts

of Faynan and Timna, but was maintained in the chiefdoms of the Beersheba Culture in the north and in the settlements on the coastal strip of the Red Sea in the south.

Hence, there is only indirect evidence for Late Chalcolithic/EB I copper production in both areas. Although Timna Site 39 is repeatedly mentioned in the literature as a Chalcolithic smelting site (Rothenberg 1978), its dating to the fifth millennium BC remains heavily debated (e.g. Adams 1999). However, Chalcolithic mining at Timna in this period is supported by finds of conical hammerstones at Timna itself (Ordentlich and Rothenberg 1980) and from safe stratigraphic contexts at the Late Chalcolithic site of Hujayrat al-Ghuzlan near Aqaba (Brückner *et al.* 2002).

The most abundant evidence of copper production using ores from Faynan between 4500 and 3500 BC is at Tell Abu Matar (Shugar 2000). It is located c. 100 km. from the source, crossing the Wadi Arabah to the north-west. In a copper workshop, amounts of slag, chunks of ore, fragments of crucibles and perhaps of a type of smelting furnace, and metal objects were found. Even if metal was produced on a small scale compared with later periods, this indicates a more

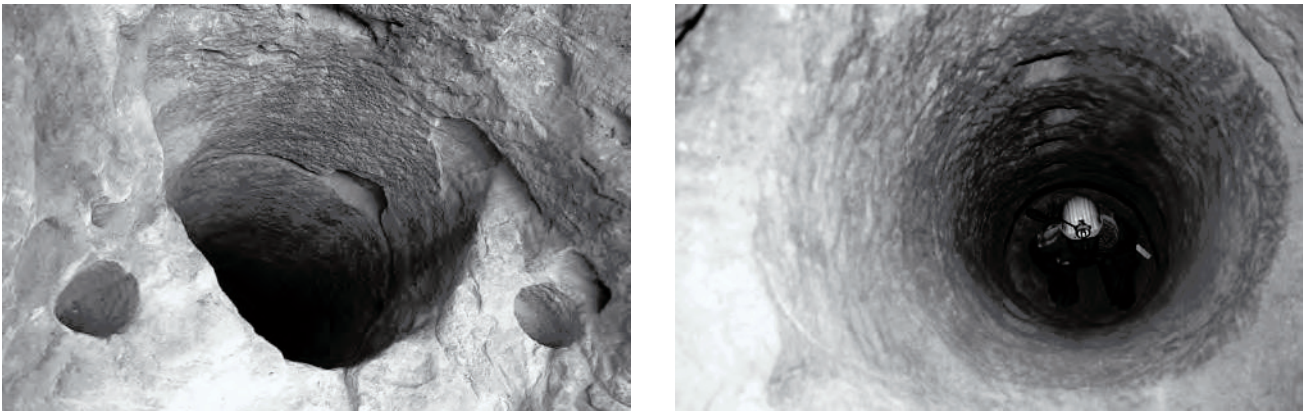


Figure 8.6: Mine shafts probably of Iron Age date from Timna (left) and Faynan (right). The construction features (chisel marks, footholds) are very similar in both localities and indicate a common technology for the exploitation of copper ore. Courtesy G. Weisgerber, Deutsches Bergbau-Museum, Bochum.

extensive and intensive copper production than at all other contemporaneous villages in this region, e.g. at Shiqmim or at Bir Safadi (Shalev and Northover 1987; Golden, Levy and Hauptmann 2001). Faynan copper ore was also found in Wadi Ghazze west of Shiqmim, and it is suggested that it was smelted at Ashkelon, Afridar (Segal, Halicz and Kamenski 2004).

There is no clear scientific proof whether or not metal or ore from Faynan were included in the fourth-millennium BC trade network between the Nile Delta and Canaan. There are arguments to support such an export, since comparable copper ores have been found along the coastal strip of northern Sinai (personal communication E.D. Oren) and at Maadi (Pernicka and Hauptmann 1989), and multiple exchange of metal objects is known from this period. CuAsSb-metal objects of unknown origin were found in the Nahal Mishmar hoard and at other localities, and the gold objects from Nahal Qanah possibly originate from Egypt or Nubia (Gopher *et al.* 1990). However, as long as copper ores from the deposits in the south-western part of the Sinai Peninsula are not properly investigated this problem must remain a lacuna in our knowledge.

It was probably with the early expansion of the Kura-Araxes culture from Transcaucasia in the fourth/third millennium BC that a quantity of copper objects high in arsenic and nickel reached the southern Levant from the north. Geochemical and lead isotope analyses show that they probably originated from eastern Anatolia /Transcaucasus, most probably from the region of Ergani Maden (Hauptmann *et al.* 2003). A cluster of these objects occurs in the Upper Euphrates area at Arslantepe, Tepecik, Hassek Höyük and Norsuntepe. In Canaan these alloys were found among objects of the Nahal Mishmar hoard (Tadmor *et al.* 1995), in other Late Chalcolithic maceheads (unpublished results Bochum/Jerusalem), at EBA Kfar Monash (Hestrin and Tadmor 1963; Bochum, unpublished results) and Tall ash-Shuna (Rehren, Hess and Philip 1998). One object

of this alloy was found at Late Chalcolithic Maadi in the Nile Delta (Pernicka and Hauptmann 1989).

During the Late Chalcolithic, copper ore from Timna and from mineralisations a little further to the south crossed the Wadi Arabah for some 10–30 km. to Tall Magass and Hujayrat al-Ghuzlan (Hauptmann *et al.* in preparation). Similar to the metallurgical pattern in the north, copper was smelted and cast inside these settlements. Again there are indications that the metal in the shape of, for example, rectangular ingots (Schmidt *et al.* 2003) left Hujayrat for Lower Egypt, because similar ingots are recorded from Maadi (Rizkana and Seeher 1989).

There is a change in the organisation of copper production in the second half of the fourth millennium BC, i.e. during EB I. This is shown by the settlements of Wadi Fidan 4, on the western periphery, and Faynan 100 (Wright 1998), in the centre of the Faynan mining district. At the former site dozens of stone mining tools (Weisgerber 1996) – ores, crucible fragments, slags and metal objects – were found, while the latter site yielded fragments of crucibles and casting moulds. For the first time specialised craftsmanship was carried out next to the ore deposit, and mining and metallurgy together became the economic income of these sites. While mining in this period still did not exceed simple techniques, smelting and processing of ore required considerable skill and experience.

During the third millennium BC the rapid cultural development of the Near and Middle East is accompanied by an explosion in metallurgy (Strahm 1994). The domestic mode of production of the Chalcolithic/EBA I, when metal was restricted to privileged groups of society, was superseded by a new ‘industrial’ mass production that led to widespread distribution of copper. In the Wadi Arabah, this continued with interruptions until the Late Bronze and Iron Age.

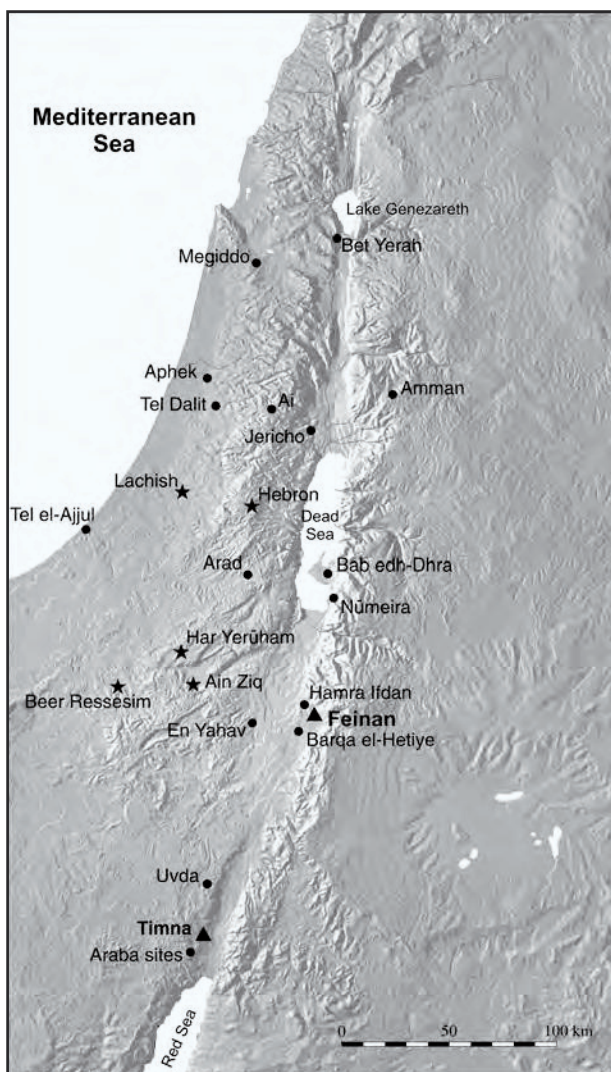


Figure 8.7: Important EB II–IV sites with metal objects and remains of metallurgical craftsmanship. Localities where crescent-shaped bar ingots were found are marked with an asterisk. Courtesy A. Hauptmann, Deutsches Bergbau-Museum, Bochum.

Metal production and processing clearly moved closer to the mining districts. At Faynan all the steps of EBA mining and metallurgy of copper are preserved in a unique way: there are no parallels in archaeometallurgy to this mining district in the Middle East. More than 50 mines and a dozen smelting sites were discovered. The excavation of the largest metal factory in the Near East at Khirbat Hamra Ifdan (Levy *et al.* 2002) provided new insight into a multistage craftsmanship of metal processing from raw copper to the final object during EB III/IV. Khirbat Hamra Ifdan, like the site of Barqa al-Hetiye some kilometres to the south (Adams 2003), may have been a checkpoint on the trade route to the west, where copper smelted in the Faynan area was collected. One of the most typical products of Khirbat Hamra Ifdan were crescent-shaped bar ingots, which were exported to a number of sites in the southern Levant (Segal, Halicz and Cohen 1999; unpublished data Bochum, Figure 8.7).

There are indications – albeit no clear archaeological evidence yet available from Timna – that all the metallurgical skill applied and developed at Khirbat Hamra Ifdan, proof of the development of new organisational patterns in mining and metal production, was also known in the southern part of the Wadi Arabah. This is indicated, for example, by the use of natural wind-powered furnaces to smelt copper, as practised at Faynan (Hauptmann 2000). This seems to have been a common technique across the entire southern Wadi Arabah: on almost every hilltop, scatters or dumps of copper slags with furnace remains were recorded (Avner 2002).

Tin bronze, in the sense of a deliberately produced alloy, was manufactured neither at Faynan nor at Timna in the third millennium BC. However, this is due to lack of access to tin rather than lack of knowledge of metallurgical techniques. EBA tin bronzes in the Levant are in any case rare and restricted to a few finds at Pella (Philip, Clogg and Dungworth 2003), Bab adh-Dhra (Hauptmann 2000) and Zeiraqun (Bochum, unpublished results).

Provenance studies of EBA metal objects have revealed the southern Negev as being a metallurgical province of copper originating in the Wadi Arabah. Pure, unalloyed copper of local origin was the predominant metal. In contrast to the north Jordan Valley, where a complex acquisition of metals from Anatolia and from Cyprus has been attested (Philip, Clogg and Dungworth 2003), here the impact from abroad is much less. At EB II Arad, the copper objects originated almost exclusively from Faynan (Hauptmann, Begemann and Schmitt-Strecker 1999).

Khirbat Hamra Ifdan is the hallmark for the last phase of copper production and processing at the end of the EBA in the Wadi Arabah. It is followed by a decline in metal-making until the upturn in the Late Bronze Age/Iron Age. With the beginning of the Middle Bronze Age, copper production in the Wadi Arabah seems to have been replaced by Cyprus (Belgiorno 2000).

## Conclusion

The organisation of copper production from the ore deposits on the eastern and western margins of the Wadi Arabah, and the distribution of metal from these deposits, clearly show that this desert landscape was never a barrier.

The similarity of mining and metallurgical technologies at Faynan and Timna clearly demonstrates an intensive exchange of craftsmanship and technology between the two mining districts. This is exemplified by shafts, galleries, chamber and pillar constructions,

slags, the positions and design of smelting furnaces, and by the development of refractory ceramics.

Crossing the Wadi Arabah, copper was traded from east to west and vice-versa. Copper from Timna was exported to settlements near Aqaba, and from there possibly to the Nile Delta. Copper from Faynan was exported to sites in the Beersheba basin from the Late Chalcolithic and during the developed EBA. During the fourth and third millennia BC this region was what is called a metallurgical province. Next to the predominant 'local' metal, foreign metals were also in use. These metals were clearly imported, at least partly via the route of the Jordan Valley and the Levantine corridor which reaches far to the north.

In contrast, there is no evidence yet for the distribution of copper from the Arabah to the east. Evidence for west-east connections to the Jordanian Plateau existed during the Pre-Pottery Neolithic. Green secondary copper ores from the Wadi Arabah, as well as turquoise from the Sinai Peninsula ('greenstones'), have been found among the beads in settlements such as Ain Ghazal, Basta and Beidha (Bochum, unpublished results). But no copper or copper ore from the Rift Valley was found, for example, at the remote EB I site of Jawa, on the eastern margins of the Fertile Crescent (Betts 1991). Therefore it seems that, at least for the copper ore and metal from Faynan and Timna, the actual barrier was not the desert landscape of the Wadi Arabah, but much more the steep ascent to the Jordanian Plateau.

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# Copper trading networks across the Arabah during the later Early Bronze Age

*Russell Adams*

## Introduction

Excavations in the Faynan region of southern Jordan during 1989–1993 provided the first opportunity to define a ceramic typology and chronology for the Early Bronze Age of southern Jordan south of the Wadi Hasa. Prior to this time, the lack of well-stratified excavation data in this southernmost part of Jordan meant that there was little upon which to build a definitive ceramic profile for the region. In contrast to this situation in southern Jordan, the Early Bronze Age of western Palestine had been extensively explored and a large amount of data, both historic and new (Glueck 1961, 1968; Rothenberg 1970; Beit-Arieh 1977, 1981; Cohen and Dever 1978, 1979, 1981; Cohen 1986, 1999), had provided a significant increase in evidence for this period allowing a fuller understanding of the rich prehistoric and Bronze Age landscapes on the western side of the Wadi Arabah.

In the Faynan region excavations at the site of Khirbat Hamra Ifdan during 1990–1992 allowed for the development of a ceramic typology for the Early Bronze Age III–IV (Adams 1999, 2000), which, combined with the excavations in 1990 and 1993 at the type sites in the same region for the Early Bronze Age I at Wadi Fidan 4 (Adams and Genz 1995; Adams 1999), and for the Early Bronze Age II at Barqa al-Hetiye (Fritz 1994a, 1994b, nd; Adams 1999, 2003), provided a nearly complete ceramic typology of the Early Bronze Age of the region. These ceramic typologies were particularly important due to the series of radiometric dates which allowed for the dating of the principal strata at each of these sites (Hauptmann 2000: 65–66, table 7) and which taken together with the ceramic typologies provided a firm basis for comparison of these Early Bronze Age sites at Faynan with other regions. Although there was a small gap in the Early Bronze Age during the late phase of the Early Bronze Age I, the general picture which emerges is one of steady human occupation in the region throughout the Early Bronze Age.

The sites in the Faynan region during the Early Bronze Age are key to understanding the expansion of copper metallurgy in the Levant during this formative period of technological development. The evidence for this development has been discussed elsewhere (Haupt-

mann 2000; Adams 1999, 2002), but it is important to note here that, as a result of the central role of copper production and trade in the development of complex society and inter-regional trade in the southern Levant during the Early Bronze Age, the Faynan region sites, despite their location away from what has been considered the ‘mainstream’ of cultural developments, played a significant role in technological and social developments in the broader region during this period. It is not unreasonable therefore to assume that this impact can be traced in terms of local cultural developments in Faynan in general as well as through evidence of relationship between Faynan and other regions. This is particularly true in terms of the east–west relationship between the Faynan region and the heartland of developing ‘urban’ centres during this period in the Jordan Valley and in western Palestine. Despite the potential difficulties of transportation posed by the physical geography and environment of the Wadi Arabah, these regions have a long history of interaction, and it appears now that, rather than a barrier, the Arabah has been a major route (both east–west and north–south) for trade and cultural interaction during the Early Bronze Age.

## Early contacts between Faynan and western Palestine

The initial phase of the Early Bronze Age witnessed the first local development of copper production in the Faynan region, building upon a long period throughout the Chalcolithic when copper ores were mined and exported to other regions for production of metal. During the Chalcolithic period there is significant evidence elsewhere that copper ores had been transported from the Faynan region, to the northern Negev (Levy 1995) and as far as Egypt (Hauptmann and Pernicka 1989). In particular the Beersheba Valley cultures during this period may have held a near monopoly on copper smelting since there is as yet no evidence of any local copper production near the mining zones of Faynan or Timna. Despite the apparent transport of ores from Faynan to western Palestine, an activity which no doubt required significant organisation of resources and labour, these activities left virtually no evidence of cultural impact upon the local populations at Faynan. Emerging

evidence for Late Neolithic and Chalcolithic occupation in the Faynan Basin is one of a consistent local development sequence from the Pottery Neolithic through the Early Bronze Age I, albeit with some gaps during the later phases of the Chalcolithic period. At the beginning of the Early Bronze Age, the village level societies of the Faynan Basin such as the one at Wadi Fidan 4 (Adams and Genz 1995; Adams *et al.*, in prep.) were small-scale domestic settlements practising a combination of animal husbandry and dry farming supplemented by limited mining of copper ores and small-scale metal production. Although there is evidence of trade with other regions, and as far south as the Gulf of Aqaba, the cultural indicators and in particular the local ceramic styles had changed little from the regional Pottery Neolithic ceramics known from earlier sites such as Tall Wadi Faynan (Najjar *et al.* 1990). The first production of copper metal recorded in the Faynan region occurred during the Early Bronze Age Ia at Wadi Fidan 4 (Adams 1999; Hauptmann 2000) in the form of small-scale crucible smelting, suggesting that the region was significantly behind developments in the Beersheba Valley and elsewhere (Golden 1998, in prep.; Golden *et al.* 2001).

It was not until the early third millennium BC at the beginning of the Early Bronze Age II that the first impact of external cultural developments can be traced in the Faynan region through the adoption of ceramic styles known from western Palestine and the developing 'urban' heartland of the Early Bronze Age, as seen in the excavations of the site of Barqa al-Hetiye (Fritz 1994a, 1994b, nd; Adams 1999, 2003). This transition of ceramic styles and the relationship of this relatively sudden change to the equally rapid development in mining and smelting practices in the Faynan region suggest that the processes of technological development in metallurgy were at the least not entirely indigenous, and more likely relate to the increasingly complex societies of western Palestine and Egypt and their growing need for resources, including copper metal (Adams 1999, 2002). It has long been suggested that one of the principal reasons for the development of early city states in the southern part of the Levant during the Early Bronze Age II has been due in part to the trade in copper from the principal copper resource zones of the Arabah and southern Sinai. This emphasis upon the importance of the copper trade has varied over the years however, from Amiran's discussion of the centrality of the city of Arad in this trade (Amiran *et al.* 1973; Amiran 1978; Amiran and Gophna 1989), to others who see the development of social complexity more broadly tied to the expanding specialisations in technology, of which copper is only one, albeit a prime example (Joffe 1993). Although in general there is a noticeable rise in the volume of copper found at habitation sites throughout the Levant during the Early Bronze Age II, there is little clear evidence for extensive trading networks from the

archaeological evidence of western Palestine. Despite the suggested centrality of copper production and trade as a key factor in the development of complexity during this period, the evidence for the copper trade in the southern Levant is comparatively sparse. Perhaps the best evidence that this trade must have existed at a significant level is the evidence for the rapid development of specialised mining and copper smelting technology at Faynan during this period and for the increased scale and intensity of production which accompanies these changes (Adams 1999, 2002, 2003). Since there is no possibility that this was to meet a local demand, it must be assumed that the copper was produced for export to other regions. In this regard the evidence at one of the principal outlets of the proposed copper trading networks is worthy of mention. The extensive assortment of copper objects used in elite burials during the Old Kingdom is equally convincing as to the importance of copper as an item of conspicuous consumption by Egyptian elites. Recently Gophna and Milevski (2003) have suggested that there is reason to suspect that there was a maritime trade of ores from the Arabah in general and Faynan in particular during the EBA I-II and that sites along the southern coastal plain such as those at Ashkelon, Afridar and Tall as-Sakan provided a maritime base for the movement of copper up the Levantine coast towards the Lebanon and also to Egypt. It is still assumed that overland trade to the Levantine coast across the northern Negev was facilitated through sites such as Arad, En Besor, Tel Halif and Tel Erani, from where the copper would have been shipped by sea. At the same time the overland routes through the North Sinai and presumably other routes to the northern Levant such as the Jordan Valley are assumed not to have been active in certain periods. Although this is an interesting idea, there is at present a complete lack of evidence in support of this maritime route and it is largely speculation that it existed at all. It is much more likely, given the current evidence, that overland trade of copper was the most significant avenue for movement of copper *throughout* the Levant and to Egypt up to the end of the Early Bronze Age, despite evidence suggesting sea-borne trade between Egypt and Byblos from the Early Bronze Age III onwards. One of the reasons why such a maritime trade could be proposed is that interpretations of the overland route through the arid zones of western Palestine have suggested gaps during the Early Bronze Age, and particularly in the EBA I and III. Recent research reviewing this evidence, however, suggests that these so-called gaps can be reconciled with the available evidence.

### **The Early Bronze Age population of the arid zones of the southern Levant**

Recently Avner, Carmi and Segal (1994) and Avner and Carmi (2001) have suggested that these so-called gaps

in the evidence for populations in the southernmost portion of the Levant in the Negev and Sinai are in fact illusory. Using the survey data from southern Israel, they have shown that, despite the significant gaps *perceived* on the basis of artefactual dating (principally ceramics and lithics) during the Chalcolithic and Early Bronze Age I and again in the Early Bronze Age III (Avner and Carmi 2001: 1204, fig. 1), in fact the radiocarbon evidence from all periods of the Early Bronze Age indicates not only a continuity of occupation but also a *steady growth* in populations throughout the period from EBA I through EBA III, followed by a significant decline in the terminal phase of the EBA IV (Avner and Carmi 2001: 1205, table 1, fig. 2). It is clear from this evidence that the problem of 'gaps' in the population of the region is more perceived than real and that when reliance upon artefactual dating is supplemented by radiometric dates these gaps simply disappear. Distinguishing between the sub-phases of the Early Bronze Age has always been problematic, due largely to the complexity of the ceramic and lithic data. Despite these complexities these data have been skewed to support specific theories regarding human occupation in and interactions with these arid zones during the Early Bronze Age. The overemphasis upon the EBA II due to theories regarding the role of the town of Arad, as well as upon the EBA IV to support theories regarding the decline in urbanism and a reversion to pastoralist mode of population during the terminal phase of the Early Bronze Age, are key examples of how the data was manipulated in support of theories which now seem to be quite untenable. Avner (Chapter 4, this volume) has clearly demonstrated that in fact these arid regions have a continuity of population which is comparable to other portions of the Levant and that these so-called marginal zones have been consistently exploited throughout prehistory, and even up to modern times. Significantly, the problem lies with the interpretation of the data and not the quality or quantity of the evidence of human occupation in these arid zones. Given the early state of research in the arid zones of southern Jordan, it can be suggested that the gaps which are apparent in this area may also be closed with the aid of further extensive survey and excavation, as well as the judicious use of radiometric dating.

### **The arid zones and the copper trade during the Early Bronze Age**

There can be little doubt that the exponential increases in copper mining, smelting and production in the Faynan region from at least the Early Bronze Age II onward led to contact between the populations of the Faynan region and western Palestine. As stated above the evidence of a break or shift in patterns of ceramics from local to more broadly regional forms is an

indication of this external contact. So too is the evidence at Faynan that these ceramics are for the first time not all locally produced. Although there is no substantial evidence during this period which links the Faynan region on a large scale with settlements in the arid zones of western Palestine, some Early Bronze Age II pottery found at Barqa al-Hetiye was composed of fabrics identified as coming from the Ora Shales formation of the southern Negev and central Sinai (for a description of this fabric group see Goren 1997: 48, fig. 7). Additionally, petrographic analysis of pottery from Barqa al-Hetiye and Khirbat Hamra Ifdan indicates that Amiran's (Amiran *et al.* 1973) 'arkosic cooking pots' from Arad were much more likely to have originated in the Faynan region of southern Jordan than Sinai (Adams 2003). This evidence, taken together with both the increased scale of copper production and increasing complexities of the mining and smelting operations, indicates that a model of inter-regional exchange of copper best supports the changes in Faynan during the EBA II. The cumulative evidence, although circumstantial, supports increasing links with western Palestine in general and the arid zones in particular, perhaps as routes along which copper from Faynan was transported to Egypt during this phase of the Old Kingdom (Haiman 1992, 1996; Adams 1999).

By the EBA III the evidence for contact between the Faynan region and western Palestine increases substantially, and contact with the southern arid zones becomes indisputable. Avner's review of the radiocarbon evidence (Chapter 4, this volume) suggests revisions in the way we view human occupation during later phases of the Early Bronze Age in the arid zones of western Palestine and can be supported by the archaeological evidence from both Faynan and the Central Negev Highlands. Key evidence in support of these contacts comes from the excavations of the copper manufactory at Khirbat Hamra Ifdan (hereafter KHI) in the Faynan region (Adams 1999, 2000, 2002; Levy and Adams *et al.* 2002). From the earliest excavations at KHI (Adams 1999) it was clear that this site held the clue to understanding the origin of the enigmatic 'copper ingots' found at so many sites in the Central Negev Highlands, including hoards from Har Yeruham (the Kochavi excavations), En Ziq and other places in southern Palestine such as Hebron (Maddin and Stech-Wheeler 1976) and Lachish (Tufnell 1958). The ingot moulds found at KHI were clearly for production of an ingot identical in type to those which had been found at a number of these sites but which had been dated to the EBA IV. In contrast to the assumed dates for these ingots from western Palestine the radiometric dates for the copper production centre at KHI suggested that these moulds (and hence the ingots) should be dated primarily to the EBA III, albeit towards the middle and end of that period (Adams 1999; Hauptmann 2000). The question arose as to how to understand the differences

in interpretation of this data, and to reconcile the dating of archaeological evidence from these two regions.

The evidence for links between KHI (and Faynan in general) and the Central Negev Highlands takes a number of forms. In addition to the similarity of the moulds to the ingots, there is also the lead isotopic evidence for the ingots and their relationship to Faynan copper ores; the physical similarity as well as the composition of the fabrics of ceramics from both KHI and the Central Negev Highlands; and last of all the close similarities in building styles between KHI and several sites in the Central Negev Highlands. Each of these groups of evidence will be reviewed briefly to illustrate the nature of the relationships between these two zones.

### **The copper ingots from the Central Negev Highlands: the lead isotopic evidence**

For a number of years the evidence from Faynan has been increasing to show that despite earlier theories regarding the importance of copper sources in Sinai and Timna, the copper sources of Faynan during the Early Bronze Age were by far the most important. In addition to the physical evidence at Faynan of mining and smelting, a range of analytical studies has been able to show the widespread distribution of copper from Faynan throughout the Levant and to Egypt from at least the Chalcolithic period onward (Golden 1998; Golden *et al.* 2001; Hauptmann and Pernicka 1989). One of the key aspects in this programme of analysis has been the work done by Hauptmann in characterising the copper ores, slags and metals at Faynan (Hauptmann *et al.* 1992), as well as his comparison of these data sets to discrete groups of copper objects indicating the possible role of Faynan copper production in the larger Levantine and Near Eastern contexts (Tadmor *et al.* 1995; Hauptmann *et al.* 1999). With regard to the copper ingots from the Central Negev Highlands, Hauptmann and his colleagues at the Max Planck Institute for Chemistry at Mainz and the Geochronological Laboratory at Münster undertook an analysis of some 70 of these ingots to determine their chemical composition and lead isotope abundance ratios (Levy and Adams *et al.* 2002). These results were additionally confirmed by independent work by Segal and Roman (1999) and Segal *et al.* (1999) through the analysis of a group of ingots from 'En Ziq and Beer Resisim. Both of these studies confirmed that, on the basis of the lead isotope abundance ratios, ingots from the Central Negev Highlands and elsewhere in western Palestine were consistent with the copper ores from Faynan (Hauptmann *et al.* 1992). This evidence, when put together with the evidence of the moulds for ingot production at KHI, suggests a firm link between the Faynan region and those sites of the Central Negev Highlands where the majority of ingots were found.

### **Ceramic styles at KHI and from sites in the Central Negev Highlands**

Detailed analysis of the similarities between the ceramics from KHI and sites of the Central Negev Highlands has been discussed elsewhere (Adams 2000), but the key points will be summarised here. In analysis of the ceramics from the excavated phases at KHI (1990–1992), the principal occupational phase at the site was determined to be Phase 5, which comprised the building (5a) and the abandonment phase (5b) of the main building complex. This was followed by Phase 6, which post-dated the use of the principal building complex. An initial appraisal of the ceramics from these phases clearly indicates that the pottery of Phase 5 is dominated by the so-called 'Family TR' or red-slipped wares (Dever 1973, 1980). This group of pottery is now well known from southern Jordan, and although this pottery has been attributed to the EBA IV in western Palestine, in southern Jordan it clearly has its roots in the EBA II and at KHI dates principally to the EBA III period. At KHI, Phase 5 has been radiocarbon dated to the period between 2600–2300 BC (Adams 1999; Hauptmann 2000), and only the overlying and later Phase 6 contains the first evidence of Dever's 'Family S' or 'Southern Family' pottery (Dever 1973, 1980). There is no evidence of 'Family S' pottery in Phase 5, but Phase 6 contains both 'Family TR' and 'Family S' ceramics, suggesting a clear overlap of these two 'families' of pottery during the EBA III/IV transition post-2300 BC.

The Phase 5 pottery is dominated by several primary ceramic forms, the vast majority of which are red-slipped wares, and include inverted-rim bowls, spouted holemouth jars, flat-bottomed juglets and bowls, as well as the first appearance of 'spouted' lamp-bowls (Adams 2000: figs 21.3–21.10). The non-slipped wares include a variety of storage jars and pithoi, many with specific applied and impressed decorations at the neck/body join (Adams 2000: fig. 21.4), and a number of large open storage vats with impressed band decoration (Adams 2000: fig. 21.10: 5, 6). This assemblage is large and very distinctive and the recurrence of the forms and decoration styles throughout suggests mass-production and a large degree of standardisation in this pottery group.

By far the best comparative assemblage for the KHI pottery comes from several of the large permanent sites of the Central Negev Highlands. Although the sites have been dated to the EBA IV period, it is clear that the similarities between the two assemblages suggest that in fact the exact dates of these sites in the Central Negev Highlands may be in doubt. A number of the very specific pottery styles which are numerous at KHI have virtually exact parallels in the ceramic assemblages from a number of sites in the Central Negev Highlands. These vessels, many of which

would be hard to distinguish when put side by side, suggest that these pots are not only contemporary but most likely were made in the same pottery workshops. Although some of the best exact parallels to KHI come from 'En Ziq (see Figure 9.1), there are many other sites with similarly comparable ceramics. To select but a few examples from 'En Ziq, the spouted holemouth jars compare very well to those from KHI (Cohen 1999: plate 110:13; Adams 2000: fig. 21.10: 7); as do the inverted-rim (Cohen 1999: plate 99: 1; Adams 2000: fig. 21.8: 1–7, fig. 21.10: 8) and flat-bottomed bowls (Cohen 1999: plate 99: 12; Adams 2000: fig. 21.7: 3); but perhaps the most remarkable of all are the 'pinched' lamp bowls (Cohen 1999: plate 100: 13; Adams 2000: fig 21.6: 4–10).

In the Central Negev Highlands the mixed nature of the 'Family TR' and 'Family S' pottery traditions evident in so many of the large permanent sites may be an indication that these sites date to that same period of 'mixed families' found in Phase 6 at KHI. It also leaves open the possibility that a number of the sites in the Central Negev Highlands have a longer history of occupation than previously suspected and that in fact many of these sites may have been occupied over the entire span of the EBA III–IV, albeit on an intermittent basis (see the radiocarbon dates in Avner and Carmi 2001: 1211; Avner, Chapter 4 in this volume). The shallowness of the stratigraphy at many of these sites in the arid zone and the lack of radiocarbon dates for most of these sites may also have contributed to the inability to clearly distinguish between these Early Bronze Age phases.

### Composition of ceramic fabrics at KHI and from sites in the Central Negev Highlands

Goren's petrographic analysis of the pottery from the Central Negev Highlands sites has also found significant similarities between these assemblages and those from Faynan. In his analysis Goren (1996) concluded that no less than 38% of the pottery from the major Central Negev Highlands sites which he examined had its origin in the southern portion of Jordan, and most likely the Faynan region. One of the principal fabric groups which Goren identifies as coming from this region is his 'Arkosic Group' which has a high percentage of feldspars which originate from the decomposition of the dominant granitic basement rocks of the region. These 'arkosic' fabrics are the dominant fabrics in all phases of the KHI assemblage and in virtually all periods at Faynan. One of the most interesting aspects of Goren's study pertains to his discovery that a large number of the so-called 'Family S' style ceramics found at sites in the Central Negev Highlands sites have their origin not in the region between Hebron and Jerusalem as might be expected, but on the basis of their fabrics most likely

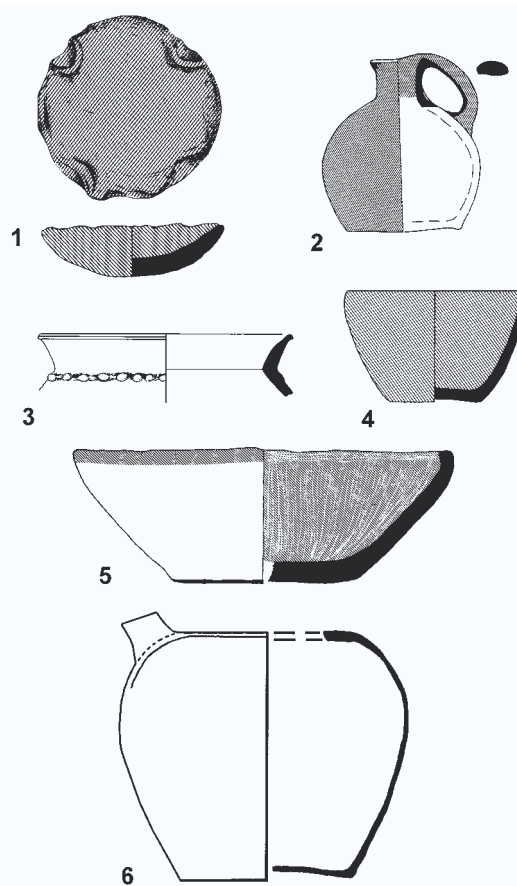


Figure 9.1: Pottery styles from 'En Ziq and Har Yeruham in the Central Negev Highlands. Styles from many sites in the Central Negev Highlands closely resemble those at Khirbat Hamra Ifdan. 1: 'En Ziq 455 1 (plate 100); 2: 'En Ziq 317 1 (plate 100); Har Yeruham 341 9 (plate 69); 4: 'En Ziq 31 1 (plate 99); 5: 'En Ziq 622 1 (plate 99); 6: 'En Ziq 193 1 (plate 110). All illustrations after Cohen 1999. Not to scale.

originated in southern Jordan. Goren concludes that the differences between 'Family TR' and 'Family S' are not entirely regional, but may also be chronological. This is also supported by the ceramic and stratigraphic data from KHI, with a clear chronological distinction between these groups.

### Architectural styles in the Central Negev Highlands and at KHI

One final similarity between the two regions lies in the adoption of very similar architectural styles at both KHI and some of the sites of the Central Negev Highlands. Despite the fact that the Negev sites occupy a quite distinctly different geographical zone than at KHI, some similarities can be discerned. One of the key features of the principal architectural phase at KHI is that the buildings are built in a semi-subterranean style, with rooms sunken below the exterior surfaces. At KHI this became evident in the earliest

excavations when comparing the external surfaces surrounding the principal building with the depth of rooms. In the Central Negev Highlands this is also not uncommon and can be seen at a number of sites where the rooms are sunken into the shallow soils covering the bedrock. This style of building is well-suited to an arid environment where there is little vegetation and comparatively little shelter from prevailing winds. In most cases rooms are small and at both sites in the Central Negev Highlands and at KHI evidence of central pillars to support the roof is common.

Another similarity is the use of rooms and courtyards in the Central Negev Highlands, and especially in those sites with rectilinear structures. The use of contiguous rooms surrounding shared central courtyards can be seen at both Har Yeruham (Cohen 1999: plate 68) and KHI (Levy *et al.* 2002: fig. 2). This building style of shared central spaces or courtyards is common to a number of the large Central Negev Highlands sites, although they are more common on sites which utilise a rectilinear rather than curvilinear building style. At KHI these central courtyards were used for copper-production activities (Levy and Adams *et al.* 2002: 431) and it is not unlikely that similar shared activities related to copper production were carried out at the sites in the Central Negev Highlands on the basis of extensive crushing and grinding equipment found at many of these sites (Haiman 1996: 18–20).

### **'Family TR': Early Bronze Age III or Early Bronze Age IV?**

As early as 1973 Dever suggested that 'the Transjordan EB IV is important for filling the gap early in the EB IV–MB I sequence; but even more significantly, it extends this sequence back into EB III...' (Dever 1973: 41). Dever's further discussion (1980) of the dating of his 'ceramic families' confirmed his initial analysis of the various groups and reiterated that 'Family TR' was likely the earliest and the 'Family S' the latest in the EBA IV. In the essential points of his arguments – that there was a chronological distinction to be made on the basis of the appearance of both of these 'families' – Dever was correct. Where his interpretation failed, however, was in determining just how early the 'Family TR' pottery truly was. It now seems clear that the 'Family TR' red-slipped pottery found both in southern Jordan and in western Palestine largely dates to the later phases of EBA III and seems to end in the earliest phase of EBA IV. The evidence from the Faynan region and also from a revised interpretation of the 'EBA IV' sites of the Central Negev Highlands supports this view. The archaeological evidence can now finally be shown to support what the radiocarbon evidence suggested all along, namely that the southern arid portions of the Levant, both in southern Jordan and western Palestine, have a full and complete

history of human occupation throughout the Early Bronze Age, with no gaps. The confirmation of this essential point is a significant factor as we continue to assess the nature and scale of the copper trading networks from Faynan to western Palestine and Egypt.

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# The emergence and first development of the Arabian trade across the Wadi Arabah

*Michaël Jasmin*

## Introduction

The goal of the present paper is to discuss the emergence of the incense road, a major trade route of the ancient Near East. From about the end of the second millennium BC onward, this route linked southern Arabia to the Mediterranean Sea via the Wadi Arabah. The main commodity transported along the incense trade route were aromatic resins extracted from myrrh and incense trees (Morris 1997). These were rare commodities with a very limited geographical distribution: they are found only in the south of the Arabian peninsula and in some parts of the western coast of Africa (van Beek 1960), in Somalia, Ethiopia, and perhaps also Sudan. This route was extremely long and arduous to travel: more than two thousand kilometres of the most arid deserts separate South Arabia from the southern Levant, where the redistribution of the incense took place.

The map (Figure 10.1) shows the itinerary of the incense trade route and the role played by several areas it crossed:

- The production area in the Dhofar and Hadramawt
- The storage area in the Saba region
- The long transportation route along western Arabia and the Wadi Arabah
- The interface zone in the Negev, with gateway communities, like Tel Masos at the end of the second millennium BC
- The distribution area in the Levant.

The role played by the Wadi Arabah appears clearly since this area represents the northern, final segment of the incense road, before it reached the northern Negev coastal plain and the sites of the Mediterranean coast. The history of the Wadi Arabah at the end of the second and in the first millennium BC is closely connected to the development of the incense trade. This is especially clear during the first millennium when the increase in the number of sites in the Wadi Arabah is directly related to the dynamism of the incense trade (Singer-Avitz 1999).

Many uncertainties surround the historical phenomenon of the incense trade route; however, its roots could be put back in the historical context of the final

Late Bronze Age and the Iron Age, at the end of the second millennium and during the first millennium BC. This trade quickly became of interest to local and international powers: control of this trade route was a motivating factor in the expansionist aims of the Assyrian, Babylonian and Persian empires.

On the other hand, it is usually recognised that the emergence of this trade route was closely related to the domestication of the only animal that made it possible to cross the Arabian desert: the camel, the introduction of which revolutionised the trade routes across the Near East.

This paper will try to offer a summary of the research on the incense trade road in the southern Levant and the Wadi Arabah and present some suggestions concerning the context of its early emergence.

## I. The incense trade route: when and how?

Two major problems need to be addressed when seeking the origins of the incense trade route. The first concerns the emergence of the route that most scholars believe took place between the thirteenth and the eighth centuries BC (Groom 1981: 37; Finkelstein 1988, 1995; Na'aman 1994: 226–27). According to Retsö (1991: 205), incense did not appear in Palestine before the seventh century BC. The second problem concerns the domestication of the camel, which as noted was the *sine qua non* condition for the development of this route. Since W.F. Albright (1970), these two phenomena have usually been both thematically and chronologically linked, a paradigm that has never been questioned. We believe that these two questions are not necessarily linked and that their discussion needs to be separated. Let us first examine the problem of dating.

For a proper dating of the emergence of the incense trade, one has first to determine the economic and political context of southern Levantine society at the end of the Late Bronze Age and during the Iron Age. There are three different chronological possibilities – the thirteenth/twelfth, the eleventh/tenth or the ninth/eighth centuries BC, each one implying a specific historical context.



Figure 10.1: The incense trade route: end of the second/first millennium BC.

### A. The thirteenth/twelfth centuries BC

At this time, New Kingdom Egypt was in political control of Palestine. The Canaanite city-states paid tribute to Egypt and the economical exploitation of the region was a main reason for the Egyptian presence in the southern Levant (Redford 1992: 84–87).

### B. The eleventh/tenth centuries BC

The second chronological possibility dates the emergence of the incense trade route to the eleventh/tenth centuries BC. During the eleventh century, following the Egyptian withdrawal, the whole region of Palestine experienced a political, economic and cultural autonomy. The Philistine city-states in the southern coastal plain underwent a

strong economic and urban development (Dothan 1992: 97) which may have induced, in the northern Negev, the sedentarisation of nomadic groups (cf. also Finkelstein 1995: 103–26).

### C. The ninth/eighth centuries BC

Finally, the third chronological possibility dates the emergence of the incense trade route to the ninth or eighth century BC. Indeed, the first incontrovertible archaeological testimony of a trade between southern Arabia and the Mediterranean zone dates to the beginning of the first millennium. The type-site is Tel Beersheba, where objects imported from South Arabia have been found in eighth-century BC contexts (Singer-Avitz 1999: 41, 50–52, 57–59).

## II. The emergence of the incense trade road at the end of the second millennium BC

In light of these three chronological hypotheses, it should be stressed that a growing body of evidence points to an early phase of contact between Arabia and the southern Levant, towards the end of the second millennium BC. The remainder of this paper will be devoted to an examination of this chronological option. The historical context of the beginning of the incense trade at this time may be sought in the Egyptian economic exploitation of the southern Negev.

### A. The Egyptian economic exploitation of the southern Negev

The economic exploitation of Palestine by Egypt in the Late Bronze II period is particularly visible in the case of the Timna copper mines (Rothenberg 1999). From the thirteenth to the eleventh centuries, the importance of a copper trade route through the Wadi Arabah, and thence to Egypt, is archaeologically well attested. In

the northern part of the Negev the growth of a site like Tel Masos during that period is proof of the economic dynamism of the site and of the region. The involvement of Tel Masos in this copper trade road is indicated by the presence there of copper metallurgical installations (Aharoni *et al.* 1975: 102; Kempinski and Fritz 1977: 158; Finkelstein 1988: 242). Tel Masos was also an interface site for the nomads in control of this trade: the meeting place between the nomadic groups living in the semi-arid Negev and the Wadi Arabah, on the one hand, and the sedentary inhabitants of the Mediterranean zone to the north, on the other.

In the south, the island of Jezirat Far'un in the Gulf of Aqaba may have played a role in these exchanges. It is a puzzling place, the real significance of which is difficult to evaluate in the absence of systematic excavations. However, traces of LB II occupation suggest that it could have played a significant role in the Egyptian overland and maritime trade through the Red Sea, in conjunction with Egyptian economic activities in the southern Negev (Rothenberg and Glass 1983: 67–68, 76–81).



Figure 10.2: Qurayyah painted ware distribution map: thirteenth–twelfth centuries BC (bold sites).

### B. Archaeological testimonies

It is against this background of an Egyptian exploitation of the copper mines of the southern Negev that we should now evaluate the growing body of archaeological evidence of contacts between the southern Levant and southern Arabia (Edens and Bawden 1989; Vogt and Sedov 1998; Edens 1999). They give some support to the hypothesis of an early dating of the Arabian trade route.

#### 1. QURAYYA PAINTED WARE

The first evidence is the presence in the southern Levant of the so-called Qurayya painted ware (otherwise known as 'Midianite ware'; Parr 1982: 128–30; Rothenberg and Glass 1983; Kitchen 1997: 131). This ware is typical of north-west Arabia during the thirteenth and twelfth centuries BC (although note that in southern Jordan its use continues into the ninth century BC, as demonstrated by radiocarbon dating: Bienkowski 2001). Outside its core area of production (Ingraham *et al.* 1981: 71–75), the same ware has been found at many sites along both the incense and the copper trade routes: as can be seen on the map (Figure 10.2). It has been found at sites

dating to the thirteenth–twelfth centuries: on the island of Jezirat Far'un (Rothenberg and Glass 1983: 67–68, 76–81), in the extreme south of the Negev around Timna and along the Wadi Arabah, and in the northern Negev (Rothenberg and Glass 1983). It has also been found in southern Palestine at important urban sites like Tel Masos and Tall al-Far'ah South, or in city-states like Lachish and Gezer. Its occurrence at these sites attests to new contacts established between the inhabitants of north-western Arabia and those of the southern Levant (Parr 1982). Interestingly, the context of discovery of the Qurayya ware is also mixed: it was found in contexts that were either domestic (as in Gezer, Lachish and Tel Masos, as per Aharoni *et al.* 1975: 109), funerary (as in Tell Judur), or even cultic (as in the Timna and Amman temples).

#### 2. ZOO-ARCHAEOLOGICAL DATA AND ARCHAEOLOGICAL ANALYSIS OF CAMEL BONES

Further archaeological testimony of contacts between the southern Levant and southern Arabia is indirect, but especially significant because of its many implications. It concerns evidence for the early domestication

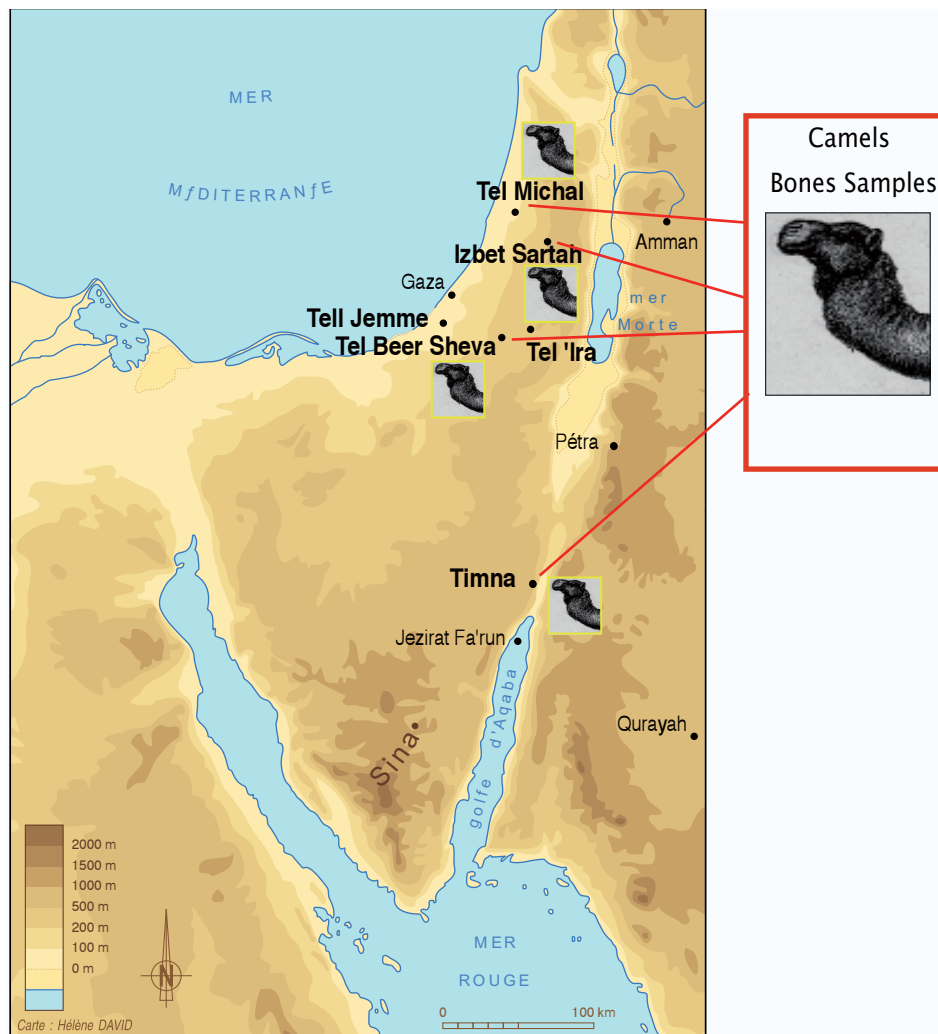


Figure 10.3: Late Bronze II and Iron Age I–II sites with camel bones (bold sites).

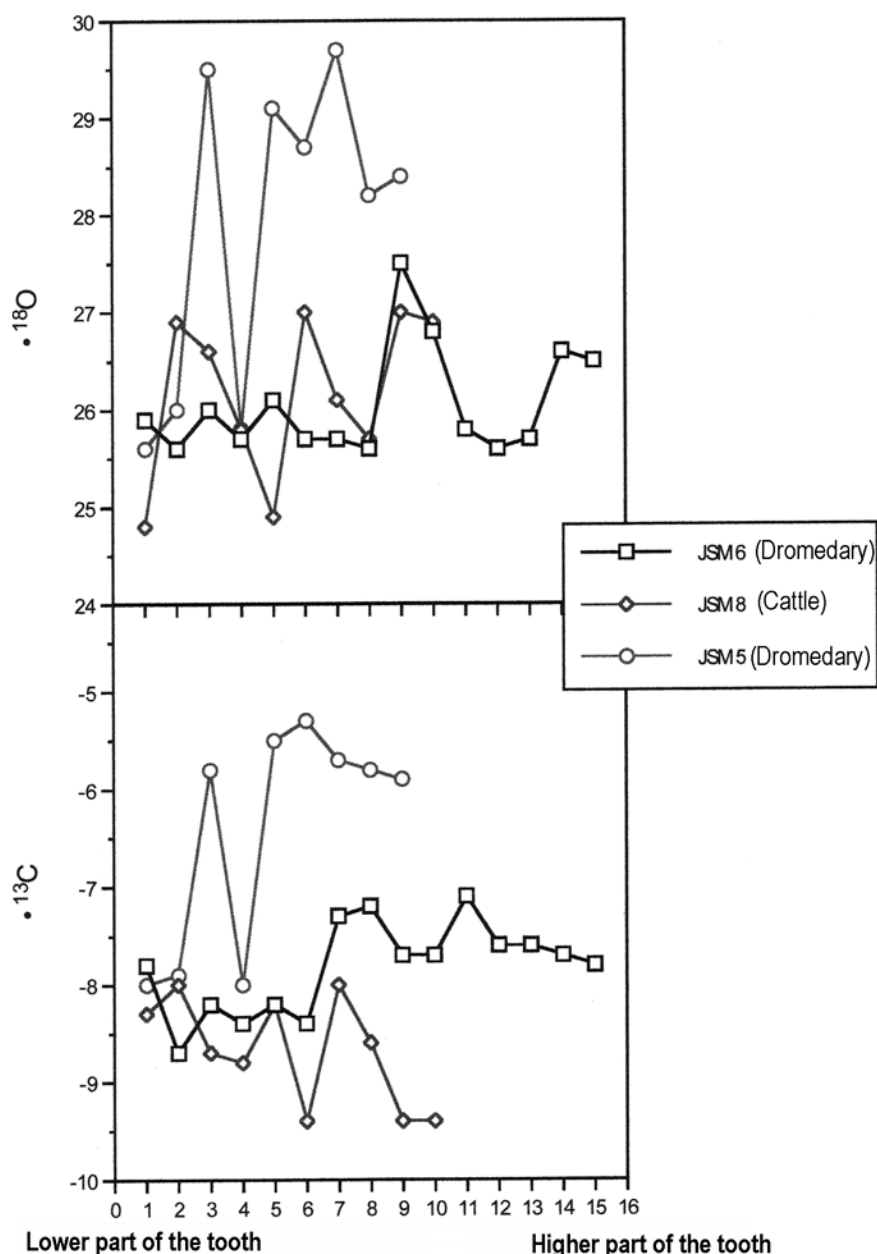


Figure 10.4: Camel teeth isotopic analysis: Izbet Sartah, eleventh century BC.

of the camel, with its first appearance in Arabia and later in the Levant.

Current zoo-archaeological data suggest<sup>1</sup> that the LB IIB, i.e., the thirteenth century BC, marks the first appearance of camel bones in Palestine (Figure 10.3). The distribution of camel bones is shown on this map. These bones were found in places like Timna (personal communication B. Rothenberg, March 2001), Tell Jemmeh (Wapnish 1981: 102), Tel Yin'am (Lundelius

2003) and Shiloh for the thirteenth century (Hellwing *et al.* 1993: 309–50), Izbet Sartah (Hellwing and Adjeman 1986: 141–52) and Tell Jemmeh for the twelfth and eleventh centuries. They were also found at northern Negev sites like Tel Beersheba (personal communication A. Sasson, April 2001) and Tel Ira (Dayan 1999: 480–87; Kolska Horwitz 1999: 488–94) in Iron Age II contexts.

It must be determined whether the bones of these camels are the remains of domestic camels or not. It must also be determined whether they were kept all their life near the site where their bones were found, or whether they travelled through the arid territories separating southern Arabia from the Levant. To a certain extent, isotopic analysis of the camel bones can help answer both these questions.

<sup>1</sup> I wish to thank all the directors of excavations who gave me permission to sample bones: Professor Israel Finkelstein (Izbet Sartah), Professor Ze'ev Herzog and Aharon Sasson (Tel Beersheba, Tel Michal), Professor Beno Rothenberg (Timna). My special thanks go to Liora Kolska Horwitz for her help.

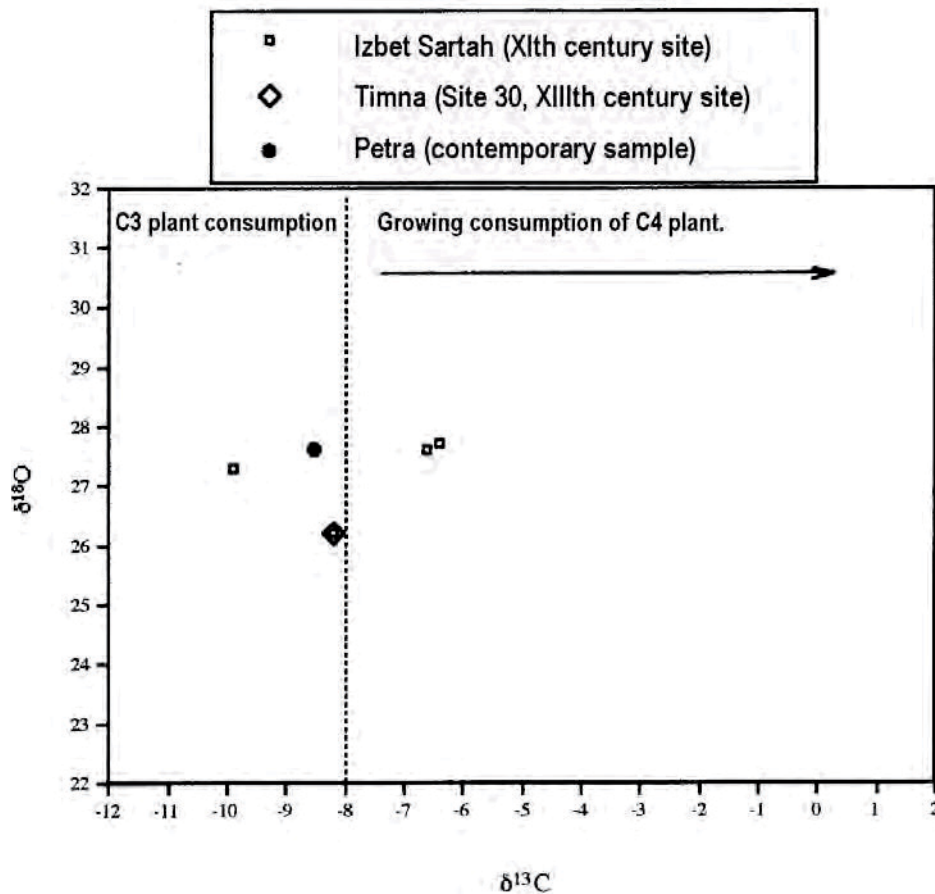


Figure 10.5: Camel teeth isotopic analysis: thirteenth–eleventh-century BC sites.

Isotopic analysis of camel bones carried out by Marjane Mashkour (CNRS) and H. Bocherens (Laboratoire de Biochimie isotopique, Université de Montpellier 2) makes it possible to identify the animal's diet and the kind of ecological zone (either Mediterranean with C3 plant repartition, or arid with C4 plant repartition) in which it lived. The geographical boundary between C3 and C4 plant repartition corresponds to the 300 mm. annual rainfall isohyet. This boundary stands globally along the Beersheba horizontal axis.

These analyses can therefore contribute to establishing whether a camel was used in long distance trans-desert trade. This research is still in an experimental stage but its initial results are quite encouraging. The first preliminary results of the analysis conducted on bones from Izbet Sartah and Timna appear on the diagram (Figures 10.4–5). The lozenges (JSM8) correspond to cattle, a sedentary animal; the rectangular dots (JSM6) correspond to a camel that has lived at the same site, like the cattle; while the circular dots (JSM5) correspond to a camel that has been exposed to an arid environment during its lifetime, presumably by travelling through desert areas. These results suggest that, by the end of the second millennium in the southern Levant, some population groups had begun to lead herds of camels through different ecological

zones, both Mediterranean and arid, and that these camels were already domesticated at this time and were moving across diverse territories.

### C. The copper road and the incense road

The possible historical link between Egyptian exploitation of the copper mines of the southern Negev and the emergence of the incense trade route has not yet been clearly studied. As noted above, since Albright, it has usually been believed that the incense trade and the domestication of the camel were interconnected phenomena. However, the appearance of the first domestic camels in Palestine could also have been linked to the development of the copper trade route under Egyptian economic and political control. Only later would the already domesticated dromedaries have been used in the incense trade, along routes already well established since they had been used previously for the copper trade.

### Conclusion

In order to understand the emergence of the incense trade road at the end of the second millennium BC, several factors must be taken into consideration:

During the New Kingdom, Egypt imported incense from the land of Punt in Africa. However, this supply came to an end towards the end of the thirteenth century (Kitchen 2002). From then on, Egypt had to find an alternative source of supply. The new source was Arabia, which may have been discovered by the Egyptians in the course of their economic activities in the southern Negev from the thirteenth to the eleventh centuries, particularly in the area of the Timna copper mines.

Another factor that played a decisive role in the emergence of a new overland incense trade route through the Wadi Arabah was the domestication of the camel (Zarins 1989: 143–48), which was well established in northern Arabia: it was a contemporaneous but distinct phenomenon, a circumstance that, in short, made possible the development of the incense trade route. The nomads of north-west Arabia played a major role in the propagation of the camel. They were in contact with both the nomadic tribes of south Arabia and with those of the Arabah and the Negev, who were themselves engaged in the Egyptian exploitation of the copper mines.

To conclude, I would suggest that research now needs to define the precise chronological sequence of these three distinct but related processes: (1) The development of the copper trade route across the Wadi Arabah, followed by (2) the development of the use of the camel for long-distance trade, and (3) the appearance of the incense trade road in the southern Levant, using the same itinerary as the copper road, at least in its northern segment.

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## The Wadi Arabah in the Hebrew scriptures

*John R. Bartlett*

### General knowledge of the Arabah

If you work through the Hebrew Dictionary and concordance you rapidly discover that the noun *ha-'arabah*, with the definite article, mostly refers to the whole rift valley from the Sea of Galilee to the Gulf of Aqabah (see, e.g., D.R. Seely 1992). Most references are to the northerly part, 'from Chinnereth as far as the Sea of the Arabah', as in Deut. 3.16, the description of the territory of the Reubenites and Gadites. Only one passage uses the word Arabah of its southern section; Deut. 2.8 describes how the Israelites marched from Kadesh-barnea in the direction of the Red Sea, by-passing Mount Seir, away from their brethren the sons of Esau in Seir, 'away from the Arabah road from Elath and Ezion-geber', in the direction of the wilderness of Moab. There are many puzzles in this brief itinerary, but the Deuteronomist at least knows of 'the Arabah road', apparently running north from the Red Sea towards the wilderness of Moab.

The Hebrew writers, however, certainly refer to some places in the Arabah. The Valley of Salt, where David (2 Sam. 8.13) or his general Joab (heading to Ps. 60), or Abishai son of Zeruiiah (1 Chr. 18.12) and later king Amaziah (2 Kings 14.7) defeated the Edomites, was probably the region of the Ghor at the northern end of the Arabah, though other places have been suggested.<sup>1</sup> At the southern end, we know of Elath and Ezion-geber. Ezion-geber, where Solomon built ships (1 Kings 9.26) and where Jehoshaphat's ships were wrecked (1 Kings 22.48), must have been on or by the sea, with sufficient deep water for a port, and the island port of Jezirat Fara'un has been a strong candidate since proposed by Leon de Laborde (1836: 290) and G. H. von Schubert (1839, II: 379) in the early nineteenth century. Ezion-geber is located 'near Elath on the shore of the Red Sea' (1 Kings 9.26); that is, Ezion-geber was located by reference to the better-known Elath. Elath was surely Tall al-Kheleifeh, the only Iron Age II site excavated on the northern shore of the Gulf of Aqabah. (For full discussion of this problem, see Bartlett 1989: 46–48; and 1990.)

Apart from the Valley of Salt and Elath, what else did the biblical writers know of the Arabah? Whose land

did they conceive it to be? Numbers 20.14–21 sets Kadesh-barnea on the edge (verse 16) of Edomite territory; from Kadesh the people travel to Mount Hor, also described (Num. 20.23) as 'on the border of the land of Edom'. Mount Hor was thus probably also west of the Arabah; Aharoni (1979: 202) suggested locating it at 'Imaret el-Khureisheh 16 km. north of Kadesh. This means that the region east and south of Kadesh and Mount Hor, the region called Mount Seir, assigned by Deut. 2 to the sons of Esau, was seen by biblical authors as falling within Edomite influence. This region clearly lay outside Judah, whose southern boundary ran (Josh. 15. 2–4; cf. Num. 34.2–5) 'from the end of the Salt Sea, from the bay that faces southward; it goes out southward of the ascent of Akrabbim, passes along to Zin [closely associated with Kadesh at Num. 20.1 and elsewhere], and goes up south of Kadesh-barnea', whence it goes off towards the Brook of Egypt. The region south-east of this line, which included most of the Wadi Arabah, lay usually beyond Judah's control, much of it probably within the region of Edomite influence (see further Bartlett 1989: 140–43).

### Springs in the Wadi Arabah

It may help us identify sites known to the biblical writers if we examine briefly the permanent and known features of the landscape – the major springs, the mining sites, the routes linking them, and the borders of Judah. The important springs, from north to south, seem to be the following (cf. Abel 1933: 153; Baly 1974: 206–7): 'En Tamar, on the south-western edge of the Ghor; about 26 km. south of 'En Tamar is 'En Hazeva ('Ain Husub); about 16 km. south again are 'En Marsev and 'Ain el-Hufeira, with 'Ain el-Fidān some 13 km. east of it on the eastern side of the Arabah. About 11 km. south-west of 'Ain el-Hufeira is 'En Yahav ('Ain Weibeh) on the west side of the wadi. About 32 km. south of 'Ain el-Fidān is Bir Madhkūr (just north of the entrance of Wadi Musa, which descends from Petra) and about 64 km. further south is 'En Yotvata, from which another 40 km. brings us, via 'En Abronah, to the Gulf. Such springs are important to travellers, to herdsman, and to armies, and might be mentioned on itineraries. Yet surprisingly the biblical itineraries relating to this area do not explicitly refer to the springs. Let us turn to the mining activities.

<sup>1</sup> Abel (1933, I: 40) proposed Wadi el-Milh east of Beersheba; Noth (1960: 196) thought the Valley of Salt lay east of the Arabah.

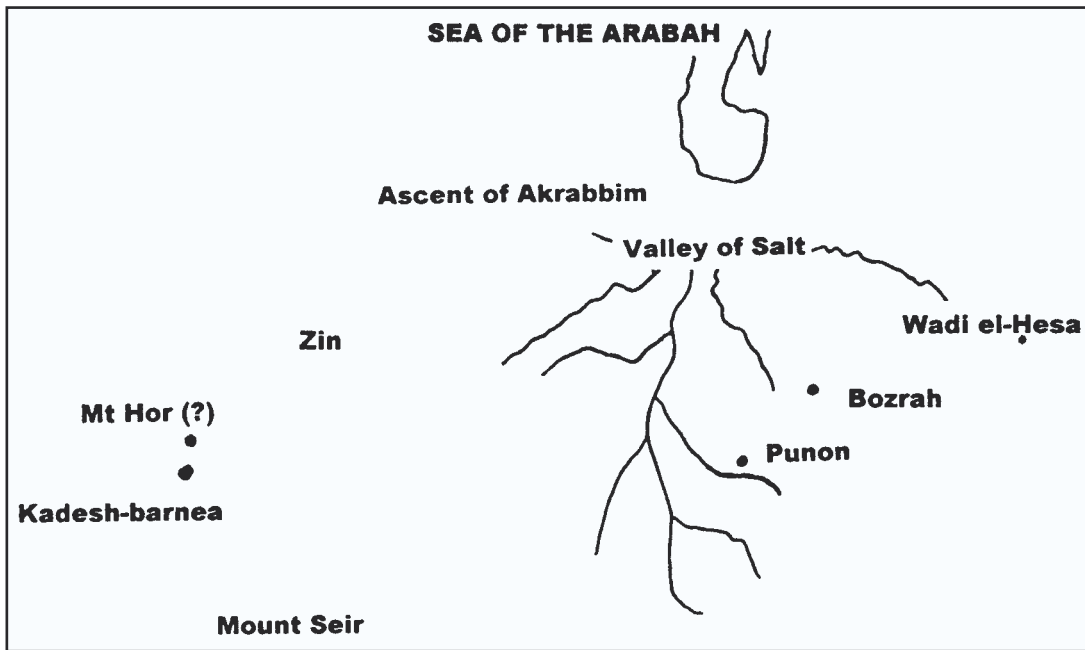


Figure 11.1: The region of the southern Arabah.

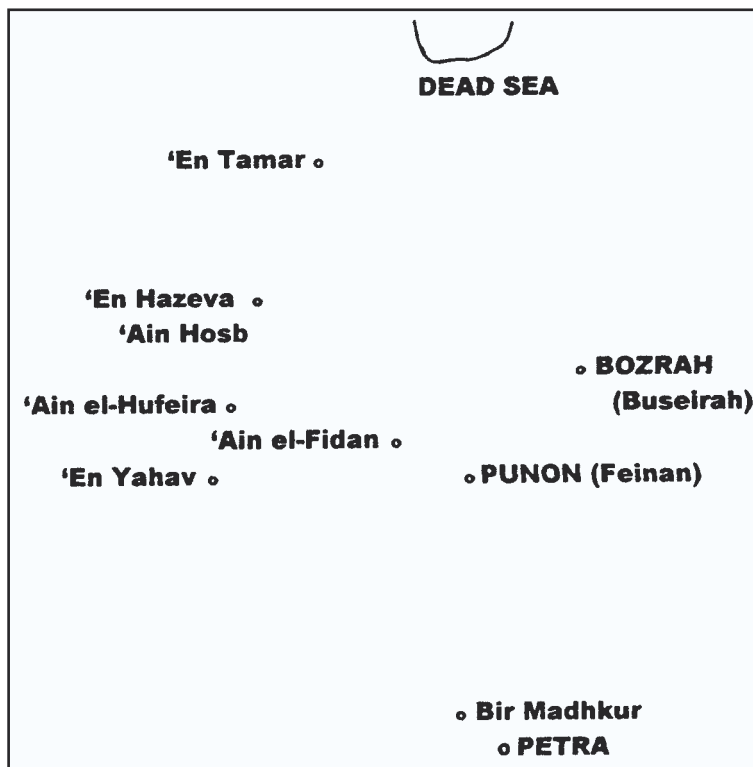


Figure 11.2: Springs in the Wadi Arabah.

**Mining areas in the Wadi Arabah**

There are two major copper mining areas in the Arabah, the Wadi Fidān region in the north, about 40 km. south of the Dead Sea (cf. Adams 2003; Hauptmann 1997; Knauf and Lenzen 1987), and Timna in the south (cf. Rothenberg 1972, 1988), nearly 32 km. north of modern Eilat. The biblical authors make no

explicit reference to these areas and their mining sites, but there are hints that they knew of them. The northern sites include Faynān, long identified with biblical Punon (Num. 33.42; see Knauf 1992) and associated with the bronze serpent incident (Num. 21.4–9), Kh. Hamra Ifdān, Kh. al-Ghuweib, Kh. al-Jāriyeh, and Kh. an-Nahās (see map, Adams 2003: 7). The two main smelting centres in the Iron Age were at

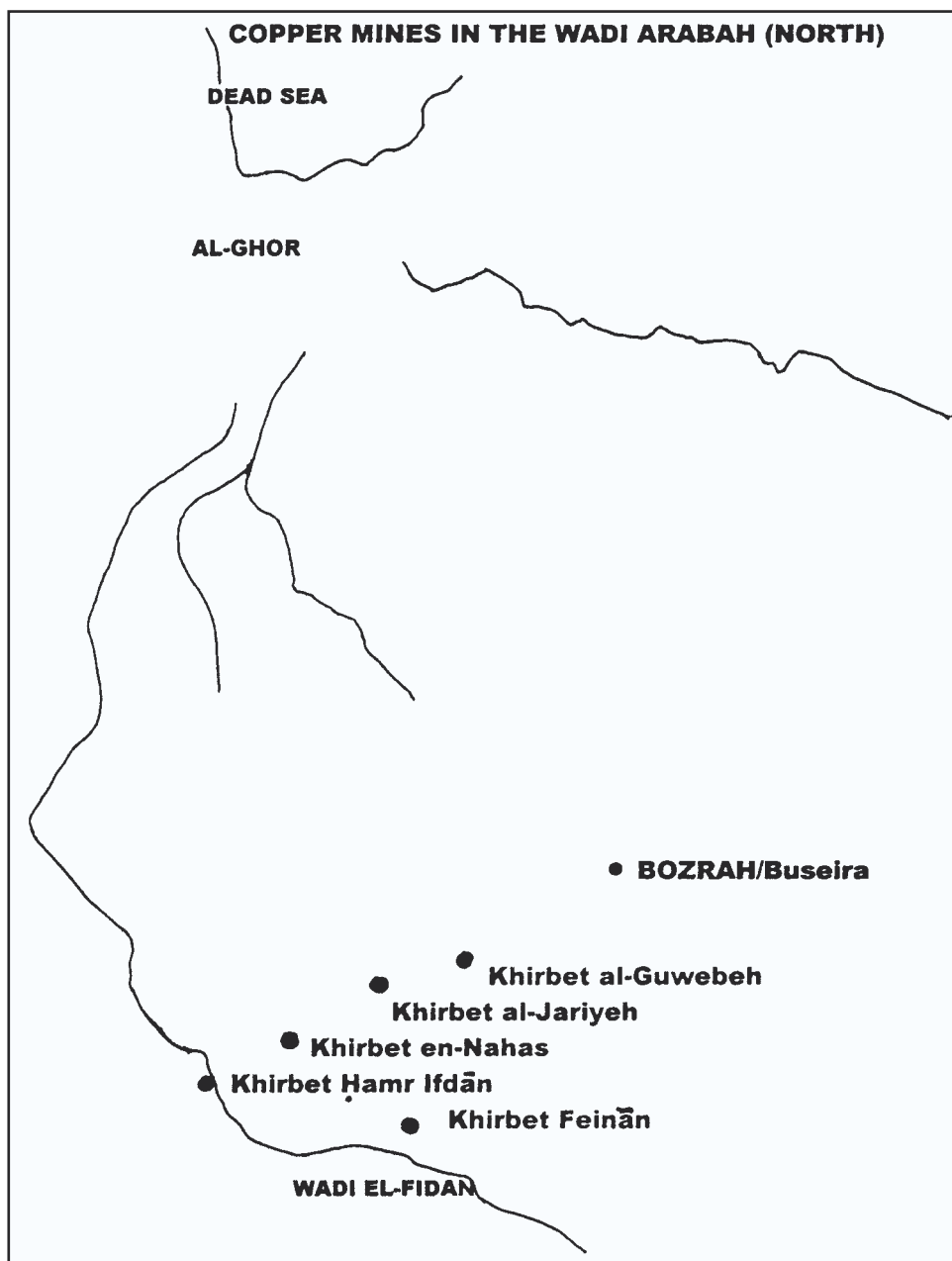


Figure 11.3: Copper mines in the Wadi Arabah (north).

Faynān and at Kh. an-Nahās; Kh. an-Nahās is reminiscent of the name Ir-nahash listed in the genealogy of the sons of Judah (1 Chr. 4.12). Aharoni demonstrated that Ir-nahash was a place-name, not a personal name; Glueck linked it with the Ge-harashim (Valley of Craftsmen) in 1 Chron. 4.13, which he identified with the Arabah.<sup>2</sup> If these suggestions are

<sup>2</sup> In this list, the clansman, as Aharoni noted (1966: 225), becomes the father of the place occupied. Thus 'Tehinnah the father of Ir-nahash' (1 Chr. 4.12) may be compared with 'Ephratah the father of Bethlehem' in the same list (1 Chr. 4. 4), and Ir-nahash is probably a place name in origin. But where was Ir-nahash? Among the sons of Kenaz in the same list is 'Joab, the father of Ge-harashim (i.e., 'valley of craftsmen')' (1 Chr. 4.14), and Nelson Glueck, linking Tubal-Cain, the forger of bronze and iron (Gen. 4.22), with

right, then the mining site of Kh. an-Nahās was possibly the Chronicler's Ir-nahash, but note that 1 Chr. 4.12 does not clearly link Ir-nahash with the Ge-harashim or the Arabah. The southern area of mining activity was at Wadi Mene'iyeh (Nahal Timna) about 32 km. north of Eilat. Mining here is not evidenced for the Iron I-II period of the kingdoms of Israel and Judah, and, unsurprisingly, the Hebrew scriptures make no certain reference to copper mining here. The note in Deut. 8.9 that God is bringing the Israelites into a good land 'out of whose hills you can dig copper' probably refers not to Timna but to the sites of the northern Arabah.

Kenites and Kenizzites, linked these groups further with the Valley of Craftsmen, which he identified with the Arabah (1959: 44–45, 134–36). Aharoni made similar connections (1966: 224). See J.A.H. Seely (1992).

## Itineraries

Most biblical evidence for the Arabah comes from the itineraries of Israel's route through the wilderness. The best known of these itineraries, Num. 33. 32–37, has the Israelites marching from Mount Sinai, and eventually past Hor-haggidgad, Jotbathah, Abronah, Ezion-geber to the wilderness of Zin (that is, Kadesh), and then Mount Hor. Deut. 10.6–7 incorporates a short section of this list, adding that Jotbathah was 'a land with brooks of water'. Simons recognises Jotbathah in 'ain tābah and et-tābah, 'a swampy depression (cf. Deut. 10.7) north of the Gulf of 'Aqabah annually turning into a lake in winter time' (Simons 1959: para 438, p. 259; cf. Abel 1938: 216; Davies 1979: 92–93). This would locate Jotbathah in the Arabah, but this seems to me far from certain, for the list appears to set Hor-haggidgad, Jotbathah and Abronah between Sinai and Ezion-geber. There is no other evidence that the biblical writers knew this region of the southern Arabah at all.

Num. 33.36–45 and Num. 20.22–21. 13 describe the journey from Kadesh via Mount Hor to Moab with almost identical routes (see in particular Axelsson 1987: 118–22):

*Num. 33. 36–45:* Kadesh; Mount Hor; Zalmonah; Punon; Oboth; Iye-abarim in the territory of Moab; Dibon-gad;

*Num. 20. 22–21.13:* Kadesh; Mount Hor; the avoidance of Edom; the bronze serpent incident [at Punon?]; Oboth; Iye-abarim, in the wilderness which is opposite Moab, toward the sunrise; the Valley of Zered; the other side of the Arnon.

This route, in the Num. 33 version, goes from Ezion-geber via Kadesh to Mount Hor, Zalmonah, Punon, Oboth, Iye-abarim in Moab and Dibon-gad, also in Moab. Kadesh is universally held to be at 'Ain el-Qudeirat; the next fixed points are Punon/Faynān and Dibon-gad. Zalmonah is sometimes located in the region of Wadi Salamānah north of Faynān and Mount Hor is often assumed to be at Jabal Hārūn near Petra, but these locations would not fit a route going roughly due east (not north-east, as Davies 1979: 90) from Kadesh to Punon/Faynān. Mount Hor (and Zalmonah) should perhaps be sought, as Davies suggested, west of the Wadi Arabah, between Kadesh and Punon, and the route would perhaps cross the Wadi Arabah from the region of 'En Yahav or 'Ain el-Hufeira, and journey for about 24 km. to reach Faynān.

The Num. 21 version also begins in Kadesh and goes via Mount Hor to the wilderness of the bronze serpent. This incident seems to replace Punon in the itinerary and almost certainly belongs in this mining region. The next place in both lists is Oboth, often located 29 km. west of Punon (Faynān) at 'Ain el-

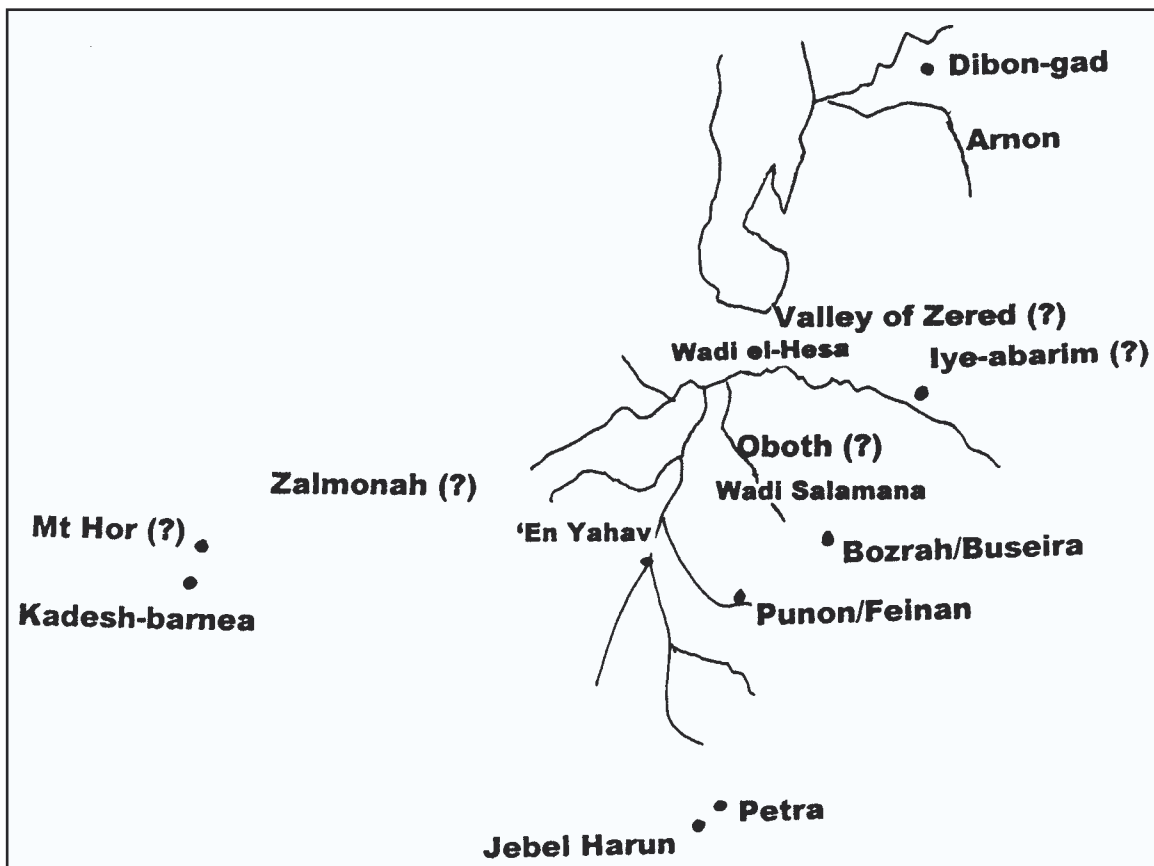


Figure 11.4: The route of Num. 33.36–45 and Num. 20.22–21.13.

Weibeh/'En Yahav (so Abel 1938: 216); this is followed by Iye-abarim (Iyim), which is described as 'in the wilderness opposite Moab, towards the sunrise' (Num. 21.11) and as 'in the territory of Moab' (Num. 33.44); the two sites usually proposed are Muhai, north of the Wadi al-Hasā (Abel 1938: 216), and Medeiyyneh in the Hasā canyon (Mattingly 1992); Davies (1979: 90) proposes a Khirbet 'Ay, north of the Wadi al-Hasā (possibly the Kh. 'Aiy 'two hours south of Kerak' rejected by Abel [1938: 216]), which he does not locate with any precision. Iye-Abarim's connection with Moab is underlined by Num. 33.45, which makes Iye-Abarim (Iyim) the station before Dibon-gad in Moab. Iye-Abarim then was perhaps not located in the Arabah but further north in Moab. This suggests that Oboth's proposed identity with 'En Yahav/'Ain el-Weibeh, or perhaps with 'Ain el-Hufeira, is far from certain; if Oboth were 'En Yahav/'Ain el-Weibeh, it ought to appear before Punon on the list. Perhaps therefore with Davies (1979: 90) we should look for Oboth somewhere north of Faynān, towards Moab (cf. Axelsson 1987: 120; Bartlett 1989: 49–50). The next station in the sequence of Num. 21 is the Valley of Zered. The Zered is generally identified with the Wadi al-Hasā (cf. Deut. 2.13) and taken as the boundary between Edom and Moab, but the Zered is nowhere described as Edom's border; indeed Deut. 2.13 and Num. 21.12 could be read as suggesting that the Israelites were in Moabite territory when they crossed the Zered on their way north to the Arnon. However, the evidence of these itineraries suggests that the Arabah could be crossed from west to east on the route from Kadesh to Punon, but it is almost impossible to know for sure where Mount Hor, Salmonah, Oboth and Iye-abarim actually were. Incidentally, for whom was this route, linking the Iron II sites of Kadesh, Punon and Dibon-gad in Moab, important historically? What was its real historical context?

This brings us to 'the way of the Arabah' (RV), 'the Arabah road' (RSV) of Deut. 2.8. What the author envisages here is not clear. He has the Israelites journey from Kadesh towards the Red Sea (not the other way round as in Num. 33. 36), by-pass Seir (to be located west of the Wadi Arabah; see Bartlett 1989: 86–90), then turn away from Seir 'away from the Arabah road from Elath and Ezion-geber', and then go on in the direction of the wilderness of Moab. Why 'away' from the Arabah road? The LXX adjusts that to 'along' (*para*) the Arabah road, which makes better geographical sense, but what if we accept the *lectio difficilior* of the MT? Does the Deuteronomist intend us to understand that the Israelites went eastward round Edom? But no, he has them crossing the brook Zered and then the boundary of Moab at Ar; the Deuteronomist surely sees the Israelites going up the Arabah road from Elath towards Moab at the northern end. But at least he evidences an 'Arabah road'.

2 Kings 3.20 refers to Jehoram's proposed attack on Edom 'by way of the wilderness of Edom'. The geography of this story is clearly influenced by Num. 20. 2–13, in which the Israelites' attempt to pass through Edom is once again preceded by a wilderness wandering (Bartlett 1983; 1989: 120–21). 'The way of the wilderness of Edom' is otherwise unattested but, if not invented on the basis of Num. 20.4, could well indicate the Arabah. An army coming from Jerusalem (as Amaziah's en route for Sela, 2 Kings 14.7) would probably march via Arad, the Valley of Salt (2 Kings 14.7), and along the Arabah, climbing up to Busayra or Sela above by one of the major wadis.

A route into the Arabah appears in the descriptions of Judah's boundary in Num. 34.3–6 and Josh. 15.1–4. These show Judah's southern border as running from the south end of the Dead Sea to the Ascent of Akrabbim (scorpions) (cf. also Judg. 1.36), and then via the wilderness of Zin to Kadesh (cf. Ezek. 47.18, where the border runs from Tamar to the waters of Meribath-Kadesh). The Ascent of Akrabbim is either a term referring to the whole length of the Hazera ridge (Baly 1974: 35, 206) or the name of one of the passes over it, either the pass running from Dimona over the scarp to 'En Tamar, or the pass over the scarp about 16 km. further south-west, just south of Hammakhtesh haqatan leading from Dimona or Yeroham down to Hazeva/'Ain Husub (see also Abel 1938: 46–47; Aharoni 1979: 70; Görg 1992). Whichever it was, this route would cross the Arabah to the Faynān region.

## Conclusion

To summarise, what do the biblical writers – that is, essentially the Deuteronomist and Deuteronomistic Historian – know of the Arabah? They knew of the Judaeian border from the Dead Sea to Kadesh, via the Ascent of Akrabbim and the Wilderness of Zin, together with the site Tamar in the wilderness (1 Kings 9.18; see Lott 1992; probably the later Roman Tamara; see Gichon 1992) as a border-point (Ezek. 47.19). They knew the Valley of Salt at the northern end. They knew of the mining activities around Faynān and perhaps at Kh. en-Nahās, though not of Timna. They knew several routes across and along the Arabah (probably using important springs like 'Ain Husub/'En Hazeva and 'En Yahav/'Ain Weibeh – but strangely, they do not name them). They knew Elath and the port Ezion-geber at the southern end, as a gateway to the riches of Ophir. The evidence suggests, therefore, that they probably knew the northern end better than the southern end, and nothing of the middle – but between Faynān in the north and Timna in the south, there was not a lot for a historian from Jerusalem to get excited about.

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## 'Down to the Sea': Nabataean colonisation in the Negev Highlands

*Tali Erickson-Gini*

The presence of the Nabataeans in the Negev of southern Israel has long been an established fact due to intensive archaeological investigations carried out throughout the region by a number of researchers from the nineteenth century onwards. Nabataean presence in the Negev dates back to the Hellenistic era and long past the Roman annexation of Nabataea in AD 106, to as late as the Byzantine period. Recent archaeological investigations have brought to light new evidence that provides a sharper view of the dynamics of Nabataean activity in the region west of Petra and the Wadi Arabah. This evidence shows that for the greater part of their history, the Wadi Arabah served as an interface for Nabataean culture between Petra and the Negev.

### **Nabataean trade routes through the Negev in the Hellenistic period until 100 BC**

The earliest references to the Nabataeans were provided by Diodorus Siculus in the first century BC, quoting an earlier work by Hieronymus of Cardia dated to the fourth century BC. Here they are described as a wealthy Arab tribe that transported valuable products such as frankincense and myrrh which they obtained in Arabia 'down to the sea' (Diod. XIX: 94,4–5). Later historical records, combined with the archaeological record, point to the port of Gaza as the focus of their activity on the Mediterranean Sea. This city was accessed by overland routes leading from Petra to the north-west, through the Wadi Arabah, across the Negev Highlands and down into the coastal plain around Gaza (Figure 12.1). The earliest Nabataean inscription so far discovered was found in the Negev in the ruins of Elusa (Halusa) by Woolley and Lawrence in 1914 (Woolley and Lawrence 1914–15: 59). The presence of the Nabataeans at Elusa in the Hellenistic period is also indicated by the discovery of pottery and coins dated to the third and second centuries BC (Negev 1977b: 546). Similar evidence was found at the sites of Nessana and Oboda in the Negev Highlands (Negev 1977b: 546–47; Bellinger 1962: 70). These sites are located along roads that the Nabataeans frequented on their journeys to and from the Mediterranean coast. Elusa, which was to become the major Nabataean settlement in the region in the Roman and Byzantine periods, was located on a major crossroad where the Petra–Gaza road intersected with the Beersheba–Kadesh Barnea road leading to Sinai and Egypt. Oboda was located south-east of Elusa on

another junction of ancient roads, including the Petra–Gaza road through the Negev Highlands. Nessana was located south-west of Elusa on the Beersheba–Kadesh Barnea road near that road's intersection with the Darb el-Gaza route.

The excavation of hilltop forts located in the central Wadi Arabah, the southern edge of the Dead Sea and the central Negev has shed more light on the earliest phase of Nabataean activity in the region. These sites include Moa (Moyat Awad), located north-west of Petra on the western side of the Wadi Arabah, 'En Tamar next to the Dead Sea, and 'En Ziq in the Nahal Zin basin near modern Sede Boqer, all of which were investigated by teams under the direction of Rudolph Cohen on behalf of the Israel Department of Antiquities in the early 1980s (Cohen 1983a: 31; 1984a: 25–26; 1981; 2000: 76). Two other hilltop forts located next to the springs of 'En Erga and 'En Rahel were excavated by Israel and Nahlieli in 1981 (Israel and Nahlieli 1982; Figure 12.3). Each of these forts displays a defensive character, with their construction on steep hilltops next to springs with a clear view of the surrounding area and roads. The forts are small in size, averaging 17 x 17 m. with a series of casemate rooms surrounding a central courtyard. The fort constructed next to 'En Erga in the central Wadi Arabah appears to have been abandoned due to severe earthquake damage before it was completed, sometime in the third century BC. Only one find was found at the site, a ceramic bowl dated to the Hellenistic period, buried below the floor surface probably as a foundation offering. A new fort was constructed one kilometre further west on a high hilltop next to the spring of 'En Rahel. Numismatic and ceramic evidence from this site show that it was occupied sometime from the early to middle third century BC until around 100 BC. The fort at 'En Rahel contained ample evidence of Nabataean trade and ties with Egypt. Alabaster jars and lids found at the site were produced in Yemen and appear to have been used to transport raw incense resins. Incense resin was also found on a small limestone altar discovered at the site.

The fort at 'En Rahel overlooks a section of an ancient track used up to the early twentieth century and called the Darb es-Sultan or the King's Road. This road bypassed a major topographical obstacle, the Ramon Crater, and skirted around its northern side by way of

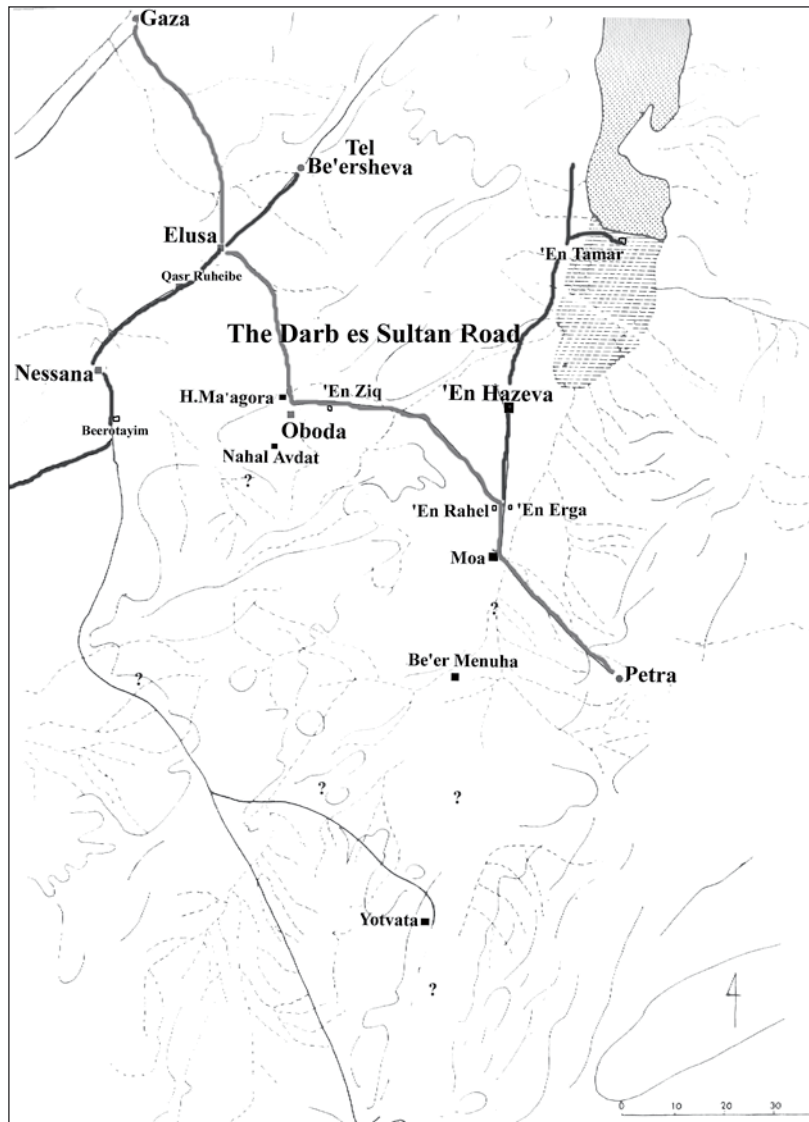


Figure 12.1: Known roads and possible tracks used by the Nabataeans in the Negev in the Hellenistic period, third–second centuries BC.

difficult mountain passes and a series of dry streambeds such as Nahal Marzeva, Nahal Neqarot, Nahal Zinim and Nahal Zin to the Sede Boqer plateau (Figure 12.2). The road passed by one spring, 'En Orahot, that was probably used as a camp ground and proceeded to the oasis at 'En Ziq where a permanent fort was constructed on a steep hill overlooking the area. Evidence of a mass burial of a group of people, mainly women and children, was found below the fort in the ruins of a Middle Bronze Age I site. The grave was dated to the Hellenistic period and contained beads and a Hellenistic lamp (Zias and Numeroff 1986: 66–67).

The fort at 'En Rahel, as well as those at Moa, 'En Tamar and 'En Ziq, displays signs of heavy occupation in the second half of the second century BC until around 100 BC, when all the Negev sites were apparently abandoned for several decades and again occupied by the Nabataeans at the end of the first century BC. This abandonment is probably due to the

capture of Gaza by Hasmonean forces under Alexander Jannaeus sometime between 101 and 96 BC (Jos. *Ant.* XIII, 358–64; Negev 1977b: 535). Coins of Alexander Jannaeus were discovered at Nessana, a possible indication that the site was occupied by Hasmonean forces during his reign (Bellinger 1962: 70; Urman and Harpak 1994: 49–50).<sup>1</sup>

Hellenistic Nabataean painted pottery (dated to between 150–100 BC), coins and other finds have been discovered at other sites in the Negev. These sites include Be'er Menuha, a small fort on the western side of the Wadi Arabah located nearly opposite Petra, Horvat Ma'agora on the road between Oboda and Elusa, and Qasr Ruheibe on the road between Elusa

<sup>1</sup> In recent discussions with the excavator of the site, the late Dan Urman, ceramic evidence of the presence of Judaean forces at the site may have been uncovered which is as yet unpublished.



Figure 12.2: The hilltop Nabataean fort at 'En Ziq.

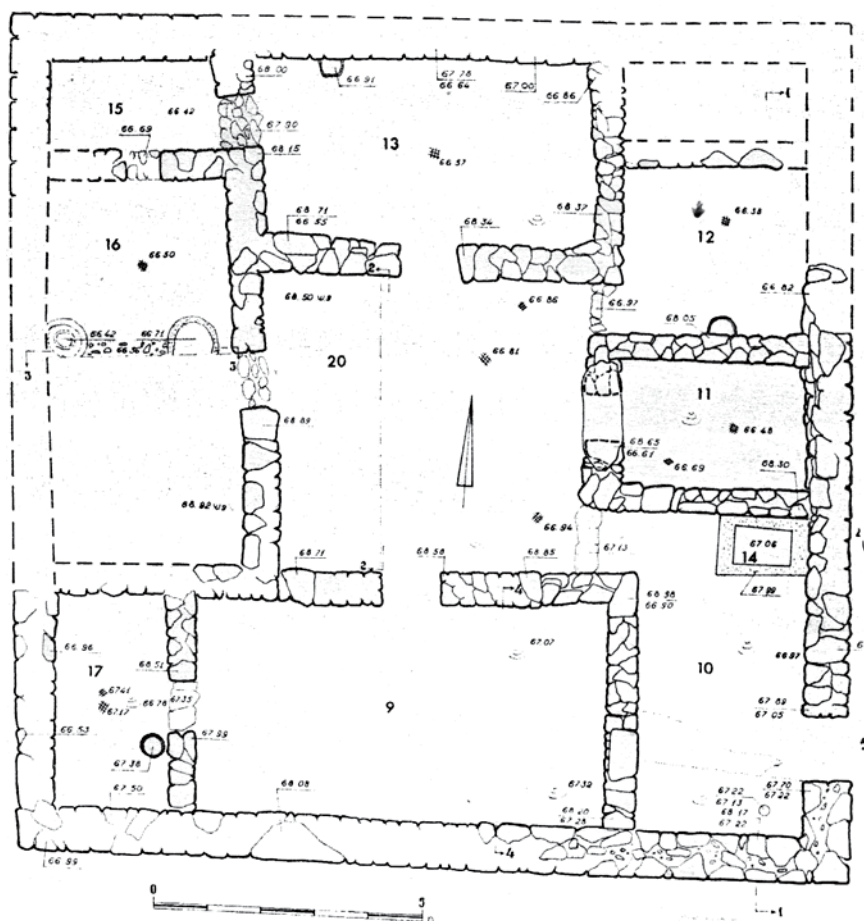


Figure 12.3: The Hellenistic Nabataean fort at 'En Rahel in the central Arabah (Shamir 1999).

and Nessana (Cohen 1976b: 59–60; 1983d: 68–69).<sup>2</sup> A few sherds of Hellenistic Nabataean pottery were found at the site of 'En Hazeva in the central Arabah

(Cohen and Israel 1996). At 'En Hazeva and Qasr Ruheibe older fortifications dated to the Iron II period were reoccupied and a small Nabataean casemate fort was built on the ruins of the latter site.

<sup>2</sup> According to one member of the excavation team, Hellenistic Nabataean pottery was discovered in the ruins of the Nabataean fort in Qasr Ruheibe (personal communication Yigal Yisrael).

The nature of the sites referred to above appears to be primarily related to trade and defence. In this early phase of Nabataean history no true permanent

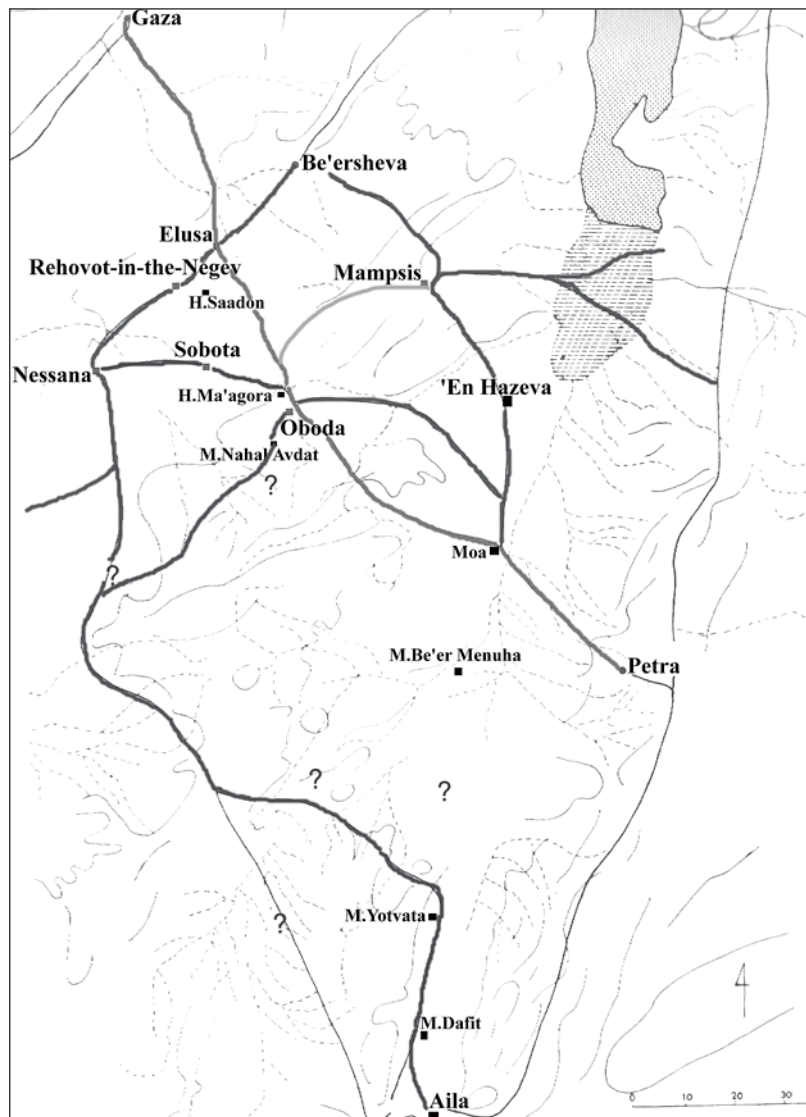


Figure 12.4: Known roads and possible tracks used by the Nabataeans in the Negev in the Early Roman period, late first century BC–first century AD.

settlements are known to have existed in the Negev. Rather, seasonal movement along a number of roads is indicated. At Oboda extensive camping grounds have been found all over the site. Oboda is notable for its abundant pottery, including imported fine wares and Rhodian jars, and coins dated primarily to the second half of the second century BC found throughout the site over bedrock. At 'En Rahel, a farmhouse and an aqueduct were discovered below the site, dated by the excavators to the third century BC. However, these structures were probably used by a single family or Nabataean guards stationed at the site. It appears that, in this early stage of their history, the Nabataeans were based primarily in and around Petra and transited the Negev on a seasonal basis as part of their involvement in commercial long-distance trade from which they derived a large part of their income. At present there appears to be no evidence that the Nabataeans ever settled in the Negev in the Hellenistic period or even used the region as pastoralists.

### Nabataean settlement in the Negev in the Early Roman period

Towards the end of the first century BC the Nabataeans returned to the Negev, this time permanently. Their activities in this period were focused on building a network of roads and caravan stops, first in the sites that they had abandoned since the beginning of the first century BC and eventually at new places along secondary roads (Figure 12.4). One major initiative was the construction of stations and water cisterns along a formerly little-used trail between Moa and Oboda by way of the Ramon Crater (Figure 12.4).<sup>3</sup> The Ramon

<sup>3</sup> Installations found along the ancient trail between Moa and the Ramon Crater are an indication that it was in use in the Bronze Age. In the Ramon Crater the new Nabataean road led directly to the north-west and up onto to the Nakfa Plateau by way of the newly constructed Mahmal Pass. The earlier trail led south-west towards the direction of the

Crater is the largest natural crater on earth and it was a formidable topographical barrier until the Nabataeans quarried a pass, the Mahmal Pass, along its north-west face sometime towards the end of the first century BC (for route see Figure 12.5). From this point the road rose to the Nafha Plain and onward to Oboda. The new Moa–Oboda road shortened the trip between Petra and Gaza considerably. Caravans travelling along this road were probably made up of groups of no more than 20 or 30 camels in order to navigate the steep climbs and descents required along passes such as Ma'ale Mahmal east of Oboda as well as Naqb Sleisel west of Petra (Kloner 1998: 132, 135). Traffic along these passes was one-way and had to be carefully controlled, well defended and conducted in a minimum amount of time. Military posts and way stations were constructed at Har Masa, Qasra, in Nahal Neqarot, Sha'ar Ramon, above the Mahmal Pass and at Grafon (Cohen 1983b: 69; 1982c: 86–87; 1982b: 87–88; 1983e: 69–70; 1988–89: 164–65; 2000: 85–86, 90; Meshel and Tsafirir 1974: 41–44). With the exception of Har (Mt) Masa, each station had a nearby cistern or, as in the case of Sha'ar Ramon, was built next to a spring. The cisterns found in Nahal Omer below Qasra and next to the fort at Grafon were quarried into solid bedrock in a streambed, examples of which can also be seen opposite Oboda in the Rumaliyah cisterns in Nahal Zin. Nabataean cisterns with transverse arches were constructed next to the Neqarot site and above the Ramon Crater at the Mahmal fort. A building with an irregular plan was found at the Nahal Neqarot site and dated to the late first century BC or early first century AD.

By the middle of the first century AD traffic along the route appears to have increased considerably and two large caravanserais were constructed at Moa and Sha'ar Ramon (Figure 12.6). These structures are located on level terrain, with quite a large area, averaging 30 x 30 m. and often larger. They resemble the earlier type of Nabataean forts in that they are made up of a series of rooms located around a large courtyard. These structures contained evidence of bathing and cooking facilities echoing the description of these way stations by Pliny the Elder:

'...indeed all along the route they keep on paying, at one place for water, at another for fodder, or the charges of lodging at the halts, and the various octrois, so that expenses mount up to 688 denarii per camel before the Mediterranean coast is reached; and then again payment is made to the customs officers of our empire' (Pl. XII 32.64–65).

modern town, Mizpe Ramon, and the Atzmaot Pass. In recent years a few pieces of Hellenistic pottery have been found by Yigal Yisrael in Nahal Neqarot at a campsite unrelated to the later Nabataean and Roman structures constructed along the road.

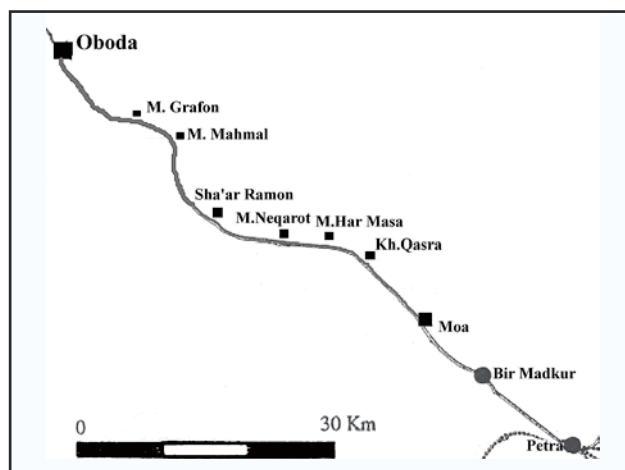


Figure 12.5: Forts and stations along the Petra–Gaza Road between Moa and Oboda, established in the late first century BC.

In addition to the new Moa–Oboda road, the Nabataeans reoccupied and utilised their original positions on the Darb es-Sultan at 'En Rahel and 'En Ziq as well as 'En Hazeva where a substantial Nabataean presence is indicated from the early first century AD until the Roman annexation. Similarly, by the middle of the first century AD new sites were settled and began to be built up at Mampsis (Mamshit) on the junction of the Scorpion Pass–Arabah road and the road between the southern end of the Dead Sea and the northern Negev, at Sobota (Shivta) on a track between Nahal Besor (the Petra–Gaza Road), at Nessana and at Rehovot in-the-Negev on the road between Elusa and Nessana. Smaller caravan halts grew into villages such as the site of Mezad Yeruham located on the Mampsis–Oboda road (Cohen 1992: 1054–56). Further north along the same road at the site of Horvat Bor (the Ruin of the Cistern) it appears that the Nabataeans constructed an arched cistern similar to those found next to the forts at Neqarot and Mahmal (Israel and Erickson-Gini 2001). These

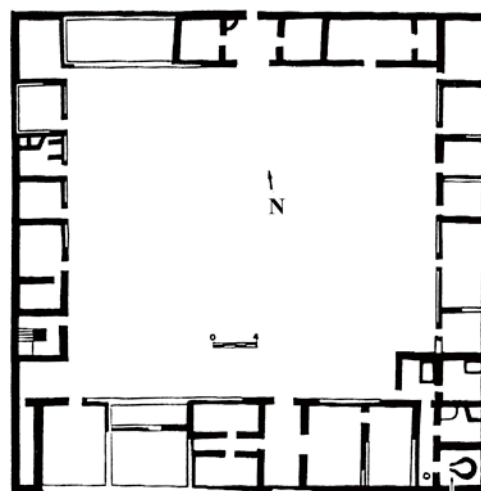


Figure 12.6: The Nabataean caravanserai at Sha'ar Ramon next to 'En Saharonim on the southern edge of the Ramon Crater (Cohen 2000).

cisterns appear to have been a hallmark of Nabataean hydraulic technology, and public cisterns of this type have been found at the site of Hawara in southern Jordan and in private Nabataean residences in Petra (Oleson 2003: 42\*; Kolb and Keller 2002: 286–87). Other than the cistern itself, which is still standing, little remains of the site after it was partially destroyed by modern road works. However, Nabataean coins from the first century AD and Early Roman pottery sherds have been discovered at the site.

Caravansaries were built at a number of these new stops, such as 'En Rahel, Horvat Ma'agora and possibly Mezaad Tamar, and two structures of this type were constructed at Mampsis. Caravansaries have also been found in the southern Wadi Arabah at Dafit, a Nabataean site located north of Aqaba, and at Rujm Taba on the eastern side of the Wadi Arabah opposite Yotvata (Dolinka 2002: 432–35).

The first century AD was a period of unparalleled political and economic expansion for the Nabataeans. The robust nature of long-distance trade between Petra and the Mediterranean world is indicated by the relatively large number of coins minted in Rome found at Moa (personal communication Rudolph Cohen). A purse with coins and semiprecious stones originating in the Indian Ocean was found in a burial at Oboda (Negev 1977a: 29).

Little is known about the permanent structures that housed the Nabataeans in the Negev in the first century AD. The best evidence is provided by Oboda and Mampsis. Oboda appears to have had large spacious houses located east of the acropolis. Three rooms of a structure of this type were uncovered by the writer during excavations at the site in early 2000. These structures appear to have large open courtyards and smaller surrounding rooms and probably a second storey. At least one nearby structure from the same period was built above a subterranean system of quarried caves and a possible underground cistern. It appears that the early buildings in this area of the site

were used as a source of building stones and robbed out in later periods, leaving only the lowest courses or foundations intact. Only a few of these structures have been excavated and published. At Mampsis, the original dwellings at the site, dating to the middle of the first century AD, appear to have been rather primitive. These structures had small irregular-shaped rooms built on the steep hillside. Most of these original structures were destroyed when sections of the hillside were levelled and large spacious villas were built in the middle of the second century AD. However, some remains of this earlier period were discovered at the site by Avraham Negev and later by the writer in excavations on the southern side of Building XII (Negev 1988: 112; Erickson-Gini 1999: 11–12).

A further indication of the spread of Nabataean culture and influence can be seen in the construction of temples. The *temenos* platform at Oboda appears to have been constructed sometime before the beginning of the first century AD (Figure 12.7). The earliest inscription from Oboda was found in this area and is dated to the second regnal year of Aretas IV, 8/7 BC (Negev 1997: 3). Two structures that probably served as temples were constructed in the middle of the first century AD at Horvat Hazaza, located along the Mampsis–Oboda road, and in Nahal Boqer overlooking the main Petra–Gaza road (Haiman 1991: 22; Erickson-Gini and Israel 2003: 10\*) (Figure 12.8). A small structure that has been tentatively described as a shrine or temple was discovered at Moa in the central Wadi Arabah (Cohen 2000: 78). At Yotvata a first-century AD Nabataean structure built with fine ashlar stones may also have served as a temple (Meshel 1990: 24).

The period between the end of the first century BC and much of the first century AD was critical in the development of Nabataean culture in Petra, and this is mirrored in the settlement activity in the Negev in the same period. One possible explanation for the steep rise in the standard of living and intensive expansion of Nabataean activity in this and other regions may be the



Figure 12.7: The Nabataean temple platform of Oboda, late first century BC (Negev 1997).



Figure 12.8: The Nabataean temple at Horvat Hazaza located along the Oboda–Mampsis road in the Central Negev Highlands, first century AD.

production and marketing of perfumed oils in Petra from the end of the first century BC, as suggested by David Johnson (Johnson 1987). It is proposed that the Nabataeans responded to the growing competition in lucrative international trade in that period by entering a new phase of economic activity in the form of unguent production. Significantly, the production of Nabataean ceramic unguentaria, probably used to market perfumed oils, begins in this period and continued until the collapse of international trade in the third century AD. Nabataean unguentaria are commonly found at Nabataean sites in the Negev from the period between the end of the first century BC and the early to middle third century AD. They have been found buried as foundation offerings at 'En Rahel and at Mampsis (Erickson-Gini 1999: 55, fig. 14.1.6, pls 4.1, 6.1).

The development of the new, shorter route between Petra and Oboda by way of the Ramon Crater was probably a direct result of this new economic activity, one that would have required safer and faster roads that facilitated transportation year-round. Moreover, this type of economic activity encouraged the permanent settlement of Nabataean colonists outside the Petra region along main and secondary roads, firstly in order to provide road services, and eventually as towns in their own right. The system of payment for road services, as well as outright taxation, is well documented by historical sources such as Pliny and the *Periplus of the Erythraean Sea*, a manual by an unknown author, probably an Egyptian Greek, for merchants sailing from the Red Sea to east Africa, south Arabia and India, dated to the mid-first century AD (Casson 1989: 9).

The genesis of the unguent industry in Petra appears to be paralleled, and probably influenced, by the monopoly on the cultivation, production and marketing of balsam oil by Herod the Great in the Dead Sea area of Judaea in the later part of the first century BC. In the early first century AD the Romans

took control of the production of balsam in the Dead Sea region, and 'En Gedi became the centre of production as part of the emperor's *patrimonium* after AD 6 (Cotton 2001: 142–46). At the site of 'En Boqeq, located near the border between Nabatea and Judaea on the south-west shore of the Dead Sea, an *officina* dated to the first half of the first century AD has been interpreted as constituting part of the imperial *fiscus* (Cotton and Eck 1997). The identity of the workforce in the *officina* is unclear. The excavators have interpreted the presence of stone vessels produced in Judaea as evidence that the workers were Jewish with close trade relations with the Nabataeans (Fischer, Gichon and Tal 2000: 85). However, half of the coins found at the site were Nabataean, and Nabataean finewares and Eastern terra sigillata sherds were also found, suggesting that the workforce may have been ethnically mixed (Magness 2002: 347; Graf 2003: 92). Other evidence pointing to Nabataean activity in the southern area of the Dead Sea in the first century AD includes indications that the last Nabataean king, Rabbel II, owned date plantations in the vicinity of Zoar around 99 AD. In addition, a substantial Nabataean community existed at Mahoza from the first through third century AD, the nearby cemetery of which contains the remains of nearly 5000 shaft graves (Yadin 1963: 153–54; Politis 2002: 27–29). In view of the evidence pointing to Nabataean activity around the southern and eastern shores of the Dead Sea in the second half of the first century AD, the establishment of Mampsis and other Nabataean caravan stops along the Dead Sea–Beersheba road in the same period appears to have been a natural development.

### The continuation of Nabataean culture after the Roman annexation in AD 106

One of the extraordinary facts to emerge from decades of research in the Negev is the accumulating evidence of the continuation of Nabataean culture, language

and religion in this region long after their loss of political independence in AD 106. This continuity of culture was facilitated by several factors, the most important of which was the region's link with Petra and southern Jordan.

The reasons for the Roman takeover of Nabataea are not specifically recorded, but apparently one main factor was Rome's interest in controlling Nabataean commerce and trade. It has been suggested that direct control over Nabataea became more profitable for the Romans than the previous indirect control of trade outlets (Fiema 1991: 103 n. 36). The presence of Roman citizens in Petra in the first century AD, presumably merchants and traders, may have foreshadowed the annexation of Nabataea (Strabo 16.4.21). Roman trade colonies were often located in areas beyond the Empire prior to annexation, and Isaac has pointed out that the Roman residents in these areas were, together with the military, among the first to profit directly from Roman annexation (Isaac 1992: 385). In this context, the Romans probably desired a smooth transfer of control in Nabataea, although some researchers have suggested that the annexation may have been accompanied by acts of destruction (Schmid 1997: 416–20).<sup>4</sup>

Following the Roman annexation a new province, *Provincia Arabia*, was established which included the Negev. Petra continued to be an important administrative and religious centre under Roman rule and the city received several honorary titles. The Babatha archives, a collection of documents dated to the years between AD 93/94 and 132 found in a cave west of the Dead Sea in 1961, make several references to the *boule* or city council at Petra (Yadin 1963). In the wake of the annexation the Romans quickly began constructing the *Via Nova Traiana*, which served as the main artery of commerce and military movement between the Gulf of Aqaba and Syria, where the Third Legion Cyrenaica was based at Bostra.

In the period following the annexation, the town of Mampsis was thoroughly renovated with the construction of spacious houses. These houses contain Nabataean architectural elements such as Nabataean capitals and arched cisterns (Negev 1988: 116; Oleson

2003: 42\*). In order to facilitate their construction on the rocky slopes of the site, earlier structures were cleared away in order to level sections of bedrock on which the foundations of the new houses stood (Negev 1988: 112). This method of construction in the form of manipulation of bedrock appears to have been used at Petra, examples of which have been revealed in the construction of the Great Temple (Joukowsky 2002: 326). Recent excavations by the writer at Oboda have also revealed the construction and occupation of houses after the annexation. The construction of a theatre at Elusa was probably carried out sometime in the latter part of the second century AD (Negev and Gibson 2001: 158).

The ceramic assemblages found at these and other sites in the Negev indicate that international long-distance trade continued uninterrupted after the annexation and throughout the second century AD. Most of the ceramic vessels, and particularly fine ware vessels and unguentaria, found from this period were produced in the vicinity of Petra. However, a tradition of local pottery production in the Negev is apparent in this period, which continued well into the Byzantine period.

In the wake of the collapse of international trade in the third century AD, it appears that in the fourth century the inhabitants in the Negev turned to agriculture and the trade in agricultural products, particularly wine, as their primary means of subsistence. It is probable that this development was prompted by the increased presence of Roman forces in the region from the Diocletianic period, when the Tenth Legion was transferred from Jerusalem to Aila on the Gulf of Aqaba. Under Diocletian the *Provincia Arabia* was reorganised into the new province of *Palaestina* and the Negev and Sinai continued to be part of the same administrative unit as that of Petra and southern Jordan (Tsafirir 1986).

Roman military activity intensified at 'En Hazeva in the central Wadi Arabah with the construction of a fort, a cavalry camp and bathhouse at the site. A series of small forts was constructed along the Ma'ale Tsafir route leading up the ancient 'Scorpions Pass' to Mampsis. At Oboda a large Roman army camp measuring 100 x 100 m. was constructed in the Diocletianic period and there are indications that Roman forces patrolled the road between Oboda and Sha'ar Ramon until the early fifth century AD (Erickson-Gini 2002). Late Roman army installations were also discovered along the Mampsis–Oboda road at Horvat Bor (Israel and Erickson-Gini 2001–02). The focus of military activity in the Negev and southern Jordan in this period probably bolstered relations between the populations in these two regions.

Ceramic assemblages found at Negev sites in this period, and particularly those sealed by the earthquake

<sup>4</sup> Petra was probably damaged by an earthquake in the early second century AD as proposed by Russell (1985). More recent evidence for earthquake damage at Petra in this period has been found at az-Zantur and possibly in the Great Temple (Kolb and Keller 2002: 286; Joukowsky 2002: 319). There is clear evidence of earthquake destruction in the early second century at 'En Rahel in the central Wadi Arabah. This site was destroyed by an earthquake and was never occupied by Roman forces. Earthquake damage in the second half of the second century AD has also been detected at Aqaba (Dolinka 1999: 56).

destruction of AD 363, point to continued ties with Petra and southern Jordan. The vast majority of oil lamps discovered in the fourth-century AD fort at 'En Hazeva were produced in the Petra region. These lamps have also been found in fourth-century contexts at Mamphis and Oboda. The latter assemblages also indicate that the Nabataean tradition of painted ware bowls continued until around AD 363. The AD 363 earthquake appears to have been a watershed in the relationship between the Negev and the Petra region. Assemblages found in later contexts, and particularly those dated to the early fifth century AD at Oboda, discovered in 2000 by the writer, show that within a few decades pottery from the Petra region no longer dominated these assemblages. However, evidence of the continuation of Nabataean ethnicity and religion in contexts dated to the early fifth century has been brought to light with the discovery of a Nabataean inscription in ink written on the plaster wall of a room in Oboda. This inscription, written by the plasterer himself, refers to the Nabataean god, Dushara (Negev 2003: 25–26).

## Conclusions

To summarise, Nabataean settlement of the central Negev began sometime towards the end of the first century BC and accelerated by the middle of the first century AD. This settlement activity appears to have developed directly out of the Nabataeans' control and maintenance of the region's trade routes. The loss of political independence in AD 106 does not appear to have had a negative effect on Nabataean culture in either the Negev or Petra. On the contrary, the inclusion of the former Nabataean realm in the Roman Empire appears to have had an immediate positive effect on the inhabitants, as is apparent from the architectural developments and material culture found in second- and early third-century AD contexts at Negev sites. The ethnic, religious and cultural link between the Negev settlements and Petra was strong enough to withstand the economic and political instability of the third century AD, including the virtual cessation of international trade through the region. Within a few decades the inhabitants appear to have adapted to a new subsistence strategy in the form of agricultural production and the trade in agricultural products, mainly viticulture. This new economic base was probably stimulated by the increased presence of Roman military forces in the region from the time of Diocletian and the transfer of the Tenth Legion from Jerusalem to Aila in that period. Pottery produced in Petra continued to dominate ceramic assemblages in the Negev sites until around AD 363. By the early fifth century this material link with Petra appears to have finally waned, for the first time in the history of Nabataean presence in the Negev. However, the continuation of Nabataean religion and the use of the

Nabataean language in the Negev are evident as late as the early fifth century AD.

## Abbreviations

- Diod.: *Diodorus of Sicily*, 12 volumes, transl. R.M. Greer. Cambridge, MA, 1954.  
 Jos. Ant.: Josephus Flavius, *Complete Works: The Antiquities of the Jews*, transl. W. Whiston. New York, 1976.  
 Pl.: C. Plinius Secundus, *Naturalis Historia*, ed. H. Rackham. London, 1947–1963.  
 Strabo: *The Geography of Strabo*, ed. H.L. Jones. Cambridge, MA, 1949–1969.

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 — 1983b. Mesad Har Massa. *Excavations and Surveys in Israel* 2: 69.  
 — 1983d. Mesad Be'er Menuha. *Excavations and Surveys in Israel* 2: 68–69.  
 — 1983e. Mesad Ma'ale Mahmal. *Excavations and Surveys in Israel* 3: 69–70.  
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## The Nabataean presence south of the Dead Sea: new evidence

*Yizhar Hirschfeld*

### The border between the Judaeen and Nabataean kingdoms

The region immediately south of the Dead Sea (the northern Wadi Arabah) was part of the Nabataean kingdom, whose capital was Petra. The regional capital of this district was Zoar, mentioned several times as a renowned Nabataean city in the papyrus documents discovered in the Cave of Letters in Nahal Hever in the Judaeen desert (Yadin *et al.* 2002: 8–9). In recent years I have gathered new evidence on the Nabataean presence in the area. In the desert oasis of 'En Tamar, south-west of the Dead Sea, I discovered a Nabataean burial cave. North of the oasis lies Mezaad Gozal, which, in my opinion, was erected as a Nabataean roadside fort on the border with the Judaeen kingdom. This article will present new archaeological data that attest to the Nabataean presence in the northern Wadi Arabah.

Where did the border run between the Judaeen and the Nabataean kingdoms in the Late Hellenistic and Early Roman periods? According to Josephus Flavius, Alexander Jannaeus (103–76 BC) conquered Nabataean Zoar (*Ant.* 13.397), but his son John Hyrcanus II returned it to the Nabataeans (*Ant.* 18.14). Jannaeus built the fortress of Machaerus north of Nahal Arnon (Wadi Mujib) and Herod the Great (37–4 BC) inherited the fortress, which apparently remained in Jewish hands until the Jewish Revolt (on Machaerus, see Netzer 2001: 75–76). One may assume that the border between the Judaeen and the Nabataean kingdoms on the eastern side of the Dead Sea passed south of Machaerus, parallel to the deep gorge of Nahal Arnon (Figure 13.1).

Where was the border between the two kingdoms on the western side of the Dead Sea? According to the sources and archaeological finds, Masada was undoubtedly in Judaeen hands. According to Josephus (*War* 7.285), Masada was first built in the days of Jonathan the Hasmonean (152–142 BC) and from then until its destruction in AD 73 remained in Jewish hands, except for the period of the proconsuls (AD 6–66) (Yadin 1993: 973–84). South of Masada, at a distance of approximately 15 km., lies the oasis of 'En Boqeq. In the centre of the oasis an estate house of the Herodian period, that is, from the reign of Herod until

the Jewish Revolt, was discovered and excavated. The excavators uncovered stone vessels made in Jerusalem, used only by the Jewish population (Fischer and Tal 2000). Based on this finding, the excavators surmised that 'En Boqeq belonged to Judaea. According to them, the many Nabataean finds discovered in the excavation, among them coins and clay vessels, reflect the close commercial ties between the Jews and Nabataeans in the period under discussion.<sup>1</sup>

The oasis of 'En Boqeq is located about 5 km. north of the estuary of Nahal Zohar (Figure 13.2). The wide estuary is the result of the convergence of two water-courses: Nahal Zohar from the north and Nahal Heimar from the south. If we assume that the oasis of 'En Boqeq was in the Judaeen kingdom, then it is reasonable to assume that the border between the two kingdoms passed along the estuary of Nahal Zohar and Nahal Heimar. Support for this assumption is found in Mezaad Gozal, which lies about 2 km. south of the Nahal Zohar estuary.

### Mezaad Gozal

Mezaad Gozal is one of the most impressive sites along the shores of the Dead Sea. The fort is situated on the shore of the large man-made pool that is what remains today of the southern part of the Dead Sea, close to the modern Highway 90, which runs south towards the Arabah Junction (Figure 13.3). The elevation of the top of the walls of the fort is -388.68 m., while the water level in the pool below it is at -393.16 m. In other words, the fort is preserved to a height of about 5.5 m. above the current level of the Dead Sea. There is evidence that in the Early Roman period the level of the Dead Sea was about -395 m., i.e., more or less the water level of the pool today (Hirschfeld 2004: 56–58). From this we learn that at the time of its building by the Nabataeans (as will be suggested below), Mezaad Gozal stood on the shore of the Dead Sea.

<sup>1</sup> In the opinion of Rachel Bar-Nathan (personal communication), the many Nabataean finds at 'En Boqeq indicate that in the first century AD the site belonged to the Nabataeans. However, I believe that the presence of the stone vessels contradicts this claim.



Figure 13.1: Map of roads and settlements around the Dead Sea in the Early Roman period.

Mezzad Gozal commands the road that passes through the narrow space between it and the steep cliffs of Mount Sedom. In a survey of the Wadi Arabah made by Fritz Frank in 1932, which included the archaeological sites in the southern part of the Dead Sea region (En-Gedi and 'En Boqeç), Mezzad Gozal is not mentioned at all, for a simple reason: the period of Frank's survey was one of relatively high rainfall, and consequently the level of the Dead Sea was higher and the remains of the fort were inundated. At that time the route running along the foot of Mount Sedom was impassable and Frank bypassed it from the west (Frank 1934: 202). Only much later, in the early 1950s, did the level of the Dead Sea begin to drop, leaving Mezzad Gozal exposed as it is today.

Yohanan Aharoni and Beno Rothenberg identified Mezzad Gozal as an Edomite roadside fort dating from

the eleventh and tenth centuries BC (Aharoni and Rothenberg 1960: 16–17, 36; for additional information, see Aharoni 1964: 112–13). Their conclusion was based on early Iron Age potsherds found in the site. However, this conclusion is not incontrovertible. In the excavations of Pesach Bar-Adon at sites along the western shore of the Dead Sea, such as Rujum el-Bahr (Ma'aganit ha-Melah), Khirbat Mazin (Qasr el-Yahud or Mezzad Kidron), and Qasr et-Turabeh (Mezzad Samar), remnants of Iron Age pottery were discovered together with later potsherds of the Hellenistic and Early Roman periods (Bar-Adon 1989). According to Aharoni and Rothenberg, remnants of pottery of the Roman period were also found in Mezzad Gozal. Like the sites excavated by Bar-Adon, Mezzad Gozal should perhaps be dated by the later material found in it; consequently, this would be a Nabataean rather than an Edomite site.

Analysis of the remnants of Mezzad Gozal supports the assumption that it was built as a Nabataean roadside fort. There is a square tower (16 x 16 m.) surrounded by a forewall whose thickness ranges from 2.5 to 3.5 m. (Figure 13.4). Seven courses of stones, each 0.4 m. thick, appear in the southern wall of the tower, which is preserved to a height of 2.8 m. The forewall (in Greek, *proteichisma*) characterises the architecture of fortifications in the Hellenistic and Early Roman periods (Lawrence 1979: 277–79). Such walls are known from several sites in Israel, for example the Hasmonean wall of Jerusalem (Broshi 1976: 75–79), the wall dated to the second century BC at Sha'ar ha-

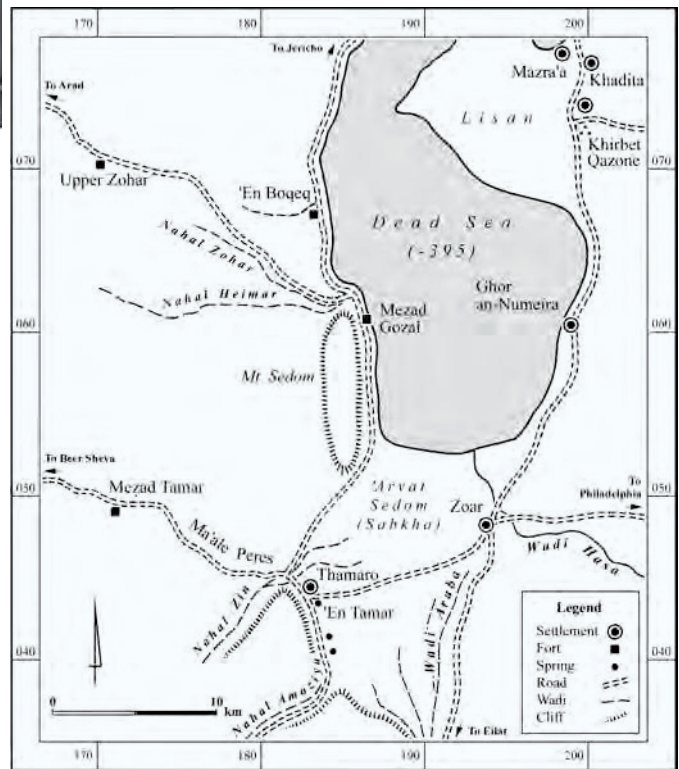


Figure 13.2: Map of roads and settlements south of the Dead Sea.



Figure 13.3: Mezad Gozal, looking north.

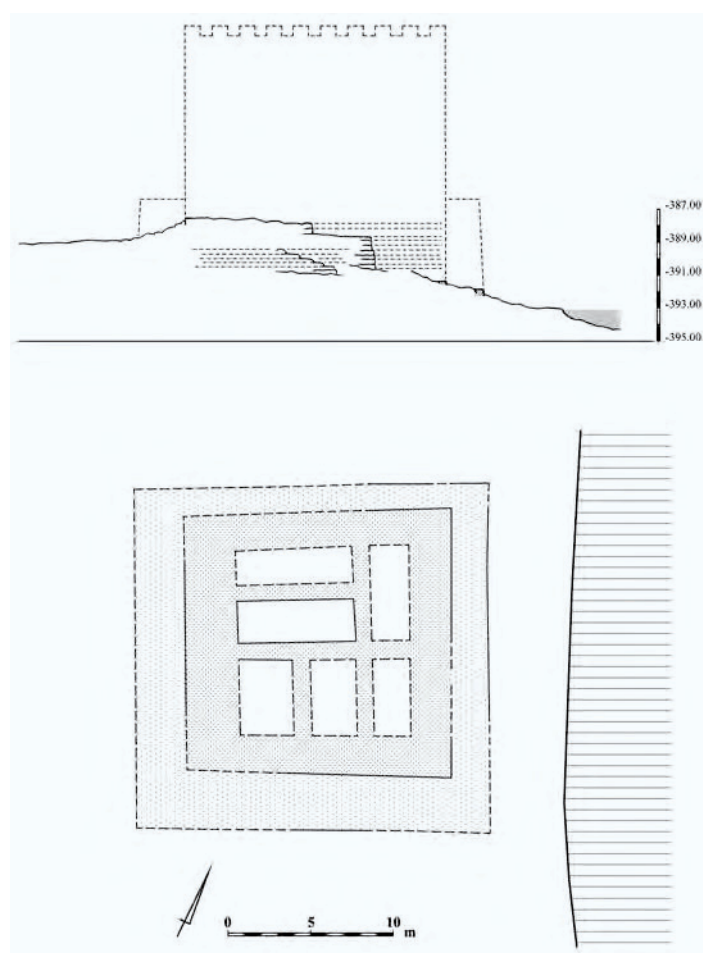


Figure 13.4: Plan and cross-section of Mezad Gozal.

'Amaqim in the Galilee (Segal and Naor 1993), and the wall at Horvat 'Eleq (Ramat Hanadiv) in the south of the Carmel range (Hirschfeld 2000: 254–80). These data indicate that Mezad Gozal was built by the

Nabataean kings in order to defend the border with Judaea and the road that runs south past the main settlements, 'En Tamar and Zoar, in the northern Wadi Arabah.

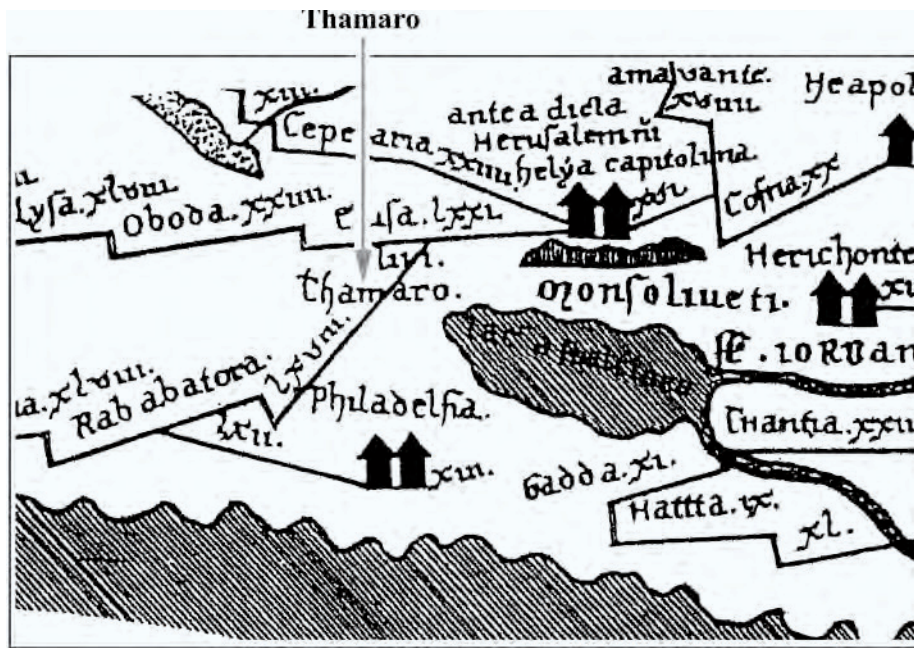


Figure 13.5: Section of the Peutinger Map depicting the southern Dead Sea.

### 'En Tamar: ancient Thamaro?

'En Tamar (in Arabic, 'Ein el-'Aros, 'the spring of the palm tree') lies about 12 km. south-west of Zoar. Although today the international border running along the Wadi Arabah separates 'En Tamar from Zoar, the wadi had no significance as a frontier in the Early Roman period. The Nabataean kingdom included the Arabah, the Negev and Sinai. The main road from Zoar to the Nabataean towns of the Negev (Mampsis [Kurnub], Oboda and Elusa) ran west via 'En Tamar. 'En Tamar belongs to a group of springs south-west of the Dead Sea that flow for a distance of about 7 km. along the marl ridge that bounds the salt marsh known as 'Aravat Sedom (in Arabic, Sabkha), south of the Dead Sea (for 'Aravat Sedom, see Braslavi 1956: 34–36).

Hydrological research has shown that this is an independent group of springs fed by groundwater unrelated to the Dead Sea (Mazor 1997: 268). Two important routes emanated from 'En Tamar: the southern route through the wide riverbed of Nahal Amatzia in the direction of Hazeva and Mo'a and from there to the Gulf of Eilat, and the western route ascending through Ma'aleh Peres in the direction of Mampsis, Elusa and Gaza. In a survey undertaken recently along Ma'aleh Peres, masonry retaining walls and hewn steps were discovered, an indication of the ascent's importance in antiquity (Ben-David 2001; 2002).

Ma'aleh Peres was part of the east-west road south of the Dead Sea that connected the two sides of the Dead Sea Valley. This road is marked in the fourth-century AD Roman road map known as the *Tabula*

*Peutingeriana* (Figure 13.5). The Peutinger Map is based, among others, on the writings of the Roman geographer Ptolemy of the second century AD, and consequently is assumed to reflect the settlement picture of Palestine in the Roman period (see, e.g., Finkelstein 1979). On the map, beside the road south of the Dead Sea, appears a settlement by the name of Thamaro. Eusebius (*Onomasticon* 8, p. 14), in the fourth century, mentions a village named Thamar as a place inhabited by a military unit, one day's walk from Mampsis. The Madaba mosaic map (mid-sixth century AD) shows a town named Thamara south of the Dead Sea (Avi-Yonah 1954: 43). All of these names are variations on the Hebrew *tamar*, 'date palm'. Tamar is usually identified with 'En Tamar, though some identify it with 'En Hazeva, about 30 km. south of the Dead Sea.<sup>2</sup> The main find at 'En Hazeva, a huge Iron Age fortress, might be linked with biblical references to King Solomon, who fortified 'Tamar in the wilderness, in the land' (2 Kings 9:18). It is conceivable that the name Tamar was given to two different places and that both 'En Hazeva and 'En Tamar were called Tamar/Tamara in antiquity.

The archaeological finds at 'En Tamar attest that this was the second most important settlement after Zoar in the northern Wadi Arabah. The site was founded in

<sup>2</sup> Alt (1935: 34) suggested identifying Thamaro with the fortress of Qasr el-Juheiniye (Mezad Tamar) at the top of Ma'aleh Peres and with the town of Tamar south of the Dead Sea. On the other hand, Aharoni (1963) proposed to identify Thamaro further south with 'Ein Husub ('En Hazeva). For a summary and references, see Tsafirir *et al.* 1994: 247.

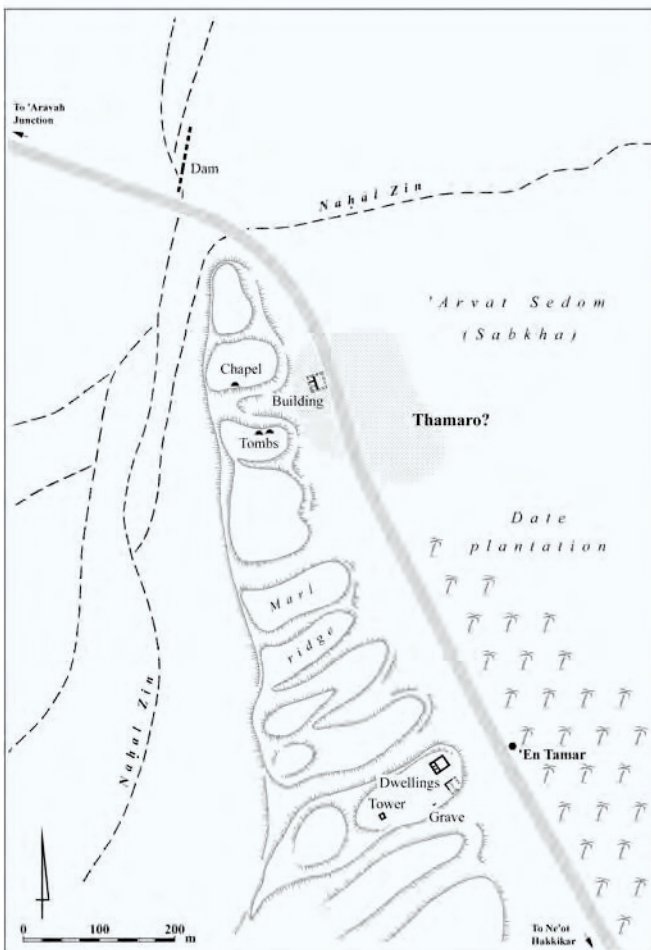


Figure 13.6: Plan of the remains in the desert oasis of 'En Tamar.

the late Iron Age and continued into the Nabataean, Late Roman and Byzantine periods. From this standpoint, 'En Tamar is part of the general settlement picture along the Wadi Arabah that has been revealed

by archaeological surveys (King *et al.* 1989; MacDonald 1996). The site is a typical desert oasis of the Dead Sea Valley. The remains are not concentrated in one place, but are distributed, as at Zoar, Callirrhoe and Jericho, over several areas of the oasis. The Nabataean residents of 'En Tamar benefited from the general prosperity of the Dead Sea region. The local economy, like that of other desert oases around the Dead Sea, was based on plantations of date palms, which gave the place its name, and on balsam groves. The site was surveyed in 1932 by Frank (Frank 1934) and in 1960 by Rothenberg (Rothenberg 1967), and was excavated in 1982 by Rudolph Cohen on behalf of the Israel Antiquities Authority (Cohen 1983).

The archaeological remains of 'En Tamar are spread over some 800 m. along the modern road that leads from the Arabah Junction to Ne'ot Hakkikar (Figure 13.6). The spring flows to the east of the highway at an elevation of -360 m., while most of the remains are on top of the marl ridge that bounds 'Aravat Sedom to the west of the highway. The remains include walls, buildings, rock quarries and concentrations of potsherds in two foci, one west of the spring and the other north-west of it.

#### *The remnants west of the spring*

Two dwellings, a tower and possibly a robbed grave were surveyed about 100 m. west of the spring, at the summit of the marl ridge (at an elevation of approximately -310 m.). The two dwellings are close to one another (about 20 m. apart) and include residential rooms and courtyards that face north overlooking 'Aravat Sedom (Figure 13.7). Although Rothenberg and Cohen posited that these are fortified buildings



Figure 13.7: Remains of buildings west of 'En Tamar, looking north-east. In the background is 'Aravat Sedom (Sabkha).

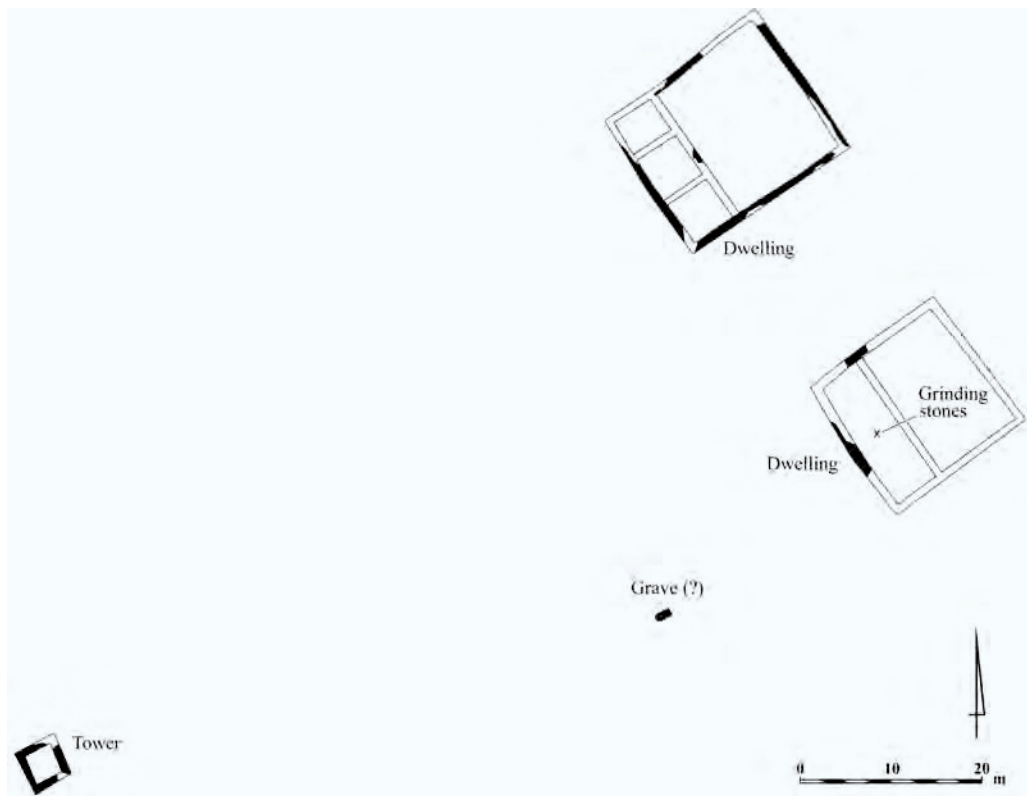


Figure 13.8: Plan of remnants west of the spring at 'En Tamar.



Figure 13.9: Grinding stones in a building west of 'En Tamar, photograph and drawing.

that served as guard stations, the archaeological finds reveal a different picture.<sup>3</sup> The walls of the buildings, 0.7 m. thick, are made of local fieldstones (Figure 13.8). In the courtyard of the eastern of the two buildings

<sup>3</sup> Rothenberg (1967: 115) refers to the remains of the buildings west of the spring by the name of Mezaḏ 'En Tamar. According to Cohen (1983), the buildings west of the spring served as guard stations along the Roman road from 'En Tamar to Zoar.

were found pieces of basalt grinding stones of the type called the 'Olynthus mill' (Figure 13.9). Both stones, the upper and the lower, are square, and in the middle of the upper millstone is carved a hole for pouring in the grain. The upper millstone was operated by pushing from the sides. This type of millstone came into use in Palestine in the Hellenistic period (Frankel 2003: 7). South of these buildings, at the top of the ridge, is a square tower (4 x 4 m.) that commands the entire region (Figure 13.10). Between the tower and the



Figure 13.10: The tower west of 'En Tamar, looking east.

two other structures we noted the remains of what is probably a robbed grave.

Pottery collected at the site (Figure 13.11) includes sherds of the late Iron Age (eighth and seventh centuries BC) and of the late Hellenistic and Early Roman periods (second century BC to first century AD).<sup>4</sup> Similarly, two bronze coins were found in the area, one of the Nabataean king Aretas II (110–100 BC) and the other of Alexander Jannaeus (103–76 BC).<sup>5</sup> The two coins and the pottery support the assumption that the structures west of the spring were built by the Nabataeans in the second century BC and were in use at least until the first century AD.

The structures are indeed located on a high point that commands the road at the foot of the marl ridge and the entire surrounding area, but they are not necessarily forts or way stations. Judging by the character of the building and the finds (such as the millstones), these were residential dwellings of the inhabitants of 'En Tamar in the Roman period. The elevated location had considerable advantages, such as fresh breezes, an outlook over the cultivated areas, and distance from mosquitoes and other pests that proliferate in the region in the spring.

#### *The remnants north-west of the spring*

Remains of additional buildings, whose remnants are spread out on both sides of the road that leads to Ne'ot

Hakkikar, were surveyed about 500 m. north-west of 'En Tamar. Beyond them, in the direction of the 'Aravah Junction, stands a fairly impressive dam wall (Figure 13.12). The wall is preserved to a length of 15 m. and a height of 2.5 m. It is built parallel to the riverbed of Nahal Zin, indicating that it diverted floodwaters from the direction of the site. The dam is described in Rothenberg's survey (Rothenberg 1967: 116), and appears in a photograph in Frank's survey of the Arabah (Frank 1934: plate 49A).

The region south-east of the dam was apparently the settlement centre of 'En Tamar, which is identified with ancient Thamaro. Rothenberg (1967: 116) describes the remains as 'a large ruin entirely covered in sand and earth'. According to him, the ceramic finds included potsherds of three periods: the Iron Age, the Nabataean period, and primarily the Byzantine period. In 1982, Cohen excavated a relatively large building (30 x 40 m.) on the western side of the road (Cohen 1983). A few remains of the building are still visible (Figure 13.13). Judging by the character of the remains, it seems that this was a residential building with several rooms arranged around a central courtyard. During the excavation, two stages of construction were discerned: a Nabataean stage of the first century BC and above it a Late Roman stage of the second to third centuries AD. The two periods of the building's existence are demonstrated in the ceramic finds, which include typical Nabataean potsherds (Figure 13.14). The excavation yielded three Nabataean coins (one of Aretas IV) and five Roman coins of the second to third centuries AD.<sup>6</sup>

<sup>4</sup> The pottery was identified by A. de Vincenz, R. Bar-Nathan, J. Magness and T. Erickson-Gini.

<sup>5</sup> The coins were identified by D.T. Ariel of the Israel Antiquities Authority.

<sup>6</sup> This information was kindly provided by D.T. Ariel of the Israel Antiquities Authority. The coins were identified by Y. Meshorer of the Israel Museum.

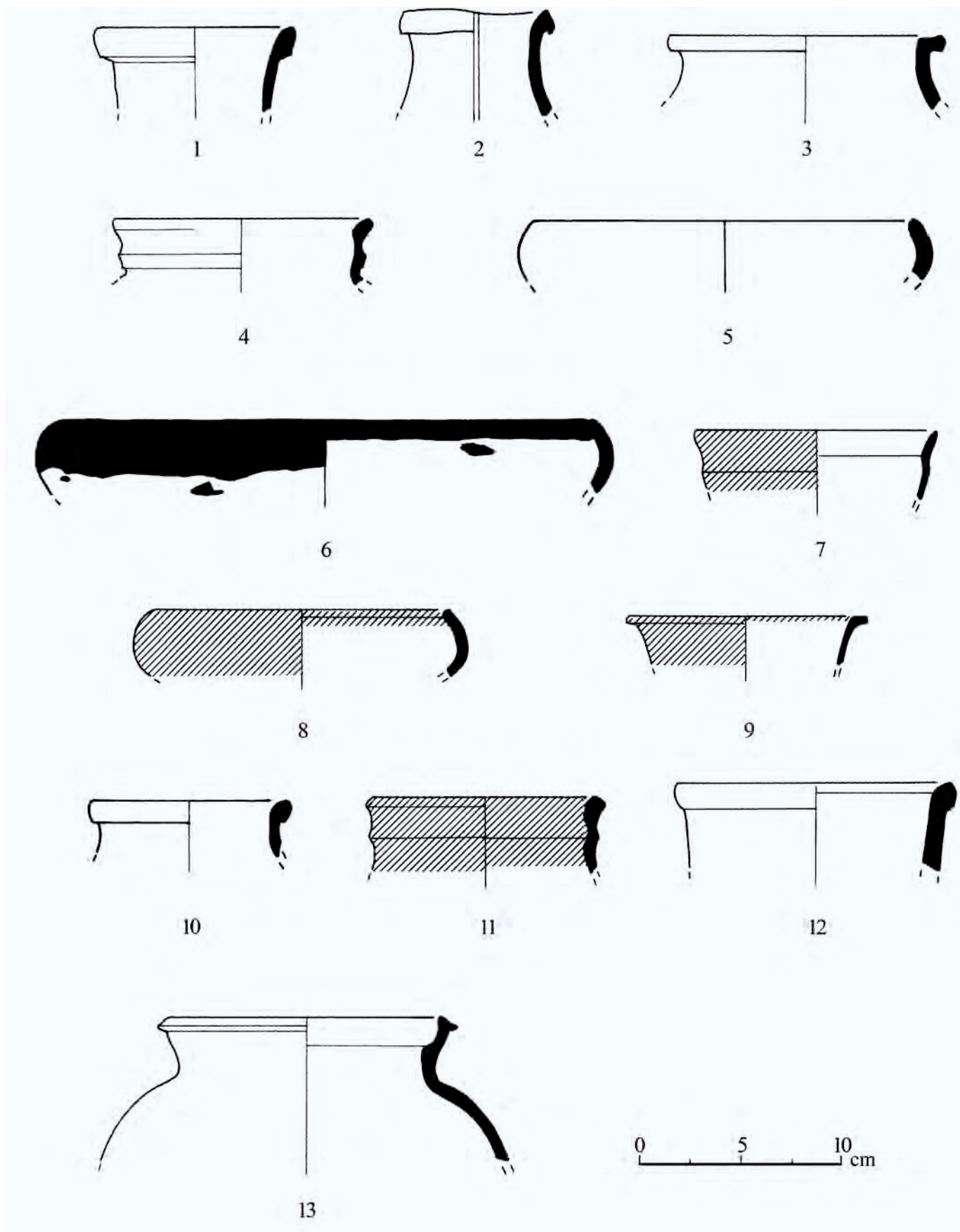


Figure 13.11: Pottery from the buildings west of 'En Tamar (nos. 1–5, Iron Age II; nos. 6–13, Early Roman period).



Figure 13.12: The dam north-west of 'En Tamar, looking north.



Figure 13.13: Remains of a building excavated by Rudolph Cohen north-west of 'En Tamar, looking south-west.

### *The Chapel of the Crosses*

To the west of the Nabataean residential building is a man-made cave hewn in the cliff of the marl ridge (Figures 13.15, 13.16). The chapel was discovered in Frank's survey (1934: 256) and the cave and its crosses were described by Rothenberg (1967: 116). The walls of the cave are coated with a thick layer of grey plaster in which are incised 10 crosses, a strong indication that the cave served as a chapel in the Byzantine period. The cave is rectangular and its axis is north-south. It measures 4.5 x 7 m. and its vaulted ceiling reaches a maximum height of 2.2 m. (Figures 13.17, 13.18). The entrance is entirely open and lacks any visible means of closure. Although a prayer niche was not found in

the cave, there is a large cross with a small cross on either side in the centre of the long east wall (Figure 13.19). The location and arrangement of the three crosses supports the assumption that the cave served as a chapel. Within the cave is a small cell (1 x 1.3 m.), only 1.4 m. high, whose role is unknown. The floor of the cave, hewn in the soft marl, was covered by a layer of earth and dung left by the flocks of bedouin shepherds. Below the level of the floor, opposite the three crosses, was a recess containing four lumps of pure salt (Figure 13.20), probably placed there as an offering in the Byzantine period. In addition to the three crosses in the east wall, seven other crosses were discovered. A large cross 1.4 m. long is incised at the

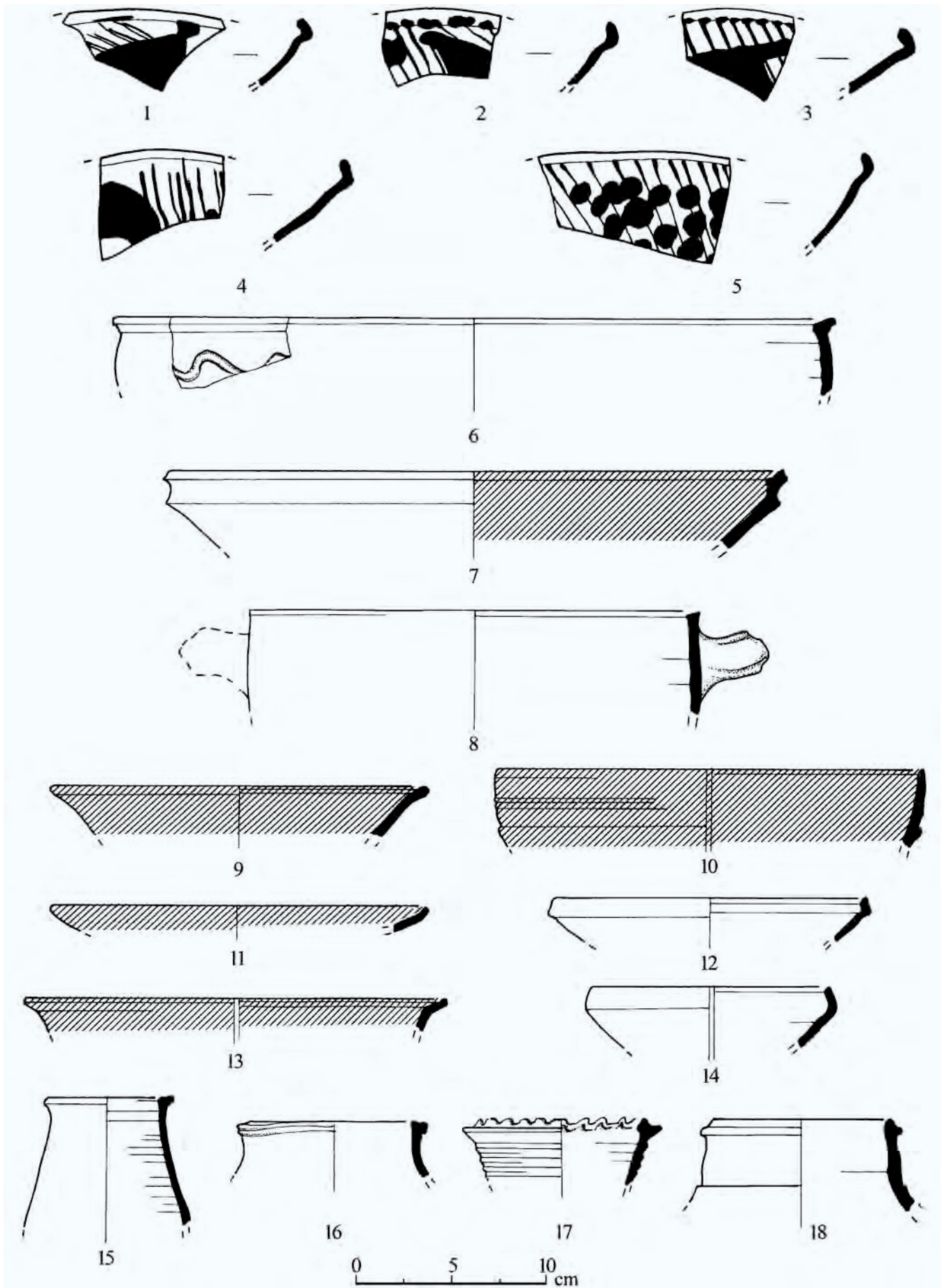


Figure 13.14: Pottery of the first century BC–first century AD from the building at 'En Tamar excavated by Rudolph Cohen.



Figure 13.15: The Chapel of the Crosses in the ridge north-west of 'En Tamar, looking west.



Figure 13.16: The opening of the Chapel of the Crosses, looking north-east.



Figure 13.17: The interior of the Chapel of the Crosses.

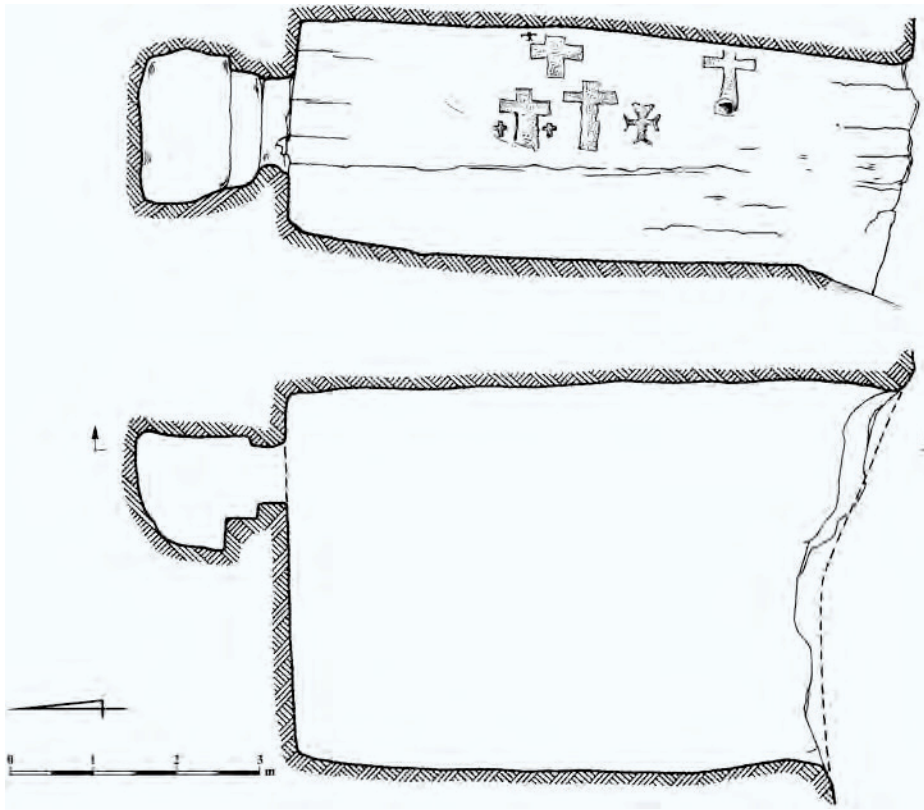


Figure 13.18: Plan and cross-section looking east of the Chapel of the Crosses.

top of the vault, close to the entrance to the cave (Figure 13.21; Frank 1934: plate B63). To its east is another cross, 1.1 m. long (Figure 13.22). A small niche intended to hold an oil lamp (10 x 15 cm., 12 cm. deep) was hewn in the base of the cross. Another three crosses were incised in the east wall and another two in the west wall. These 10 crosses in total were apparently incised at various times in the course of the Byzantine period.

The discovery of the Chapel of the Crosses is consistent with what we know of the flourishing settlements in the northern Arabah in the Byzantine period. Settlement in 'En Tamar was continuous from the Early Roman period until the end of the Byzantine period; Rothenberg (1967: 116) discovered many Byzantine potsherds at the site. Zoar continued to function as the major city in the southern Dead Sea Valley and as an important Christian centre. North-east of Zoar were discovered remains of the Monastery of St Lot, which appears in the Madaba Map (Politis 1993; 1999). The 'Desert of Zoar' is mentioned several times in the hagiographic literature (e.g. Cyril of Scythopolis, *Life of Sabas* 22, p. 115) as a region in which hermits secluded themselves (the 'Desert of Zoar' belongs to a group of deserts, like the 'Desert of Jerusalem' and the 'Desert of Zif,' which were named after the dominant towns on their borders). The pilgrim Antoninus of Placentia (c. AD 560) tells of a nunnery in the Zoar region and of a female hermit named Maria who used to isolate herself 'between

bulrushes and palms on the border of Zoar near the Dead Sea' (*Piacenza Pilgrim* 34, pp. 85–86). The Chapel of the Crosses in 'En Tamar was perhaps intended to mark the sanctity of the place in relation to the traditions of the local recluses (Figure 13.23). On the other hand, in view of the unusual form of the cave, its broad entrance and the absence of a prayer niche, it is possible that the cave was hewn earlier than the Byzantine period in association with the burial cave found near it.<sup>7</sup>

#### *The Nabataean burial cave*

Opposite the Chapel of the Crosses, at a distance of about 50 m., is a Nabataean burial cave; Rothenberg (1967: 116) mentions the burial cave opposite the chapel and another burial niche near it (Figure 13.24). In 2001, I excavated the site and found many items that illustrate the Nabataean occupation.<sup>8</sup>

<sup>7</sup> According to Rothenberg (1967: 116), the crosses in the cave post-date its cutting. He maintained that incisions and other marks that are similar to those found in the burial caves of Oboda were found on the walls and ceiling of the cave.

<sup>8</sup> The excavation was conducted on behalf of the Institute of Archaeology of the Hebrew University of Jerusalem (license no. 96/2001–2). Participating in the excavation were Y. Arbel, O. Ron and O. Misch-Brandl (area supervisors), J. Zias (anthropologist), G. Laron (photographer), D. Porotsky (surveyor), and guides of the En-Gedi Field School (excavators). Scholars who examined the finds were O.

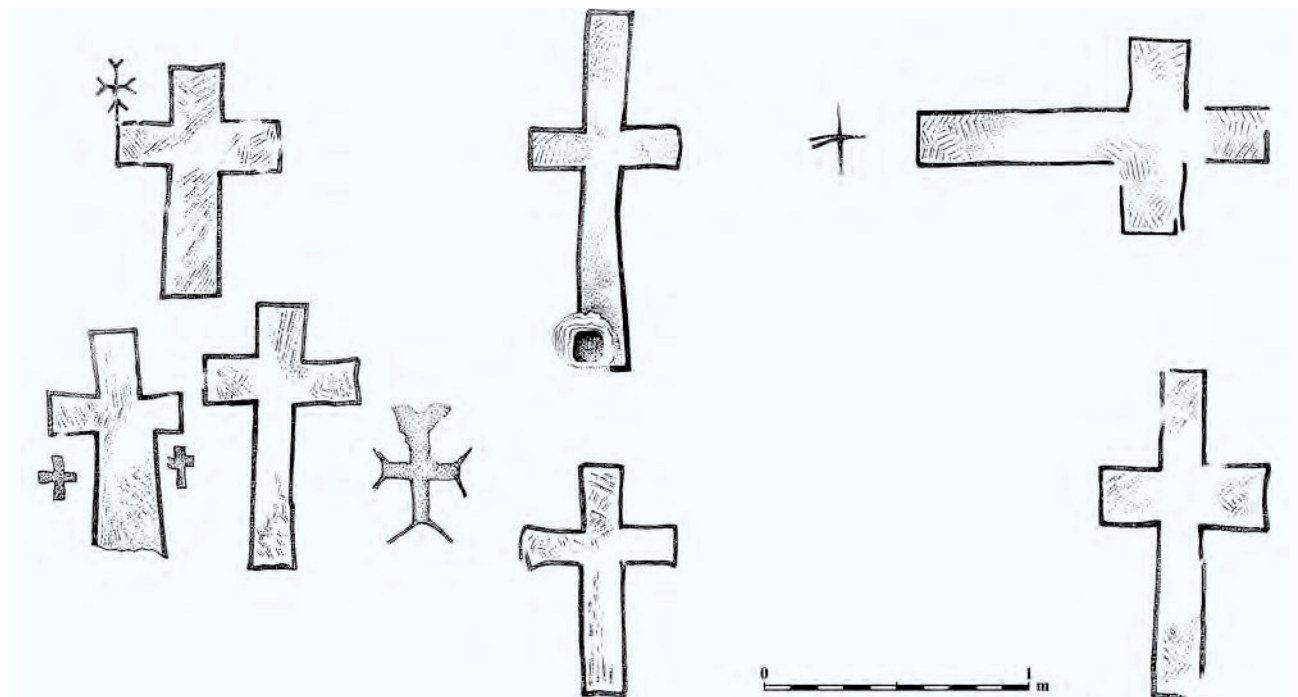


Figure 13.19: The crosses incised in the long eastern wall of the Chapel of the Crosses, photograph and drawing.



Figure 13.20: Lumps of salt found under the floor of the Chapel of the Crosses.

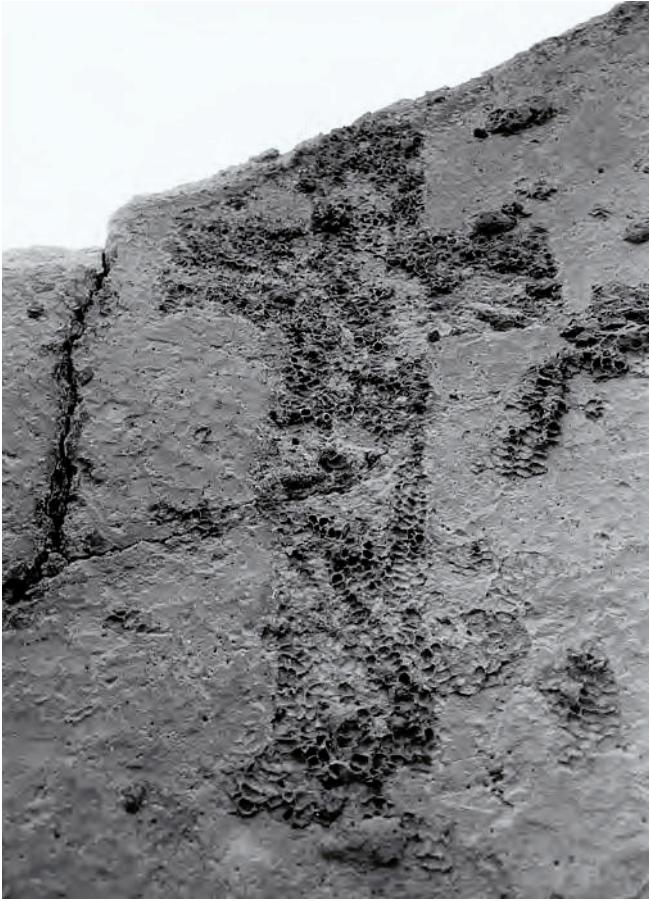


Figure 13.21: The cross incised at the top of the vault of the cave of the Chapel of the Crosses, looking south.



Figure 13.22: The cross incised in the long eastern wall of the Chapel of the Crosses, looking east. Note the lamp niche hewn in the base of the cross.



Figure 13.23: Proposed reconstruction of the Chapel of the Crosses in the Byzantine period (drawn by Anna Yamim).



Figure 13.24: The Nabataean burial cave (left) and another burial niche (right), looking south.

The entrance to the burial cave, carved in the soft marl, is through a small opening via three steps. The interior of the cave is relatively small (2.5 x 3 m.) and its height is only 1.5 m. (Figure 13.25). Burial niches hewn in the walls of the cave had been robbed before our arrival, but in the floor we found five sealed cist graves (Figure 13.26). The graves are hewn to measurements appropriate to the size of the deceased and covered with stone slabs, making it possible to return and use the site for family burial over several generations. This method of burial is typically Nabataean. A similar, though more elaborate, tomb is No. 825 at Petra, a rock-hewn family tomb dating from the mid-first century AD (Shaer and Aslan 1997). Like 'En Tamar, it has hewn burial niches, some in the floor and some in the walls.

The finds in the burial cave of 'En Tamar testify to its use from the first to the third centuries AD. Most of the pottery vessels (Figure 13.27) date from the first–second centuries AD. Among the glass vessels (Figure 13.28), the outstanding items are two transparent bowls decorated with facets, a small bottle decorated with concave marks, and a larger, round bottle decorated with etched stripes. The glass vessels are later than the pottery vessels and were dated to the second to third centuries on the basis of parallels from sites such as Dura Europos in Syria (Perkins 1963) and Karanis in Egypt (Harden 1936). The glass vessels were apparently deposited in the burial cave's last period of use and reflect the wealth of the family whose members are buried in it.

Shamir (textiles: cf. Chapter 14 in this volume), Y. Frankel (leather), N. Lipschitz (botany), Y. Gurin and S. Hadad (glass), A. de Vincenz, R. Bar-Nathan, J. Magness and T. Erickson-Gini (pottery), M. Ponting (metal), and D.T. Ariel (coins).

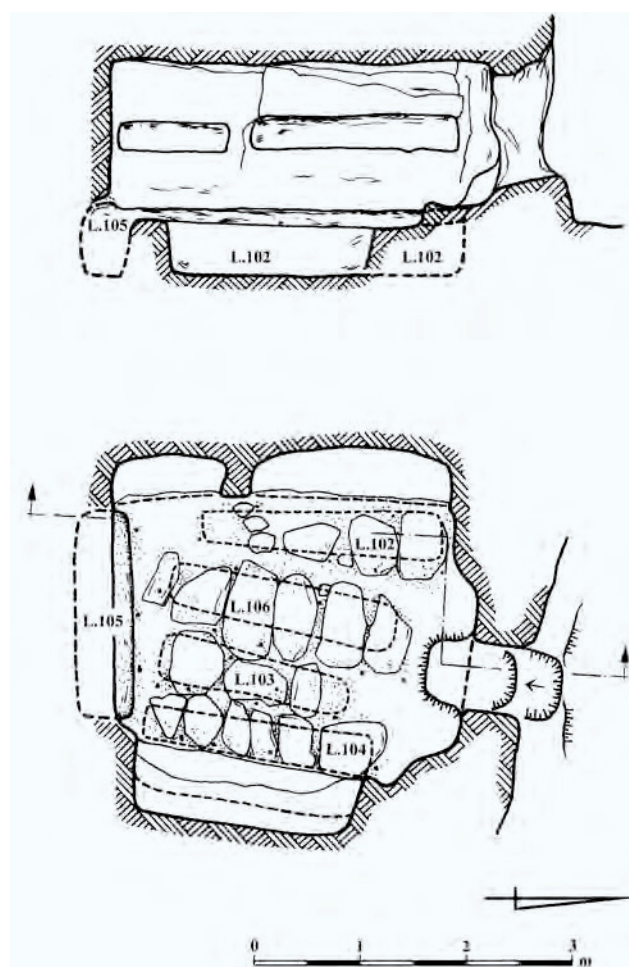


Figure 13.25: Plan and cross-sections of the length and width of the burial cave of 'En Tamar.

In the westernmost grave (locus 102) we found two articulated skeletons, of a woman and a man. Anthropologist Joe Zias of the Israel Antiquities Authority identified the woman as being about 30 years of age and relatively tall (1.72 m.), while the bones of the man indicate that he suffered from tuberculosis and died at the age of 20–25. In the grave were found linen shrouds, a small tin plaque (5.8 x 5.8 cm.) decorated with floral motifs, and various organic materials (leather scraps, coloured textiles, a twisted date palm cord and walnuts). The tin plaque was perhaps part of a mirror or some other decorative item (Figure 13.29:4). A similar object was found in the excavation of Herodium (Speransky-Marshak and Yuzefavsky 1998: 190–93; my thanks to Shula Hadad for drawing my attention to this object).

In the smaller grave (locus 103) was found the skeleton of a female adolescent aged 13, who suffered from a deformity of the skull. The skeleton was found wrapped in a linen shroud. On each of the girl's arms was a silver bracelet, one of them decorated with snakes' heads (Figure 13.29:5). The grave's size is appropriate to that of the skeleton and it appears to have been especially hewn for the burial of the girl. Beside the deceased were found a bronze spatula (16.6 cm. long) and a box made from the wood of *Colutea istria*, which grows in the region, containing a blue cosmetic powder (Figure 13.29:1). The quality of workmanship of the box is excellent, attesting to the skill of the local woodworkers.

In the third grave, on the eastern side of the burial cave (locus 104), we found three skeletons: one of a child aged 3–4, and beneath it those of a man aged 39–44 and next to him a woman aged 18–21. The man's height was estimated as 1.73 m. and that of the woman as 1.54 m. Close to the man's head was found an intact glass bottle of the second or early third century AD (Figure 13.30) that still contains a brown organic

material, apparently a precious fluid that had evaporated (Figure 13.31). It is likely that the bottle held perfume, as was common in that period; thus, for example, 10 glass perfume bottles were found in the Roman grave of the second to third centuries excavated in Amman (Hadidi 1982). The woman was wrapped in a linen shroud and near her were a silver earring, a gold-plated necklace, a bronze spatula intended for cosmetic use, and a bone pin (13 cm. in length) with two small holes at its end (Figure 13.32:1). The necklace was found complete on the neck of the woman (Figure 13.33). It is made of gold-plated beads and carnelian beads. The beads were strung on linen thread. The high quality of the necklace is indicative of the wealth of the deceased.

In addition, many organic finds were found in this grave, such as large pieces of leather, and linen textiles, sometimes decorated with wool bands, belonging to the shrouds. Among the finds was the leather sole of a sandal with bronze nails of the *caliga* type (Figure 13.34). Since Roman legionaries wore sandals of this type, it is not unlikely that the man served in the Roman army. In this context, we may note the grave of a Roman soldier from the fourth or fifth century that was found in the Lisan peninsula of the Dead Sea (Parker 1994). These finds are consistent with what we know from the sources about Roman army units stationed in Thamara and Zoar (Eusebius, *Onomasticon* 8, p. 14).

In the fourth grave (locus 106) were found the skeletons of a child aged 18–36 months, an adult man and an adult woman. The man was relatively old (over 40) and had lost his eye-teeth. The woman was younger (25–35) and about 1.47 m. in height. She was lying on her back in a fully extended position. By her right side were found *in situ* three cosmetic items: a glass perfume bottle, a fine-toothed comb made of boxwood, and a bronze spatula (Figure 13.36). The



Figure 13.26: The interior of the burial cave before and after opening of the graves, looking south.

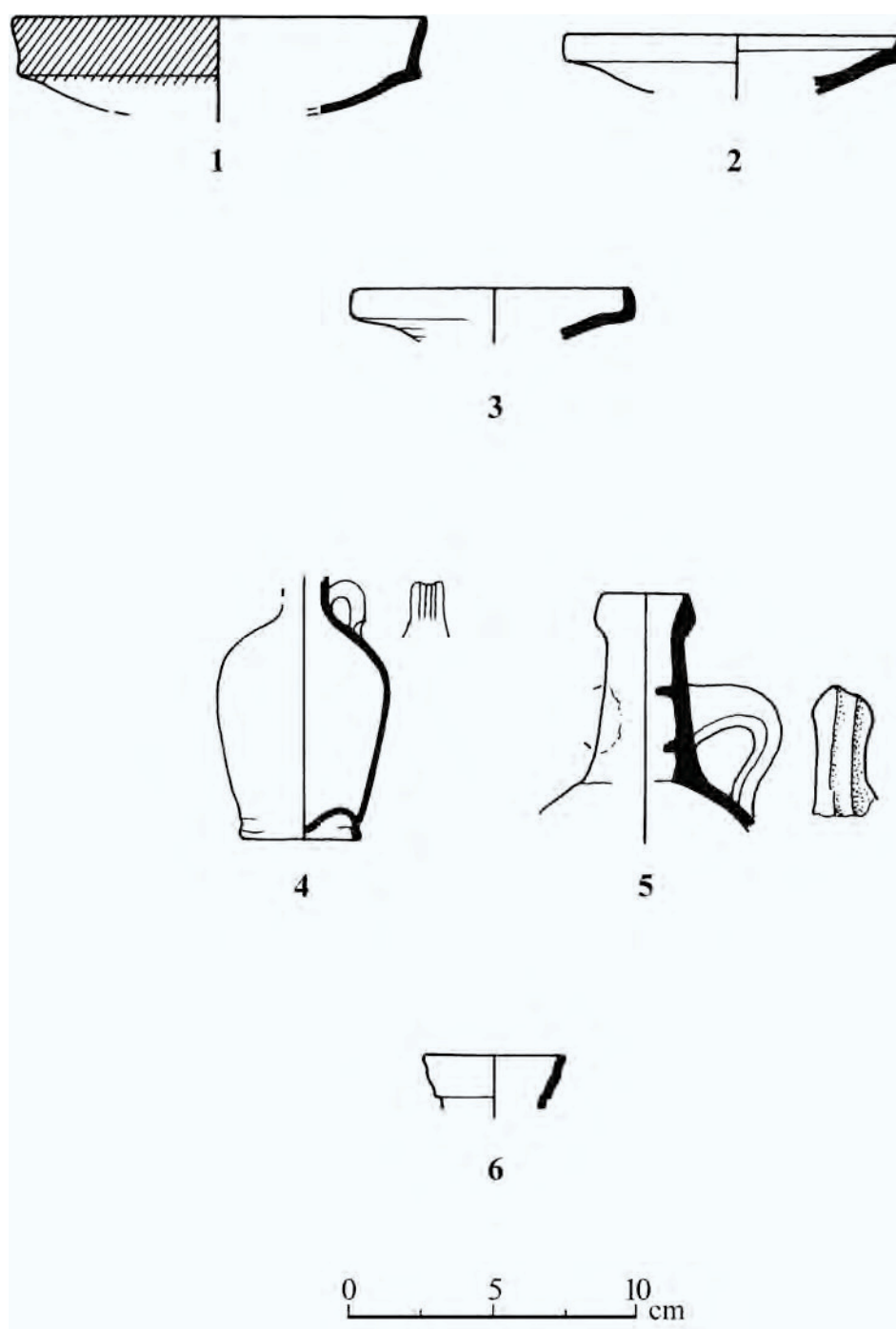


Figure 13.27: Pottery of the first to second centuries AD found in the burial cave of 'En Tamar.

woman was wrapped in a shroud made from panels of lambskin.

The fifth grave (locus 105), which is orientated east–west, yielded no finds.

The finds from the burial cave, dated to the first to third centuries AD, reflect the material prosperity of the settlement of 'En Tamar, which was exceeded in importance only by Zoar in the area south-east of the Dead Sea.

### Zoar: the City of Palms

Zoar, today's as-Safi, is located on the estuary of Nahal Zered (Wadi Hasa) south of the Dead Sea. In the Mishnah, Zoar is called 'the City of Palms' (Yevamot 16, 6), while Eusebius (*Onomasticon* 42, p. 31) describes it as a place in which balsam was grown. In the Madaba Map, Zoar is depicted as a city surrounded by a wall and towers, with a group of date palms near it (Blázquez 1999: 251). Medieval sources note that the indigo plants from which dye was manufactured, as

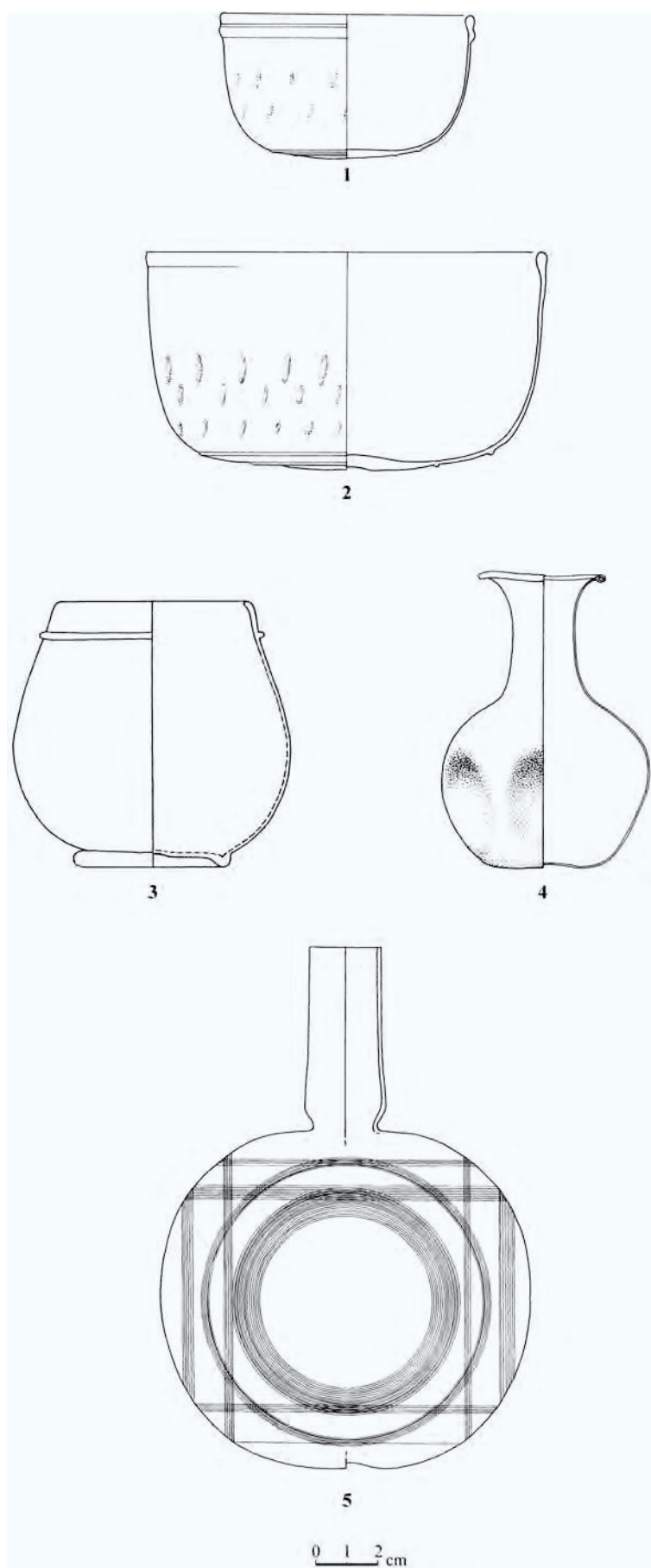


Figure 13.28: Glass vessels of the second to third centuries AD found in the burial cave of 'En Tamar.

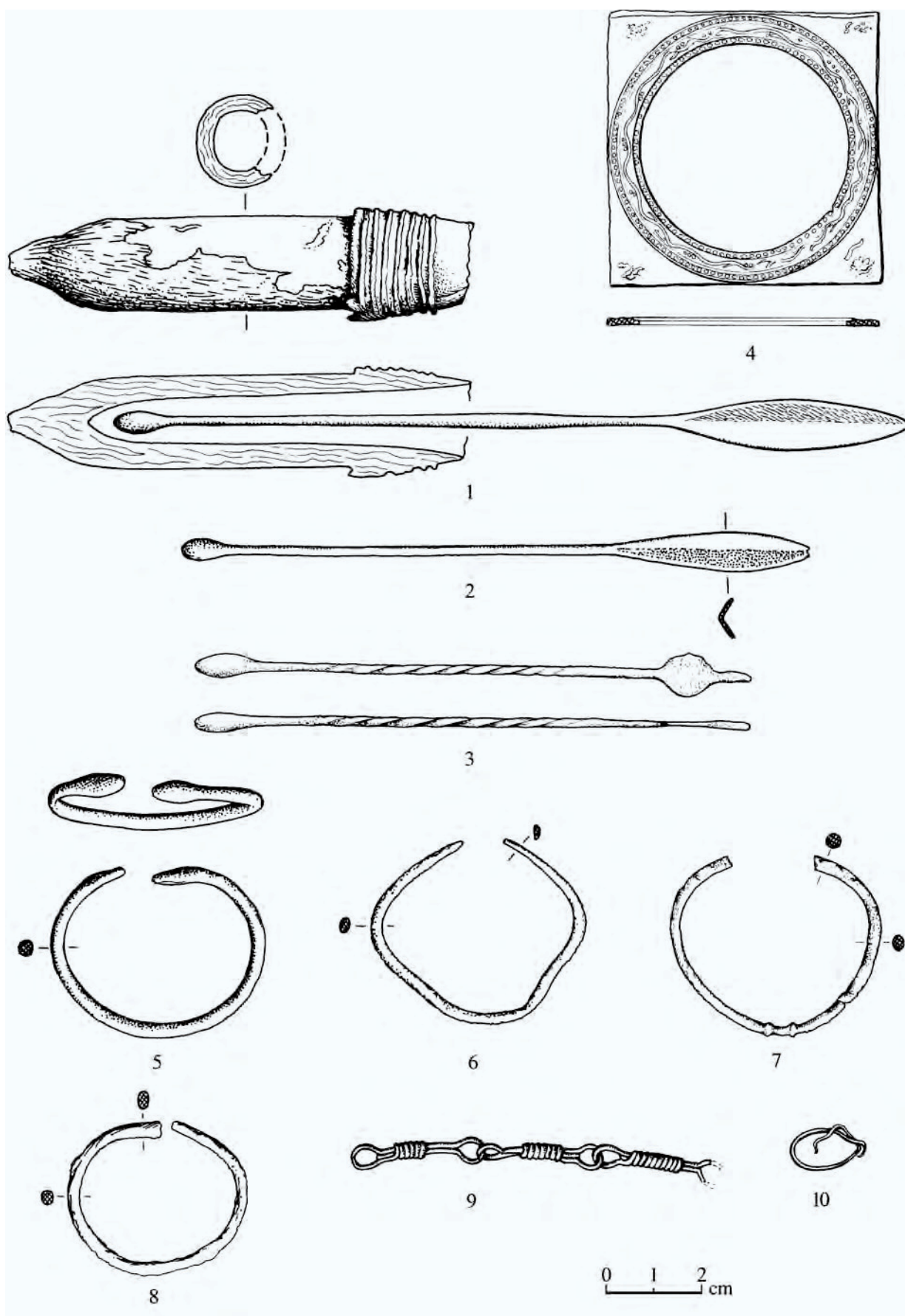


Figure 13.29: Various objects found in the burial cave of 'En Tamar.



Figure 13.30: The glass bottle as found in the burial cave of 'En Tamar.

well as excellent dates from which date honey was produced, grew in Zoar (Amar 1998).

Zoar was the main Nabataean city south of the Dead Sea. In the documents of Nahal Hever the region of Zoar is called 'the region of Eglathaim' (Lewis 1989: 20–21; Yadin *et al.* 2002: 8–9). This region includes the three settlements of the Lisan peninsula, Mazra'a, Khaditha and Sakhina. Mazra'a, in the north of the peninsula, is mentioned in the Nahal Hever documents as a settlement of Nabataeans and Jews. A cemetery that served all three settlements of the Lisan was recently discovered in the middle of the peninsula (Politis 1998a). The cemetery at the site called Khirbat Qazone includes more than 3,500 graves (Figure 13.37). All are shaft graves dug in the marl, of a type known from Qumran. In the bottom of each grave, on the eastern side, is a burial niche in which the body of the deceased was laid on his back with the head turned to the south, exactly as at Qumran. After interment, the niche was covered with mud bricks and the shaft above it was filled.

In an excavation carried out at the site by Konstantinos Politis, 24 graves were found. In these graves were the remains of skeletons of men, women and children wrapped in shrouds of leather or linen. Parts of the skin and hair of the deceased were still preserved on



Figure 13.31: The glass bottle containing evaporated remnants of perfume.

some of the skeletons. Finds included gold and silver jewellery, leather sandals, wooden vessels, and pottery and glass vessels of the first and second centuries AD. Five Nabataean tombstones were also found. As in the cemeteries of Jericho and En-Gedi, the finds of the cemetery of Khirbat Qazone reflect the good economic condition of the residents of the Dead Sea region in the period under discussion.

Another Nabataean settlement in the region of Zoar is Mahoza, which is repeatedly mentioned in the documents of Nahal Hever. Mahoza means 'port' in Aramaic (Cotton and Yardeni 1997: 152). It was recently suggested that Mahoza be identified with the site called Ghor an-Numeira, about 12 km. north-east of Zoar (Hadas 2002: 207). A large delta containing a natural anchorage was found there. The site includes remains of a Nabataean fort and a large Byzantine town (Waheeb 1996). According to the documents there was a mixed community of Nabataeans and Jews in Mahoza.

Excavations have not yet taken place in Zoar, but surveys conducted in the oasis have recorded its ancient remains (Politis 1998b). A large cemetery of the Byzantine period (fourth to seventh centuries AD) was found on the western bank of Nahal Zered. Thus far, more than 300 tombstones have been found, most of

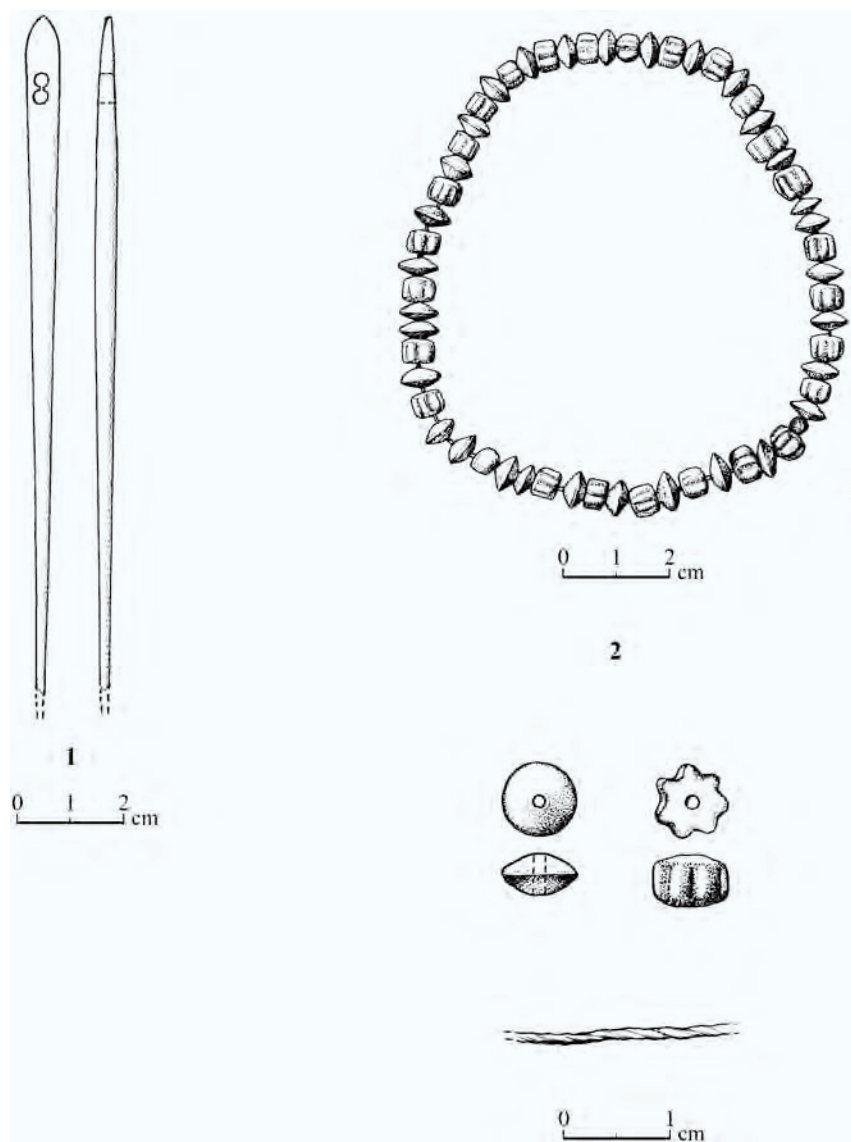


Figure 13.32: Bone pin and necklace found in the burial cave of 'En Tamar.



Figure 13.33: Necklace found in the burial cave of 'En Tamar.

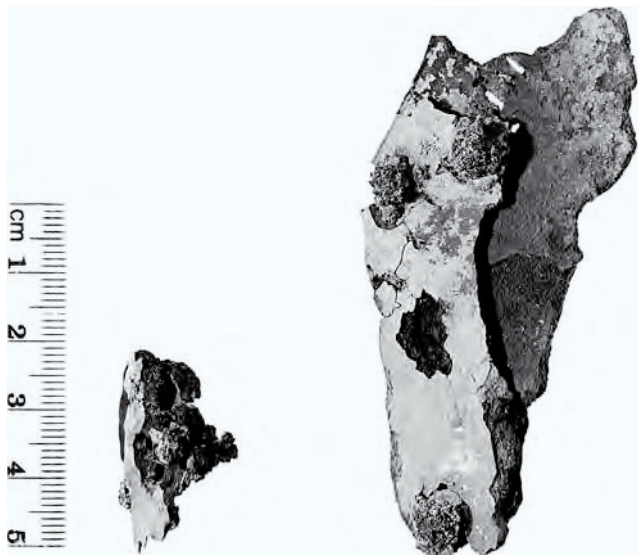


Figure 13.34: The sole of a sandal with metal nails (caliga) from the burial cave of 'En Tamar.

them inscribed in Greek but some in Aramaic, testifying to the existence of a thriving Jewish community alongside the non-Jewish population. The town itself is situated north of the cemetery in a site called Khirbat Sheikh 'Issa. The site includes remnants of buildings, a church, mosaic floors, and a wall. No remains of the Early Roman period have yet been found.

### Summary

The archaeological finds from the Nabataean sites south of the Dead Sea indicate the continuity of settlement from the Early Roman period (first century BC) to the end of the Byzantine period (seventh century AD). The Nabataean population of the region did not suffer from the dramatic events that afflicted the Jewish population in the northern sections of the Dead Sea, where the Jewish Revolt (AD 66–73) and the Second



Figure 13.35: Skeleton of an adult female lying in locus 106, looking north. Note the glass vessel by her right side.

Jewish Revolt (AD 132–135) greatly harmed the Jewish population and caused far-reaching demographic changes. In Jericho, for example, the Jewish population disappeared and a pagan population, which later became Christian, took its place. In the village of En-Gedi, Jewish settlement practically ceased to exist in the second century and signs of destruction and ruin are visible there. The village was re-established only during the third century.

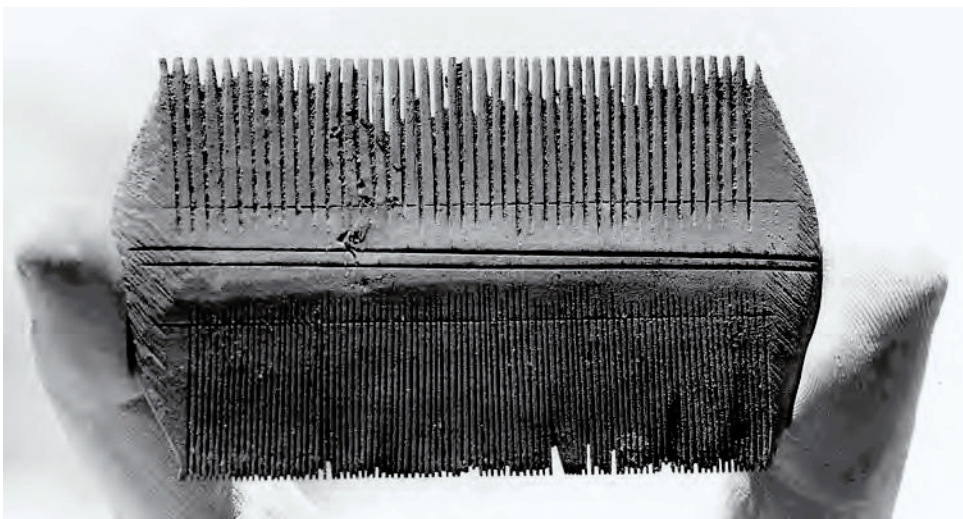


Figure 13.36: Comb found in the burial cave of 'En Tamar.



Figure 13.37: The Nabataean cemetery at Khirbat Qazone, looking north.

The finds at 'En Tamar, on the other hand, attest to continuous prosperity. The local Nabataean population benefited from the region's economy, based on dates, medicines and perfumes. The region first started to flourish in the late Iron Age, when the Arabs developed the perfume trade under the Assyrian Empire. The location of 'En Tamar and Zoar on the transport route along the Syrian-African Rift Valley increased their importance. Me'ad Gozal was apparently built by the Nabataean kings as a border fort close to the border between the Judaeans and the Nabataean kingdoms. In the Early Roman period, 'En Tamar became the most important Nabataean town south-west of the Dead Sea. The archaeological finds at the site help to identify it with 'Thamaro' in the Peutinger Map, also mentioned in the *Onomasticon* of Eusebius. At the same time, Zoar maintained its status as the main city south of the Dead Sea and as the regional capital. In the Byzantine period, Zoar became an important Christian centre and several monasteries were erected in its environs. The sources mention hermits who lived in the 'Desert of Zoar'. Zoar continued to exist even after the Arab conquest in the seventh century.

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## Textiles, basketry, cordage and fruits from 'En Tamar: preliminary report

*Orit Shamir*

Several hundred artefacts made of organic materials – textiles, basketry, cordage, leather, wood, fruits and seeds – were discovered in the burials at 'En Tamar (Figure 14.1) (for the excavations at 'En Tamar, see Hirschfeld, Chapter 13 in this volume, which provides the wider context for this chapter). These materials were preserved due to the arid climate of the region; however, it is very rare to find them in such a good state of preservation. The textiles, basketry and cordage from 'En Tamar should be seen in the context of similar materials from sites in the Wadi Arabah region dating between the first century BC and the eighth century AD (Shamir 2003). The function of these materials was mainly to transport goods such as perfumes, spices, pigments, precious metals, pearls and textiles along the trade route between Petra and Gaza.



Figure 14.1: Textiles before cleaning.

### Textiles

Most of the textiles are made of linen in plain weave technique. The threads are S-spun, which means spinning to the left (Figures 14.2–14.3).

There is a small group of linen textiles decorated with red woollen bands. This mixture of linen and wool, in Hebrew *Sha'atnez*, is interesting in view of the biblical prohibition of such a mixture which was allowed only to the high priest (Ex. 28:4ff., 39; Deut. 22:11; Lev. 19:19; Roussin 1994: 183)

They are seldom found in Israel, even at non-Jewish sites. The few examples include: Kuntillet 'Ajrud from the end of the ninth century BC – three examples explained as belonging to the high priest (Sheffer and Tidhar 1991), Wadi ed-Dâliyeh – three textiles belonging to Samaritan refugees (Crowfoot 1974: 60, 63).

They have not been found at sites occupied by Jews, e.g., Masada, Qumran, Cave of Letters, in contrast to Syria (e.g. Dura Europos and Palmyra, Pfister and Bellinger 1945: 25, no.256; Pfister 1934: 13; 1937: pls 2: C, 4:F), and in Egypt (Precker 1992: 144).

The red dye was probably obtained from madder (*Rubia tinctoria*), which was in common use in Israel and is still used today, for example in Turkey.



Figure 14.2: Linen in plain weave technique.

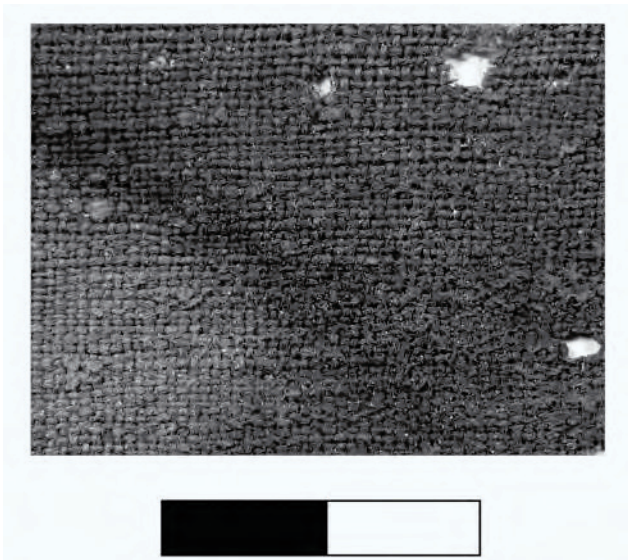


Figure 14.3: Linen in plain weave technique.

### Cordage

A few short cords were found in the burials. They are made of date-palm fibres.

### Fruits and seeds

Fruits and seeds include date-palms, nuts, olives and Egyptian Balsam (*Balánites Aegyptiaca*, Figure 14.4). The distribution of Egyptian Balsam is east and west Africa, Arabia, the Nile Valley and the Judaeen desert. The tree form is multi-branched with dark green leaves. Its green fruit is ellipsoid, up to 4 cm. long, with a hard stone seed.

In early times the tree must have had a wider distribution than today, since stones of its fruits have been found frequently in the ancient tombs at Giza, Thebes and various other sites in Lower and Upper Egypt.

The economic value of Egyptian Balsam has been known in Egypt since ancient times. Its most important product was the oil extracted from its kernel. The fruit pulp was eaten raw or made into cakes, and was also used in the preparation of an alcoholic drink. Different parts of the *Balánites* tree were traditionally used to treat a wide range of illnesses.

Placing seeds from these trees within burials conforms to Egyptian traditions.

At Qasr al-Yahud, near Jericho, the seeds were found in the hands of the deceased. Anthropological evidence indicates that these individuals were probably Egyptian and Nubian in origin (Zias 2002: 264).

### Summary

This research is only in its first stages, and hundreds of textiles have yet to be analysed and catalogued. At this stage we can come to the following conclusions:

### Materials

Half of the textiles found from the Roman Period in Israel are made of wool, and one-third are made of linen. The other materials are goat-hair and camel-hair textiles. Wool was dominant at Nabataean sites such as 'En Rahel (Shamir 1999), Mo'a, Qazra and Sha'ar Ramon (Shamir 2003). In Egypt linen was also the preferred material for burials from the First Dynasty onwards (Petrie 1909: 147–48; Murray 1910). This phenomenon (of linen in burials) has also been observed at 'En Gedi (Sheffer 1994).

This is in contrast to the Nabataean burials at Khirbat Qazone (Politis 1998; 1999; Shanks 1999). The site was originally located on the eastern shore of the Dead Sea and dated to the second century AD. Some of the textiles have features that point to the third century AD. The textiles are mostly made of wool (Granger-Taylor 2000).

### Origin

Linens may well have been of local Galilean, Jordan Valley or Beth Shan production (Safrai 1994: 155–58).

### Spinning

S-spun threads have been typical of Israel and Egypt for thousands of years.



Figure 14.4: Seeds of Egyptian Balsam (*Balánites Aegyptiaca*).

### Weaving

Plain weave was still the commonest weave in the Near East during the Roman period. The textiles from 'En Tamar are not warp-faced like the linen textiles from Egypt.

### Looms

The warp-weighted loom went out of use in the region at the end of the first century AD, when the vertical two-beam upright loom became popular (Shamir 1994: 277; 1996).

### Decoration

The typical decoration of the Roman period in Israel are bands, usually ornamenting tunics by flanking the neck opening, descending from the shoulders, on the back and front (in Latin *clavi*).

In certain periods band widths designated the rank of the garment wearer, for example Roman senators wore tunics with wide *clavi*. However, in the time of Bar Kokhba this mark of status had lost much of its value, and Pliny (*Natural History* 33, 29) bitterly complains of the difficulty in distinguishing senators by the width of their *clavi*, as even those who were not entitled to them wore such tunics (Bergman 1975: 41–42; Yadin 1963: 207, 218–25; Pfister and Bellinger 1945: 12–15, pls 5–7). The lack of distinction in the width of the *clavi* in later periods is clearly evident in the drawings of tunics from Egypt and Dura Europos, and in Early Christian mosaics (Bergman 1975: 41–42; Yadin 1963: 207, 218–25; Pfister and Bellinger 1945: 12–15; Goldman 1994).

### Use

Shrouds from the Roman period have been found at Akeldama (Jerusalem, personal observation), 'En Gedi (Hadas 1994) and Jericho (imprints of textiles found on bones and skulls: Hachlili and Killebrew 1999: 169). The material used was probably linen because of the equal number of threads in the warp and the weft. Shrouds have been found at Nahal David and Se'elim, but the material is unspecified (Aharoni 1961: 19; Avigad 1962: 182–83). None of the other sites such as Mamshit, Wadi ed-Dâliyeh and Wadi Murabba'at mentioned by Hadas (1994: 56) has yielded shrouds.

At the Khirbat Qazone cemetery reused textiles such as tunics, mantles and scarves were used as shrouds, and exhibit a range of repairs, in particular patching. There is a small number of items that were made specifically for burial, e.g. decorated leather shrouds in seven burials, and a textile shroud made of linen that had not been previously used or washed (Politis 1998; 1999; Shanks 1999; Granger-Taylor 2000).

The textiles of 'En Tamar do not show evidence of sewing or signs of reuse, and may have been made specifically for burial.

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# The Rujm Taba Archaeological Project (RTAP): results of the 2001 survey and reconnaissance

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## Introduction

The Rujm Taba Archaeological Project (RTAP) conducted a preliminary survey and reconnaissance of Rujm Taba in August 2001. The project was inspired by previous research and fieldwork in and around the site undertaken during the 1990s by the Southeast Arabah Archaeological Survey, directed by Andrew M. Smith II. Three main archaeological components of the site were identified: a large building identified by previous researchers as either a caravanserai or fort; a village consisting of 22 features, many of which represent separate structures; and a large necropolis containing numerous tombs. Both the caravanserai and village date from the Nabataean/Early Roman period and have the potential to provide excellent stratified deposits unspoiled by later occupation; however, both areas are in immediate danger from natural and human destruction. RTAP intends to conduct further investigation of the site in the future.

## Site location and regional environment

The site of Rujm Taba is located in the heart of the Wadi Arabah valley of southern Jordan, 41.5 km. north-east of Aqaba and 4 km. south of the village of Rahma (Figure 15.1). The remains straddle the modern Dead Sea Highway, approximately 1 km. north of the Taba mudflats and to the south-east of a large sand-dune field. The well-known landmark and important regional water source known as 'Ain Taba lies along the road some 3.5 km. to the south. In antiquity, the site served as a way station on the major Nabataean route that ran northward along the eastern escarpment of Wadi Arabah from Aila<sup>1</sup> (modern Aqaba) to the south-east coast of the Dead Sea.

Geologically, the Taba region is part of the Pre-Cambrian Aqaba Granite Complex, a hard and jagged component of the Great Rift Valley (Bender 1974: 25), which extends along the entire length of Wadi Arabah

and, due to subsurface discharge, gives rise to some springs on the eastern side of the valley (Burdon 1959: 23, 58). More specifically, the site falls within the Rahma Foliated Suite (McCourt *et al.* 1990: 26–27), of which the Taba Monzogranite Unit makes up the largest portion (Rabba *et al.* 1988: 19–20; Ibrahim 1991: 31–32).

The climate is arid and hot in the area around Taba. During the summer, the mean maximum temperature is 39° C, although it can often get as hot as 47° C; during the winter, the mean minimum temperature is 11° C, but temperatures during the desert night can often be as low as 2° C (al-Eisawi 1996: 117; Rashdan 1988: 4; Ibrahim 1991: 3–4, table 1). Rainfall is mostly limited to the winter months and averages between 50 and 100 mm. *per annum*; however the region is so arid that evaporation measurements of up to 5000 mm. can occur annually (Rosenthal *et al.* 1990: 340). In recent years, there has been little or no rainfall in the southern Wadi Arabah.

There are three types of soil present at Rujm Taba: mudflats, *hammadas*, and sandy soils. A mudflat (Ar. *sabkha*) is a place in the desert where water accumulates and the soil is made up of very fine sedimentary particles – mainly clay and silt; when the water evaporates, the result is a crusted surface that retains some of its water (al-Eisawi 1996: 101). Local inhabitants continue to dig shallow pits and wells at the edge of the alluvial fans along the eastern boundary of the Taba mudflats, where the groundwater is easily accessible. *Hammada* soils, often referred to as Grey Desert Soils, cover some 50% of the region; they are gravelly, consisting for the most part of flint, basalt and limestone (Burdon 1959: 20). At Rujm Taba, *hammada* soils are generally found to the west of the modern highway between the mudflats and the dunes. Sandy soils make up nearly a quarter of the Arabah valley. The movement of sand dunes can often cover archaeological remains in the region (Smith 1995: 28). A large dune field is gradually encroaching on Rujm Taba from the north-west. Although it has not yet engulfed any of the structures mentioned by previous visitors, some ancient architectural remains may already have been subsumed in the sand. As none of the aforementioned soil types are conducive to extensive plant life, the vegetation in the

<sup>1</sup> Parker 1997: 21. By agreement of the two archaeologists working in Aqaba, the Nabataean/Roman/Byzantine site is referred to as Aila, and the Islamic fort and surrounding areas are known as Ayla.

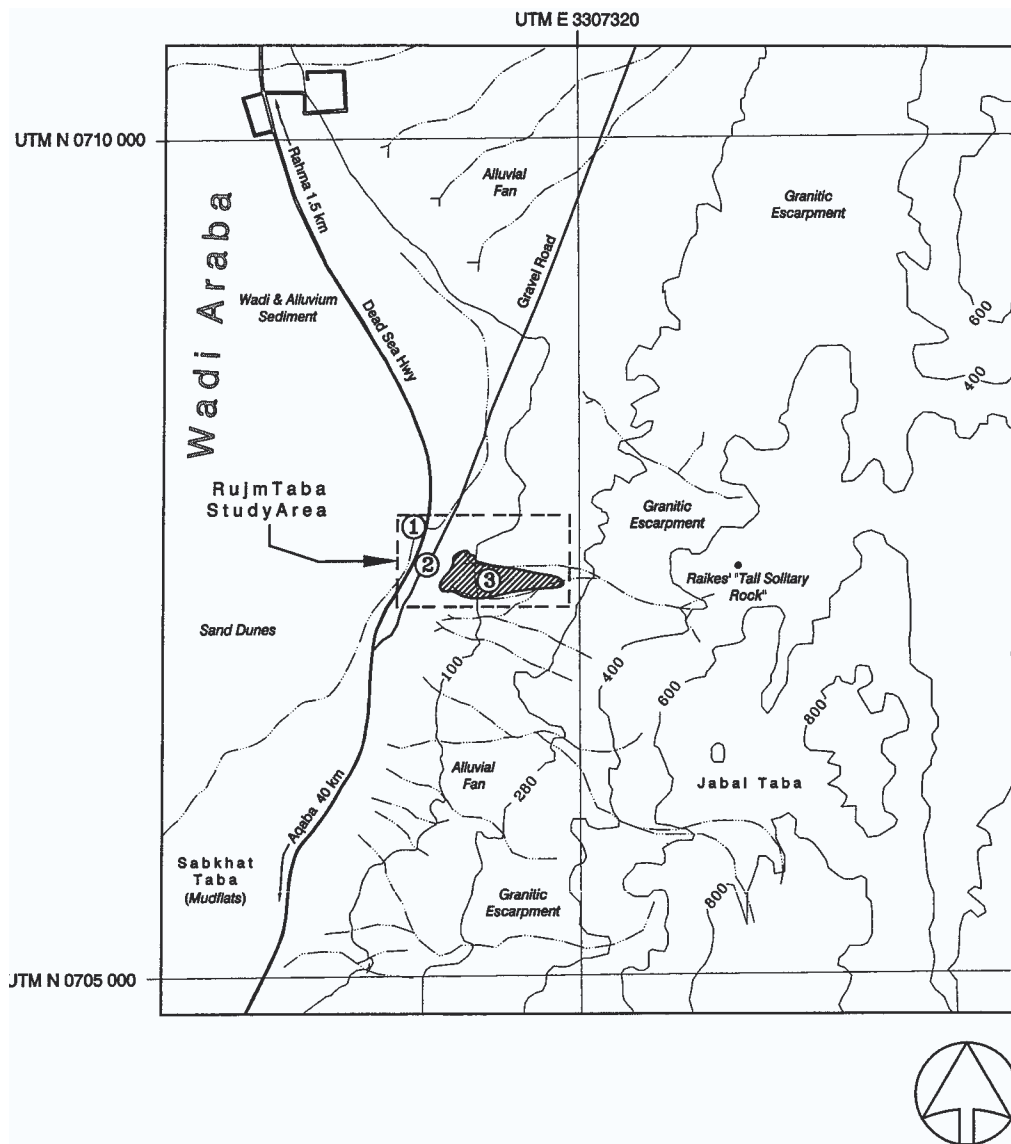


Figure 15.1: Map showing the RTAP 2001 survey area and the regional environment surrounding Rujm Taba (by S.C. Fraser).

area is made up of only some 50 different species of desert shrubs, low bushes, and acacia trees (al-Eisawi 1996: 96–121).

In addition to the soil types mentioned above, the steep sides of the Arabah are studded with rocky alluvial fans (Ibrahim 1991: 85–86). Created by the swift-flowing flash floods of the winter season, they are composed of boulders and cobbles carried down from the heights. The archaeological site at Rujm Taba is located along the base of a rounded alluvial fan radiating from the eastern escarpment of the Wadi Arabah. Most of the village is located on the slightly higher and more stable ground between two major streambeds on the slope of the fan. While the setting may seem treacherous, the ancient inhabitants presumably took measures to safeguard the settlement from sudden flooding. In addition to the plentiful

supply of water near the site, the granitic field of the fan provided a large quantity of relatively uniform and easily accessible building stone.

### Previous research

Rujm Taba completely escaped the notice of the ancient Greek and Latin authors, who fail to mention it either directly or indirectly. The site remained essentially *terra incognita* until it was visited by an 1883 expedition of the Palestine Exploration Fund, which camped there temporarily (Kitchener 1884: 210). The expedition provided useful information about the flora and fauna found in the immediate environs of Taba (Hart 1885: 252–54; 1891: 30–32); many of the animal species present in the region at that time have since been hunted out of existence.

In September of 1902, the great Czech scholar Alois Musil visited the area of Rujm Taba. He described the spring of Ain Taba (Musil 1907: 1.17, 20, 253, 256; 2.190–91, figs 138–39), but failed to mention any of the archaeological remains at the site.

Fritz Frank, who surveyed the Wadi Arabah between 1932 and 1934, compiled the first detailed catalogue of archaeological sites in the region. This survey included a compendium for each site of all extant architectural features, inscriptions and pottery. During his visit to Rujm Taba, Frank (1934: 238) provided the first detailed description of the site:

‘Am Ostrand der *‘araba* angekommen wandten wir uns nach Süden und erreichten un 10 Uhr die Ruinen von *‘en taba*, etwa 6 km. von *wadi darba* entfernt. Die Ruinen liegen unmittelbar am Fuß des Gebirges auf einer Geröllhalde, bedecken eine Fläche von 200 zu 100 m und bestehen aus rohen Granitblöcken; südöstlich von ihnen ein Friedhof, 300 m nördlich noch ein Ruinenhügel. Alles ist sehr zerfallen; ich sah feine alte Keramik...’

[‘We arrived at the eastern escarpment of the Araba and turning south...we reached the ruins of En Taba, approximately 6 km. away from Wadi Darba. The ruins consisted of rough granitic blocks and are situated on a slope immediately at the foot of the mountain range, covering a surface area from 200 to 100 m.; south-east of that [was] a cemetery, and 300 m. to the north was a ruin mound. All is in a ruinous state...I saw fine ancient pottery...’] (Frank 1934: 238).

Frank was therefore the first to identify the archaeological components at Rujm Taba. The ‘rough granitic blocks’ he referred to as being on the slope of the escarpment were no doubt the remains of the Nabataean village, as confirmed by the RTAP team. The necropolis mentioned by Frank may indeed extend a considerable distance to the south of the village, but only the easternmost portion of it was investigated by RTAP. In addition, the ruin mound to the north of the village cited by him most certainly represents the extant architectural features of the Nabataean caravanserai, although it is in reality about half the distance from the edge of the village than the 300 m. offered by Frank. Finally, the fine ware pottery that he referred to was most likely the Nabataean painted and unpainted fine wares that he noticed frequently throughout his travels in the Arabah valley. After Frank’s visit, however, Rujm Taba once again faded into obscurity and was not even visited by Nelson Glueck during his extensive surveys of the region.

Thomas Raikes reported the remains of a ‘Nabataean Fort and Village’ at Rujm Taba (Raikes n.d.: 14–15; 1985: 100), just 4 km. south of the petrol station at

Rahma (Khouri 1988: 129), during his surveys associated with road construction in the Wadi Arabah during the years 1967–69 and 1975–79. He also noted the presence of thin Nabataean pottery there, confirming the previous work of Frank.

The most important and comprehensive investigation of the archaeological remains at Rujm Taba has been the fieldwork of the Southeast Arabah Archaeological Survey (SAAS), under the direction of Andrew M. Smith II, a component of the Roman Aqaba Project that began as the Southeast Arabah Archaeological Reconnaissance (SAAR) in 1993. The archaeological remains at Rujm Taba correspond with SAAR sites 17–19 and SAAS sites 135–136 (Smith and Niemi 1994: 478–79; Smith 1995: 45–47, 117, pl. 2; Smith *et al.* 1997: 57–58). Although the focus of his research was broader, with a more regional emphasis, Smith described the extant architectural remains and pottery found there and also stressed the endangered nature of the site, due to both bulldozing activities associated with highway construction and local vandalism (Smith and Niemi 1994: 478–79).

## Objectives of the RTAP 2001 field season

The objectives of the first season of archaeological reconnaissance at Rujm Taba were: 1) to locate and describe the site in greater detail than had been possible for survey projects with a broader, regional emphasis; 2) to ascertain the physical extent of the site as well as to delineate its major features; 3) to conduct intensive surface collection in order to obtain a large body of representative, datable cultural material; 4) to assess the impact of human activity and natural processes on the integrity of the site; and 5) to ascertain the feasibility of further archaeological research at Rujm Taba.

## Methodology

### *Master site grid*

As a preliminary measure to facilitate future work at the site, the team established a permanent site datum (Figure 15.2) along the western side of the highway. The datum formed the origin for an infinitely expanding grid aligned on the UTM grid and corrected for magnetic declination.<sup>2</sup> The four quadrants of the grid

<sup>2</sup> The RTAP datum coordinates are as follows: UTMN 0705502, UTME 3307308, elevation 75 masl ±3 m. According to the 1997 Arabic version of the *Wadi Rahma (3049.IV) Topographical Map* produced by the Royal Geographic Center, magnetic declination was approximately 4° 0′ 8″ East in 1997, and has moved 3′ 2″ east each year since then.

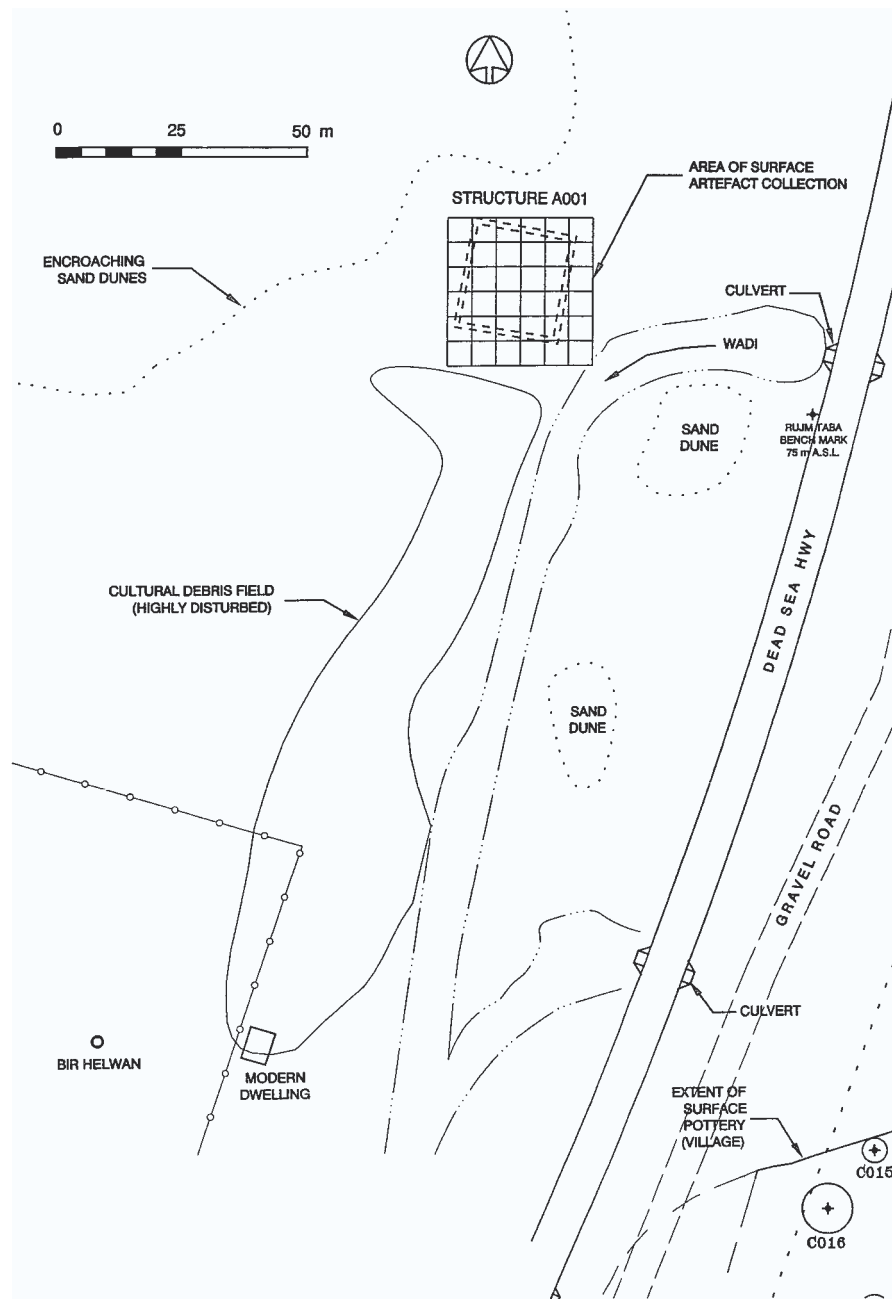


Figure 15.2: Plan showing the RTAP permanent site datum on the western side of the Dead Sea Highway and Structure A001, the Nabataean caravanserai (by S.C. Fraser).

were labelled: A, north-west of the datum; B, north-east of the datum; C, south-east of the datum; and D, south-west of the datum. The main grid was further subdivided into 5 x 5 m. squares. Each may be labelled according to its quadrant and its E-W and N-S distance from the datum (Field, x-coordinate/y-coordinate). Thus square C006/045 occupies an area 25–30 m. east and 225–30 m. south of the datum. The 5 x 5 m. square size was chosen to conform to any future excavation, which would be conducted on that module.

### Surface collection

It is well established that the results of surface artefact collection may not reflect accurately all periods and

types of human occupation at a site, but they remain the most useful assessment of a site without excavation. During this preliminary reconnaissance and survey, two blocks of 36 5 x 5 m. squares were selected for intensive surface collection. The first encompassed the entire caravanserai, Structure A001 (Figure 15.2); the other was an area selected within the apparent central portion of the village (Figure 15.3). The goal of intensive collection in these two areas was to obtain a body of datable material, which would be large enough to better understand the occupational history of the site. In addition, the choice of two areas from different parts of the site permitted comparisons between them in terms of quantity and type of artefacts in the hopes of assessing the probable function of each area.

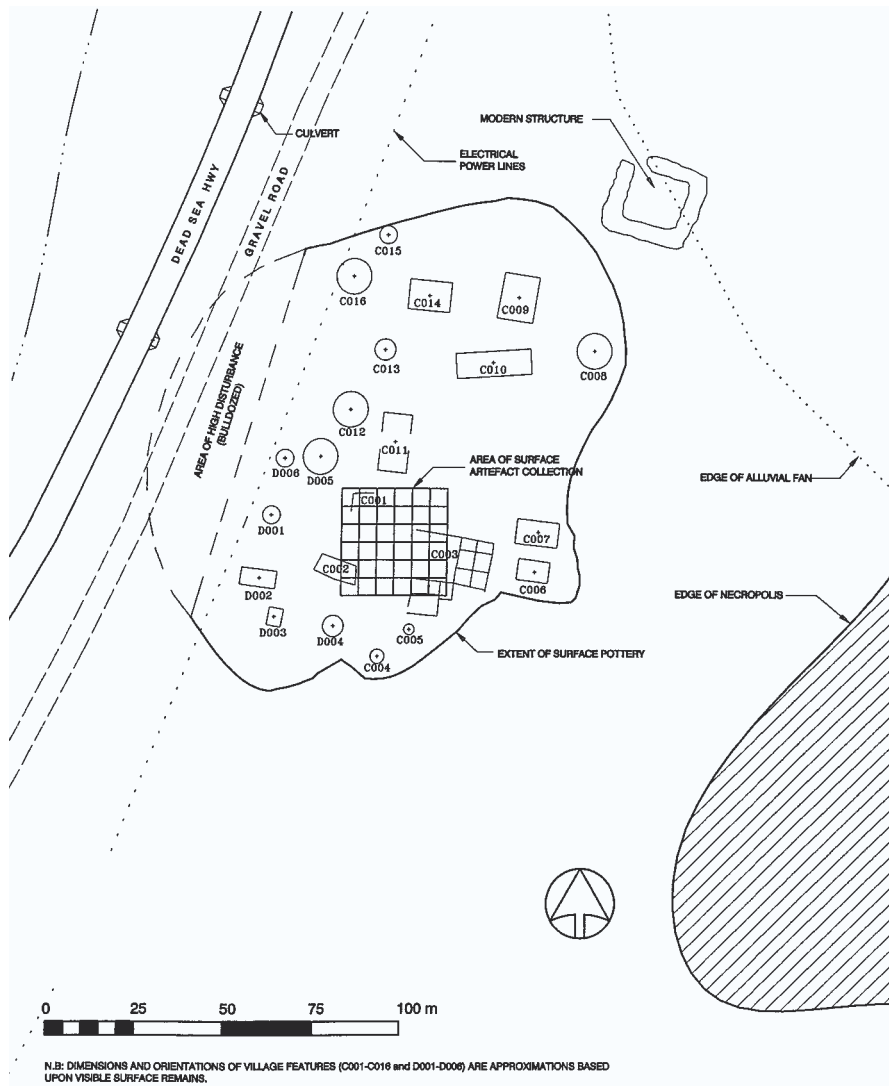


Figure 15.3: Plan showing the Nabataean village and its features, located on the eastern side of the Dead Sea Highway (by S.C. Fraser).

The artefacts were collected and labelled by individual 5 x 5 m. squares. Only diagnostic artefacts were collected. For the purposes of this survey, diagnostics were defined as: all rims, bases and handles; all

painted and unpainted fine wares; all imported wares; all metal and glass; and any non-local stone. Bone and shell were not collected from the surface. The results of the surface collection are discussed below.



Figure 15.4: General view of Structure A001: view from the north (photo: R.J. Cook).

## General site delineation

### Structure A001

The various components of the site were delineated by walking the landscape. Structure A001, the Nabataean caravanserai, is located 55 m. west of the modern highway in a broad, flat area of *hammada* soil, between a small but dynamic wadi and the dune field. Located some 150 m. to the south-east is a major local water source. According to an informant, the structure is known locally as Bir Hilwan. The probable extent of the caravanserai was determined by examining its remaining architecture and the irregular topography, and by estimating the size of its surface scatter.

Structure A001 (Figure 15.4) is roughly square, measuring approximately 20 x 20 m., and has at least four internal rooms. The entire building seems to have been constructed of the pink, grey and white granite that is plentiful in the nearby alluvial fan. It is preserved to an average height of at least 1.25 m. above the desert floor, but in some places – i.e., the north-west corner – the extant architectural remains rise to more than 2 m. Crude wall lines (Figure 15.5) and the remains of an internal corner were visible in the south-west portion of the structure, but attempts to clean the tops of the walls and establish precise wall lengths and widths were



Figure 15.5: West wall line of Structure A001: view from the south (photo: R.J. Cook).



Figure 15.6: Preserved course of masonry from the south wall of Structure A001: view from the east (photo: R.J. Cook).

frustrated by the decomposition of the top course of masonry, which had become highly friable due to weathering. Where a second course of stone was visible, it seemed to be much better preserved (Figure 15.6).

The architectural plan of Structure A001 exhibits all the elements typical of a Nabataean caravanserai, with clear parallels coming from elsewhere in the Wadi Arabah valley and in the Negev desert. The Nabataeans seem to have preferred caravanserais that were either square or nearly square. These consisted of a large, central courtyard surrounded by a series of rooms measuring between approximately 3 and 5 m.<sup>2</sup> situated along the interior of the outer walls (Figure 15.7). Many of these

structures had staircase-towers, a common feature in Nabataean architecture.<sup>3</sup> It has been suggested that 'debris pushed forward by [a] bulldozer gives the false impression of a northwest corner tower' (Smith 1995: 46) on Structure A001, but our examination of the extant architectural remains of that corner suggests that it may indeed be a square tower, similar to that from Phase 3 at the Nabataean caravanserai of Horvat Dafit (Dolinka

<sup>3</sup> See Negev 1973 for Nabataean staircase-towers at Mampsis and Oboda. They are also present at the caravanserais of Sha'ar Ramon and Mo'a, and at the Nabataean fort of Horvat Ma'agora in the central-western Arabah (personal communication T. Erickson-Gini).

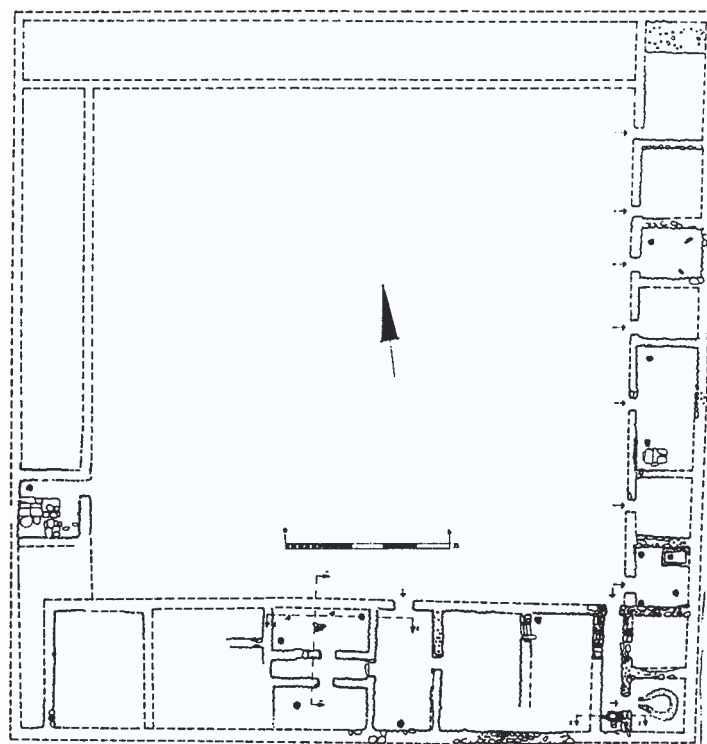


Figure 15.7: Plan of the Nabataean caravanserai at Sha'ar Ramon in the south-central Negev (from Cohen 1982: 88).

forthcoming), which represents the closest architectural parallel to Structure A001 and is situated only 14 km. to the south-west of Rujm Taba.

Nabataean caravanserais<sup>4</sup> generally measured from approximately 16 to 42 m.<sup>2</sup> and are almost always located on level ground. They often offered such amenities as 'bathtubs' and cooking installations, such as that at Sha'ar Ramon (Figure 15.7) in the south-central Negev (Cohen 1982: 88), and were large enough to accommodate groups of travellers with a relatively small caravan of camels. Of particular interest is the fact that those which have been excavated on the western side of the Wadi Arabah and in the Negev all seem to have been constructed during the first century AD, although many were often occupied after the Roman annexation of Nabataea in 106 AD (personal communication T. Erickson-Gini). Structure A001 at Rujm Taba therefore fits all of the criteria for a Nabataean caravanserai: it has the right size, shape and layout; it is located on level ground; and the surface pottery from the RTAP 2001 Survey and Reconnaissance (see below) strongly supports a date in the first century AD for its construction.

<sup>4</sup> For Nabataean caravanserais in the western Arabah and Negev, see the following: Cohen 1982, for Sha'ar Ramon; Cohen 1982a, for Mo'a; Cohen 1982b, for Neqarot; Cohen 1984, for Be'er Menuha; Cohen 1984a, for 'En Tamar; Cohen 1984b, for Har Massa; and Cohen 1984c and Dolinka forthcoming for Horvat Dafit. For Nabataean caravanserais and forts from the eastern Wadi Arabah see the following: Smith and Niemi 1994; Smith 1995; and Smith *et al.* 1997.

### *The village*

The general boundaries of the village were located by walking transects across the site until surface ceramics and architectural remains were no longer visible. The village (Figure 15.8) occupies an area of 1.17 ha and rises from 73 m. ASL to 86 masl (metres above sea level) at its easternmost limit. The team mapped the centre of each probable architectural feature and estimated its physical extent (see Figure 15.3 above). In total, 22 such features were documented (C001–016, D001–006), making the village much more substantial than previously thought. While 11 of these features likely represent separate structures, the other features may well be smaller components of much larger buildings.

Feature C003 (Figure 15.9) was partially located within the area of surface collection for the village and was examined in greater detail. It measures some 22 x 23 m. and consists of at least 10 discernible rooms, including a courtyard. It appears that the nearby Feature C002, which lies directly to the west of C003, may indeed be a component of the larger structure. The exterior walls of C003 measure about 1 m. in thickness, and the interior walls of the complex are between 70 and 80 cm. thick. It has been suggested (personal communication S. Fakhiry) that the architectural remains of C003 bear a remarkable resemblance to the East and West Complexes at Wadi Ramm, re-excavated in the late 1990s (Tholbecq 1998; Dudley and Reeves 1997, 1998). The architecture of C003 and its relationship with structures at other Nabataean sites warrants further investigation.



Figure 15.8: General view of the Nabataean village: view from the west (photo: R.J. Cook).

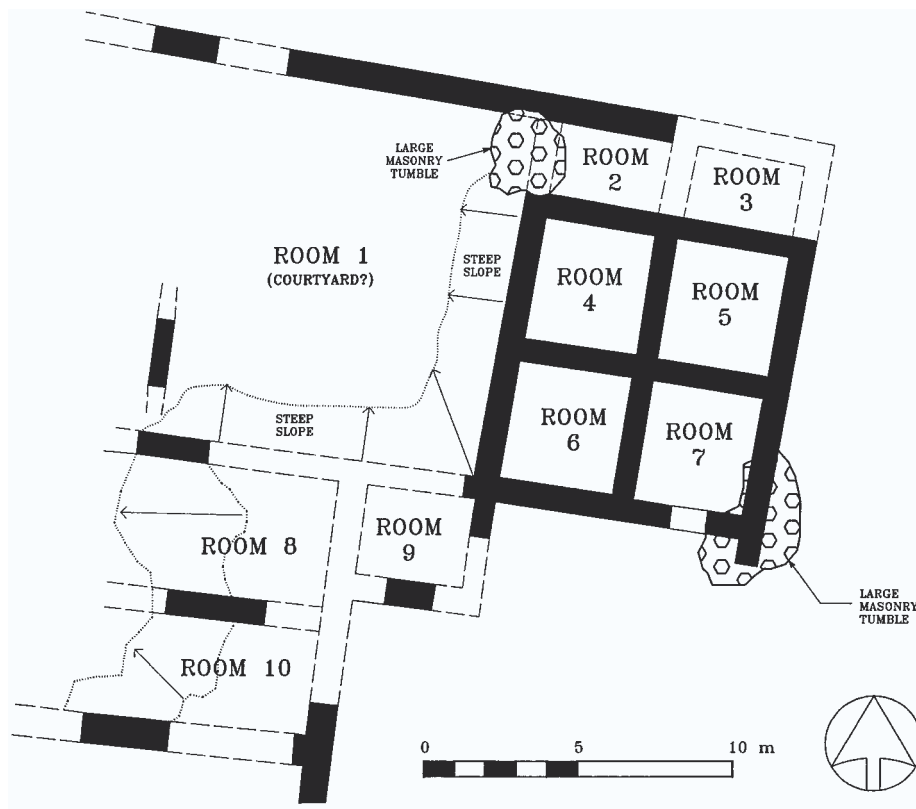


Figure 15.9: Sketch plan of the surface walls from Feature C003 in the Nabataean village (by S.C. Fraser).

In addition to the pottery collected from the village, the following were also found: fragments of two imported basalt grinders; a spouted mortarium made from local stone (Figure 15.10); two sherds of Roman glass dating from the mid-first and second centuries AD, respectively (personal communication D. Keller); and a Nabataean bronze coin of Rabbel II, dating to

AD 90/91 (Meshorer 1975: 76–78, 110, no. 153), which was found in the village just outside of the surface collection area (D005/043).

Preliminary analysis of the artefact distribution from the surface collection in the village has revealed the presence of at least one area that was devoted to food

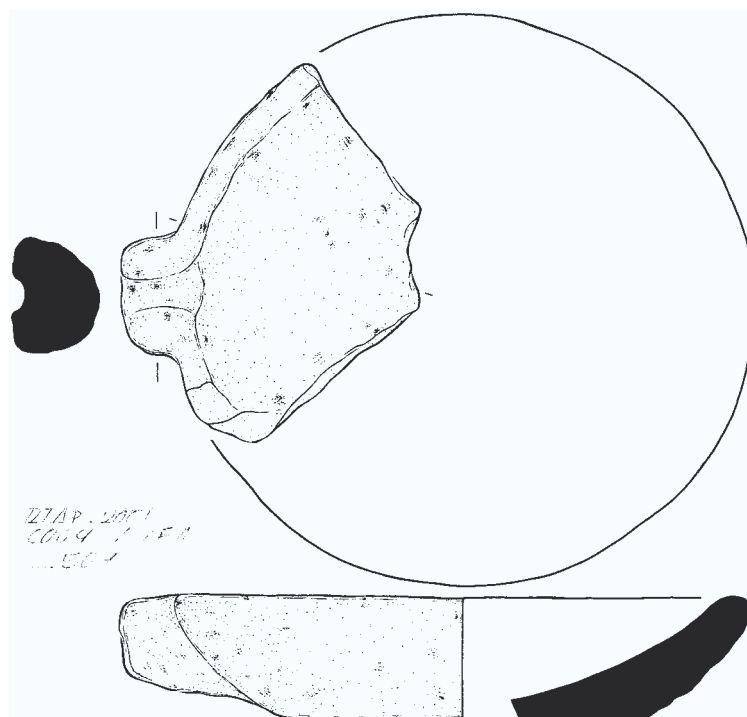


Figure 15.10: Spouted mortarium made from local stone, found within the area of surface collection for the village (drawing by Q. Twaissi).

preparation and cooking activities. In the sector delimited by squares C002/048–049 and C003/048–049 an imported basalt grinder, a mortarium rim, several sherds (including handles and a base) from a Nabataean cooking pot, and a *tabun* fragment were found. It is hoped that future intensive surface survey at the site will suggest the specific functions of other areas in the village.

### The necropolis

The largest component of the three main archaeological sites at Rujm Taba is the necropolis (see Figure 15.1 above). It measures approximately 1.7 km. around its perimeter, covering a total area of some 11 ha, and is bounded by two streambeds that flow from the base of the escarpment of the steep granitic slopes above. The necropolis is located between 80 and 90 m. due east of the village, up the slopes of the alluvial fan. It rises from c. 95 m. to 225 masl, measures about 700 m. east–west, and at its widest point measures 250 m. north–south.

Although time did not allow a more detailed investigation of the necropolis, survey was conducted by RTAP at the easternmost limit of the alluvial fan, where the *siq* into the *jebel* begins (Figure 15.11). Nineteen tombs were discerned in an area measuring c. 1900 m.<sup>2</sup>, a very small portion of the overall cemetery. If this rate of tombs/m.<sup>2</sup> were to remain constant, there could well be over a thousand burials throughout the cemetery; a conservative estimate would suggest a minimum number of between 500 and 600 tombs. Unfortunately, the majority of the burials on the lower part of the slope

have been completely looted; those on the upper slopes, however, appear to be more intact and undisturbed. The team was unable to locate even a single sherd in the necropolis, making interpretation of the tombs problematic.

Many of the large and loosely piled cairns of cobbles in the necropolis share attributes with alleged Late Bronze Age tombs found in the Arabah (personal communication K. Hamdan; note that the tombs are unpublished and the Late Bronze Age dating is unconfirmed). However, with the exception of three sherds that have been attributed to the Iron Age (personal communication C. Whiting), there is no ceramic evidence earlier than the first century BC from the surface collection at the main habitation site. If the necropolis were of an earlier date, it is unclear where the inhabitants of the Nabataean-period village would have buried their dead. Perhaps there is a local tradition of tomb construction that spans millennia. At any rate, the date of this cemetery remains elusive and will only be determined by further investigation.

### The 'Tall Solitary Rock'

The final feature of interest from the RTAP survey is a large monolithic stone located on a peak above the village (see Figure 15.1 above). This is certainly what Raikes referred to as a 'tall solitary rock' (Raikes n.d.: 15) when he surveyed the area in the late 1960s and early 1970s. Located some 1800 m. east of the village, this large rectangular stone is situated some 560 masl and nearly 1.75 km. above the benchmark established



Figure 15.11: Survey area of the necropolis, at the easternmost limit of the alluvial fan: view from the west (photo: R.J. Cook).

for the site by RTAP. According to a local informant, there is no oral history for this monument-like rock; however, he suggested that a similar stone is to be found directly to the west on a granitic peak of the western escarpment of the Wadi Arabah. The function of this stone is unknown, but Raikes (n.d.: 15) proposed that it might have marked an ancient signalling station. Due to time constraints, the RTAP survey was unable to visit this feature.

### Pottery

A total of 1539 sherds was collected during the RTAP 2001 survey and reconnaissance. Only 325 pieces of pottery were recovered from Structure A001. The presence of this rather small amount of ceramic material is no doubt due in part to the fact that the Nabataean caravanserai at Rujm Taba was sherded heavily during previous survey work conducted by both Raikes and Smith. Preliminary assessment of the surface pottery from Structure A001 provides a tentative chronological sequence for the building and reinforces its Nabataean origin. Of the 325 sherds collected, the vast majority (74.5%) were of the distinct, thin Nabataean painted and unpainted fine wares, ranging in date from the early first through the mid-second centuries AD. Interestingly, the surface collection produced a paucity of cooking (6.8%) and coarse (1.8%) wares. No pottery of apparent Late Roman or Byzantine date was recovered from Structure A001.

Ceramics collected from the village offer a glimpse of its occupational history and reinforce its domestic nature. Of the 1214 sherds collected, the overwhelming majority (83.5%) were Nabataean painted and unpainted fine wares, ranging in date from the mid-first century BC through the mid-second century AD. Also present were 22 fragments (mostly body sherds)

of imported Eastern Sigillata A. In addition to the finewares found in the village, there were a number of cooking wares of contemporaneous date to the fine wares, as well as sherds from storage jars and Nabataean unguentaria and lamps. It should be noted that only 13 sherds, less than 1% of the pottery recovered from the village, were of Late Roman date (see below).

### *Nabataean painted fine ware bowls*

(Figure 15.12)

Nabataean painted fine ware (hereafter NPFW) has received more scholarly attention than all other types of Nabataean pottery. Although information about the NPFW provided by most excavations conducted during the past century is of little use (Dolinka 2003: 35–46, 51–54), recent fieldwork and reports have clarified the origins and development of this fine ware. While studies concerning the decorative motifs (e.g. Schmitt-Korte 1984) have provided insight into the variety of patterns employed by the Nabataean potters, they are of little chronological value. All previous studies concerning the chronology of the NPFW (e.g. Parr 1970), as well as chronological schemes based upon petrographical analysis (e.g. Gunneweg *et al.* 1988), need to be revised in light of the recent work conducted by the Swiss at Petra az-Zantur (Schmid 2000), which provides the most recent typochronology of the NPFW to date.

NPFW bowls from Petra are well attested in the ceramic repertoire recovered from the surface collection conducted by RTAP, and they represent a significant portion (23%) of the total pottery assemblage from Rujm Taba. The examples illustrated here exhibit well-known forms and decorative motifs for these vessel types. The rim diameter of the NPFW bowls collected by RTAP averages 17.6 cm. The first

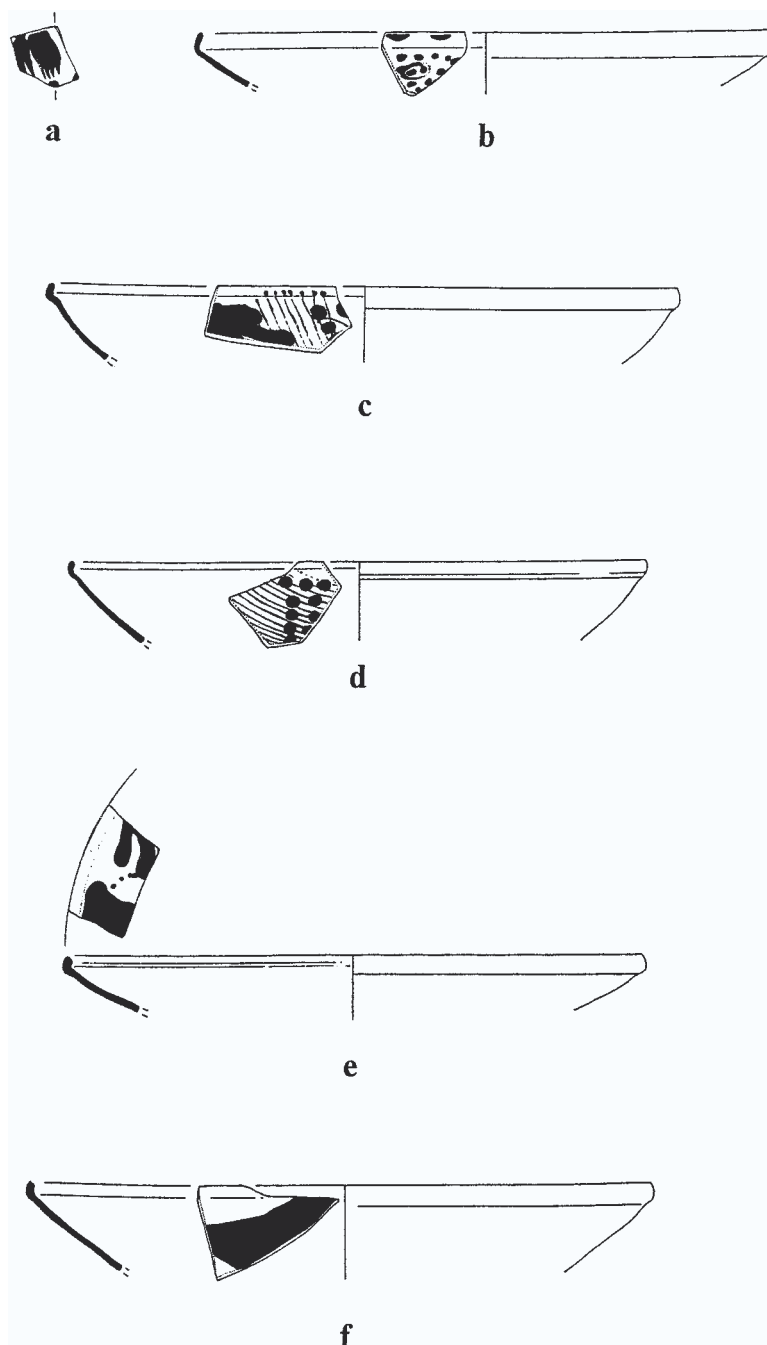


Figure 15.12: Sherds from Nabataean painted fine ware bowls recovered at Rujm Taba: scale 1:2 (drawings by M. Faulkner).

piece (Figure 15.12a), although only a body sherd, comes from C001/047 and is important because of its early date. It belongs to Schmid's Dekorphase 2c and dates to the early first century AD (Schmid 2000: 28, 184, abb. 88). A total of five sherds from this Dekorphase were collected from the village, representing 2% of the NPFW collected there; none were found in Structure A001. The piece has a very dark grey (N3) core and a red interior (2.5YR 6/8) and exterior (10R 5/8). The painted decoration of small leaves is also rendered in a red (10R 4/6) colour.

The next five vessels are all typical NPFW carinated bowls with inverted rims of varying types. The rim

sherd in Figure 15.12b was discovered during a preliminary collection in the village during the first day of the RTAP survey. The fabric, interior and exterior are all red (2.5YR 6/7). The so-called 'peacock eyes' and dots motif (Schmitt-Korte 1984: 16) are painted in a dark red (2.5YR 4/6) colour. The vessel dates from Schmid's Dekorphase 3a, or 20–70 AD (Schmid 2000: 28, 184, abb. 89), but the closest parallel to the example from Rujm Taba comes from Oboda (Negev 1986: 56 no. 400).

Another NPFW carinated bowl from Dekorphase 3a was collected from square C002/047 (Figure 15.12c). It has a red (2.5YR 5/8) fabric and interior and a light red

(10R 6/7) exterior. The painted decoration is rendered in a dark reddish grey (10R 4/1) colour. While the vessel form and rim stance are paralleled at Petra (Schmid 2000: abb. 90), the decoration of 'radial cypresses dots and lines' from this vessel is reminiscent of examples found at Oboda (e.g. Negev 1986: 51 no. 367). Vessels dating to Dekorphase 3a made up the second largest category of NPFW collected by RTAP, representing 21% and 25% of the sherds from A001 and the village, respectively.

The largest category of NPFW recovered by RTAP comes from Schmid's Dekorphase 3b, which he dates to the late first century AD (Schmid 2000: 28–29, 184, abb. 91). Nearly half (48%) of the NPFW from Structure A001 and exactly half of it from the village falls under this category. The decorative motif on these vessels is almost unequivocally made up of stylised palmettes, double cones and clusters of dots – often interpreted as 'grapes' – on a background of fine lines. The example illustrated here (Figure 15.12d) was gathered during a preliminary collection in Structure A001 conducted on the first day of the RTAP survey. It has a red (2.5YR 5.5/8) fabric and interior, a red (10R 6/7) exterior and is decorated with dark reddish brown (5YR 3/2) paint. These vessels, with their distinct decorative motifs, are ubiquitous throughout the Nabataean kingdom.

Vessels from Schmid's Dekorphase 3c are also well represented in the ceramic corpus from Rujm Taba and comprise the third largest category of NPFW found at the site, or 8% from A001 and 15% from the village. These bowls date to the early second century AD. The first example (Figure 15.12e) comes from the preliminary collection in A001. It has a light red (10R 6/8) fabric and interior, light red (2.5YR 6/8) exterior, and reddish black (10R 2.5/1) paint. Interestingly, the decoration was carelessly applied by the painter, demonstrated by the three dribbles of paint between the palmette and the cone. The rim form of this bowl has an exact parallel from Petra (Schmid 2000: 29, 184, abb. 92). The second NPFW 3c bowl (Figure 15.13f) comes from C006/048. It has a light red (2.5YR 6/7) fabric, light red (2.5YR 5.5/8) interior and exterior, and a reddish black (10R 2.5/1) painted decoration. This example is also paralleled at Petra (Schmid 2000: 29, 184, abb. 93). Both of the NPFW 3c bowls from RTAP exhibit the typical decorative motif found in the 3b bowls, but they lack the fine background lines and the paint is much darker and more thickly applied.

### *Nabataean unpainted fine ware bowls*

(Figure 15.13)

The overwhelming majority of the pottery collected by RTAP is represented by the Nabataean unpainted fine ware (hereafter NFW), aptly referred to as 'Petra red ware' ('Amr 1987). Of the 1539 sherds recovered from

the surface collection, 900 (58.5%) of them fall into this category. For the NFW, the typology of rouletted and impressed forms offered by Khairy (1982) is useful for identifying type patterns. Once again, the typochronology provided by Schmid (2000) from the Petra az-Zantur excavations serves as a solid basis from which to work with this highly common type of fine ware.

The first NFW vessel, from square C001/047, found during the RTAP survey is a Gruppe 1 incurved bowl (Figure 15.13a) from Phase 1 at Petra az-Zantur (Schmid 2000: 7, 24, 179, abb. 3), broadly dated by the excavators from c. 150–50 BC. The rim sherd has a red (2.5YR 5/6) fabric, yellowish red (5YR 5/8) interior and exterior, and a yellowish red (5YR 4/6) slip on the rim exterior. These bowls are commonplace in Late Hellenistic contexts throughout Nabataea, with the most examples of this type dating to the mid-first century BC (e.g. Zeitler 1990: fig. 14.4).

The majority of the identifiable NFW rim sherds recovered by RTAP conform to the Gruppe 6 bowls with vertical rims from az-Zantur, which date from c. 50 BC–AD 20 (Schmid 2000: 8, 24). The illustrated example (Figure 15.13b) was found in square C005/049. It has a dark grey (N4) core, a yellowish red (5YR 5/6) interior, and a reddish yellow (5YR 6/6) exterior. An exact parallel for the sherd found at Rujm Taba is attested at Petra (e.g. Schmid 2000: 181, abb. 49).

Another NFW type well represented in the corpus from Rujm Taba is the Gruppe 7 bowl with vertical rim, which dates to Phase 3, or AD 20–100, at az-Zantur (Schmid 2000: 9, 25). The piece from the RTAP survey (Figure 15.13c) was collected from square C002/047. Where the body and rim join together, there is a slightly indented bend on the vessel. Its fabric, interior and exterior are all yellowish red (5YR 5/6) in colour, and the form is paralleled at Petra (Schmid 2000: 182, abb. 53).

Commonplace at Nabataean sites are the rouletted bowl bases that conform to az-Zantur Gruppe 8, which is also dated from Phase 3 (Schmid 2000: 9, 25, abb. 57–59). The RTAP example (Figure 15.13d), found in square C004/045, has a red (2.5YR 6/6) fabric and a red (2.5YR 6/8) interior and exterior. Several examples of this type were found in Petra North Ridge Tombs 1 and 2 (Bikai and Perry 2001: figs. 5:10; 8:2, 6–7).

Finally, an NFW rouletted bowl (Figure 15.13e) was recovered by the RTAP survey team in square C006/049. The type corresponds to Schmid's Gruppe 9 bowl and dates to az-Zantur Phase 3 (Schmid 2000: 9, 182, abb. 61–65). The example from Rujm Taba has a light red (10R 6/8) fabric, interior and exterior, and a rim diameter of 23 cm. This large vessel has thin inclined walls and a carinated body that, although not

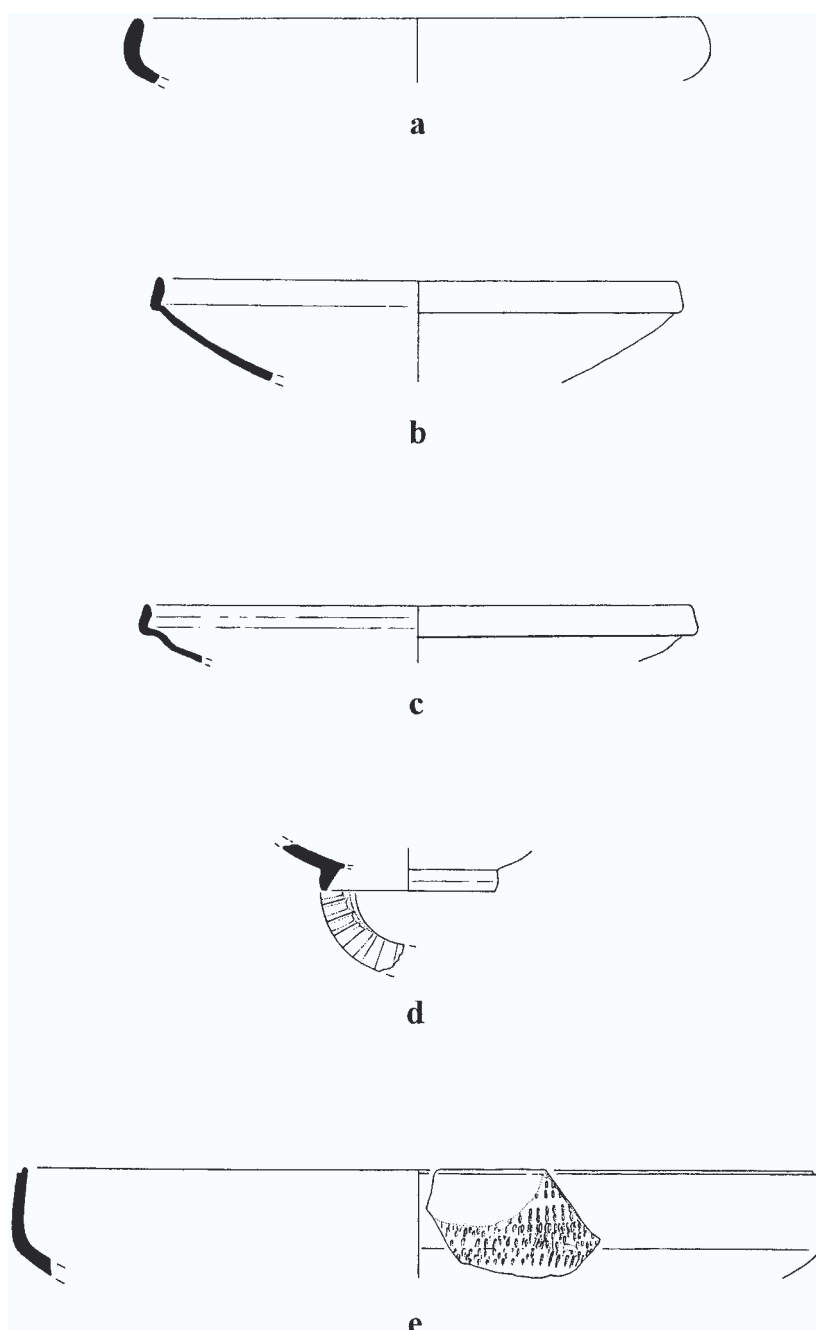


Figure 15.13: Sherds from Nabataean unpainted fine ware bowls collected in the village at Rujm Taba: scale 1:2 (drawings by M. Faulkner).

illustrated, sat on a ring-base. The rim has a fairly deep incised groove on the top, making it offset. The rouletting pattern on this vessel covers the area of the vessel from the rim to where the carination begins, and conforms most closely to Khairy Pattern 8 (Khairy 1982: 276). Bowls of this type are extremely common at Petra and are distributed throughout the Nabataean realm.<sup>5</sup>

<sup>5</sup> For rouletted Nabataean bowls, see the following: Crowfoot 1936: pl. 3:1; Murray and Ellis 1940: pls 9:2 and 4, 31:116 and 118; Parr 1970: fig. 7 no. 110; Khairy 1975: pl. 17:239 and 241 – type F2 Bowls; Negev 1986: 67 nos 508–514; Erickson-Gini 1999: 24, fig. 1.9.1; Dolinka 2003: 70, nos 31–32; and Bikai and Perry 2001: 72, fig. 8:1.

#### Jars (Figure 15.14a–c)

A few NFW jars were collected during the RTAP survey. The first (Figure 15.14a) is a thin-walled jar rim from square C002/047. It has a rim diameter of 10.5 cm. and the vessel walls are extremely thin, measuring only 1.7 mm. thick. It has a red (2.5YR 6/7) fabric, interior and exterior. A close parallel is attested from Phases 1–2b at Petra az-Zantur, which dates to the first century BC (Schmid 2000: 79–80, 196, abb. 337). The second NFW jar rim (Figure 15.14b) was found in square C005/045. It has a red fabric (10R 4/8), interior (2.5YR 5/8) and exterior (10R 5/8), and a rim diameter of 9 cm. The rounded, externally thickened rim form can be found on similar vessels from Phase 2a

(50–30/20 BC) at Petra az-Zantur (e.g. Schmid 2000: 62, 191, abb. 226).

An interesting ceramic find from the preliminary collection in the village is a Late Roman jar base (Figure 15.14c). The fabric and interior are red (2.5YR 5.5/8), and it has a very pale brown (10YR 8/3) exterior slip. An exact parallel for this jar base was uncovered during excavation at Mampsis, where the form ‘...appears to be a predecessor of the refined bag-shaped juglet found in Late Roman and Early Byzantine [contexts]’ (Erickson-Gini 1999: 49, fig. 12.1.2). These jars with thickly ribbed bodies are commonplace at Nabataean sites in Late Roman contexts.

Of interest, five jar rims dating from the Late Roman period (not illustrated) were found in the Nabataean village. All of them are comparable to a well-known type of jar from Petra dated to the mid-fourth century AD (Fellmann-Brogli 1996: abb. 752–54, type A12a). Almost all of them came from the RTAP grid y-coordinates 048 and 049, locales associated with food preparation and cooking activities during the Nabataean period. Their presence may suggest Late Roman occupation or reoccupation of structures just outside of the survey area.

#### *Jug and juglet* (Figure 15.14d–e)

Closed forms such as jugs and juglets were a rarity in the RTAP surface collection. Indeed, the only two rim sherds that were found are illustrated here. The first is an NFW jug rim, neck and handle vestige (Figure 15.14d) from square C004/049. It has a rim diameter of 5 cm. and its fabric, interior and exterior are all the same colour red (2.5YR 5.5/8). A close parallel is attested at Oboda (Negev 1986: 86 no. 702). The second rim sherd comes from an extremely thin-walled NFW juglet (Figure 15.14e). Found in square A014/008, it has a rim diameter of only 2 cm., and the sherd is only 1.9 mm. thick. The fabric, interior and exterior are all red (2.5YR 6/6), and an exact parallel dating to the late first century AD was uncovered during the Petra az-Zantur excavations (Schmid 2000: 77, 196, abb. 325).

#### *Unguentaria* (Figure 15.14f–g)

A total of six fragments from unguentaria was collected from the Nabataean village. This vessel type has been found, along with complete NPFW bowls, within foundation deposits of Nabataean structures in the Negev and the western Arabah (personal communication T. Erickson-Gini). The only typo-chronology developed for the Nabataean piriform unguentaria was produced over a decade ago (Johnson 1990), although the date ranges employed for his vessel groups are rather broad.

Almost all of the unguentarium sherds collected by RTAP come from the lower part of the vessel, where the lower body joins the base. Five of the six pieces came from plain piriform unguentaria; the other was of the ribbed variety. A Nabataean piriform unguentarium rim and neck (Figure 15.14f) was found in square C002/047. It has a rim diameter of 3 cm. The fabric is red (10R 5/6), with a weak red (2.5YR 5/4) interior and an exterior slip that is light reddish brown (5YR 6/4) in colour. This unguentarium rim conforms to Johnson’s Group One Form III, which he dated to ‘...before 27 AD’ (Johnson 1990: 237, 245, fig. 1:III). Parallels for this type are found at other Nabataean sites, such as Oboda (Negev 1986: 107 no. 916) and Tomb 2 from the North Ridge at Petra (Bikai and Perry 2001: 74, fig. 9:12).

A Nabataean piriform unguentarium base fragment (Figure 15.14g) was discovered in square C005/049. It is representative of the other unguentaria collected by RTAP. It has a dark grey (N4) core, and a red interior (10R 5/6) and exterior (2.5YR 5/8). The sherd comes from Johnson Group Three Form VIII, which dates to mid-second century AD, i.e. ‘Trajanic and later’ (Johnson 1990: 238, 247, fig. 3:VIII).

#### *Cooking pots* (Figure 15.14h–j)

Examination of Nabataean common and coarse ware vessels was neglected for a very long time, as ceramicists seemed to prefer studying the Nabataean fine wares instead. It was not until the groundbreaking work of Khairy (1975) that this issue was addressed. While Khairy’s work did provide a comprehensive typology of forms known at the time (Khairy 1975: 203–46, 354, 413–24, pls 44–55, F1–15), only very broad chronological dates were offered, and the study remains unpublished to this day. A published reconciliation between Parr’s stratigraphic sequence from Petra (Parr 1970) and Khairy’s typology could provide a solid basis for comparanda when dealing with these rather utilitarian forms that have often been neglected by excavators in the past. Thanks to the recent skilful work of Gerber (1996, 1997, forthcoming) there will soon be a comprehensive study on the Nabataean common wares. When completed, this will surely be the standard reference for the typo-chronology of Nabataean cooking pots and other common ware forms, just as *Late Roman Pottery* (Hayes 1972) is for the later fine wares in the Mediterranean.

The three examples of Nabataean cooking pots illustrated here all date from the late first–early second centuries AD and have the most common rim type for these vessels: a collared and everted rim that is slightly thickened on the interior and almost triangular in section. The rim diameter on these cooking pots ranges from 10 to 12.5 cm. The first example (Figure 15.14h),

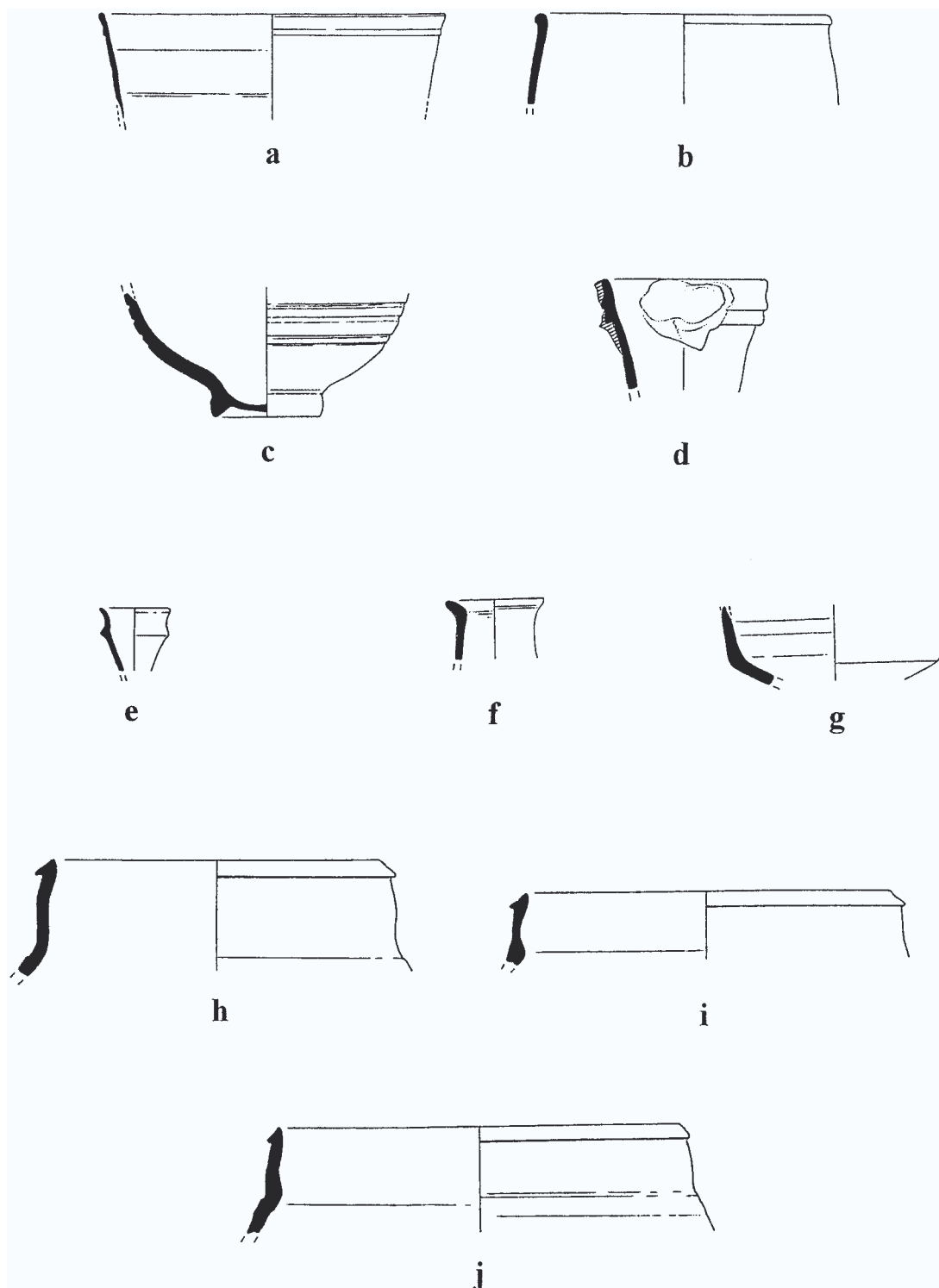


Figure 15.14: Sherds from jars, jugs, juglets, unguentaria, and cooking pots recovered by the RTAP survey team: scale 1:2 (drawings by M. Faulkner).

from square C005/048, has a red (10R 5/6) fabric, interior and exterior and has numerous white calcite inclusions. Similar examples of these rather high-necked cooking pots have been found at Petra (Gerber 1996: 150, taf. 32e).

The second cooking pot rim (Figure 15.14i) was discovered in square C002/050. It has a weak red

fabric and interior (2.5YR 5.5/4) and an exterior slip that is a very pale brown (10YR 8/3) in colour. Parallels for this form are also attested at Petra (Gerber 1997: 410, fig. 7). The final cooking pot illustrated (Figure 15.14j) comes from square C002/050. The fabric is a weak red (10R 5/4), and both the interior and exterior are dark reddish grey (2.5YR 4.5/1). An exact parallel was found at Petra (Gerber 1996: 148, 150, taf. 32f).

### Interpretation

Analysis of the pottery collected during the RTAP 2001 Survey, particularly the Nabataean painted and unpainted fine wares, provides valuable insights into the occupational history of Rujm Taba. First, it appears that the village was founded before the construction of the caravanserai, the latter of which was built during the early to mid-first century AD. This notion is supported by the presence of NPFW sherds from Petra az-Zantur Dekorphases 2b–c and NFW dating from the mid-first century BC found in the village, and a lack of any NPFW earlier than Dekorphase 3a found in the caravanserai.

Second, the ceramic evidence gathered by RTAP suggests that both the village and the caravanserai at Rujm Taba flourished during the late first century AD, aptly demonstrated by the fact that half of the NPFW from the village and nearly half (48%) of the NPFW from Structure A001 are dated to Dekorphase 3b, or c. 70–100 AD. A high amount of activity at Rujm Taba during this period seems to call into question the notion repeated by many scholars (e.g. Bowersock 1983: 156) that the discovery of the monsoon winds in the mid-first century AD caused a major decline in the Nabataean overland caravan trade. Quite contrary, Rujm Taba seems to have thrived in an era of supposed economic deterioration.

Third, according to the RTAP ceramic repertoire there seems to have been a decline in activity and occupation at Rujm Taba during the early to mid-second century AD, an idea supported by the fact that numbers of NPFW drop off sharply during this period, with only 8% of the total pottery from Structure A001 and 15% of the total ceramics from the village dating from Zantur Dekorphase 3c. Whether or not this decline should be attributed to the Roman annexation of Nabataea in AD 106, or an earthquake that devastated the Rift Valley during the early second century AD,<sup>6</sup> is still a matter of debate among scholars that could easily be resolved through stratified excavations at Nabataean sites, such as Rujm Taba, located along the major trade routes that were in use during the period in question.

Finally, there is some evidence for either limited occupation or camping activities in the village during the late third/early fourth century AD, as evidenced by the handful of Late Roman jar sherds discovered during the RTAP surface collection. Taken together, the ceramic evidence gathered by RTAP has provided a tentative occupational history for Rujm Taba, but only excavation at the site will provide definitive results.

<sup>6</sup> Russell 1985; Schmid 1997. See also the discussion in Dolinka 2003: 8–9, 30–32. There is clear evidence of earthquake destruction dating to the early second century AD from the Nabataean forts of 'Ein Rahel and 'Ein Erga (Korjenkov and Erickson-Gini 2003) in the west-central Arabah.

### Site integrity

#### Structure A001

The Nabataean caravanserai faces numerous threats from both human activity and its environmental setting. The construction of the modern highway (c. 1978) has significantly altered the landscape around A001. A culvert installed where the highway begins its gentle curve to the north-west (Figure 15.15) now channels a large volume of seasonal runoff directly towards the structure. In fact, the wadi created by this diversion of water has eroded the soil at the south-eastern corner of A001 to a depth of approximately 1.25 m. below the desert floor (Figure 15.16). The most disturbed portion of the wadi, where it turns 90° to run south along the western side of the highway (see Figure 15.2 above), is now extremely close to the structure and will inevitably begin to damage A001 in the near future. Further investigation at Rujm Taba should assess the feasibility of erecting a retaining wall or wadi diversion along the south-eastern section of A001, where the structure is most threatened.

Human activity has also had a substantial impact on Structure A001. Vehicle tracks were clearly visible across the structure, suggesting stone robbing and/or bulldozing of the interior. A large pit, about 1.50 m. deep and now filling with windblown sand, suggests that there has been considerable disturbance in the recent past. Ironically, the best preserved and least robbed portion of the structure, along its eastern side, is also that which is most threatened by the wadi formed by the culvert underneath the modern highway.

A highly disturbed field of rubble and cultural debris, measuring 175 x 30 m., was noted to the south of A001, but did not contain any identifiable architectural remains and stopped short of the structure. A local informant suggested the material had been dumped there during the construction of the modern highway. Presumably the bulk of the scatter – composed of sherds, many granitic pebbles and cobbles, and a few boulders – originated in the village area of the alluvial fan on the eastern side of the highway, although it is possible that some of the scatter may have been displaced from A001.

Finally, encroaching sand dunes located to the west and northwest of A001 pose yet another threat to the structure. Since the geological map for the *Wadi Darba 3049 IV Map Sheet* was created in 1986, the dunes appear to have moved a considerable distance to the east; if the dunes maintain this eastward movement, they will eventually overtake Structure A001.

#### The village

While under considerably less threat than Structure A001, the Nabataean village at Rujm Taba has also



Figure 15.15: A culvert installed underneath the Dead Sea Highway channels a large volume of seasonal runoff directly towards Structure A001: view from the west (photo: R.J. Cook).

been a victim of the modern economic and technological development of the Wadi Arabah. A section of the village running some 125 m. along the eastern side of the modern road, covering an area of approximately 0.2 ha, was bulldozed when electrical power lines were installed (see Figure 15.3 above). A cultural debris field, thickly strewn with thin Nabataean sherds and stone pavers, remains visible on the surface (Figure 15.17). The bulldozed area is clearly part of the village that has been lost forever.

### Concluding remarks

Evidence recovered from the RTAP 2001 survey and reconnaissance has provided a glimpse into the occupational history of Rujm Taba. Structure A001 apparently had a limited occupation that flourished during the first and second centuries AD, which

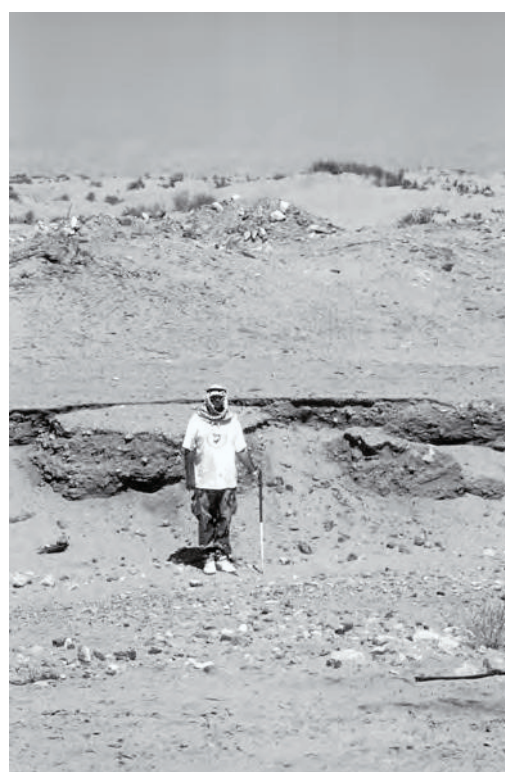


Figure 15.16: Wadi created by water flow from the culvert has severely eroded the soil near Structure A001: view from the east. Note Structure A001 directly behind the standing figure (photo: R.J. Cook).



Figure 15.17: Section of the village bulldozed when a service road was created for installation of electrical power lines: view from the southwest (photo: R.J. Cook).

would correspond well with the development of Nabataean trade and expansion of settlements during this period (see Erickson-Gini, Chapter 12 in this volume). There seems to be a paucity of artefactual evidence for either cooking or storage activities in A001 when compared to the material from the village. However, excavation of the building may unearth *tabuns* and associated cooking wares such as those found in the aforementioned Nabataean caravanserai at Sha'ar Ramon, as well as that at nearby Horvat Dafit (Dolinka, forthcoming).

The village (C001–016, D001–006) appears to have had a more complex occupational history than Structure A001. While the majority of the ceramics recovered from the village are contemporaneous with those from A001, there were several sherds from the first century BC (e.g. Figures 15.13a–b, 15.14a–b), suggesting that the village was founded before the caravanserai during the first wave of Nabataean settlement of the Arabah and Negev during this period (see Erickson-Gini, Chapter 12 in this volume). In addition, there was also a small but significant number of jars dating from the mid-fourth century AD. Taken together, the artefactual evidence suggests continuous and extensive occupation of the village from the mid-first century BC to the late second century AD with subsequent 'squatter occupation' during the Late Roman period, but only excavation will clarify the occupational phasing for the village.

Two seasons of excavation by RTAP are tentatively planned, with the primary focus being Structure A001 – a high-priority salvage excavation. The main objective for RTAP is to record as much of Rujm Taba as possible, before the resource is lost completely. In order to preserve the site for future interpretation and appreciation, RTAP is developing strategies for post-excavation site conservation of the extant architectural features. The project also plans to work with the Jordanian Ministry of Tourism and Antiquities to investigate the cultural tourism potential of this highly accessible site. Located along the busy Dead Sea Highway connecting Amman to Aqaba, Rujm Taba is well sited to provide visitors with a glimpse of life at an ancient Nabataean road station in southern Jordan.

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# Roman organisation in the Arabah in the fourth century AD

*Benjamin Isaac*

Following the survey work carried out by Fritz Frank in the Negev, Albrecht Alt made an extensive attempt to trace a string of Diocletianic *castella* in the Wadi Arabah (Alt 1935; Isaac 1992).<sup>1</sup> The assumption here was that there must have been a *limes* system in the Negev such as allegedly existed in Germany.

The existence of such a system was firmly denied by Beno Rothenberg, based on his survey of the Arabah in the 1960s:

The Diocletianic reform brought no essential military changes to the 'Arabah. Only three small fortlets were erected there, all sited at the extreme ends of the 'Arabah, and protecting essential water-sources on major west–east roads. There was never a line of 4th century *castella* in the 'Arabah, and no traces of any north–south road running all the way from the Dead Sea to the Red Sea have ever been found. A quantity of Byzantine sherds in the remains of an Iron Age watch-tower or a Nabataean khan do not make it a Roman fortress (Rothenberg 1971: 220).<sup>2</sup>

This paper reconsiders the available sources in an attempt to assess the merits of these two contradictory opinions and any possible alternatives. I will argue that Rothenberg was right in challenging the view that there was a line of fourth-century *castella* in the Arabah, but wrong in denying the existence of a fourth-century north–south road through it. Furthermore, I will argue that the archaeological evidence attesting the existence of this road corresponds with the evidence from the literary sources, as long as the dates of these sources are carefully interpreted.

First of all, Eusebius' *Onomasticon* (Klostermann 1904) will be brought to bear on this issue. Additional sources are the *Notitia Dignitatum*, *P. Colt* 39, the *Beer Sheva Edict(s)* (Isaac 1998)<sup>3</sup> and the Madaba Map. The confusing evidence from the *Tabula Peutingeriana* will also be discussed.

<sup>1</sup> Numerous publications by Mordechai Gichon argued that there was a 'limes system' in the Negev from the Flavian period onwards. For my own discussion of these theories see Isaac 1992.

<sup>2</sup> For the road to Elath see Aharoni 1954; 1963.

<sup>3</sup> *P. Colt* refers to the papyri discovered at Nessana (Kraemer 1958); cf. Casson 1952; Isaac 1998. For the Beer Sheva edict(s) see now Di Segni 2004.

The evidence of Eusebius' *Onomasticon* for the state of the road-system in the late third century is of crucial importance.<sup>4</sup> This source contains more than 30 references to 20 roads in Palestine, Arabia and Syria. Usually this takes the form of a statement that a site 'is x miles from A as one goes to B'. As argued elsewhere, Eusebius used up-to-date information regarding the Roman public roads which he found in the governor's office in Caesarea. The *Onomasticon* thus contains fairly full evidence for the public roads in the province in the late third century AD. Moreover, it often states explicitly which locations the roads were seen as linking, thus providing evidence regarding the nodal points of the system. The sources cited here therefore give us the following decisive information. There was a public road from Aelia Capitolina to Hebron through Bethlehem (Sources 1 and 2). This road continued from Hebron to Aila (Elath/Aqaba) past Mampsis (Source 5). A look at the map shows that this road can only have run through the Arabah. As regards garrisons, it is clear from Sources 3 and 4 that the village of Carmel, situated on the road between Hebron and Mampsis was garrisoned in this period (Isaac 1998).<sup>5</sup> Other garrisoned sites on this road are Malatha,<sup>6</sup> Mampsis (Stern *et al.* 1993)<sup>7</sup> and Thamara which has not been identified with certainty (Source 5).<sup>8</sup> Finally, the last

<sup>4</sup> For the date of this work and the nature of the underlying sources, see Isaac 1998.

<sup>5</sup> Other sources relevant for the site of Carmel are *Notitia Dignitatum Orientis* 34.20 which gives the *Equites Scutarii Illyriciani* as the local garrison. It is also mentioned in *P. Colt* 39, which suggests it was a military site. It lies on the road from Hebron to Malatha. Cf. Isaac 1998: 294.

<sup>6</sup> For this site see Josephus, *Ant.* 18.6.2 (147) describing it as a tower which served as a refuge to Agrippa I. It is mentioned by Ptolemy, *Geogr.* 5.17.4: Μαλιάρθρα; and by Eusebius, *On.* 14.3; 88.4; 108.3; as a reference point, but not as a garrison. It was garrisoned by a *Cohors Prima Flavia* according to *Not.Dig.Or.* 34.45. For the excavations, see Stern *et al.* 1993: 934–37.

<sup>7</sup> Eusebius mentions it as a site on the road from Hebron to Aila, but does not include it among the military sites (Source 5). However, it is mentioned in *P. Colt* 39 and the Beer Sheva Edict(s), which suggests there was a garrison at a later stage, i.e. in the fifth–sixth century.

<sup>8</sup> Thamara is also mentioned by Ptolemy, *Geogr.* 5.16.8, which shows that it existed under that name before the mid-second century AD. I am not convinced by the tentative identification of the site now called Mezad Thamar with ancient 'Thamara'. The excavations by M. Gichon have

military site identified in the literary sources is the legionary base at Aila on the Gulf of Aqaba/Elath (Source 6), where the old Trajanic road through Transjordan and the road here discussed came together.<sup>9</sup> Eusebius' *Onomasticon* is the earliest source which locates the *legio X Fretensis* there rather than in Jerusalem. As is well known, in this period the legion would have been smaller in size than at the time it was first based in Jerusalem in the first century.<sup>10</sup> It is almost certain, therefore, that the base at Aila was smaller in size than the average second-century legionary base as known in the west.

This evidence from literary sources must be interpreted in combination with newly discovered epigraphic material from the Arabah.

### Milestones in the Arabah (Avner 1995; Wolff 1996)

Three Tetrarchic and Constantinian milestations<sup>11</sup> have been found (Kennedy 2000: 193; Wolff 1996: 725–68), each of them numbering eight to 10 pieces, all of them north of Yotvata. One of those, found at Yahel, 12 m. north of the fort, gives the distance *ABOSIA* 12 m., i.e. 'ab Osia' or 'a Bosia' 12 miles. They are dated to the Tetrarchic and Constantinian reigns (AD 284–324). The existence of milestations along a road from Aila which continues northwards beyond Yotvata proves that there was a public road all along the Arabah in the Tetrarchic period.

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produced evidence of occupation from the end of the third century to the late sixth or early seventh century (Isaac 1992: 193–95).

<sup>9</sup> The excavations at Aqaba by S. Thomas Parker have not uncovered remains of the legionary base. Note the fragments of a building inscription found at Aila (Aqaba) dated AD 324–26 (*Inscriptions grecques et latines de la Syrie* 21.4 no. 150; cf. MacAdam 1989).

<sup>10</sup> As has been pointed out, however, it is quite possible that the base in Jerusalem contained the headquarters and only part of the legion, even in the first century, as there is evidence of vexillations based elsewhere (see Isaac 1992: 427f., 431, 433).

<sup>11</sup> Especially photographs in Wolff 1996: 762–64: three Tetrarchic and Constantine milestations, 16056.93645; 16230.93868; 16145.93765 (Wolff 1996: 725–68; Kennedy 2000: 193f). Along the eastern slope of the Arabah, further evidence of ancient roads has been found: a) a stretch of surfaced road running towards the south of Gharandal; b) a quarry with five discarded milestones 10 km. north of Gharandal at Qa'a es-Sa'idiyeen; c) a possible anepigraphic milestone at Bir Madkhur; and d) stretches of what is said to be an old road further north (see Smith *et al.* 1997: 59–62 and figs 12, 14; Perry and Smith 1998: 594).

### Inscription from Yotvata (AD 296–306)<sup>12</sup>

From the excavations carried out by Z. Meshel it appears that the Roman fort south of Yotvata was not occupied later than the fourth century. Yotvata, approximately 34 km. or one day's march in military terms north of Elath, is the most important of all sites in the western section of the southern Arabah because it has the best water supply in this otherwise extremely arid region. All over the area underground water is accessible (Frank 1934; Glueck 1935; Aharoni 1954; Rothenberg 1967; Applebaum 1971).<sup>13</sup> The remains are visible of an ancient water collecting system called in English 'chains of wells' (*qanat, foggara*) and with it were associated sherds of the Persian and Roman periods (Evenari *et al.* 1982). The reason for the existence of a fort on this site, even though it lasted less than a century, is obvious. It served as a road-station in an oasis on an important road, perhaps a junction or crossroads. It policed the oasis and, conversely, it could exist where it did thanks to the water supply. It lies one kilometre south of the earlier remains of the Chalcolithic period and Iron Age I.

In combination these sources and finds show that we may regard the following road as attested in the ancient literary and epigraphic sources listed above: Jerusalem (Aelia) – Bethlehem – Hebron – Mampsis – Thamara – Aila. The tetrarchic date of the southern part of this road is attested by the milestones. The descents from the Hebron Mountains and into the Arabah, now called 'Ma'aleh Deragot' and 'Ma'aleh 'Aqrabim', are elaborately constructed with carefully made steps and watchtowers, possibly in the Tetrarchic period (Harel 1959).

Along this road a number of military posts are attested in literary sources and epigraphy: Carmel, Malatha, Mampsis, (B)Osia (Yotvata), Aila. The dates of these are as follows:

Carmel is mentioned by Eusebius, in the *Notitia* and in *P. Colt* 39: i.e. it was occupied from the Tetrarchic period – sixth century. Malatha is mentioned as a reference point by Eusebius and as a military site in the *Notitia Dignitatum*, i.e. it was garrisoned before the end of the

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<sup>12</sup> Roll 1989: 239–60 (ed. princeps) interprets this as architectural terminology. I prefer to read this as a reference to a unit of horsemen and the name of the unit (*Constantianam?*) (Isaac 1992: 188; similarly *Année Epigraphique* 1990 no. 1015. Eck sees *Costia* as a place-name in the ablative (Eck 1992). The inscription mentions a governor of Palaestina, Aufidius Priscus, who now occurs also on inscriptions from Caesarea (Burrell 1993: 287–95; *Année Epigraphique* 1993, nos 1621; 1624. Cf. Kennedy 2000: 209). See also Meshel 1989; Kindler 1989; Kennedy 2000.

<sup>13</sup> The first description known to me is by Musil 1907: 254 with figs 139–40.

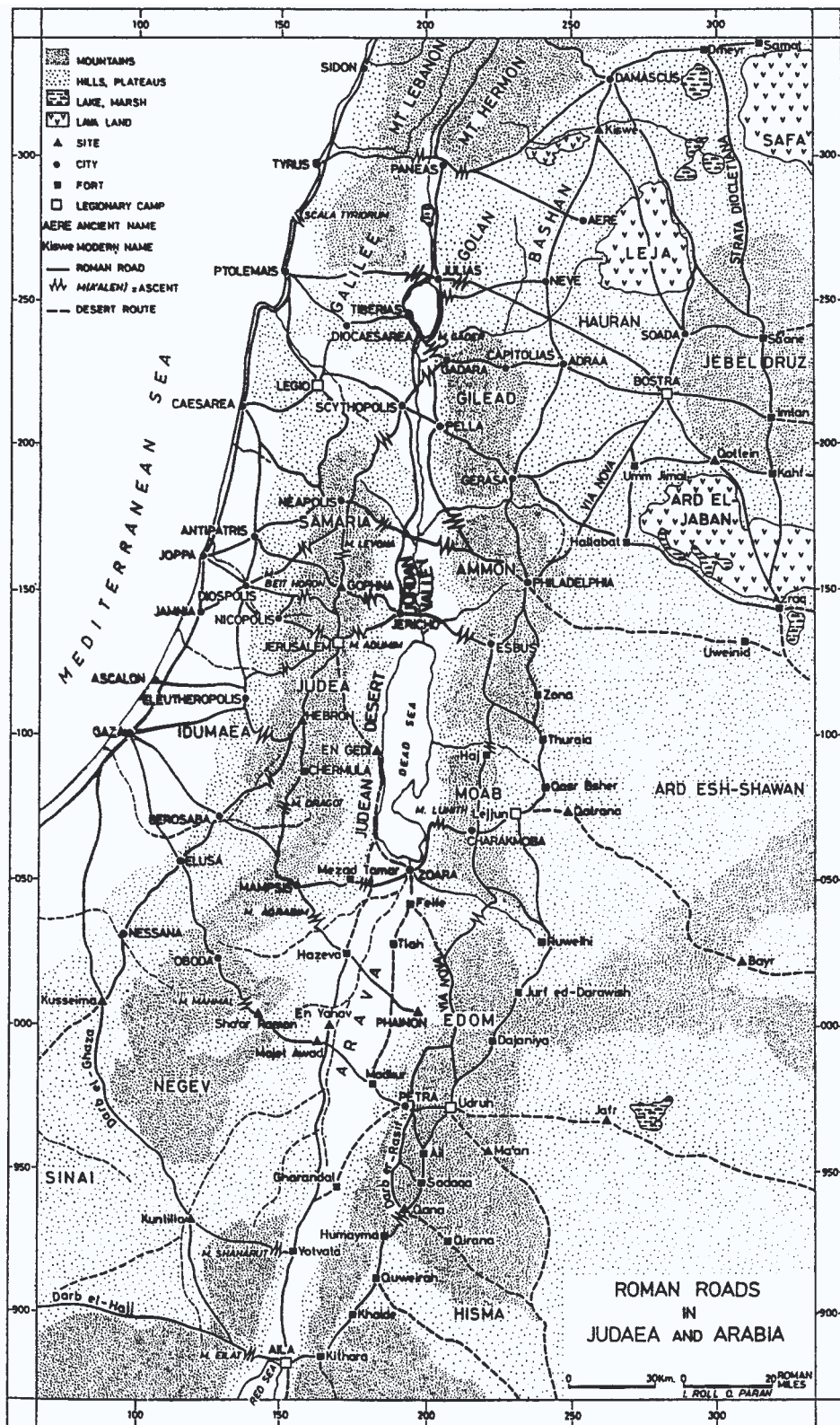


Figure 16.1: Roman roads in Judaea and Arabia.

fourth century. Mampsis is listed in *P. Colt* and the Beer Sheva edicts (Isaac 1998), i.e. it almost certainly was a military site in the fifth and sixth centuries. However, the town was certainly inhabited in the fourth century, as attested by the excavations. It may be significant that Eusebius does not mention it as a garrisoned town.

(B)osia is Tetrachic – mid-fourth century as attested by an inscription and excavations. Aila was a legionary base from the Tetrarchic period onwards.

Note also the following two sites: Mo’ah (Moyet ‘Awad, ancient Calgouia?) (Cohen 1987; Isaac 1992;

Tsafirir *et al.* 1994),<sup>14</sup> usually described as a road-station in the Arabah on the Petra–Gaza road. It could equally well have serviced travellers along the north–south road through the Arabah if it existed before the Tetrarchic period. Second, and perhaps more relevant for the present paper: En Hazeva (=Eusebius' Thamara?) on the crossroads Mampsis–Phaenon and the north–south road through the Arabah (Tsafirir *et al.* 1994).<sup>15</sup> En Hazeva certainly was occupied in the fourth century AD and would naturally have served as a station on the road from Mampsis to the southern Arabah, here discussed.

### The Tabula Peutingeriana

The Peutinger map (Figure 16.2) has important information, which, however, is hard to correlate with the facts on the ground. It shows three routes coming together at a site called Ad Dianam.<sup>16</sup>

- 1) The Clysma–Phara–Haila road in Sinai (Mayerson 1994a and b; Tsafirir *et al.* 1994; Kennedy 2000).

- 2) The *via nova Traiana* through Transjordan (Graf 1997; Kennedy 2000). The Peutinger map lists beyond Petra: Zadagatta (=Sadaqa), Hauarra<sup>17</sup> and Praesidio (Khirbat al-Halde?). Between Humayma and Aqaba there are three known ancient sites: Quweira, Khalde and Kithara, for one (or two) sites named on the Peutinger map.

- 3) The road from Jerusalem to Elusa and from there to Oboda–Lysa–Gypsaria–Rasa–Ad Dianam, indicated on the Peutinger map. This corresponds with the known route from Avdat past the Ramon Crater and thence south–east past Mezad Shaharut to Yotvata (Tsfarir *et al.* 1994; Abel 1967).<sup>18</sup>

This requires brief comment:

- 1) Mayerson reconstructs the route and observes that the distance from Phara to Haila is given as 50 m. while it is in fact some 250 km. So, it is clear that at least this distance given on the map is incorrect.

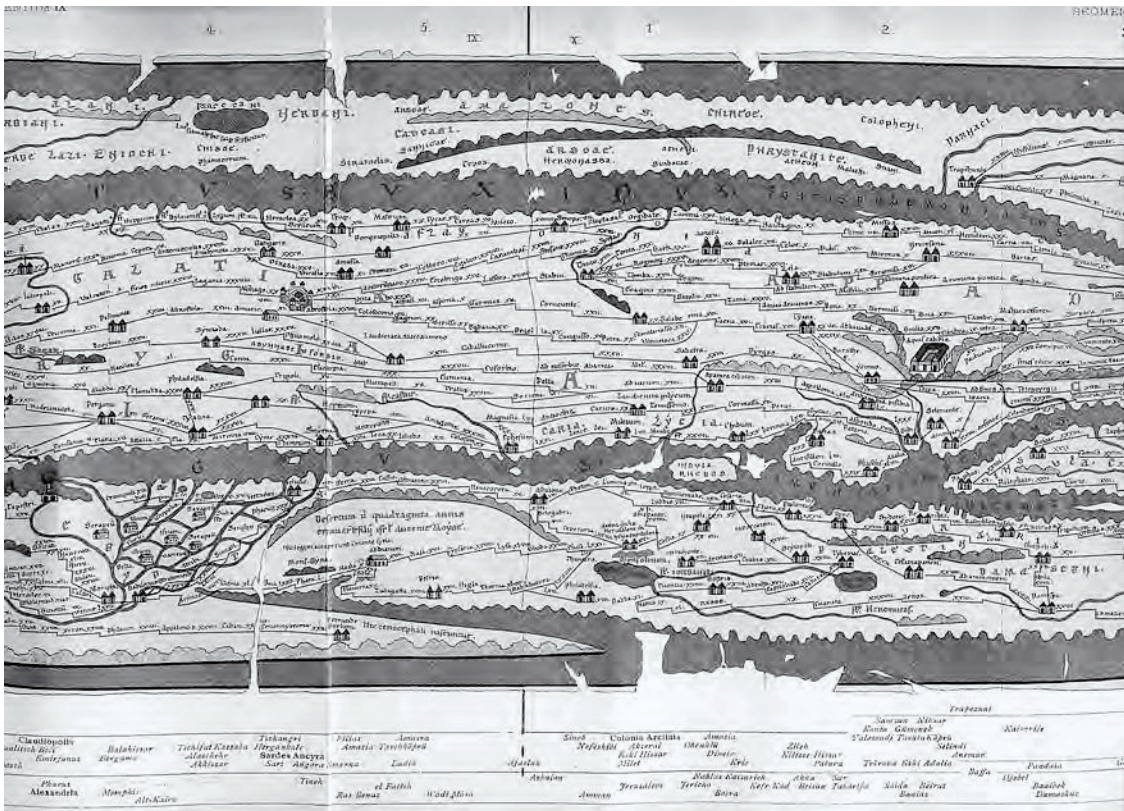


Figure 16.2: The Peutinger map.

<sup>14</sup> Calgouia is listed by Ptolemy 5.16.8.

<sup>15</sup> For Thamara/Thamaro see above and note 8.

<sup>16</sup> To judge from the vignette on the map, Ad Dianam was a more significant site than Aila.

<sup>17</sup> Auara: Ptolemy, *Geogr.* 5.16; Haura of the *Notitia Dignitatum* = modern Humayma.

<sup>18</sup> Lysa and Gypsaria are not identified with certainty, see Tsafirir *et al.* 1994, map and p. 172, s.v. Lysa; 137, s.v. Gypsaria. Both are listed by Ptolemy, *Geogr.* 5.16. Rasa has not been identified. See Abel 1967: 214 for a suggestion.

- 2) The customary identification of Ad Dianam with Yotvata is an hypothesis, based on the traditionally recorded Arabic place-name Ghadian and on the fact that it is the only significant site in the Arabah north of Aqaba/Elath. It must now be considered uncertain whether Ghadian/Yotvata is to be identified with *Ad Dianam* of the Peutinger map, for it certainly was named 'Osia' or 'Bosia' in the Tetrarchic period.<sup>19</sup> Furthermore I do not regard it as likely that the same place would have been called 'Costia' on the official Roman inscription of the same date cited above, as suggested by Werner Eck (above, note 12). It will not do simply to claim that official, local Roman inscriptions of a single period have garbled the name of a military site to such an extent. As part of a solution it has been suggested that *Ad Dianam* was in fact one of the unidentified ancient sites along the *via nova Traiana*. That solves a problem along this road, but creates another problem, no less serious.
- 3) *Ad Dianam* is a meeting point of three roads on the map, all three well identified. If we move *Ad Dianam* away from the Arabah it is hard to see how it could have been connected with road 3 here described and, besides, we would have another site (Yotvata) not listed. We must conclude that the Peutinger map here has been corrupted and all efforts at engineering create new problems instead of the ones they are meant to solve. It may be better not to try to force a decision on the ancient name(s) of the fort at Yotvata in the presence of so much uncertain or conflicting evidence.

One far more important point is certain. The Peutinger map fails to indicate a Roman road that is attested by Eusebius and has now been confirmed beyond doubt by Tetrarchic milestones, namely the north–south road through the Arabah discussed in this paper. This is all the more remarkable, since the Peutinger map lists Thamaro. Eusebius specifically mentions this as a village along the road from Hebron and Mamphis to Aila, but the Peutinger map places it on an east–west road running from Rabba on to Elusa.<sup>20</sup> The obvious explanation for the absence of this road from the map is that this road really belongs to the Tetrarchic period and was not organised as a Roman road before the late third century. This reinforces – if reinforcement were

needed – the view that the basic material of the Peutinger map for this area reflects the second-century state of affairs and is based on a source of that period (Bowersock 1983: 169–71).

It is clear now that Rothenberg was partly right and partly wrong in his conclusions. He was right in claiming that there was never a line of fourth-century *castella* in the Arabah, but there definitely was a north–south road running through it and almost certainly it was first constructed and organised in the Tetrarchic period. The existence of Roman milestones confirms that there was a public road, organised in the late third century, and the literary evidence clearly shows what were regarded as the main destinations for those travelling along the road. To the same period belong a number of military positions along the road, at least four, possibly five. There can be no doubt that construction and organisation of the road, laid out in the Tetrarchic period, was connected with the transfer of *legio X Fretensis* from Aelia (Jerusalem) to Aila (Aqaba). We should see this then as a part of the measures which accompanied the transfer of the legion to the Red Sea shore. Since the early second century there had been, of course, a road linking Aila with Transjordan, the *via nova Traiana*, as it is described on milestones. This road linked the southern part of the province of Arabia with the northern part, more specifically with the legionary headquarters and provincial centre at Bostra. Now, in the Tetrarchic period, the legion in Jerusalem was transferred to Aila on the Red Sea, and a public highway was organised through the Arabah, linking the new legionary base with the region of the abandoned legionary headquarters in Jerusalem. Aila was now linked with western Palestine as previously it had been connected with Transjordan, a conception that was expressed administratively by the transfer of the Negev to the province of *Palaestina*.

### The sources

1. Eusebius, *Onomasticon* 6.8–16 Ἀρβώ (Gen. 23: 2): "αὕτη ἐστὶ Χεβρών", κώμη νῦν μεγίστη, μητρόπολις οὖσα τὸ παλαιὸν τῶν ἀλλοφύλων ... Αἰλίας ἐκ νότου διεστῶσα σημείους β πρὸς κ.

Hieronymus 7.11–18: Arboc ... haec est autem eadem Chebron, olim metropolis Filistinorum ... distat ad meridianam plagam ab Aelia milibus circiter viginti duobus.

Arbo ... this is Hebron, once the capital of the Philistines... it is about twenty-two miles south of Aelia.

2. Eusebius 42.10–13, Βηθλεέμ (Gen. 35: 19): φυλῆς Ἰούδα, Αἰλίας ἄποθεν σημείους ἐπὶ τὰ νότια περὶ τὴν φέρουσαν εἰς Χεβρών ὁδόν,

<sup>19</sup> It is also quite unclear how the *via nova Traiana* would have reached Aila past the site of Yotvata.

<sup>20</sup> For Thamaro, spelled Θαμαρῶ, see also Ptolemy, *Geogr.* 5.16.8. It is also mentioned by the *Notitia Dignitatum* 34.46, is listed in the Beer Sheva edict(s) and appears on the Madaba Map.

Hieronymus 43.19–21: Bethleem ... in sexto ab Aelia miliario contra meridianam plagam iuxta viam quae ducit Chebron.

Bethlehem ... six miles south of Aelia on the Hebron road.

3. Eusebius 118.5–10, Κάρμηλος (I Sam 25: 2): ἔνθα ἦν Νάβαλ. κόμη ἐστὶν εἰς ἔτι νῦν Χερμαλά ὀνομαζομένη, ἣτις ἐρμηνεύεται Κάρμηλος, ἀπὸ δεκάτου σημείου Χεβρών πρὸς ἀνατολάς, ἔνθα φρούριον ἐγκάθηται.

Hieronymus 119.4: Carmelus, ubi Nabal quondam Carmelius fuit, et nunc villa est Chermela nomine, in decimo lapide oppidi Chebron, vergens ad orientalem plagam, ubi et Romanum praesidium positum est.

Carmel ... is now a village named Chermela, 10 miles east of Hebron, where a Roman garrison is located.

4. Eusebius 172.20–24, Χερμέλ (Jos 15, 55): φυλῆς Ἰούδα, κόμη μεγίστη Χερμέλ ἐν τῷ Δαρωμᾷ, ὅθεν ἦν Ναβάλ, πλησίον Χεβρών πρὸς νότον. ἔνθα φρούρια κάθηται στρατιωτῶν.<sup>21</sup>

Chermel ... of the tribe of Juda, a very large village in the Daroma, whence Nabal, near Hebron and south of it, where a Roman garrison is based.

5. Eusebius 8.7–9: λέγεται δέ τις Θαμαρὰ κόμη διεστῶσα Μάψις ἡμέρας ὁδόν, ἀπὸντων ἀπὸ Χεβρών εἰς Αἰλάμ, ἣτις νῦν φρούριον ἐστὶ τῶν στρατιωτῶν.

Hieronymus 9.6: est ed aliud castellum Thamara, unius diei itinere a Mamphis oppido separatum, pergentibus Ailam de Chebron, ubi nunc praesidium positum est.

There also is a village Thamara, one day from the town of Mamphis on the road from Hebron to Aila, where now a garrison is located.

6. Eusebius 6.17–8.5, Αἰλάμ (Gen. 14, 1): ἐν ἐσχάτοις ἐστὶ «Παλαιστίνης» παρακειμένη τῇ πρὸς μεσημβρίαν ἐρήμῳ καὶ τῇ πρὸς αὐτὴν ἐρυθρᾷ θαλάσσει τλωτῇ οὔση τοῖς τε ἀπ' Αἰγύπτου περῶσι καὶ τοῖς ἀπὸ τῆς Ἰνδικῆς ἐγκάθηται δὲ αὐτόθι τάγμα Ῥωμαίων τὸ δέκατον. καλεῖται δὲ νῦν Αἰλά.

Hieronymus 7.25: Ailat in extremis finibus Palaestinae iuncta meridianae solitudini et mari rubro, unde ex Aegypto Indiam et inde ad Aegyptum navigatur. sedet autem ibi legio Romana cognomento decima. et olim quidem Ailath a veteribus dicebatur.<sup>22</sup>

Aila is on the border of Palaestina, near the southern desert and the Red Sea, from where they sail from Egypt to India and from India to Egypt. There is based the so-called tenth Roman legion. Once it was called Ailath by the ancients.

7. AE 1986: 0699; AE 1987: 0961; AE 1990: 1015; AE 1992: 1714.

Perpetuae Paci / Diocletianus Augus(tus) et / [[Maximianus Aug(ustus) et]] / Constantius et Maximianus / nobilissimi Caesares / alam costia constituerunt / per providentia(m) Prisci pr(a)esidis [[[provinciae —]]] / [[[—]]] // Mul(tis) XX // Mul(tis) XL

## Abbreviations

AE Année Epigraphique

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cuius littore Ahila posita est, ubi nunc moratur legio et praesidium Romanorum. Cf. Ptolemy *Geogr.* 5.17.1: ἡ δὲ Ἐλάνα κόμη κατὰ τὸν μυχὸν κειμένη τοῦ ὁμωνύμου κόλπου ἐπέχει μοίρας.

<sup>21</sup> Cf. *On.* 92.20.

<sup>22</sup> Hieronymus, *comm. in Ez.* 47.18ff.: lingua maris rubri, in

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## Roman Aila and the Wadi Arabah: an economic relationship

*S. Thomas Parker*

The Roman city of Aila, now located within the modern city of Aqaba in Jordan, flourished from the late first century BC until well into the Islamic period. Located in a coastal oasis at the nexus of several land and sea routes and surrounded by deserts, Aila existed primarily to service commercial traffic between the Roman Empire and its eastern neighbours (Figure 17.1). The hyper-arid climate forced the city's inhabitants to import most commodities from some distance. Because Aila was flanked on both west and east sides by mountains, the Wadi Arabah was the easiest and most natural land route to and from it (Figure 17.2). Contrary to the views of some scholars, recent surveys have revealed significant traces of north–south roads running through the wadi, in addition to the long-known east–west routes that crossed the Arabah (for a summary, cf. Kennedy 2000: 193–94).

Recent excavations of Aila have yielded much new evidence suggesting that some specific goods most likely reached Aila via the Wadi Arabah and that products were also shipped from Aila north via this same wadi. There is also evidence that the Arabah was not only a major commercial route, but that it was also the source of essential raw materials for some of Aila's industries. The southern end of the Wadi Arabah was probably administered by Aila as a portion of its *territorium*, although the precise boundary is still unclear. But even farther north there is evidence of Aila's economic influence. In short, Aila and the Wadi Arabah were intimately connected economically. The purpose of this paper is to explore some of the evidence for this economic relationship. Although some elements of the relationship seem clear, other parts remain obscure.

Aila probably emerged as a Nabataean city in the late first century BC (for a summary of the literary and other documentary evidence on Aila, cf. Parker 1997: 20–22.) Strabo, writing in the early first century AD, explicitly identifies Aila as a *polis* or city (*Geography* 16.2.30), servicing the lucrative traffic in aromatics and other luxury products from southern Arabia (*Geography* 16.4.4). Following the Roman annexation of Nabataea in AD 106, a great trunk road, the *via nova Traiana*, was constructed from southern Syria to its southern terminus at Aila. Dated milestones attest to the completion of the road between AD 111 and 114. It is notable that the southern segment of the road,

directly north of Aila, was finished first. The strategic importance of Aila is further suggested by the transfer of a Roman legion, *legio X Fretensis*, from Jerusalem to Aila at the end of the third century AD (Eusebius *Onomasticon* 16.17–21). A group of recently discovered Tetrarchic milestones in the Wadi Arabah probably reflect road construction associated with the legion's transfer (Kennedy 2000: 193). It was still based at Aila at the turn of the fifth century (*Notitia Dignitatum* Or. 34.30). Aila remained an active commercial port through the Byzantine period until its surrender to Muslim forces in 630. It continued to flourish under Islamic rule, as evidenced by both the Roman Aqaba Project (Figure 17.3, cf. Parker 1996, 1997, 1998, 2000, 2002, 2003) and the University of Chicago excavations at the adjacent Early Islamic site (Whitcomb 1987, 1988a, 1988b, 1989a, 1989b, 1989c, 1990, 1993).

The project's regional survey of the south-eastern Wadi Arabah, conducted between 1994 and 1998, recorded approximately 330 archaeological sites (Figure 17.4). Nearly all the sites recorded by the survey were small, unobtrusive, and yielded few artefacts. Although many sites yielded evidence of occupation in the Roman and Byzantine periods, most appear to have been nomadic campsites, cemeteries, stone rings, and rock cairns. A few apparently serviced and protected traffic moving through the Wadi Arabah. Therefore, it does not appear that Aila possessed a *territorium* that could have provided significant amounts of agricultural produce for its population. Instead, the hinterland primarily seems to reflect the presence of nomadic pastoral tribes (Smith and Niemi 1994; Smith *et al.* 1997; Parker 2000: 374). In short, the evidence from both the survey and the excavations suggests that Aila was largely dependent on imports of food and most other essentials drawn from beyond the city's immediate hinterland (Parker 1997: 38–39; 2002: 421–23). This marks a strong contrast with the Early Islamic period, which witnessed the development of a substantial agricultural hinterland in the region of Yotvata by harnessing water resources through a complex system of underground water channels (see Whitcomb, Chapter 19 in this volume).

The excavations revealed that a wide variety of trade goods, including bulk commodities such as wine, oil, glass, metal, and other products, and not just luxury items, passed through the port in the Early Roman/Nabataean period (the first century BC to the

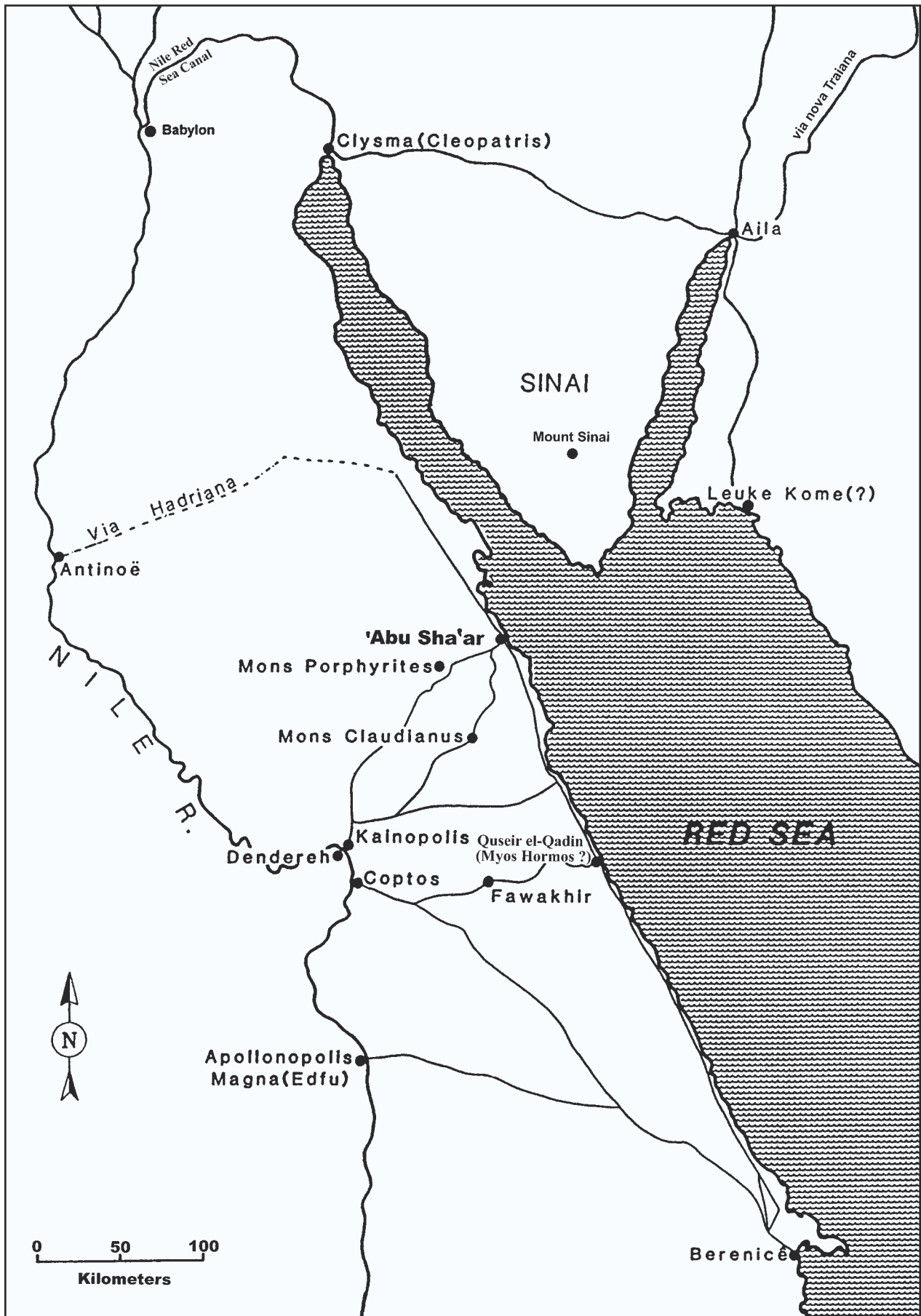


Figure 17.1: Roman ports of the Red Sea. Note the location of Aila at the nexus of several trade routes.

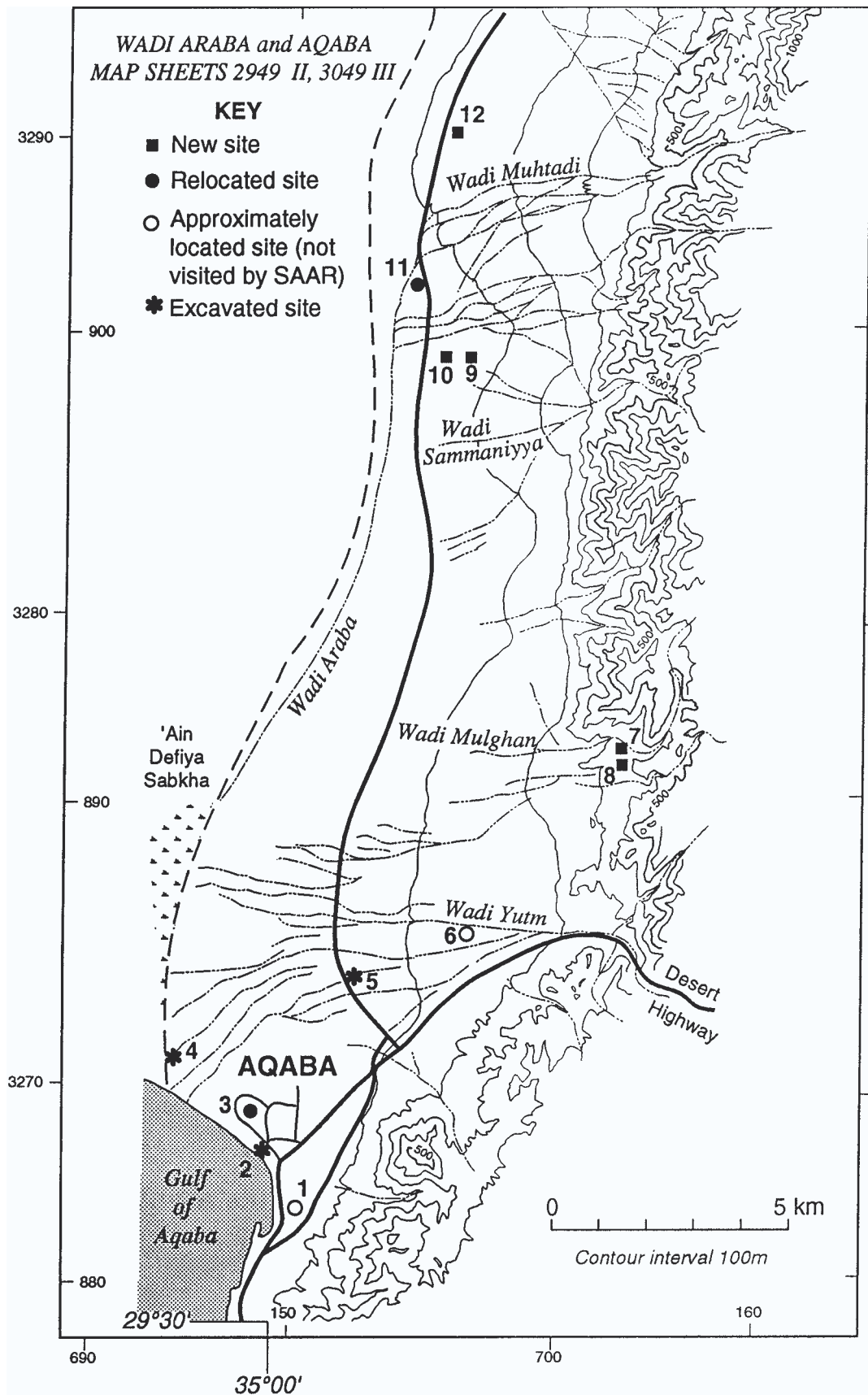


Figure 17.2: Map of the Aqaba region. Roman Aila lies between the sites marked as #2 and #3. The roads shown are major modern roads. Most of the other numbered sites are archaeological sites visited by the Roman Aqaba Project's Southeast Arabah Archaeological Survey. Only a few of the sites recorded by the survey in this region are shown on the map.

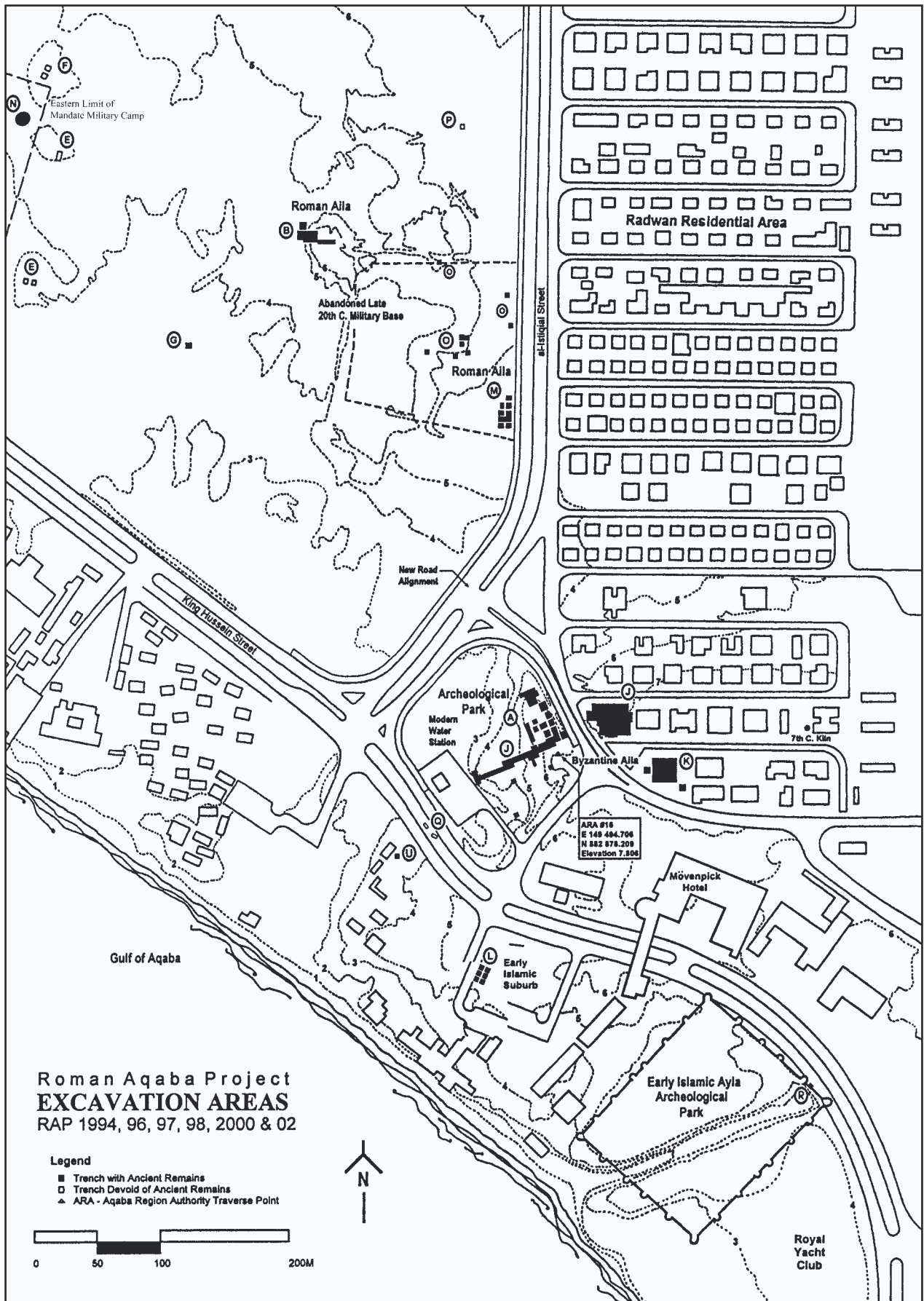


Figure 17.3: Site plan of excavation areas of the Roman Aqaba Project, 1994–2002. The University of Chicago team excavated the walled Early Islamic site near the beach.

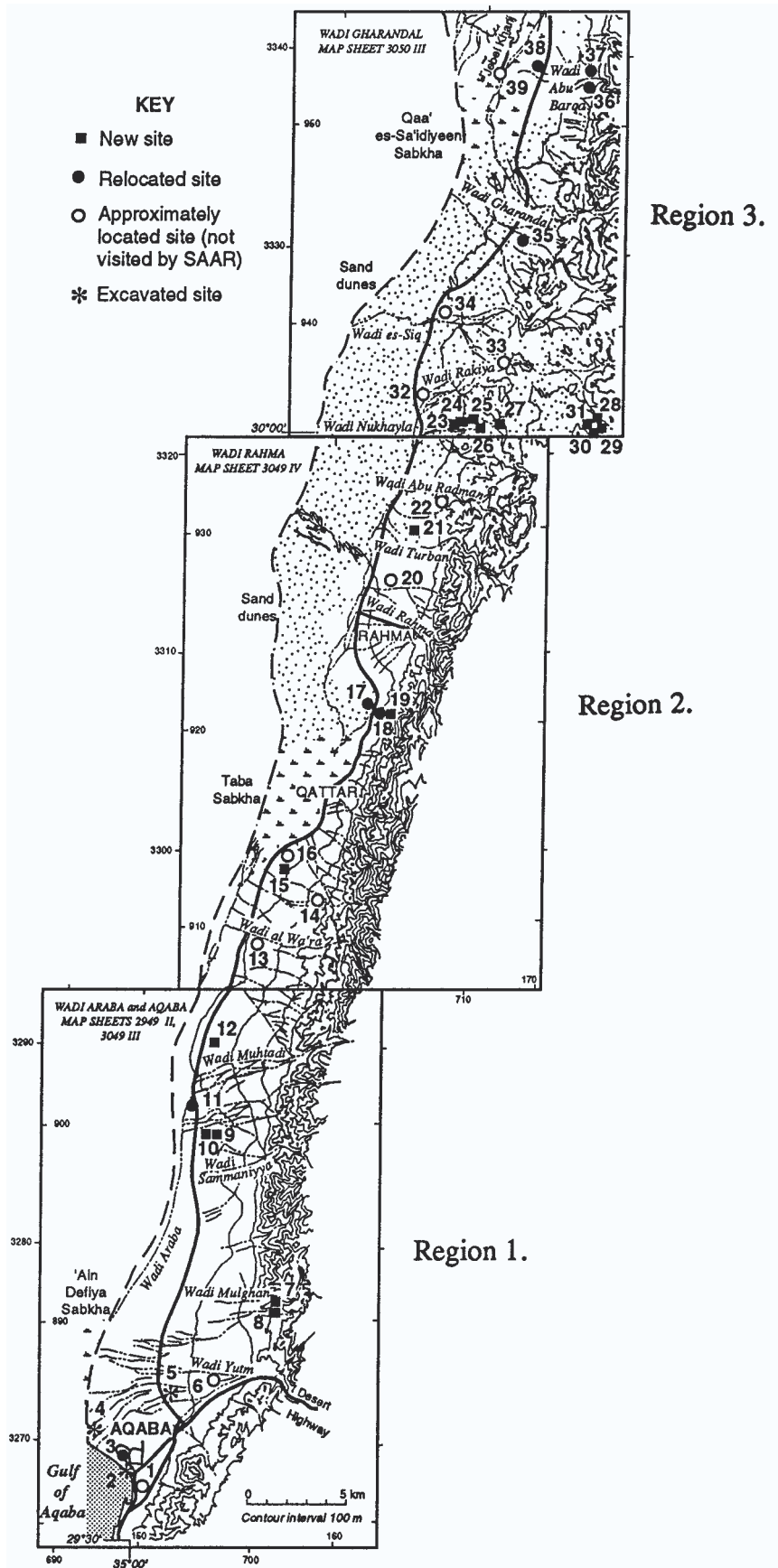


Figure 17.4: Map of the region surveyed by the Southeast Arabah Archaeological Survey, a component of the Roman Aqaba Project, between 1994 and 1998. Only a small sample of the approximately 334 archaeological sites recorded by the survey is shown.

first century AD). We must also consider products that passed through the port but did not survive in the archaeological record, such as frankincense, myrrh, spices, textiles, and slaves. The first-century AD merchant's guide, *Periplus of the Red Sea*, of course, provides some evidence about the archaeologically 'invisible' cargoes of this period. Thousands of sherds of imported pottery, such as terra sigillata and amphorae from the Mediterranean, strongly suggest that Aila was a thriving centre of commerce in this period, as also documented by written sources. The most abundant type of fine ware by far at Aila in this period is Nabataean, both painted and unpainted, produced in the immediate vicinity of Petra. The most direct route between Petra and Aila was the Wadi Arabah, although the Nabataean route that antedated the *via nova Traiana* may have offered an alternative (Parker 1997: 40; 1998: 388–89; 2002: 423–25).

The excavations also recovered evidence that Aila was not only a centre of trade, but also the base of several industries, such as pottery-making and copper-processing (about which the written sources are silent) in the Early Roman/Nabataean period (Parker 1997: 40; 1998: 389; 2000: 375, 378; 2002: 412, 423). A recently published study of the Nabataean pottery from Aila suggests that so-called 'Aqaba ware' was exported to a number of sites in southern Jordan and the Negev, no doubt partly via the Wadi Arabah (Dolinka 2003). Significant quantities of copper ore, copper slag, and several hundred copper and bronze artefacts suggest that copper from the mines in the Wadi Arabah (Hauptmann and Weisgerber 1987; 1992; Rothenberg 1993) was shipped to and in some cases processed in Aila (Parker 1997: 40; 1998: 389).

There is evidence for a significant increase in trade at Aila at the turn of the fourth century, which witnessed quantities of imported red slip table wares from North Africa, Turkey, Cyprus, and Egypt and a dramatic increase in the quantity of imported amphorae, particularly from Egypt and Gaza (Parker 1998: 388–89; 2002: 424). This suggests continued commercial connections, in some cases with distant parts of the empire. Some portion of both the fine ware and the amphorae (particularly those from Gaza) likely reached Aila via the Wadi Arabah. It is logical to associate this increase in commercial activity with the arrival of *legio X Fretensis*, although there is also evidence for a general revival of Red Sea trade in the fourth century.

By the early fifth century Aila was producing its own amphorae and shipping them the length of the Red Sea, where they are attested at such ports as Berenike on the Egyptian coast, Adulis on the coast of Eritrea, and even at Axum in modern Ethiopia (Wilding 1989: 314; Hayes 1996: 159–61). The distribution pattern of these Aila amphorae was clearly southward. To the north they are

found at Humayma (ancient Avara) (Oleson *et al.* 1995: 320, fig. 3; Amr and Schick 2001: 118, fig. 3:1) but do not seem to be attested north of Petra (Brogli 1996: 255, abb. 766–67). The identity of the specific products bottled in these jars at Aila for shipment to the south remains unclear. The excavators of the kilns for these amphorae at Aila have reasonably suggested that they were intended for Palestinian agricultural goods brought overland to Aila in some other, perhaps perishable, containers (skins? bags?). At Aila these products were then presumably transferred into the Aila amphorae for loading on ships for transport down the Red Sea (Melkawi *et al.* 1994). If so, most of the agricultural products from Palestine probably reached Aila via the Wadi Arabah. Such products from Jordan more likely reached Aila by means of the *via nova Traiana*.

Aila has also yielded significant quantities of glass. Since there is no evidence for local glass production, all the glass remains must represent imports to the site. The glass appears to be largely utilitarian, presumably for local consumption (Jones 2000). However, there is some limited evidence for imported luxury glass, including a cage cup from the early fourth-century putative church at the site (Jones 2003). Most of the glass at Aila likely derived from the famed glass factories of the Levantine coast and thus also probably reached Aila via the Wadi Arabah.

The excavation of Aila yielded some botanical remains, mostly recovered through flotation. The relative scarcity of wood and the abundance of dung suggest that timber was not readily available in the region during the Roman and Byzantine period. The one exception is palm wood, which does appear relatively often in the botanical record. The palm apparently was exploited for both construction and (along with its fronds) as fuel. But dung clearly served as the principal fuel for most purposes, including cooking (Parker 1997: 38–39; 1998: 387). In short, the botanical evidence suggests that the regional environment in the Roman and Byzantine periods was not appreciably different from modern conditions.

This in turn raises the question of where sufficient supplies of fuel were obtained to supply the city's metal, pottery and other industries. Excavation of a dump yielding deposits of charred pottery, ceramic slag, kiln wasters and charcoal reflects Aila's ceramic production in the Early Roman/Nabataean period (Parker 2000: 378; 2002: 421). Interestingly, analysis of the wood charcoal revealed that the vast majority of the charcoal derived from palm, tamarisk, and acacia. Palm wood was available locally, but at least some of the tamarisk and acacia was probably harvested from the Wadi Arabah.

Preliminary analysis of a large sample of faunal bones recovered from Aila also suggests some intriguing

results regarding the economy (Parker 1997: 39; 1998: 387–88; 2002: 422–23). Not surprisingly, fish and shellfish comprised a significant portion of the corpus. Red Sea fish are also attested at many sites in both the Negev and southern Jordan, including Petra (e.g., Lernau 1986; Studer 1994; Desse-Berset and Studer 1996). To cite merely one example: the recent Finnish excavations of the Monastery of Aaron in Petra have yielded over 4,600 animal bones. Over half of these are fish, of which 95% (parrot fish and groupers) derive from the Red Sea (Studer 2002: 169). Many such shipments of fish and shellfish northward from Aila presumably travelled via the Wadi Arabah. Hunting seems to have made virtually no contribution to the diet at Aila. The vast majority of the mammalian bones were derived from sheep and goat, with camel a significant minority. There was very limited evidence for a few other domestic mammalian species exploited for food, such as cattle, pig and chicken. A few other domestic species used principally as work animals, such as donkey, horse and dog, were present but also extremely rare. Of particular importance are the sex and mortality profiles of the caprines recovered. Preliminary analysis suggests that most of these animals were imported ‘on the hoof’ to the city for immediate consumption, rather than being raised locally. This model of importation for urban consumption is paralleled elsewhere in the Roman Empire, including Rome itself.

What were the sources of these caprines? The project’s regional survey of the south-eastern Wadi Arabah revealed evidence of a nomadic population in the Roman and Byzantine periods (Smith *et al.* 1997; Parker 2000: 374). The nomads presumably included elements of the Thamudic tribes, who are epigraphically attested in the region. Perhaps these nomads periodically visited Aila to exchange their animal products, such as meat, milk, hair, and hides, for agricultural and manufactured goods available in the city. Such trade naturally might have also included nomads from adjacent areas, such as the Hisma to the east and the Sinai to the west.

To conclude, the evidence from Aila strongly suggests a persistent and intensive economic relationship with the Wadi Arabah. The valley was exploited as a trade route for Aila’s imports and exports to and from the north. Various raw materials and other natural resources essential to the city’s economy, such as copper, fuel and food, were certainly or likely derived from the Arabah. But there remain many unanswered questions. These include the geographic extent of the Aila’s administrative control over the region, the nature of the city’s relationship with the local nomadic tribes, and the nature and sources of the content of the Aila amphorae. Clearly, the Arabah played an essential role in the economic life of one of the great international ports of the Roman Empire.

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## Were there gold mines in the eastern Arabah?

*Ze'ev Meshel*

The idea presented in this paper, which attempts to answer the above question, is based on three facts:

1. The existence of three large pillar-chamber mines (called in Arabic 'Umm al-'Amed', or U.e.A for short) near or beside ancient copper mines in Khirbat Faynan, located in the eastern Arabah (for location see Figure 18.1);
2. The existence of an important Roman historical record;
3. The positive results of the recent gold-prospecting in the eastern Arabah.

### The pillar-chamber mines

#### **U.e.A. 1 (map ref. UTM 7394 3848)**

The first note of such a cave was published in 1930 by Horsfield and Conway (1930: 372). After a short description of Khirbat Faynan they write: 'Reports of the Arabs would suggest that the copper came from Umm el 'Amamid "the mother of columns", a cave which has a small entrance and a roof supported by free-standing columns'.

The cave was first visited in 1934 by Nelson Glueck during his pioneering survey of Edom. His adventurous description goes as follows: 'We had heard about Umm el 'Amed from the Arabs. Its name "the Mother of Pillars" suggested that it might possibly be a copper mine. We had searched for it a long time and been led on many false trails before finally finding a guide in Shobek who knew where it was located. It turned out to be a large copper mine cut into the face of a sandstone cliff on the right side of the wadi, eight km. South of Khirbat Faynan...' (Glueck 1935: 89–90, Figures 18.2–18.3 here). The few other explorers who followed Glueck many years later came to the same conclusion: it was indeed a copper mine (Kind 1965; Hauptmann 1986; Lindner 1986; 1987; Hauptmann and Weisgerber 1987).

A few years ago, impressed by the descriptions of the cave as 'one of the most impressive Roman mining monuments...' and as 'a monument of the technical achievement of the Roman Imperium...' (Hauptmann and Weisgerber 1987: 427), we also visited the cave. It is much larger than expected: 112 m. long, 25 m. average

width and 1.7 m. average height. Sixty-nine irregular pillars support its ceiling, producing a very fine chamber-pillar construction of 4000 cubic metres (Figures 18.4–18.5). The pick lines left by the tools are still visible. We found that an old path ascends to the cave from Faynan and a modern prospecting track reaches it from the west. The geological setting of the cave is very important: it was cut in the earliest sandstone formation, known as the Umm Ishrin Formation (Figure 18.6) (for the geological section of Jordan see Rabb'a 1994).

Faynan is well known for its abundance of copper ore, fresh water, easy approach and gentle topography. Visiting the cave after having visited Faynan, we wondered why such enormous effort had been invested in cutting the rock and even constructing a special road ascending from Faynan (Figure 18.7). Could it have been for the copper which is a mere 0.8% of the rock's content (Kind 1965: 60)?

#### **U.e.A. 2 (map ref. UTM 7390 3839)**

This cave is located in very rough topography, 1 km. south of Cave 1 on the eastern side of Wadi al-Hejna, 30 m. above the wadi bed. Smaller than Cave 1, it was discovered by accident on a hike to Cave 1 in 1997. There is one pillar at the entrance that extends about 30 m. and widens to about 10 m. At first one has to crawl in on a high heap of dusty goats' dung, but inside you can stand and see some more pillars. No green veins or nodules could be seen (Ravek and Shemida 2000: 224–25). The geological setting of the cave is similar to that of U.e.A. 1: in the earliest sandstone formation, just above the basement (Figure 18.8).

#### **U.e.A. 3 (map ref. UTM 7206 3497)**

This cave is not near Faynan, but is to be found about 40 km. to the south, near Wadi Abu Kushaybah. The area was explored in 1964 by Kind as part of a seven-month survey of ancient mines in the eastern Arabah (Kind 1965). Between Wadis Abu Kushaybah and Abu Qurdiya he describes seven sites of mines, 'all of them for copper' (Kind 1965: 64–71, Abb. 3).

We found that the most interesting ones are his 5A and 2. Mine 5A – (U.e.A. 3) – is a pillar-chamber mine, the only one of this kind in the Wadi Abu Kushaybah area (Figures 18.9–18.10). Its western part collapsed in the

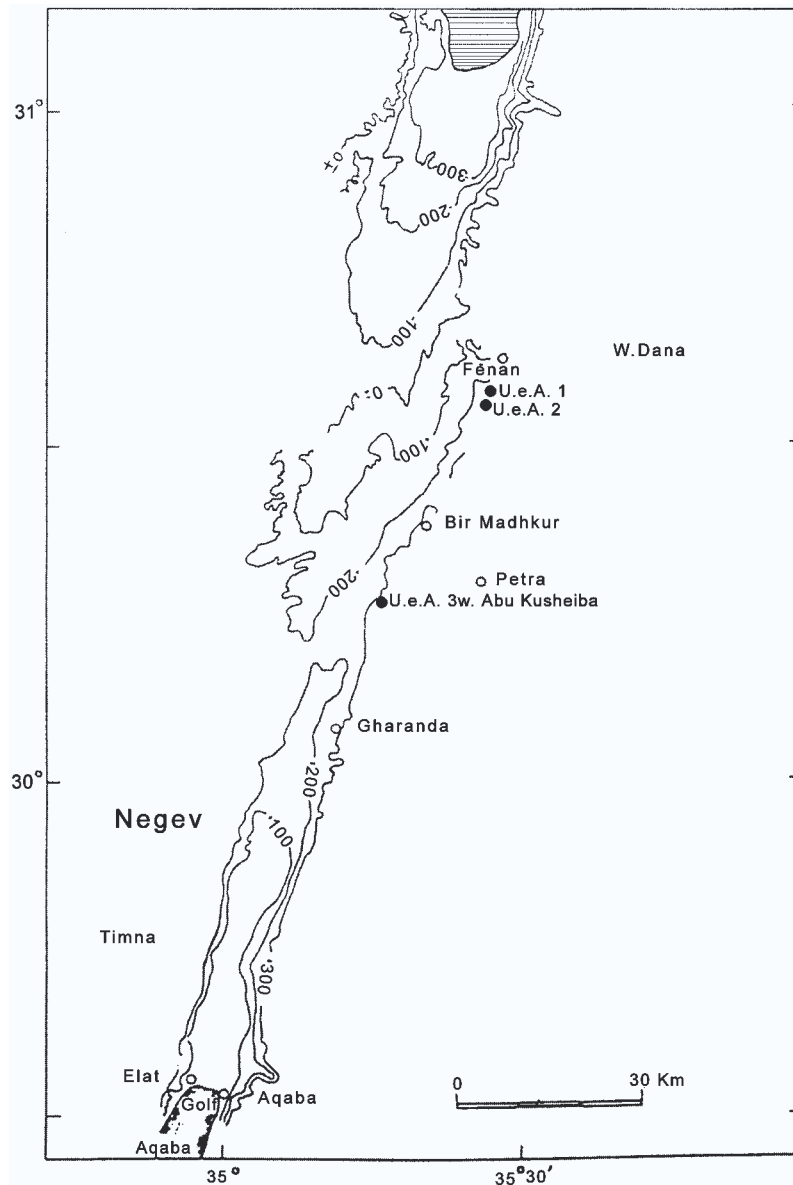


Figure 18.1: Map showing location of sites mentioned in the text.



Figure 18.2: Glueck's photo of U.e.A. 1 (from Glueck 1935: 90, fig. 34).



Figure 18.3: Entrance to mine U.e.A. 1.

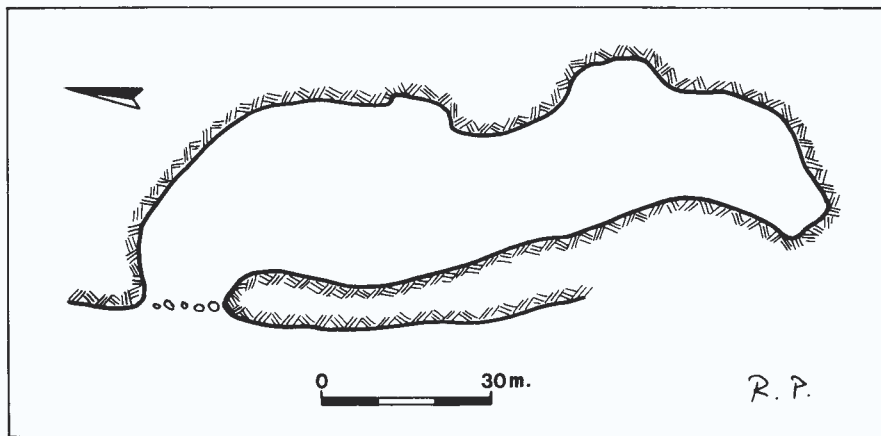


Figure 18.4: Plan of mine U.e.A. 1.



Figure 18.5: Inside mine U.e.A. 1.

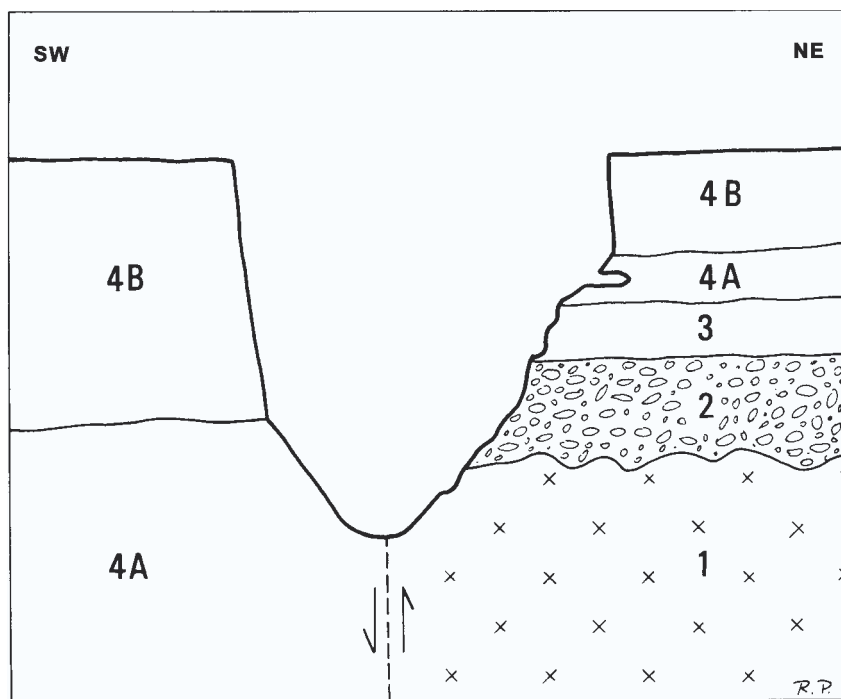


Figure 18.6: A schematic geological section of U.e.A. 1: 1) Ahaymir Volcanics; 2) Salib; 3) Burg; 4A) Lower Umm Ishrin sandstone; 4B) Upper Umm Ishrin.



Figure 18.7: The ancient road from Faynan to U.e.A. 1.

past and the roofed part is 30 m. long and 20 m. wide. Inside there are 19 pillars (Figure 18.11). In front of the cave there is a large heap of cut sandstone, full of many small green nodules containing 0.23% copper (Kind 1965: 66, abb. 5–6; here Figure 18.12). According to Kind, about 3500–4000 tons of ore, containing 0.8–0.9% copper, were quarried from the mine. '20 tons of copper, at most, were extracted here' (Kind 1965: 60).

Kind's Mine 2 is a group of four caves cut in the upper part of a white sandstone slope. There is only one

pillar in one of the caves but clear green veins are visible in all of them (Kind 1965: 66, abb. 4).

Over the past two years we visited Wadi Abu Kushaybah twice. We examined mine 5A (our U.e.A. 3), which is unique in this area. Its geological setting is similar to that of the other two – in the lower sandstone formation just above the basement (Figure 18.13). Not far from the cave a prospecting camp is now situated. A good new track leads to it, beside which is Kind's Mine 6, with three very small

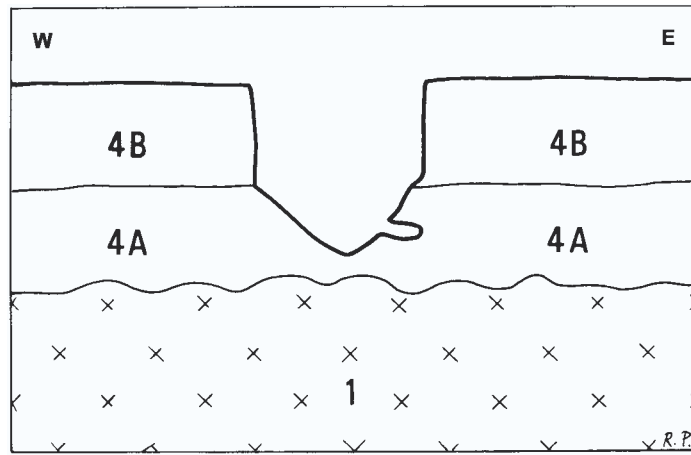


Figure 18.8: A schematic geological section of U.e.A. 2 (for numbers see caption to Figure 18.6).

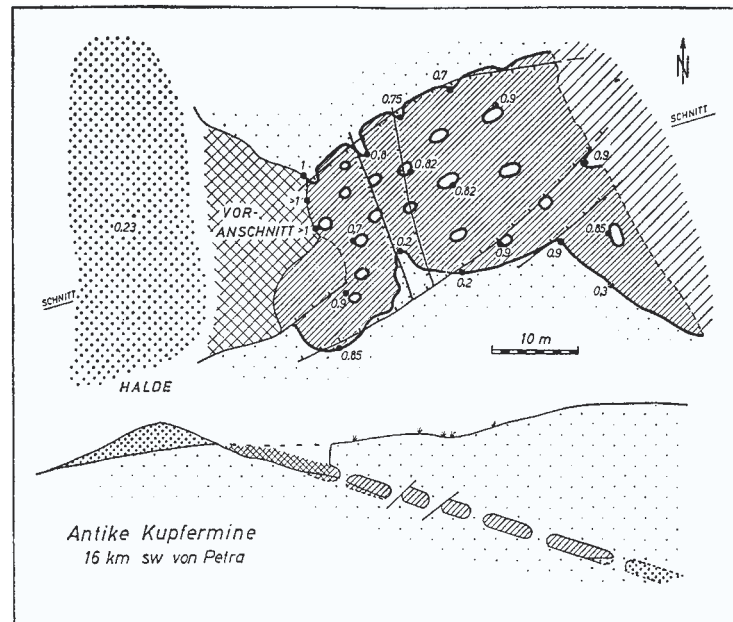


Figure 18.9: Plan and section of U.e.A. 3 (from Kind 1965: 68, Abb. 6).



Figure 18.10: Entrance to mine U.e.A. 3.



Figure 18.11: Inside mine U.e.A. 3.



Figure 18.12: The heap of cut sandstone in front of mine U.e.A. 3.

(surprising how small!) heaps of slag, and the fort he discovered (Kind 1965: 66–71).

The numerous green nodules all over the area show clearly that copper was mined here. But was copper-mining the purpose of all the mines?

The small contribution we made to the exploration of this area is the discovery of two short sections of an ancient paved road between the fort and the west–east route (today a new asphalt-paved road), which runs along Wadi Abu Kushaybah. We believe that the proximity of these three elements – the fort, the ancient road and U.e.A. 3, is not accidental. They may point precisely to the presence of the element we believe was sought here – gold.

### **The Onomasticon of Eusebius: a Roman historical record**

Eusebius, the Bishop of Caesarea, composed the Onomasticon in the early fourth century AD. Written in Greek, it is a list of place-names mentioned in the Bible and their identification with contemporary Roman sites. Biblical Punon, identified by Eusebius with Roman Phaino (today Khirbat Faynan), is mentioned four times. In connection with Biblical Di Zahab ('zahab' in Hebrew means gold), he writes as follows: 'KATA TA CHRUSEA ["at the gold mines" – this is the way he understood the Hebrew name "Di Zahab"] they are mountains full of gold ore in the desert, 11 days' journey from Mount Horeb, in which Moses wrote Deuteronomy. It is said that formerly the

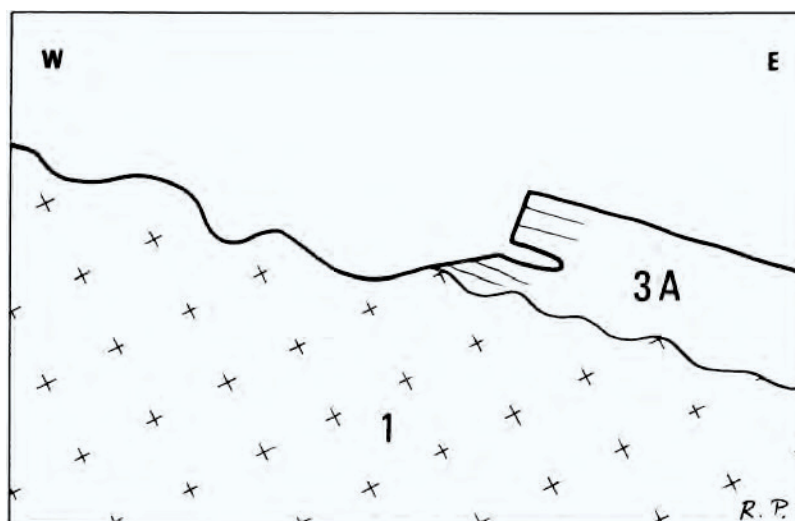


Figure 18.13: A schematic geological section of U.e.A. 3: 1) Ahaymir Volcanics; 3A) Abu Kushaybah sandstone.

mountains of the gold-mines lay beside the mines of Phainon' (Freeman-Grenville 2003: 64).

Sixty years later, in the second half of the fourth century, Jerome translated the Onomasticon into Latin. He wrote: 'CATATACHRYSEA ["at the gold mines"] these are gold-bearing mountains in the desert, eleven days' journey from Choreb, beside which Moses is said to have written Deuteronomy. Also from the copper mines at Phaenum, which collapsed in our time, they think the neighbouring mountains were once full of veins of gold' (Freeman-Grenville 2003: 64).

Is there any connection between these descriptions and, at the very least, the two caves south of Faynan? U.e.A. 3 is very similar to them, both in shape and geological setting. We believe that they were quarried using the same method, for the same purpose and in the same period. The plentiful Nabataean sherds around all the sites at Wadi Abu Kushaybah date them to the Nabataean-Roman period, fitting the above historical record very well.

### Recent gold prospecting in the eastern Arabah

In recent years the Jordanian Natural Resources Authority (NRA) has implemented a gold-prospecting project in the eastern part of the Arabah. The study area is situated 90 km. north of Aqaba, some 4 km. east of the highway, in Wadi Abu Kushaybah. Anomalous gold values were detected there, sited over felsic volcanic rocks. They retained gold values of up to 40 g/t in heavy mineral concentrates collected from wadi beds. This anomaly was consequently termed the 'Wadi Abu Kushaybah gold occurrence'. An area of some 1375 square kilometres was identified for initial prospecting with a view to determining the presence of primary and secondary gold mineralisation

(Warwick *et al.* 1996: Abstract; see also Gow and Lozej 1986; Abu Ajamieh *et al.* 1988: 97–98; Abu Laila *et al.* 2001).

In 2002, a memorandum was signed with an American company to conduct studies and to mine for gold in Wadi Abu Kushaybah (Jordan Times 2002).

### Summary

Of the three different foundations on which our theory of the presence of gold at Faynan is based, it must be said that the geological one is not the strongest: gold values were detected in the alluvial gravel of wadi beds. The sandstone formations were not examined. Alluvial deposits of gold result from the erosion and washing-away of gold contained in rocks by the action of wind or flowing water (Herrington *et al.* 1999: 12). The sandstone formations were also formed, millions of years ago, by the same process: weathering and erosion of the igneous bedrock, mainly by the action of wind.

We have shown that the U.e.A. mines were cut in the earliest sandstone formation just above the basement. Theoretically, therefore, secondary alluvial gold could have been deposited in such a formation. This phenomenon is called a 'palaeoplacer' and its best example is to be found at the Witwaterstrand mines in South Africa – the world's richest gold mines (Pretorius 1975; Roscoe and Minter 1993 (the gold there is in conglomerate beds).

It is not surprising that in the same Lower Umm Ishrin Formation copper is also present, the green nodules of which are clearly visible. It is possible that while the ancients were looking for copper, in very few places they discovered tiny signs of gold.

The uniqueness of the U.e.A. mines is a fact. Additionally, two of them are not only very near to Faynan – the richest copper-production site in the Arabah, indeed in the southern Levant – but are located in very rough topography and difficult to approach. No reasonable explanation has yet been provided as to their purpose.

The Onomasticon is considered a reliable historical record. In our view it is accurate in this case as well. Even if our theory is mistaken, the pursuit of the hidden mines of the noble metal should not be abandoned.

### Acknowledgments

We wish to thank our friends and colleagues who participated in the trips to Jordan, and at least some of whom believe that there is some sense in our idea: H. Ben-David, J. Diner (gold-prospecting consultant), I. Haviv (geological sections and mapping), A. Izdarechet, A. Kloner, G. Peli, R. Pinhas (drawing), R. Porat (mapping, photos, plans), S. Ravek, E. Raz, A. Shemida. We are deeply obliged for their assistance and counsel.

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# Land behind Aqaba: the Wadi Arabah during the Early Islamic period

Donald Whitcomb

## Introduction

One of the fundamental aspects of a city has been its definition as 'the creator of affective space', that is, an urban complex will develop a functional relationship with an economic and social territory composed of resources (agricultural and mineral), subsidiary settlements (towns and villages), and a connecting network of roads and stations.<sup>1</sup> At first glance, the historic cities antecedent to modern Aqaba seem singularly deficient in developed hinterland and thus both isolated and artificial as a normative urban centre. On the other hand, such a lack of territorial development would seem more expected for a maritime entrepot or port. The geographer Yaqubi (de Goeje 1892: 340–41) described Ayla in the late ninth century as a city of pilgrims and merchants. The dominance of these classes of occupants suggests the usefulness of the geographical concept of 'foreland', the ultimate destinations after crossing the vast steppic 'seas'. This foreland would be Cairo, Gaza (and Ramla), and Madina, that is, the provinces of Egypt, Palestine, and the Hijaz, as Muqaddasi notes (Whitcomb forthcoming). Muqaddasi further describes Ayla (or Wayla) as the 'port of Palestine' ... from which its [export] good come, and the 'storehouse of the Hijaz', the ultimate consumer in the early Islamic period, due to its wealth and prestige (de Goeje 1906: 179, I. 2–4).

On the other hand, the population of Ayla was composed of '...common people and the people remember that they were the *mawali* of 'Uthman ibn 'Affan' (de Goeje 1906: 340–41). This suggests that the people who founded Ayla were from Madina and were converts and clients of 'Uthman (himself a merchant *par excellence*). Expansion of the town meant a serious effort (and expense) in the establishment of an infrastructure for building and maintenance of this urban entity. As a city one must expect regional administrative and religious, as well as commercial roles to be highly developed.

The Aqaba archaeological project began as an effort to save an urban site located in the heart of the modern

city, one destined for immediate development in the absence of awareness of the complex architectural remains masked by an empty, undifferentiated beachfront. Excavations began in 1986 and, from 1995, conservation and research has been continued by Sawsan Fakhry of the Department of Antiquities. In addition to articles detailing the results of these excavations, preliminary studies have examined relationships to the forelands, with western Arabia (Whitcomb 1998: 403–18), with early Islamic Egypt (Whitcomb 1989a), with Abbasid Iraq (Whitcomb 1989b), and with broader ceramic connections including Palestine (Whitcomb 1990–1991). Delineation of the hinterland of Aqaba has been the initiative of Thomas Parker and the Wadi Arabah surveys (see Parker,

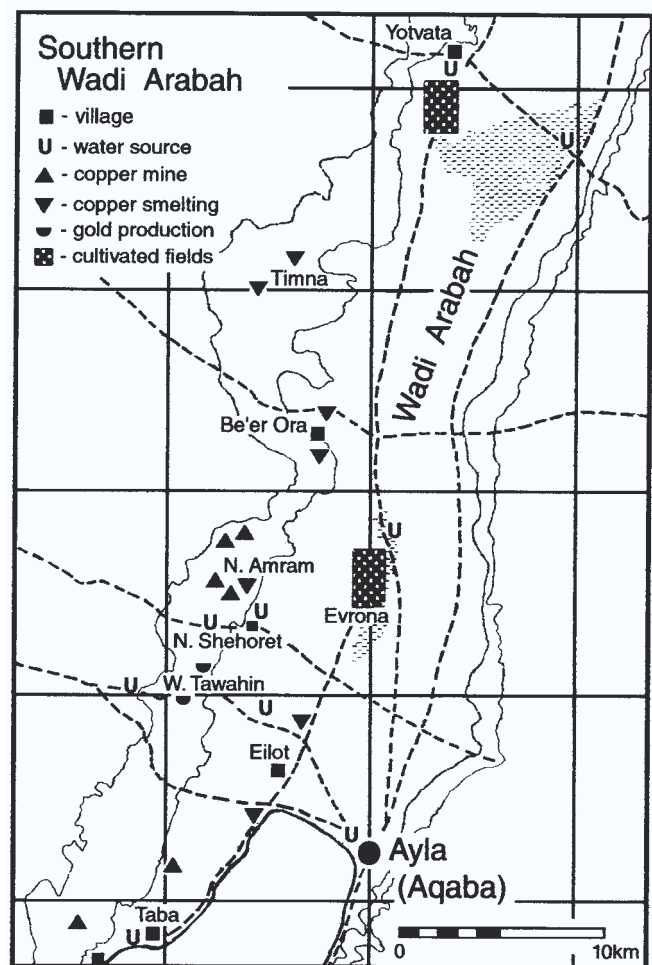


Figure 19.1: Map of archaeological sites of the Early Islamic period (after Avner and Magness 1998: fig. 1).

<sup>1</sup> This orientation toward cities and settlement hierarchy derives from the research of Paul Wheatley discussing Aqaba or Ayla (Wayla) in the Early Islamic period (2001: 290–91).

Chapter 17 in this volume). These surveys have concentrated on remains of the Classical periods, while incidentally revealing Islamic continuities associated with Islamic Ayla. The disparate evidence of Islamic periods has come into sharp focus through the efforts of Uzi Avner and Jodi Magness (1998). The following paper will attempt to retrace the brilliant synthesis of their research (Figure 19.1), shifting the perspective to that of the city of Ayla and the relevant discoveries from those excavations.

### Support for the city of Ayla

The foundation of the city of Ayla necessitated the importation of building stone for the city walls and most of its buildings (Whitcomb 2006; Figure 19.2). The only local stone is granite cobbles from the nearby mountains, which was never worked and usually used

as filler or foundations. Limestone was used for architectural elements where carved detail was desired. The actual construction of Ayla involved extensive use of sandstone, the preferred material with multi-colour veins recalling the beauties of Petra's architecture. The quarries for sandstone, the same formation as that of Petra some 60 km. north (on the eastern side of the rift), were found directly west of Aqaba at Eilat (Figure 19.3) by Avner (Avner and Magness 1998: 39) and in the Nahal Roded by Ze'ev Meshel (Meshel 1974). One may thus imagine a lively interaction bringing building materials to the site of Ayla, a location selected for its abundant and shallow resource, fresh water.<sup>2</sup>

The fame of the Wadi Arabah for its extensive copper mining and production has been noted for earlier periods (see Hauptmann, Chapter 8, and Adams, Chapter 9 in this volume). The excitement over



Figure 19.2: View of the Egyptian Gate and north-western wall of Ayla (photo: D. Whitcomb).



Figure 19.3: View of Eilat and the Wadi Arabah from Aqaba (photo: D. Whitcomb).

<sup>2</sup> Indeed, one must note that the subterranean course of the Wadi Arabah aquifer shifts toward the eastern side of the alluvial plain, passing beneath and accounting for the continuous occupation of Ayla and subsequently modern Aqaba (Cimiotti 1980).

Chalcolithic and Early Bronze production has tended to over-shadow later operations of the Nabataean and Islamic periods. Indeed, Avner and Magness (1998: 40) are able to testify that 'the ceramic evidence indicates that the *most intensive mining activity* took place during the early Islamic period'. They make reference to relative clarity obtained for non-glazed ceramics in the Aqaba excavations, specifically the isolation of Mahesh ware, styles characteristic of the later eighth and early ninth century in this region (Whitcomb 1989b). Many of the smelting centres are accompanied by small settlements such as Be'er Ora; originally thought to be bedouin camps, these may represent seasonal occupation for the population of Ayla. Direct evidence of metal processing within the city of Ayla has not been found (nor is this likely). There is indirect evidence from the congregational mosque of Ayla, constructed c. 750 and built upon a massive platform of earlier fill. In addition to clearly pre-Abbasid ceramics, the most common artefacts within this fill were cut fragments of copper, wastage of copper object production within the city.

Mining within the Nahal Roded also included gold production, specifically the processing operations at Wadi Tawahin, identified and described by Avner (Avner and Nahlieli 1993). As he notes, this production must have entailed careful governmental supervision from the city; moreover, this gold production was part of a broad industrial effort in Upper Egypt and throughout Arabia during this time period (Al-Askar 2002). The excavations at Aqaba (Whitcomb 1994: 18) were less lucky in finding evidence of this production, with one exception, a hoard of 32 dinars from the north African mints of Sijilmasa and Qayrawan. There is no evidence of minting operations at Ayla, though there is a continuing tradition of a mint at Ayla during the Fatimid period.<sup>3</sup>

Agricultural resources for maritime cities in the western Indian Ocean have always been something of a puzzle. The severe lack of agricultural potential near the great port of Siraf on the Iranian coast led Tony Wilkinson (1992: 8–9, 16) to suggest a balance with Sohar in Oman, where a case for over-production could be made. There seems little potential for agricultural activity along the coast at Aqaba in the past, as in the present, other than limited horticulture. Nor are the marine resources particularly abundant at the head of the gulf. Historical accounts (Jomier 1953) suggest that

provisions for the Hajj caravan were stocked from Gaza and stored in the fort. Such an explanation for basic foodstuffs would seem to place a severe limit on expansion of urban population, particularly for long-term occupation. This appreciation has changed with the exposition by Avner and Magness (1998: 46–49) of the evidence of qanats and cultivated fields at Evrona farm, Yotvata, and in the Uvda valley. They estimate a minimal area under cultivation of more than 600 ha. At the time of conquest, the *jizya* or poll tax was set at 300 dinars (one/adult male) or a population of 1000 to 1500. Even when added to the Muslim population of Islamic Ayla, a population well within the carrying capacity of these fields may be postulated. This assessment of a vital agricultural hinterland has been possible through the careful analysis of the qanats, by tradition a Persian (read, Abbasid?) contribution, and assemblages of coins, ostraca and ceramics indicating a consistent early Islamic chronological framework (Porath 1987).

### The population of Ayla and its region

The population of pre-Islamic Aila may be considered Nabataean tribal descendants in a town in steep decline during its latest Byzantine and Sasanian phase. When Uthman founded a new town beside the older Aila, the population was most likely imported from the Hijaz, a multi-cultural mix of south Arabian urbanites, peasantry, and bedouin, typical of the post-conquest emigrations. This relationship of urban renewal and sedentism in a widening area has been explored to great effect by Haiman (1995). His analysis turns on two aspects: a gradual penetration of Arab tribes and a slow evolution of an Islamic administration from the traditional towns. This model assumes the gradual appearance of 'foreign tribes', an ethnic population (Hijazi?) distinct from the indigenous nomad populations, who were after all 'Byzantine', or perhaps post-Nabataea Nabataeans (*pace* Shahid). The foundation of the city of Ayla clearly illustrates the organisation of its region as an 'affective space' in terms of acquisition of raw materials for building and industry, as well as the expansion of agricultural farmsteads. One may also expect, as the archaeological indicators of this period are applied to other sites, such as the complex at Yotvata (Avner and Magness 1998: 49), that a more complete understanding of the socio-economic structure of the Wadi Arabah will emerge.

### Sughar: a northern perspective

One should not leave the early Islamic period in the Wadi Arabah without a note on Ayla's companion city anchoring the northern extremity near the Dead Sea. In the tenth century, Muqaddasi described the south-

<sup>3</sup> This coin dates to 1120 (524 A.H.). Not only does this suppose a retaking of the city after Baldwin's capture in 1116, unattested in other sources, but it suggests the founding of a new mint in this damaged and vulnerable town. The origin of this identification is an entry by Lavoix, who labelled the coins as uncertain, with a possible reading of Taima. See Lavoix 1896: #436 and #437; Gil 1992: 258; and Shama 1980: 155.

ernmost district of Bilad al-Sham (Greater Syria) as al-Sharat, with its capital called Sughar. This city seems to have been a continuation of the earlier Zughar or Zoar, and the modern town of Safi. In a manner similar to Ayla, this fertile (though hot) location was a nexus of mercantile connections which prompted Muqaddasi to describe it as 'a little Basra' (Muqaddasi, *Ahsan al-Taqasim*: 178). Its industries included the cultivation of both sugarcane and especially indigo (Muqaddasi, *Ahsan al-Taqasim*: 180). Evidence of this production is found at the site of Tawahin Sukkar (Photos-Jones *et al.* 2002). Preliminary research at the site of Sheikh 'Isa (Whitcomb 1992: 232–42) indicates that part of the urban complex may still be available for archaeological research.

The city of Sughar may be considered as an organising principle for resources and settlements in the southern Ghor where it meets the coast of the Dead Sea. Numerous settlements in this area remain to be studied, as indicated by Yizhar Hirschfeld (Chapter 13, this volume). Absence of excavations means that evidence is unfocused and chronological development from at least the Classical periods into the Islamic without definition. Two general textbooks exist for this region, *The Archaeology of Society in the Holy Land* (Levy 1995), and *The Archaeology of Jordan* (MacDonald, Adams and Bienkowski 2001), both worthy compendia but lacking in cross-Jordanian syntheses. Such unification of research results would enhance Sughar and the study of the northern Wadi Arabah, just as this paper has attempted to demonstrate comparing research behind Eilat with the excavations in the site of Ayla. This is not simply a scholastic nullification of modern borders but a synthetic approach to cities and settlements, farmers and nomads, valleys and highlands which together form the historic process of regions of the Middle East.

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## Nineteenth-century travellers in the Wadi Arabah

*Eveline J. van der Steen*

Nineteenth-century travellers and explorers of the Holy Land are somewhat of a curiosity for us. We regard them with respect and admiration, and we admit that they added a great deal to the scholarship of their time. However, we also find that their knowledge and contributions to scholarship are now largely outdated, replaced by new views acquired with tools and techniques of which they could not have even dreamed: we use satellite measuring and GIS to redraw their maps, Carbon 14 to redate their sites, and Neutron Activation Analysis to analyse their pottery.

As we read their accounts, we are often glad we do not have to follow in their footsteps, riding a camel for days and weeks on end, suffering from fleas and other vermin, always afraid of being robbed or murdered by bedouin, drinking foul water and eating dry bread. Their accounts make excellent reading, and can be quite humorous. Alois Musil, for example, describes the meal he was given by a reluctant Sai'diyeh tribesman in Wadi Faynan:

...on a dirty wooden plate we were given boiled grain with butter poured over it. The burghul was full of black goat hairs and goat droppings. When we remarked on this, our host expressed the opinion that goat droppings enhanced the aroma, and goat hairs were excellent for cleaning the stomach (Musil 1907: 280; author's translation).

We admire these authors and their accounts, but if we study them at all, it is for their own sake, rather than for their contributions.

Until the nineteenth century, most of the travellers in these regions were mainly interested in identifying holy places and collecting relics. This kind of activity started with Helena, the mother of the first Christian emperor, Constantine, who found the 'true' holy cross (see Drijvers 1991 for the history of this legend). It has never really stopped.

However, by the end of the eighteenth and the beginning of the nineteenth century a new interest awoke. Napoleon's expeditions in Egypt awakened the interest of western scholars, as well as a fair amount of greed. For the first time expeditions were prepared with the express purpose of collecting scientific information and archaeological treasures from the holy land.

Most of these expeditions tended to focus on the west side of the Jordan, and of course Egypt. The east side of the Jordan, as well as the Wadi Arabah, were still *terra incognita*. They had fewer holy places to offer, and were considered dangerous country (Kinglake 1879: 157ff; Irby and Mangles 1868: 102).

Map-making was a main objective of these expeditions of exploration. Existing maps focused largely on the holy places, and the actual geography remained elusive. A map from 1686, the 'Totius Terrae Sanctae Delineatio', designed by P. Cluver, shows a mountainous area between the Dead Sea and the Red Sea, with the route of the Children of Israel meandering through it (Figure 20.1). In fact, the only reason the region south of the Dead Sea was included at all was because of the Israelite wanderings in the desert. On another map of the Dead Sea, by a Dutch mapmaker named Petrus Schenk, from 1792, Edom lies to the south-west of the Dead Sea, and consequently the Wadi Arabah would run due west (Figure 20.2). In the southern end of the Dead Sea itself the cartographer writes: 'According to D'Anrillen and Bachiene the Dead Sea runs east here, but according to Busching and others it runs west. This is still uncertain' (author's translation).

These were the maps with which the first nineteenth-century travellers had to work. In fact, in the days of Burckhardt, the existence of the Wadi Arabah was unknown to western travellers (Burckhardt 1822: vi). It is no wonder that Burckhardt states: 'The existence of the valley El Araba.... appears to have been unknown both to ancient and modern geographers, although it forms a prominent feature in the topography of Syria and Arabia Petraea. It deserves to be thoroughly investigated' (Burckhardt 1822: 443).

However, for us the most important contribution of these travellers was not their geographical discoveries, important as they were at the time, but their description of daily life. They tell us about a society that is lost to us, but that was still flourishing when Seetzen and Burckhardt travelled the country, and even in the time of Musil. These travellers describe a world in which the political and social organisation was determined by tribal interaction and kinship structures. They describe a regional economy dependent on agriculture, pastoralism and trade, all of which were controlled by a limited number of powerful tribes, who often 'employed' smaller, dependent tribes.



Figure 20.1: Detail of P. Cluver's 1686 map 'Totius Terrae Sanctae Delineatio', showing the region between the Dead Sea and the Red Sea.



Figure 20.2: Detail of Schenk's 1792 map of the Dead Sea, showing the southern end of the Dead Sea.

The recording by these nineteenth-century travellers of their necessary daily dealings with this society, the observations they made about the daily life, skirmishes over power and territory, and social organisation of the tribes, turned them into ethnographers '*avant la lettre*', recording a society that has since ceased to exist.

These travel accounts need to be viewed with a critical eye. Most of the travellers had various axes to grind. Both John Lewis Burckhardt and Ulrich Jasper Seetzen, who made several trips through Jordan at the beginning of the nineteenth century, did so to perfect their disguises as Arabs, in order to be able to explore the interior of Africa. Neither of them reached their goal: both died before they could travel into Africa. However, while living as Arabs in the Levant they both acquired an intimate knowledge of Arab society east of the Jordan, which they described in detail. Other travellers, such as Irby and Mangles, Robinson and Palmer, were merely interested in finding and describing antiquities. Their dealings with the tribes were a necessary evil for them, an attitude reflected in their accounts. Nevertheless their observations, however biased, are valuable, because they reveal the hegemony of the tribes. If we can see through the anger and irritation, we can observe the power structures in the region through their eyes. Finally, Alois Musil, who travelled at the end of the nineteenth century, belonged to a new generation of travellers, who were genuinely interested in and studied the customs and habits of the local population. He lived with the Rwala bedouin, and was the first to use photography extensively as a tool in his research. He published a volume dedicated to the Rwala, as well as an '*ethnologischer Reisebericht*'.

The first traveller to investigate the Wadi Arabah was Ulrich Jasper Seetzen, in 1807. Seetzen was a German scholar and collector. He actually crossed the wadi only once, in 1809, and his notes of that expedition are lost. He never even drew his own maps; his editor drew them long after he died. However, he collected information regarding the wadi from his bedouin guides and hosts, especially about the topography, the inhabitants and the economy. When he was staying with the Bani Hameide in Wadi Mujib in 1807, he heard them tell stories about their *ghazus*, which extended to the region of Gaza (Seetzen 1854–59/II: 346). The Hameide territory was largely south of the Wadi Mujib, although Seetzen found some of their tents north of the wadi. He travelled south with a Hameide guide, following the Dead Sea coast line, in constant dread of the Huwaytat, who also roamed here and had a feud with the Bani Hameide. In the village of Ghor Mezra'a, Seetzen met Sheikh Hammada of the Ghawarnah. The territory of the Bani Hameide ended here, and the Ghawarnah took over as his protectors. The Ghawarnah lived in Ghor Mezra'a and Ghor

Safiyeh at the south end of the Dead Sea, and cultivated indigo, which they exported to Egypt. They were on good terms with the Huwaytat, who controlled the Wadi Arabah and the Shera. Hammada was Seetzen's first source of information about the Wadi Arabah. He took Seetzen from Ghor Mezra'a to Ghor Safiyeh. Interestingly, they came across a group of Bani Sakhr tribesmen, who were grazing their camels here. The aggressive Bani Sakhr had their territory much further east and north, but one of their branches, the Ka'abene, occasionally grazed in the Wadi Hasa, as Robinson would later observe, and even west of the Dead Sea. It is also possible that these Bani Sakhr were on their way to rob the Huwaytat, with whom they were at constant odds.

Seetzen (1854–59/II: 355), basing himself on the information given to him by Sheikh Hammada, describes the territory of the Huwaytat as extending from the south end of the Dead Sea to Aqaba and Ma'an. Hammada traded cereals with the Huwaytat, and travelled regularly in their territory. Seetzen's description of the Wadi Arabah as a broad plain that started at the south end of the Dead Sea and ran all the way to Aqaba was based on Hammada's accounts. Especially on the east side, there were many springs and wadis, at which points the soil was very fertile. Another curiosity, mentioned by Hammada, was the presence of several ruined khans along the foothills of the eastern mountains, which led Seetzen to conclude, first, that there must have been an ancient road to the south here, and second, that the region between the Ghor Safiyah and Aqaba was hardly as neglected as he had originally thought.

Relations of different sorts prevailed on the east–west axis through the Wadi Arabah. Mentioned above are the *ghazus* that the Hameide conducted in the Gaza region. At the same time, there were regular trade relations between the people from Hebron and the villages on the Jabal: Tafila, Busayra and Shobak. The following spring, when Seetzen undertook a trip into Sinai, he found *duwars* of the Huwaytat south of Hebron. They pastured their camels, sheep and goats here in spring, under the protection of the Tiaha, whose territory this was (Seetzen 1854–59/III: 10).

During Seetzen's stay in St Catherine's monastery, the leader of the local bedouin tribe provided him with the names of all the tribes east and west of the Wadi Arabah (Seetzen 1854–59/III: 101). Among the western tribes south of the Hajj road were the Sawalha, the Hewat, the Tiaha, the Terabin et-Tur, the Mezene and the Jabaliyeh, who lived around the monastery.

North of the Hajj road were the Qais (who probably claimed descent from the legendary tribe of that name), Azazma, Tiaha, Huwaytat and Bani Okba, Arab al-Ghor, Sa'idiyyin, Bani 'Atiyya and Uhedat.

East of the Wadi Arabah the sheikh mentioned, among others, the Imran, Maaze, Hokuk and the Alawin. He did not mention the ubiquitous Huwaytat by name. The Imran and the Alawin were Huwaytat sub-tribes, however, and as such were included in the list (Oppenheim 1943: 159). The Huwaytat also figured in the list of tribes that lived in Egypt, and according to tradition they actually had an Egyptian patriarch.

Seetzen summed up the differences he noticed between the Arabs from east of the Wadi Arabah and those of the west. Some of these differences may have been accidental, or specific to the different tribes he met, or even to the season in which he travelled. However, one difference between the two regions was obvious: the Sinai Arabs were much poorer than the eastern Arabs, they did not practice agriculture, and they had few cattle.

John Lewis Burckhardt (1822; 1830) was hired by the Association for Promoting the Discovery of the Interior Parts of Africa, in London. He was to travel to Africa disguised as an Arab merchant; his travels through Syria and Arabia were mere preparation. He

never got to Africa, but he did discover Petra, for which he became famous. His map is the first on which the Wadi Arabah appears (Figure 20.3).

Burckhardt’s observations about the bedouin tribes are very detailed. His *Notes on the Bedouins and the Wahabis* is a first-hand source of information on tribal territories, power relations and economic relations. Burckhardt was a witness to the wars between the Wahabis and Mohammed Ali Pasha of Egypt, and his account of the movements of the tribes in these wars is invaluable.

Burckhardt and Seetzen were practically contemporaries, although they never met, because Seetzen died about the time when Burckhardt started his travels. However, Burckhardt was well aware of the exploits of his colleague, even though his diaries were not published until 1854. Burckhardt’s observations about the Wadi Arabah match those of Seetzen: the Huwaytat ruled the Shera and the Wadi Arabah (Burckhardt 1822: 403, 412), and the Tiaha controlled the west (Burckhardt 1822: 481, 560). However, the tribe of the Hajaja, which Seetzen had encountered on the Karak Plateau (Seetzen 1854–59/II: 322, 366), was now gaining increasing



Figure 20.3: Detail of the map in Burckhardt’s Travels in Syria (1822) – the first map to show the Wadi Arabah.

power in the northern Jabal (Burckhardt 1822: 403; 1830: 16). This change in territory may have been partly caused by the politics of the Majali tribe of Karak, who were the ruling tribe on the Karak plateau, and who successfully expelled or subjugated every tribe in the region. When Burckhardt travelled down from Karak in 1812, Sheikh Yusuf Majali actually served as his guide (Burckhardt 1822: 395 ff). Between the Huwaytat and the Bani Sakhr to the north-east a constant state of raiding and robbing prevailed. Both tribes regularly penetrated each other's territory and drove off as many camels as they could lay their hands on, sometimes several thousand at a time. In Burckhardt's time, the inhabitants of Ma'an Hijaziye were allied to the Bani Sakhr (Burckhardt 1822: 410) and consequently at war with the Huwaytat. The other villages of the Jabal and Shera, however, including Ma'an Shamiye, were under the protection of the Huwaytat, who had actually built 'castles' or towers in several of them (Burckhardt 1822: 407, 410).

The economy of the region was largely determined by the trade between the east and west: local products were transported to and from Gaza on a regular basis, and Burckhardt found merchants from Hebron in most villages. The main event in the region was the annual Hajj: the markets that were held during the two days when the pilgrims passed on their way to Mecca, and the two days when they returned, could sustain families for a whole year (Burckhardt 1822: 436–37; Wallin 1979: 9). Burckhardt observed that since the Hajj had ceased in 1803, owing to the wars with the Wahabis, this prosperity was now in serious danger.

The Huwaytat also organised large trade caravans through the desert to Egypt, and it was with one of those that Burckhardt crossed the Wadi Arabah, through the southern Wadi Gharandal, a regular crossing place for caravans. The springs of Gharandal were a much frequented camping place in winter. However, when Burckhardt crossed the wadi, it was August, and consequently he saw no trace of human activity except some bedouin burial sites on the eastern descent. He noticed that, unlike the eastern hills, the western side was dry and devoid of activity. In winter the several wadis were used as camping places for tribes from Hebron and Gaza; that was all. The crossing of the wadi took an hour and a half.

A few years after Burckhardt, in 1818, two British navy officers, Charles Irby and James Mangles, published an account of their trip from Hebron to Karak and Petra (Irby and Mangles 1868: 102–23). They did not travel in disguise, but openly and as foreigners. Their intended visit to Petra throws an interesting light on the power relations in the region. The local authorities refused to give the travellers a travel permit for Petra, primarily, it seems, because they had no control over the tribes there, and did not want to be held responsible for their

well-being if they went there. Eventually, Irby and Mangles went to Hebron, where they procured a letter from the local sheikh for the sheikh of Karak, the same Yusuf Majali who had guided Burckhardt six years earlier. Relations were usually good between Karak and Hebron, because Hebron traders resided in Karak, and its leading tribe, the Majali, were originally from Hebron. The trip to Petra almost resulted in a tribal war between the tribe that controlled the Petra area and the tribe headed by Abu Rashid from the Shobak region, under whose protection the party had placed themselves.

Irby and Mangles did not give the names of these tribes, but Edward Robinson, who travelled the region in 1838, found many of the groups involved still present, and provides their names. Both groups were sub-tribes of the Huwaytat: the Bedun (or Bedul) who lived around Petra, and the Abu Rashid from Shobak (Robinson 1874: 155 ff; but see Russell 1993: 16–20). He even met the sheikh of the Bedun who had opposed Irby and Mangles' visit. The sheikh was an old man by then, and instead of trying to start a new war he demanded an enormous payment from Robinson.

These accounts show that in the first half of the nineteenth century the region east of the Wadi Arabah was considered, both by the Turkish authorities and by the western tribes (especially the Jehalin, whose territory was west of the Dead Sea), as a dangerous and wild area, mainly owing to the presence of several aggressive tribes. At the same time, there were friendly relations between Karak and Hebron, and trade through the wadi between the Shera and Egypt, mainly conducted by groups of Huwaytat, the masters of the Shera.

The time in which Robinson travelled the region was a rare period during which it was under government control. Ibrahim Pasha had temporarily subjugated the tribes, to such an extent that even the Huwaytat and the Bani Sakhr paid tribute. Nothing indicates, however, that the government interfered with the internal affairs of the tribes in this region. The territorial divisions were not much different from the time of Burckhardt, with several sub-tribes of the Huwaytat sharing the territory of the Wadi Arabah and the Shera, and the Hajaja controlling the Jabal. Robinson noted that the Hajaja, who were still expanding, had now firmly established themselves in the northern Jabal. In the region of the Wadi Hasa there were some groups of Ka'abene bedouin (a branch of the Bani Sakhr). Other groups of Ka'abene lived west of the Dead Sea. The latter were on good terms with the Jehalin, who, as noted, controlled the region west of the Dead Sea, and actually intermarried with them, according to Robinson's informants. The eastern Ka'abeneh, on the other hand, had a feud with the Jehalin. It is clear that the tribes of the region viewed

the Wadi Arabah both as a convenient border between territories, and as a bridge and a point of contact.

In 1845 a Finnish traveller, George August Wallin, on his way to Jauf, crossed the Wadi Arabah from west to east, along the southern Wadi Gharandal, using the same pass that Burckhardt had taken 33 years earlier (Wallin 1979: 6 ff). Wallin made some interesting observations regarding the economy and tribal organisation of the region.

He observed, first of all, that Ma'an was a town completely dependent on the trade with the bedouin, and once a year with the Hajj pilgrims. The merchants of Ma'an bought goods in Gaza, Hebron and Aqaba that they traded or sold at a good profit to the bedouin and pilgrims (Wallin 1979: 8). They mainly provided the bedouin with clothes, gunpowder, lead, weapons, coffee and spices, which they exchanged for sheep, wool, butter and milk. Regarding tribal territories, Wallin observed that the Huwaytat had extended their presence into southern Sinai. They were now the largest tribe in the region. At the same time there were a number of different tribes and sections of tribes dwelling in the Shera mountains: the Rwala and Naif, both tribes of the desert confederation of the Anaze; from the south came Sherarat, pushed out of Wadi Sirhan by the growing power of the Shammar, and clans of the Bani Sakhr lived around Shobak. Some of these movements may have been seasonal, but some also seem to have been more permanent. The Hajaja were still masters of the Jabal, and controlled Tafila.

In 1870, when Edward Palmer, a scholar of the Palestine Exploration Fund, crossed the Wadi Arabah on his way to Petra, he noted that the prosperity of Ma'an was declining. Palmer blamed this on the diminishing trade, which was gradually being replaced by sea trade, and on the fact that the Ottoman government did nothing to control the region and safeguard the trade routes. His descriptions of his travels from west to east through the Sinai and the Wadi Arabah and of his dealings with the different tribes are enlightening. West of the wadi he came across physical evidence of the contacts between east and west, in the form of way stations for the caravan trade (Palmer 1871: 405). Palmer observed that the Wadi Marrah, which runs east into the Wadi Jereifeh and so into the Wadi Arabah, was marked with stone heaps, each of which commemorated 'incidents of Arab warfare', places where warriors or their horses fell, or entrenchments used in the battles. This was the wadi, he was told, through which the eastern tribes made their incursions into Azazmah territory (Palmer 1871: 416). These raids were very common, and usually went in both directions.

According to Palmer, the tribes east of the Arabah were involved in a war, which made his travelling north

from Wadi Musa dangerous. It is difficult to judge whether the conflicts between the tribes were really as bad as Palmer suggests, as it is clear from his accounts that he had little sympathy for the bedouin, and considered them hardly more than savages. He may well have exaggerated, or at least to have put his impressions in the worst possible light. The feud of the Jehalin with the eastern tribes was long-standing, and had been described by numerous travellers before Palmer. The territorial divisions were more or less the same as they had been: the Hajaja were still on the Jabal, and the Huwaytat controlled the Shera and the Wadi Arabah.

Towards the end of the nineteenth century the Czech Alois Musil travelled the region extensively, for the purpose of making ethnological observations. He published accounts of his travels, wrote a volume about the ethnology of the region, and published detailed maps (Musil 1907–1908). His masterpiece was a volume on the manners and customs of the Rwala Bedouin (Musil 1928). He also took and published many photographs.

Like Palmer, Musil blamed the decline of the region on the diminishing trade, a direct result, according to his informants, of the Suez Canal (Musil 1907: 38). However, trade between Ma'an and Gaza seems to have been flourishing in his day (Musil 1908a: 204; 1908b: 56).

At the end of the century the territorial divisions were still largely the same as they had been 30 years earlier: the Hajaja continued to control the Jabal and the Huwaytat were the masters of the Shera and the Arabah. Skirmishes between east and west were still common. Wadi el-Marra, where Palmer had seen the remains of the incursions of the eastern tribes, was still the stage for regular invasions of the Hajaja, especially at harvest time (Musil 1907: 169, 188). Wadi Jereifeh, further to the east, was the favourite battleground for the Ma'aze and the Hajaja, when they came to raid the Sa'idiyyin. But he also came across the remains of battle grounds further south (Musil 1908a: 181). In 1896, the same year in which Musil made his first effort to travel east through the Wadi Arabah, the Huwaytat organised a major raid on the Terabin and Tiaha of the Negev. That same year had seen a dry winter, which caused some of the smaller, 'wild' tribes to stay longer in the Wadi Arabah, in search of water and pasture (1907: 225), and others to travel north or to Egypt, crossing the wadi. Groups of a Huwaytat tribe, the Ibn Jazi, from Shera, now camped in Tiaha territory on the west (1907: 237). In periods like these, the Wadi Arabah was a notoriously dangerous place. In fact, Musil considers it to be one of the most dangerous places to travel (1907: 190, 193), especially the regions close to the water wells.

## Conclusions

These accounts and stories make it clear that there were significant differences between the east and west sides of the Wadi Arabah, not only in topography, geography and ecology, but as a consequence also between the populations – if one can speak of an actual population on the west side. The main population on the east side was concentrated in a relatively narrow strip on the edge of the western plateau of Edom. This region has a relatively high annual rainfall (200–400 mm., MacDonald 2000: fig. 4), as well as high fertility. This was the location of the villages and towns, populated by fellahin under the protection of several main tribes, roughly the Huwaytat in the south and the Hajaja in the north. Social organisation was complex, and the power relations were clear: the Huwaytat and the Hajaja controlled the region, and the smaller tribes, many of which were at least partly settled and considered fellahin, were subject to them and paid them *khawa*. This situation was fairly stable throughout the nineteenth century, despite skirmishes and occasional wars. The power of the main tribes was practically absolute during most of this period, with the exception of the short reign of Ibrahim Pasha in the 1830s, and again towards the end of the century, when the Ottoman government finally got a foothold in Karak, from which they could control the southern regions more effectively. The economy of the region was a combination of agriculture, pastoralism and trade, again largely controlled by the main tribes, but at the same time strongly determined by the international east–west trade between Arabia and Egypt, and especially by the annual Hajj. The demands created by the trade and by the Hajj induced the production of a surplus, as well as creating smaller scale trade, between Karak and Ma'an, or Gaza and Ma'an, for example.

There was nothing to match this situation on the west side of the Wadi Arabah. Rainfall was significantly lower there; it was for all practical purposes the eastern end of the Negev desert. The west side of the Wadi Arabah was part of the territory of the Tiaha, the Terabin and the Azazmeh, and a number of smaller tribes, which had no particular interest in the Wadi Arabah or the region. They were largely nomadic, occasionally camping in the eastern wadis to feed their camels, sheep and goats, and sometimes cultivating small patches of land for subsistence. Their economic interests focused on the towns to the north and west: Gaza and Hebron, and the springs of Beersheba.

In a sense, therefore, the Wadi Arabah was a border between two completely different regions in terms of ecology, economy and tribal territory.

At the same time, the economic interests of both the Shera and Jabal, and the town of Gaza, as well as the

east–west trade route between Egypt and Arabia linked both sides of the wadi and turned it into a bridge between east and west. Several much frequented passes traversed the wadi, usually connected with springs: one by Gharandal, south-west of Petra, one further north, going through the Wadi Merzaba past the springs of Weybeh, and it seems that the famous Scorpion pass was also still used. Control of the wadi, vital for the flow of traffic between east and west, was in the hands of the Huwaytat, who consequently also controlled the trade itself.

There seems to have been little north–south traffic through the wadi, partly because the controlling Huwaytat sub-tribes had turned it into a dangerous region, and partly because the route over the eastern highlands was more comfortable and offered better conditions. On the other hand, in winter and spring the wadi was heavily populated by tribes coming to feed their flocks. This was considered the most dangerous period to travel through the wadi.

Apart from regular trade, a fair amount of robbing and raiding also took place between east and west. The major tribes, the Huwaytat, the Tiaha and the Terabin, were generally on good terms with each other (although Musil mentions a major raid by the Huwaytat on the Tiaha and Terabin: this seems to have been an exception), largely because they shared economic interests. Among the smaller tribes, however, the relationships between east and west seem often to have been marred by feuds. It seems therefore that the function of the wadi depended on scale: for the major, large-scale economy, based on international trade, the wadi was a bridge. For the smaller tribes, whose territories and interests were limited to one side, it served both as a border and a convenient barrier when needed.

The importance of the accounts of the western travellers describing the region is that they give us eye-witness information about the relationships between the tribes, about their economy and about the intertribal social organisation. They are, in fact, the only source of information about this social, political and economic system, which had already started to disappear in Musil's day. Musil travelled the region at the very end of an era. In this region, the First World War was still largely fought and won by the bedouin tribes, but later they felt betrayed by the western powers, and overruled by a new society.

The value of the sources discussed varies according to the background of the writer. Seetzen, Burckhardt especially, and later Musil had a thorough understanding of the social organisation of the tribe, and of intertribal relationships. Other travellers, such as Irby, Mangles and Palmer, made their observations with

more western eyes. They actually travelled as westerners, which strongly influenced not only their observations, but also the behaviour of the tribes towards them, and consequently the nature of the information they received. Irby and Mangles almost started a tribal war, simply by being there, and being westerners. Nevertheless, as noted, the information these travellers have left us is extremely valuable since it is the only first-hand information that we have.

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## Relations between bedouin tribes on opposite sides of the Wadi Arabah, 1600–1950

*Clinton Bailey*

The great rift of the Wadi Arabah served as a point of orientation and differentiation between the bedouin tribes that lived, respectively, to the east and west of it, from the beginning of the seventeenth century AD until the mid-twentieth century.<sup>1</sup> To the east and south-east (the northern Hijaz) were the 'Amarin, Bani 'Ugba, Bili, Huwaytat, Ma'aza (also called Bani 'Atiyya), Majali, Masa'id, Sa'idiyyin and 'Umran confederations.<sup>2</sup> To the west, in both Sinai and the Negev, the tribes that had contact with any of these latter were the Aheiwat, 'Azazma, Muzayna, Tarabin, Tiyaha, Wuheidat and Zullam. Three of the above tribes also had grazing land and oases in the Arabah: the Sa'idiyyin in the north, the 'Umran in the centre, and the Aheiwat in the south.

Based on accounts still heard among the bedouin in Sinai and the Negev in the last third of the twentieth century, the tribes on either side of the Wadi Arabah knew of each other and maintained relationships characterised by both hostility and friendship, depending on changing circumstances. Such fluctuating relationships were not dissimilar to those prevailing within each group on its respective side of the wadi, except that they were less immediate and were pervaded by a sentiment that the tribes dwelling on the opposite side belonged to a somewhat different world. The present study will depict the basic dynamics of relationships between the tribes facing each other over the Arabah by making brief reference to stories from their oral tradition that indicate these dynamics. In the appendix, a more detailed version of the unpublished stories will be presented.

### Knowledge of the tribes living on the opposite side of the wadi

With Cairo, Gaza and Beersheba (the last, since the turn of the twentieth century)<sup>3</sup> being major markets where

livestock could be traded and other products procured, even by bedouin living east of the Wadi Arabah (Burckhardt 1831, vol. 1: 29–30), it is not surprising that, to attend them, these bedouin passed through the Negev and Sinai, thereby acquiring knowledge of and, in some cases, forming relationships with tribesmen along the way. One oral tradition, heard among the Zullam tribal confederation, currently of the Negev,<sup>4</sup> tells of a holiday visit paid by their ancestors from the Bili tribe in the northern Hijaz to the most prominent chief in the Negev, remembered as al-Wuheidat, chief of the Wuheidat confederation. This must have occurred during the seventeenth century, as the host tribe arrived in the Negev in the mid-sixteenth century (Bailey 1985: 25, 27, 48). The story is especially remembered by the Janabib tribe of the Zullam, as it attributes the name of one of its sections, the al-Wajj, to an incident occurring during this visit. The eighteenth-century traveller, Le Comte de Volney, having passed through the Negev, also related that it was customary for tribes of the east to pay visits to the chief of the Wuheidat at holiday time (De Volney 1798, vol. 2: 202), probably as a sign of deference to the man who controlled the routes that gave them access to the markets of Gaza.

Another tradition, heard in east-central Sinai,<sup>5</sup> establishes the use made of the markets of Cairo by tribesmen from east of the Arabah, and their resultant knowledge of the Sinai bedouin. It tells of a man of the Ma'aza tribe of north-west Arabia whose camel was impounded by an Egyptian merchant there, owing to an unpaid debt from the previous year. Seeing him sitting in despair, a member of the Tarabin confederation of Sinai paid the debt for him, so that he could recover his camel and return home. The story is recalled as an example of gratitude, because when the Ma'aza raided the camels of the Tarabin in Sinai the following year, the man, realising that the shepherd was his benefactor's son, released him together with his father's herd. Another confirmation of the attraction of the Egyptian markets for bedouin from east of the Arabah is an account heard by the Czech

<sup>1</sup> For the immigration of tribes to these respective areas see Peake 1958, Gubser 1973, and Bailey 1985, *passim*.

<sup>2</sup> Although technically most tribes belong to a tribal confederation, which bears the overall name with which its members identify, the term 'tribe' in this paper will refer to a confederation, unless otherwise specified.

<sup>3</sup> For the establishment of Beersheba by the Turkish authorities, see al-'Arif 1934: 244.

<sup>4</sup> Oral communications from men of the Zullam Janabib: 'Abdallah Mu'atig al-Wajj (10 November 1976) and 'Id Salim Ibn Darraj (3 May 1978).

<sup>5</sup> Oral communication from Muhammad Husayn Abu Salama, of the Tarabin Hasablah (20 October 1999).

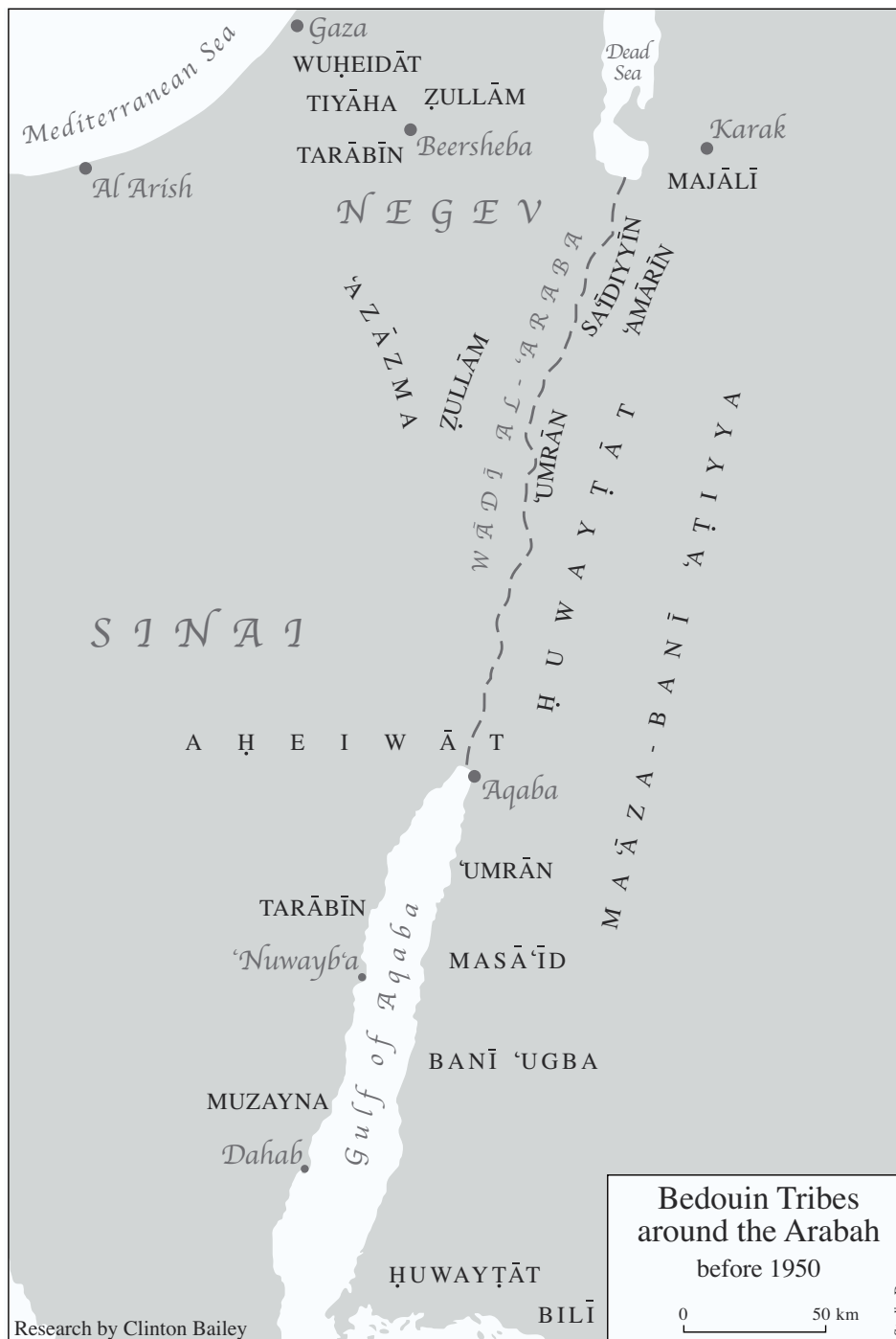


Figure 21.1: Map of bedouin tribes around the Arabah before 1950.

scholar-explorer, Alois Musil, in the first decade of the twentieth century, from a member of the Huwaytat tribe, also of northern Arabia, that many of his fellow tribesmen had immigrated to Egypt, initially attracted by the camel market in Cairo (Musil 1926: 129ff.).

### Hostile relations between tribes on opposite sides of the Arabah

Most of the traditions that were heard among bedouin living to the west of the Wadi Arabah allude to the tribes

of the east as a source of danger. One such source was their suspected desire to conquer lands there, especially in the Negev, where rainfall, pasture, and the ability to grow winter cereals, were more plentiful than in their own deserts. The other, more frequent, dangers were their camel raids. A small mountain pass in the central Negev, just west of present-day Kibbutz Sde-Boker, is still called 'The Tight Pass of the 'Amarin' (Deigat al-'Amarin) by the local bedouin, to commemorate an ambush their ancestors once laid there for raiders of that tribe, dwellers on the mountain slopes bordering the northern Arabah on the east.

### *Attempts to conquer lands in the Negev*

One attempted conquest of their lands recalled by bedouin of the Negev was that of the Bani 'Ugba and Masa'id tribes, acting in concert in the seventeenth century.<sup>6</sup> Tribesmen of these two tribal confederations from north-west Arabia, whose native territories were blighted by drought, made their way up the Wadi Arabah to a spring called 'Ayn Husub (today 'En Hazeva). While deploying there for invasion, the chief of the Wuheidat resorted to a stratagem, involving a beautiful woman, who would set the leaders of the two groups against each other in a war that decimated their ranks and foiled their invasion. Ultimately, the Bani 'Ugba were appended to the Wuheidat, to whom their women were subsequently married off,<sup>7</sup> while the remnants of the Masa'id forces moved out to north-western Sinai (Shuqayr 1916: 117–18).

A nineteenth-century tradition tells of another invasion of the Negev, this time by the Bani 'Atiyya tribe from north-west Arabia, also looking for pasture.<sup>8</sup> They not only grazed there during the spring pasture season, but also proceeded to plant summer crops, such as tobacco and watermelons. A coalition of tribes from the Negev, organised by the leading figure in the Tiyaha confederation at the time, Salman 'Azzam al-Huzayyil, finally routed them at a spot, henceforth called 'the Place of the Slaughter' (al-Madhbaha), 10 km. west of Beersheba, around 1830.

### *Camel raids into the Negev and Sinai*

One camel raid, related by people of the Kashakhra section of the Zullam Janabib tribe of the central Negev,<sup>9</sup> was perpetrated against them by people of the 'Umran tribe, situated in the central Arabah and in the very north-west corner of the Arabian peninsula. The 'Umran often raided into the central Negev, but this time they were foiled by an alert leader and his kinsmen, who fired at the raiders as they were rounding up the grazing camels. This particular raid is remembered, owing to one of the raiding party, called al-'Agir ('the Impotent'), who was wounded and taken prisoner. Before releasing him, the Janabib cauterised him from head to toe as a warning that they would be severe with future raiders. Upon his return, 'the Impotent' slept with both his wives, who thereupon became pregnant and bore him sons. Attributing his good fortune to the cauterisation performed upon him by the Kashakhra, he declared his lasting indebtedness to them.

<sup>6</sup> For more complete renditions of this event, see al-'Arif 1934: 118–19; Bailey 1991: 212–15.

<sup>7</sup> Oral communication from Salim Muhammad Salim al-'Ugbi, of the Tiyaha Bani 'Ugba, 12 February 1972.

<sup>8</sup> For more complete renditions of this event, see Bailey 1980: 55–58.

<sup>9</sup> Oral communication from 'Id Salim Ibn Darraj, 8 May 1998.

Another tradition, heard in east-central Sinai,<sup>10</sup> tells of raiders from the Ma'aza tribe who invaded a herd belonging to the Ghurayganiyyin tribe of the Aheiwat confederation. The tradition is recalled, owing to the instance of their killing the herd's shepherd, the yet uncircumcised son of the owner. As killing such a boy warrants four acts of blood-vengeance, according to bedouin law, the account tells of how his family pursued the raiders into Arabia with this compound revenge in mind.

### *Skirmishing between tribes in the Arabah and the Negev*

The 'Azazma tribe of the central Negev highlands were occasionally wont to pasture their livestock on the shrubbery of the Arabah and used to water them at the wells there. As some of this area belonged to the Sa'idiyyin, with whom the 'Azazma officially lived in friendship, such an arrangement was possible. This, however, did not prevent personal antagonisms from occurring, such as they might among any neighbouring bedouin, anywhere. Such an occurrence is related by members of the 'Azazma Sarahin tribe,<sup>11</sup> in which one of their herdsmen, a young lad, was beaten and had his rifle taken by a shepherd of the Sa'idiyyin near the well of Bir al-Mlayhi (today Be'er Menuha). The latter had accused him of enticing his stud camel over to his herd of camel mares. This story is recalled by the Sarahin as an example of using a blood truce, issued by a wounded party to an assailant, as a stratagem for ultimately taking revenge. In this case, the leader of the 'Awwadat section of the Sarahin awarded the Sa'idiyyin an unusually long truce – a full year – in which to make amends for the assault and the wounding of the boy. Failing to utilise this period, the 'Azazma leader granted them a further year-long truce. The Sa'idiyyin, however, now convinced that the long truces reflected fear on the part of the Sarahin to engage them in hostilities, also let the second truce elapse, without having made amends nor even requesting a further extension. On the very next day, however, the Sarahin, encamped in the northern extremities of the Negev, gathered their forces and mounted a surprise attack upon a camp of the Sa'idiyyin at an oasis called 'Ayn Ghadyan (today Hai Bar), in the southern part of the Arabah, inflicting heavy casualties upon them.

### **Amicable relations between tribes on opposite sides of the Arabah**

Despite frictions between tribes from opposite sides of the Arabah, living in close proximity and forced to

<sup>10</sup> Oral communication from Muhammad Husayn Abu Salama of the Tarabin Hasablah, 29 June 1998.

<sup>11</sup> Oral communication from Hmayd Salman as-Saddan of the 'Azazma Sarahin, 15 May 1975.

subsist on the paucity of resources that their respective deserts might offer, the oral tradition indicates that amicable relations also existed. These might even entail support in warfare between the tribe receiving such support and others on its own side of the wadi. They might take the form of debts of gratitude undertaken by tribesmen toward a group from the other side of that wadi in return for a benefaction received from the latter. There are also accounts of people from one side of the wadi granting shelter to murderers from the opposite side against vengeance from the latter's own area. Most of the traditions heard among the bedouin indicate amicable relations between the 'Azazma and Tarabin confederations west of the Arabah and the Huwaytat, east of it, including the affiliated Sa'idiyyin and 'Umran tribes.

### *Support in warfare*

One tradition heard both among the 'Azazma in the Negev and the Huwaytat in Jordan tells of a war waged by Jordanian tribes – the Majali, Hijaya, Bani Sakhr and Bani 'Atiyya – against the Huwaytat, perhaps to expel the latter from its territory.<sup>12</sup> Consequently, the Huwaytat sent three camel riders to each of the Zullam, 'Azazma and Tarabin tribal confederations, in the Negev, requesting help. As customary in such straits, the necks of the mounts had a strip of black tent cloth tied around them as a symbol of despair, which the party acceding to their request for help would cut to symbolise the end of that despair. Whereas the Zullam turned the messenger to them away, the 'Azazma and Tarabin cut the cloth and joined the Huwaytat and Sa'idiyyin at their war camp near Wadi Rasif, in the Arabah. The 'Azazma relate this event to contrast the disdain shown for them by the Sa'idiyyin (who demeaned them as uncouth, serving coffee to the more polished Tarabin, before them) with their bravery, which won the day for the Huwaytat by killing their arch-foe, 'Owda al-Majali, in battle.

A somewhat less dramatic tradition among the 'Azazma recalls how a man of their tribe joined men of the Sa'idiyyin in an effort to retake the latter's camels, which had been pillaged by raiders from the Bani 'Atiyya tribe, from where they were grazing in 'Azazma territory, in one of the larger wadis that flow into the Arabah from the central Negev (Wadi Figri; today, Nahal Tzin).<sup>13</sup> Told in order to amuse themselves over their own conceived innocence, as well as to boast of their insistence on justice, the story relates how a

camel-less 'Azzami man, meeting the Sa'idiyyin on their way, ran alongside the cameleers carrying his gun, which they tried to get from him by feigning to relieve him of the burden of carrying it. He kept refusing and running. When they finally caught up with the Bani 'Atiyya, the 'Azzami downed five of them, claiming each one's camel as his due. When the operation terminated, the Sa'idiyyin denied him his booty, disgruntled that they had warranted none, and gave him only one camel. Later, charging them with injustice before a bedouin judge, the 'Azazma man was awarded the full five.

### *The mutual grant of sanctuary*

A bedouin proverb, referring to murderers fleeing from vengeance, holds that 'Refuge with a friendly tribe will not protect you from revenge' (Bailey 2004: 252), indicating that a tribe will not stop members of one with which it enjoys good relations from entering its territory, even if they are seeking revenge. To shield oneself from almost certain revenge, then, means finding refuge with a tribe hostile to one's own, and preferably one situated far away. Hence, when the purported ancestor of the Zullam confederation in the northern Negev killed a fellow tribesman of the Bili, in north-west Arabia, he fled all the way to the Negev, seeking refuge with one of the tribes there, perhaps the powerful Wuheidat, in the seventeenth century. The Zullam relate this tradition to explain their confederation name, meaning 'descendants of "the Unjust One"' (az-Zalim).<sup>14</sup> His injustice stemmed from the fact that, after he had agreed to reconcile with the killers of his son in exchange for a blood-money payment of 40 camels, he resorted to blood vengeance when they proved able to present him with only 39. As the Zullam subsequently thrived in the Negev, one assumes that 'the Unjust One' was well-received there as a fugitive.

The 'Azazma tell of a murder that took place among them, when a man of the Sarahin Kullab clan in the central Negev killed a man of the Sarahin Hawasa clan, subsequently fleeing to the eastern side of the Arabah, finding refuge among the Sa'idiyyin.<sup>15</sup> It was only after one of their shepherds angered a Sa'idi shepherd, by urging his flock to get to a well before that of the latter, that he was deemed unwelcome. He was told that, if he was so bold with the Sa'idiyyin, he had no reason to fear vengeance by the Hawasa, and might consider returning to where he had come from. Insulted, he did so. The story is related to show how the victims of murder may pardon their violators without resorting to revenge, if their pride and reputation for strength are

<sup>12</sup> Oral communications from Swaylim Sulayman Abu Bilayya of the 'Azazma Sarahin, 17 May 1995, and Salih Salim az-Zalabya, of the Huwaytat Zalabya (Wadi Rumm, Jordan), 29 October 1998. See also Bailey 1980: 73, n.112; Bailey 1991: 132, n. 2.

<sup>13</sup> Oral communication from Sulayman Husayn al-Khraynig, of the 'Azazma Sarahin, 27 November 1997.

<sup>14</sup> Oral communication from 'Ali Abu al-Graynat of the Zullam Abu Graynat, 15 May 1971. Cf. al-'Arif 1934: 125.

<sup>15</sup> Oral communication from Swaylim Sulayman Abu Bilayya of the 'Azazma Sarahin, 3 May 1969.

restored. Indeed, the Hawasa pardoned the Kullab from vengeance when they heard what their shepherd had told the Sa'idiyyin, in reply to the insult; namely, that they were indeed taking refuge with them, because they knew the Hawasa to be inveterate defenders of their rights, sure to take revenge for a murdered clansman. In addition, by stressing that they would nonetheless rather face that danger than have all the 'Azazma insulted as cowards, they had also salvaged both the pride of the Hawasa and that of their entire confederation, and were deserving of having revenge waived in favour of a blood-payment.

### **Hisni, or the recognition of benefaction, across the Arabah**

An act of extreme kindness between people of different tribal confederations is called a *hisni*, in bedouin Arabic, and creates an obligation to perform a commensurate act in return, whenever that might be required. As already cited in the story of 'the Impotent' and the story of the impounded camel of a man of the Ma'aza (see above), the *hisni* obligation exists among tribes on opposite sides of the Arabah, as elsewhere. A further account, related by the Hasablah clan of the Tarabin in south-east Sinai, tells of *hisni* owed to them by a section of the 'Umran, of north-west Arabia.<sup>16</sup> It stems from the murder of a man of the 'Umran who had brought some goats over to Sinai for sale to the tribes in the southern part of the peninsula, probably sometime in the nineteenth century. He stopped off with the Hasablah for a few days and then made his way to the Muzayna, camped to the south. When he had not returned to his people for a considerable period of time, they sent scouts to Sinai to discover the reason. The Hasablah were able to help them, owing to one of their girls whose mother had married a man of the Muzayna. Shepherding her stepfather's flock, she noticed how it had recently increased by several new goats, something she casually related to another Hasablah shepherdess. The latter girl, having relayed this news to her father, enabled her clansmen to lead the 'Umran scouts to the killer, the Muzayna stepfather of the first shepherdess. Henceforth, the 'Umran acknowledged that they owed the Tarabin Hasablah a debt of gratitude, a *hisni*.

### **Summary**

The great rift called the Wadi Arabah, although revealed to the western world by John Lewis Burckhardt only in the early nineteenth century (Burckhardt 1822: 441–45), and constituting an impassable barrier to normal communication since the establishment of a border there between the Hashemite Kingdom of Jordan and the new State of Israel in 1949,

was not impassable to the bedouin who straddled it on both sides, probably from ancient times down to the mid-twentieth century. This paper, using oral traditions heard among elderly bedouin during the last third of the twentieth century, shows the type of relations that prevailed among tribes on opposite sides of the geographical divide, at least from the seventeenth century AD for the next 350 years.

The impressions emerging from the remembered traditions indicate a certain familiarity by the eastern tribes of those to the west of the Arabah, especially those along the way to camel markets in Gaza and Cairo. The traditions also tell of hostilities, again from east to west, including efforts to conquer new and better pasturelands, raid camel herds, and harass weaker neighbours. As tribal relations in general reveal, however, these were not a departure from the nature of hostilities that were often endemic between tribes living elsewhere, such as between those on each respective side of the Arabah. As in relations between any two tribes anywhere, moreover, these hostile relations existed either alternately or simultaneously alongside friendly relations, manifest in the aid offered to other tribes in warfare, in sanctuary offered people fleeing revenge, or in the recognition of obligations owed to people from the opposite side of the Arabah for benefactions rendered.

The picture emerging from bedouin oral traditions is important for extrapolating the nature of human relations within and over the Wadi Arabah throughout recorded history. Except for the rare initiatives of external governments to utilise this area as a security zone, a transit station, or source of minerals, and to establish settlements there, most of the inhabitants of the Arabah had to be nomads – called *badu*, or bedouin, since the emergence of the Arabic language among them – for only they possessed a culture that enabled them to live and survive in this harsh desert.

**Appendices: five unpublished accounts of events cited in the paper as related by bedouin (with the terms and phrases commonly used in their transmission, in Arabic)**

### ***A visit from the east to a chief in the Negev:***

Four men of the Bili tribe in the Hijaz were travelling to visit the chief al-Wuheidi, in Wadi Shari'a, on the occasion of the festival, 'Id al-Adha. When they were descending into the Wadi Arabah, through a mountain pass called Gof Hisma, the lead camel suddenly smelled the stinking carcass of an animal and took fright. Her rider tried to control her by hitting her flanks with his hooked riding stick (*mahjan*). From excitement and fright, however, the camel clamped his tail down on the stick, snapping

<sup>16</sup> Oral communication from 'Anayz Salim al-'Urdu of the Tarabin Hasablah, 12 June 1985.

it, and broke into a frantic gallop, leaving the other riders behind. So swiftly did the camel run, that he covered the [350 km.] distance needed to get to al-Wuheidi's camp, in Wadi Shari'a, at dusk. On arrival, the rider dismounted, entering the chief's tent to drink coffee, when the camel unexpectedly lifted her tail, letting the camel-stick drop. Seeing this, al-Wuheidi asked, 'From where did her rider come?' (*min wayn rakibha jow*), and was answered [in rhyme], 'From Gof Hisma straightaway' (*min gof hisma toww*). The chief said, 'A tall story!' (*ghazal*). The rider countered [punning on 'story', which is also 'antelope'] with, 'The antelope has left tracks' (*al-ghazal lah gasasat*); 'In three days, my companions will arrive'. After learning that the rider hailed from a place in the Hijaz called 'the Cleft of Jaww (Thilim al-Jaww)', and impressed by his speed, he inverted the letters and nicknamed him, 'Speedy' (al-Wajj). The name stuck, and his descendants came to be called al-Wujuj (a section of the Zullam Janabib).

#### **Helping a Ma'aza man at the market in Cairo:**

The Ma'aza were from the east, raiders against Sinai. They would raid Sinai – the Muzayna, the Aheiwat, the Tiyaha, the Tarabin – and take our livestock. In those days, people would go to market (*biykhattiru*) in Cairo (Gal'it Masr), even from the east. There was no sea [the Suez Canal] in the middle. There was no bread unless people stocked up in Cairo. Once, one of our forefathers, called Imsallam al-Hajj, went to market in Cairo and saw the Ma'aza stocking up at the merchants and leaving, but one of them was sitting there outside and crying. My forefather said, 'I'll stop by that fellow'. He said to him, 'Why are you crying, fellow?' The man said, 'What do you have to do with me? You have your problems, I have mine'. But Imsallam al-Hajj wouldn't go on. He just stood there and said, 'I won't leave you unless you tell me the reason for your crying'. The man said, 'I am crying, O doer of good, because I have lost a camel. I owe the merchant one pound, and he is unwilling to wait for it till next year. He has taken my camel and I cannot return with the caravan of my people'. Imsallam al-Hajj dug into his purse and came up with a pound. He said, 'Take this to the merchant, for the caravan is already leaving'. After retrieving his camel and setting off with the caravan that Imsallam al-Hajj had also joined, the Ma'azi said, 'You who asked after me, what is your name?' He told him, 'Imsallam al-Hajj of the Tarabin'.

A year later, the Ma'aza came on a raid, reaching the 'Ijma [a plateau in central Sinai], where the son of Imsallam al-Hajj was herding his father's camels, peacefully playing his shepherd's flute (*shababa*), not far from his father's encampment in Wadi as-Sawwana. The raiders surprised him, tied his hands

together, and bound him to a genista bush. Then they went on to raid the black camels of the Tiyaha [cf. Murray 1935: 114], whom they had seen at the nearby well of Rajib, leaving him and his camels under guard with one of their men. When the guard noticed the Tarabin brand on the camels, he asked the boy, 'Who is your father?' 'Imsallam al-Hajj', the shepherd replied. Then the man freed the boy, cut the string that held his fire-iron (*znad*) and gave it to him saying: 'Go tell your father that the one he freed with gold guineas, has freed his camels'. The father, returning home from an excursion in Wadi Firan [a major wadi in southern Sinai], and knowing about the raid, said to his son, 'Curse your forbears. You let them take our camels!' The boy replied, 'No father, I brought them home. He freed them'. 'Who freed them?' the father asked. The boy told him of the man who instructed him to tell his father, 'He whom you freed with gold pounds<sup>17</sup> has freed them' (*illi atlagtah bi-jnehat dhahab atlaghin*). Imsallam al-Hajj then said, 'My son: Throw a good deed even into the sea and you'll find it!' (*irmi at-tayyiba fi-l-bahar tilgaha*).

#### **The curing of 'Salim the Barren' after a raid:**

We had a forefather called Abu Trayfat, who grazed his camels around the hillock, Tuwal al-Malahi [in the central Negev, just north of present-day Mitzpe Ramon]. Every time he spotted a party from the 'Umran, he would engage them in battle with his rifle, using thymeleia (*mitnan*) for a wick. One day, he looked out and saw seven men, and he began firing at them, driving them away. As they say, 'Those that move are prey for the sitter' (*al-mu'aggid seid al-ga'id*). Then he went down to check on them and found one alive, but drenched in blood. Seeing that he was alright, he said, 'Get up!', and he took him to his tent high on the hillock where others were waiting. Abu Trayfat told him, 'This is our desert. Why don't you lay off our camels?' (*laysh ma titub 'an al-bil*). The man said, 'I won't lay off your camels'. They brought wood, lit a fire, and put some stones (*ridaf*) in it, and his men laid the prisoner – whose name was Salim the Barren (Salim al-'Agir), because he had no children – next to it. They said, 'Take your clothes off'. He took them off. Abu Trayfat said, 'Stretch out on your back!' (*inbatih 'a gafak*) and they cauterised him from his pubic hairs (*masha'irah*) to his chest. He asked, 'What is this for?' They said, 'That's for our old she-camel (*hadha 'end al-fatir*), to teach you not to come to her again'. Then he ordered him to lie on his stomach and moved the hot stones from his waist up to the hollow of his nape (*nugrit al-'ar'ur*). The man asked, 'What is that for?' They said, 'That's for our young she-camel (*hadha li-l-bakra*), so that you tell the 'Umran what

<sup>17</sup> The speaker here compounds the original loan as a gesture of gratitude for the generosity shown him.

happened to you’.

They pitched a small tent for the man to recover in, and kept him a prisoner for a year. After a year, when Abu Trayfat came to see him one day, he found him sad. When he asked him why he was sad, Salim al-’Agir told him that he had two wives, but had fathered no children, as he was impotent (*mish nafi*), adding, ‘But I am longing for home’ (*addirat talabat ahalha*).<sup>18</sup> Abu Trayfat said, ‘God ease your way’ (*Allah yisahlil ‘alayk*). I will bring you a young camel, a saddle, and a water-skin (*girba*), and my wife will grind you some flour. Tomorrow you will go home. But warn the ‘Umran that, “for trying to take our camels, whether tawny or white, we have the fire”’ (*al-humr wa-l-owdah ma ‘endha ghayr an-nar*).

When Salim al-’Agir returned to his people, he slept with his wives, who, within four or five months, became pregnant, each finally giving birth to a boy. Overjoyed at this good fortune, he believed that it came from the cauterisation he had received from Abu Trayfat. So, before much time had passed, he visited his enemy, announcing that he now considered him his benefactor (*hisnah*), and that his people would never again raid his camels.

#### ***A raid by the Ma’aza on the Aheiwat Ghurayganiyyin in Sinai:***

Many years ago people from the Ma’aza, from the east, came to raid the camels of the Ghurayganiyyin section of the Aheiwat, our neighbours. Near Wadi al-Murahi, they found the son of Sulayman Abu Ghuraygana, a boy yet uncircumcised – our maternal nephew (*bin akhna*),<sup>19</sup> as his mother was of the Tarabin – herding his father’s camels. They slit his throat, buried him, and fled. When the child did not return to his camp that night, his four brothers and three paternal cousins went looking for him. They found his body and the tracks of the Ma’aza and went after them. They crossed the Arabah and, after Aqaba, they spotted them at ash-Sharaf. The Ghurayganiyyin shot and killed one, and one fled.

For the next two years, the Ghurayganiyyin raided the Ma’aza taking many of their camels. Finally, Nasir Abu ‘Usban of the ‘Umran – neighbours of the Ma’aza – told them, ‘This is revenge. There is no peace from it. The Ghurayganiyyin feel they must slaughter us [i.e., you]’ (*hadha trad – ma minnah salama – ghayr yidhibahuna khalis*). He said, ‘Let me

go and ask for a camel-truce (*jira*).<sup>20</sup> They said, ‘Fine’. So Abu ‘Usban went to the Ghurayganiyyin and paid them for a camel-truce. They said, ‘The camel-truce payment is accepted, and the evil is killed’ (*magbula aj-jira u-maktula as-seiya*),<sup>21</sup> and they agreed to meet with the Ma’aza in Abu ‘Usban’s tent to receive blood payment. The Ma’aza came, bringing two unmarried girls with them.<sup>22</sup> When they met, the Ghurayganiyyin said to the Ma’aza, ‘Our man was an uncircumcised boy. We are entitled to take the lives of four men’ (*arba’ rigab*). The Ma’aza said, ‘You’ve already killed one’. They replied, ‘That leaves three’. They said, ‘Here’s payment for one life, and here is a marked girl (*ghurra*) for you to marry without bride-price’. The Ghurayganiyyin said, ‘That leaves two’. Abu ‘Usban said, ‘I, the master of this tent (*ra’i al-bayt*), concede one to the Ma’aza’. Then the Ghurayganiyyin conceded another, and the problem was resolved.

#### ***Aid to the Huwaytat in their war with the Bani ‘Atiyya:***

There was a war between the Huwaytat and Sa’idiyyin and the Bani ‘Atiya and al-Majali. When the Bani ‘Atiya were about to crush them they sent three riders of camels with black tent-cloth around their necks to the Zullam, the ‘Azazma and the Tarabin, requesting aid.<sup>23</sup> The Zullam rejected the request, but the ‘Azazma and Tarabin each cut the strip from around the camel’s neck, as a sign of assent. When these reinforcements arrived at the Sa’idiyyin camp at Wadi Rasif, the hosts insulted the ‘Azazma, who were ragged, by serving coffee to the well-dressed Tarabin first. One of the Subhiyyin section of the ‘Azazma, ‘Id al-Hitirsi, composed a poem in which he said (see Bailey 1991: 132, n. 2 for the Arabic text):

<sup>20</sup> Given after the violation of a woman’s honour or before negotiations begin for paying a blood-price following murder (see Bailey 2004: 277–79).

<sup>21</sup> This declaration usually stipulates accepting the blood-price (see Bailey 2004: 342). Here, the reference to a camel-truce, unless uttered by mistake, would have the same effect, as once the truce is accepted there is an obligation to accept blood-money instead of taking revenge (*ibid.* 278).

<sup>22</sup> Such a girl (*ghurra*) is given to a close relative of the murdered man in order to replace him with a son she will bear. Sometimes, a *ghurra* is given instead of a blood-price; sometimes in addition to it. Here the murderers brought two girls, as the murder of a child warranted four acts of revenge or payments.

<sup>23</sup> Such a black strip was traditionally sent from a tribe threatened with aggression to another, requesting aid (oral communication from Musa Hasan al-’Atawna, of the Tiyaha Nutush, 1 October 1973).

<sup>18</sup> Lit. ‘Our lands want their people to return’, expressed such to save face for the emotion of longing.

<sup>19</sup> Lit. ‘paternal nephew’, used as a sentiment of greater affinity and commitment than is warranted according to bedouin law (see Bailey 2004: 138).

By God, if you made of the horsemen two groups  
 Such a division would please me;  
 Drinking coffee's an act of mutual love,  
 But here it's dispensed with partiality.

The separate tent was duly pitched, after which the men went out to battle. It ended when 'Owda al-Majali was shot by al-Hitirsi, with the help of Abu al-Khayl, of the Sawakhna section. The Sa'idiyyin were reluctant to acknowledge the 'Azazma deed, but two of their shepherdesses, who were watching the battles, testified that 'there were two who killed al-Majali'. They attacked together and they emerged together as if by plan, and each was wearing a simple sheepskin (*ja'ad*) on his back [proof that they were poor people of the 'Azazma]. Later, girls of the 'Azazma would sing a ditty:

Al-Majali fell in Wadi Rasif – the horses of Ibn Jazi<sup>24</sup>  
 then crushed him.  
 But the 'Azazma horses refuse to drink – Full from  
 drinking his blood.

(*al-Majali tayih fi-r-rasif – khayl Ibn Jazi watannah  
 amma khayl al-'Azazma wa'if – 'ayyaf wi-shirbit min  
 dammah*).

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<sup>24</sup> The commander of the Huwaytat-led alliance, perhaps Abtan Ibn Jazi (see Peake 1958: 212).