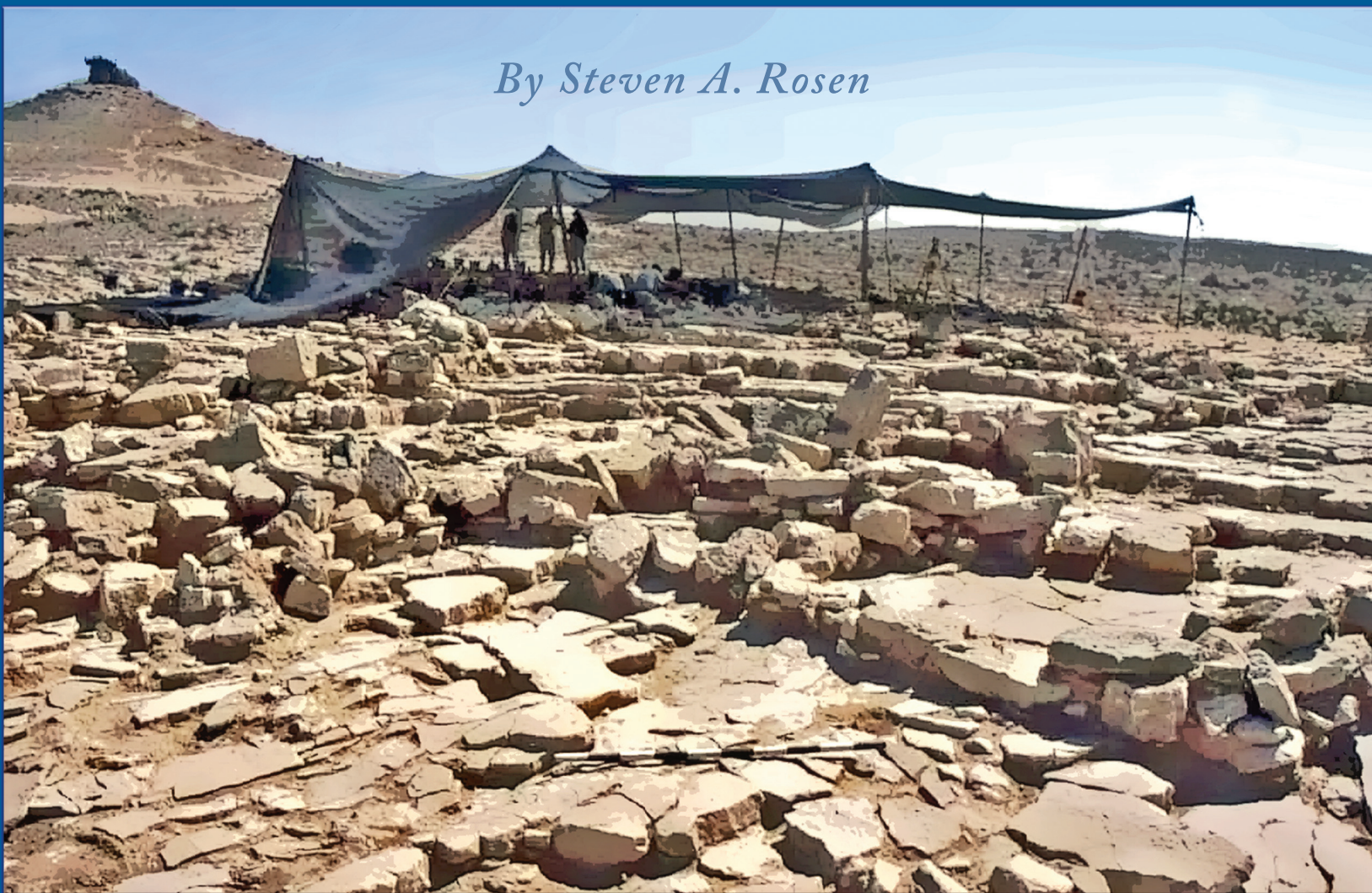


AN INVESTIGATION INTO
EARLY DESERT PASTORALISM
EXCAVATIONS AT THE
CAMEL SITE, NEGEV

By Steven A. Rosen



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INTO
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CAMEL SITE, NEGEV

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Frontispiece: The Camel Lookout, located 200 m south of the Camel Site and the feature from which the site takes its name.

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With contributions by Yael Abadi-Reiss, Yoav Avni,
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Sorin Hermon, Yoram Haimi, Philippa Ryan,
Benjamin A. Saidel, Irina Segal, Robert H. Tykot,
Jacob Vardi, and Alison Weisskopf

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Boaz and Yaniv both excavated at the Camel Site.

Steve Rosen
Beersheva, June 2010

For my parents, Janice and Bernard Rosen

INTRODUCTION: TOWARD AN ARCHAEOLOGY OF EARLY NOMADISM AT THE CAMEL SITE

STEVEN A. ROSEN

The archaeology of pastoral nomadism is a difficult subject. Indeed, several generations of archaeologists working in the Near East (and Asia as well) have assumed that the subject was beyond the reach of archaeological methods (e.g., Albright 1949:82–83; Childe 1951:70; Kenyon 1980:204–206). Others have suggested either severe limitations to the record (e.g., Finkelstein and Perevoletsky 1990) or a lesser importance in light of historical records (e.g., Mayerson 1989). For many, ethnography and ethnology seem to have provided an adequate substitute for archaeology, often in conjunction with historical records (e.g., Khazanov 2009). Ethnoarchaeology seems also to have served as a replacement for archaeological research in some circumstances (e.g., Cribb 1991).

Ignoring the fact that Stone Age prehistorians regularly engage in the analyses of small-scale mobile societies, the debates over the archaeology of later-period pastoral nomads seem to have been conducted not only in the absence of data from pertinent sites and surveys but in the very absence of experiment—systematic attempts to see if such data exist. The apparent blindness here is partially conceptual. Even the presence of ostensible nomadic sites can be dismissed if one takes as axiomatic that nomads do not leave re-

mains. Thus remains that *are* found can be dismissed as those of “seminomads,” “sedentizing nomads,” or simply not “pure nomads.” The true nomads did not leave remains.

The crudeness of this debate has masked more serious questions concerning the actual nature of early pastoral adaptations. Ancient nomads were not simply Bedouin transported back in time. Historical, technological, environmental, social, and cultural contexts were profoundly different. In fact, given the absence of a time machine that might allow us to do proper ethnography of ancient societies, there is no substitute for archaeology for actually documenting, defining, and studying these ancient societies.

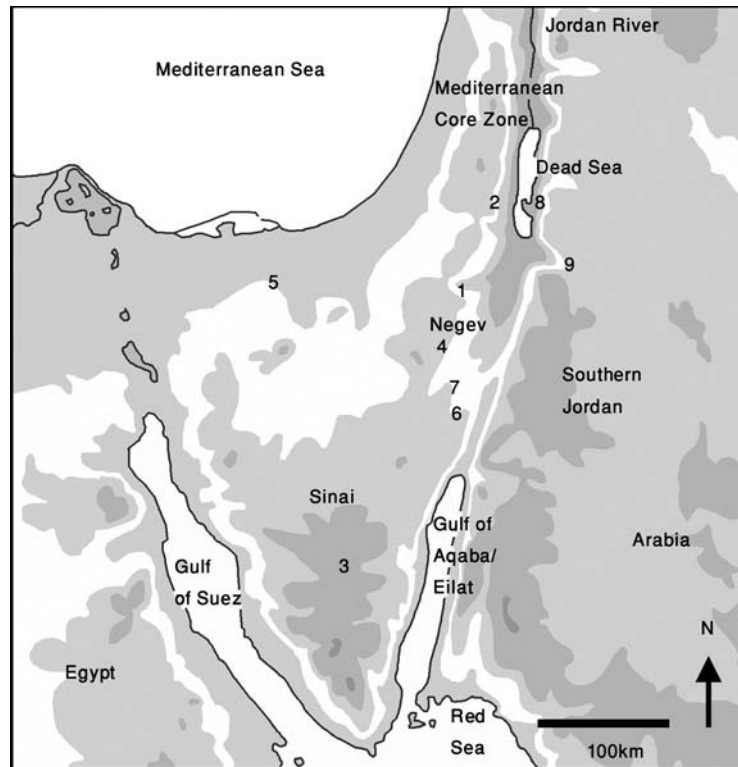
Excavations at the Camel Site were conducted in response to these issues. The best answer to the question of whether nomads leave archaeological remains is to fully document such remains. The best way to research early nomadism is to actually analyze those remains.

RESEARCH BACKGROUND

The Early Bronze Age (ca. 3700 to 2200 B.C.E.; all dates are calibrated) in the deserts of the southern Levant (Figure 1.1) was first identified as a significant cultural horizon in the late 1960s

Figure 1.1. General location map, with sites mentioned in the text.

1. Camel site
2. Arad
3. South Sinai sites (e.g., Nabi Salah, Sheikh 'Awad, Nawamis sites)
4. Har Karkom
5. Gebel Maghara
6. Timna
7. Uvda Valley
8. Bab edh Dhra
9. Feinan



and early 1970s following surveys (e.g., Cohen 1985; Rothenberg 1972a, 1972b, 1975) and excavations (e.g., Amiran et al. 1973; Beit-Arieh 1974, 1981, 2003; Beit-Arieh and Gophna 1981; Kochavi 1967)¹ in both the Negev and Sinai. During this formative period, three basic approaches to interpretation of the horizon emerged. The first, which can be dubbed the Timnian approach, stressed desert sequences, internal development from local predecessors, and ties to metallurgical development (especially Kozloff 1972–73, 1981; Rothenberg 1972a, 1972b; Rothenberg and Glass 1992; Rothenberg and Merkel 1998). The second, the Mediterranean perspective, viewed the horizon as primarily an extension of, or attached to, core zone phenomena or sites, especially deriving from either Egypt or the Mediterranean southern Levant (especially, e.g., Amiran et al. 1973; Beit-Arieh 1986; Cohen 1999; Finkelstein 1995). Finally, the third approach, the prehistoric approach, can be seen in investigations of a special set of mortuary structures known as *nawamis* and interpreted as the remains of an ancient pastoral nomadic society or as attached to perspectives derived from Stone Age studies (Bar-Yosef et al. 1977, 1986; Eddy and

Wendorf 1999; Juli 1979; Kozloff 1972–73, 1981; for southern Jordan, Henry 1992, 1995; Henry and Turnbull 1985). There are significant overlaps between these—they all deal with basically the same materials. Nevertheless, they tend to stress different aspects, focus on somewhat different goals, and emphasize different field and analytic methods.

In the Timnian approach (Eddy and Wendorf 1998; Kozloff 1972–73, 1981; Rothenberg 1972a, 1972b; Rothenberg and Glass 1992; Rothenberg and Merkel 1998; see also Rosen 2011 for a recent update), based mostly on survey, Early Bronze Age society in the Negev and Sinai was the latest phase in the local development of the Timnian culture, seen as an indigenous herding society that had evolved out of the Neolithic, as early as the sixth millennium B.C.E. The initial definition of the Timnian was based primarily on lithic industries, which Kozloff (1972–73, based partially on Ronen 1970) viewed as essentially Paleolithic in character. Working with Rothenberg, Kozloff (1981) later excavated several Timnian sites in Sinai, defined a limited ceramic assemblage comprised almost exclusively of holemouth cooking vessels and storage jars and a lithic assemblage

dominated by a small flake industry, and concluded that the society was essentially a pastoral adaptation roughly comparable to that of modern Bedouin of the region. His suite of radiocarbon dates, never fully published, indicated a range from the end of the sixth millennium through the beginning of the third millennium B.C.E.—that is, Late Pottery Neolithic through Early Bronze Age II in northern terminologies. Methodologically, excavations and surveys were a mix derived from both the early historical archaeology of the Levant (biblical archaeology) and prehistory (see later discussion). Rothenberg's work focused especially on metallurgical evolution (e.g., Rothenberg 1990), which he attached to the local pastoral cultural sequence. For Rothenberg, the Timnian is divided into three phases, early, middle, and late, based primarily on ceramic petrographic sequences, critiqued methodologically by Sebbane et al. (1993).

At roughly the same time, Beit-Arieh's Mediterranean approach to understanding the Early Bronze Age horizon in the Negev and Sinai was to see it in the contexts of the northern Early Bronze Age (e.g., especially Beit-Arieh 2003 for summary; Amiran et al. 1973; Beit-Arieh and Gophna 1976, 1981). Sites in the Negev and Sinai were apprehended as essentially extensions, colonies, of Arad, the Early Bronze Age town in the northern Negev whose *raison d'être* was assumed to be the copper trade (e.g., Amiran et al. 1997; Ilan and Sebbane 1989; Kempinski 1989). For Finkelstein (1995:67–86), the desert populations provide the origins of Arad in the sedentarization of pastoralists, and the town is interpreted as a city of nomads. In this context, Beit-Arieh (1986) clearly recognizes a local culture alongside the Aradian “colonies,” but his research focus was clearly on the “colonies.” Chronologies and terminologies from the Mediterranean zone were adopted to provide the basic culture-historical frameworks for the desert societies. Thus, based especially on excavations at such sites as Sheikh 'Awad and Nebi Salah, Beit-Arieh (1974, 1981, 2003) stressed architectural continuities with Arad, ceramic connections based on both typology and petrography, and evidence for metallurgical activities (Beit-Arieh 2003:196–208). Cohen (1999:37–83; also by ex-

tension, e.g., Haiman 1992a, 1992b, 1993a, 1993b; Lender 1990) went so far as to attribute all Negev Early Bronze Age sites to the Early Bronze II on the basis of assumed connections with Arad, regardless of the weakness of the direct evidence for such relatively precise period dates. Later work (especially Avner 1998; Avner et al. 1994; Sebbane et al. 1993) established the clear presence of an Early Bronze I horizon in the Negev, something Bar-Yosef et al.'s (1977, 1986) work on the *nawamis* and Kozloff's (1972–73, 1981) work on the Timnian had more or less clearly established anyway. Given the biblical associations of Anati's (e.g., 1986) research around Har Karkom, his work on what he dubbed the Bronze Age Complex (BAC, of which the Early Bronze Age is one poorly distinguished subphase) can also be classed with the Mediterranean approach, in spite of his background in prehistoric archaeology. Methodologically, his excavations and surveys were conducted using the techniques of historical archaeology, with modifications to document the rock art of the region.

Excavations of the *nawamis* in Sinai (Bar-Yosef et al. 1977, 1986; Goren 1980) employed methods and approaches essentially adopted from prehistoric archaeology, and Bar-Yosef was actively engaged in two additional prehistoric projects in Sinai in this period—one a survey and excavation project in the Gebel Maghara area of northern Sinai that dealt primarily with the Upper and Epipaleolithic (Bar-Yosef and Phillips 1977b), and the second focusing on excavations of Neolithic sites in southern Sinai (e.g., Bar-Yosef 1981, 1984). With respect to the investigations of the *nawamis*, emphasis was placed on the reconstruction of the society reflected in the archaeology of the *nawamis* and associated occupation sites, with less focus on evolutionary sequences or external connections. Goren-Inbar (1993) engaged in ethnoarchaeological fieldwork among the Bedouin in conjunction with this work. The sites were initially dated to the mid-fourth millennium B.C.E. based on material culture parallels with Egypt, essentially Early Bronze I, but were not attributed specifically to either a stage of the Early Bronze Age or to a previously defined culture such as the Timnian. Methods were those of prehistoric archaeology.

Although these differences in approach are well reflected in the contrasting culture-chronological schemes employed by different scholars (Figure 1.2), in fact by the 1980s they clearly converge. Thus Beit-Arieh (1986) explicitly recognized two basic cultures in Sinai, one local or indigenous and one originating in the north, while Rothenberg and Glass (1992) more fully acknowledged the role of external influence and trade on settlement systems (cf. Joffe 1993:79–82; Sebbane et al. 1993; Stager 1992). The *nawamis* culture was also recognized as part of an overall local adaptation (Bar-Yosef et al. 1986), essentially a facies of the Timnian (Rosen 2011).

With Israel's withdrawal from Sinai into the Negev following the peace accord with Egypt, Israeli research efforts shifted east, to the Negev. Thus by the mid- to late 1980s, the approaches abstracted above were supplemented by the first analyses of data derived from the surveys and excavations conducted under the auspices of the Negev Emergency Survey (e.g., Cohen 1999:7–8; Haiman 1992b). If on one hand much of this

work was basically similar in conception to its predecessors, on the other, some of it is clearly more anthropological in perspective, attempting to place the Early Bronze Age societies of the desert in a more general framework derived from the ethnography and anthropology of pastoral nomadism and from the recognition that physically the sites had more in common with those of the prehistoric Neolithic and Epipaleolithic sites in the desert than they did with contemporary Bronze Age sites in the north (e.g., Avner 1990; Bar-Yosef and Khazanov 1992; Haiman 1992a, 1992b; Rosen 1988, 2002). Although this incipient paradigm transition was initially hampered by the limitations of methods derived from an earlier archaeology, very early in the project one can see the adoption of methods derived from prehistoric archaeology, such as field sieving, collection of all artifacts including flint waste, and a greater reliance on radiocarbon assays for dating. At roughly the same time, a series of projects in the peripheral desert zones of Jordan also began to provide comparative materials for those derived

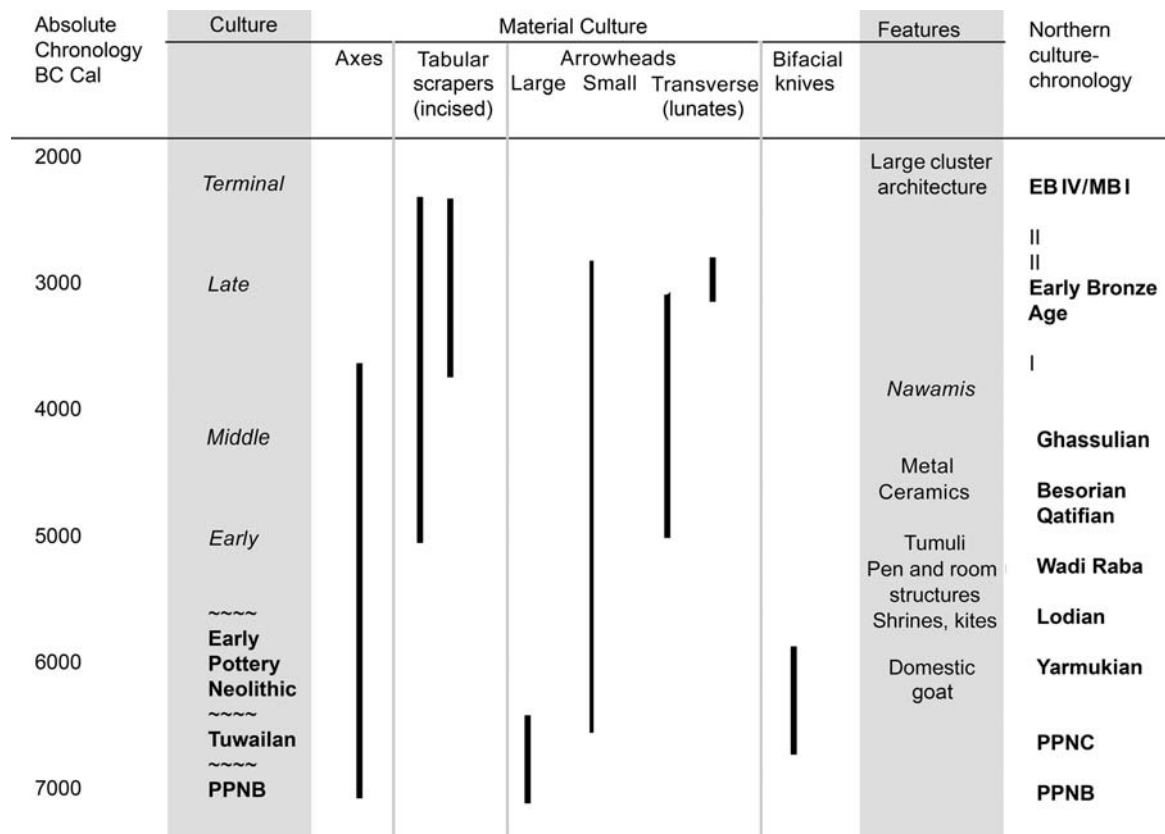


Figure 1.2. Basic chronological frameworks and features.

from the Negev and Sinai. Significantly, much of this work was conducted by archaeologists with formal training in prehistoric archaeology (e.g., Betts 1992, 1998; 2001; Henry 1995). Most of these materials were early—Paleolithic, Epipaleolithic and Neolithic—but Henry’s (1995) work in southern Jordan during this period specifically focused on later sites. He adopted the Timnian terminologies and an explicitly ecological approach, clearly derived methodologically and analytically from his background as a Paleolithic archaeologist, tending to deemphasize the possibilities of external connections and historical specificities. A similar approach was adopted by Eddy and Wendorf (1999) in their studies of Timnian sites in Sinai.

In the above review are echoes of some of the classic debates concerning the goals and methods of archaeology, especially those surrounding issues of culture-history versus processual (and later post-processual) archaeology, more inclusively “anthropological archaeology” (beginning with Binford 1962 and continuing through, for example, Watson 2009). Thus the methodological and theoretical evolution in the archaeology of the Levantine deserts (and more generally in Levantine archaeology) parallels that of the transition from traditional culture-history to anthropologically oriented archaeology in the English-speaking world in such aspects as the broadening of research questions beyond chronology and archaeological systematics and an expansion of the battery of methods used and materials analyzed. However, it is important to stress that in fact the structure of the transition to this broader set of questions, approaches, and methods differs in different places. It is beyond the scope of this work to deal with this issue in depth, but several points can be noted. First, the presence of texts significantly affects the paradigms adopted by archaeologists, both enhancing interpretative abilities on the one hand and raising blinders on the other (Rosen 2003). Second, and tying into the first, anthropological archaeology very much finds its roots in prehistory. Yet like classical archaeology and Egyptology, Near Eastern archaeology deals with complex societies in some senses less reducible to a more generalizing anthropology. Historical particularism—in the Near East, espe-

cially political history and its relatives—is an ever-tempting alternative to generalizing theory, much more so than for prehistory. Finally, the social and disciplinary structure of archaeology in the Near East (and for that matter Europe), differs from that of North America. Thus, on one level, Israeli archaeology (akin to American Near Eastern studies or classics departments) is a discipline distinct from anthropology. On another, in Israel (and Europe) departments of archaeology create a linkage between different subdisciplines of archaeology—that is, prehistoric (Stone Age), Bronze/Iron Age, and classical archaeology—often not present in North America. Thus the trajectory of disciplinary transition in Israel (and undoubtedly in other regions as well), this broadening of archaeological inquiry to incorporate a range of “anthropological” questions, took on a different form than that of North America, one that was more evolutionary and more internal than the usually perceived revolution of New Archaeology (cf. Binford 1962; Cherry 2003).

By the late 1980s and early 1990s, a basic understanding of the Early Bronze Age horizon in the desert regions had been achieved, shared by most scholars in its general outline if not in all particulars. Thus desert Early Bronze Age societies were seen to span the end of the fourth millennium and beginning of the third millennium B.C.E., the Early Bronze I–II in the northern chronology, with dispute over continuity of settlement into the end of the third millennium (e.g., Avner et al. 1994; Finkelstein and Perevoletsky 1990). Origins could be attributed to both local Neolithic/Chalcolithic ancestors, early phases of the Timnian in Rothenberg’s terminology (Henry 1995; Rosen 2008, 2011), and incursions from the north stimulated by demand for raw materials, especially copper (Beit Arie 2003: 196–208; Ilan and Sebbane 1989; Kempinski 1989). Subsistence activities focused primarily on sheep and goat pastoralism, requiring a seasonal round for grazing the herds that must have been modified to accommodate demands of the exchange system. Exceptions to the primacy of pastoralism occurred in special microenvironments that allowed opportunistic agriculture, as at the small agricultural farmsteads in the Uvda Valley (e.g., Avner 1990) and around trade outposts such

as those at Nebi Salah (Beit-Arieh 1974). Arad, in the northern Negev (Amiran et al. 1997), Bab edh-Dhra (Rast and Schaub 2003), and perhaps other towns in southern Jordan served as gateways into the Mediterranean zone for nomadic peoples and as foci for nomad–settled interaction.

HISTORY OF THE SITE AND ITS INVESTIGATION

The Camel Site was discovered during the course of intensive archaeological survey of the Makh-tesh Ramon/Mitzpe Ramon area directed by the author under the auspices of the Negev Emergency Survey (e.g., Rosen 1994) in 1982. It was sketched and photographed, and sherds were collected from the surface for the purpose of general attribution and then registered with the Archaeological Survey of Israel, then functioning as a subsidiary company of the Israel Department of Antiquities. A site plan based on surface features was drawn by the architectural survey team of the Negev Emergency Survey.

Excavations were initiated at the site on a weekend outing in October 1992 with archaeology students from Ben-Gurion University, continued with students and foreign volunteers in a two-week season in August 1993, and continued with two short weeklong seasons at the beginning and end of May 1994 with volunteers and Ben-Gurion University students. They were completed in a final month-long season in July–August 1996, which served as the Ben-Gurion University study dig for that year.

The specific goals of the excavations are reviewed below, but the site itself was chosen for investigation for four reasons:

1. The location of the site at the edge of Mitzpe Ramon made logistics simple, considerably reducing expenses.
2. The small size of the site suggested it could be excavated fully in a reasonably short time, providing a good sample.
3. Surface features indicated that it conformed to expectations concerning a “small, typical” Early Bronze Age site.

4. Initial test pits indicated good research potential.

The Goals and Methods of the Camel Excavations

In light of the above, the excavations at the Camel Site were conceived with three primary goals:

1. To assay the utility of the field and analytic methods of prehistoric archaeology when applied to a period usually investigated using the more traditional (lower-resolution) methods of Near Eastern archaeology.
2. To make a substantive contribution to the archaeology of the desert Early Bronze Age by excavating a small peripheral site fully, examining its material culture and spatial associations in great detail.
3. To place the site and the horizon in some larger picture or framework of peripheral pastoral nomadic adaptation.

Assaying Field Methods

Methodologically, excavations at the Camel Site were conceived to test methods of prehistoric archaeology (for the Negev and Sinai, see, e.g., Bar-Yosef and Phillips 1977a:6; Marks 1976:5) for the early historic periods in the desert. In general, these periods, from the Chalcolithic through classical times, have been investigated using the methods of traditional Near Eastern historical archaeology—that is, variations on the Wheeler–Kenyon method (e.g., Kenyon 1953; Wheeler 1954; also see Bergren and Hodder 2003 for a recent political critique) and its variants (e.g., Dever et al. 1978). Indeed, given the shallow stratigraphy associated with most desert sites, the balks or sections, the most characteristic aspects of archaeological excavations in Levantine archaeology, have often been done away with, leaving ad hoc sections and visible surface architecture to define excavation proveniences.

The field methods of southern Levantine prehistory can be summarized and contrasted with those of traditional historical archaeology from three perspectives: provenience control,

stratigraphic control, and collection/sampling. Although there are clear exceptions to all cases, as a general rule, especially for excavations conducted in the Negev, the basic contrasts outlined below obtain. The intent is not critique. The interplay between the development of theory and method in science is complex, and each clearly can stimulate the other given specific circumstances. The field methods of Near Eastern archaeology, the Wheeler–Kenyon method in its variations, developed over the course of approximately half a century and served well to document the archaeology of the region, especially that of tells and large-scale sites, given the questions asked at the time. That methods should develop or improve is not an indictment but an expected result of scientific practice.

Horizontal Provenience Control. Standard or traditional historical archaeological procedure divides a site according to a large grid. Areas or fields are excavated in squares, usually 25 (5×5 m) or 100 (10×10 m) m² in size. Within these squares, recording is by architectural and stratigraphic components; each distinguishable unit is a locus or a layer (depending on the specifics of the terminology). Thus a layer within a room might be a locus. Such a locus might be quartered or halved, but the size of the archaeological unit is dependent on the size of the structural unit. Further subdivision is usually by the basket, an arbitrary unit determined by the approximate area from which specific artifacts are collected. Thus several baskets may be collected in a single locus, and the general area represented by each basket will be indicated on a top plan. In the Negev, excavation by grid, leaving sections, has often been neglected on the assumption that stratigraphy of single-period occupation sites is simple and that balks interfere with our ability to comprehend a site as a unit. Furthermore, in the absence of well-defined grids, excavation in the Negev has focused on architecture, sometimes to the exclusion of nonarchitecturally defined areas of a site.

The advantages to this grid and locus method lie in the ability to reconstruct stratigraphy by examining standardized sections and in the relative ease of excavation. The method provides intuitively obvious units of analysis, the loci, based on the physical structures of the site. It is designed to

allow excavation to depth and can allow relatively rapid earth removal. This allows large-scale exposure in a relatively short time. For our purposes, the primary disadvantage lies in analytic difficulties associated with the nonstandardized units of excavation. It is impossible to generate fine-grained artifact distribution maps, and thus intra-locus comparison is virtually impossible. Of course, small-scale grids can be added when necessary, but they are not integral to the method, and it is not clear how efficacious they really are on large-scale excavations.

In the general absence of architecture, prehistoric archaeology in Israel has relied almost exclusively on grids for provenience control. Given the small size of sites, perhaps the key point, and the absence of obvious referents such as architecture, grids have generally been small, varying from 2×2 m to 1×1 m and 0.5×0.5 m in size. Excavation is conducted according to the individual squares in the grid, usually denoted with a letter and a number (and sometimes with a subsquare letter). Artifacts are collected and curated according to that square. In the presence of architecture, especially for Natufian, Harifian, and Neolithic sites, the grid is usually superimposed on the architecture and remains the primary provenience unit. The architectural features, defined as loci, provide secondary provenience units and are especially important when a single grid square overlaps two loci, as when two adjacent rooms share a wall in the middle of a square. Sections can be placed where deemed important by excavation of the appropriate squares. Although recording of individual artifacts in three dimensions, and including such attributes as strike and dip, has sometimes been suggested and carried out, the high density of artifacts in prehistoric sites in the Negev—sometimes hundreds of artifacts per square meter (usually microliths in Epipaleolithic sites)—renders such recording techniques difficult.

The advantages to excavation according to fine grid are primarily analytic. In a site with high densities of artifacts, maps of artifact density that allow sublocus patterns to be revealed can be generated. Statistical analysis and comparisons are easily achieved given the standardization of excavation units, and indeed the method lends itself easily to various analytic approaches, such as GIS.

The disadvantages are logistic. Excavation according to such grids requires constant maintenance (time and effort), since stakes move during the course of excavations, cord breaks, and so on. Excavation to depth requires constant care to avoid stakes shifting. Excavation according to fine grid also precludes use of large tools such as picks, especially for units 1 m^2 or smaller. This slows down excavation, reducing areal exposure unless compensated for by extra time in the field or extra manpower.

Excavations at the Camel Site were conducted using a $2 \times 2\text{ m}$ grid, with one axis denoted by numbers and the second by letters, subdivided into quadrants of 1 m^2 each and labeled “a” (northwest quadrant), “b” (northeast quadrant), “c” (southwest quadrant), or “d” (southeast quadrant) (Figure 1.3), resulting in a basic excavation unit of 1 m^2 . All built structures and features were given locus numbers for easy reference. Walls were not numbered, but grid and locus reference allowed easy and unambiguous denotation. Artifacts were collected during excavation and placed in bags labeled with the appropriate grid unit, denoted by an uppercase letter, a number, and a lowercase letter (*a*, *b*, *c*, or *d*; the quad-

rant). Stratigraphic provenience (surface, upper, lower) was also noted on the bag, so that all artifacts could be associated with a single square meter and a level. For squares cut by walls separating two loci, a locus number was added to avoid ambiguity. Thus a typical provenience denotation might be “N29c, Loc. 31, Sur.” The site plan was drawn at a scale of 1:20 using the site grid. All individual stones larger than fists were drawn.

Stratigraphic Control. Stratigraphic control has generally been a strong point of traditional Near Eastern archaeological method, from its development to its more or less modern form with Albright (1936–37), Kenyon (1953), and Wheeler (1954). In one sense, the emphasis on stratigraphic control has dominated the perception of the archaeological record, reflecting a kind of fixation on the diachronic, often at the expense of larger exposures and in-depth understanding of single periods or societies (e.g., Gilead 1987). Sites are excavated according to layers assumed to reflect chronological and structural sequences in their formation. That is, on a larger scale, the strata documented on a site reflect the different phases and periods in its overall development, while on a

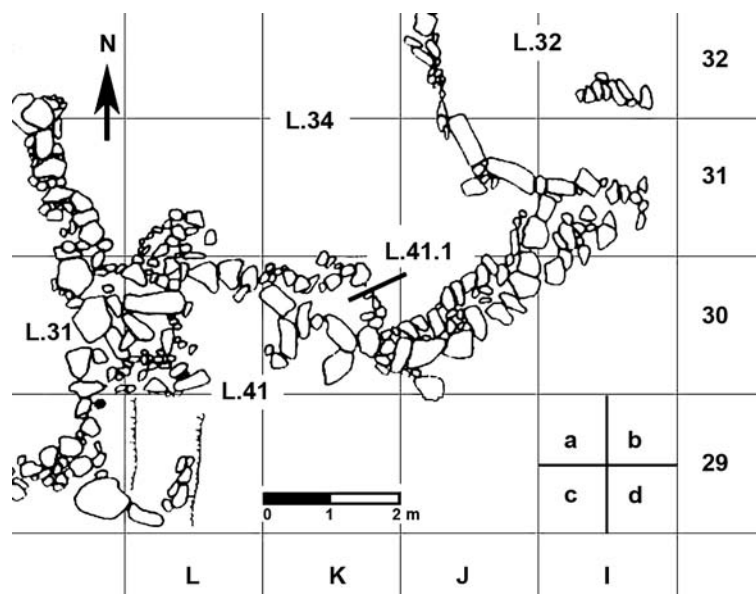


Figure 1.3. Basic grid system used on the Camel Site excavations.

smaller scale, substrata may be interpreted as local building trajectories and sequences of maintenance, collapse, repair, and reconstruction. Perhaps surprisingly, there has been little emphasis on natural taphonomic processes involved in site formation, the implicit assumption being that these are secondary and subsumed in the massiveness of human construction. The set of stratigraphic sequences and subsequences on tell sites can be extremely complex, but unraveling it is usually assumed to provide the primary key to understanding the occupational history of a site.

In the Negev, the stratigraphic paradigm in historical archaeology has sometimes resulted in paradoxical interpretations. On the one hand, single-period occupations have often been excavated with little or no stratigraphic control, sections consisting of little more than cross-sectional elevations of site construction (e.g., Cohen 1999: figures 73, 74–76, 81), with no documentation of fill sequences or sediment matrix. On the other hand, distinctions based on natural processes, such as deflation, loess reworking, and pedogenesis, have sometimes been interpreted as indicative of multiple occupations. Since nontell sites in the Negev have rarely been excavated in 5×5 m grids, sectioning for defining stratigraphy has been haphazard, accentuating problems of stratigraphic control.

Stratigraphic methods in prehistoric archaeology in the Negev are derived from those of classical cave stratigraphy (e.g., Bordes 1972), with emphasis on fine-grained definition of strata, including such substratigraphic features as lenses and dispersed hearths. Given the shallow nature of most desert sites (the Camel Site at its deepest is only 40 cm) and the scarcity of such features in most sites, stratigraphic control has been maintained through the use of arbitrary spits, usually 5 or 10 cm in depth. Conjoinable piece analysis of one Epipaleolithic dune site (Rosen 2000) has shown movement of up to 10 cm (Villa 1982), suggesting that stratigraphic distinctions of this order may be difficult. Within prehistoric sites with architecture, horizontal stratigraphy may allow sequencing of structures, but its meaning in terms of artifact associations is less clear. In general, there is recognition of taphonomic processes such as sheet wash and deflation, causing hori-

zontal dispersal and vertical concentration, respectively.

At the Camel Site, the site surface was mapped topographically using a fixed datum. In the absence of complex layering, the site was divided into three basic layers: surface, upper, and lower (see Chapter 3 for discussion of the stratigraphy). In the event of these layers being greater than 10 cm in thickness, they were divided arbitrarily into 1 and 2—that is, upper 1 and upper 2 (with 2 beneath 1) and lower organic 1 and lower organic 2 (with 2 beneath 1). Stratigraphic sections were drawn in selected locations to ascertain relationships between features and to explicate site formation. Relative depth, taken from the datum, was determined using line levels and a dumpy level.

Collection and Sampling. The question of what constitutes archaeological data and how and where it should be collected on a site continues to evolve rapidly. New techniques of use to archaeology are being developed constantly. Thus, to a great extent, any attempt to characterize the basic methods of collection and sampling in Near Eastern archaeology is bound to result in caricature. However, it is possible to characterize the collection and sampling methods in Negev historical archaeology in the 1980s to compare them with those of contemporary prehistoric archaeology in the same region and to understand the methodological goals of the Camel Site excavations.

For Negev and Sinai historical archaeology from the 1970s through the early 1990s, the range of data types collected was sometimes limited and selected. For example, although ceramics and lithics were always collected, with the exception of the Uvda Valley project (1980–1981), lithic waste was often discarded, along with less obvious informal (ad hoc) stone tools. Other artifactual materials, for example, beads, shells, bones, milling stones, and metal objects, were collected, but given the general use of larger tools (shovels and short-handled hoes—*turiyot*), along with only sporadic sieving (often through rather large screens, for example, 5 mm), many small objects, such as microliths, prills, and beads, were undoubtedly missed in many excavations. Indeed, even collection of such large objects as milling stones often suffered from selective discard due to

perceived lack of significance and difficulties of transport. Sampling and collection of environmental data (for example, sediment samples for chemical analysis, phytolith studies, and micro-morphological samples) was virtually absent, and even radiocarbon assays were rare (see Avner 1998 for significant exceptions). In a very real sense, traditional archaeology was a discipline whose scope focused on culture-history and hence diagnostic artifacts.

Beyond the “what” of the collection, excavations were often restricted to specific parts of sites. At the risk of overgeneralization, the priorities were usually first to excavate rooms, defining what were perceived as habitation structures, then to excavate parts of enclosures of various types, to help in their delineation and definition, and then to excavate other features, such as tumuli. Open areas beyond or between architectural elements were rarely excavated.

In distinct contrast, sampling and collection in prehistoric archaeology in the desert in this period stressed a greater range of collection and more exhaustive methods. Thus all artifacts were collected and all sediments dry-sieved, usually through 2 mm mesh. Thus large and exhaustive samples of small artifacts were collected. Artifacts such as lithic waste and bone splinters were collected as well. Excavation was usually conducted using small tools, specifically handpicks and trowels, with the recording of specific contexts of larger artifacts when deemed worthwhile. Excavations of prehistoric sites usually saw systematic collection of sediment samples. The difficulties of wet-sieving and flotation in the desert environment notwithstanding, many projects removed samples of promising sediments for laboratory flotation and analysis.

Given the small size of most Paleolithic sites in the desert (rarely greater than 200 m²), collection usually encompassed entire sites. Even for the larger Natufian, Harifian, and Neolithic sites, excavations were usually conducted in blocks according to the grid, not by locus, so that all areas of the site, including open spaces, were sampled.

Basically, excavations at the Camel Site adopted the sampling and collection methods of prehistoric archaeology. All sediments excavated were sieved through 2–3 mm mesh, and all artifacts,

including flint chips, were collected. Flotation and other sediment samples were collected from contexts with possible preservation potential—for example, from beneath in situ milling stones, from hearths, and from dark sediments. The shallow depth of the site and the reworked nature of the upper layer of loess rendered the chronological associations of most sediments suspect. As seen in the plan of the site, significant areas between architectural features and beyond them were excavated. Important activity areas were defined in this way.

Assaying Analytic Methods

The two primary contrasts between prehistoric and traditional analytic methods in the archaeology of the Negev lie in the use of statistical and quantitative methods and in a greater stress on environmental evidence. Obviously the use of numerical analyses ties directly into the field methods reviewed above. The source of these contrasts lies in the disparate origins, goals, and development of the respective subdisciplines, as well as in the differing materials studied, especially texts. Traditional—read biblical and classical—archaeology in the Levant has always placed a greater emphasis on culture-history, while prehistoric archaeology has focused more on ecology, even during the early days of the discipline. A distinct convergence is evident in the last decade.

In terms of quantitative analysis, the large quantity of material recovered, for example, some 28,000 lithic artifacts in various subcategories, demands quantitative processing. It is notable that the ratio of chipped stone artifacts to sherds is roughly 28:1 and that the methods of processing such figures derive directly from procedures standard to prehistoric archaeology. Even with respect to the ceramics, quantitative analysis (e.g., Saidel 2002b and this volume, Chapter 5) is essential for comparative study of assemblages. Whereas traditional approaches to ceramics in the region have emphasized typology and chronology—basically the definition and use of index fossils—quantitative comparison provides important information on site and assemblage function. Even a simple statistic such as minimum

number of pots provides important insights into the intensity of occupation of the site.

Stress on environmental variables, expressed primarily in the collection and analysis of sediment samples and in the attempt to define site formation processes, also derives from approaches taken in Levantine prehistoric archaeology. This is not merely the adoption of “scientific methods” to answer traditional questions but rather the incorporation of ecological questions into the understanding of the society as reconstructed from the excavation data.

In terms of specifics, analyses undertaken at the Camel Site included spatial distribution studies of artifacts, attribute analyses of lithic assemblages, interassemblage quantitative analyses of ceramics and lithics, sedimentological studies of various types providing information on site formation processes and environment, and scientific methods for artifact analysis, such as obsidian hydration, electron microprobe analysis of obsidian and copper samples, and mineralogical analysis of ceramics, millstones, and millstone waste. Of course, traditional typological characterizations of artifacts are also presented. Radiocarbon determinations confirm artifact-based chronologies.

The Substantive Contribution

Beyond the methodological experiment, the exhaustive excavation of an Early Bronze Age site was intended to provide new data to be incorporated in any new synthesis of the period and place. The choice of a small site, peripheral even in terms of the Negev, adds another dimension to our basic perspective on desert Early Bronze Age society. The number of sites excavated is still small enough that any new site will automatically contain new materials.

To anticipate the results of the work, the lithic assemblage from the Camel Site, with some 28,000 artifacts, constitutes the largest and most complete assemblage of its kind. It thus provides a quantitative baseline for other comparisons. The discovery of copper artifacts and apparent copper waste in such a small site adds a new dimension to our understanding of the period, since it indicates that the inhabitants of the site were involved in either trade or production of copper

(or both), in addition to being consumers. The discovery of obsidian chips, seashells from both the Red Sea and the Mediterranean, and pink quartz crystals; evidence for manufacture and trade in various kinds of beads; and, for the first time, evidence for milling stone manufacture, all provide new data and substance for our comprehension of the period.

The Pastoral Nomadic Adaptation

The final goal of the investigations at the Camel Site was to place the site, and the society that it presumably represents, in some general framework of pastoral nomadism and related adaptations. There are two dimensions to this goal and one important qualifier.

First, pastoral nomadism can be viewed as an evolving adaptation to historical, social, and ecological contexts. The Negev Early Bronze Age variant, as represented by the Camel Site, can be viewed as a part of a sequential or historical development. It can be placed in a general diachronic and evolutionary context, not in the nineteenth-century (or 1960s) linear social evolutionary sense but as part of the cumulative record of the desert adaptations we call pastoral nomadism. To argue against such an approach is to claim that unlike the rest of us, pastoral nomads have remained static in their basic lifeways, an untenable claim both historically and morally. For example, and again to anticipate some of our conclusions, the conclusions drawn from the investigations at the Camel Site, along with other research on the development of pastoralism in the Negev and surrounding areas, suggest that the economic asymmetries we associate with classical pastoral nomadic societies in the Middle East developed precisely in this period and that earlier pastoral societies in fact maintained a significantly greater degree of economic autonomy.

The second dimension is horizontal or synchronic. The pastoral society reflected in the Camel Site can be examined from the perspective of its basic social, cultural, ecological, and economic structures, both as they operated internally—for example, in the spatial structure of the site—and in terms of relations with other elements of the larger Early Bronze Age society, as in trade,

movement, and cultural affinities. From this perspective, Negev Early Bronze Age pastoral society may constitute a valuable addition to the general anthropological corpus of pastoral nomadic societies, one with perhaps few, if any, good modern parallels. This addition, in turn, might add insights to our understanding of the general set of lifeways we call pastoral nomadism.

If these two dimensions are clearly archaeologically anthropological, the qualifier is most certainly methodologically archaeological. Organic materials, including the animal bones on which most archaeological studies of pastoralism are based, are simply absent from the material assemblage recovered from the Camel Site (in spite of both sieving and sample flotation, as above). Shallow accumulations in the desert steppe do not effectively preserve organic materials.

In a critique of a paper submitted to the *Journal of the Israel Prehistoric Society* on the microlithic drills and bead production system found at the Camel Site, one anonymous reviewer went so far as to question the attribution of the Camel Site inhabitants to the general rubric “pastoralists,” citing the absence of bones from herd animals. This remains an important critique, to which there are important answers.

First, while the attribution of a site to a general subsistence mode should not be undertaken lightly, we do not hesitate to assume that Epipaleolithic sites in the Negev without organic remains or bones can nevertheless be attributed to hunter-gatherers. There are enough sites that do have bones (and it does not take too many), and there are enough functional similarities between those with and those without, to extrapolate the basic subsistence (e.g., Goring-Morris 1987), even if we cannot detail it. A similar case can be made for the Camel Site and its other boneless relatives, for example, Rekhes Nafha (Saidel 2002a). That is, the social and cultural contexts of the Camel Site place it securely in a period when the primary subsistence mode in the desert was pastoralism. Specifically, goats and sheep were domesticated millennia earlier (Horwitz et al. 1999), and even donkeys no later than the preceding (fourth) millennium B.C.E. (Milevski 2009). The remains of herd animals are well evident in all contemporary sites with bone preservation

(e.g., Hakker-Orion 1999; Henry 1995:368–369; Horwitz 2003; Horwitz and Tchernov 1989). Furthermore, the architectural and material culture similarities between these sites, boneless or not, indicate that they are part of the same social system. Differences are taphonomic and not cultural, and the Camel Site falls clearly into the desert pastoral nomadic subsistence mode.

Second, if we cannot reconstruct herd-culling patterns without bone assemblages, modern ethnography demonstrates a great range of other activities not directly related to animal husbandry, crucial in their diversity, on which pastoralists depend for making a living. Sites such as the Camel Site provide information on pastoral societies beyond what animal bones themselves can tell us, and this information is no less important to our understanding of the pastoral adaptation than are the data and interpretations based on the bones. Indeed, the idea of an archaeology of pastoral societies beyond bones (Chang and Koster 1986) is of itself of some importance.

Third, the basic assumption of pastoral nomadism is also crucial, even if only as a working hypothesis (albeit one about which in my opinion there is really little question). Thus issues of seasonality and mobility become research foci, issues often otherwise neglected, especially when such sites are investigated from a more cultural-historical approach. Similarly, the interpretation of the data of external relations—ceramic sourcing, material culture linkages, the movement of materials—when viewed from the perspective of pastoral nomadism, is quite different from interpretations based on assumptions of colonization or caravan trade.

To make the point more explicit, too often archaeological research on nomads, and certainly ancient historical research on the same, actually does not engage nomadic cultures themselves. Rather we look at nomads sedentarizing, or nomads and the state, or nomads as agents of change influencing sedentary civilizations. Yet the analysis of pastoral and nomadic societies is of inherent value without necessarily referencing relations to “civilization” or “civilizing” processes. In this, the linkage to anthropology, with its roots in the study of the “other,” is most evident. However, taking this even further, the fact that so little work

has actually been conducted on the archaeology of ancient campsites renders them all the more important. We have been excavating tells for well over 100 years, and ancient cities and villages have long been the focus of archaeological research around the world. We are literally missing vast tracts of the human career in the absence of an archaeology of nomads.

THE STRUCTURE OF THE WORK

An Investigation into Early Desert Nomadism is a hybrid study, half descriptive site monograph and half synthetic essay on early desert pastoralism in the Negev. The 13 chapters fall into three basic categories: background (chapters 1 and 2), data generated from different archaeological realms (chapters 3 through 11), and synthesis (chapters 12 and 13). At the risk of repetition, the overview presented here summarizes these materials, providing a general perspective from which the details can be seen in a larger view.

Chapters 1 and 2 (“Introduction: Toward an Archaeology of Early Nomadism at the Camel Site”; “Location and Environment”) place the investigations into a larger general context in terms of scientific background (history of research, goals, and so on) and geography. The research background has been reviewed above. Geographically, the Camel Site is in the arid central Negev (Figure 1.1), a region in which dry farming is not possible and agriculture developed at its earliest only in the Iron Age, ca. 1000 B.C.E. (two millennia after the occupation of the site). This harsh environment is reflected in all aspects of the culture apparent at the site, from the evidence for mobility and the ephemeral nature of the site, a standard response to desert environments, to the absence of sickle blades and to the low population densities of the region. In recent times, prior to the modern state of Israel, the region was the realm of local Bedouin tribes, who infiltrated the area some 300 years ago (Bailey 1980).

Chapter 3 (“The Physical Site”) reviews the architecture and stratigraphy. The scrappy camp nature of the site is evident in the physical remains. The basic pattern of enclosures and attached rooms is nevertheless clear, and the low walls and absence of large quantities of stone fall

suggest stone hut bases and fences with organic superstructures. This architecture fits with our general perception of early desert pastoral adaptations and, prior to the domestication of the camel, also reflects a pre-tent mode of mobility (Rosen and Saidel 2010). Stratigraphic analyses suggest two phases of occupation, but in fact it is not possible to trace two distinct occupational horizons over the site. Chapter 4 (“Chronology”) summarizes the different data concerning periods of occupation (C14 and material culture) and concludes that the primary occupation was during the Early Bronze Age II, ca. 3000 to 2700 B.C.E., with a second occupation in the terminal third millennium B.C.E., in the Intermediate Bronze Age. These determinations correlate in general with the stratigraphic assessments.

Ceramic analysis (Chapter 5, “Pottery from the Camel Site”) reveals a small assemblage of fewer than 1,000 sherds, typical of the indigenous Early Bronze Age culture of the Negev, the Timnian, with a subassemblage dating to the end of the third millennium B.C.E. (and according with other analyses of material and stratigraphy). The assemblage shows limited diversity, but petrography reveals several clay sources, probably a reflection of the mobility of the inhabitants and perhaps some trade connections. Of course, the small size of the assemblage also fits with the idea of mobility. Spatial analyses suggest deliberate discard beyond the confines of the architecture. The spatial study of the ceramics is also integrated into the general spatial analysis presented in Chapter 12, allowing the ceramic distributions to be compared with other elements of material culture.

The ground stone materials (Chapter 7, “Milling Stones and Waste”) constitute the first evidence in the Negev for the manufacture and trade of milling stones in this period. The milling stones themselves are small querns made of ferruginous and quartzitic sandstones found exclusively in the Makhtesh Ramon, the closest exposures some 10 km distant. The absence of evidence for agriculture in the region (or on the site) suggests that these tools were used either for processing collected plant resources or perhaps imported grain, a pattern known among some recent Bedouin. The presence of broken sandstone rough-outs, flakes, chunks, and chips indicates

that the site functioned as a secondary production center, and the presence of hundreds of milling stones of the same raw material at the northern Negev site of Arad, with no evidence for manufacture, suggests a system of pastoral exchange.

Analysis of the seven copper objects from the Camel Site (Chapter 8, "Copper Objects from the Camel Site") shows a greater technological complexity than might be expected at a small site in the desert. The nature of the artifacts (two awls, two prills, and three lumps) suggests trade and perhaps scavenging/recycling; the distance from the copper sources in Feinan (the likely source) or Timna again reflects mobility and perhaps trade. The large-scale consumption of copper at Arad, already linked to the Camel Site through milling stones and some ceramics, suggests a market for pastoral exchange.

Three obsidian chips (Chapter 9, "The Camel Site Obsidian") were analyzed for chemical content and date (to establish that they were not collected in antiquity from a Neolithic site). The chemistry establishes their source in eastern Anatolia, and hydration analyses establish that they are indeed third millennium B.C.E. in date. These artifacts then constitute another exchange item, reflecting most likely a trinket or gift exchange system and contrasting, for example, the milling stone exchange system. In a similar fashion, the beads and shells (Chapter 10, "Shells, Beads, and Other Artifacts") reflect both the manufacture and probable trade of ostrich eggshell beads and the exchange of seashell beads, notably from both the Mediterranean and the Red Sea. The worked hematite, pink quartz crystals, and small fossils probably attach to similar gift exchange systems, again reflecting low-level nomadic production, exchange, and mobility.

Analyses of sediments and microartifacts (Chapter 11, "Sediments and Microartifacts from the Camel Site") provide information on both site activities and site formation processes. In particular, varying parameters of organic content, particle sorting, and magnetic susceptibility reflect the spatial heterogeneity of activities on the site. The differential recovery of quartz sand grains suggests specific areas of milling stone use or manufacture, tying into that general heterogeneity. Grain size

analyses confirm the idea that the upper layer of loess was reworked, supporting the stratigraphic assessment of two basic phases of occupation.

The two final synthetic chapters (Chapter 12, "The Organization of Space at the Camel Site," and Chapter 13, "The Camel Site in Perspective") provide overviews of the research at the level of the site and the larger level of the region/period and the general subject. The analysis of the spatial distribution of artifacts (lithic types, ceramics, sandstone types, and other material culture) from the Camel Site links the disparate elements presented in detail in other chapters and demonstrates a complexity not expected in a small pastoral encampment. Activities (bead making, milling stone manufacture, food preparation, discard, stages of lithic reduction) were patterned spatially, suggesting social rules and distinctions not normally associated with archaeologically "simple" societies. This complexity fits well with the heterogeneity evident in the sedimentological analyses, as well as with the different levels of exchange and production apparent in other analyses. The intrasite analyses then feed into larger perspectives, providing a picture of a functioning desert society based on a wide range of interlocking activities and using the methods outlined, offering new ideas on how to continue research into the subject.

The final chapter offers an evaluation of the materials of the Camel Site from methodological, substantive, and theoretical perspectives, as outlined earlier in this chapter. Methodologically, the investment in the more rigorous field practices of prehistoric archaeology, not surprisingly, are found to be totally justified by the enhanced material culture assemblages recovered and the greater contextual detail, together providing much greater interpretative potential. Substantively, the materials from the Camel Site define in depth the Late Timnian culture, offering a reference for future excavations and investigations. Finally, the Camel Site is placed in larger regional, chronological, and theoretical (read anthropological and historical) perspectives. Briefly stated, the materials reflect a greater complexity than might be expected of a small campsite, especially in the diversity of exchange and production systems, perhaps reflecting economic intensification tied to

the rise of urbanism in the Mediterranean zone. Two final related points are that these ancient desert pastoralists are not Bedouin; the materials from the Camel Site demonstrate clearly that while modern ethnographic materials can perhaps be used to generate hypotheses, they are no substitute for archaeology. Indeed, the materials from the Camel Site demonstrate the tremendous potentials of an archaeology of ancient nomadism.

NOTE

- 1 Nelson Glueck (e.g., 1953, 1958) surveyed extensively in the region as well but did not recognize the Early Bronze Age as a separate or significant cultural horizon there (e.g., Glueck 1959:59).

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CHAPTER 2

LOCATION AND ENVIRONMENT

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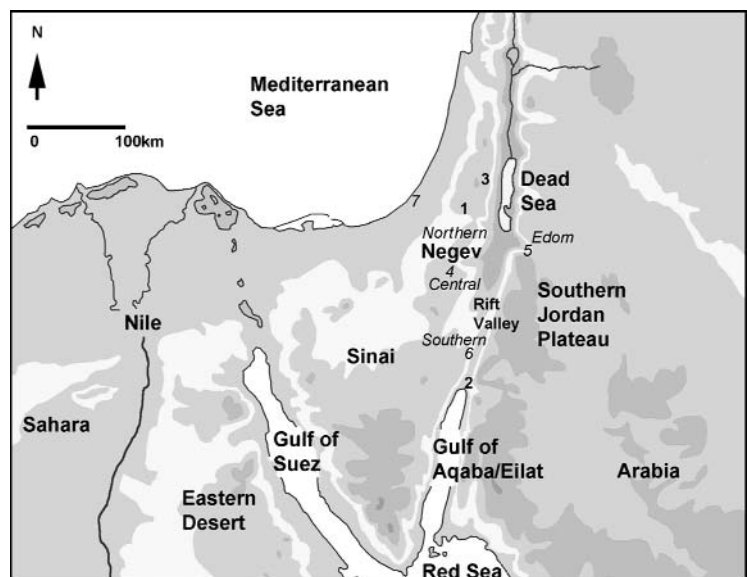
THE SOUTHERN LEVANTINE DESERTS

This large region, consisting of the Negev in Israel, the southern Jordan Plateau in Jordan, and the Sinai Peninsula in Egypt (Figure 2.1), constitutes a large geographic transition zone between the larger deserts of the Sahara to the west and Arabia to the east and from the Levantine Mediterranean zone in the north to the steppes and deserts farther south. While the east–west transition is primarily a

geographical one, with variability resulting from topographical and geological features such as the Rift Valley and the mountains of central Sinai, the north–south transition constitutes a climatic and environmental gradient. Thus, from the Mediterranean zone of the Hebron Hills to the Beersheva Basin, annual rainfall declines from 500 mm per year, more than adequate for the full range of the classic Mediterranean fruits/vines/olives/cereals agricultural complex, to 200 mm per year, which

Figure 2.1. Map of Negev and surrounding areas.

1. Beersheva
2. Eilat/Aqaba
3. Hebron
4. Makhtesh Ramon
5. Wadi Feinan
6. Timna
7. Gaza



constitutes the limits of subsistence dry farming practicability, in a distance of only 30 to 40 km. Vegetation grades from Mediterranean open forests, chaparral, and garrigue to open steppe, Irano-Turanian vegetation. Farther south, this steppe region extends to the central Negev, to the Makhtesh Ramon; rainfall declines another 100 mm per year; and vegetation becomes increasingly sparse. South of the Makhtesh Ramon, rainfall declines to a mere 25 mm per year in the Eilat/Aqaba area, and the Irano-Turanian steppe vegetation is replaced by the Saharo-Arabian. A similar north-south gradient is present in Jordan, although the Mediterranean and Irano-Turanian zones extend farther south due to the higher altitudes of the mountains on the east side of the Rift Valley. The Jordan Plateau also shows an east-west rainfall/vegetation gradient, from the Mediterranean zone of the central hills of Jordan to the eastern deserts. In Sinai the north-south gradient is less evident, since the coastal zone is quite arid from the start. The primary exceptions to these gradients are the high mountains of central Sinai, where aridity is ameliorated by altitude, and the Rift Valley and Gulf of Eilat/Aqaba, where the combination of natural springs and intense heat creates oases, patches of relict tropical (Sudano-Deccanian) vegetation (Danin 1983; Nir 1985; Rosenan and Gilead 1985a, 1985b). Throughout history, these oases have served as foci for way stations for trade and transhumance.

Geographically, the region is comprised of a mosaic of subunits whose environmental variability is important. Although these units tend to grade into one another, for the sake of organization they can be divided into three large units: the Sinai Peninsula, the Negev, and the southern Jordan Plateau, with the Arava Rift valley between the Negev and the Jordan Plateau.

In the west, the Sinai Peninsula is bounded in the southeast and the west by the two northern arms of the Red Sea, the Gulf of Eilat/Aqaba and the Gulf of Suez, and in the north by the Mediterranean Sea. It connects to Egypt in the northwest and continues into the Negev in the east. It may be divided into four subregions (e.g., Bartov 1985; Orni and Efrat 1980:125):

1. The northern Sinai consists of the Mediterranean coastal areas of Sinai. It is

dominated by dune systems but also provides the main land link between Egypt and the southern Levant.

2. Central Sinai is a large dissected plain, draining north, but is hyperarid, such that little water actually reaches the Mediterranean.
3. The southern Sinai is a region of high igneous mountains.
4. The Red Sea coasts are marked by beaches and springs.

Rainfall and vegetation vary by region. Of particular note is the somewhat higher rainfall, and resulting patch of Irano-Turanian vegetation, in the southern Sinai. This region is also rich in minerals, including copper oxides and turquoise, which both play roles in human settlement in the region.

In the east, the southern Jordan Plateau can be divided into two basic regions: the mountains of Edom and the plains of northern Arabia. The mountains rise above 1,000 m and are dissected by numerous wadis (ephemeral streambeds) running into the Arava. The more southerly extension of the Mediterranean zone east of the Arava, due to the higher elevation of Edom as compared to the Negev Highlands in the west, is important, since environments on the same latitude east and west of the Arava Valley are not comparable. Furthermore, the deep wadis incising the large plateau create patches of arid desert in a mosaic of environments between the Mediterranean and steppe zones on the plateau. Of especial note are the copper sources at Wadi Feinan. East and south of these mountains, the plains of northern Arabia constitute a region of extreme aridity.

Given the nomadic lifeways envisioned for the inhabitants of the Camel Site, a general description of the Negev is necessary to provide background on possible migratory patterns. To the extent that artifacts found on the Camel Site (ceramics, shells, copper, crystals) derive from different places in the Negev, Sinai, and southern Jordan, and artifacts from the central Negev (chipped stone tools, milling stones, beads), perhaps from the Camel Site, moved to different places in the Negev and Sinai, it is likely that the

inhabitants visited at least some of these places in the course of seasonal or longer-term cycles of movement.

The Negev is a triangular area extending roughly from the Mediterranean coast near Gaza to the Dead Sea and south from each side to the Gulf of Eilat/Aqaba. It also may be divided into three subregions:

1. The loessial plains of the northern Negev receive enough rainfall to make dry farming practicable at the subsistence level. These plains grade into the dunes of northern Sinai and the Israeli coastal plain.
2. The central Negev Highlands consist of five parallel ridges of hills and valleys, achieving peaks of around 1,000 m in elevation. The higher elevation results in somewhat increased rainfall and thus a degraded Irano-Turanian steppe vegetation system.
3. The southern Negev is a dissected plateau dominated by Nahal Paran (*nahal* is the Hebrew equivalent of “wadi,” an ephemeral desert stream). The region is hyperarid. Copper sources and ancient mines have been found at Timna, on the edge of the Arava and the Paran Plateau.

Although often included as a fourth subregion of the Negev, geographically the Arava Valley falls between the hills of the Negev and those of the Jordan Plateau. This geological graben, part of the African-Syrian rift system, begins at the Dead Sea, ca. 400 m below mean sea level, and rises to some 200 m above mean sea level before descending again to the Gulf of Eilat/Aqaba. It is especially notable for the numerous springs and patches of tropical vegetation, in spite of a near absence of rain.

THE SITE REGION

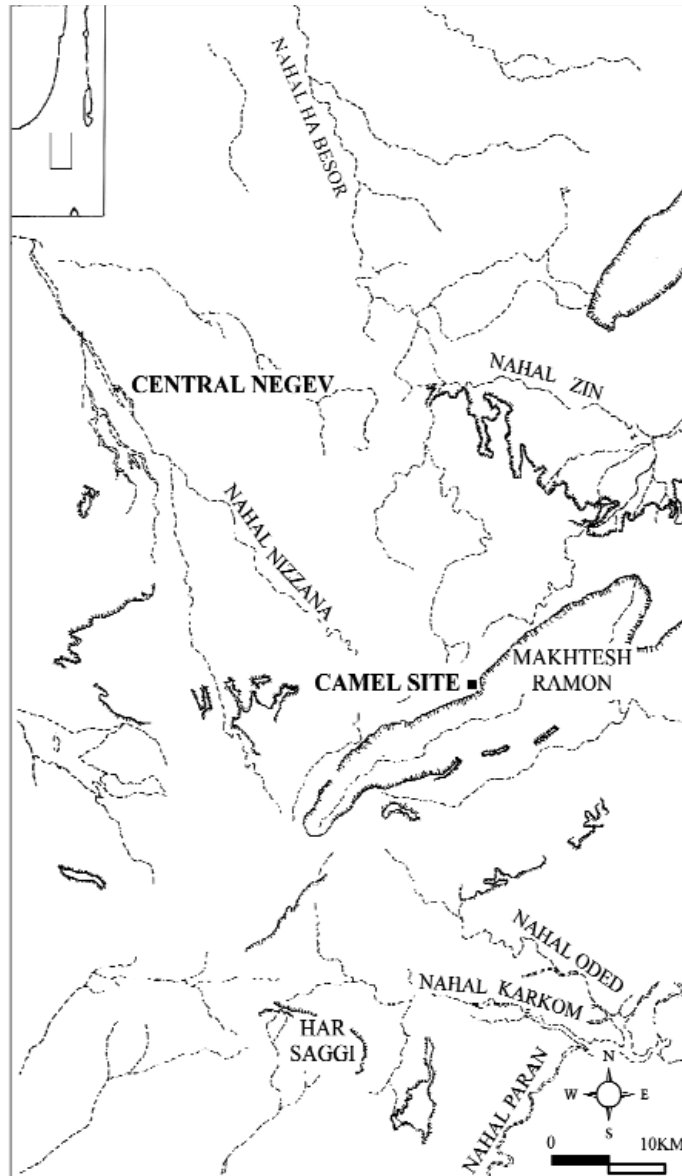
The general region is arid, falling climatically into the desert mesothermal B'2–B'4 transitory stage, based on the Thornthwaite index of thermal efficiency, a standard climate classificatory system (Evenari et al. 1982; Rosenan and Gilead 1985a, 1985b). Rainfall patterns are Mediterranean, and precipitation occurs only in the win-

ter months, from October through April, with 80 percent falling from November through February. Average annual precipitation is around 125 mm but is also marked by great variability from year to year and may rise as high as 200 mm in a particularly wet year and as low as 10 mm in a drought year (Rosenan and Gilead 1985a; Shanan et al. 1967). Mean humidity is approximately 55 percent; the average annual temperature is 18 °C, with a mean coldest monthly temperature (January) of 9 °C and a hottest monthly temperature of 26 °C (Rosenan and Gilead 1985a, 1985b). Snowfall in Mitzpe Ramon is not uncommon.

In spite of the general aridity and desert landscape, the site location is clearly ecotonal, the north wall of the Makhtesh Ramon, more correctly referred to as the Makhtesh Ramon, marking an abrupt transition between two geographic zones (Figures 2.2, 2.3): the Saharo-Arabian desert zone of the *makhtesh* (plural *makhteshim*) and areas farther south, and the degraded Irano-Turanian steppe zone north of the *makhtesh* (e.g., Danin 1983; Orni and Efrat 1980:15–35). These two geographic zones contrast in a range of features, including climate, soils, geology, relief and drainage patterns, vegetation, and access to other natural resources (Evenari et al. 1982).

The Makhtesh Ramon (Figure 2.3) is not an impact crater, a volcanic crater, or a glacial cirque but an erosional cirque formed by the coincidence of soft (clay, sandstone) substrata capped by harder limestone, breached and eroded as a result of the increased relief caused by uplift and dome formation. Such occurrences are geologically rare but are a characteristic feature of the central Negev, where there are three well-developed *makhteshim* and an additional incipient example (Ben-David and Mazor 1988). The Makhtesh Ramon is 35 km long, 7 km wide at its widest, and approximately 300 m deep from the top of the cliff to the central draining wadi (Nahal Ramon). The cliff walls run near-vertical in places, 10 to 20 m high, and the Makhtesh in general drops some 200 m vertically over 400 m horizontally before flattening out in a central plain, which lies at approximately 550 m above sea level, well beneath the Camel Site. Passage down the cliff face is restricted to breaches in the cliff, and the Camel Site is located close by one such path. Major passes are located several kilometers east and west of the Camel Site.

Figure 2.2. Map of the central Negev showing location of the Camel Site and the Makhtesh Ramon



Within the *makhtesh*, rainfall averages less than 100 mm per annum. Sediments and soils on the slopes of the *makhtesh* consist of rock outcrops, *hammadas* (desert pavements resulting from deflation), and rocky desert soils, with reg soils and coarse desert alluvium on the central plain (Evenari et al. 1982:40, figure 21). Soils exhibit a high degree of salinity—over 40 percent (Ravikovitch 1969). Geologically, the *makhtesh* provides a cross section of the geological history of the region, with exposures from the Triassic through the early Cenozoic (e.g., Zak 1968). As indicated above, the upper layers, Cretaceous and later, are harder limestones, while lower strata,

located in the center of the *makhtesh*, are dominated by clays and sandstones. The sandstones, deriving from the Jurassic Inmar Formation, are often lateritic or metamorphized, and these hardened sandstones were exploited in the Early Bronze Age for the production of milling stones (Abadi and Rosen 2008; see also Chapter 7). They are not found elsewhere. Relict Jurassic volcanoes and basalts are also present and may have been occasionally exploited by ancient people. Geomorphologically, the *makhtesh* is marked by the steep escarpments of its sides and the flatter alluvial beds and plains of the central drainage, Nahal Ramon, the ephemeral stream

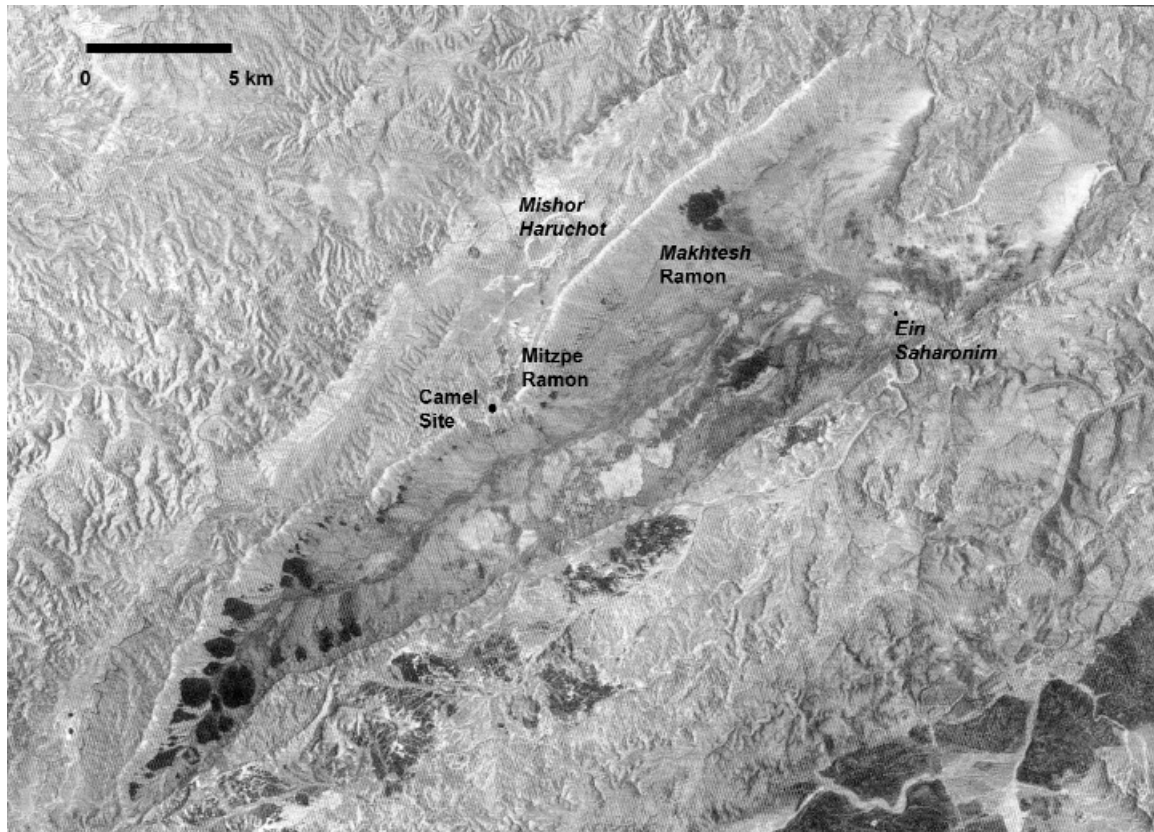


Figure 2.3. The location of the Camel Site on the cliff of the Makhtesh Ramon.

that, along with its tributaries, drains the *makhtesh*. Nahal Ramon ultimately flows to the Arava Rift valley.

Vegetation in the Makhtesh Ramon has been classified as Saharo-Arabian and is dominated by *Haloxylon* (white saxaul), *Zygophyllum dumosum* (bean caper), and *Anabasis articulata* (jointed anabasis) (Danin 1983:42–45; Zohary 1953). *Retama raetam* (broom) is common in the wadis. In the western and upper reaches of the *makhtesh*, Irano-Turanian steppe vegetation infiltrates.

The area north of the *makhtesh* can be divided into two geographic zones: the hilly region west of the Camel Site, and the flatter plain to the east. The hilly area is strongly dissected and drained by two primary wadis: Nahal Nizzana farther west and Nahal Zin (Figure 2.2). These, in fact, constitute a major watershed, with Nahal Nizzana ultimately flowing to the Mediterranean, and Nahal Zin to the Dead Sea. Some of the peaks of the hills in this area are well over 900 m above sea level, with wadi beds and valleys often 50 to 100 m lower. East of the Camel Site, the Plain of the

Winds (Mishor HaRuchot) shows less relief, less altitude, and less dissection. The highest areas of this plain are approximately 800 m above sea level, with the wadi beds only 20 to 50 m lower. The primary wadi draining the area is Nahal Hava, flowing to the Arava Rift valley. In classical times, many of these wadis were terraced and farmed using runoff irrigation systems. These systems are virtually absent in the wadis of the *makhtesh* (Kedar 1967; Rosen 1987).

Climatically, this area is more moderate than farther south in the *makhtesh*. As above, rainfall averages ca. 125 mm per year, again with considerable yearly variability. Sediments and soils are generally saline, but less so than in the *makhtesh*, and consist of brown lithosols (brown, shallow, rocky desert soils) and gray desert loess (especially in the Valley of the Winds), with *hammadas* on the slopes. Bedrock is comprised of late Cretaceous and early Cenozoic limestones (Bartov 1985; Evenari et al. 1982:40–41, figures 21, 22; Nir 1985) and includes good sources of flint, absent from the *makhtesh*.

Vegetation is a degraded steppe, dominated by *Artemisia herba-alba* (white wormwood) on the slopes and plateaus and by *Anabasis* in the loess valleys. Other common plants include *Zygophyllum dumosum* and *Retama raetam*, especially in the wadis. *Pistachia atlantica* (Atlantic terebinth, Atlantic pistachio) grows in Nahal Nizzana and the upper reaches of Nahal Zin (Danin 1983:42–45; Zohary 1953).

No perennial sources of water are located in the vicinity of the site. The nearest spring is located about 25 km southeast, at Ein Saharonim. Although there are wells at Be'erot Loz and Borot Oded, these postdate the Early Bronze Age by at least two millennia. Regardless, winter rains commonly result in wadi flow and flash floods; pools of remnant water sometimes last well into the spring. Coincident with the rainfall, late winter/early spring flowering is the general rule for the vegetation. Obviously, these patterns have significance for reconstructing human seasonality.

Modern wild animal populations of the region have been severely impacted by human activities in the past 150 years, much more so apparently than the flora. Between the introduction of the gun among Bedouin populations, the repeated occupations by massive military presences, generally increasing human population, and, finally, the attempt by authorities to restore and protect some habitats and animals, some species have gone extinct, others have suffered immense demographic decline, and others have been introduced or reintroduced. In this context, the impact of domestic herd animals, present in the Negev for at least 8,000 years in varying numbers, on the ecology of wild species is difficult to assess and even more difficult to extrapolate back in time. Clearly, modern wild populations cannot be used to directly model ancient ones, and even the populations recorded in the late nineteenth century, before the final episodes of decline and extinction occurred, provide only a general outline of the wild animals present in ancient times. Nevertheless, even given these qualifications, the major species present today, and recently, constitute a baseline from which to look at ancient environments.

The primary ungulates present in the central Negev in recent times are gazelle (*Gazella dorcas*, although one cannot rule out the mountain

gazelle, *G. gazella*, in ancient times), ibex (*Capra ibex*), and onager (*Equus hemionus*). The gazelles and onagers inhabit primarily the plains and gentle slopes of the region, while the ibex are especially found along the cliffs and steeper slopes. The presence of a desert kite in the Makhtesh Ramon indicates that gazelles were hunted in later prehistory (e.g., Helms and Betts 1987; Meshel 1980), although direct dating of the kite has not been achieved. Other large mammals known in historic times but since hunted to extinction include the oryx and perhaps some species of deer. In terms of human subsistence, obviously all of these have been supplemented by domesticates, especially sheep, goats, donkeys, and camels and, to a lesser extent, cattle and horses (Shkolnik 1982).

Predators present in the region today include wolves, foxes, hyenas, and leopards. Smaller fauna include especially hyraxes along the cliff edges of the *makhtesh*, porcupines, and the desert hare (*Lepus capensis*). A range of smaller rodents and lizards of various sizes are also found in the region, as are raptors and other birds. Most significant here is the evidence for ostriches, in the form of ostrich eggshells on the site used for beads and known historically (Tristram 1884:139).

THE SITE LOCALE

The Camel Site, just west of the town of Mitzpe Ramon in the central Negev (Figure 2.4), is located on a spur between two incised and convergent wadis, approximately 200 m south of the north cliff of the Makhtesh Ramon and the peak overlooking the *makhtesh*, referred to as the Camel Lookout (see frontispiece). At its top, this peak is 892 m above sea level and accords a view of a large part of the Makhtesh Ramon, as well as the plain north of it. The site itself is approximately 865 meters above sea level and rests on a flat area between the slopes of the spur, with only a small gradient of 3 percent southeast–northwest.

The site rests on and in a shallow layer of loess directly overlying stepped limestone bedrock (Figure 2.5). This bedrock is exposed over much of the slope and the spur on which the site is located. Shrub vegetation cover on the spur is sparse (Figure 2.6) but is denser in the wadis

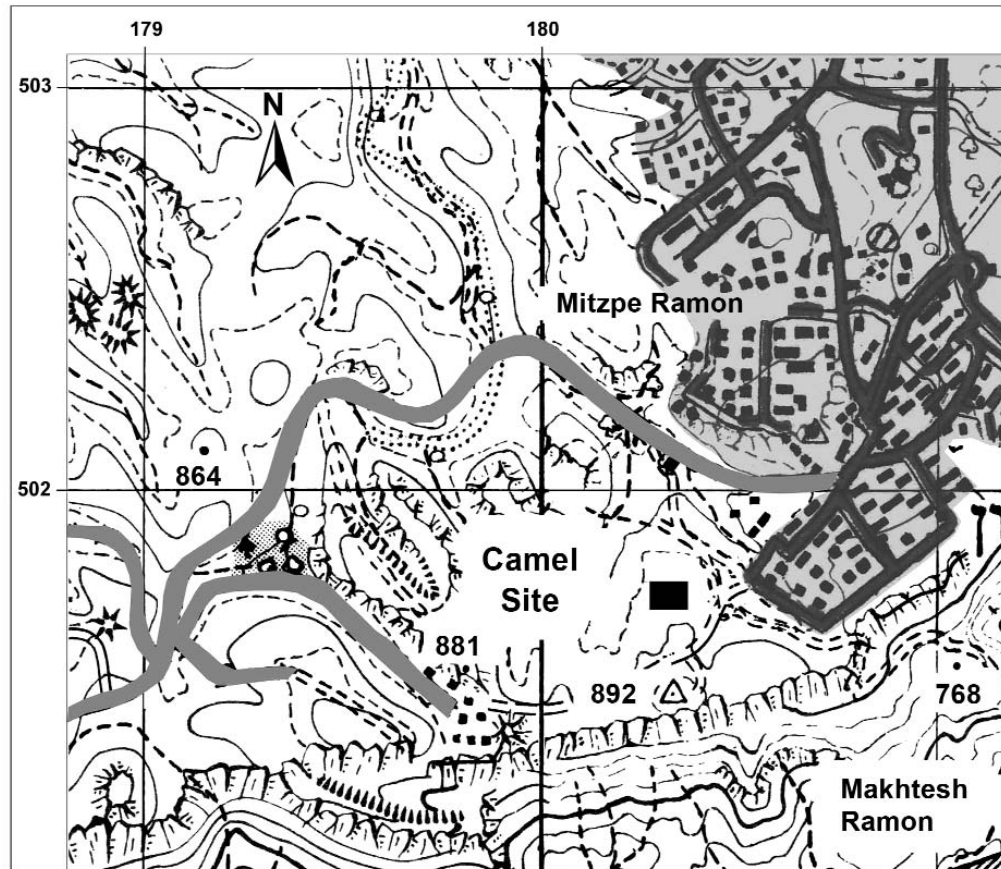


Figure 2.4. The Camel Site in Mitzpe Ramon.



Figure 2.5. Stepped limestone bedrock beneath excavation.



Figure 2.6. Natural surface looking north of the site, with a cluster of bushes and Mitzpe Ramon in the upper right.

below the site, where small broom trees (*Retama*) or brushes are present. North of the site, at the convergence of the two wadis on either side of the spur, the wadi bed has been reforested with pine.

Additional man-made features on the spur include a large rectangular tumulus at the base of the peak (100 m south of the site) and several stone scatters, stone lines, and stone piles of non-descript nature. Although it is likely that many of these features are ancient, with the exception of the tumulus, none preserve any depth of deposit, and no artifacts were found in direct association with them. Artifacts found on the general surface of the spur included a few classical-era sherds and modern gun shells and cans.

PALEOCLIMATE AND ENVIRONMENT IN THE CENTRAL NEGEV

Although the modern environment of the central Negev is desertic, numerous studies indicate an ameliorated climate at the end of the fourth/beginning of the third millennium B.C.E. (roughly the Early Bronze Age II, the period of occupation of the Camel Site; all dates are calibrated absolute dates except where indicated otherwise) in the southern Levant. While little of this work has ac-

tually been conducted in the central Negev, much derives from adjacent areas, such as the northern Negev and the Dead Sea, and can be expected to reflect the central Negev as well. Regardless, even studies as far afield as the pollen studies from the Sea of Galilee and isotope studies of speleothems from central Israel must reflect regional events and not microenvironmental idiosyncrasies.

Recently devised corrections for old carbon (Stiller et al. 2001) require the subtraction of some 1,200 years from middle Holocene uncalibrated C14 dates taken from the Sea of Galilee before they can be calibrated dendrochronologically. Taking this into consideration, the base of the Kinneret (Sea of Galilee) diagram (Baruch 1986), dating roughly to the end of the fourth millennium B.C.E., shows a high level of arboreal pollen. The Hula core analyzed by Tsukada (Baruch and Bottema 1999; Van Zeist and Bottema 1982) is in substantial accord. Although Baruch (1986) has suggested the possibility of anthropogenic disturbance in the form of olive cultivation playing a role here, there is a parallel rise in oak, not likely to be the result of human factors. In the Negev, the pollen assemblage from two sites in Nahal Zin, assigned by Juli (1979) to the Chalcolithic (terminal fifth millennium

B.C.E.) but almost undoubtedly better attributed to the Early Bronze Age (late fourth/early third millennium B.C.E.), contained low percentages of arboreal pollen, including olive, oak, pine, juniper, and almond (Horowitz 1976:66, 1979:248). None of these species are found in modern Negev pollen diagrams.

Alluvial terraces in the northern Negev, around Kiryat Gat, dated to the Early Bronze Age (third millennium B.C.E.) on the basis of associated ceramics, indicate increased water flow during this period, perhaps a continuation of the earlier Chalcolithic system, in clear contrast to the ephemeral nature of the modern streams (Rosen 1986a, 1986b). This is especially evident in the earlier phases of the Early Bronze Age and seems to decline in later phases. This system reverted to an erosional regime at the end of the third millennium B.C.E.

Goodfriend's (1988, 1990) analysis of stable carbon isotopes from dated snail shells, collected from different sites in the Negev and reflecting shifting C3–C4 plant communities (roughly Mediterranean versus desert plants), accords with an Early Bronze Age (fourth to third millennium B.C.E.) amelioration. In particular, the snail data suggest a southward shift of the isohyets of 20 to 30 km, such that the 300 mm isohyet shifted somewhat south of Beersheva, today receiving only 200 mm of rain per year. This suggests that the Mitzpe Ramon area might have received as much as 150 mm of rainfall per annum, significantly greater than today, although still arid.

Analysis of speleothems from the Sorek Cave (Bar-Matthews et al. 1999) shows two early rainfall spikes in the Early Bronze Age (mid-fourth to third millennium B.C.E.), separated by declines and followed by a longer episode in the middle of the third millennium B.C.E. These spikes, as well as the longer episode, are of a higher order than modern rainfall levels, indicating precipitation levels of an order higher than those of today. Although it is difficult to evaluate the precision of the dates, the general trend reflects greater humidity with some fluctuations. This is also reflected in the pollen diagram from the Atzmaut Rockshelter, just outside Mitzpe Ramon (Babenki et al. 2007), showing a peak in Graminae (relative to *Artemisia*, *Compositae*, and *Chenopodiaceae*) and thus a somewhat ameliorated climate in the third millennium B.C.E.

Finally, Frumkin et al.'s (1991, 1994; also Bookman et al. 2004) analyses of Mount Sedom cave width ratios and driftwood remains found in these passages indicate high Dead Sea levels in the third millennium B.C.E. (Neev and Emery 1976, 1995), with a rapid drop-off toward the end of the millennium (all calibrated). This suggests increased runoff in the Early Bronze Age and hence increased precipitation.

Thus, in general, there is good agreement from different realms of evidence that the southern Levantine Early Bronze Age climate was more humid than that of today (Rosen 2007: 70–102 for summary). Applying this information to the environments around the Camel Site, the following points can be made:

1. The Camel Site during the Early Bronze Age (early to mid-third millennium B.C.E., the period of the primary occupation at the site) was more humid than it is today, and the area around Mitzpe Ramon received as much as 150 mm average yearly rainfall. Given occasional snowfall in the region today, it is likely that winters would have seen more snow. This is still insufficient for dry farming, requiring a minimum 200 mm for barley agriculture and 300 mm for wheat, but it is more than adequate for sheep/goat pasturage. Certainly, vegetation cover would have been increased, and the region would have taken on a more steppe-like aspect than is evident today.
2. It is unlikely that river systems were perennial, but greater precipitation would also have resulted in longer periods of water availability in the absence of perennial sources.
3. Given later erosional episodes, it is likely that the deeply incised wadis adjacent to the site were shallower, perhaps filled with accumulated sediment that was later scoured out. Hill slopes may have shown greater sediment cover along with the greater vegetation cover.
4. The Makhtesh Ramon would also have been more vegetated, although it is not clear that the actual plant communities,

contrasting with those farther north, would have changed. The cliff would still have functioned as an abrupt geographical threshold, and there is little evidence for significant changes in the cliff face following the Pleistocene. Geomorphological analysis of stream systems south of the *makhtesh* (Ben-David 1997) indicates later Holocene erosional episodes even in these more desertic areas. Thus, prior to these episodes, the wadis would have had a less incised aspect.

5. Increased vegetation cover and water availability would have enhanced carrying capacity for both domestic herds and wild animals. Although basic plant communities need not have changed, an ameliorated steppe might well have supported a wider range of mammalian fauna—perhaps deer, wild sheep, wild goats, and mountain gazelles. Increased biomass from the presence of domestic herds could also have affected raptor populations. It must be stressed that in the absence of preserved animal bones from the Camel Site and other contemporary archaeological sites in the central Negev (but see, e.g., Henry and Turnbull 1985 for southern Jordan), such speculations are only that.
6. Although the period can be characterized as generally more humid, climate clearly fluctuated as well. Given the imprecision accompanying dating both the environmental events and specific archaeological settlements, it is not possible to closely correlate settlement changes with these fluctuations. Establishing clear causality between short climatic episodes and historical events is still basically guesswork.

THE CAMEL SITE IN THE DESERT

In addition to its physical environment, the Camel Site is located in a cultural context, one linked directly to its physical setting. The Negev in the Early Bronze Age II (ca. 3000 to 2700 B.C.E.), the primary occupation of the site, shows

a demographic florescence (Cohen 1999; Rosen 2009; see also Chapter 13 for discussion) with specific patterns of settlement of which the Camel Site is a part. Its place in this system can be examined from three perspectives: that linked to the specific period of climatic and environmental amelioration reviewed above; its place in the larger system of settlement in this period; and finally in terms of the particulars of the site location and its meaning for understanding the nature of this desert society.

The climatic amelioration that seems to attend the late fourth/early third millennium B.C.E. cannot be interpreted as a single prime mover determining the social ecology of desert settlement in this period, but its influences must be considered (see especially Rosen 2007: 128–144 for a general perspective on the Levant). At a regional level, the founding of Arad Stratum IV as a village in the late fourth millennium B.C.E. (Early Bronze Age Ib) and its development into a gateway town (Amiran et al. 1997; Finkelstein 1995:67–86), providing a market infrastructure and focus for the central Negev populations in the Early Bronze Age II (early third millennium B.C.E.), must have been grounded at some primary level on an agricultural base, like all such towns and cities in this region and period. The issue is of particular import for Arad, located in an area where subsistence dry farming based on primitive agriculture might not be possible today. The fact of agriculture, enough to support the town, is well established based on the abundance of sickles, milling stones, and indeed plant remains at the site (papers in Amiran 1978). Thus, given the available agricultural technologies of the period, and in the absence of an environment that might afford the luxury of irrigation, Arad probably was able to exist where it did because of that ameliorated (read wetter) climate. Once facilitated by the improved climate, its specific location was a function of proximity to the resources that constituted its *raison d'être* as an entrepôt for the desert—most notably copper but probably also bitumen, greenstone, and other resources found in the desert.

The rise of Arad is clearly concomitant to the rise of the central Negev pastoral system of which the Camel Site is a part, linking the rise of the pastoral system only indirectly to the ameliorated

climate. It is not hard to conceive of an alternative system arising, perhaps based on an Arad-type site somewhat farther north or west (in better-watered areas) should farming not have been possible at Arad. Then again, it is also possible that it was precisely that location at Arad that made the system functional.

This episode of ameliorated climate probably enhanced the richness of the steppe vegetation in the central Negev, facilitating the pastoral subsistence base on which the larger system rested. It is impossible at this stage of our knowledge to determine which particular factor (climate, economy, geography, technology, or social organization), if any or all of them, was necessary for the system to function. The basic fact of an integrated system seems clear.

On the regional scale, the concentration of Early Bronze Age sites, both indigenous, such as the Camel Site, and Aradian outposts (e.g., Beit-Arieh and Gophna 1976; Cohen 1999:37–82), is focused on the steppe zone of the central Negev, the more arid regions to the east, west, and south showing much lower site densities (the microenvironments of the Uvda Valley in the southern Negev notwithstanding). The geography and topography of the region tie into a marginal Mediterranean system with degraded steppe vegetation whose patterns of seasonality must have provided an underpinning for the basic lifeways of the Camel Site folk. Thus the rhythm of densest spring growth in the highest areas of the central Negev, winter water availability in most areas, new growth in the early winter in the lowlands, the necessities of mobility tied to both grazing and trade systems, and the locations of different resources, both those required for subsistence and those required for trade, acted upon human decision making in determining the actual patterns of settlement reflected in the archaeological remains. Without a great deal more research based on many more sites, we cannot yet reconstruct this system, but we can understand its basic principles.

Finally, the specifics of the Camel Site itself—located on an ecotone, with access to the steppe above the *makhtesh*, the mineral resources within it, and the passes providing access to the east and south—provide the parameters of settlement decisions. The site locale is not optimal in terms of

grazing; nor is it a large site, unlike the clusters in the higher areas in the west (Haiman 1992). Thus its specific location must reflect a set of variables, each weighted according to its perceived importance within a larger system, one integrating both the physical and social environments.

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THE PHYSICAL SITE: STRATIGRAPHY, ARCHITECTURE, AND SITE FEATURES

STEVEN A. ROSEN

Traditional recent architecture in the deserts of the Near East, and for that matter among mobile pastoralists in Eurasia and North Africa in general, is usually subsumed under the rubric “tent.” The Bedouin black tent is so ubiquitous as to be considered a fundamental characteristic of Bedouin society (Andrews 1997; Burckhardt 2005 [1831]; Feilberg 1944; Manderscheid 2001; Szabo and Barfield 1991:29–31; Verity 1971). By extension, archaeologists, historians, and anthropologists working on premodern periods have assumed, more often than not, that the ubiquity of the black tent also implies antiquity, this in spite of the actual great variability in domestic structures among modern-day nomads (A-Magid 2008) and the virtual absence of evidence for the existence of habitation tents in the desert prior to the first millennium B.C.E. in the Near East (Rosen and Saidel 2010). The black tent, with all its cultural accoutrements, is a recent invention (Saidel 2008).

Once relieved of the baggage of the Bedouin tent as a catch-all description of desert habitation structures, the detailed documentation of ancient desert architecture, especially indigenous architecture, becomes a crucial ingredient in the description of these societies. Although plans of early desert pastoral sites have been published

(e.g., Bar-Yosef et al. 1986; Beit-Arieh 2001, 2003; Haiman 1991, 1992; Kozloff 1981; Reich 1990), detailed explication of the construction, attached features, phasing (stratigraphy), and implications of these aspects of the architecture have not been pursued. Once a detailed analysis of the physical site has been achieved, then a proper spatial analysis using the distribution of material culture as it relates to architecture can also be attempted (see Rosen 2001 for a preliminary study of one site and Chapter 12 for such an analysis here).

The Camel Site is essentially a single-period occupation, dated to the Early Bronze Age II (henceforth EB II; ca. 3000 to 2700 B.C.E.; Figure 1.1; see Chapter 4 for chronological analysis and overview), with secondary Early Bronze Age IV (henceforth EB IV; ca. 2200 to 2000 B.C.E.) presence and characteristic architecture and stratigraphy of the general period and region. This said, and anticipating the conclusions, it is important to place the architecture in its cultural and historical context. Beit-Arieh (1986, 2003; also Rothenberg and Glass 1992) has demonstrated the presence of two cultural entities in the Negev and Sinai in this period: one consisting of Aradian trade outposts probably connected primarily to copper exploitation (Amiran et al. 1973) and reflecting the penetration of a northern

urban culture into the desert, and the second an indigenous desert pastoral society dubbed the Timnian (Kozloff 1972–73; Rosen 2011; Rothenberg and Glass 1992; for southern Jordan, see Henry 1995:353–374). In spite of overlap, these two societies contrast in the structure and content of their material culture systems (Saidel 2002; Rosen 2008, 2011) and, no less importantly, in their basic architecture. Those architectural contrasts will be reviewed in the summary discussion at the end of this chapter, but suffice it to say here that architecturally the Camel Site clearly represents the indigenous Timnian culture.

Finally, the detailed documentation is necessary not only for better comprehension of the nature of the site as it functioned but also for understanding its development during occupation and afterward. Although it is tempting to view the site as a functioning whole, analysis shows that different elements may not have been contemporary, both within the EB II and from it to the later EB IV. In fact, although it was not possible to fully separate the different features by phase or period, the demonstration of different episodes of construction is of itself important, even if a complete key to the developmental sequence of the site components is beyond our abilities.

STRATIGRAPHY

Stratigraphy at the Camel Site was documented in a series of drawn sections taken from different areas of the site (Figure 3.1) and accompanied by photographs. Stratigraphy at the site does not consist of construction or occupation layers as typically defined in Near Eastern archaeology but of depositional layers differentiated more by the processes of deposition and post-deposition than by sequential occupations. The natural stratigraphy of areas beyond the architecture (Figure 3.2) is relatively simple, consisting of three definable strata: (1) the surface crust; (2) an upper layer of reworked loess; and (3) bedrock. Within the areas delineated by the architecture, an additional layer, the lower organic layer (Figure 3.3), is sometimes (but not always) present, thus giving us four essentially “natural” layers: (1) surface; (2) upper layer; (3) lower organic layer; and (4) bedrock (Figures 3.4, 3.5). These are described below, fol-

lowed by a description of the basic site formation processes.

Surface

The uppermost level distinguished is the surface crust, 2 to 3 cm thick. This upper crust is comprised of yellow sandy silt, compacted and platy. It is found throughout the site and beyond it. It does not represent a living surface but rather an exposure surface. Flint artifacts found on the surface are often patinated, and surface ceramics are heavily abraded. They are probably not in primary in situ context, although architecture probably restricted movement within the locus in which they are found. Even beyond the architecture, the deflating surface need not have resulted in great horizontal movement, and artifact concentrations do represent original associations, if not precise locations.

Upper Layer

This is a layer of yellow sandy silt, reworked loess, 10 to 25 cm in thickness, beneath the surface crust. Its basic structure is small clods, more crumbly and less platy than the upper crust. It is found through the site and beyond it. It incorporates fallen stones and blocks, but the walls of the site often cut through it. It does not represent the original living surface but rather deposition and redeposition (some aerial, mostly sheet wash) following the original deposition. Although flint artifacts found in this horizon show fresh edges and are generally not patinated, and ceramics are much less abraded than those found on the surface, it is difficult to evaluate how much the artifacts may have moved. The artifact concentrations outside the architecture may have been displaced vertically as a result of deflation, without too much horizontal movement, explaining the concentrations of sandstone waste on the south side of the architecture and the ceramics on the west side. In some cases, the upper layer can be divided in two by differences in texture, with the upper facies more powdery and the lower more flaky or compacted. These differences may be the results of disturbance or perhaps reflect an internal episode of use/exposure.

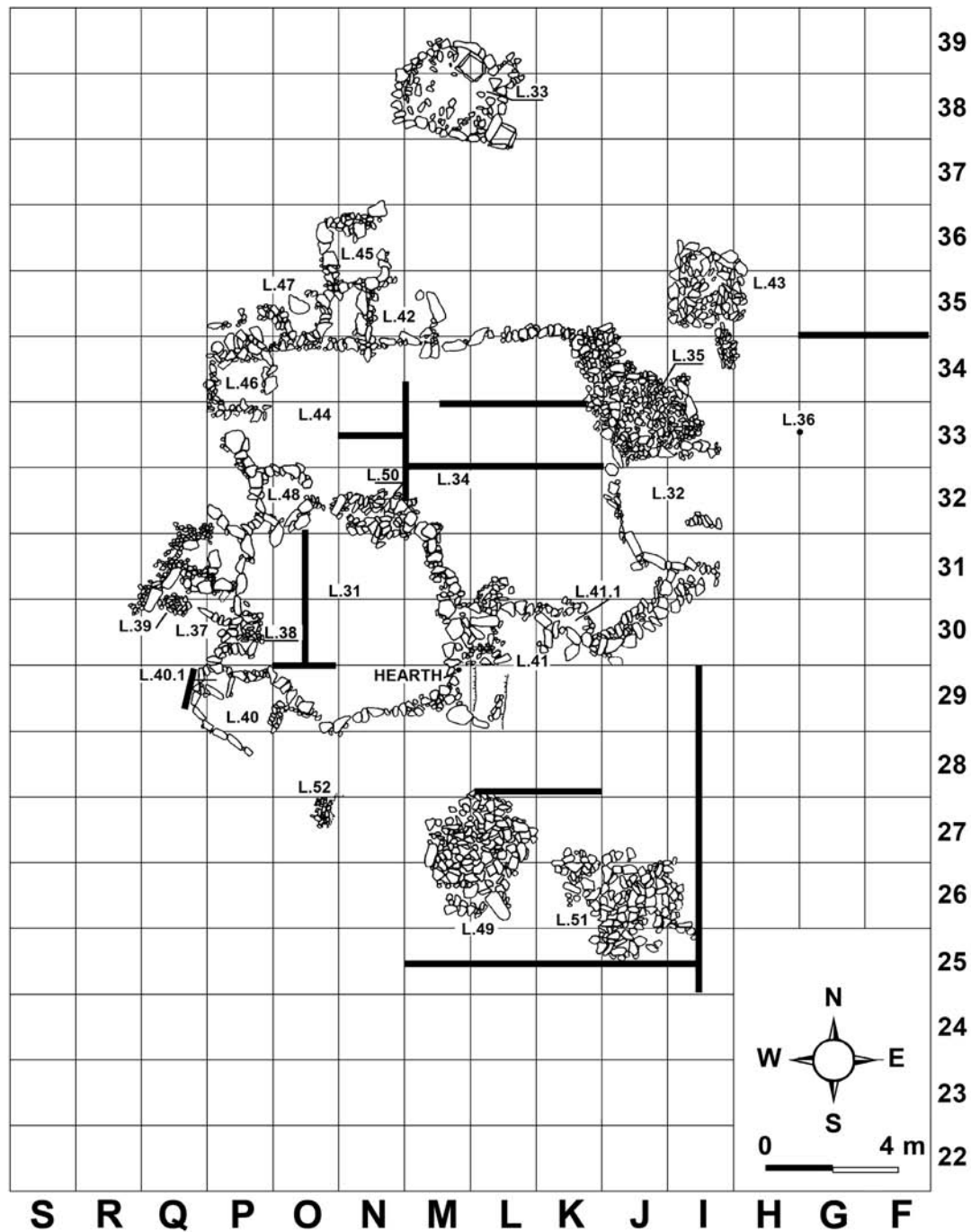


Figure 3.1. Location of drawn sections in Camel Site excavations.

Lower Organic Layer

This is a layer of reworked loess with a darker organic component, 5 to 10 cm in thickness, beneath the upper layer and directly above the bedrock. It is similar in structure to the upper

layer but somewhat more powdery. It is light gray-yellow in color. This layer is located primarily, although not exclusively, in the enclosure loci. The sources of the organic material may vary, and within the enclosures may be associated with dung deposits. It is also possible that

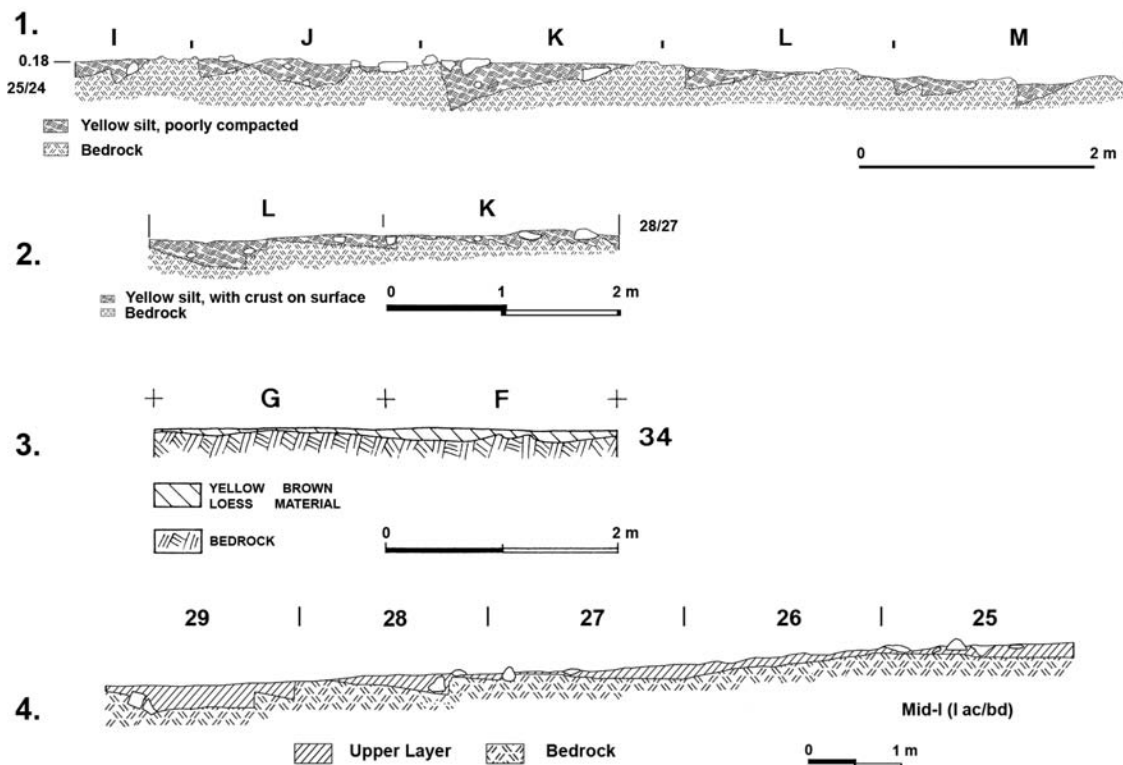


Figure 3.2. Section drawings beyond the architecture.

the lower organic horizon simply represents organic occupation debris, especially dispersed hearth deposits, and that spatial differences in stratigraphy represent differences in activities other than penning animals. Micromorphological examination (B. Pittman, personal communication) indicates some pedogenesis in this horizon in samples taken from the enclosure loci, but the source of the organic material seems to have been introduced (Y. Plahkt, personal communication). Notably, both enclosures also had hearths in them, and woody phytoliths were found in the samples, perhaps deriving from hearth dispersal (A. Rosen, personal communication). However, the regularity of the horizon, with no evident lenses of organic material, and the absence of charcoal flecks argue for the dung alternative as the primary source of the organic matter.

Flint and ceramic artifacts in this horizon are similar in their basic aspects to those of the upper layer, showing generally less abrasion and wear than those found on the surface. They undoubtedly preserve basic associations and may actually

represent original discard locations after displacement caused by the occupation itself.

The lower organic layer seems also to be present beneath Loci 39 and 40 (Figures 3.6, 3.7) and within Locus 37. As indicated above, its origins in these loci may be different and may be related to hearth dispersal as opposed to dung horizons. It is not found in other room loci; nor is it found outside the architectural remains (Figure 3.2).

Bedrock

The bedrock substrate of the site is composed of degrading, stepped limestone. It is Turonian in date. The stepped aspect (Figure 3.8) is the source of a disconformity between the bedrock and the lower organic layer, in fact occasionally punctuating this layer (and the other layers) into discontinuous segments (Figure 3.3:34).

Process and Sequence

The original and basic matrix of the site is aeolian loess, initially deposited during the Pleis-

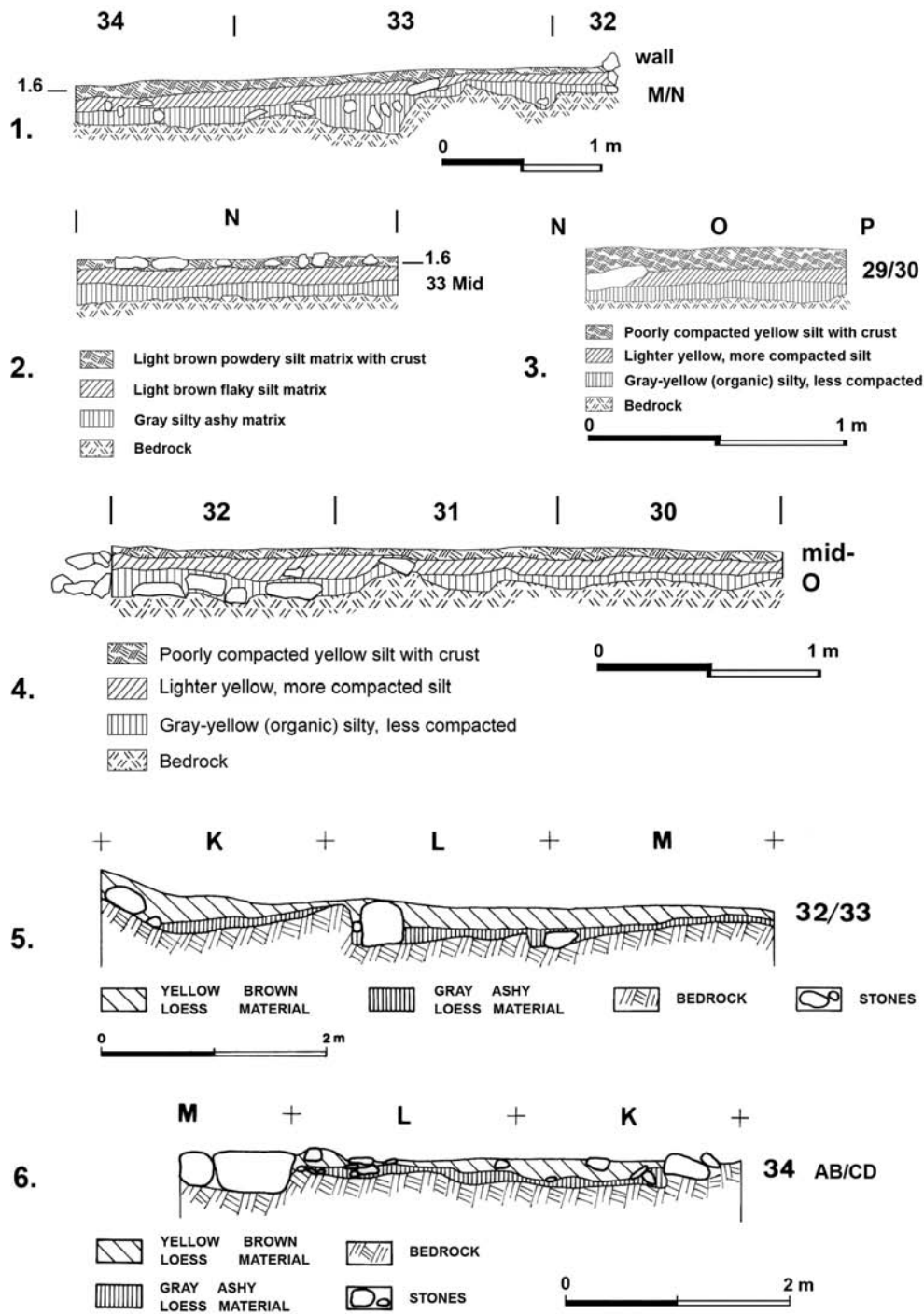


Figure 3.3. Section drawings within the architectural features.

ocene and early Holocene. This loess has been reworked and redeposited on the now mostly denuded slope in patches, filling in spaces between the eroded steps of the limestone bedrock and

into occasional small natural basins. The erosion on the ridge seems primarily to take the form of sheet wash caused by the hill slope gradient. Both the gradient and the effects of the architecture

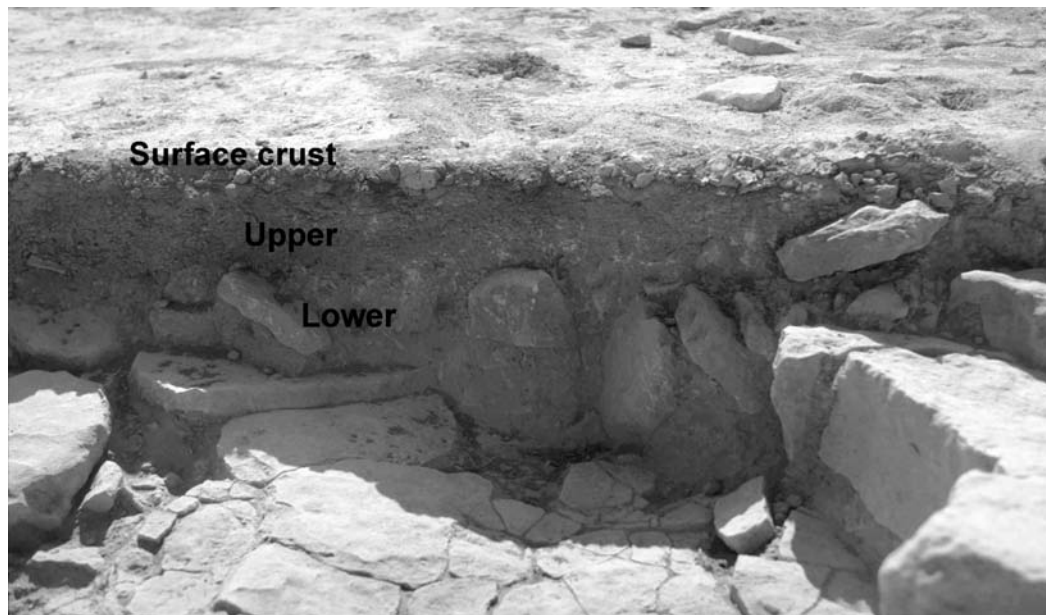


Figure 3.4. Basic stratigraphy of Locus 34 with lower organic layer.

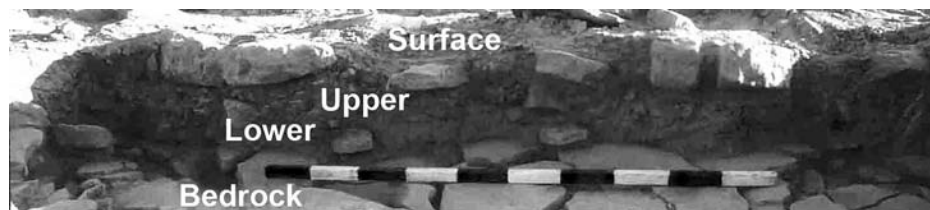


Figure 3.5. Basic stratigraphy of Locus 34 with lower organic layer.

can be seen in Figure 3.9, a 10-cm contour map of the area around the architecture. The construction of the site in essence created a silt trap, with increased buildup of reworked loess upslope of the walls, to a degree neutralizing the natural gradient of the hill and thus decreasing erosion in and around the structures. These processes were evident over the course of the seasons of excavation, when sections left exposed were eroded by wind and rain, and sediment washed downslope within the confines of the architecture.

Within the architectural remains, anthropogenic sediments comprised of ash from dispersed hearths, dung (?), and other organic residues from the human occupation constitute an addition to the basic matrix of the site. For the most part,

these seem to have been deposited on an original loess layer and integrated into it, probably initially mechanically through trampling and later undergoing some initial pedogenetic process (B. Pittman, personal communication), thus forming the lower organic layer. Post-occupational processes of erosion and redeposition then covered this mixed loessial anthropogenic horizon with “cleaner,” unmixed loess, deriving primarily from outside the site and brought in by wind, creating the upper layer. Puddling and baking caused surface crust formation.

Outside the architecture, the same processes of deposition, erosion, and redeposition continued without the addition of an architecturally protected organic horizon. Thus, even if organic components

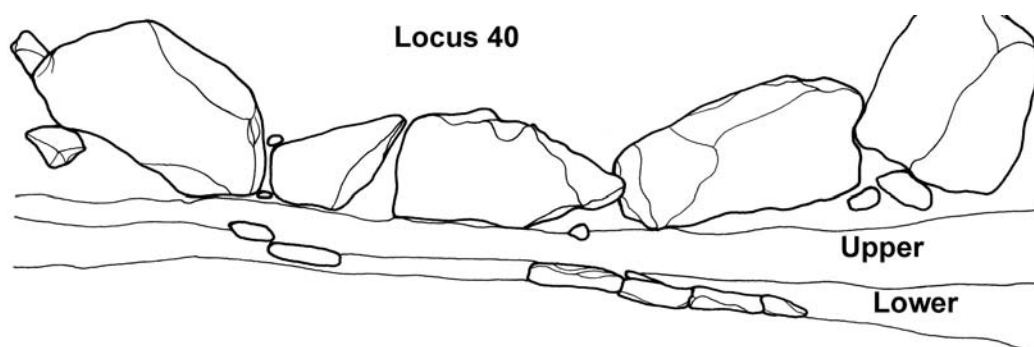


Figure 3.6. Elevation drawing of stratigraphy of outer (southwestern) face of Locus 40.

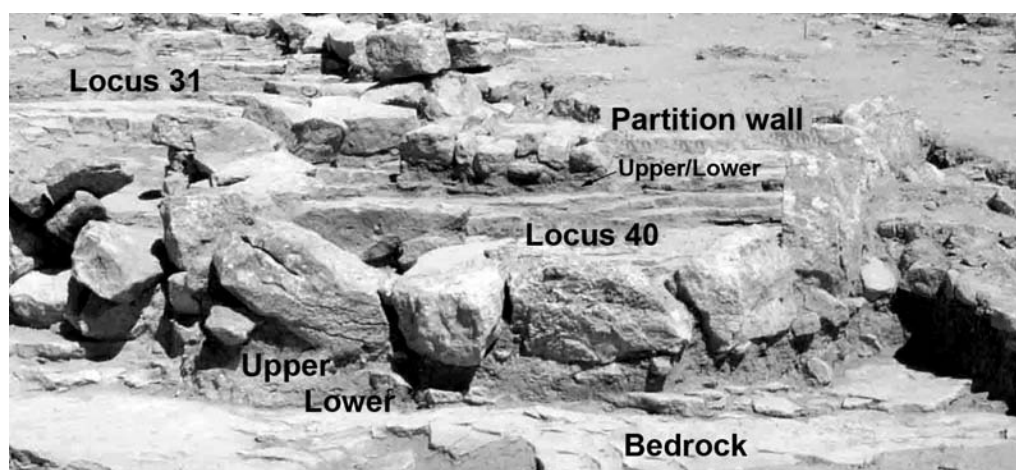


Figure 3.7. Lower organic layer beneath outer (western) wall of Locus 40.

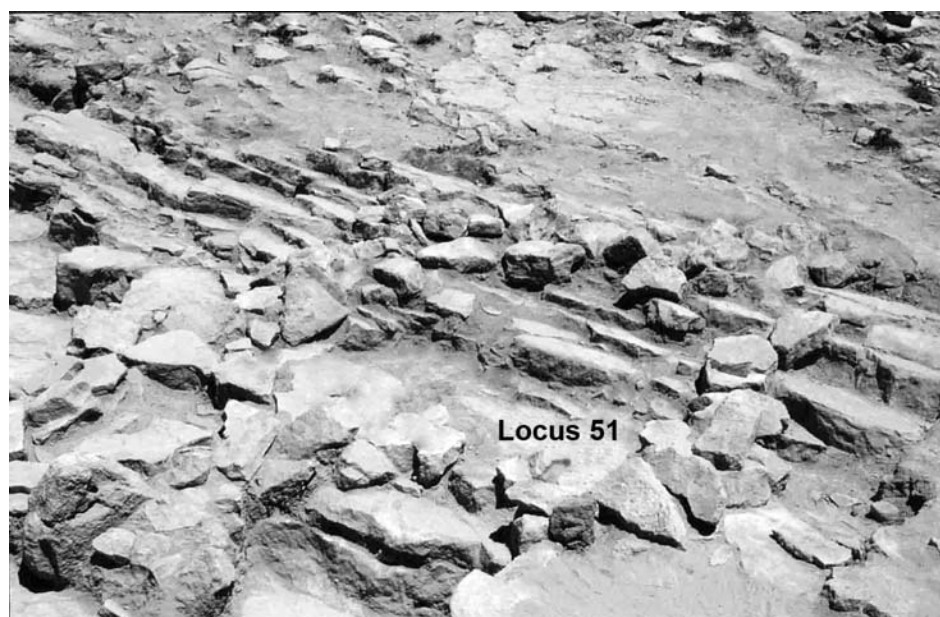


Figure 3.8. Locus 51, showing margin stones after tumulus excavation.

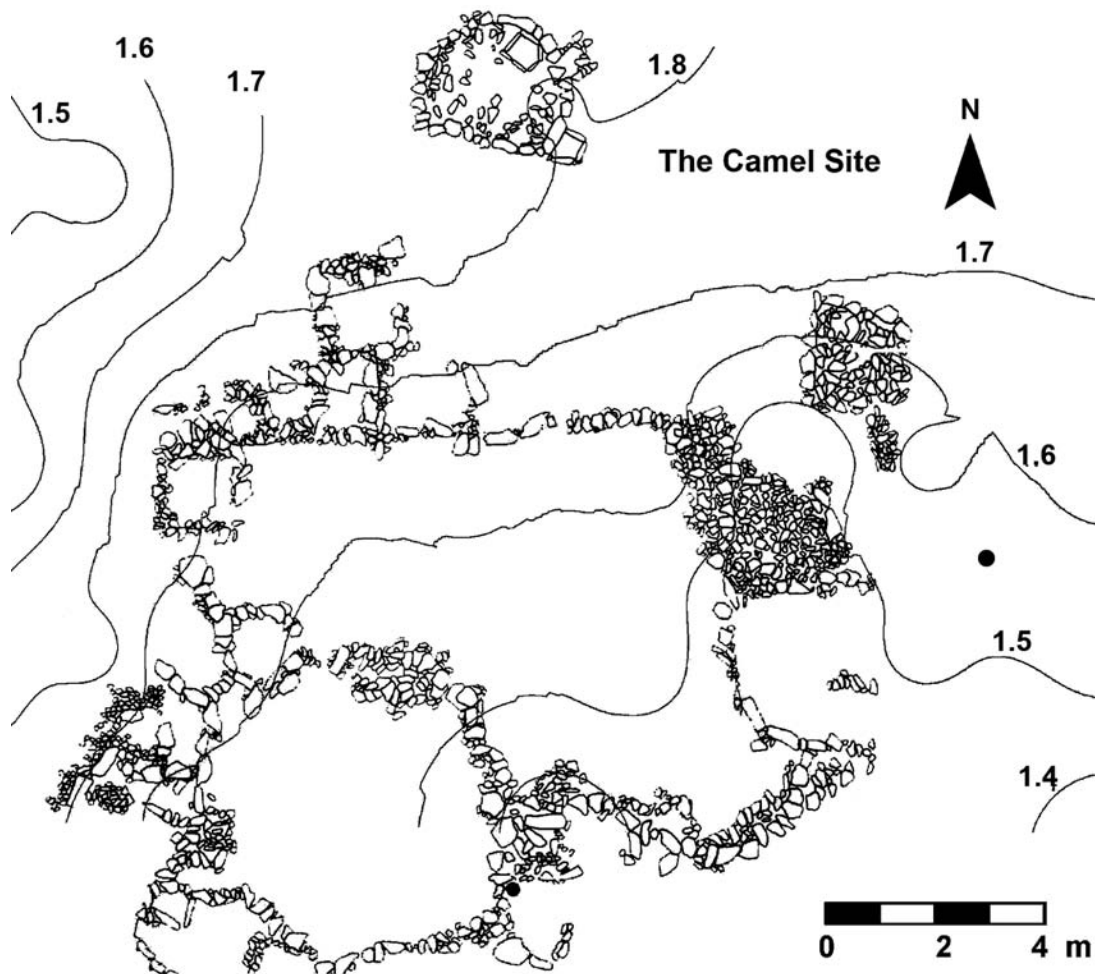


Figure 3.9. Contour map of the architectural area of the Camel site showing both the slope of the site and the effects of architecture.

were added to the basic matrix—for example, on the west side of the site, where the concentration of broken ceramics suggests the possibility of a midden (discussion in Chapters 5 and 12)—organic materials would likely have been washed away without the architecture to enclose and preserve them.

Given this processual understanding of the stratigraphic sequence, it is clear that the three layers cannot be used to define absolute contemporaneity between loci or areas on the site. If the lower organic layer defines the periods of earliest systematic activity in a specific locus when it is present, since it is deposit related to specific activities or episodes, this layer need not have

been deposited at precisely the same time in different loci or areas of the site. Furthermore, the absence of the lower organic layer need not indicate a later date of occupation; rather it suggests that the activity, or activities, responsible for the formation of this layer did not occur in that particular location.

This said, within any particular locus or area, the stratigraphy nevertheless defines a sequence of depositional episodes and periods of time. Walls and features built on bedrock or on the natural loess contrast with those built on top of the lower organic or upper layers. Although the scrappiness of the architecture sometimes makes it difficult to determine whether a wall cuts into a



Figure 3.10. South wall of Locus 31 between Loci 40 and 41, built on bedrock and natural loess.

layer (the wall is later) or the layer abuts it (the wall is earlier), several important stratigraphic markers can be noted.

As in Figure 3.6, the exterior walls of Locus 40 (see Figure 3.10 for the location of the locus) rest on the upper layer, in turn on top of the lower organic layer. This is also true of the eastern wall of the locus and contrasts with the interior wall of the locus (that shared with enclosure Locus 31), which rests on bedrock and the upper layer (Figure 3.11). That is, Locus 40 was constructed later than Locus 31—indeed, enough later that re-deposited loess could accumulate on top of the lower organic layer. This must have taken some time, and it is tempting to assign this locus to the EB IV, although there is no direct evidence for this. In contrast, the walls of the adjacent room Locus 37 lie on natural loess and bedrock and contrast with both the hearth Loci 39 (within Locus 37) and 38 (Figure 3.12) and with the interior partition walls of Locus 37, all thereby later phenomena.

Locus 41 shows similar features, with the EB II radiocarbon-dated hearth (Chapter 4) lying beneath the interior features of the locus but apparently contemporary with the exterior walls of the locus and the walls shared with Loci 31 and 34. Unlike Locus 40, which seems to have been constructed later, and like Locus 37, Locus 41 seems to show reuse.

The walls of all the enclosure loci (31, 34, 44), including the walls that connect between rooms, were all built on natural loess, with no evidence for underlying layers (e.g., Figure 3.10). This sug-

gests that they are original Early Bronze Age constructions but is not conclusive.

Tumulus Locus 51 seems to have been built directly on natural loess; however, the presence of flat-lying flints beneath the stone fill layer of the locus suggests that the surface had already been in use before the tumulus was constructed. It is not possible to speculate on when this actually occurred in the span of the site use. Similarly, Tumulus 35 seems to be cut or built into Locus 32. Although the ad hoc construction prohibits the physical determination of whether the tumulus (Locus 35) cuts the room (Locus 32) or the room exploits the wall of the tumulus, the fact that the southern and western walls of the locus are made of upright stones resting on or close to bedrock, and the northern wall (attached to the tumulus) is of flat-lying stones resting on a greater accumulation of loess, suggests that the tumulus postdates the room.

ARCHITECTURE

In basic concept, the Camel Site is typical of the desert Early Bronze Age (the late Timnian culture), comprising enclosures and attached rooms, with tumuli and other associated features (Figures 3.11, 3.13). Five basic types of components can be defined: (1) two larger irregular enclosures (Loci 31, 34/44); (2) eight smaller rooms (Loci 32, 37, 40, 41, 42, 45, 46, 47); (3) five tumuli (Loci 33, 35, 43, 49, 51); (4) various small features such as hearths (Loci 36, 38, 39), bins (Loci 40.1, 41.1, 48, 50), and small stone piles (52); and (5) open spaces not bounded by walls or structural

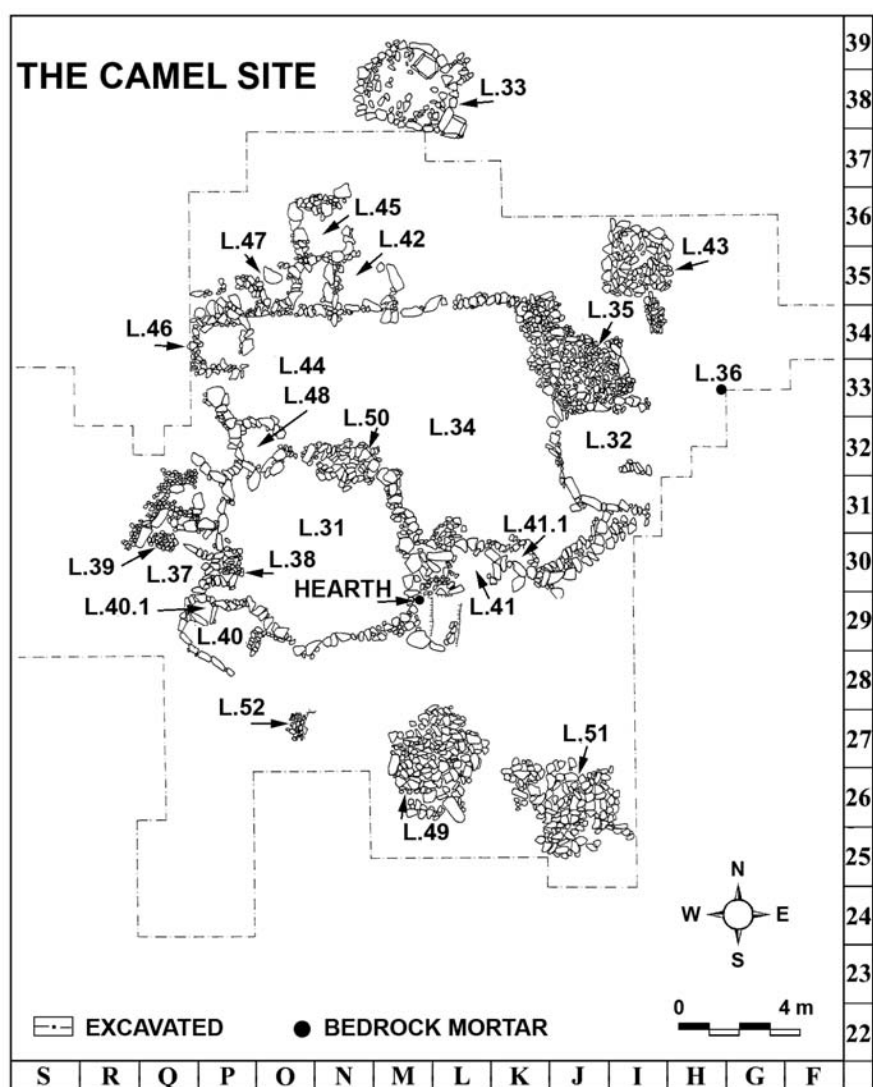


Figure 3.11. Plan of the Camel Site showing grid system, loci, and excavated area. Bedrock mortar located in O22.



Figure 3.12. Hearth Loci 38 and 39 resting on top of lower organic and upper layers.

features, denoted by reference to their grid squares. Two additional hearths were excavated by reference to grid square (in Squares L29 and L33), and one bedrock mortar was recorded at Square O22. These were not assigned locus numbers.

The excavations covered an area of approximately 400 m², down to depths varying from 5 cm to 40 cm, depending on the depth of the cultural horizon and the bedrock. Excavations included all architectural features (except two tumuli left unexcavated), areas between excavated features, and areas showing a high density of surface artifacts. The area of the site, including unexcavated areas beyond the boundaries of the architecture, is estimated at ca. 650 m², although the absence of features and the scarcity of artifacts in these unexcavated areas leave open the question of how one defines site boundaries.

Construction is of local, unworked field-stone, taken directly from the exposed stepped limestone bedrock immediately surrounding

(and lying beneath) the site. The largest stones are slabs up to 1 m in length, although most are on the order of 25 to 50 cm in largest dimension. Preserved height of walls does not exceed two courses, 25 to 50 cm in height, but given the quantity of fallen stone, some of the walls—the stone parts anyway—could have been as high as 1 m. Indeed, given the size and shape of the building stones, the narrow breadth of the walls, and the quantity of fallen stone, it seems unlikely that the stone parts of the walls could have been any higher. Given the scrappy, ad hoc construction, the single-stratum nature of the site, and the stepped and sloping bedrock, wall base levels and heights are of little analytic value and to avoid cluttering are not presented on the site plan. This lack of analytic value is illustrated, for example, in the great variability in wall height preservation; preserved wall heights in a single room may vary as much as 60 cm (remembering that the excavation itself was never deeper than this), depending on whether the segment of the



Figure 3.13. General view of the Camel Site after excavation, showing tumulus Locus 49 in the foreground with enclosure Locus 31 in left center and enclosure Locus 34 right center.

wall was represented by a single flat-lying course or by an upright with a second course. While variability of wall bases is not as marked, absolute differences of up to 20 cm were noted in single loci, depending on the presence of bedrock outcrops. Relative stratigraphic differences are reviewed in each locus description when relevant.

Enclosures (Loci 31, 34/44)

Locus 31 is roughly round, covering an area of ca. 30 m². It is defined on its west side by the interior walls of room Loci 37 and 40 and on its northern wall by two small bins (for lack of a better term), Loci 48 and 50. The western wall of Locus 41 defines the southeastern corner of the enclosure. The presence of connecting walls between Locus 50 and Locus 41 and between Locus 41 and Locus 40 defines Locus 31 clearly as a deliberate enclosure and not merely an open area between room and feature loci. These connecting walls are low, preserved to a maximum height of only one to two courses. That between Loci 50 and 41 is more massive than the single-row, single-course wall between Loci 40 and 41 (Figure 3.10). The absence of significant quantities of fallen stone indicates that they were never much higher.

In fact, the complex comprised of Locus 31 and its attached loci seems to constitute a subunit of the site. It is tempting to suggest that this was the core of the original settlement and that Locus 34 and its attached loci were added later, but it is impossible to determine whether the Locus 31 complex cuts into the Locus 34 complex or the Locus 34 complex was added to the Locus 31 complex. Walls are too simple structurally to let us ascertain the difference between addenda and cutting. Regardless, there is no evidence to suggest that the difference is any more significant than that of subphases within the construction of the site over several visits.

Stratigraphically, the interior of Locus 31 shows three distinct strata: (1) a surface crust, 2 to 3 cm in thickness; (2) an upper reworked loess layer, 5 to 20 cm in thickness; and (3) a lower mixed loess-organic horizon, 3 to 8 cm in thickness (Figure 3.3:3–4). The bedrock substratum is stepped due to the deterioration of the Turonian limestone layers on the hill slope, so that the

stratigraphic layers are in fact truncated as each section abuts an exposed limestone step. The entire locus slopes to the west in approximately a 3-percent gradient (Figure 3.9) caused by the location on the hill slope.

Enclosure 34/44 is comprised of two sections, Loci 34 and 44, the division of them defined by the presence of a dense stone fill in Locus 44 (Figure 3.14) that ends roughly in the middle of the vertical line of grid column M. That is, Locus 44 in the west of the enclosure is surrounded by Loci 42 and 47 on the north, Locus 46 on the west, Loci 48 and 50 on the south, and Locus 34 in the east, which in turn is abutted by Loci 35 and 32 on the east and Loci 41 and 41.1 on the south. As indicated for enclosure Locus 31, the presence of connecting walls between Locus 42 and Locus 35, Locus 50 and Locus 41, and Locus 41 and Locus 32 suggests strongly that Locus 34/44 was indeed deliberately enclosed. The northern connecting wall, between Loci 42 and 35, is a single-course, single-row wall of medium slabs, with what appears to be a deliberate gap in the middle. It contrasts with the connecting wall between Loci 41 and 32, which is two rows wide and two courses high, clearly more massive, and lacks any evidence for an opening or gap.

A burnt area in a natural niche or pit within the stepped and deteriorating bedrock, evidenced by red and black discoloration of the underlying stone, is located in Square L33, inside Locus 34.

Stratigraphically, Locus 34 is similar to Locus 31, with three basic layers: an upper crust, an upper loess horizon, and a lower organic horizon (Figures 3.3:1–2, 3.3:5–6). As noted, Locus 44 includes a great deal of fallen stone in the upper loess horizon. It rests on the lower organic horizon and sometimes penetrates it. The large quantity of stone suggests either an intentional stone pile or dump, very irregular and impossible to define, or that the walls of the features surrounding Locus 44 were somewhat higher than in other places on the site and collapsed, leaving a larger quantity of fallen material.

Rooms (Loci 32, 37, 40, 41, 42, 45, 46, 47)

Room loci are variable in size and shape. Construction is generally of upright slabs set adjacent



Figure 3.14. Dense stone fill in Locus 44.

one to the other, sometimes with another course of stones placed on top of the uprights. In some cases, is it hard to see how another course could actually have been placed. There is no direct evidence concerning roofing. The presence of columns and roofing slabs in the succeeding Early Bronze Age IV structures in the Negev (ca. 2200 B.C.E.) (e.g., Cohen 1992; Cohen and Dever 1981) indicates that even at that later date, tenting was still either unknown, uncommon, or perhaps not economical (Rosen and Saidel 2010). Thus it is reasonable to assume that superstructures of the Early Bronze Age Camel Site were of brush. Notably, they are generally smaller than those of the succeeding EB IV (the Intermediate Bronze Age). Some rooms show internal partitions and other features, perhaps indicating phasing in repair or redesign.

Flooring is absent, and the occupation layer seems to have been directly on the original land surface. Rooms do not appear to have been excavated as shallow pits before construction of walls, as is common in Pre-Pottery Neolithic B sites (e.g., Bar-Yosef 1981; Goring-Morris and Gopher 1983; Henry et al. 2003) and EB IV sites (e.g., Cohen 1992). Excavations were conducted down

to bedrock, but the original surface was several centimeters higher, as evidenced by the occasional flat-lying sherd or flint. With the exception of Locus 40, with a lower organic layer, perhaps derived from dispersed hearth matrix, and Locus 37, with some accumulation beneath the internal hearth Locus 39, no stratigraphic distinctions could be discerned within the accumulated loess of the room fills.

From the perspective of size, the rooms fall into two groups: those roughly medium in size (area varying from 6 to 11 m²; Loci 32, 37, 40, and 41) and those that are small (area varying from 1.5 to 3.5 m²; Loci 42, 45, 46, and 47). It is undoubtedly significant that the four small rooms cluster in the northwestern corner of the site, attached to enclosure Locus 34/44, whereas three of the four larger rooms cluster around enclosure Locus 31. The small rooms also seem more closed, whereas the larger rooms are more horseshoe shaped, with one open side. This reinforces the perception of distinct complexes around the two enclosures, although the stratigraphic distinction drawn for Locus 40 indicates greater complexity.

Locus 32 (Figure 3.15) was the first room excavated on the site. It is about 11 m² in area, C

shaped, and open to the east, and it shows a small linear stone pile in the entryway whose meaning or function is unclear. The tumulus Locus 35 (Figure 3.15) abuts it on the north side, and the wall of the locus serves as the margin of the tumulus. As indicated earlier, the fact that the southern and western walls of the locus are made of upright stones resting on or close to bedrock, and the northern wall (attached to the tumulus) is of flat-lying stones resting on a greater accumulation of loess, suggests that the tumulus postdates the room. The western wall of the room separates it from enclosure Locus 34. The southern wall of the locus attaches to a connecting wall, attached at its other end to the northeastern wall of Locus 41. Fallen stone within the locus and just outside the walls indicates at least one additional course of stones and perhaps two, although the stones of the upper courses were clearly smaller than those on the basal course. Wall height did not exceed 1 m.

Stratigraphically, only two layers could be defined: the surface crust and the upper reworked loess layer. There was no evidence for any organic horizon, and depth of deposits was only 10 to 15 cm. Fallen stones were embedded in the upper

layer, indicating that it postdated the actual occupation horizon. However, this could be ascertained only by reference to the base of the walls and the lowest level on which stones fell. There was no evidence for intentional construction of a floor.

Locus 37 is an elongate room, about 7 m² in area, C shaped, and open to the south (Figure 3.16), with what appears to be an internal hearth of fire-cracked stone. Locus 39 (Figure 3.17), a possible ash dump, is adjacent to it and two separate small partition walls (Figure 3.17). As indicated earlier, these postdate the initial construction of the locus and are poorly constructed and poorly preserved. Their original status is difficult to define. The eastern wall of the locus separates it from enclosure Locus 31 and connects with the wall of room Locus 40. The western and northern walls face the external open areas of the site. The basal course of these outer walls is of large upright stones, but these are supplemented by smaller stones, both lying on top of the uprights and abutting them, especially on the outside of the western wall. These seem to represent both intentional support stones and stone fall from the second and possible third courses. The inner wall

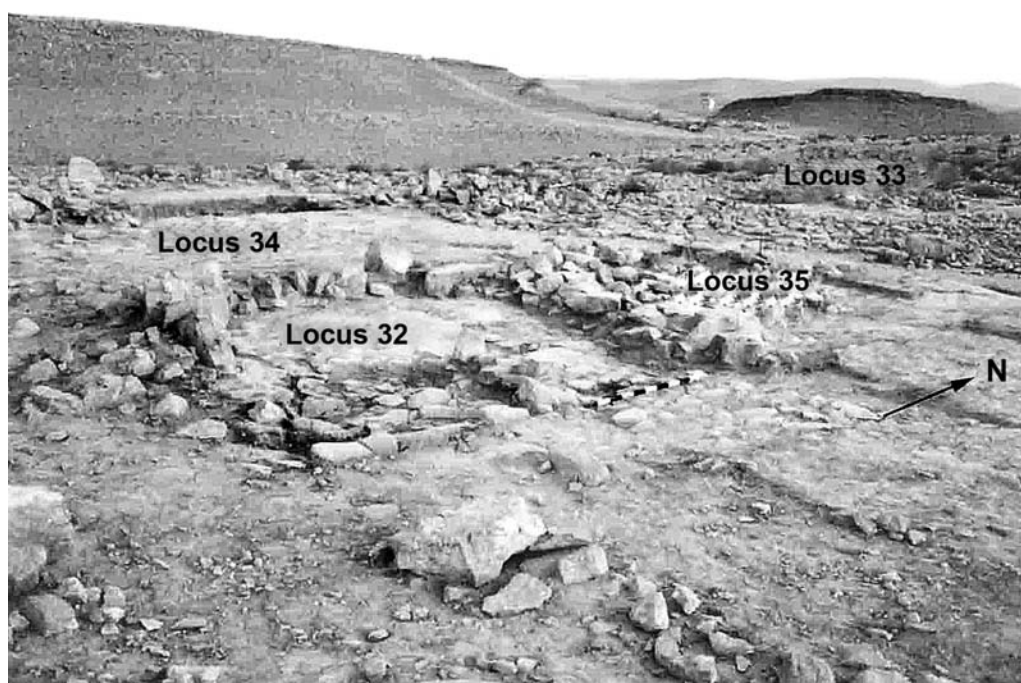


Figure 3.15. Locus 32 with adjacent Locus 35.

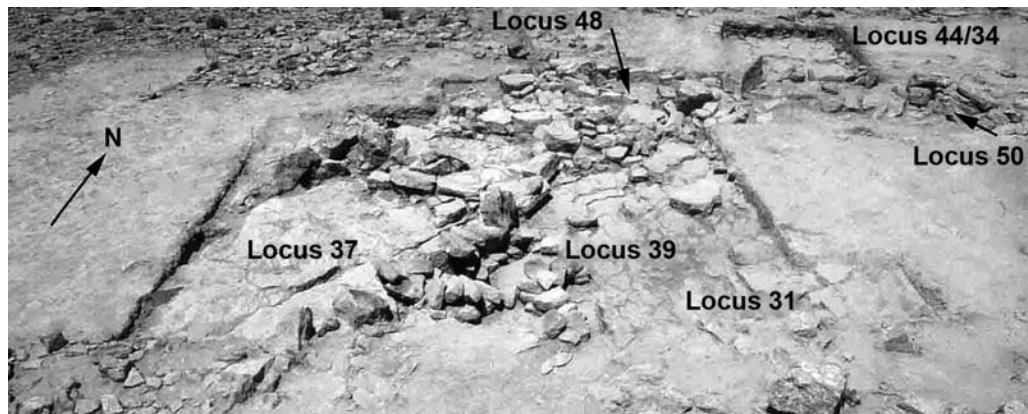


Figure 3.16. Room Locus 37 after removal of hearth Locus 39.

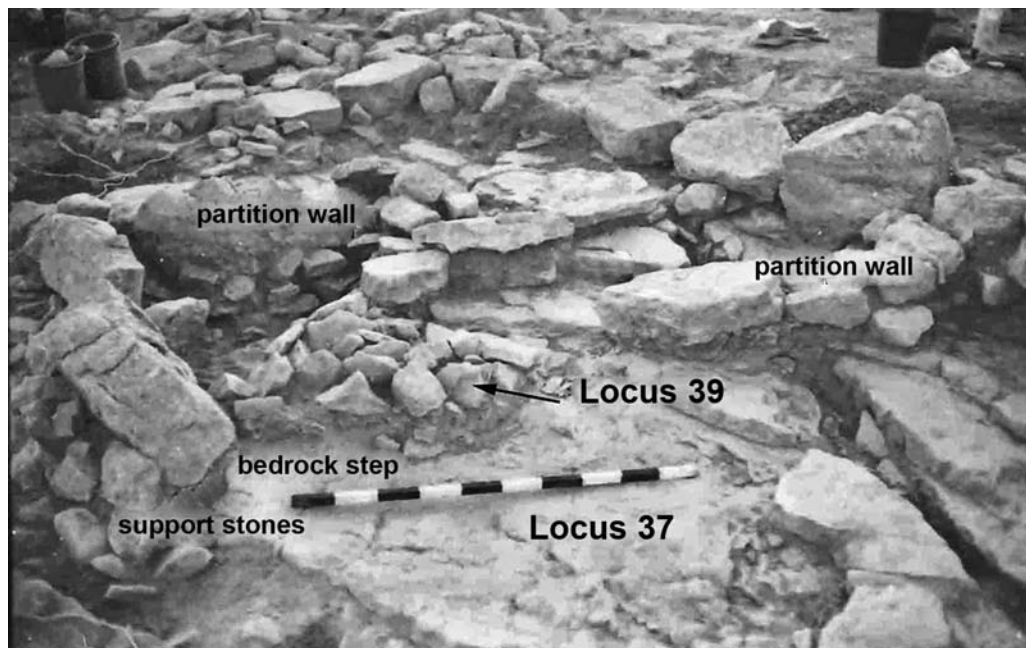


Figure 3.17. Interior of Locus 37 showing partition walls and hearth Locus 39 before removal.

shared with Locus 31 is perhaps fallen, and the stones are not currently upright. Walls did not stand higher than 1 m.

Stratigraphically, as above, there are at least two phases in the construction of the locus. The earlier is represented by the construction of the outer walls of the locus, and the later by the interior partitions. It is worth noting that the outer western wall of Locus 37 seems to have been built partially on a bedrock step and later fell over, requiring support stones, as seen in Figure

3.17. The probable hearth, Locus 39, is embedded in the upper part of the floor matrix and is best associated with the second phase. The sediment matrix consists of a surface crust and an upper reworked loess. The original occupation floor could be defined by reference to the base of the walls and the hearth, which was partially dug into the ground and partially raised above it. The partition walls were higher than the base of the outer walls. Although ash scatter from the hearth was present in the locus matrix, a clear organic

horizon could not be defined. Notably, artifacts associated with the part of the matrix fill of Locus 37 were specifically recovered beneath the partition walls and in the matrix of Locus 39, supporting the idea of these representing a later phase.

Locus 40 (Figure 3.18) is roughly similar in shape to Locus 37, 6 m² in area, C shaped, and open to the southeast. It shows an internal bin (Locus 40.1) in its northwestern corner and a short partition wall closing it off on the northeastern side. The north side of the locus abuts enclosure Locus 31, and the east wall of Locus 37 attaches to the northwestern corner of the locus. Construction is of upright standing slabs, except for the partition wall, made of smaller cobbles. There is less fallen stone around this locus than around Locus 37.

Stratigraphically, the western wall of the locus rests on and in the lower organic layer and the upper layer (Figures 3.6, 3.7). The partition wall lies on top of the lower organic layer and was not embedded in it. This layer is significantly darker than is usual on the site. Fallen stone from the walls lies in the upper layer and on the surface. In this context, it is worth noting that Saidel (Chap-

ter 5) has noted the presence of EB IV ceramics in Locus 40 (along with EB I–II ceramics), suggesting possible reuse during the later period.

Locus 41 (Figure 3.19) is more difficult to characterize than the three previous room loci. Although it is basically C shaped like the others, 8 m² in area, and opening to the southeast, the collapsed walls and fallen stone, along with the presence of at least one partition wall, render it more difficult to comprehend. There are clearly at least two phases of construction and possibly three associated with this room.

The locus is bounded on the south by an open area. The west wall of the locus attaches to the southern wall of Locus 31 and to the connecting wall between Loci 40 and 41. The north wall of the locus abuts Locus 34 and attaches to the boundary walls between Loci 31 and 34 (on the north side) and between Loci 32 and 41 (on the east side). The small, binlike Locus 41.1 is attached to the exterior face of the north wall of the locus (Figure 3.20).

Construction of Locus 41 is of upright slabs and smaller blocks and also exploits natural steps in the limestone (Figure 3.19). Walls are poorly

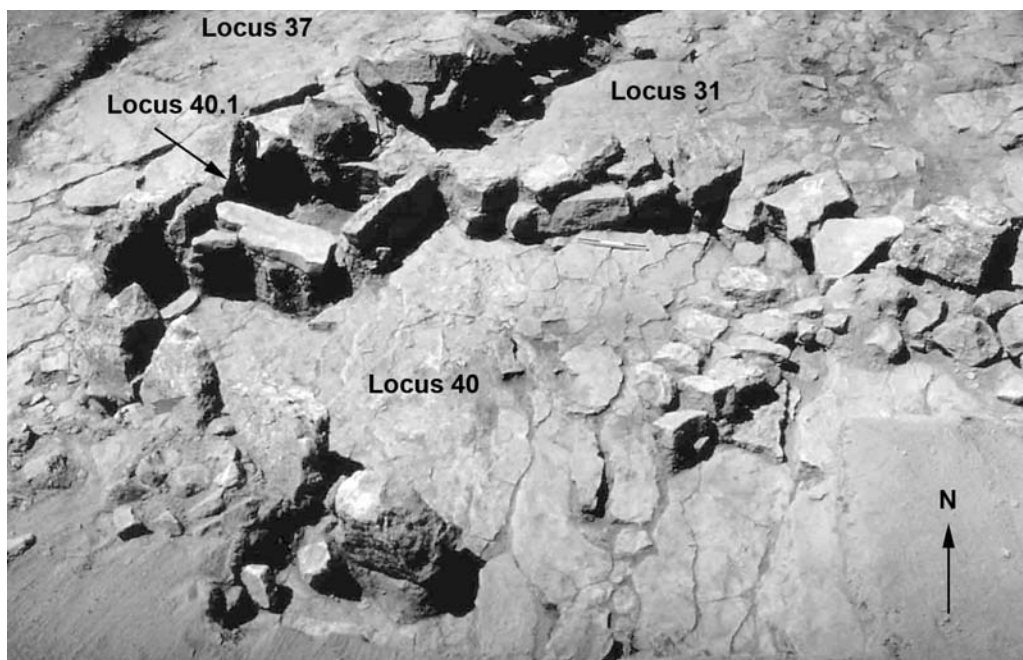


Figure 3.18. Locus 40.

preserved, with much fallen stone, and it is difficult to distinguish between in situ blocks and stones of later phases of construction/repair and fallen stones from the first phase of construction. An internal partition wall divides the locus into two sectors, in the north and south. The eastern side of the southern sector is marked by a bedrock step. A hearth, from which radiocarbon determination Rta-3083 derived (Chapter 4), is located in the northwestern corner of the southern sector and appears to lie beneath the western wall of the locus, although it is unclear how intact

the wall is—it may have collapsed onto the hearth. The hearth is in a depression bounded on one side by a bedrock step.

Phasing and stratigraphy of the locus and its components are difficult. Lying almost directly on bedrock, the hearth can be assigned to the earliest phase of use/construction of the locus. The larger upright stones of the north wall of the locus, and the two larger stones of the south wall, also rest on or near bedrock and can be attributed to this early phase. The western wall above the hearth and the partition wall adjacent to it lie

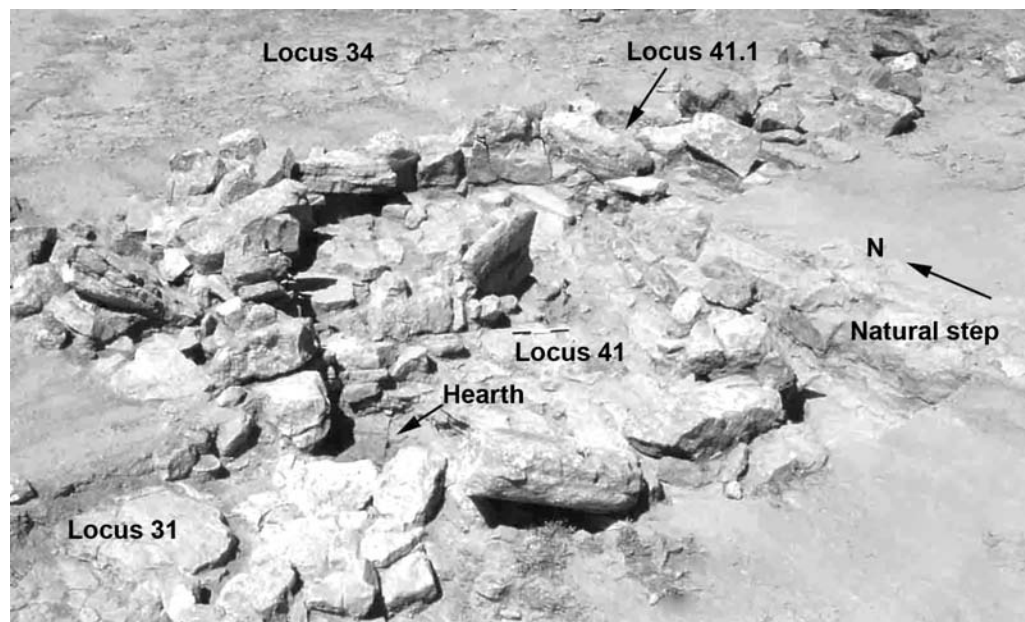


Figure 3.19. Locus 41.

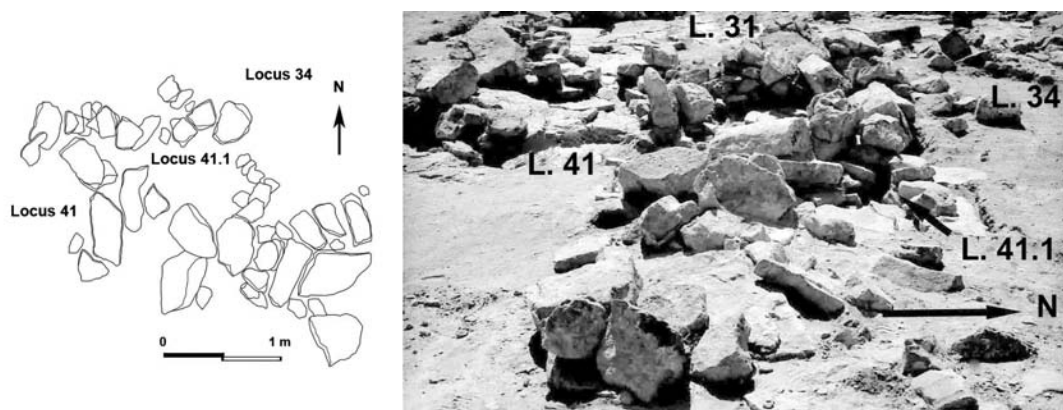


Figure 3.20. Locus 41.1.

above the hearth stratigraphically, on and in the upper layer. Construction is less orderly. This section seems to postdate the initial construction, perhaps making use of parts of the original locus but changing its shape and character. In terms of sediments, only the surface and upper layer were present inside the locus. There was little dispersal of hearth ash beyond the hearth itself. As with Locus 40, the presence of EB IV sherds in and around this locus (along with those attributable to the EB I–II) reinforces the impression of several occupations, even if they cannot be strictly defined.

Locus 42 (Figure 3.21) is part of a cluster of four small room loci on the northwestern side of the site. It is one of the smaller rooms, only 3.5 m² in area. Although C shaped and open to the northeast, its walls are less curved, and the opening is more closed than those of the first four room loci. Construction is of standing slabs, with some fallen stone. Walls are preserved to one to two courses, with the lower course of larger stones than the upper. In the northwest, the locus shares a wall with room Locus 45, and in the south with enclosure Locus 44. The western wall of the locus is adjacent to a small bounded open space between three room loci and the enclosure. In the east, the locus faces an open area. Stratigraphically, the internal matrix consists of the surface crust and the upper layer, which included

fallen stones. No lower organic layer was present; nor is there evidence for construction phases.

Locus 45 (3 m² in area) is more rectangular in shape than other loci (Figure 3.21), with a smaller entrance, which is on the east side. In spite of these differences, construction is similar to that of Locus 42, and the variation in shape should not be considered significant. It shares a south wall with Locus 42 and the bounded space between loci mentioned above. Otherwise, it is surrounded by the open space on the north side of the site. The north wall is constructed of smaller stones than the other parts but is well integrated. This slight change in construction may represent repair. Otherwise, there is no evidence for phasing, and stratigraphy is similar to that of Locus 42.

Locus 46 (2.5 m² in area) (Figure 3.22) is a small squarish room on the northwestern side of the site. It shows no obvious opening. Construction is of both larger blocks and smaller cobbles. The interior of the room contained a great deal of fallen stone, suggesting the walls were at least two courses higher than the preserved two to three courses.

Locus 47 (Figure 3.23), at 2.5 m² in area, is the smallest of the cluster of three rooms on the north side of the site. It is C shaped, with its open end facing south. A large stone has fallen from the northern wall, blocking the open end. Construction is of blocks, with fewer larger slabs, up to three or four courses high. The quantity of

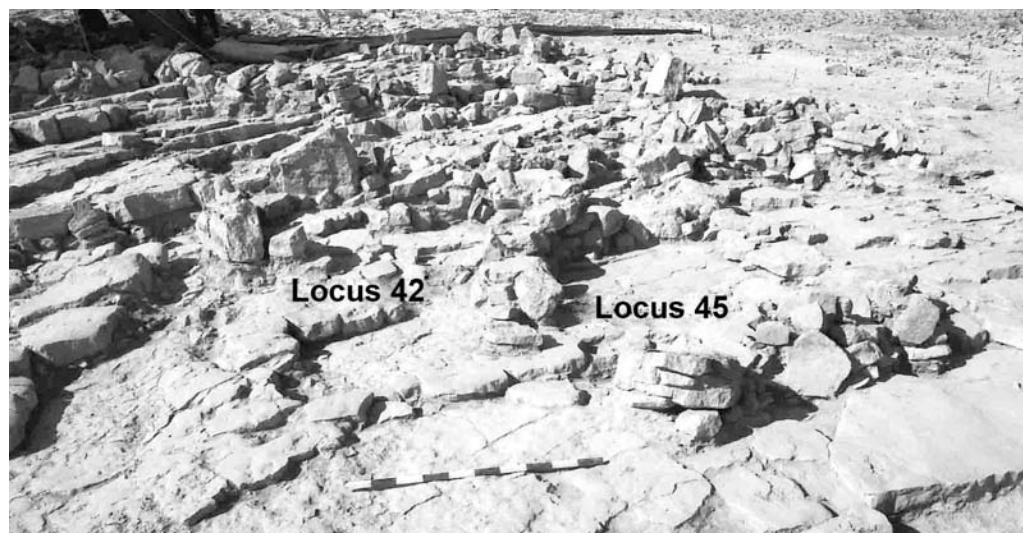


Figure 3.21. Room Loci 42 and 45, looking southwest.

stone fall suggests perhaps another course lay atop these. The locus shares its southern wall with enclosure Locus 44. The walls on the east and west are adjacent to bounded spaces between other loci. The area north of the locus is open. As with the other loci of the cluster, there is little evidence for phasing, and stratigraphic distinctions are absent.

Tumuli (Loci 33, 35, 43, 49, 51)

The five tumuli are all basically similar in size and conception. They are stone piles roughly 2 to 4 m² in area, with a single-course, single-row margin of larger stones and an internal fill of varying

sizes of stones in several layers but not in any discernible order. Unlike most tumuli from the period in the Negev, with the exception of Locus 33, none show internal cists or boxes. Most show accumulations of snail shell, indicating the presence of hollows used by pack rats, which predate the snails. No artifacts were recovered in any of the tumuli, although lithics were recovered at the base of Locus 43 (see below). Although the term *tumulus* implies a burial, no evidence for mortuary remains or behavior was found.

Locus 33 (Figure 3.24), located north of the main architectural features of the site, had a well-defined perimeter wall of larger blocks set carefully one adjacent to the other. Two binlike struc-

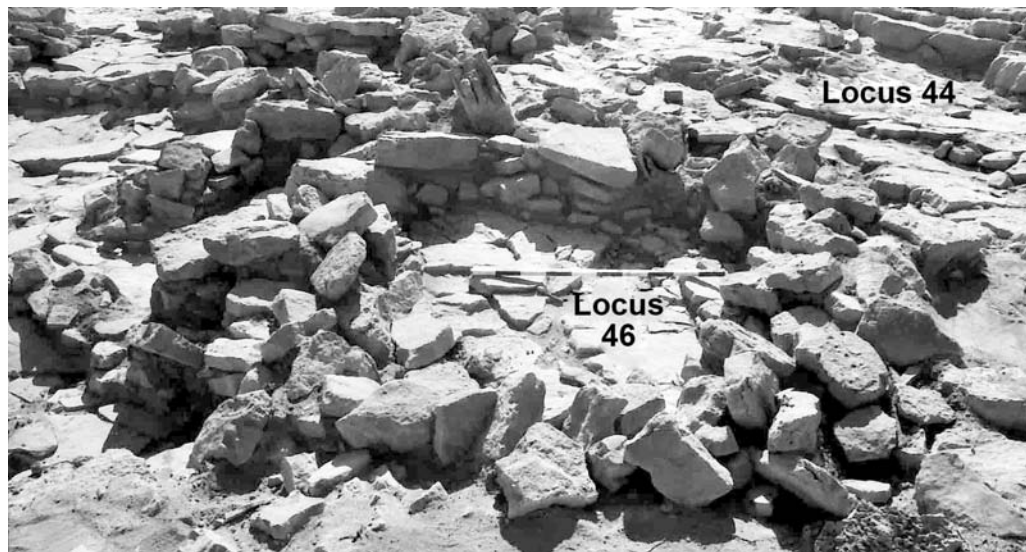


Figure 3.22. Locus 46.

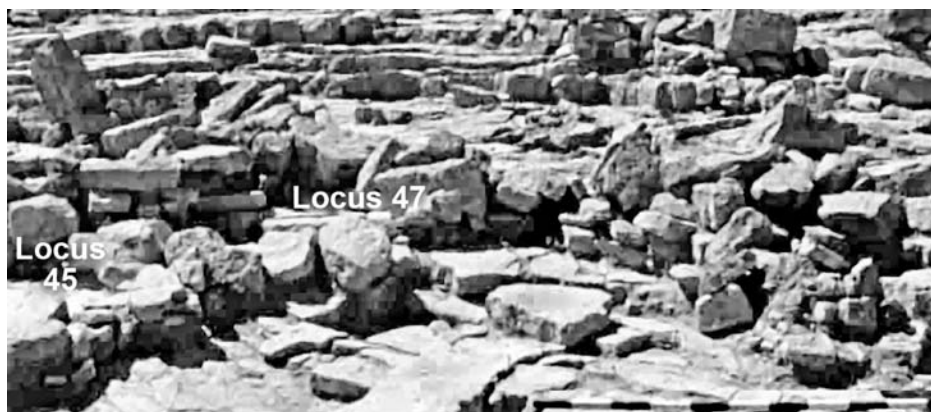


Figure 3.23. Locus 47, looking south.

tures, constructed of upright slabs, were located on the interior of the tumulus, abutting the margin wall. The northern bin was intact, and the southern collapsed. Neither contained artifacts or other discernible remains beyond sterile loess. Two similar external features, found on the east side of the tumulus, also abutted the margin stones and were also empty. In the presence of these features, Locus 33 differed somewhat from the other tumuli, which did not have them. The internal fill of the tumulus was of varying sized stones and cobbles. Only the bins were excavated. The margin wall was cleaned for better definition, but the internal fill was not removed.

Locus 35 is the only tumulus embedded in the actual construction of the site architecture, abutting both Locus 34, east of the tumulus, and Locus 32, on its south (Figures 3.11, 3.25). In both cases, the margin stones of the tumulus serve both as the eastern side of the enclosure (Locus 34) and the northern wall of the room (Locus 32). The clear integration of these walls with the other loci and the spillage over the top of the western margin wall (in grid squares K-J 33–34) suggest that the tumulus postdates the other two

loci and, by extension, perhaps the main occupation of the site.

The margin stones continue around the entire perimeter of the locus. The tumulus itself consists of a dense fill of cobbles and stone blocks in a general tumble, at least three layers of stone deep. No internal features were discernible, in spite of removal of the upper layer of stones. Excavations were restricted to this upper layer.

Locus 43 (Figure 3.26) is located in the northeastern section of the site, outside the main architectural complex. It has a perimeter of larger stones and an interior fill of smaller blocks and cobbles. This fill was somewhat shallower than in the other tumuli, only two to three stones deep, and it was excavated to bedrock. A linear feature of similar aspect extended as a kind of appendage out of the southern end of the tumulus.

Several pieces of lithic debitage were found on the original surface, beneath the fill of the tumulus. Although these pieces were not typologically diagnostic, technologically they fit the rest of the assemblage from the site. This suggests an occupation of the site prior to the construction of the tumulus, with the tumulus thus postdating at

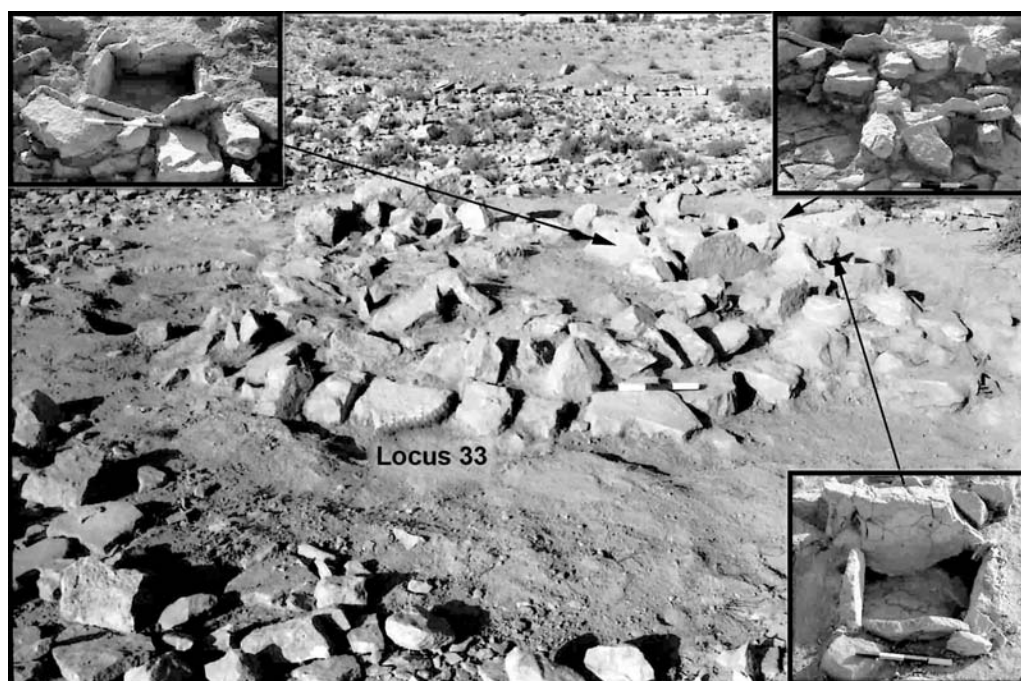


Figure 3.24. Tumulus Locus 33 with internal bin and associated bin structures.



Figure 3.25. Tumulus Locus 35.



Figure 3.26. Tumulus Locus 43 after excavation.

least part of the occupation. No snail shells were found in this locus.

Locus 49 (Figure 3.27) is one of two tumuli located on the south side of the architectural complex. It has similar features to those described above, with margins defined by larger stones and an internal fill with no discernible order. It was cleaned and the top layer of stones removed, but it was not fully excavated.

Locus 51 (Figure 3.8) is the second of two tumuli located south of the architectural complex. It was somewhat more amorphous than the other tumuli, its margins less well defined by larger blocks. The interior fill stones were piled four to

five layers deep, in no discernible order. It was fully excavated and contained an abundance of snail shells. No artifacts were found.

Small Features (Loci 36, 38, 39, 40.1, 41.1, 48, 50, and 52 and Other Features)

Hearths and Fire Pits. Loci 38 and 39 (Figure 3.12), located within enclosure Locus 31 and room Locus 37, respectively, seem to be built hearths with concentrations of fire-cracked limestone. Locus 38 is attached to the east face of the wall between Loci 37 and 31. It is roughly rectangular in shape, with an interior fill of angular limestone



Figure 3.27. Tumulus Locus 49.

cobbles, apparently fire-cracked. There are no other obvious signs of heating. Locus 39 is roughly round in shape, built as a cluster of small blocks of angular limestone, about 0.5 m in diameter and 10 cm deep. Although an ash concentration with floor discoloration was found less than 0.5 m southeast of Locus 39, the locus itself showed no concentrations of ash or charcoal. The status of both of these loci as hearths must remain in question, although their construction suggests this function.

Locus 36 is a fire pit (Figure 3.28) containing an ash lens built into a natural (or enhanced) niche in the stepped bedrock. It measures 30 × 20 cm, and the ash lies directly on the bedrock, which shows shades of gray and red, discolorations undoubtedly associated with the heat of the fire. It was located about 5 cm beneath the surface and was sealed by the surface crust.

Similar fire pits, exploiting natural niches in the stepped limestone, containing darker sediments and showing bedrock discoloration, are found in Square L35d (just outside Locus 34, beneath the stone fall of the northern enclosure wall of Locus 34) and Square M34d (in Locus 34).

Three similar pits were also found in the R-S 31–32 area west of the architectural complex.

A fire pit 10 to 15 cm deep and about 30 cm across in Square M29b was excavated in Locus 41 (Figure 3.19). Like those described above, it was built against a step in the limestone, within a natural niche, and was found beneath the collapsed partition wall of Locus 41. The radiocarbon determination from this hearth (Chapter 4) probably reflects the early phase of occupation of the site.

In addition to these, a series of nine small patches of ash, gray bedrock discoloration, and charcoal flecks, none larger than 20 cm across, was found in the general area of J-K-I 29–30–31, just east of room Locus 41. These too seem to exploit the stepped nature of the bedrock, although they are not located within hollows or niches. Some of these patches included bits of modern roots but were found 20 cm beneath the modern land surface. Potsherds in this area also showed signs of burning.

Bins. Loci 40.1 (Figure 3.18) and 41.1 (Figure 3.20) are small boxlike features attached to other walls. Locus 40.1 is located in the northwestern



Figure 3.28. Hearth Locus 36, built against a bedrock step.

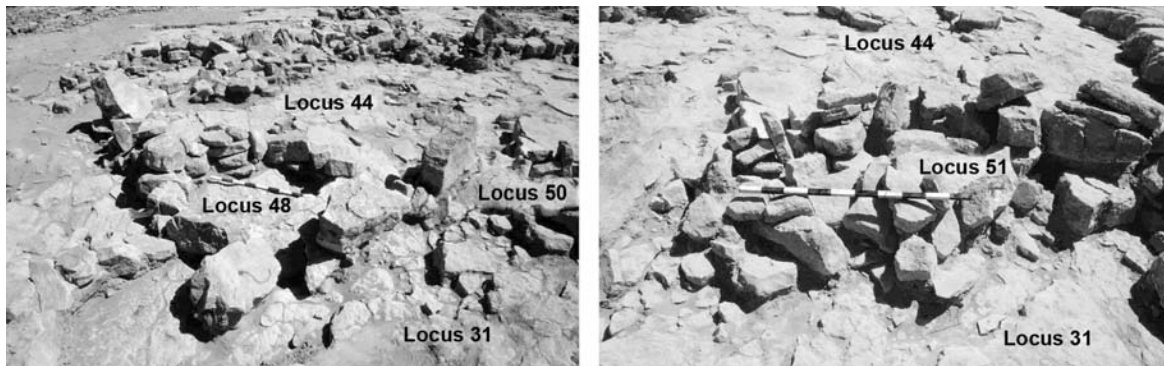


Figure 3.29. Loci 48 and 50.

corner of room Locus 40 and is constructed of two upright slabs, each about 30 cm in length, set at right angles to one another in the corner of the room, with a few smaller stones in support. A roof slab for this “bin” was found collapsed inside it. The interior space of the bin was empty, and sediments consisted of only sterile loess.

Locus 41.1 is located on the exterior wall of room Locus 41, actually in the interior of enclosure Locus 34. It too was boxlike, although built of smaller blocks and not slabs.

Loci 48 and 50 (Figure 3.29) are small enclosed features, bins (?) integrated into the wall separating enclosure Loci 31 and 34/44, and each measuring about 1.5 to 2 m² in area. Both showed interior stone fall, suggesting original heights perhaps 0.75 m high, and both were built on or near bedrock or the original upper layer, with no evidence for an underlying lower organic layer. Similar structures in terms of size, construction, and physical connection to pens are used by modern Bedouin as night pens for kids and lambs.

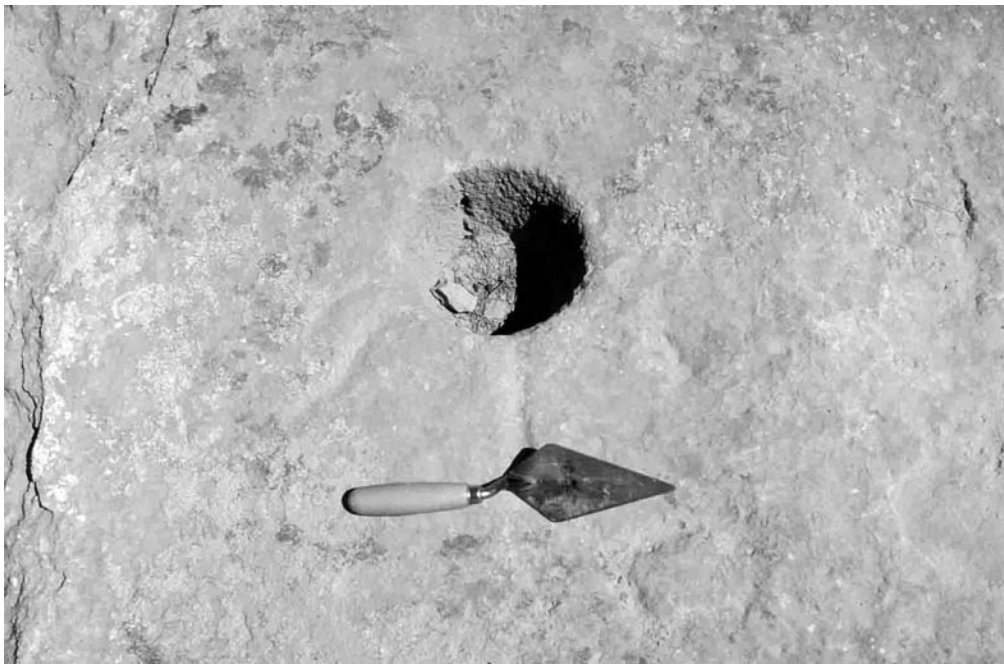


Figure 3.30. Bedrock mortar in Square O22d.

Bedrock Mortar. Square O22d, south of the collection and excavation area, contained a small bedrock mortar. It measured 17 cm in diameter across the top, 19 cm deep, and was conical in shape, so that the base of the mortar was somewhat smaller than the mouth. Two shallow irregular channels, perhaps 2 cm across, 20 to 30 cm long, and 1 to 2 cm deep attach to the mortar. A modern rifle cartridge was recovered in the mortar (Figure 3.30).

DISCUSSION

In reviewing the stratigraphy and architecture of the Camel Site as presented above, several basic conclusions can be drawn. Stratigraphically, there is an important distinction between the walls resting on or in the upper layer, or on or near the modern surface, and those on the original ground surface or abutting the lower organic layer. Given the reworked nature of the upper layer, some time must have passed between the earliest phases of construction, best attributed to the early third millennium B.C.E. (roughly equal to EB II), and the later phases, probably best attributed to the Early Bronze Age IV. That is, there is no genuine conti-

nuity of settlement between these periods at the site, even though there is reuse of the site, the apparent addition of a room, and modification of other rooms and features.

Architecturally, stating the obvious, the site shows little evidence for genuine long-term investment. The construction is fundamentally scrappy. There is no evidence for extended or long-term occupation, and there is only minimal occupational accumulation. Room superstructures were of perishable materials, most likely brush (available in the wadis). Unlike the pit structures evident in other periods and at other sites, the shallow nature of the topsoil at the Camel Site, with bedrock quite close to the surface, did not permit excavation to any significant depth. There is no evidence for planning, and construction seems to be basically expedient.

The contrast with “Aradian” architecture requires emphasis. At Arad itself (Amiran 1978; Amiran et al. 1997: e.g., frontispiece), domestic architecture consists of rectilinear broad-room structures, apparently roofed with wooden beams (Amiran et al. 1997: frontispiece). Stone benches are present along the wall bases of the interiors of these rooms. Courtyards with high walls attach to and enclose the front of these rooms, and some-

times complexes with multiple broad rooms attach to irregular but angled (that is, polygonal as opposed to curvilinear) courtyards.

The architecture at the various “Aradian” outposts in the Sinai and the Negev seems to represent ad hoc variations on the Arad theme. For example, the sites in the southern Sinai (Beit-Arieh 2003) show broad rooms, roughly rectangular, although not as markedly so as at Arad. Benches are present in many of the rooms, and walls were stone-built up to roof height, although roofing is difficult to reconstruct. Unlike Arad, primary complexes (as opposed to smaller secondary clusters) often show interior courtyards surrounded by contiguous rooms. These appear not to be simple domestic complexes as at Arad, and the architecture seems to reflect differing functions and raw materials (especially in the absence of adequate supplies of wood in the desert), as opposed to some inherent cultural contrasts. This, of course, is in distinct contrast to the architecture at the Camel Site.

The Camel Site architecture thus appears to reflect an indigenous pen-and-attached-room type (Rosen 2008), originating perhaps as early as the late seventh millennium B.C.E. and certainly by the sixth millennium B.C.E. in the early stages of the evolution of the Timnian culture (Goring-Morris 1993; Kozloff 1981; Rosen 2011). Its appearance seems to coincide with the adoption of domestic goat herds in the desert, explaining the centrality of the enclosures. The basic type seems to be an adaptation to the mobile lifestyle and the demands of pastoralism in the Timnian culture in its various phases.

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CHRONOLOGY

STEVEN A. ROSEN

Chronological issues concerning continuities and discontinuities in the archaeological record are among the most debated in the archaeology of the Negev. In general, that record is one of punctuated sequences, periods of florescence followed by periods of virtual absence (e.g., Cohen 1999; Rosen 1987), the interpretations of which are varied. Finkelstein and Perevoletsky (1990) have claimed that these periods of decline in the record reflect shifts in the regional economy and external relations, resulting in increased nomadism, decreased archaeological visibility, and apparent settlement decline. Based on studies indicating that nomadic societies in the Negev leave remains accessible to archaeological analysis, Rosen (1992) has argued that the archaeological declines reflect genuine demographic declines. Analyzing radiocarbon date distributions from the southern Negev, Avner (1998; Avner et al. 1994; also see Sebbane et al. 1993) has argued that many of the so-called gaps or declines are more apparent than real, caused by ambiguities in the record of diagnostic fossil indices and periodization frameworks. Importantly, it is clear that the chrono-cultural sequences in the different regions of the Negev (Chapter 2) do *not* correlate in terms of settlement florescence and decline; dif-

ferent regions show different periods of increase and decrease in site numbers. Rosen (2009) attempted to explain these patterns in a model of expanding and contracting culture zones, one in northern Arabia/Sinai and one in the Mediterranean zone, at times linked and at times operating independently.

Anticipating the data presented below, the primary occupation of the Camel Site is dated to the Early Bronze Age II (ca. 3000 to 2700 B.C.E.), one of the periods of archaeological florescence in the central Negev. The secondary occupation, dated to the Early Bronze Age IV (ca. 2200 to 2000 B.C.E.), is another period of florescence, separated from the earlier by a period of apparent decline. Thus close analysis of the chronology at the Camel Site can offer insights into aspects of the debate concerning continuity and discontinuity in the region.

One final point concerning chronological analysis needs to be reiterated. Every first-year student in archaeology learns the distinction between absolute and relative dating. Personal experience suggests that many never seem to grasp the facts that without associated materials, absolute dates are worth little archaeologically and that relative dating techniques such as stratigraphy

may be more reliable measures of chronological process than absolute dates when the absolute dates come with large standards of deviation. The point is that all techniques come with qualifiers, and therefore the more we employ, the better our chronologies and the better our understanding of processes of change. The Camel Site dates derive from radiocarbon assays, analyses of material culture, and stratigraphic evaluation. Although much of the discussion of the material culture appears in other chapters, the comparisons between materials are also important and hence are reiterated here.

RADIOCARBON DATES

Four samples were sent to the Weizmann Institute for radiocarbon assays. All samples were small charcoal fragments collected in small sieves when the charcoal was noticed during excavation. This is significant, as the bits of charcoal were not integrated in a single lump or chunk, and there was no way of ascertaining in the field whether some bits might not be intrusive. Although it was not possible to ascertain that the source of the charcoal was not some long-lived tree (for example, *Pistachia*), the dominant brush vegetation of the area suggests that this would not be the case (although given an ameliorated climate, this is perhaps not a strong line of evidence). Given the

shallow nature of the deposits and the presence of penetrating roots, this is no mean problem. The assays are summarized in Table 4.1.

Assays Rta-2043 and Rta-3083 derive from Locus 41 and just outside it, the first from a hearth. Notably, they overlap at the 2-sigma level. The stratigraphic contexts of these two dates are important, since the later date was found in the lower organic layer, actually discontinuous in this locus due to the stepped nature of the bedrock, and the earlier date was from the upper layer. This suggests that within the room, the two horizons are chronologically indistinguishable, and both lie beneath the later construction and partitions. The calibration curves are presented in Figures 4.1 and 4.2. The problem of the flat calibration and multiple intercepts for Rta-2043 is ameliorated somewhat by the earlier Rta-3083, so that together they suggest a date in the earlier part of the first half of the third millennium B.C.E.—that is, the Early Bronze Age II.

Rta-3084 is modern and probably derived from a root that penetrated the subsurface. In terms of site attribution, Rta-3082 also can be considered an aberrant date, since no material culture found on the site can be attributed to this period, the Middle Bronze Age IIc to Late Bronze I age. Given proximity to the surface and the evidence of root penetration from Rta-3084, the date could be the result of sample mixture.

Table 4.1. Summary of Radiocarbon Assays

Sample	Provenience	C14	Calibrated B.C.E. 1 sigma	Δ C13
Rta-2043	Locus 41 M29b lower	4115 \pm 50	2860–2580	–24.0
Rta-3083	Locus 41 J29c upper	4345 \pm 65	3080–2880	–21.2
Rta-3082	Locus 32 I31c upper	3235 \pm 55	1600–1430	–19.7
Rta-3084	Locus 34 J31d upper 2	Modern		

SOURCE: Calibrations according to Stuiver et al. 1998.

Figure 4.1. Calibration curve for R_t-2043.

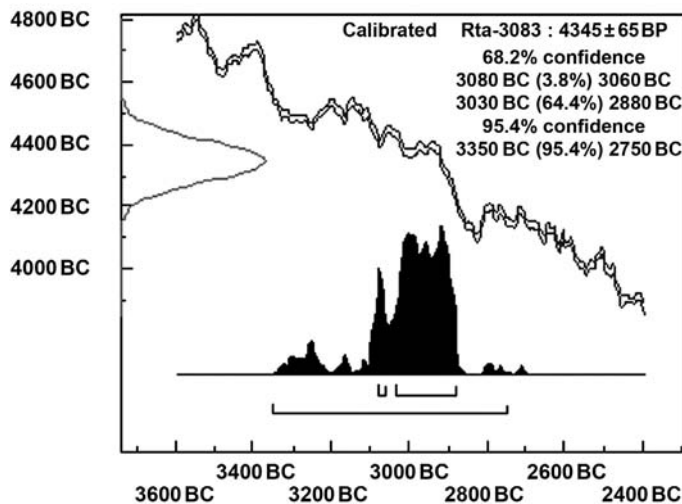
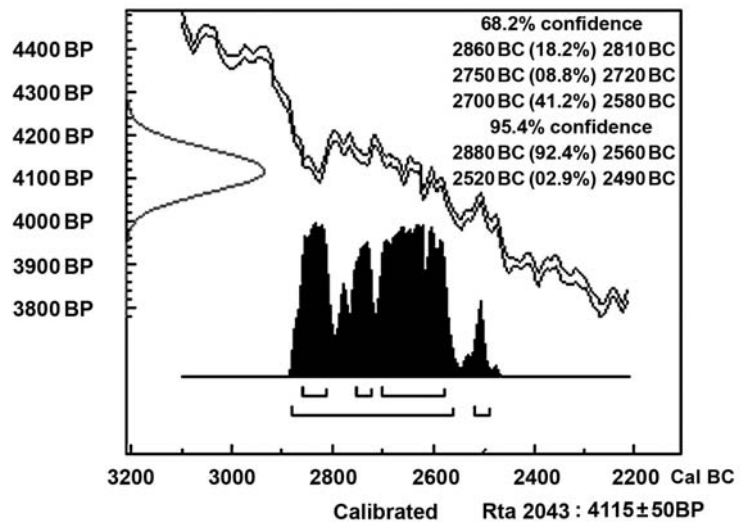


Figure 4.2. Calibration curve for R_t-3083.

CERAMICS

Saidel (Chapter 5) has summarized the ceramic chronological evidence. In terms of the Early Bronze Age sequence, simple holmouth jars are indeterminate, dating anywhere from Early Bronze Age I to Early Bronze Age III, but the cup-bowl with calcite inclusions suggests a possible date of very late Early Bronze Age I or early Early Bronze Age II. He concludes that in general, the four cup-bowl sherds should be dated to the Early Bronze Age II, with a hint of an earlier occupation. One small sherd, either a globular jar or an amphoriskos, also has its parallels in Arad, but because the piece is such a small fragment, it cannot be assigned definitely to the either Early

Bronze Age I or Early Bronze Age II. One ledge handle deriving from a storage jar also has parallels in Early Bronze Age II Arad assemblages.

The Early Bronze Age IV (ca. 2200 to 2000 B.C.E.) is represented by three everted rim sherds of storage jars, with parallels from Ein Ziq and Be'er Resisim (Chapter 5). One Early Bronze Age IV pithos fragment is also present, as are three holmouth sherds with cut rims, also typical of the period. Notably, no Early Bronze Age IV materials were recovered from the lower organic layer—only from the surface and the upper layer. This contrasts with Early Bronze Age II materials, found in all three layers.

Although no sherds (or for that matter any material culture) were attributable to the Early

Bronze Age III (ca. 2650 to 2200 B.C.E.), the issue is not as straightforward as it might seem. Thus the most diagnostic markers of the Early Bronze Age III, Khirbet Kerak wares, are not found in central Negev sites at all, and this may be as much a function of distance as chronology, the source being in northern Israel. Furthermore, Early Bronze Age IV materials from other sites have been dated by radiocarbon to anywhere from 2000 to 2500 B.C.E. (Segal 1999)—that is, in apparent overlap with the Early Bronze Age III. If some of these dates are faulty (for example, assayed on ostrich eggshells), nevertheless the absolute chronology of the Early Bronze Age IV and its relationship with the Early Bronze Age III in the desert are not yet clear.

MILLING STONES

Although milling stones are not usually diagnostic, the use of quartzitic sandstone and ferruginous sandstone (Chapter 7), also found at Arad (Amiran et al. 1997:55, 88), strengthens the Early Bronze Age I–II connection. No compositional studies have been made on Early Bronze Age IV milling stones, but Cohen (1999:266) indicates that most of the milling stones at Ein Ziq were of limestone, with only limited sandstone types. Obviously, raw material is an inadequate dating criterion, but it nevertheless supports the primary Early Bronze Age II attribution of the site.

LITHICS

The tool assemblage from the Camel Site (Chapter 6) contains several diagnostic types:

Micro lithic lunates (Rosen 1983a, 1997:43–44) have been found in sites dating to the Early Bronze Age II in the Negev and Sinai. Henry (1995:362–365) attributed them to the Timnian culture and conflated this chronologically with the Chalcolithic, which probably extends the type back too far. The type has not been found in Early Bronze IV contexts, such as at Be'er Resisim and Ein Ziq (Rosen et al. 2006; Vardi 2005), although collection procedures at these excavations included only occasional sieving.

Tabular scrapers (Rosen 1983b; 1997:75) have been recovered from sites as early as the Late

Neolithic but are especially common in Chalcolithic and Early Bronze Age sites. Significantly, they are not a component of Early Bronze Age IV assemblages.

Micro lithic drills have been found in sites dating from the Pre-Pottery Neolithic B through the Early Bronze Age IV (at Be'er Resisim [Rosen et al. 2006]). However, the double shoulder type, typical of the Camel Site and the neighboring site of Rekhesh Nafha (Saidel 2002), is as yet found primarily in Early Bronze Age I–II sites, with other periods showing drills more triangular shaped. It is not clear if the shape differences are chronologically determined or perhaps a function of the worked raw material.

COPPER TOOLS

The two copper awls recovered from the Camel Site (Chapter 8) are not typologically diagnostic to a particular period. However, the arsenical copper alloy of the awl from Square P30a is typical of Early Bronze Age and Chalcolithic copper objects (e.g., Ilan and Sebbane 1989) and has not been found (so far) among objects from the Early Bronze Age IV (cf. Segal 1999; Segal and Roman 1999).

STRATIGRAPHY

As outlined in the discussions on stratigraphy (Chapter 3), there is evidence for locus modification, construction of partition walls, later construction of features such as hearths, and possibly the later construction of Locus 40. The location of the hearth in Locus 41, beneath the collapse of a later wall, indicates later construction, although it is not possible to assign a date to that construction. The presence of artifacts beneath tumulus Locus 43 also indicates occupation before the construction of that locus. That many of these modifications are stratigraphically separated from the earliest construction phase suggests that some time passed between episodes of construction and modification, and it is tempting to correlate these episodes with the Early Bronze II and Early Bronze IV, respectively. Of course, as indicated in Chapter 3, since the layers are processually depositional, they (the

lower organic and upper layers, respectively) need not be contemporary in all areas of the site. In Locus 41, there was little chronological difference between them.

SUMMARY

Materials attributable to the Early Bronze Age II dominate the fossil indices in the material culture assemblage recovered at the Camel Site (Figure 4.3). Materials from the Early Bronze Age IV are found but do not constitute as great a presence as those from the earlier period, although the presence of a pithos fragment and storage ware is of interest, suggesting more than ephemeral presence. The radiocarbon dates from the Camel Site are best attributed to the Early Bronze Age II.

Given the above discussion, and the nature of the site stratigraphy, clearly it is not possible to attribute nondiagnostic artifacts to one or the other of the two periods of occupation on the site (Early Bronze I–II versus Early Bronze IV) with absolute confidence. Nevertheless, the working hypothesis here has been to treat the material culture as a single assemblage, basically Early Bronze Age II. Beyond the fact that the bulk of diagnostics do indeed seem to date to the earlier period, and the stratigraphy also supports such a hypothesis, it should also be noted that culturally there is indeed continuity within the Timnian Complex (Rosen 2011), and many scholars have noted the basic material continuities between the Early Bronze Age I–II (and III, not evident in the Negev Highlands) and the Early Bronze Age IV (and thus, indeed, the terminology).

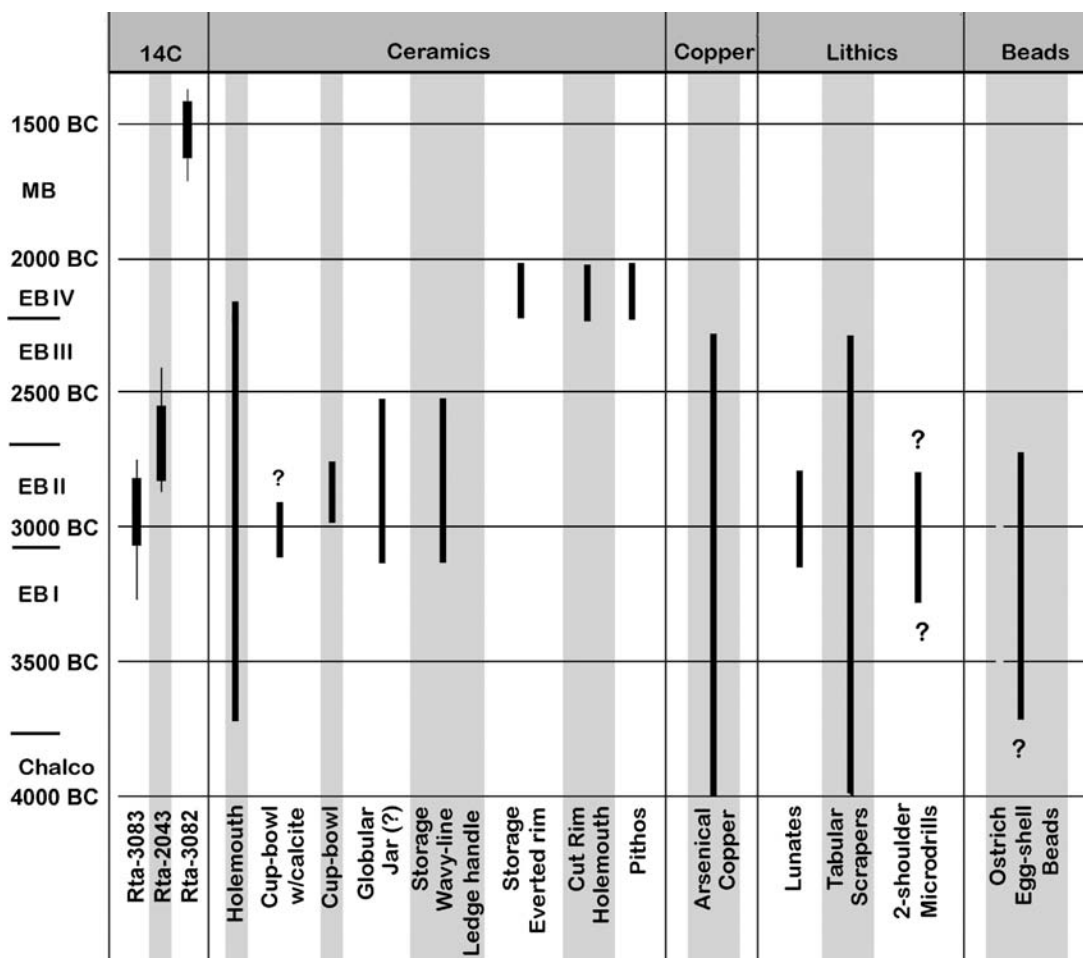


Figure 4.3. Schematic summary of chronological evidence from the Camel Site.

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THE POTTERY FROM THE CAMEL SITE

BENJAMIN A. SAIDEL

Ceramics have traditionally played the core role in material culture analysis in Levantine historical-period archaeology, primarily because they have provided the primary fossil indices for culture-historical attributions (see Chapter 1). Thus ceramic assemblages and specific ceramic types have been associated with specific periods and often with specific ethnic or cultural groups (see Amiran 1969 for numerous southern Levantine examples). In the desert, among smaller-scale and generally more mobile societies (at least until the era of classical desert urbanism and agricultural settlement), the smaller assemblages and their more limited typological diversity have rendered chronological and cultural attributions based on pottery more difficult; nevertheless, this remains a significant goal of ceramic study, as reflected in Chapter 4.

Needless to say, a glance at any introduction to archaeological ceramics (e.g., Arnold 1985; Freestone and Gaimster 1997; Orton et al. 1993; Sinopoli 1991) will suffice to demonstrate that a range of analytic goals can be achieved using pottery. Thus, in addition to chronology and cultural attribution, the ceramics from the Camel Site can be used to examine site function, spatial organization, site formation processes, and interregional relations.

Excavations at the Camel Site recovered 971 sherds, of which only 31 (3 percent) were diagnostic. Of the diagnostic sherds, there are 23 rim sherds (74 percent), five bases (16 percent), and three decorated body sherds (10 percent). The numbers themselves are significant—they are very small. A season of excavation of a similar area at a typical village site in the Mediterranean zone might produce 50,000 sherds or more, and this without sieving. The smallness of the assemblage is even more evident considering a rough estimate of minimum number of vessels—only 23 rim sherds were recovered. Assuming that each represents a vessel (an unlikely assumption), then the entire assemblage reflects perhaps 20 vessels (attempts to join pieces resulted in only two conjoins). The implications for the nature of the site and the lifeways it represents are reviewed later, but in short, the site is a campsite.

All the pottery is heavily weathered, and as the figures demonstrate, the diagnostic sherds are small in size (Figures 5.1–5.3). These features too reflect the surface nature of the site, its long exposure, and the nature of site formation.

Based on these sherds, the assemblage is dated to the Early Bronze Age II (and perhaps the latest phase of the Early Bronze I), ca. 3000 to 2700 B.C.E., and the Early Bronze Age IV, ca.

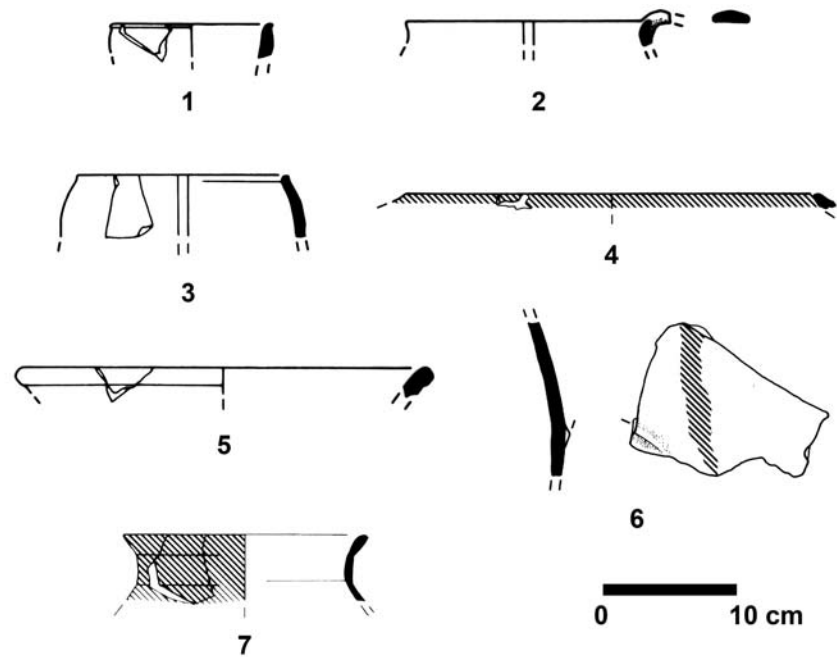


Figure 5.1. Cup-bowls; jars; small jar or amphoriskos. See Table 5.1 for details.

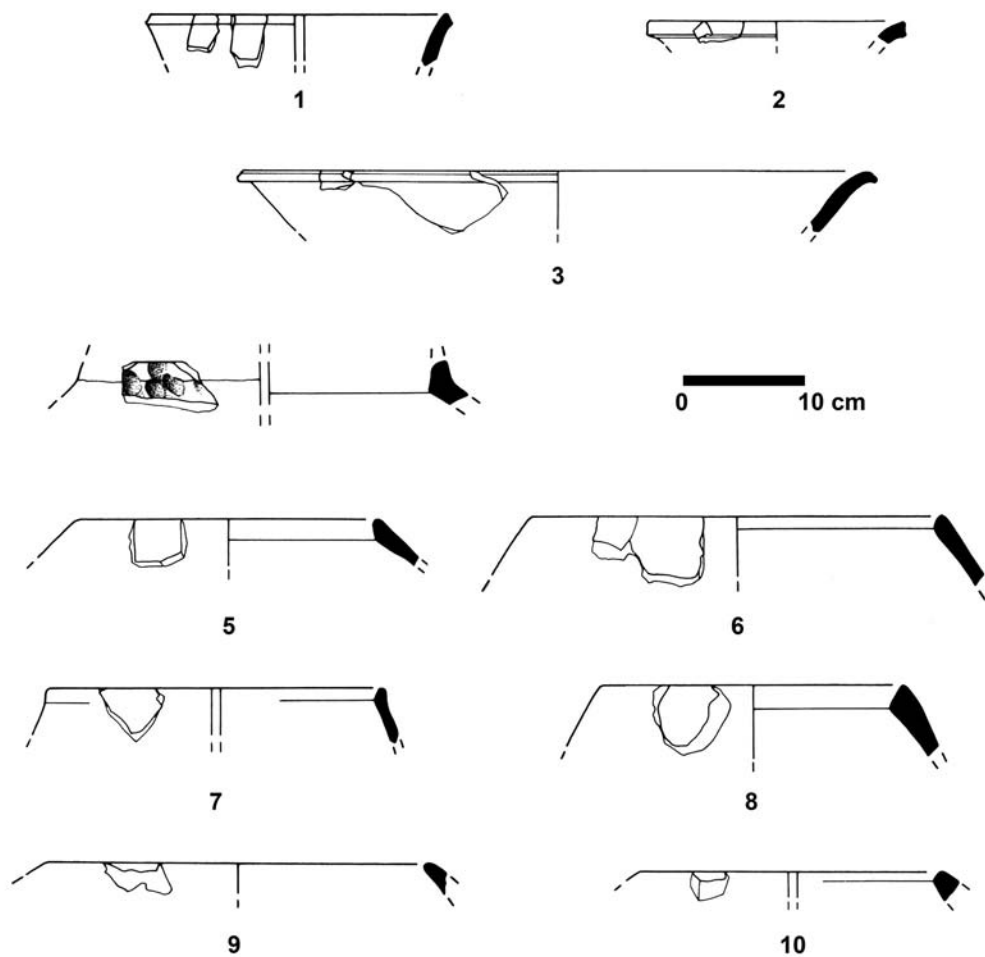


Figure 5.2. Everted rim storage jars; pithos shoulder; holemouth rims. See Table 5.1 for details.

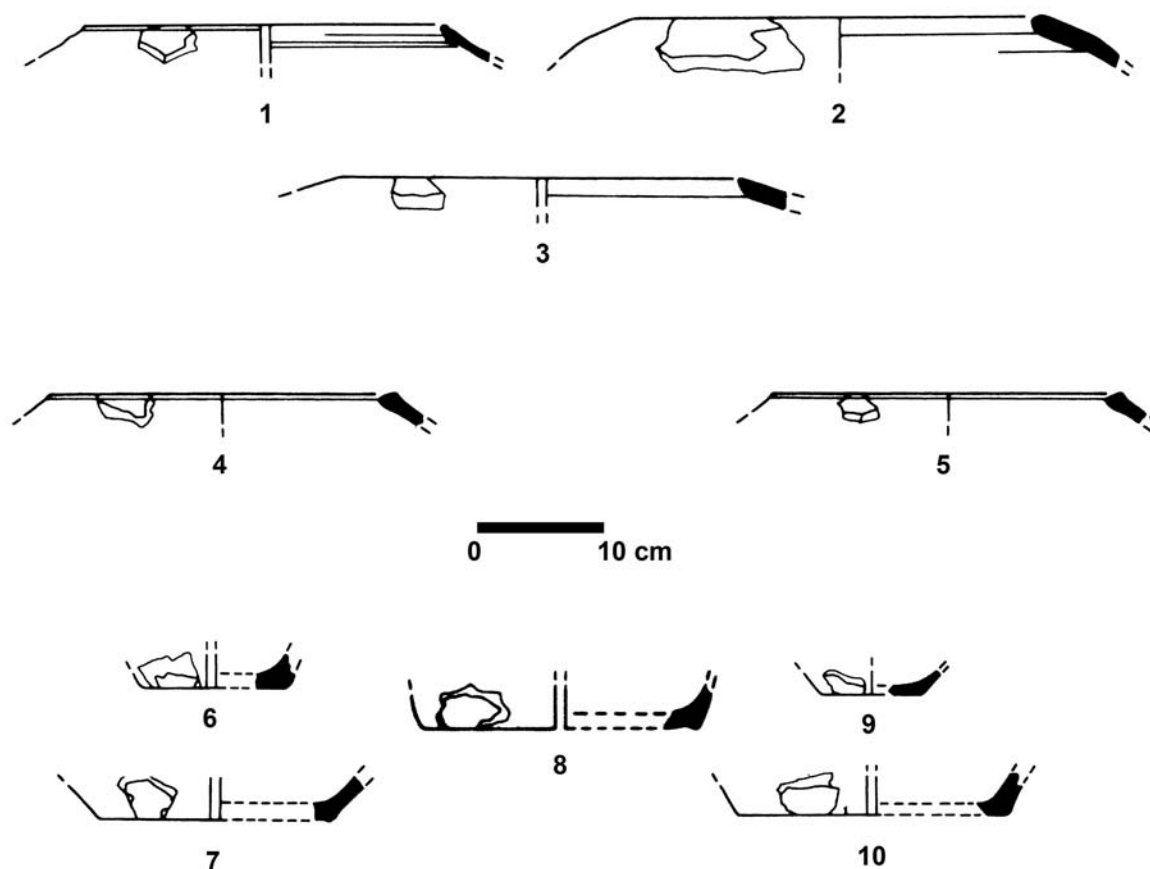


Figure 5.3. Holemouth rims; bases. See Table 5.1 for details.

2200 to 2000 B.C.E. One red-ribbed body sherd typical of Late Byzantine/Early Islamic cooking pots was also found. Notably, none of the ubiquitous Gaza Ware, reflecting recent Bedouin occupation, was found at this site (e.g., Haiman 1999: 12*; Rosen 1981), an important point as it suggests that there was little recent disturbance, a common problem on many desert sites.

TYPE DESCRIPTIONS AND CHRONOLOGY

Cup-Bowls

The presence of cup-bowls is fortuitous, as they are more chronologically diagnostic than most of the pottery found at other Early Bronze Age encampments in the Negev Highlands. At the Camel Site, most of the cup-bowls are found within the vicinity of Locus 32. Of the four cup-bowls in this assemblage (Figures 5.1:1, 5.1:3–4), three are rims and one is a rim with a portion of the handle (Fig-

ure 5.1:2). Given the small size of the pottery, it is difficult to draw exact parallels with examples found at other sites in the Negev and Sinai. Parallels for these cup-bowls are found in Strata II and III at Tel Arad and at some sites in southern Sinai (Table 5.1). Based upon these parallels, the cup-bowls from the Camel Site are dated to the Early Bronze Age II (Figures 5.1:1–2, 5.1:4) (Table 5.1). However, one sherd contains calcite inclusions, which may indicate that this particular cup-bowl is dated to the late Early Bronze Age Ib, the terminal fourth millennium B.C.E. (Figure 5.1:3) (Porat 1989 and see later discussion).

NECKED JARS, STORAGE JARS, AND PITHOI

While limited in numbers, several types of storage jars are present at this site. For example, both a rim sherd and a body sherd belonged to a ledge handle jar (Figures 5.1:5–6). The body sherd (Figure 5.1:6) is decorated with a painted wavy

Table 5.1. Pottery Parallels

Plate	Type of Vessel	Provenance	Munsell	Parallels
5.1:1	Cup-bowl	I33b	Ext. 2.5YR7/8 Int. mottled. 2.5YR7/8, 2Gley 5/5PB	Arad Stratum III, plate 14, Amiran 1978 Arad Stratum II, plates 24:16, 24:32, Amiran 1978 Sheikh Awad, figures 4.19:2–4, Beit-Arieh 2003:126 Sheikh Muhsen, figure 4.19:7, Beit-Arieh 2003:126
5.1:2	Cup-bowl	I36c	Ext./int. 5YR6/4, 5YR7/4, 7.5YR7/4 (fabric)	Ibid.
5.1:3	Cup-bowl	I34c	Ext. mottled 2Gley5/5PB, 2.5YR6/8 Int. 7.5YR5/3	Ibid.
5.1:4	Cup-bowl	P35a	2.5YR6/6	Ibid.
5.1:5	Jar	Q32b	Ext. 5YR6/6 Int. 5YR6/6	Arad Stratum IV, plate 12:5, Amiran 1978 Arad Stratum III, plates 15:30, 15:31, Amiran 1978 Arad, Stratum II, plate 31:1, Amiran 1978
5.1:6	Painted body sherd	P31c	Ext. 5YR6/6, 5YR7/6, 5YR6/4 Painted line 2.5YR4/4, 2.5YR5/4	Arad Stratum IV, plates 11:12–14, 11:16, Amiran 1978 Arad Stratum II, plate 33:5, Amiran 1978
5.1:7	Amphoriskos or globular jar	N32d	Ext. 2.5YR7/4, 2.5YR6/4	Arad Stratum IV, plate 10:13, Amiran 1978 Arad Stratum II, plates 24:1–4, Amiran 1978
5.2:1	Flat-bottom storage jar (two sherds)	Q12b surface and P27c surface	Ext/int. 5YR6/4	Har Sayyad, plate 56:26, Cohen 1999 Har Sayyad, plates 57:7, 57:10, 57:15, Cohen 1999 Ein Ziq, plate 109:6, Cohen 1999 Beer Resisim, plate 137:8, Cohen 1999
5.2:2	Flat-bottom storage jar	H32c upper	Ext. 7.5YR7/4, 7.5YR8/4 Int. 7.5YR7/3, 7.5YR7/4	Har Sayyad, plate 57:4, Cohen 1999 Beer Resisim, plate 137:7, Cohen 1999
5.2:3	Pithos (warped rim)	P35b, P36d	Ext/Int. 10YR6/2– 10YR6/3	Har Sayyad, plate 57:9, Cohen 1999 Ein Ziq, plate 109:1–2, Cohen 1999
5.2:4	Pithos shoulder	H32c	Ext/int. 10YR6/2– 10YR6/3	Har Sayyad, plates 57:9–12, Cohen 1999 Ein Ziq, plates 109:1–2, Cohen 1999
5.2:5	Holemouth cooking pot	P34a/Locus 39	Ext. 2.5YR6/6 Int. 2.5YR7/8	Tel Esdar, plate 27:10, Cohen 1999 Har Horesha, figure 12:4, Haiman 1991:9*

Table 5.1. Pottery parallels (continued)

Plate	Type of Vessel	Provenance	Munsell	Parallels
5.2:6	Holemouth vessel	Surface survey	Ext/int. 5YR5/2	Arad Stratum III: Amiran 1978: plates 18:19, 18:27 Arad Stratum II: Amiran 1978: plate 45:23
5.2:7	Holemouth vessel	H33c	Ext/int. 5YR6/4	Arad Stratum III: Amiran 1978: plate 18:16
5.2:8	Holemouth vessel	Locus 52, cleaning	Ext. 1Gley 4/N Int. 1 Gley 4/N	Nebi Salah: Beit-Arieh 2003: 111, figure 4.1:10 Arad Stratum III: Amiran 1978: plate 21:28 Arad Stratum II: Amiran 1978: plate 49:11
5.2:9	Holemouth vessel	Locus 40, cleaning	Ext. 5YR6/6 Int. 5YR6/6	Sherd too small for parallels to be drawn
5.2:10	Holemouth vessel	P24a	Ext. 5YR6/6 Int. 5YR6/6	Ibid.
5.3:1	Holemouth vessel	L32a lower	Ext. 7.5YR7/3 Int. 1Gley5/N	Be'er Resisim: Cohen 1999: figure 137:6 Ein Ziq: Cohen 1999: figure 109:1
5.3:2	Holemouth vessel	P36d upper	Ext. 5YR6/4, 5YR5/4 Int. 1Gley5/N	Arad Stratum IV: Amiran 1978: plate 8:32 Arad Stratum III: Amiran 1978: plates 18:6, 19:2 Arad Stratum II: Amiran 1878: plates 45:11, 45:22 Har Horesha: Haiman 1991:9*, figure 12.6
5.3:3	Holemouth vessel	O26b upper	Ext/int. 5YR 5/2	Arad Stratum III: Amiran 1978: plate 18:8 Nahal Mitnan: Haiman 1992:34, figure 10.6
5.3:4	Holemouth vessel	M26a upper	Ext. 7.5YR 7/4 Int. 5YR/ 6/6	Nahal Boqer: Cohen 1999: figure 82:12 Mashabbe Sade: Cohen 1999: figure 79:7
5.3:5	Holemouth vessel	M26b upper II	Ext. 7.5YR 7/4 Int. 5YR 6/6	Nahal Boqer: Cohen 1999: figure 82:10–13 Mashabbe Sade: Cohen 1999: figure 79:6–8
5.3:6	Base	K35d lower III	Ext. 1Gley 5/N Int. 1Gley 4/N	Sherd too small for parallels to be drawn
5.3:7	Base	H32a upper	Ext/int. 2.5YR 6/6	Ibid.
5.3:8	Base	Locus 32	Ext. 7.5YR 7/3 Int. 1Gley5/N	Ibid.
5.3:9	Base	O28c upper	Ext/int. 5YR 5/1	Ibid.
5.3:10	Base	I32b upper	Ext. motled [mot-tled?] 2.5YR 6/4, 2.5YR 6/6	Ibid.

line, reddish brown in color (Munsell 5YR 5/4), on a reddish-yellow fabric (Munsell 5YR 7/6). Similar vessels are found in Strata IV–II at Tel Arad (Table 5.1; for additional comparanda, also see Amiran 1978: plates 12:5, 12:19, 15:31, 31:1).

A small rim sherd (Figure 5.1:7) with a brown slip could belong to either a small amphoriskos or a small globular jar. Parallels for both types of containers are found at Tel Arad. The former is present in Stratum IV, dated to the Early Bronze Age I period (Amiran 1978: plate 10:13), while the latter is present in Stratum II, dated to the Early Bronze Age II (Amiran 1978: plate 24:1–4).

Storage vessels from the Early Bronze Age IV period include everted rim sherds from flat-bottom storage jars (Figures 5.2:1–3) that are similar to examples found at Ein Ziq and Be'er Resisim (e.g., Cohen 1999:177, figure 109: 1–2; 219, figure 137:8). The diameter of one storage jar is large because the rim is warped (Figure 5.2:3). Present in this assemblage is the join of the neck and shoulder of a pithos (Figure 5.2:4). The impressions of four fingertips are present on the exterior of this sherd. This type of pithos is also found at a number of Early Bronze Age IV sites in the Negev (Table 5.1).

Holemouth Vessels

Most of the diagnostic sherds found at the Camel Site are rim sherds from holemouth vessels (Figures 5.2:5–10, 5.3:1–6). A number of scholars have described the problems of using holemouth vessels as type fossils for dating archaeological sites in the Negev and Sinai (Avner et al. 1994: 278–280; Saidel 1998:158–160; Sebbane et al. 1993). This discussion begins with those holemouth vessels dated to the Early Bronze Age II, and it concludes with those attributed to the Early Bronze Age IV.

This assemblage has five rim sherds from holemouth storage jars (Figures 5.2:9–10, 5.3:2, 5.3:5–6) and six rim sherds from holemouth cooking pots (Figures 5.2:5–6, 5.2:8, 5.3:1, 5.3:3). One of these sherds was too small to be illustrated. The storage jars are characterized by a coarse friable fabric that contains rough inclusions. In contrast, the fabric of the cooking pots is well fired and not friable (Ornit Ilan, personal

communication). Two types of holemouth vessels—those with everted rims and those with thick rims—are attributed to the Early Bronze Age II. Most of the holemouth vessels found at the Camel Site have parallels with similar examples found at other sites in the Negev Highlands (Table 5.1). The two thick rim sherds (Figures 5.2:6, 5.2:8) are similar in form to those of other holemouth cooking pots found at sites in the Negev Highlands and at Arad in the northern Negev (Table 5.1; for additional comparanda, also see Cohen and Dever 1981: 67, 71, figure 10:1–3; Haiman 1991:9*, figure 12: 2–14). From the Intermediate Bronze Age, two sherds from holemouth vessels have cut rims (figures 5.3:4–5). Similar types of vessels are found at the settlements of Mashaabe Sade and Nahal Boqer in the Negev Highlands (Cohen 1999:128, figures 79:6–8; 133, figures 82:10–13).

Miscellanea

There are five bases in this assemblage (Figures 5.3:6–10) and one diagnostic body sherd. The diagnostic body sherd is incised with the wavy comb decoration found on pottery from the Early Bronze Age IV; however, due to the small size of this sherd, it is not illustrated.

PETROGRAPHY

Yuval Goren carried out a petrographic study on six body sherds (Table 5.2). Originally, these sherds were selected for petrographic analysis as a means to determine the chronological periods present at the Camel Site (e.g., Porat 1989; Saidel 1998:187). Subsequent research has demonstrated that petrography is not a sound method for dating (e.g., Avner et al. 1994:280, figures 11:3–4, and fn. 16; Sebbane et al. 1993:39, fn. 4). Nevertheless, this limited petrographic study provides some insights on the provenance of the clay and temper found in these six samples (Table 5.2). Given its size, the diagnostic pottery was not submitted for petrographic analysis, as this procedure would have destroyed the sherds. Below are some brief observations on the samples from the Camel Site. The sample numbers mentioned below refer to the grid square where the sherds were unearthed.

Table 5.2. The Petrographic Samples from the Camel Site

Sample Number	Temper	Source	Reference
J32/1	Loess and calcareous matrix (“kurkar”)	Northern and northwestern Negev and the southern Shephela	Goren 1996:48, 54
J32/3	Fossil shells	Ora Formation in the southern Negev and central Sinai	Porat 1989:175–177, 180 Goren 1996:54–55
J32/4	Fossil shells	Ora Formation in the southern Negev and central Sinai	Porat 1989:175–177, 180 Goren 1996:54–55
J32/15	Moza clay-dolomitic sand group	Judean hills in the area of Jerusalem	Goren 1996:51–52
S32a	Arkose	Southern Sinai or the Feinan area of southern Jordan	Porat 1989:174
S31c	Fossil shells	Ora Formation in the southern Negev and central Sinai	Porat 1989:175–177, 180 Goren 1996:54–55

Sample S32a contains arkose. However, it is not possible to determine if this temper came from southern Sinai or southern Jordan. In southern Sinai, clay deposits containing arkose were used to make cooking pots during the Early Bronze Age II period (Porat 1989:172, 174), whereas in the area of Feinan in southern Jordan, clay tempered with arkose was used to produce a wider range of vessels during the Early Bronze Age IV (Goren 1996:53, 54, 59), as well as the Early Bronze Age II.

Sample J32/15 is from the Moza clay-dolomitic sand group (Goren 1996:51–52). Dolomitic clay was used to produce pottery in the Early Bronze Age I and the Early Bronze Age IV (Porat 1989:47, 49; Goren 1996:51). Vessels made from Moza clay and dolomitic sand make up a large portion of the ceramics found at Early Bronze Age IV settlements in the central Negev (Goren 1996:47, table 3, 52). The source of this petrographic group is located in the Nahal Refaim in the eastern Hebron Hills/Judean Desert, where archaeologists have identified “an ancient quarry of dolomitic sand (Goren 1996:52).

Samples J32/3, J32/4, and S31c contain fossil shells from the Ora Formation. Outcrops of this geological formation do not appear north of the

Makhtesh Ramon (Porat 1989:177). In the central Negev, the only known exposure of the Ora Formation is situated inside the Makhtesh Ramon (Goren 1996:54–55; Haiman and Goren 1992:148–149; Porat 1989:177). Additional outcrops of the Ora Formation are also located in Sinai. In the Early Bronze Age II, fossil shells are present in the fabric of holemouth jars. Porat (1989:177) concluded that these vessels could have been made in Uvda Valley and/or “somewhere in central Sinai.” During the Early Bronze Age IV, this temper is present in the fabric of spouted holemouth jars with duckbill rims (Goren 1996:55, 59; Porat 1989:175, 180). Thus Porat (1989:180, 183) maintains that the same clay deposits are in use during both the Early Bronze Age II and Early Bronze Age IV. In contrast, Goren (1996:59) maintains that the Early Bronze Age IV spouted holemouth vessels were made locally in the “southern Negev,” implying different sources in different periods.

Upon visual examination, four sherds appear to have calcite inclusions (Ornit Ilan, personal communication). Calcite is present in one base (Figure 5.3:8) and in three types of vessels: an amphoriskos/globular jar (Figure 5.1:7), a cup-bowl (Figure 5.1:3), and a ledge handle jar (Figure

5.1:6). Calcite is used as a temper in the Early Bronze Age I (late fourth millennium B.C.E.) and Early Bronze Age IV, but it is not used in the Early Bronze Age II (Porat 1989). Therefore, the presence of calcite in these four sherds may be evidence of an Early Bronze Age Ib occupation at the Camel Site (Ornit Ilan, personal communication.).

THE SPATIAL DISTRIBUTION OF THE POTTERY

A spatial analysis of the pottery discarded at the Camel Site (Figure 5.4) provides a number of insights on chronology and human behavior. This study is facilitated by the field methods employed (Chapter 1) and by the location of this campsite on relatively flat terrain, constraining post-depositional movement of the artifacts. In this research, the pottery from the lower, upper, and surface layers are combined, summed, and plotted for each 1 × 1 m subsquare. This method is chosen because the nature of the stratigraphy makes it difficult to establish contemporaneity between various loci (Chapter 3). Also, the poor condition of the ceramics makes it virtually impossible to restore the pots. There are only two vessels with conjoinable sherds, both Intermediate Bronze Age storage jars. One storage jar has two sherds that do not actually join, but based on the fabric and finish, both are from the same container (Figure 5.2:1). The sherds were found in subsquares Q12b and P27c, and the distance between these locations is 16 m. The two conjoinable rim sherds from a second storage jar (Figure 5.2:3) were recovered in subsquares P35c and P36d, and the distance between these subsquares is 1 m.

The limited quantity of diagnostic pottery indicates that the total number of vessels at the Camel Site for the Early Bronze Age and Intermediate Bronze Age was quite small. The diagnostic pottery is concentrated in three portions of the site (Figure 5.4):

1. In front of and adjacent to Locus 32. The types of vessels found in this area of the site include Early Bronze Age II cup-bowls, a holemouth vessel, and an Early

Bronze Age IV pithos (Figures 5.1:1–3; 5.2:2, 5.2:4, 5.2:7).

2. Adjacent to Loci 46 and 47, diagnostic sherds include the following vessels from the Early Bronze Age II: a cup-bowl, a holemouth cooking pot, a storage jar, and one diagnostic sherd from a flat-bottom storage jar attributed to the Early Bronze Age IV (adjacent to Locus 47) (Figures 5.1:4–5, 5.2:3, 5.2:5, 5.3:2).
3. On the southwestern side of Locus 40 are two sherds from Early Bronze Age IV holemouth vessels next to large quantities of nondiagnostic pottery. Perhaps these rims sherds and the large quantity of nondiagnostic pottery associated with them are the remains of a pot drop. Although this idea is speculative, these ceramics may have been associated with a circular platform used for storing household items and other impedimenta. Additional diagnostic sherds are scattered throughout the architectural complex, and a few are scattered outside the structure. In particular, the paucity of diagnostic ceramics in the southern and western clusters of pottery is surprising, given that these sections of the site contain the largest quantities of discarded pottery (Figure 5.4; Table 5.3).

The majority (82 percent) of the pottery, 787 sherds, was found outside the architecture, whereas only 177 sherds (18 percent) were found inside (Figure 5.4). The distribution of the pottery inside the bases of the huts provides evidence that the interiors of these shelters were intentionally cleaned by their inhabitants. For example, the presence of thin scatters of pottery outside the entrances to Loci 32, 40 and 41 most likely represents the sweeping out of broken vessels from the interior of these dwellings. This behavior is also reflected in the petrographic analysis of four sherds found in Subsquare J32b in Locus 32. Three of the four samples from this subsquare contain different clays and tempers (Table 5.1), thereby suggesting that minimally three different vessels were broken inside or adjacent to this

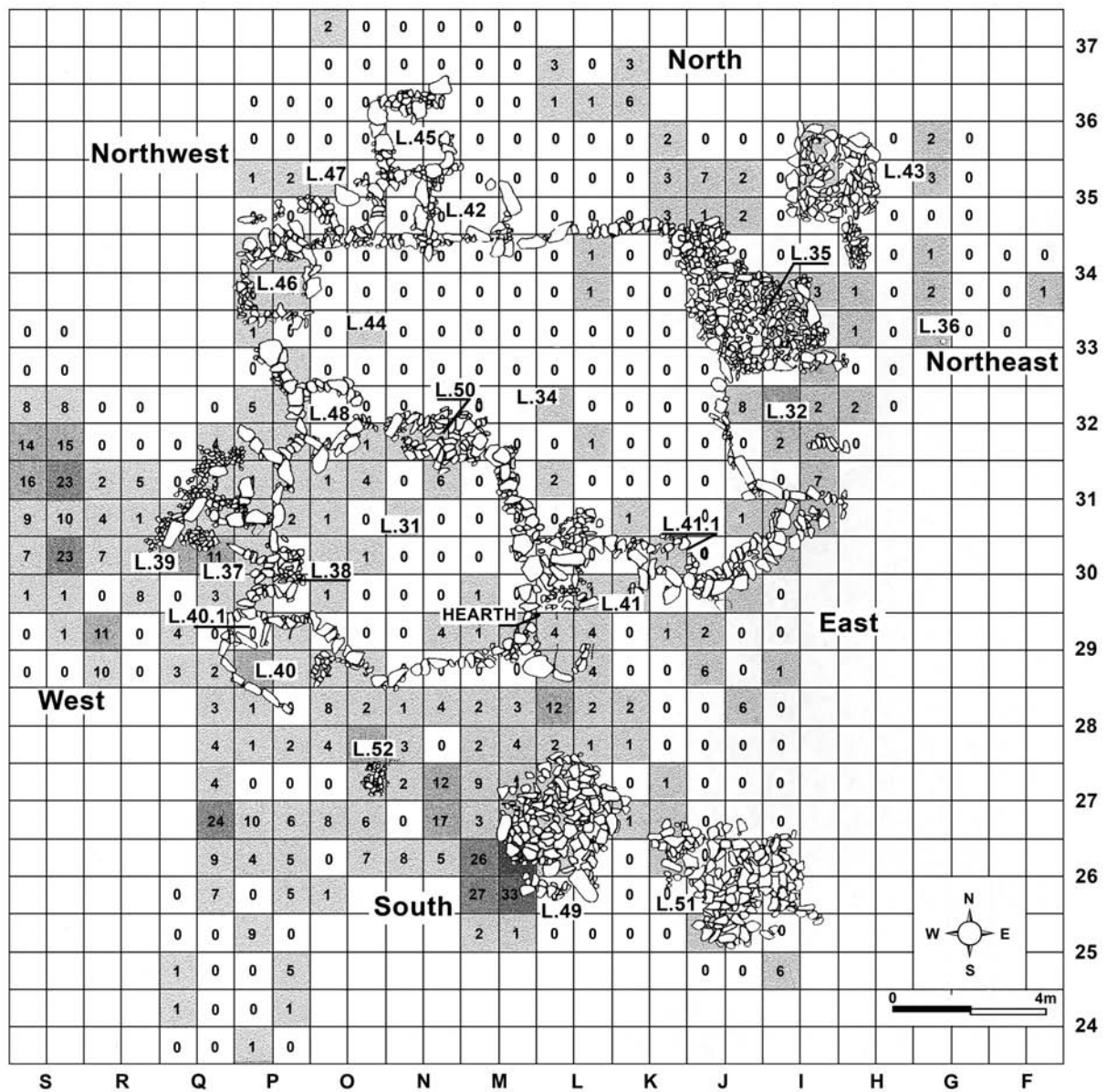


Figure 5.4. Sherd distribution with diagnostic sherds indicated by “d” and clusters of sherds indicated as “South,” “West,” etc.

Table 5.3. Quantities of Sherds Found in Selected Areas of the Camel Site

Cluster	Northern Cluster	Northeastern Cluster	Eastern Cluster	Southern Cluster	Western Cluster	Northwestern Cluster	Total
Number of sherds	34	18	40	416	273	6	787

locus. Furthermore, it is unlikely that the 35 sherds found in Locus 32 represent the complete remains of these three ceramic containers.

The quantities of discarded pottery found outside the architecture indicate that certain areas were used more often than others for dumping broken ceramics and presumably other types of waste. For instance, there is a thin scatter of ceramics immediately outside the northwestern to eastern walls of this structure (Table 5.3). In contrast, 273 and 416 sherds were found outside the western and southern sides of the complex, respectively (Table 5.3). The large numbers of sherds found in these locations indicate that they were intentionally used as dumps. In the southeastern and north-northeastern portions of the site, small clusters of pottery were located next to the circular stone platforms identified as Loci 33, 43, 49, and 51, perhaps indicating that they were storage platforms or some such.

CONCLUSIONS

The above analyses of the ceramic assemblage from the Camel Site have implications for understanding the site on several levels. As per the introduction to this chapter, at the traditional level of culture-history, based on numbers of sherds, the assemblage reflects two periods of occupation, a primary one during the Early Bronze Age II (ca. 3000 to 2700 B.C.E.), with a hint that it perhaps began somewhat earlier, in the final stages of the Early Bronze Age I (ca. 3100 B.C.E.) (Saidel et al. 2006:206–208; Yekutieli 2004), and a secondary occupation in the Early Bronze Age IV (ca. 2200 to 2000 B.C.E.). This assessment accords well both with the radiocarbon assays and other chronologically diagnostic elements of material culture (Chapter 4), as well as stratigraphic assessments suggesting a chronological gap between the primary and secondary occupation horizons (Chapter 3).

Beyond chronology, the mere presence of the pottery at the Camel Site is evidence of exchange and mobility, as none of these vessels were made on-site. Petrographic analysis shows clearly that sources were varied, coming from the Mediterranean zone and desert areas to the east and south. This picture of varied sources and off-site

production accords well with other elements of material culture that show similar variability in sources and distances (Chapters 9, 10, and 13). The pottery was moving around, and given the nonsedentary nature of the architecture (Chapter 3), it is likely that the inhabitants were moving with it. This basic mobility is also reflected in the low numbers of sherds. The roughly 1,000 sherds on the site probably reflect at most 30 vessels (an optimistic estimate). This number has its own implications. We cannot reconstruct breakage rates per unit of time here, but given a model of seasonal movement (Chapters 2 and 13), it seems unlikely that a band of pastoralists would break so many pots in a single season of occupation. Admittedly speculative, the number supports the idea of return visits to the site, which would accord with the investment in construction, as minimal as it may seem (Chapter 3).

The idea of investment and return also ties into issues of site organization. The presence of apparent middens, as evidenced by the denser concentrations of pottery, accords well with the analysis of material-culture distribution patterns on the site (Chapter 12), indicating a clear structure to activities on the site. Rooms were cleaned (evident also in the rarity of conjoinable lithic waste; Chapter 12), and waste was tossed into a midden. The fact that the midden was outside the architecture allowed natural erosional processes to wash away the fine sediments (Chapter 3), ultimately leaving only the larger and inorganic ceramics as evidence of this behavior. In this context, the eroded nature of the pottery is also evidence of these post-depositional processes.

Interassemblage comparisons of vessel type between the Camel Site and other pastoral campsites in the Negev Highlands, such as Har Horeshe, Nahal Mitnan, and Ramat Matred (Figure 5.5), demonstrate that holemouth vessels represent the largest category of containers at all these settlements (Saidel 2002:184, figure 3). In fact, type diversity is quite restricted at these sites, suggesting a specific functional configuration for pottery at Early Bronze Age pastoral encampments (Timnian encampments, to use the cultural designation). In contrast, a broader range of vessel types is found at Arad and Sheikh Muhsen (Saidel 2002:183–185). The former is a

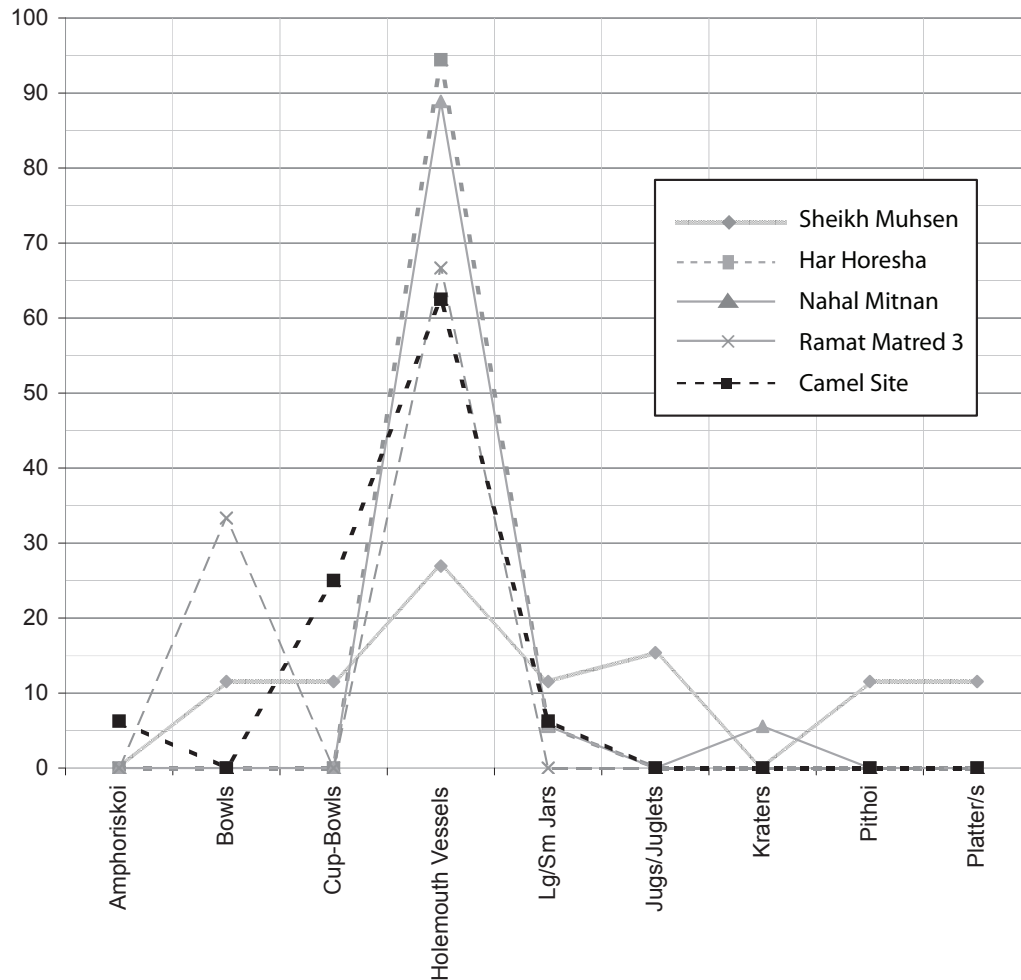


Figure 5.5. A comparison of the ceramic assemblages present at Early Bronze Age II arid zone sites. Sheikh Muhsen is Aradian in its cultural affinities. The others are Timnian.

fortified town in the northern Negev and the latter an “Aradian” outpost in southern Sinai (Beit-Arieh 1986:29–45; 2003:443). There is also a functional difference between the pottery assemblage from the Camel Site (and those of other pastoral encampments) and those found at Sheikh Muhsen, an Aradian site. Cooking pots, identifiable both typologically and by the commonly found soot and signs of burning present on the sherds, constitute a larger proportion of the pottery assemblage at the Camel Site than at Sheikh Muhsen (Saidel 2002:187, table 4). In contrast, higher frequencies of storage jars at Sheikh Muhsen indicate greater storage functions, a clear necessity for either an urban town or an outpost whose primary function was probably trade. Alternatively, the lower frequency of

ceramic storage vessels at the Camel Site may be evidence for the use of biodegradable containers—for example, skins—by the inhabitants of this seasonal camp (Saidel 2002:191–192). This distinction, drawn between Arad and “Aradian” sites, and “indigenous” Timnian sites such as the Camel Site on the basis of ceramic configuration, is also reflected in the architecture (Chapter 3) and in clear differences in the lithic assemblages (Chapter 7).

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THE LITHIC ASSEMBLAGE FROM THE CAMEL SITE

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Lithic analysis in the Bronze and Iron Ages has been recognized for some decades as offering important insights into early metal-using societies both in the Near East (Rosen 1997b) and elsewhere (e.g., Eriksen 2010; Högborg 2009). Beyond the issue of the metal-flint replacement process, stone tools in early complex societies fully reflect the increasing economic, social, and political complexities integral to the rise of urbanism and the state. In this increasing social complexity, we can also trace the rise of periphery–core relations and, as a special subset, the rise of the desert–sown spectrum. The lithic assemblages, perhaps more than any other realm of material culture, reflect the distinct evolving trajectories of the two culture regions. It is important to stress here that while the functional distinctions between the desert and the settled zone are well evidenced in the chipped stone industries, and are certainly not trivial, they are not the only distinctions. The basic structures of production and consumption differ between the two areas—lithic industries in the heartland showing increasing evidence of specialization and exchange in specific tools, side by side with ad hoc production and use of others, with the desert industries remaining fundamentally domestic in structure, even when achieving the level of cottage industry.

Integrated with other analyses (Rosen 2009), especially the comparative spatial study (Chapter 12), the lithic industries offer deep insights into some of the basic structures of Timnian society.

The lithic assemblage from the Camel Site, with 27,757 artifacts, is both the largest component of material culture collected from the site and the largest lithic collection from a post-Neolithic site south of the Beersheva Basin. To the uninitiated, this number may sound high, but it must be put into perspective. A typical primary in situ Epipaleolithic campsite in the Negev dunes, Givat Hayil 33 (Rosen 2000), covered an area just under 30 m, lacked architecture, and contained more than 5,000 lithic artifacts, a lithic density of more than 150 artifacts per square meter (see Goring-Morris 1987 for numerous additional examples). The Pre-Pottery Neolithic site of Wadi Tbeik in southern Sinai covered an area of approximately 350 m, contained architecture at some level similar to that of the Camel Site, and contained approximately 160,000 lithic artifacts (Gopher 1981), for a density of more than 450 artifacts per square meter. The lithic density at the Camel Site was approximately 70 artifacts per square meter. That is, the Camel Site is not a special site. The lithic industry is not especially rich, although relative to

other excavations of the period in the region, it was better collected. The large number probably reflects the reuse of the site seasonally, over some period difficult to estimate. It is reasonably clear that were contemporary sites in the region collected in a similar fashion, a similar quantity of materials would be recovered.

The analysis of the lithic industry, as the largest and best representative collection of its kind so far, constitutes both a crucial aspect of the study of the site and an important reference point for understanding the nature of lithic assemblages in the post-Neolithic deserts of the southern Levant in general.

The assemblage is dominated by waste products (debris, debitage, cores), comprising approximately 98 percent of the total, with only 2 percent tools (Table 6.1). This high proportion of waste, and in particular the high proportion of chips (67 percent), clearly derives from the exhaustive sieving conducted during excavation. Significantly, the recovery of microlithic tools (microlithic drills, lunates, a transverse point, a small point fragment, and retouched bladelets) comprising fully 20 percent of the tool assemblage reflects activities—semispecialized bead

manufacture and hunting—only little documented previously for the period. Clearly, the visibility of these activities derives in no small part from the recovery methods employed (Chapter 1).

For the nonspecialist, it is important to note that lithic analysts have long implicitly recognized that the distinction between tools and waste is not clear-cut. Many unretouched pieces were probably used, and many retouched pieces may well have gone unused. That is, the term *tool* is a technical term basically meaning “retouched,” and the terms *waste* and *debitage* refer to the by-products of lithic reduction, which may or may not have been used. This distinction continues to inform virtually all lithic analysis, not because of its functional implications but because it separates levels of reduction and investment. While it is perhaps possible to conduct microwear analyses on a sample of flakes and/or blades to determine whether they were used, the focus of this study was the technological and typological analysis of the lithic materials.

Given this basic distinction, the analysis of the lithic assemblage follows standard practice, with a description of the raw materials, the tech-

Table 6.1. General Lithic Frequencies

Waste		Number	%	% of Assemblage
Debris	Chips	18,524	90.4	66.8
	Chunks	1,965	9.6	7.1
	Total debris	20,489	100.0	73.8
Debitage	Flakes	5,848	88.0	21.1
	Primary elements	435	6.5	1.6
	Blades and bladelets	331	5.0	1.2
	Core trimming elements	29	0.4	0.1
	Total debitage	6,643	100.0	23.9
Cores		110		0.4
Tools		Number	%	% of Assemblage
Tools		515		1.9
Total assemblage		27,757		100.0

nology (the waste assemblage), and the tool assemblage according to a standard typology (Rosen 1997b).

RAW MATERIALS

Raw material sources in the Negev, and in the Levant in general, are notoriously variable, even within single sources. A well-known road-cut about 40 km north of the Camel Site shows at least four fundamentally different types of flint (the issue of terminology, *flint* versus *chert*, is one of common usage, and in the Levant one uses *flint*), varying in such crucial particulars as grain and texture and homogeneity. Colors and sizes of the nodules also vary, all within a couple of meters (although separated by several million years chronologically). Thus few efforts have been made in the Near East to characterize flint sources chemically, this differing significantly from obsidian (Chapter 9). Raw materials here can be divided by color into nine different types, as in Table 6.2. These can be grouped into three main types, probably related to source: (1) small, mostly worn-out flint pebbles of various shades of brown and gray, used for the manufacture of most tools; (2) small nodules of either gray or brown translucent flint, exclusively used for the production of microliths; and (3) a range of other raw

materials, less frequently used, including small nodules of fine-grained black flint, fine-grained purple flint (possibly heat treated), and white patinated flint. The three pieces of obsidian, representing trinkets and not tool production, are dealt with separately.

The first two types are available locally, either in late Cretaceous bedrock exposures in the near vicinity of the site (e.g., Boutié and Rosen 1989) or in adjacent wadis. The brown flint used for tabular scrapers is difficult to distinguish from other medium-grained brown flints, but the size of the pieces requires large nodules, whose closest known sources are located on the western slopes of the Negev Highlands, 20 to 30 km away (e.g., Mazor and Stekelis 1960; Rosen 1983c, 1997b: 75). High-quality flint is generally unavailable in the Makhtesh Ramon. Sources of fine-grained black flint are unknown but are probably local. The rarity of this material, and the on-site association with the obsidian, suggests that it was not strictly a raw material for tool manufacture but was a semiprecious trinket material, like the obsidian. Both the purple and patinated flint types probably derive from local sources, the modifications caused by heat and exposure rendering their precise attribution more difficult.

The presence of all types of flint (excepting the tabular scraper material) both in the tool and

Table 6.2. Raw Material Frequencies (Sampled)

Raw Material	Tools	Waste	Total
Quantity	269	501	778
Light brown	18.22%	20.24%	19.54%
Dark brown	13.01%	13.36%	13.24%
Light gray	37.17%	22.4%	27.51%
Dark gray	10.04%	15.32%	13.5%
Purple	2.6%	4.91%	4.11%
White	15.99%	12.97%	14.01%
Black	1.49%	2.55%	2.19%
Translucent brown	1.12%	6.68%	4.76%
Translucent gray	0.37%	1.57%	1.16%
Total	100.00%	100.00%	100.00%

waste assemblages indicates that all types of flint were processed on-site (again, except the tabular material). The relative quantities probably reflect general availability, since all tool types were made on all different types of flint. Table 6.3 presents the frequency of raw material type exploitation by selected types of tools and waste products. The light gray and/or brown flint was the most commonly used material for the production of most tools and also dominates cores, flakes, blades, and bladelets. As above, translucent flint, on which almost a quarter of the microliths were made, was not used for other tools, and the few cores, flakes, and blades found on this material probably reflect the production of these pieces. Notably, nodules of this material, usually found in wadis, are small and inappropriate for the manufacture of larger tools.

TECHNOLOGICAL DESCRIPTION

Definitions

The lithic analysis follows definitions used in the local protohistoric research (e.g., Gilead et al. 1995; Rosen 1997b; Roshwalb 1981) and Levantine prehistoric research in general (e.g., Bar-Yosef 1970; Goring-Morris 1987; Inizan et al. 1999; Marks 1976). Assemblages were divided into two main groups: tools and waste products. Artifacts with intentional retouch were classified as tools, with the remainder defined as waste products, further divided into debris, cores, and debitage.

All amorphous fragments not belonging to any other category were classified as debris. The general class comprises the bulk of the assemblage. Within this class, chips are fragments smaller than 20 mm, and chunks are larger than 20 mm. Flakes smaller than 20 mm were arbitrarily grouped with the chips for logistical reasons, even if they perhaps reflect a different production stage. Excluding such flakes, chips reflect small-scale breakage, either as a by-product of the manufacturing process or through post-depositional processes such as burning or trampling. Microflakes, the products of retouch, are also included in the chips, but often these are too small for recovery even in the 2–3 mm mesh. Chunks are either blocks of unworked or little worked raw ma-

terial or result from manufacture breakage of larger pieces.

Cores are the original blocks from which flakes were struck. Diagnostic features are flake removal scars, often showing a negative of the bulb of percussion, and striking platforms. Cores were two-dimensionally measured: length is the perpendicular line from the most used striking platform to the end of the core, and width is measured perpendicularly to length at the widest plane of the core along this axis. Additional observations made on cores were raw material, relative quantity of cortex retained, type of removals, and number of striking platforms and their orientation. The basic typology of cores derives from the type of removals; thus flake cores, blade cores, bladelet cores, and mixed cores (consisting of more than one type of removal) are defined. Special technologies, such as Canaanean blade cores (Rosen 1997b:46–49), can also be defined, although none were present in the Camel Site assemblage.

Flakes, primary elements, blades, bladelets, and core trimming elements form the second waste class: the debitage. These are all products of deliberate knapping, showing the standard diagnostic features of the process: a bulb of percussion, a striking platform, and a ventral face. Secondary features such as undulations, hinge or feather terminations, and *erraillure* fractures may also be present (e.g., Odell 2004:53–58). Flakes with more than 50 percent cortex covering their dorsal faces were classified as primary elements. Blades are typologically defined as flakes with their length along the striking axis at least twice their width. Bladelets are blades less than 12 mm in width.

Samples of flakes and blades were randomly chosen and measured; length is the maximum extension along the striking or percussion axis, from the striking platform to the distal end. Width is the maximum extension along the edges of a perpendicular line to the length axis, while thickness is the maximum height perpendicular to the plane of the ventral face of the item. Other observations were raw material type differentiated by color and texture, butt type, number of scars on the dorsal face, and orientation of scars.

Table 6.3. Raw Material and Class Frequencies in Percent (Sampled)

Raw Material	Scrapers	Retouched Blades	Tabular Scrapers	Notches	Retouched Flakes	Borers	Microliths		Cores	Flakes	Blades	Bladelets	
N	87	26	18	68	26	27	17		97	211	98	103	
Light brown	12.64	11.54	16.67	25.00	23.08	29.63	5.88		11.34	20.38	20.41	28.16	
Dark brown	11.49	11.54	22.22	8.82	23.08	15.52	5.88		21.65	13.27	13.27	5.83	
Light gray	35.63	46.15	38.89	45.59	19.23	48.15	5.88		29.90	22.75	21.43	15.53	
Dark gray	17.24	3.85	16.67	5.88	15.38				21.65	14.22	14.29	12.62	
Purple	12.30	7.69		2.94	3.85				2.06	6.16	6.12	3.88	
White	18.39	19.23	5.56	11.76	7.69	3.70	58.82		6.19	14.69	13.27	15.53	
Black	12.30				7.69				5.15	1.90	3.06	0.97	
Tran. brown							17.65		2.06	4.74	6.12	15.53	
Trans. gray							5.88		0	1.90	2.04	1.94	
	100%	100%	100%	100%	100%	100%	100%		100%	100%	100%	100%	
Raw Material	Scrapers	Retouched Blades	Tabular Scrapers	Notches	Retouched Flakes	Borers	Microliths	N	Cores	Flakes	Blades	Bladelets	N
Light brown	22.45	6.12	6.12	34.69	12.24	16.33	2.04	49	10.68	41.75	19.42	28.16	103
Dark brown	28.57	8.57	11.43	17.14	17.14	14.29	2.86	35	30.88	41.18	19.12	8.82	68
Light gray	31.00	12.00	7.00	31.00	5.00	13.00	1.00	100	25.44	42.11	18.42	14.04	114
Dark gray	55.56	3.7	11.11	14.81	14.81	0	0	37	26.92	38.46	17.95	16.67	78
Purple	28.57	28.57	0	28.57	14.29	0	0	7	8.00	52.00	24.00	16.00	25
White	37.21	11.63	2.33	18.60	4.65	2.33	23.26	43	9.09	46.97	19.7	24.24	66
Black	50	0	0	0	50.00	0	0	4	38.46	30.77	23.08	7.69	13
Trans. brown	0	0	0	0	0	0	100.0	3	5.88	29.41	17.65	47.06	34
Trans. gray	0	0	0	0	0	0	100.0	1	0	50.00	25.00	25.00	8

Tools were classified according to existing type lists proposed for the protohistoric research in the southern Levant (Gilead et al. 1995; Rosen 1997a). In terms of technological analysis, selected attributes were analyzed on specific types, including raw material, metric dimensions, striking platform types, distal end, and morphology of retouch.

Cores and Core Processing

Table 6.4 summarizes the results of the attribute analysis performed on cores. All but 2 percent of the cores (from which blades or bladelets were removed exclusively [Figure 6.1:2]) display flake scar removals on their debitage surfaces (Figures 6.1:1, 6.1:3–6). Roughly three-quarters of the

cores show only flake scars (Figures 6.1:1, 6.1:4), indicating clearly the general character of the industry, producing mostly nondetermined flakes as the primary blanks for tool manufacture. About one-fifth of cores are mixed, showing both flake and blade/bladelet scars (Figures 6.1:3, 6.1:5–6). This suggests that blades and bladelets were struck primarily from flake cores and that occasionally cores were transformed from blade/bladelet reduction to flake reduction or vice versa. Few core trimming elements were recovered, and the small number of pieces with faceted butt blanks suggests that prior to the removal of blades/bladelets, the striking platforms of cores were rejuvenated and the knapping technique adjusted. However, the small number of the faceted butt blades/bladelets and cores with blade/

Table 6.4. Core Attributes

Core Attributes		% All Cores N = 98	% Mixed Cores N = 26	% Flake Cores N = 72	Removal Type	% from All Cores
Striking platforms	1	41.84	50.00	38.89	Flake	73.47
	2	40.82	46.15	38.89		
	3	15.31	3.85	19.44	Flake and blade	5.10
	4	2.04		2.78		
Amount of cortex	0	45.92	42.31	47.22	Flake and bladelet	15.31
	25	38.78	46.15	36.11		
	50	14.29	11.54	15.28	Blade	1.02
	75	1.02		1.39		
Number of scars	> 5	25.714	19.23	41.67	Bladelet	1.02
	> 10	55.102	69.23	50.00		
	> 15	7.143	7.69	6.94	Bladelet and flake	4.08
	> 20	2.041	3.85	1.39		
Size (in cm)	Length All Cores	Width All Cores	Length Mixed Cores	Width Mixed Cores	Length Flake Cores	Width Flake Cores
Mean	3.73	3.93	3.63	3.37	3.76	4.13
Standard deviation	2.15	1.36	1.32	0.97	2.39	1.42
Minimum	1.51	1.88	2.01	1.88	1.51	2.13
Maximum	20.90	9.70	7.08	5.82	20.90	9.70
Count	95	96	26	26	69	70

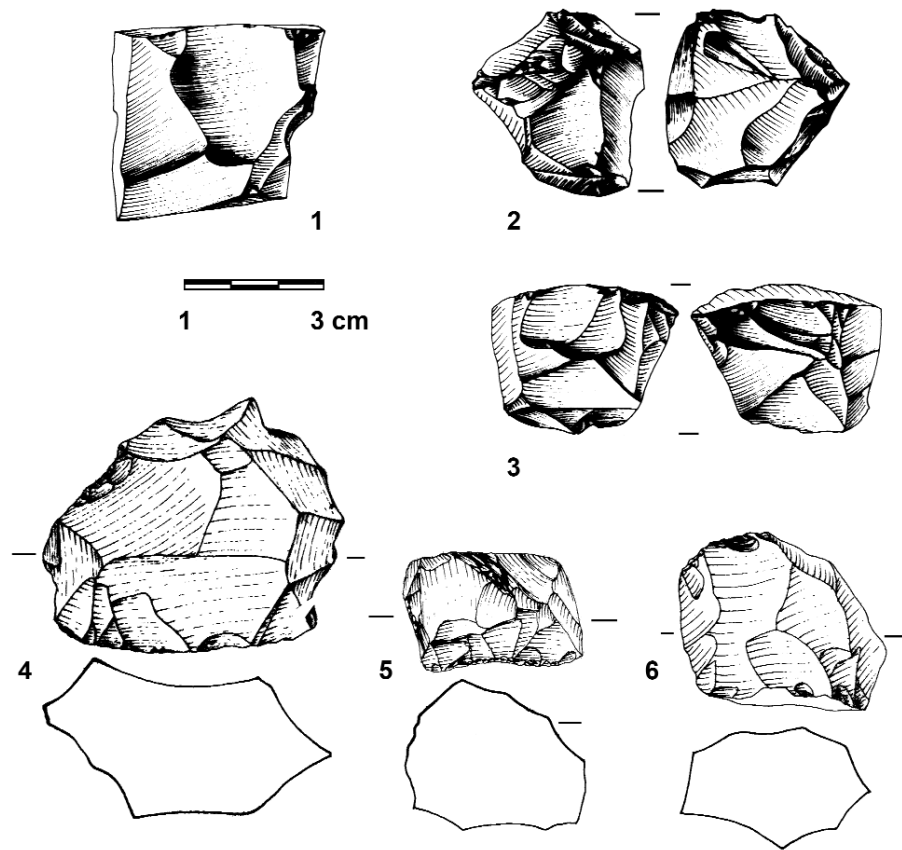


Figure 6.1. Cores from the Camel Site.

bladelet scars indicates that the production of blades/bladelets was limited.

Cores were almost equally exploited from either one or two striking platforms (Table 6.4). Some of the flake cores were further exploited from three or four striking platforms, indicating that size and shape of removals was not necessarily important. Blade/bladelet cores and mixed cores have either a single platform or are bipolar but were rarely further utilized from a third striking platform. This suggests that the somewhat more standardized shapes of blades and bladelets required a somewhat more standardized technology. By the time these cores were transformed into mixed cores (through the removal of flakes), they were already near exhaustion and could not be rotated for further reduction from a different platform.

Almost one-half of the cores lack cortex, again indicating a high degree of exploitation (as mirrored in the high number of multiple-platform cores). Only a small number of cores retain

cortex on more than 50 percent of their surfaces, reflecting reduction to near exhaustion. This behavior may be related to the absence of specific requirements for the size and shape of blanks—ad hoc tools being produced on demand from the most easily obtainable blanks and not following a set method.

The high degree of exploitation of cores is also reflected in the high number of scars on the debitage surfaces. Most cores have 5 to 10 scars, reflecting their state in the last stage of removals (Table 6.4). Mixed cores were apparently even more efficiently exploited than flake cores, given the fact that they exhibit more scars on their debitage surfaces than flake cores.

The dimensions of the cores (Table 6.4) show that they have a generally squat shape, most being wider than they are long. Cores used for the production of blades/bladelets are smaller than flake cores and more elongated, again suggesting that this sub-technology allowed greater and more efficient reduction.

Five intrusive cores, apparently collected in the vicinity by the inhabitants of the Camel Site during the course of occupation, were also recovered. All show patina, contrasting with the Early Bronze Age materials. Three are technologically Levallois, attributable originally to the Middle Paleolithic. The presence of Middle Paleolithic scatters in Mitzpe Ramon has been well documented (Boutié and Rosen 1989). Two other flake cores were rolled and clearly brought onto the site.

Debitage and Blank Production

Flakes dominate thedebitage assemblage (the flake-to-blade/bladelet ratio is 17.7:1) and thus clearly constitute the preferred blank to be further retouched and shaped into various tools. They are generally small but with large size variability (Table 6.5). Dorsal scar patterns show little regularity.

Blades and bladelets comprise smaller components of thedebitage and seem to have been manufactured using a technology roughly similar to that of the flakes. Although they have been separated here according to standard lithic analytic practice, the categories overlap technologically (see the discussion below), and the metric cutoff at 12 mm is arbitrary (cf. Kaufman 1986). One real difference seems to be in raw material. Of the 16 blades and bladelets produced from semi-translucent fine-grained flint, 15 were less than 13 mm in width, and the last was only 14.9 mm wide. This raw material derives from small wadi pebbles and could not be used to produce larger pieces. Thus the use of this raw material, perhaps because of its fine grain, automatically selects for smaller items.

The main technological attributes of flakes, blades, and bladelets are presented in Table 6.5. Observations of butt types reveal that blades and bladelets show a somewhat higher proportion of punctiform butts than do flakes, suggesting perhaps a greater use of a soft hammer. However, in all cases the dominant butt type was flat, suggesting a tendency rather than a qualitative technological difference.

The amount of cortex and the number of scars on the dorsal face indicate that blades and flakes were knapped in the early stages of reduc-

tion, but bladelets and small flakes were removed at later stages, suggesting flexible technologies and the exploitation of cores for multiple goals. Thus a typical reduction sequence would involve the knapping of large cortical butt flakes and blades with a hard hammer in the earlier stages of reduction, followed by more intensive production of flakes and blades, during which the striking platforms of cores were occasionally rejuvenated and faceted, and sometimes ending with a change in technique—the use of the soft hammer and/or indirect percussion, whereby punctiform butt bladelets and small flakes were obtained. This suggestion is supported also by the fact that punctiform butt flakes are the smallest among flakes, some of them being apparently further modified into microlithic drills (see below). Thus, while there is no marked difference between the production of flakes and blades, bladelets were apparently obtained by applying a different final subroutine to the reduction sequence, even though there is no evidence of a systematic production of bladelets.

Examining the amount of cortex on the dorsal face of selected tool classes indicates that the preferred blank was a flake without cortex. More than half of the tools were made on this type of flake, and only one-fifth were made on primary elements—that is, showing 50 percent or more cortex (and most of these were retouched flakes or notches/denticulates).

The butt types of tools on flakes indicate that few cortical butt flakes (removed at first stages of knapping) were further retouched, most flake tools having a flat butt or a faceted butt (possible evidence of a secondary stage of removal).

The ratio of flakes to primary flakes at 13.4:1 suggests a relatively long reduction sequence. This is in accord with the high degree of core exploitation reflected in the flake-to-core ratio of 55.7:1 and indicates that these ratios are not a function of selective discard (since primary and secondary flakes would presumably receive similar discard treatment, perhaps in contrast to the cores).

Core trimming and rejuvenation elements (CTEs) are rare in the Camel Site assemblage. They are comprised exclusively of flakes whose dorsal scar patterns exhibit scars contrary to the general axis of flake removal, thus reflecting core trimming or rejuvenation. There is no standardi-

Table 6.5. Technological Attributes of the Debitage

Technological Attributes		% Blades	% Bladelets	% Flakes
Butt type	Cortical	10.29	6.25	7.58
	Faceted	10.29	5.21	5.21
	Dihedral	1.47	3.13	7.11
	Flat	58.82	53.13	69.67
	Punctiform	10.29	7.29	2.84
	Winged	8.82	25.00	7.58
Cortex	0	73.74	93.20	71.09
	< 25	15.15	5.83	23.22
	< 50	11.11	0.97	5.69
Scars	> 2	6.19	0.98	9.95
	> 4	70.10	88.24	63.51
	> 6	19.59	10.78	21.33
	> 8	4.12	0.98	5.21
	Count	97	102	211
Measurements (in cm)		Length	Width	Thickness
Blades	Mean	4.19	1.66	0.61
	Standard Deviation	1.26	0.53	0.27
	Minimum	2.62	1.20	0.23
	Maximum	9.42	4.36	1.58
	Count	52	99	99
Bladelets	Mean	2.47	0.91	0.47
	Standard Deviation	0.60	0.20	1.18
	Minimum	1.49	0.15	0.13
	Maximum	4.29	1.19	12.00
	Count	57	103	103
Flakes	Mean	2.76	2.47	0.58
	Standard Deviation	1.11	0.94	0.30
	Minimum	1.10	0.87	0.15
	Maximum	7.87	6.19	2.29
	Count	211	211	211

zation in shapes or patterns of core trimming, and the CTEs do not fall into defined categories typ-

ical of other, more sophisticated technologies, such as crested blades or core tablets.

In general the debitage assemblage reflects the same lack of technological standardization seen in the cores. This is evident in the metrics of the flake products and in the variability of the butt types. The absence of dedicated blade and bladelet technologies, present in contemporary Mediterranean zone industries, constitutes a major contrast between the regions, reflecting fundamental differences in the organization of production.

TYPOLOGICAL DESCRIPTION

The tool typology is adapted from Rosen (1997b). Type frequencies are presented in Table 6.6.

Arrowheads (N = 19; 3.7 Percent)

Three types of arrowheads were recovered from the Camel Site. The most common (n = 17) are the microlithic lunates (Table 6.7; Figure 6.2), hafted as transverse arrowheads (e.g., Clark et al. 1974; Rosen 1983b). These resemble typical late Natufian and Harifian lunates (cf. Goring-Morris 1987: figures IX-13:12–16, IX-15:13–21, IX-16: 1–16.), having curved backs produced by abrupt dorsal retouch. No Helwan retouch was present; nor is there any evidence for use of the microburin technique. The blanks used for production were bladelets and perhaps small flakes. Most lunates are on translucent flint, while a few are covered by a white patina. Microlithic lunates are a well-established part of desert Early Bronze Age assemblages (Rosen 1984, 1997b:39–44).

One bifacially pressure-retouched tang/point from a small arrowhead (Figure 6.2:1), classifiable as either a Haparsa point or a Nizzanim point (Gopher 1994), was recovered. Although these

Table 6.6. General Tool Class Frequencies

Type	Number	Percent
Arrowheads	19	3.7
Sickles	8	1.6
Retouched blades	33	6.4
Borers/drills	119	23.1
Tabular scrapers	18	3.5
Scrapers	109	21.2
Notches/denticulates	119	23.1
Retouched flakes	65	12.6
Varia	10	1.9
Intrusives	15	2.9
Total	515	100.0

small points are usually attributed to the Pottery Neolithic, they are present in contemporary Egyptian assemblages (Clark et al. 1974) and are found in low numbers in fifth-, fourth-, and third-millennium desert assemblages (e.g., Bar-Yosef et al 1977, 1986; Rosen 1984).

One rectangular transverse point (Figure 6.2:2), tending toward trapeze in shape, shows nibbling on the transverse edge, probably edge damage. It measures 12.0 × 8.7 × 2.4 mm.

The function of these artifacts as arrowheads is clear from the contemporary pictures and complete arrows found in Egypt (Clark et al. 1974). Whether they were used as hunting implements, weapons, or both cannot be ascertained, although small game is present in some other contemporary desert sites where faunal remains were preserved (e.g., Betts 1992).

Table 6.7. Lunate Dimensions (of Only Unbroken Pieces)

Lunate Dimensions (mm)	Length (N = 13)	Width	Thickness
Mean	13.6	5.6	2.6
Standard deviation	2.8	1.3	0.5
Minimum	9.9	4.0	1.7
Maximum	17.4	8.7	3.7

Sickle Blade Segments (N = 8; 1.6 Percent)

Sickle blades or segments (Figure 6.3) show diagnostic gloss along the sharp working edges of pieces. Although they are otherwise similar to retouched blades, numerous studies have demonstrated the causal relationship between cutting grasses and gloss formation. The short time required for gloss to form, as little as two hours (Anderson and Chabot 2001; Kamińska-Szymczak 2002; Meeks et al. 1982; Unger-Hamilton 1984), suggests that the distinction between glossy blades and nonglossy blades is worthwhile analytically, since the gloss clearly reflects a specific function. No differences in the degree of gloss are evident.

The fact that no technological distinction can be made between the glossy and nonglossy blades indicates that the sickle blades were not the product of a special reduction sequence or manufacturing process, as is the case, for example, with

Canaanite sickle segments in the Mediterranean zone (Rosen 1983a, 1997:58–59). That is, sickle segments were part of the local blade (and flake) manufacturing system, and blades were chosen for hafting from within that system rather than being produced specifically as sickles.

Only a single sickle segment, measuring $43.4 \times 13.3 \times 4.2$ cm, was unbroken. Dimensions are summarized in Table 6.8. Five segments exhibit backing (Figures 6.3:1, 6.3:3), either straight (three) or arched (two). Edge retouch is minimal, indicating little resharpener (in contrast to northern glossy blades). Two of the broken pieces show single retouched truncations. The bulb of percussion is missing on all but one piece, perhaps as a result of the high rate of breakage, but not necessarily so.

Although glossy blades can clearly be associated with reaping (e.g., Anderson 1980; Curwen 1930; Witthoft 1967), they need not represent agriculture in any strict sense of the word. Gloss

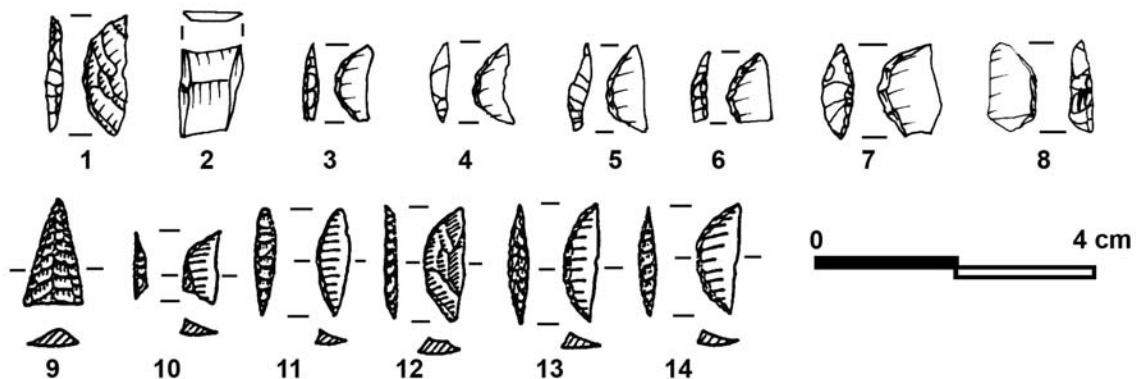


Figure 6.2. Pressure-flaked small point tip (9); microlithic lunates (1, 3–8, 10–15); and a transverse point (2).

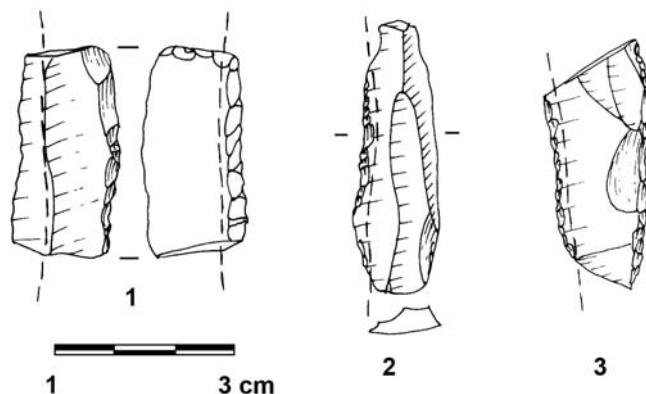


Figure 6.3. Sickle segments from the Camel Site.

Table 6.8. Sickle Segment Dimensions

Sickle Blade Dimensions (mm)	Width	Thickness
Mean	16.9	5.5
Standard deviation	2.6	1.0
Minimum	13.3	4.2
Maximum	21.8	7.0

may form from cutting wild grasses as well, and Anderson and her colleagues (Anderson and Chabot 2001; Anderson and Inizan 1993; Anderson et al. 2004) have demonstrated that threshing also results in glossy blades. The very small number of glossy blades at the Camel Site is a strong argument against the threshing sledge interpretation, given the need for dozens of such blades for a single sledge. Although it is reasonably clear that sickle segments reflect plant exploitation, more specific interpretation depends on context. In this regard, it is to be noted that the eight segments recovered represent at most only two composite sickles, considerably fewer than recovered at contemporary sites with smaller lithic assemblages in the Uvda Valley in the southern Negev, where microenvironments are more favorable to farming (e.g., Avner 1990). Furthermore, the very low percentage of sickle segments contrasts with Arad, in the northern Negev, and with sites farther north, where sickle percentages may achieve 40 percent of the overall tool assemblage (Rosen 1997b:126). In short, while it is likely that the segments were used for cutting grasses, perhaps even cereals, this activity is only of secondary importance at the site.

Retouched Blades and Bladelets (N = 33; 6.4 Percent)

Retouched blades and bladelets (Figure 6.4) have been grouped together, since there is no evidence for separate production sequences or metric modalities. The metric attributes of retouched blades are presented in Table 6.9. There is little standardization either in technology or typology. Scar patterning on the dorsal surface is not parallel, suggesting that previous removals were not

blades and that retouched blades were either chosen from a general set of flake products or produced ad hoc from flake cores. This accords with the blades described in the waste assemblage. Production was on-site. No retouched Canaanite blades, typical of Mediterranean zone assemblages, were recovered.

In terms of retouch, the group can be divided into simple retouched blades (21; Figures 6.4:4, 6.4:6) and backed blades (12; Figures 6.4:1–3, 6.4:5). Of the simple retouched blades, eight are unbroken. Retouch is minimal, consisting primarily of dorsal nibbling. Three pieces show ventral retouch, and two show alternate retouch. The backed blades show abrupt or semiabrupt retouch along one edge. Eleven are backed with bipolar retouch. Seven show straight backing, and five show arched backing. The presence or absence of backing may suggest different hafting techniques, perhaps reflecting different activities performed with the retouched blades.

Functionally, the sharp edges and the absence of intensive retouch seem to suggest that the primary function of these tools was cutting. Some of the retouched blades may have been blanks for sickle segments, but the high proportion of non-glossy to glossy blades and the presence of retouch and edge damage on some blade tools indicate that this is not the general case.

Borers and Drills (N = 119; 23.1 Percent)

The borer class is subdivided into three main subtypes, perhaps reflecting different actions performed with them (Rosen 1997b:68–71). Awls (37) are simple items, usually on flakes with one or two points (Figures 6.5:1–3, 6.5:5, 6.5:8–10). Drills (seven) are pieces with a long narrow bit at

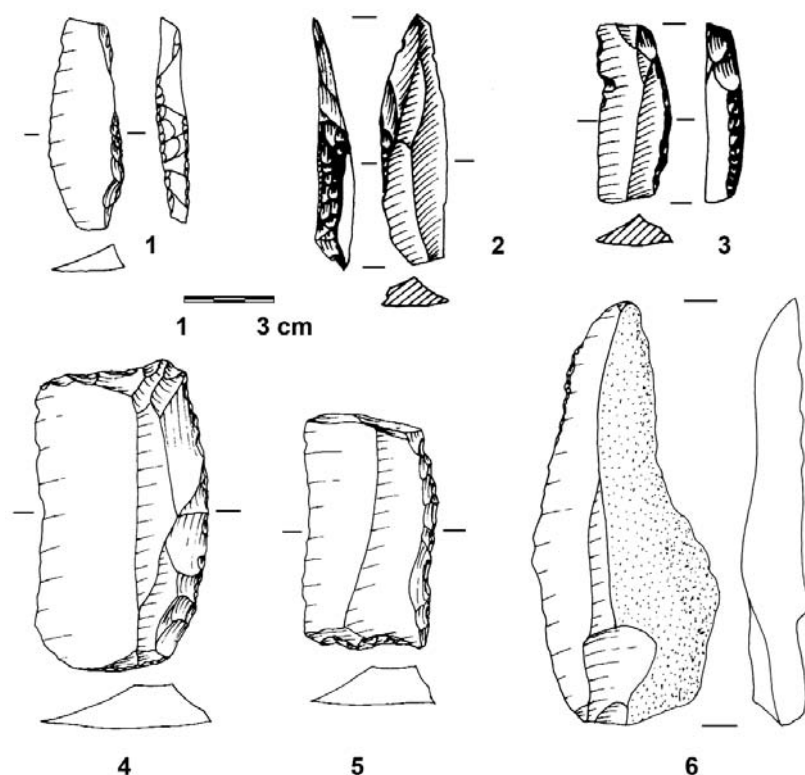


Figure 6.4. Retouched blades.

Table 6.9. Retouched Blade Metrics by Subtype

Simple Retouched Blade Dimensions (mm) (N = 20)	Length (N = 8)	Width	Thickness
Mean	40.3	15.4	5.4
Standard deviation	14.7	6.4	2.5
Minimum	25.2	8.3	2.8
Maximum	70.2	29.9	11.3
Backed Blade Dimensions (N = 12)	Length (N = 7)	Width	Thickness
Mean	38.0	16.1	6.0
Standard deviation	7.0	7.9	2.5
Minimum	30.8	7.2	3.5
Maximum	50.5	32.0	13.2

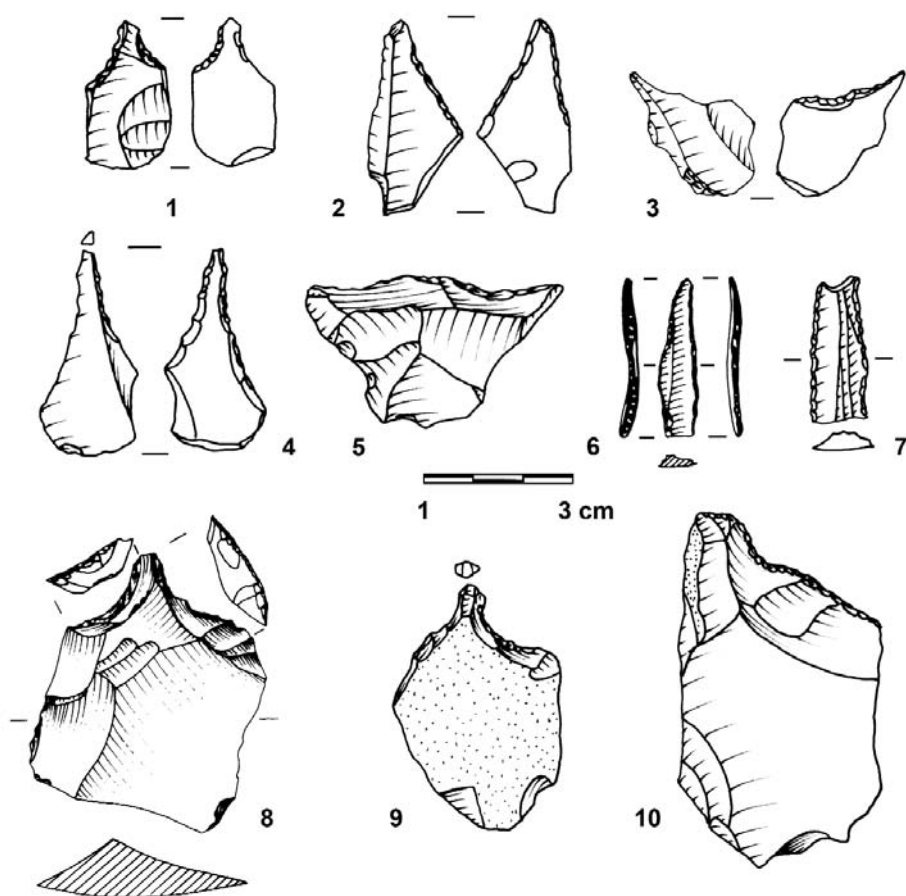


Figure 6.5. Borers and drills.

least one-third of the length of the tool (Figures 6.5:5–7). Microlithic drills (79), made on small flakes or bladelets with elongated bits (Figure 6.6), clearly functioned as bits for bow drills (Rosen 1994–95).

Awls are, for the most part, shaped on small flakes by the retouch of two notches and the distal part of the edges, thus forming a bit with a mean length of 6 mm and a diameter of 5 mm. Shapes vary, and the only feature in common is the point or bit. Two awls have their points located on the left edge, perpendicular to the axis of percussion, while another has the bit located on its right edge. One awl has two points, located at the distal parts of its edges at about 45 degrees from its percussion axis. About one-third (12) of the awls are broken.

Simple flakes were the dominant blank type, and only three awls were made on primary flakes.

Five pieces show basal retouch, perhaps indicative of hafting. The presence of awls with faceted or punctiform butts, the lack of borers with cortical butts, and the generally small size of the flakes modified into borers (Table 6.10) suggest that these tools were generally knapped at a later stage in the reduction sequence, possibly with a different technique, implying the use of a soft hammer. This suggests a somewhat greater degree of care or planning than is evident with much of the assemblage.

Drills were shaped by bilateral abrupt retouch running along at least one-third the length of the tool, forming a bit with an average length of 13.5 mm and a mean diameter of 5.3 mm. Identification of the blank type can be difficult due to the intense retouch on the bit, but based partially on dorsal scar patterns, four seem to have been made on flakes and three on blades. General dimen-

sions are presented in Table 6.11. Thus, even though apparently both awls and drills may have been used for drilling holes with similar diameters, morphological differences indicate that they may have been handled differently, were used on different raw materials (such as leather versus bone or wood), or were used for making holes of

different depths. Although the name implies piercing and perforation, McConaughy's (1979: 257–158; 1980) microwear studies of beaked pieces, equivalent to the awls discussed here, suggested use as gravers. Drills, with their longer and more regular bits, are more likely candidates for perforating tools.

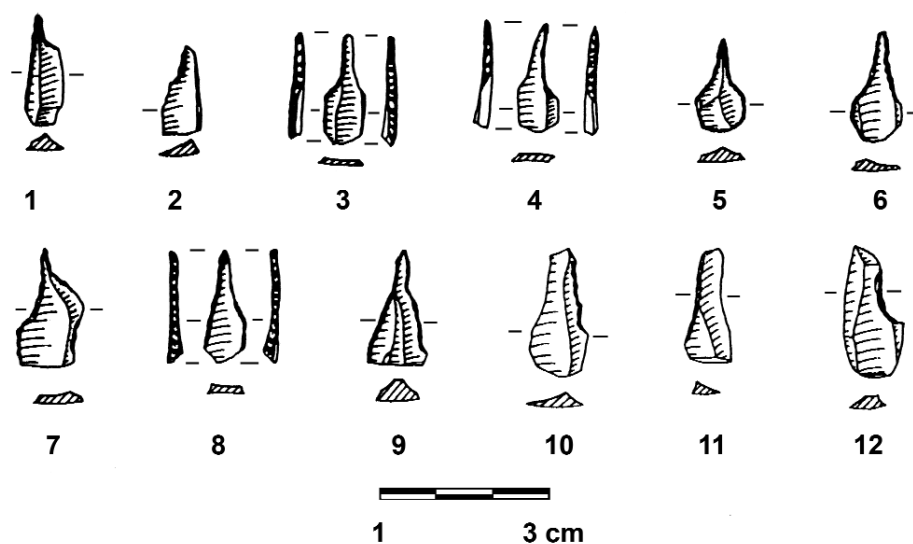


Figure 6.6. Microlithic drills (10–12 are unfinished).

Table 6.10. Awl Dimensions

Awl Dimensions in mm	Length (N = 29)	Width (N = 31)	Thickness (N = 37)
Average (mm)	31.6	26.7	9.3
Standard deviation	14.0	12.2	5.6
Maximum	73.8	62.9	25.4
Minimum	9.1	9.5	2.7

Table 6.11. Dimensions of Drills

Drill Dimensions in mm (N = 7)	Length (N = 4)	Width	Thickness
Mean	32.2	14.7	5.1
Standard deviation	1.6	3.4	1.4
Minimum	31.0	1.00	3.2
Maximum	34.5	20.7	7.1

Microlithic Drills (N = 79; 15.6 Percent)

At 15.6 percent of the tool assemblage, microlithic drills constitute one of the largest tool groups found on the site but are among the smallest tools individually (Table 6.12). Fewer than half (33) are unbroken. Of the broken pieces, 22 lack the bit, or part of it, and 9 consist only of the base. Another five consist only of the bit.

Technologically, the dimensions of the microlithic drills match those of bladelets, although as indicated above, these were not produced from a dedicated reduction sequence but ad hoc from the general flake reduction sequence. Indeed, the scar patterns on the dorsal surfaces of some of the microlithic drills suggest they may have been originally small flakes.

The microlithic drills can be divided into six general groups or types (Figure 6.6; Table 6.13). The majority (42, or 53.2 percent) are single- or double-shouldered drills. Triangles, without defined shoulders, constitute the second largest group. Only a few pieces are straight, and five pieces are unfinished, showing, for example, only a single lateral worked edge—that is, an unfinished bit.

Basal retouch is present on 33 pieces (41.8 percent), clearly suggesting hafting and supporting the idea of bow drills used for bead production (e.g., Burian and Friedman 1985; Rosen 1997a). Even given the typological variability, the microlithic drills show a high level of standardization in metrics, suggesting restricted functions in bead making focused on working ostrich eggshell. This is also reflected in the concentration of drills in Locus 37 (see Chapter 12), along with frag-

Table 6.13. Microlithic Drill Type Frequencies

Shape	Number	%
One shoulder	16	20.3
Double shoulder	26	32.9
Straight (not shouldered)	8	10.1
Triangle	19	24.1
Unfinished	5	6.3
Bits only	5	6.3
Total	79	100.0

ments of ostrich eggshells that served as raw material for the beads.

Tabular Scrapers (N = 18; 3.5 Percent)

All but one of the tabular scrapers (Rosen 1983c, 1997b:71–80) were found broken (see Table 6.14 for dimensions), and therefore original shapes could not be determined (Figure 6.7). The complete item is rounded (Figure 6.7:5), with a faceted butt and scalar retouch covering most of its circumference. It shows a double patina on some of its retouch, which is primarily ventral. The piece measures 72.3 × 66 × 15.6 mm. Most other pieces exhibit parallel or scalar retouch and occasional faceting. None have incision or striation marks on their cortexes. The various shades of the cortexes and the different types of raw materials suggest different sources. As indicated earlier, debitage reflecting the production of tabular

Table 6.12. Microlithic Drill Dimensions

Dimensions (in mm)	Length (N = 33)	Width (N = 74)	Thickness (N = 74)	Bit Size (N = 71)
Average	18.6	9.0	3.1	1.9
Standard deviation	4.7	2.0	0.9	0.7
Maximum	36.0	15.0	5.5	3.0
Minimum	11.0	4.5	1.3	1.0

NOTE: Bit size equals average (width plus thickness) divided by 2.

Table 6.14. Tabular Scraper Dimensions

Dimensions (in mm)	Mean	Standard Deviation	Minimum	Maximum
Length (N = 2)	67.4	7.0	62.4	72.3
Width (N = 6)	44.4	16.2	24.4	66.0
Thickness (N = 18)	10.0	3.0	6.0	16.3

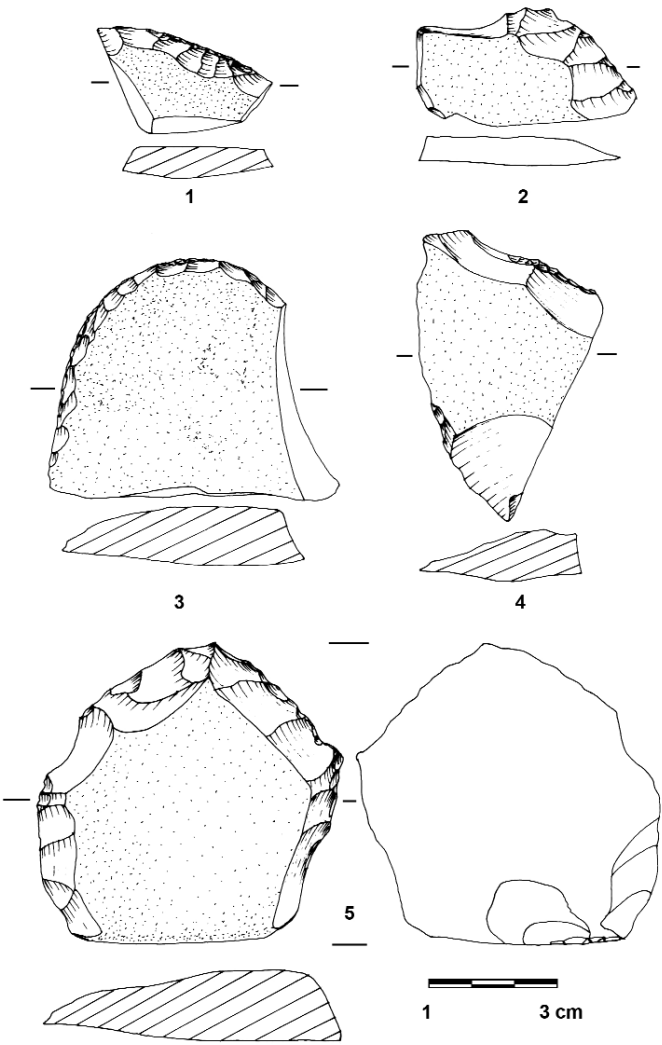


Figure 6.7. Tabular scrapers.

scrapers, either in the form of cores or blanks, was not found on the site.

The possible functions of tabular scrapers have been reviewed by Rosen (1997b:74–75) and in-

clude cutting/butchery, ritual roles, and, least likely, wool shearing. The import of these pieces suggests a greater value attached to them, but definition of their specific use at the Camel Site is impossible.

Scrapers (N = 109; 21.2 Percent)

This group is comprised of all the pieces with continuous typical scraper retouch, abrupt or semiabrupt, along one edge or more (Figure 6.8). Technologically, most are made on flakes or flake products, and only two are on cores (Table 6.15). In addition, retouched flakes (four), notches (six), and burins (one) were also reused as scrapers.

The group is morphologically variable, and no clear shape or size preference is evident (Tables 6.15, 6.16). Comparison between the various scraper subtypes does not reveal significant differences between them, most being variations of a

single basic type, a scraper with subparallel, abrupt retouch covering most of its circumference. Thus the possibility that the various scraper subtypes represent different rejuvenation stages and reuse of added working edges cannot be rejected (cf. Dibble 1987). Working edge shape is not standardized either (Table 6.17), although upon examining the set of all unbroken pieces (50 percent of the assemblage, or 55), the dominant form seems to be one with a straight or slightly convex edge. Retouch types (scalar, nibbled, parallel, stepped) appear in similar percentages, stepped retouch being the least common, apparently as a result of the thinness of the available

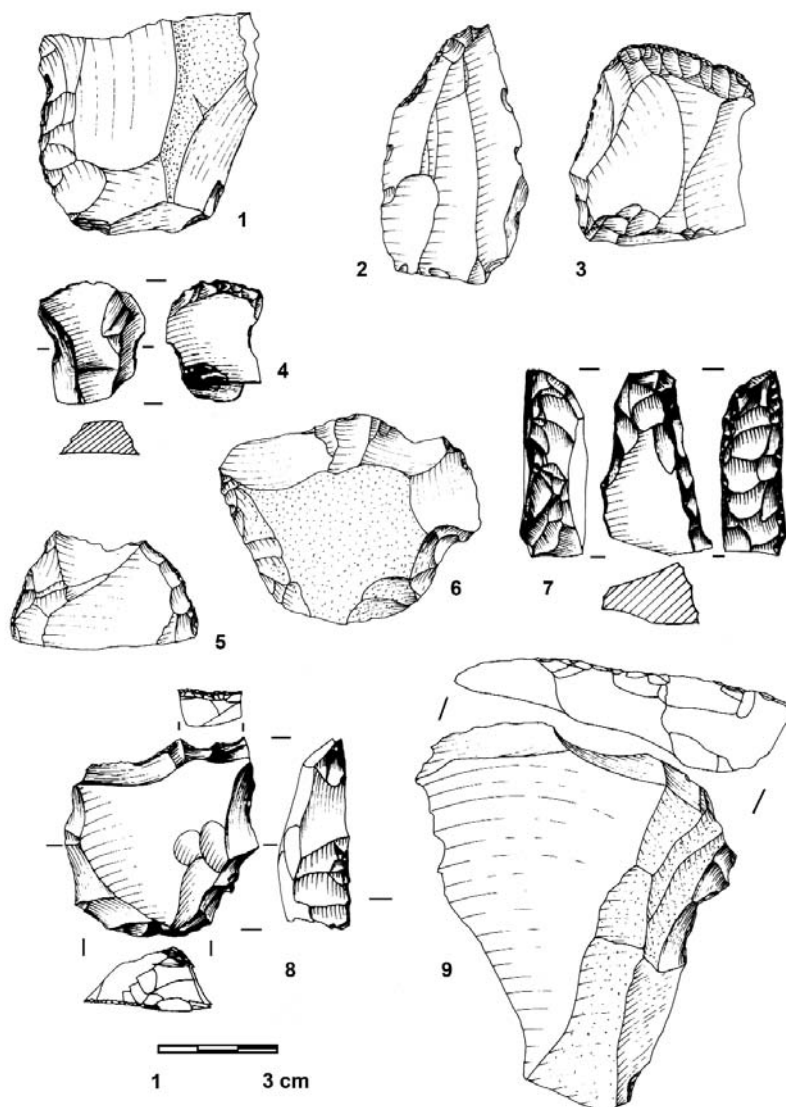


Figure 6.8. Scrapers.

Table 6.15. Scraper Blank Frequencies

Scraper Blank Types	Number	%
Blade	6	5.5
Core	2	0.9
CTE	1	0.9
Flake	96	88.1
Primary element	5	4.6
Total	110	100.0

Table 6.16. Scraper Dimensions

Scraper Dimensions (mm)	Length (N = 61)	Width (N = 88)	Thickness (N = 109)
Mean	45.3	35.2	13.2
Std deviation	14.8	14.1	5.9
Minimum	15.7	8.6	3.5
Maximum	95.7	80.2	33.7

Table 6.17. Scraper Working Edge Shape Frequencies

Working Edge Shape	Number	%
Circular	13	23.6
Concave	1	1.8
Convex	13	23.6
Irregular	1	1.8
Nosed	4	7.3
Rectilinear	19	34.5
Shoulder	4	7.3
Total (unbroken scrapers)	55	100.0

blanks. It is also possible that there was simply no need for further retouch after the initial modification. This, of course, would suggest short use and rapid discard. Retouch tends to cover most of the

circumference of the tools, half of the scrapers being completely retouched along their working edges. As above, the possibility that the extension of retouch is the result of several resharpening stages—scrapers being discarded after they went completely out of use—cannot be rejected.

In terms of morphology, 15 scrapers are pointed, perhaps used as awls; only 6 are laterally retouched (sidescrapers); 80 are steep scrapers, and 10 of these can be classified as heavy-duty or massive scrapers, with thickness and width roughly equal.

In the Middle Paleolithic period, reworking and continued reduction of scrapers has usually been interpreted as economizing behavior with respect to raw materials (e.g., Dibble 1987; Rolland and Dibble 1990). However, the proximity of flint sources to the site and the obvious need for daily mobility in grazing the herd, potentially bringing occupants directly to raw material sources, suggest that the need to conserve raw material was not the primary motive in recycling lithic material. Rather the ad hoc domestic functions carried out on the site were such that discards from earlier uses were more than adequate for the tasks at hand and were utilized for their immediate accessibility, a key point in an ad hoc assemblage.

The morphological variability and range in scraper retouch suggest that functionally these tools were used for a number of tasks. McConaughy's (1979:334–344) microwear analysis of scrapers and related pieces at Bab edh Dhra indicated scraping of both hard and soft materials (cf. Rowan and Levy 1991). Such a range would accord with the general ad hoc status of the tools.

Notches and Denticulates (N = 119; 23.1 Percent)

This category is divided into single notches (94; Figures 6.9:2, 9.6:3) and multiple notched pieces (Figures 6.9:1, 6.9:4–5), and denticulates (25). Of the total, 36 are broken. Blank type is variable, although most of the items were made on flakes (Table 6.18). Blank type for three pieces was indeterminate. Two denticulates on flakes can be classified as heavy-duty.

The notches cover one or both edges, occasionally being found also at one or both of the extremities of the items (Figure 6.9). Most of the

items have three to six notches, sometimes aligned along the edge. Double patinated retouch is present on 15 pieces, indicating collection and reuse of tools from earlier periods. Comparison between notches and denticulates does not reveal major differences. Therefore, it may be suggested that the number of notches reflects several episodes of resharpening these tools.

The ad hoc nature of notches and denticulates is reflected in their all-purpose functions. McConaughy (1979:288–289, 317–318, 324, 334) has

suggested a range of uses, including light wood-working and whittling, cutting, and plant processing, for tools equivalent to the class as defined here.

Retouched Flakes (N = 65; 12.6 Percent)

Retouched flakes are simple flakes with some retouch occurring along one or, on fewer occasions, both edges that cannot be placed in any other tool class (Figures 6.10, 6.11:4, 6). The morphology of retouch varies from nibbling to stepped, and its angle from a sharp angle (flat retouch) to abrupt retouch, most retouch being positioned on the dorsal face of the tool. One item has a ventral retouch, two have alternate retouch, and four have bifacial edge retouch (Figures 6.11:4, 6.11:6). Two are on primary flakes.

Also included in the general category of retouched flakes are truncated flakes or truncations. These are flakes showing straight abrupt retouch along an entire edge or most of an edge. Although truncations are often accorded separate typological status, in the Negev Early

Table 6.18. Notch/Denticulate Blank Type Frequencies

Blank Type	Number	%
Blade	4	3.45
Flake	75	64.7
Pebble/chunk	19	16.4
Primary element	18	15.5

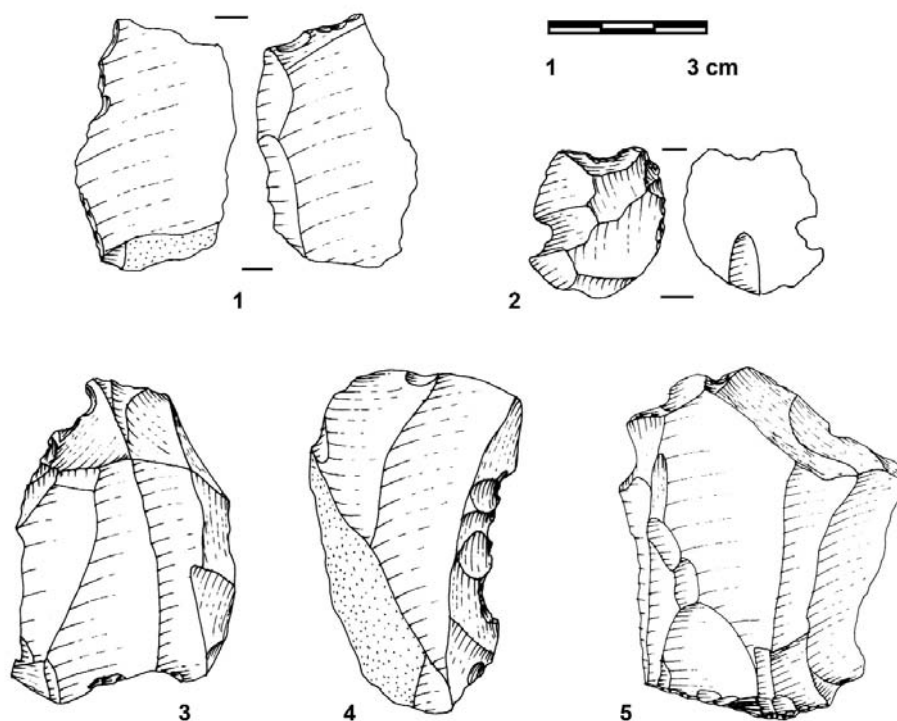


Figure 6.9. Notches and denticulates.

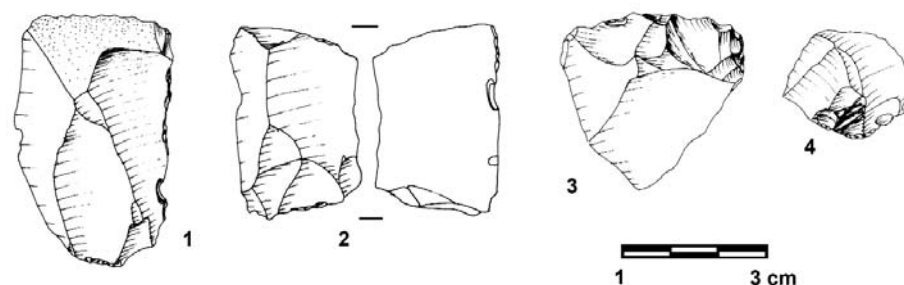


Figure 6.10. Retouched flakes.

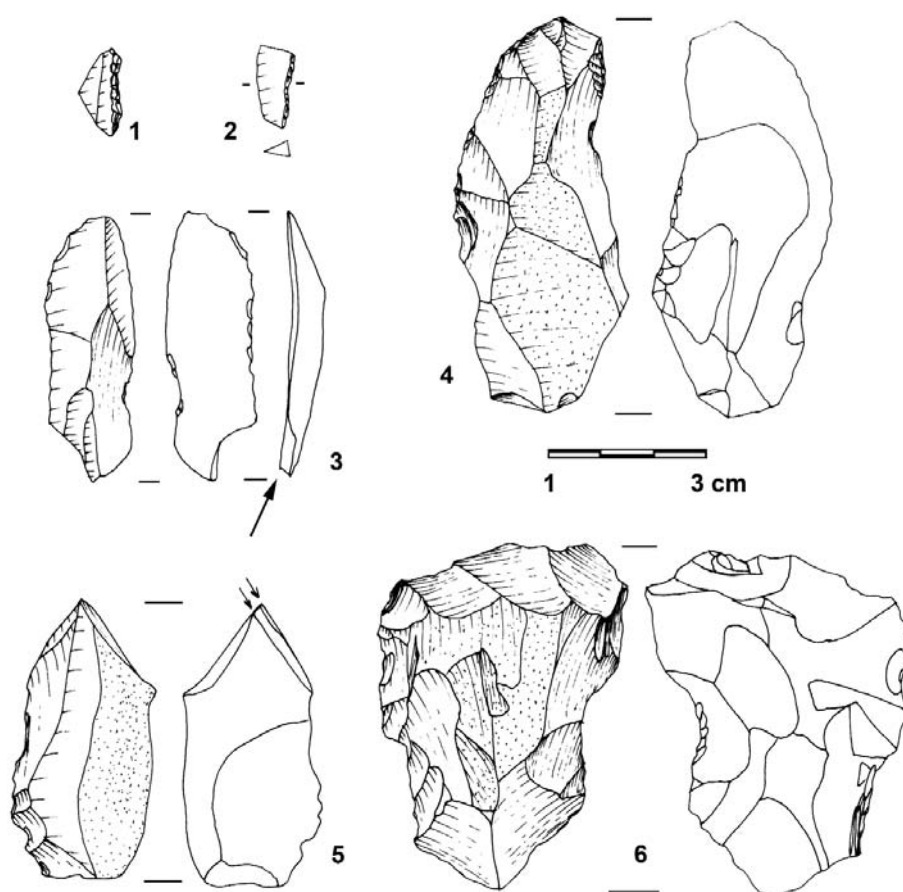


Figure 6.11. Varia, intrusives, and retouched pieces.

Bronze Age, they seem to be either incomplete tools or else simply variants of the general retouched flake category. Clearly, retouched flakes span a range of functions. Without analysis of the specific tools, it is impossible to determine use.

Varia (N = 10; 1.9 Percent)

Five burins on breaks (Figures 6.11:3, 6.11:5), probably not intentionally produced, were recovered. Four flakes show battered edges and within the general class of retouched flakes are classified

as *pieces esquillées*. One chopper on a cobble was found.

Intrusives (N = 15; 2.9 Percent)

The most obvious intrusive elements are the three Levallois cores (mentioned earlier) and three Levallois sidescrapers, attributable to the Middle Paleolithic Mousterian Complex. Although several scholars (Kozloff 1972–73; Ronen 1970) have suggested the reintroduction of Levallois technology in the Early Bronze Age, especially in the desert, this is unlikely. Aside from a general background scatter of Mousterian materials all over the Negev, several Mousterian sites have been documented in the Mitzpe Ramon area (Boutié and Rosen 1989). Thus, given both the long-term dispersal of these sites, the general presence of Mousterian materials in the area, and the typically “Mousterian” white patination on these materials, there can be little question that they be attributed to the Paleolithic. On the other hand, given the relatively high concentration of Levallois artifacts, it is likely that the occupants of the Camel Site deliberately collected these pieces as either raw material or curios. One does not find a similar density of Levallois materials off-site until approaching the outskirts of a Mousterian site, for which there is no evidence in the immediate vicinity of the site.

Other intrusive artifacts include two Ramon points, one Harif point, a microlithic triangle, a microburin, a *piquant triedre*, and three apparently Epipaleolithic retouched bladelets (Figures 6.11:1–2). Several Epipaleolithic sites are known within a few kilometers of the site (Rosen 1994), within the known radius of Early Bronze Age environmental exploitation (as reflected in, for example, the quartz crystals, fossils, and hematite), and it is likely that these artifacts were intentionally collected.

DISCUSSION

The Domestic Character of the Assemblage

The lithic assemblage from the Camel Site can be characterized as fundamentally domestic, both in terms of production and use. It is dominated by ad hoc elements (for example, scrapers, notches/

denticulates, retouched flakes, awls), produced expediently on-site; the tools were used shortly after manufacture and discarded soon after use. Even in the case of the scrapers, where increased retouch suggests reworking or sharpening and reuse, the absence of standardization in blank production and selection, and the crude and variable nature of the retouch, suggests that reuse of the scrapers should be considered more a kind of expedient recycling of old material than curation of something valued. Such “recycling” is perhaps also reflected in the apparent collection of the older material, the intrusives.

If it is perhaps not surprising that the ad hoc component of the lithic assemblage was produced on-site; the more formal and standardized elements—the microlithic drills, arrowheads (especially microlithic lunates), sickle segments, and other blade tools—were also produced on site. For each tool type, waste reflecting each stage of the entire *chaîne opératoire* has been found on the site. The only exceptions are the tabular scrapers, apparently the only type not manufactured on-site. This is not to say that every tool found was manufactured at the Camel Site and that none were transported to it. Given the mobility of Early Bronze Age desert groups, obvious off-site activities involving stone tools, such as hunting, reflected in the arrowheads, and ethnographic parallels suggesting that some types, again such as arrowheads, may be the focus of exchange (e.g., Wiessner 1983), it is likely that some tools were transported to and from the site. The point is that there is no evidence for specialized or systematic import (again, excepting the tabular scrapers). Indeed, the relative balance between waste and final products indicates that lithic artifacts were not manufactured for export either, in contrast to some other components of the material culture assemblage. In short, the lithic economy is very much a household economy, locally manufactured and used by the inhabitants of the site.

This domestic aspect of production is also reflected in the specifics of the lithic technologies represented on the site. Raw materials are local (again, excepting the tabular scrapers), and only a single reduction system can be defined. Although final products seem to vary according to expedient need—flakes, blades, bladelets—the basic tech-

nology does not vary, and there are virtually no dedicated blade and bladelet cores. This lack of specialization ties into domestic production.

Functional Perspectives

The issue of lithic function can be approached from two perspectives. First, from the more narrow view or smaller scale, the specific activities reflected in an assemblage can be reconstructed based on interpretation of specific types and their associations. From a broader perspective, the general functional characterization of a lithic assemblage or tool kit requires comparison with other assemblages and assessment based on varying site and assemblage contexts. That is, does the assemblage reflect an overall pastoral adaptation, a village setting, or a city? Henry (1992) has suggested that the general configuration of an assemblage may reflect season of use; and, of course, degree of mobility has also been associated with certain patterns of lithic exploitation (e.g., Parry and Kelley 1987).

In regard to the issue of specific activities, one must address the problems of assumptions derived from morphological and terminological biases and preconceptions. Do arrowheads really reflect hunting, sickles reaping, and scrapers hide working? Although some microwear studies have been performed on roughly contemporary materials in the general region (e.g., McConaughy 1979, 1980;

Rowan and Levy 1991), the potential variability in use of stone tools of similar morphologies, especially in the general ad hoc class, and the critiques of microwear studies used as panaceas for lithic function (Odell 2004:136–155) suggest that there is no easy answer to the question of establishing the function of specific implements. Each type must be examined on its own merits, so to speak. This said, the functions reviewed above in the typology section can be summarized.

The use of the bow and arrow is well attested in the microlithic lunates and other arrowheads. Hunting as a supplement to herding is very likely, although use of the arrows in raiding should not be discounted. Opportunistic exploitation of grasses is reflected in the sickle segments. Microlithic drills reflect bead production. A range of domestic activities includes cutting and scraping of various materials, probably including wood, bone, leather, and plant materials.

From the comparative perspective, Figures 6.12 and 6.13 summarize general class frequencies in both tools and waste from other Timnian sites in the Negev for which we have reasonable data. The similarities are clear, and differences can be almost certainly attributed to differences in collection strategies. In contrast, Rosen (1997b: 127–131) has noted contrasts between the sedentary Mediterranean zone sites and desert sites in five primary areas: arrowheads, sickle segments, other cutting tools, tabular

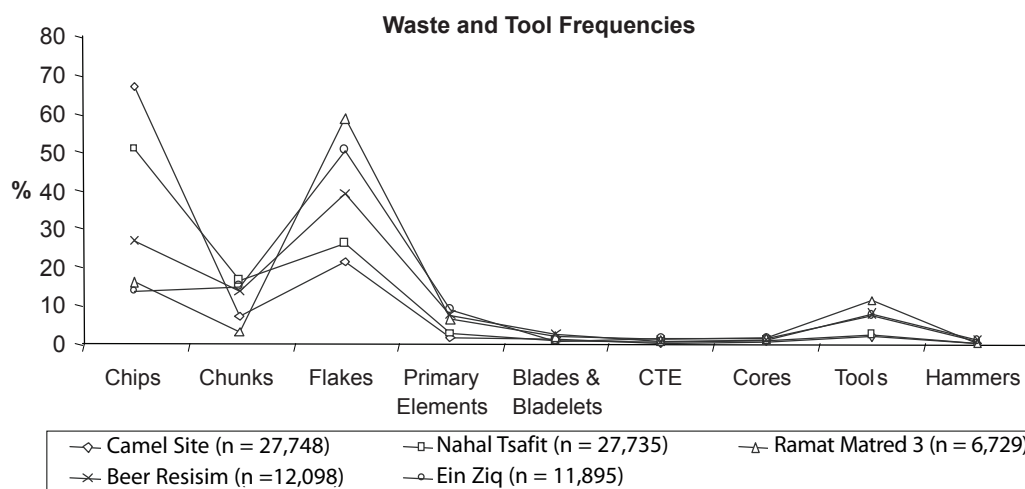


Figure 6.12. Comparison of waste frequencies from Timnian sites in the central Negev.

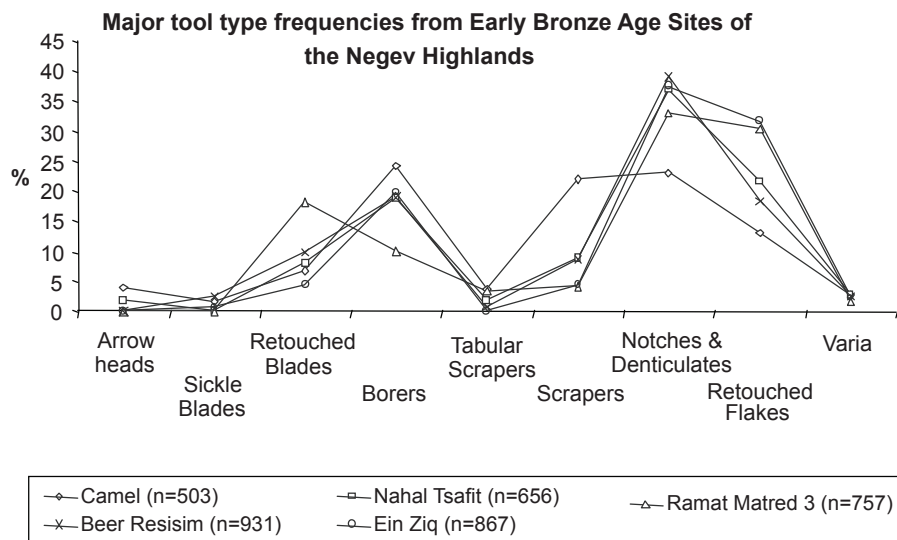


Figure 6.13. Comparison of tool frequencies from Timnian sites in the central Negev.

scrapers, and microlithic drills. While the proportions of tabular scrapers are most likely a function of distance from source, the other classes do seem to reflect actual functional differences between the general lithic tool kits. In general, these contrasts suggest basic differences in the functional configuration of the pastoral sites of the central Negev, the Camel Site in particular, and the sedentary villages and cities farther north. Contrasts with the Uvda Valley sites reflect similar differences in the range of functions, with the exception of similar proportions of cutting tools, suggesting that the lithic assemblages of the agricultural hamlets in the Uvda Valley have more in common functionally with those of the Mediterranean zone than they do with those of the pastoralists of the central Negev.

Cultural Affinities

Analysis of the lithic industry—the largest and most varied component of the material culture assemblage—constitutes the primary means of placing the Camel Site in some larger culture-historic framework. Although the fossil indices and radiocarbon assays dating the primary occupation of the site at the beginning of the third millennium B.C.E. are unambiguous, the cultural framework requires more elaboration.

The basic thesis here is that the lithic assemblage, as proxy for the inhabitants of the Camel Site, reflects a cultural complex distinct from that of the Mediterranean zone. Its origins are to be sought in earlier cultures in the deserts of southern Jordan, the southern Negev, and Sinai, and its contemporary cousins are also to be found in those regions. As indicated in the introductory chapter, Rothenberg and Glass (1992) have termed this cultural unit the Timnian, and Kozloff (1972–73) roughly defined the lithic industry associated with the complex in Sinai. The Sinai *nawamis* tombs and associated habitation sites (Bar-Yosef et al. 1977, 1986) constitute another variant of this cultural complex and include detailed lithic reports. Beit-Arieh's (1986) distinction between Aradian and local Sinaitic groups follows a similar line, but since his excavations focused on the Aradian sites, and collections were selected, they are less useful for comparative purposes.

There are two aspects to establishing the cultural affinities of the Camel Site assemblage: the contrasts with the Mediterranean zone assemblages (from the Beersheva Basin and north), and the similarities/continuities with other desert assemblages and industries.

Beginning with the contrasts between the desert and the settled zone, it is important to note that although the ad hoc flake industry dominat-

ing the Camel assemblage is common to assemblages deriving from the Mediterranean zone as well, its very nature as expedient in use and ad hoc in production suggests it is an inappropriate measure of cultural affinity. Rather than reflecting cultural commonalities, it reflects similar low levels of knapping skill, effort, and investment. Instead, examination of blade and bladelet technologies and tools, and tabular scrapers, reveals basic differences in the social and economic contexts of tool production and use.

The dominant blade type in the settled zone, used primarily for production of sickle segments, is the Canaanian blade (Rosen 1983a, 1997b: 46–49 and references). It is the product of a standardized reduction sequence (Hartenberger 2003; Shimelmitz et al. 2000) and specialized manufacture and exchange. None were found in the Camel Site, and with the exception of a few obvious long-distance trade items, the distribution of the type does not extend into the desert zone. This is presumably at least partially a reflection of the difficulties of intensive agriculture in the desert. However, the key point is that the Camel Site blades and sickles, and those from other desert assemblages as well, show a fundamentally different technology for their production. Even in (micro) environments where agriculture was practiced and blades and sickle segments comprise a significant proportion of the assemblage, as in the Uvda Valley (Avner 1990; Rosen 1997b: 127–130), the technology used for their production and the types employed are those described above for the Camel Site assemblage. Although this technological contrast can (and should) be interpreted first as a reflection of two separate (lithic) economic zones, this economic distinction can also be interpreted as a reflection of differing cultural zones.

In conjunction, the distinction between sickle segments of the Mediterranean and desert zones goes beyond technology and typology. The basic value accorded these tools differs in the different ecological zones. Canaanian sickle segments show higher intensity and greater quantity of edge retouch, sharpening, and reuse than do the desert sickle segments, reflecting a greater need to extend use-life and hence greater value. This is, of course, a consequence of both the greater significance of agriculture and specialist production,

but regardless, value systems are good indicators of social and cultural affinities. There is a clear contrast between desert and sown here.

The contrast in production of bladelets and bladelet tools (arrowheads, microlithic drills, simple retouched bladelets) between the regions is even greater than that of the blades and blade tools, since by the Early Bronze Age II, such production had ceased entirely in the north and was present only in the desert. If on one hand this distinction can be interpreted functionally—decline in hunting in the north resulting in absence of arrowheads, and the northern production of beads using copper drills instead of the flint drills used in the south (or, alternatively, bead import from the south)—structurally the basic differences are similar to those of the blades. They reflect economic differences and ultimately differences in value and culture.

The differences between tabular scrapers from northern and southern assemblages also seem to reflect a partial difference in role and value. Tabular scrapers are trade items both in the desert and farther north, and their use in various ritual contexts, such as in mortuary caches and temples (Rosen 1997b: 74–75), in both north and south, suggests shared meaning. On the other hand, the common presence of incised cortical designs on these scrapers at many sites in the north (again, including Arad and the Judean Desert) reflects both an added value associated with these pieces as well as a specific symbol system. The absence of these symbols on Camel Site tabular scrapers, and more generally the virtual absence of such incised scrapers in the desert (excepting sites clearly associated with Arad), indicates differences in the value assigned to the pieces and probably differences in knowledge of some symbols. Again, these reflect contrasts in cultural frameworks. Of course, the fact that the stone tools reflect more than utilitarian function is well reflected in the tabular scrapers but is probably also present in other types, such as the arrowheads, but is less recognizable.

Beyond the contrasts with northern zone industries, comparison with other desert assemblages shows that the Camel Site fits well into a general desert (lithic) culture. The intent is not to establish functional similarities, as earlier, but cultural or stylistic continuities across time and

space. These similarities are best seen in the more formal elements of the lithic assemblages: arrowheads, other bladelet tools, and blade tools.

Arrowheads are the most effective elements for examining lithic continuities in desert industries for several assemblages. First, their absence from Mediterranean zone assemblages by the later Pottery Neolithic precludes settled zone influences. Second, arrowheads are relatively standardized, are functionally identifiable, require a high degree of skill, and allow for some stylistic variability without affecting function (Gopher 1994).

As described above, the arrowhead assemblage from the Camel Site consists of three components: microlithic lunates, the dominant type; a transverse point; and the tang of a small pressure-flaked point. Microlithic lunates have been found throughout the desert regions, including sites in southern Jordan (Henry and Turnbull 1985), the southern Negev (Rosen 1983b), the central Negev (Saidel 2002), southern Sinai (Bar-Yosef et al. 1977, 1986), and on the coastal plain as far north as Azor (Rosen 1983b). They are also known from Egyptian early dynastic contexts, from which their function can be unambiguously inferred (Clark et al. 1974). Although presence in Egyptian contexts cannot be taken to indicate direct Egyptian connections to desert sites, the presence of other Egyptian artifacts in the Azor tombs (Ben-Tor 1975) suggests that at Azor the microlithic lunates result from Egyptian presence and not an incursion from the desert. Although dating of the sites and contexts in which these pieces have been found is often not precise, they all seem more or less contemporary with the Camel Site, some perhaps somewhat earlier. Regardless, the Camel Site microlithic lunates fall easily into the general set of contemporary assemblages.

In terms of chronological continuities, the microlithic lunate undoubtedly develops out of preceding transverse points. Although such points are known from northern areas in the Pottery Neolithic, they are unknown by the later stages of the period and most certainly are not present in Chalcolithic assemblages (barring a few rare exceptions, such as at Abu Hamid in the Jordan Valley [Dollfus et al. 1988:figure 14.3]). They are a common and diagnostic part of fourth-millennium assemblages in the desert and are known from sites in northern Sinai, southern Sinai, the

southern Negev, the central Negev, and southern Jordan. Rosen (2011) has suggested a possible developmental framework, from triangle to rectangle/trapezoid to lunate. Significantly, small points are also known from this period in the desert, although they are rare (e.g., Rosen 1997b:43–44). Thus the arrowhead assemblage is a local desert phenomenon, with no ties to the settled zone.

Microlithic drills, the primary component in the general class of retouched bladelets, are present in a number of Early Bronze Age sites in the central Negev, including Rekhes Nafha (Saidel 2002) and Beerotayim West (Saidel et al. 2006). The technology for producing these drills is shared among all the sites and, as described above, is not the standard prismatic bladelet technology known from the Chalcolithic period in the northern Negev or earlier periods. As indicated earlier, microlithic drills are absent from northern assemblages and in fact seem to be rare in sites farther south, perhaps reflecting a geographic concentration on bead production among central Negev people. Chronologically, there are clear Chalcolithic antecedents in the western Negev (e.g., Burian and Friedman 1987), as well as in the northern Negev (Roshwalb 1981:166–170) and central Negev at Nahal Tsafit. The technological relationship between the types is not clear, since the drills from the northern Negev Chalcolithic seem to derive from a more formal bladelet technology. Of significance is the continued use of the general type (with subtype differences), and the bladelet technology associated with its production, in the Early Bronze Age IV at, for example, Be'er Resisim (Rosen et al. 2006). In short, the use of microlithic flint drills may also reflect a distinct desert culture.

The blade tools and their contrasts with northern Canaanite technology have already been discussed. As indicated, the basic technology is especially common to the Early Bronze Age in the central and southern Negev. Typologically, the arched backed blade is a common tool type, again rare at best in northern assemblages. Chronologically, antecedents can be seen in earlier assemblages in the Uvda Valley, but in general origins are difficult to trace. Of further interest is the continued use of the technology and the type in Early Bronze Age IV assemblages, as at Be'er Resisim (Rosen et al. 2006) and Ein Ziq (Vardi

2005). Thus, as with other components of the Camel Site assemblage, the blades and blade tools seem to reflect a specifically desert attribute, best associated with a specifically desert culture.

SUMMARY

The chipped stone assemblage from the Camel Site reflects a basically indigenous society with trade ties to the northern zone, but one that adopted little in terms of lithic technology. Thus the production of stone tools is a basically domestic activity based on relatively simple ad hoc technologies, even when the tools themselves were somewhat more formal. As with the production of the tools, their use also can be attached to a household level of organization, even when associated with cottage industries such as bead making. Only the tabular scrapers seem to reflect regular import, and this is probably more a result of the restricted location of appropriate raw materials than any inherent specialization within the desert society. Of course, it is also of note that the tabular scrapers, on their special raw material, also seem to reflect a nonutilitarian stone tool, perhaps used in some kind of ritual activity.

Anticipating the spatial analysis presented in Chapter 12, the household level of organization is also reflected in the clustered nature of much of the distribution of different materials. There appear to be functional differences associated with different areas of the site, such as the bead production locus, or small clusters of stone artifacts suggesting episodes of knapping or consumption.

In this basic structure, the stone tool industry resembles other components of the material culture assemblage at the Camel Site (Chapters 5, 7–10). Functionally, some artifacts reflect internal consumption and use, others cottage export industries, and others more symbolic aspects of the Timnian society. In terms of the structure of production and consumption, the basically nonintensive production, occasionally for export, is evident in these other realms as well.

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MILLING STONES AND WASTE

Yael Abadi-Reiss and Steven A. Rosen

Milling stones have long been recognized as basic implements in agricultural societies in the Near East (e.g., Macalister 1912:35–40), used especially for grinding grain into flour (e.g., Driver 1969:91; Williams-Thorpe and Thorpe 1993; Wright 1991, 1994). They have been used from prehistoric times up to the modern day. Although earlier generations of archaeologists tended to do little more than note their presence, the last decade has seen the more systematic collection and study of this neglected component of ancient material culture. Analyses have focused on a range of issues (Rowan and Ebeling 2008), including typology (e.g., Hovers 1996; Khalaily and Marder 2003; Rowan 2004), raw material characterization, sources, and trade (e.g., Runnels 1985), function (e.g., Wright 1994), residues and wear analysis (e.g., Piperno et al. 2004), and gender issues (e.g., Wright 2000).

Unlike chipped stone tools, to which milling stones are technologically and conceptually related, milling stone assemblages from archaeological sites almost never include manufacturing waste. As a result, it has long been clear that they are almost always the products of off-site manufacture, with the import of finished implements. Of course, the idea of import is supported in general by the exogenous raw materials—basalts,

sandstones, phosphorites—of which most of the artifacts were made. However, even when general sources of raw materials can be ascertained by physical methods, discovery and identification of quarries and workshops have been elusive. For these reasons, among others, reconstruction of the contexts and mechanisms of milling stone production and trade have as yet been little documented in the Near East (Schneider 1996:299). We have not had materials on which to reconstruct a *chaîne opératoire* in the full sense of the term (e.g., Sellet 1993).

The assemblage from the Camel Site consists of two parts: a set of 19 milling stones and milling stone fragments, and an assemblage of sandstone production waste comprising 929 artifacts. The identification of milling stone production debris at the Camel Site (Abadi-Reiss and Rosen 2008; Rosen 1997a; Rosen and Schneider 2001) is the first such occurrence in an Early Bronze Age site in the Levant. As such, it constitutes a baseline from which to analyze and compare further production sites. Although it is clear that the production system represented at the Camel Site need not resemble systems in other regions of the Levant, studies of recently collected sandstone waste assemblages from sites similar to the Camel Site, and from quarry sites discovered in the Makhtesh

Ramon, suggest that the assemblage is representative of the Early Bronze Age Negev system (Abadi 2003; Rosen and Schneider 2001; Saidel 2002).

As most of the sandstone waste on the Camel Site was found on the surface, outside the architectural remains, the attribution to the Early Bronze Age is based on the presence of some sandstone artifacts in the lower stratum and on the fact that the primary occupation of the site is Early Bronze Age. Notably, the quarry at Site Nahal Ramon 104/160 (Rosen 1994:85; 53* for English; Rosen and Schneider 2001) contained Early Bronze Age II holmouth sherds with no evidence for Early Bronze Age IV Age presence.

RAW MATERIALS

Six different types of raw materials were identified in the milling stones and milling stone waste at the Camel Site: ferruginous sandstone, quartzitic sandstone, unmodified sandstone, basalt, limestone, and calcareous siltstone (an anvil, not included in the analysis) (Rosen and Schneider 2001). In fact, only single pieces of basalt,¹ limestone (small fragments), and siltstone (the anvil)² were identified, and thus virtually all the materi-

als are sandstone, most either of the ferruginous or quartzitic types.

Although limestone is available in the immediate vicinity of the site, the basalt, siltstone, and sandstones all derive from the interior of the Makhtesh Ramon (Figure 7.1). Basalt is found in various outcrops, especially in the western part of the *makhtesh*, for example, around the extinct volcanoes of Karnei Ramon, while sandstones and siltstones are associated with exposures of Triassic and Jurassic age, found in the lower areas, in the center and the east (e.g., Zak 1968). Two milling stone quarries, one at Ramat Saharonim North and one near Ma'aleh Ramon (Site Nahal Ramon 204/160 [Rosen 1994:85; 53* for English]), have been surveyed (Abadi 2003; Abadi-Reiss and Rosen 2008; Rosen and Schneider 2001), and there are undoubtedly many more yet to be identified. The sandstone exposures at Ramat Saharonim are located along magmatic dikes that caused metamorphosis of the exposed sandstone layers, resulting in hard quartzitic sandstones. The hardness of the sandstone varies with the degree of metamorphosis, itself a function of the distance of the sandstone from the magmatic source. Thus, even with the single source, significant variation in raw materials is evident (Abadi

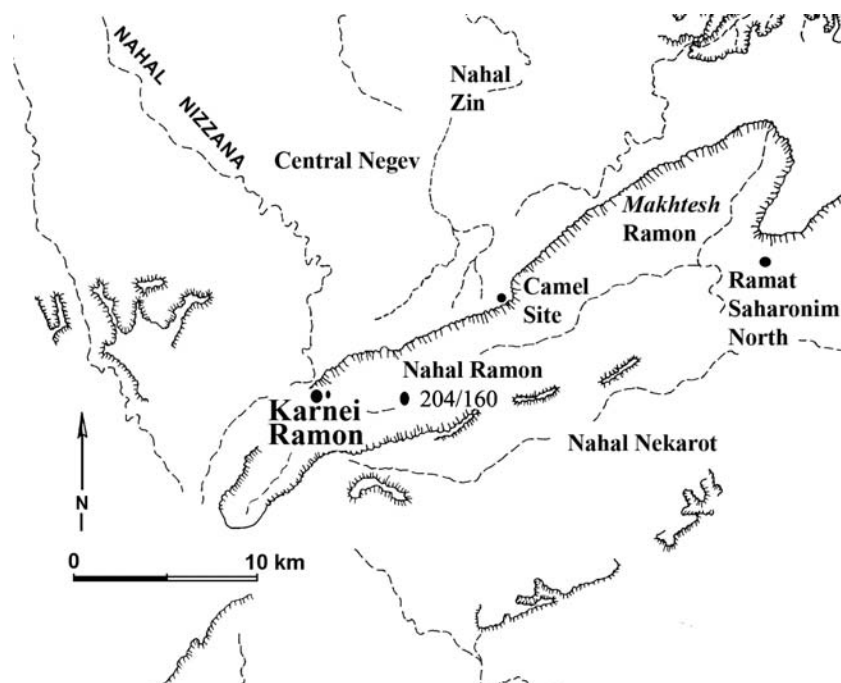


Figure 7.1. Map of potential raw material sources, known quarries for milling stones.

2003). The sandstones at Nahal Ramon are ferruginous, with iron oxides comprising approximately 10 percent of the matrix.

In this context it is also necessary to note that some of the milling stones in Early Bronze Age IV sites, such as Ein Ziq, were also made of sandstone. However, Cohen (1999:266) indicates that most were of limestone, and the sandstone artifacts were of Nubian sandstone, not the modified types (ferruginous or metamorphized) found at the Camel Site.

The key point here is that multiple sources and raw materials are represented both in the milling stone assemblage as well as in the waste assemblage. Given the relatively low numbers of artifacts and the multiple and scattered nature of the sources, even with the relative concentration in the Makhtesh Ramon, it is clear that exploitation and production are opportunistic and extensive and not intensive or focused.

TECHNOLOGY

The waste type frequencies from milling stone production are presented in Table 7.1. All the waste material is sandstone. Due to the absence of an accepted typology of waste products from sandstone, classificatory types were defined based on general principles used for chipped stone, modified to fit the characteristics of the coarser raw material and the different finished products. The key issue in modifying standard chipped stone categories was to define waste types such that different stages in the manufacturing process

could be identified. The adoption of such a waste typology is justified in light of the similarity between the basic reduction activities. With this, however, the technologies and therefore the typologies are not identical, due to the different structures of the raw materials, the microcrystalline structure of flint being significantly more easily controlled and with less force than the coarser textures of different sandstones, basalts, and other materials. Indeed, due to this coarseness, and to other contrasts in structure between different types of sandstone and microcrystalline flint, many of the products of sandstone reduction do not show the typical features of conchoidal fracture, and these can be used only as very general parameters for waste categorization.

The analysis of the assemblage from the Camel Site did not distinguish between primary and secondary flakes, but the vast majority of flakes were secondary.

Flakes (Figure 7.2) were defined on the basis of the presence of one of the following three criteria: (1) a clear ventral surface showing a degree of convexity; (2) a bulb of percussion; and (3) a well-defined striking platform. The coarseness of the raw material, and the apparent tendency to shatter, render insistence on the presence of all three analytically useless. In most standard lithic reduction typologies, flakes are usually subdivided minimally into two categories: primary or cortical flakes retaining part of the original external cortex of the source material, and secondary flakes (or simple flakes) showing a ventral surface with flaking scars from previous removals. The distinction is intended to reflect different stages in the reduction sequence. As it turns out, defining cortical surfaces of the sandstone flakes is difficult, since the sandstone exploited here does not show the clear cortical contrasts evident in flint. Even given the absence of textural and color contrasts, the presence of previous flaking scars on a dorsal surface might serve as a criterion for distinguishing primary from secondary flakes, but the distinction proved difficult at the Camel Site. It appears that virtually all the flakes at the Camel Site are secondary, in some contrast, for example, to the assemblage at Ramat Saharonim North, where primary flakes outnumbered secondary flakes by a ratio of 1.25:1.

Table 7. 1. Sandstone Lithic Distribution from the Camel Site

Type	Number	Percent
Flakes	437	46.1
Chips	434	45.8
Chunks	57	6.0
Rough-outs	1	0.1
Milling stones	5	0.5
Broken	14	1.5
Total	948	100

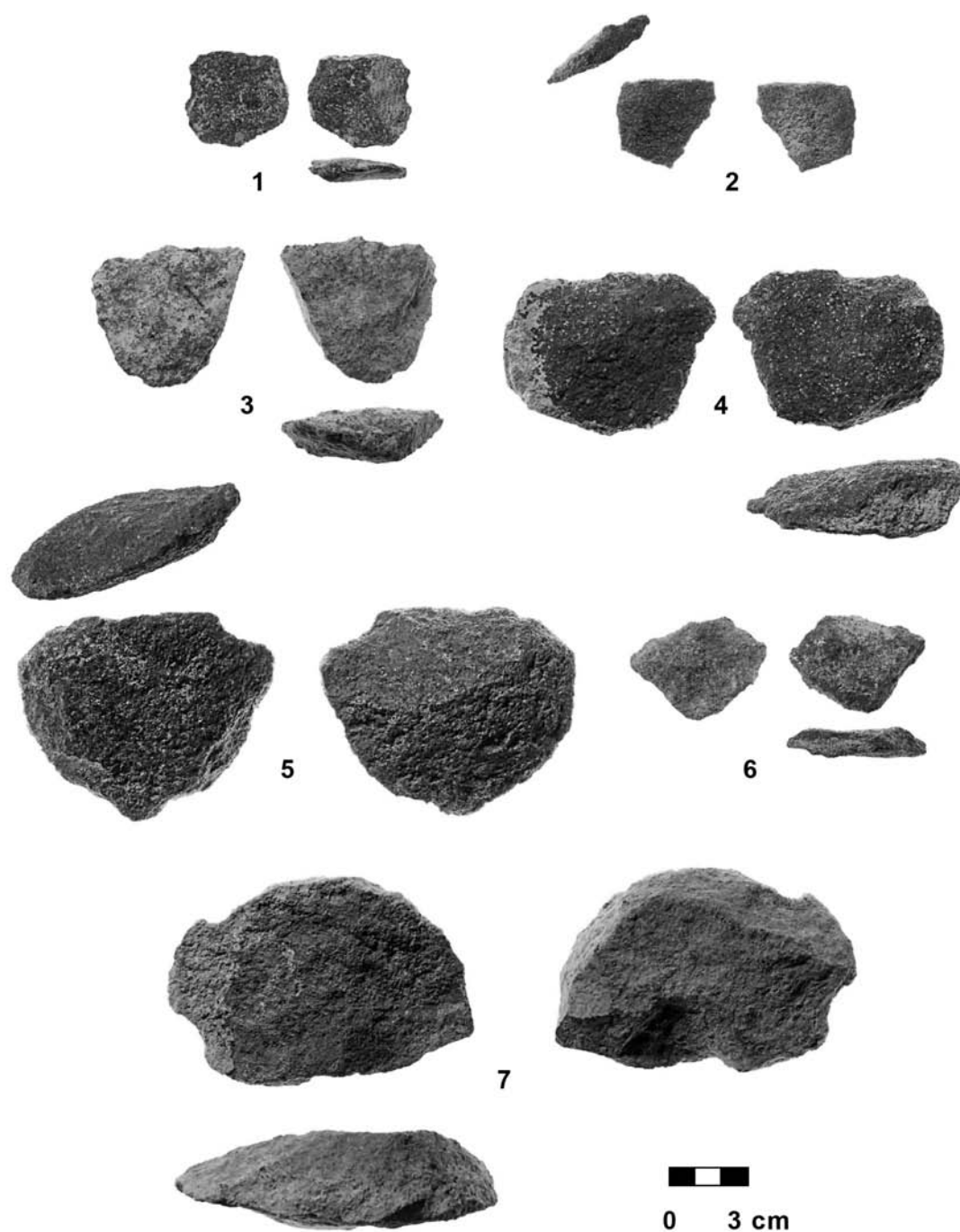


Figure 7.2. Sandstone flakes.

Debris, consisting of chunks and chips (Figure 7.3), is by definition amorphous. As per flint waste typologies, a distinction has been drawn between chips, less than 2 cm in largest dimension, and chunks, greater than 2 cm. Figure 7.4 presents the size distribution of debris compared to flakes based on both mass within size categories

and percent of artifacts within size categories. The clear difference between the flakes and the debris supports the technological distinction drawn between them. In this context, the small size of the flakes—about 90 percent under 4 cm long—is to be noted. In fact, the small size of the waste is characteristic of the entire assemblage,



Figure 7.3. Sandstone chips.

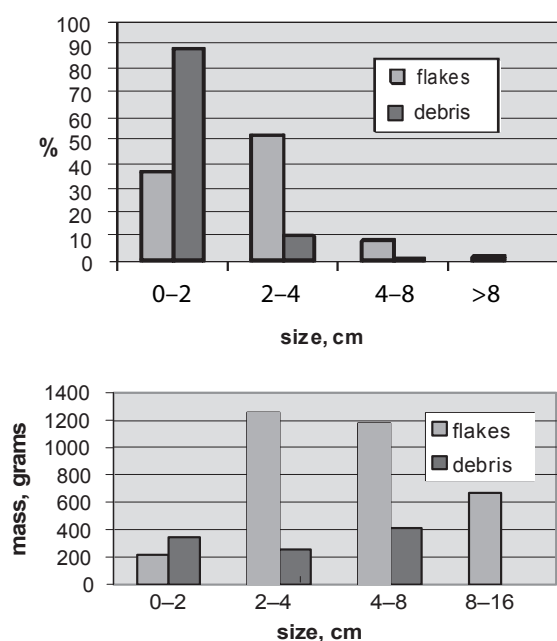


Figure 7.4. Size distribution of chips, flakes, and chunks.

indicating that reduction on the site was restricted to secondary flaking and the later stages of the milling stone production.

Only a single rough-out, a prepared block of ferruginous sandstone, was found on the site (Figure 7.5). This large block shows clear evidence for flaking yet was ultimately not made into a milling stone, to judge by the shape, probably due to a production error rendering it unfit or perhaps due to simple abandonment of the site before completion. No other blocks of raw material, either modified or unmodified, were recovered. As per the primary-to-secondary-flake ratio, this contrasts significantly with Ramat Saharonim North, where large blocks of broken and unflaked sandstone dominated the assemblage (Abadi 2003).

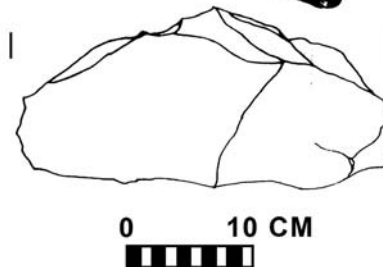
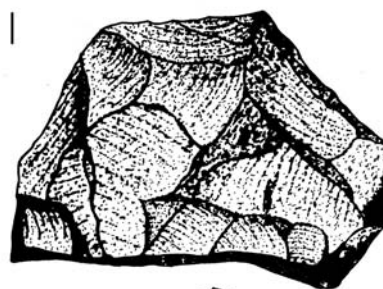
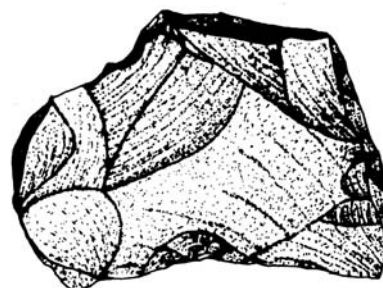


Figure 7.5. Drawing and photograph (in situ) of broken rough-out of milling stone.

In terms of distribution, the production waste is concentrated in the southwestern corner of the site, outside the architectural complex. It clearly reflects the activity area where sandstone blocks were flaked and made into milling stones (Chapter 12).

MILLING STONES

The 19 milling stones and fragments (Figures 7.6–7.8) can be divided into two basic categories: upper stones (*manos*), pushed by the person doing the grinding, and larger lower stones (*metates*), serving as the base on which the ground material was worked. The basic characteristics are summarized in Table 7.2. The primary distinguishing characteristic is size, although the used upper stones tend to resemble bread loaves, and the used lower stones saddles.

All but one of the milling stones show signs of use, either in the concavity of the basic shape, breakage, or the presence of clear use striations. The largest artifact, a lower milling stone found in Square O30a (Figure 7.8:2), is actually slightly

convex across the breadth of the working face and totally flat (not concave) across the length of the working face, suggesting that it was new or only slightly used.

Examination of the distribution of the milling stones and fragments shows that virtually all the broken milling stones (e.g., Figure 7.6) were found in secondary contexts, either incorporated into walls or in stone fall adjacent to walls (Figure 7.9). In contrast, four of the five complete milling stones were found in open spaces, in two pairs, each with an upper and a lower, one pair in enclosure Locus 31 and the second in Square L36. Three of four of these were found in either the lower stratum or in upper 2, the lower level of the upper stratum—that is, in the stratigraphically earlier levels of the site. Three of four of these were found flat on the surface, with the working face down. These are clearly *in situ* occurrences, abandoned in place. One of these was the unused milling stone described above. Two of the broken pieces, N32a and P29d, could be refitted and were found on opposite walls of Locus 34.

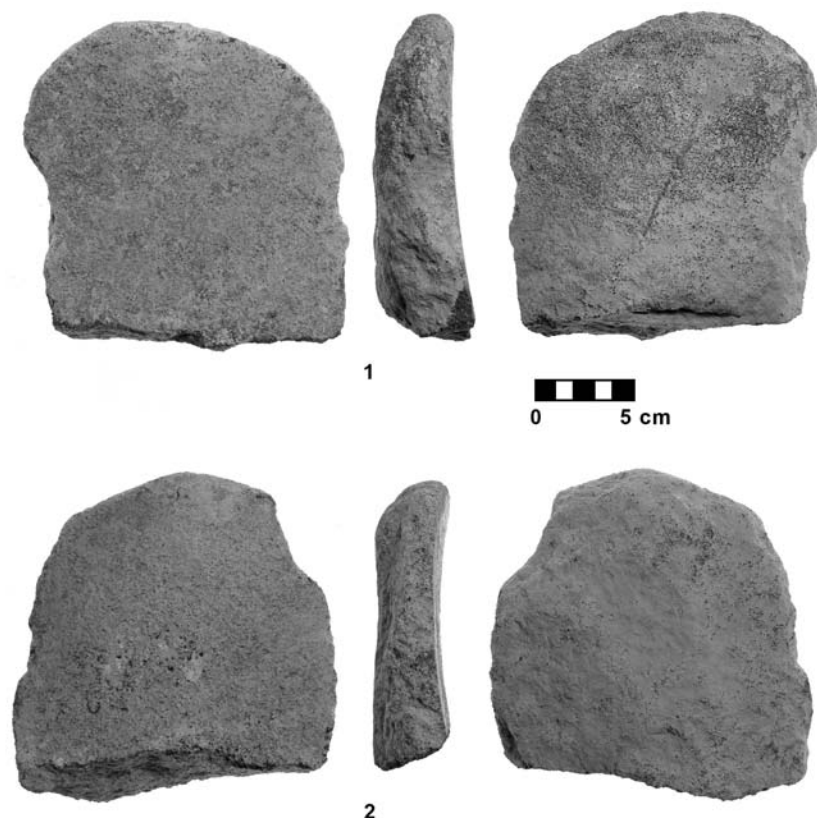


Figure 7.6. Broken milling stones.

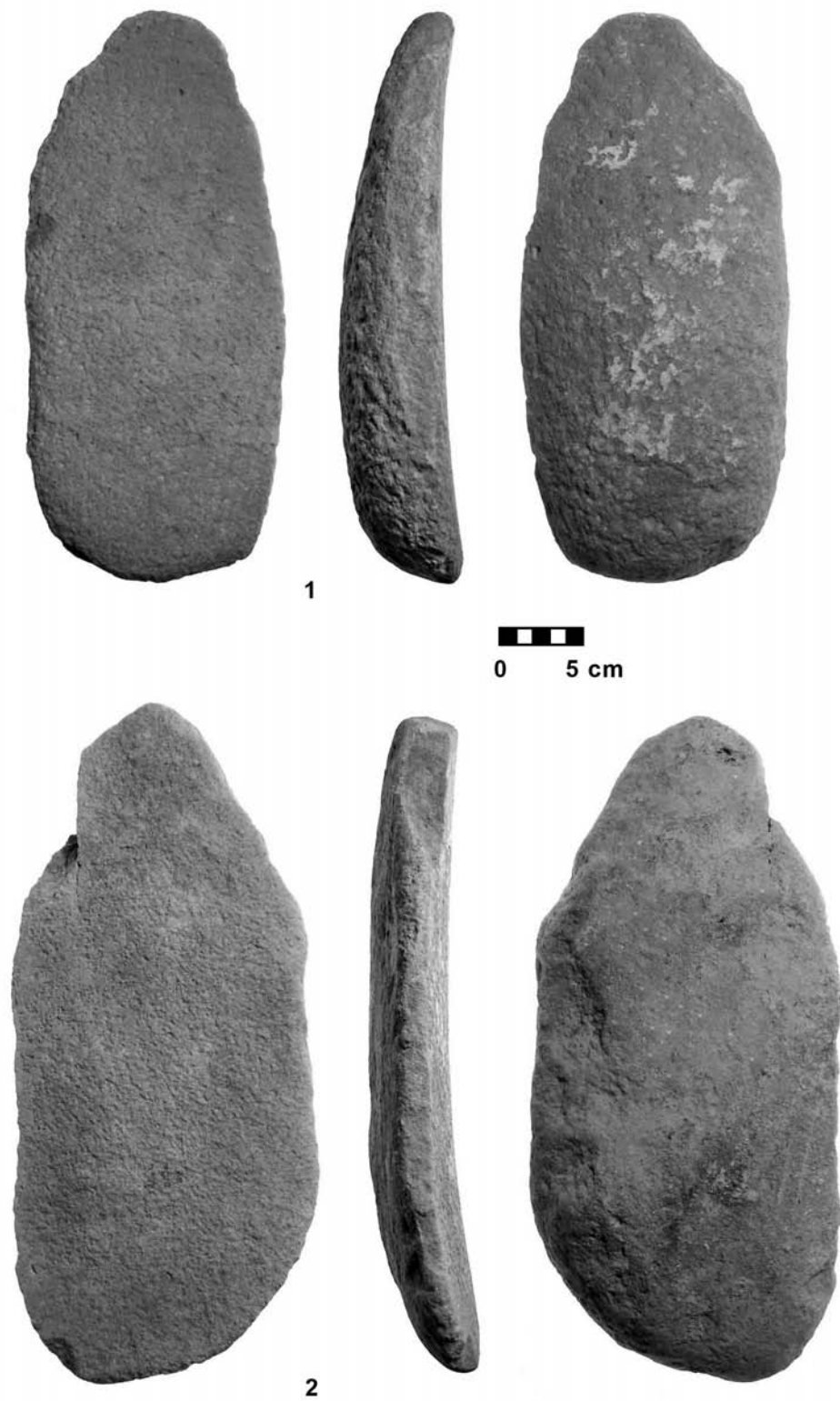


Figure 7.7. Milling stones.

Table 7.2. Milling Stone Assemblage

Square	Type	Whole	Length (cm)	Width (cm)	Thickness (cm)	Mass (g)
O28d surface	Upper	Broken	9.0	9.4	4.6	600
M31c upper	Upper	Broken	6.0	11.2	4.0	600
P29d	Upper	Broken	12.0	12.6	3.0	890
J31	Upper	Broken	6.6	13.6	6.0	900
N32a	Upper	Broken	13.3	12.6	3.2	1,000
N35b upper	Upper	Broken	19.7	13.8	6.6	3,500
P33d upper	Upper	Broken	21.5	14.5	6.2	3,500

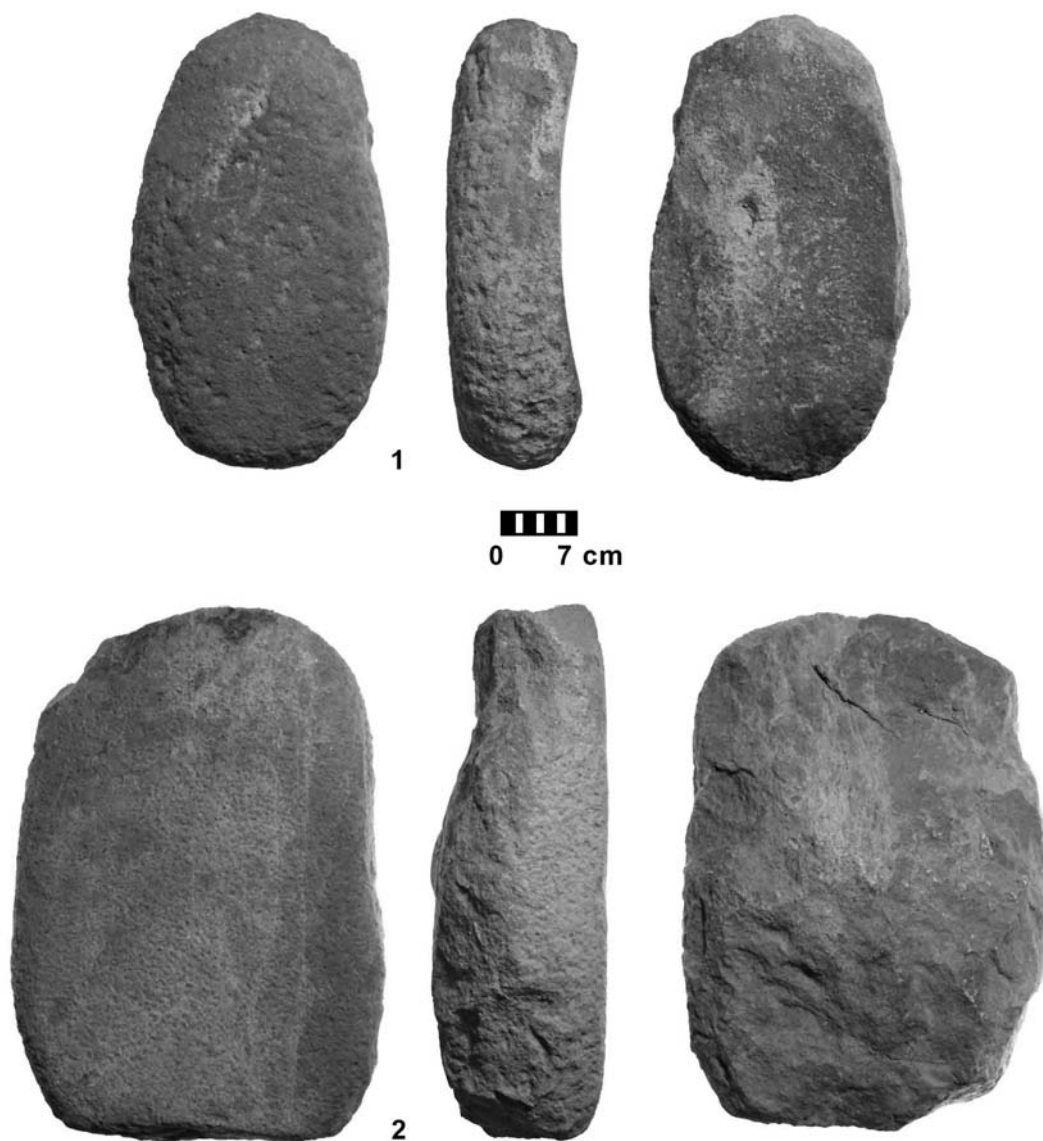
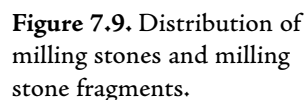
Continued on facing page**Figure 7.8. Milling stones.**

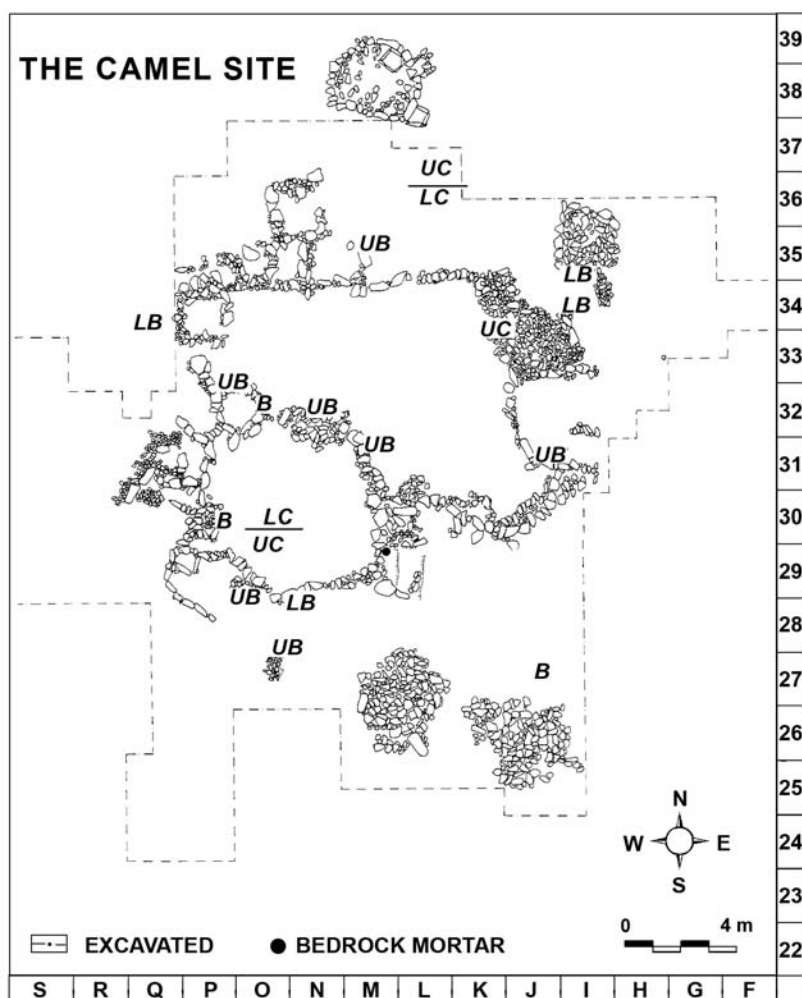
Table 7.2 (continued). Milling Stone Assemblage

Square	Type	Whole	Length (cm)	Width (cm)	Thickness (cm)	Mass (g)
Q33a	Lower	Broken	15.7	10	11.4	4,300
O28b	Lower	Broken	27.5	17.6	14	13,200
P30d lower	No ID	Broken	9.3	7.1	4.3	620
O32a	No ID	Broken	7.8	10.4	5.0	1,100
J27b	No ID	Broken	17.5	13.4	2.8	1,120
L36a upper 2	Upper	Complete	18.5	8.5	2.9	730
K33a	Upper	Complete	26.5	12.6	5.2	2,110
O29a lower	Upper	Complete	33.0	14.8	4.6	3,000
L36	Lower	Complete	32.0	18.0	7.0	8,500
O30a lower	Lower	Complete	41.5	27.2	12.5	28,000

NOTE: The artifact from P30d is limestone and that from M31c is basalt. The siltstone anvil (not included in the table) is also from M31c.



U=upper
L=lower
C=complete
B=broken.



DISCUSSION

The ground stone assemblage from the Camel Site, including the waste products, reflects a specific type of production/consumption system, a kind of cottage industry attached to a more general complex of pastoral production. Furthermore, the materials from the site represent only a segment of that system, indicating some functional differentiation between sites within the production complex.

The first point to be noted is that there is actually very little production waste associated with the site. The single rejected rough-out and around 1,000 waste artifacts probably reflect the total production of only a few milling stones. Production is extensive, not intensive. In fact, the low quantity of waste probably does not even represent the production of the milling stones found on the site, suggesting the transport and import of finished milling stones into the site, in addition to the rather ad hoc production reflected in the materials on the site. This said, it is clear that there must be other production sites in the area (e.g., Saidel 2002) and that, for the most part, these have yet to be recognized or identified.

A key point here is the abundance of sandstone milling stones deriving from the *makhteshim* of the central Negev, especially the Ramon, found at Arad (Amiran et al. 1997:55, 88), the gateway city serving the Negev (e.g., Amiran et al. 1997; Finkelstein 1995:67–86; Rosen 2003). There is no evidence for production at Arad, so all milling stones must have been imported. Thus the Camel Site is part of a general system of milling stone production and exchange whose focus must be Arad, in conjunction with its role as the general market town for the Negev in this period. In this connection to Arad, the milling stone system can be compared to other elements in the trade network reflected at the site, such as bead production and trade (Chapter 10), the copper trade (Chapter 8), and the exchange of ceramics (Chapter 5).

The configuration of the waste materials at the Camel Site indicates that preliminary reduction or preparation of sandstone blocks did not take place on-site. Although the absence of large blocks could perhaps reflect total reduction and

transformation into milling stones (or rough-outs in the single case), in fact, the general absence of primary flakes and the generally small size of the simple flakes in the assemblage indicate that only relatively advanced stages of reduction took place on the site. Abadi (2003) has demonstrated the clear contrasts between the waste assemblage from Ramat Saharonim North and that from the Camel Site (resembling closely in its configuration that from Rekhesh Nafha). Thus sandstone blocks were initially prepared at the quarries and then transported to the Camel Site, and other sites similar to it, where they were further chipped and finished into milling stones. The large size of some of these blocks, up to 28 kg in mass, indicates the use of donkeys (cf. Ovadia 1992). In this sense, the Camel Site can be considered a secondary production site in a tripartite production system of primary production sites/quarries, secondary production sites such as the Camel Site, and primary consumption sites where no production took place, such as Arad. The concentrations of waste in specific areas of the site (Chapter 12) also suggest defined production organization, probably focusing on specific individuals.

The function of the milling stones at the Camel Site also needs to be considered. Although they are usually associated with grinding cereals, a range of other functions, most involving plant food processing, has been recognized (e.g., Wright 1994). Furthermore, the arid climate and the scarcity of sickles at the Camel Site, contrasting significantly with agricultural areas to the north and microenvironments in the far south (cf. Rosen 1997b:127–130), suggest that farming did not play a major role in the economy of the site. Thus either the milling stones were used for processing gathered foods or grain was imported, a common feature of recent Bedouin societies.

ACKNOWLEDGMENTS

We are grateful to Yoav Avni for his help with the mineralogy. Joan Schneider's advice on analysis of the waste materials was genuinely useful. Dan Rabin completed some of the initial sorting of the waste materials. Photographs were taken by Alter Fogel.

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NOTES

- ¹ The basalt fragment can be characterized as vesicular alkali olivine basalt, and it is unlikely to derive from the basalt flows of the Makhtesh Ramon, perhaps deriving from basalt sources in southern Jordan or alternatively northern Israel. Given its fragmentary nature, it is difficult to interpret beyond this.
- ² The siltstone block was used as an anvil and is not included in the analysis here.

COPPER OBJECTS FROM THE CAMEL SITE

IRINA SEGAL AND STEVEN A. ROSEN

The evolution of copper metallurgy has been a subject of intense interest in the Negev and surrounding regions since the discovery of the Chalcolithic Nahal Mishmar (Cave of the Treasure) hoard in the early 1960s (Bar-Adon 1980; Key 1980; Potaszkin and Bar-Avi 1980). Since then, copper objects from the Chalcolithic and Early Bronze Age in the southern Levantine deserts have been discovered in diverse contexts, including quarries/mines, villages, trade outposts, towns, cult centers, and caches, as at the Cave of the Treasure (Amiran et al. 1973; Bar-Adon 1980; Golden 1998; Ilan and Sebbane 1989; Merkel and Rothenberg 1999; Shalev 1994; Shalev and Northover 1991; Tadmor et al. 1995). Copper sources, with evidence for exploitation in these early periods, have been discovered at Feinan in southern Jordan (Levy 2007), Timna in the southern Negev (Rothenberg 1972; Rothenberg and Glass 1992), and southern Sinai (Amiran et al. 1973; Beit Arie 2003) (Figure 2.1). Numerous analyses of these objects, including various types of elemental, chemical, and mineralogical studies (Shugar 2001, in addition to the references above), technological reconstructions (Shalev 1994; Shalev et al. 1992), and typological comparisons (Levy 2007), have been conducted.

The results of these analyses have been used, in turn, to address a large range of issues concerning early metallurgy, including technological evolution (Rothenberg and Merkel 1998), utilitarian function (Moorey 1988), ideological and social roles (Levy 1995), and the structure of production and distribution (Rosen 1993; Tadmor et al. 1995). The underlying assumption of most of these studies has been that copper was the focus of directed trade originating in early market or redistributive centers (e.g., Amiran et al. 1973; Ilan and Sebbane 1989; Kempinski 1989; Levy 2007).

The seven copper objects recovered during the excavations at the Camel Site (Table 8.1, Figure 8.1) offer a new perspective on the nature of early copper exploitation. As a campsite associated with the local Timnian culture, the find context differs from contexts associated with previous discoveries of early copper. Furthermore, as an assemblage, the objects differ as well. Only two could be identified as tools proper. These were two awls. One was severely corroded (Q30b-1), with only a small core preserved. The second (P30a) was square in section. The other objects were small lumps without definite form (L30c-2, Q30b upper 2, I32c), and prills (M26b and L30c-1),

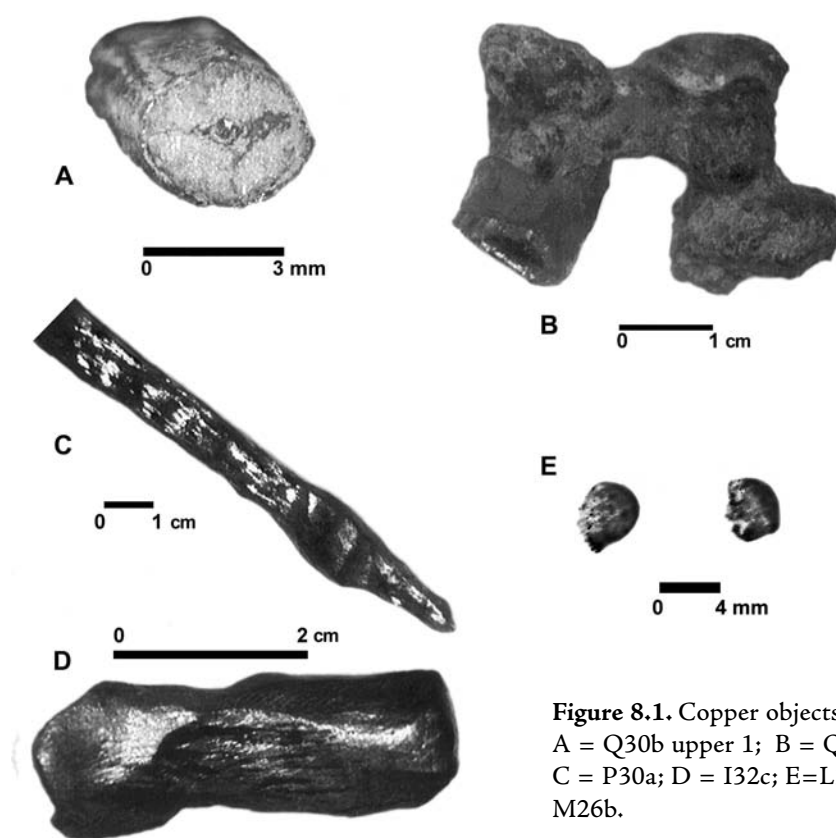


Figure 8.1. Copper objects.

A = Q30b upper 1; B = Q30b upper 2;
C = P30a; D = I32c; E=L30c lower 1 and
M26b.

Table 8.1. Copper Objects from the Camel Site

Provenience	Classification	Description
Q30b upper 1	Awl	Severely corroded
Q30b upper 2	Lump	Fused pieces, prills
P30a upper	Awl	Square section
L30c lower 1	Prill	Black, very porous
L30c lower 2	Lump	Reddish-yellow copper
M26b	Prill	Black, very porous
I32c	Lump	Worked or reworked piece

beadlike in shape. That is, with the exception of the awls, this is a scrap metal collection.

Our analytic aim was to define metal composition, technological process, and, if possible, typology and metal source based on the chemical and metallographic study. Given the nomadic nature of the Camel Site, the characterization of the metallurgy reflected in these artifacts is important for understanding the basic economy and activities of

the inhabitants. We review here first the analytic results and then discuss their implications at the end of the chapter.

ANALYTICAL PROCEDURE AND SAMPLE PREPARATION

Major, minor, and trace elements were determined by inductively coupled plasma atomic

emission spectrometry (ICP-AES). Drillings from each cleaned sample were removed for chemical analysis. After acid dissolution, 15 elements were determined using a procedure described in Segal et al. (1994).

The samples were sectioned, mounted in resin, and polished. The structure of polished and etched sections from the objects was studied using a metallurgical microscope. Microstructure and composition of local inclusions were analyzed by a scanning electron microscope (SEM-EDS) with a backscattered electron detector (BSE). The etching solution consisted of 120 ml H₂O, 50 ml HCl, and 5 g FeCl₃.

The same polished sections were used for provenance study. Lead isotope ratios were measured using a laser ablation multiple collector mass spectrometer (LA-MC-ICP-MS). The advanced method of lead isotope ratio determination is described in Segal and Halicz (2009).

RESULTS

The chemical composition of the samples is given in Table 8.2. The data indicate that all the objects except awl P30a are made of more or less pure unalloyed copper. Samples Q30b-2, M26b, and L30c-1 are similar in their relatively high iron content (1 to 1.5 percent Fe), and lumps Q30b-2, M26b, and L30c-2 in their sulfur content (0.6 to 1

percent S). Lump L30c-1 contains 17 percent sulfur, and by the chemical composition is typical for copper sulfide prills in smelting slags. Lump L30c-2, because of its purity, seems to have been discarded during casting. Sample Q30b-2 contains some zinc, cobalt, nickel, manganese, and silver. Awl P30a is made of arsenical copper. It contains 3.44 percent arsenic, 2.5 percent sulfur, and 0.2 percent antimony (Sb), associated in sulfidic ores with arsenic, deliberately added for alloying.

In terms of metallography, sample Q30b-2 reveals grain structure in polished state. It contains CuO-Cu (eutectic areas) and round and elongated copper sulfide inclusions. Sample I-32c contains copper chloride inclusions (the result of corrosion) along the grain boundaries. Round copper sulfide and copper-iron sulfide inclusions were observed in sample M26b (Figures 8.2–8.4).

Structures, revealed after etching, are described below:

Sample Q30b-1

This sample was strongly corroded, and it was impossible to see its structure.

Samples Q30b-2, M26b, and L30c-1

Equiaxial grain structure with Cu-Cu₂O eutectic can be seen in Figures 8.3 and 8.4. There are no traces of grain deformation. The presence of copper-iron oxide and sulfide inclusions in the

Table 8.2. Chemical Composition of Cu-Objects from the Camel Site (Makhtesh Ramon), in Wt. Percentage; nd = not determined.

Description	Cu	Fe	As	Sb	Zn	Pb	Co	Ni	Cd	Mn	Cr	Ag	S
Q30b-1, awl corroded	85.5	0.06	nd	nd	nd	nd	nd	0.004	nd	0.001	0.010	0.01	nd
Q30b-2 copper lump	94.0	1.42	0.01	nd	0.38	0.08	0.022	0.062	nd	0.049	0.015	0.13	1.0
P30a awl	86.6	0.48	3.44	0.2	nd	0.06	0.007	0.026	nd	nd	0.002	0.02	2.5
I32c copper lump	95.7	0.07	0.02	nd	nd	0.10	0.005	0.026	nd	0.001	0.015	nd	nd
M26b copper lump	97.0	1.5	0.01	nd	nd	0.04	nd	0.004	nd	0.008	nd	0.02	1.0
L30c-1 copper sulfide lump	68.0	1.0	0.02	nd	0.03	0.06	0.010	0.024	0.04	0.003	0.006	0.04	17
L30c-2 copper oxide lump	80.0	0.20	nd	nd	0.06	0.03	nd	0.004	nd	0.001	nd	nd	0.6

two first samples and copper sulfide matrix with iron sulfide inclusions in the last sample suggests that these copper prills were lost during smelting.

Sample P30a

Square in section, this awl reveals heavily deformed grains (see Figure 8.5). It underwent repeated heating and hammering many times. Finally the metal was annealed; straight annealing twins can be seen under the large magnification (Figure 8.6). The grain size is 0.015 mm, suggesting an annealing temperature not more than 400 °C.

Sample I32c

By its structure, we conclude that this copper lump is part of a manufactured object. The elongated form of copper-iron sulfide inclusions and corrosion cracks shown in Figures 8.7 and 8.8 is a result of the several episodes of heating and hammering. Equiaxial, not deformed, grains with straight twin lines suggest full recrystallization with the final annealing procedure. Grain size is 0.06 mm, and annealing temperature was about 500 °C.

Sample L30c-2

Its grain structure and rather pure copper (oxidized probably due to corrosion over time) suggest that it was discarded during casting.

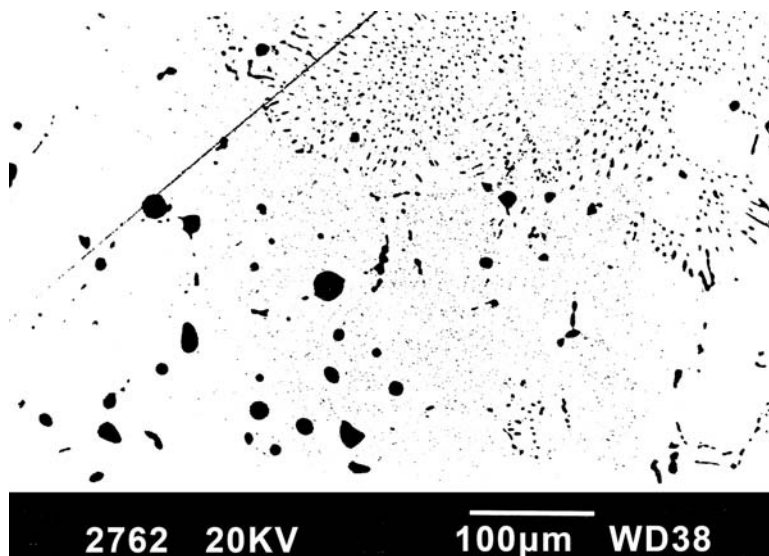
Lead isotope ratios are shown in Table 8.3. In Figure 8.9, lead isotope ratios from the objects

from the Camel Site are plotted with those of Chalcolithic copper objects from Peqi'in (Segal et al. 2011), Sandal (Segal et al. 2002), and Quruntul (Segal 2002) caves and from Nahal Mishmar (Tadmor et al. 1995). In addition, ratios for relevant ores from Feinan (Hauptmann et al. 1992), Timna (Gale et al. 1990; Hauptmann 2007; Asael 2010), and Sinai (Hauptmann et al. 1999) are also plotted. With exception of the copper sulfide lump that matches the Cambrian Timna source, ratios for Camel Site objects are in good accordance with the Feinan Dolomite limestone Shale (DLS) and Precambrian Timna ores, as well as with the copper objects mentioned above.

DISCUSSION

The complexity of the copper production/distribution system represented by the finds from the Camel Site is reflected in every aspect of the analysis. At the simplest level, the typological composition of this small assemblage, comprised mostly of copper waste and scraps, with only two tools, is anomalous for a nonproduction site. No production artifacts—crucibles, furnace fragments, hammer stones, slags, etc.—were recovered. With the absence of ores, and the fact that the Camel Site is not located near any known copper sources, it is likely that all the copper found on-site was transported there. That is, both finished tools (the awls), prills, and other copper scraps were trade items. This implies that

Figure 8.2. BSE image of sample M26b in polished state showing Cu_2O -Cu eutectic black spots and black copper-iron oxide and gray copper-iron sulfide inclusions.



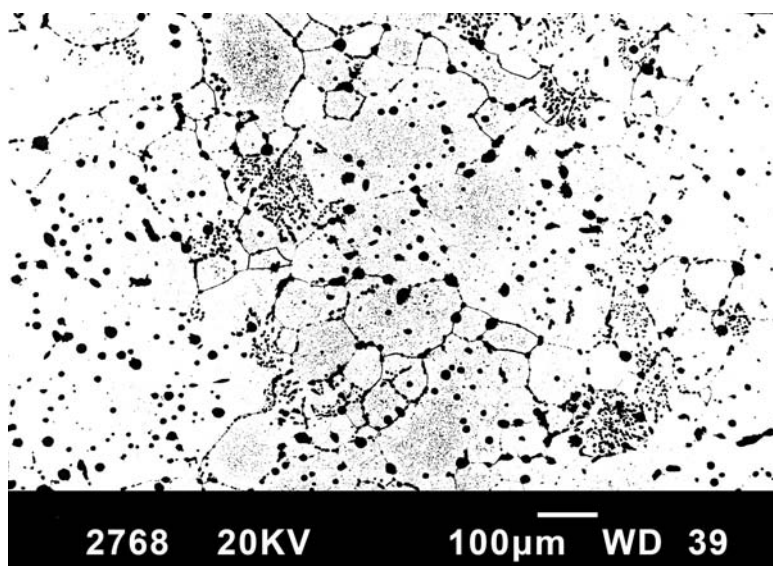


Figure 8.3. Etched surface of the M26b sample showing equiaxial grain structure with numerous copper-iron oxide and sulfide inclusions.

Figure 8.4. Enlargement of Figure 8.3.

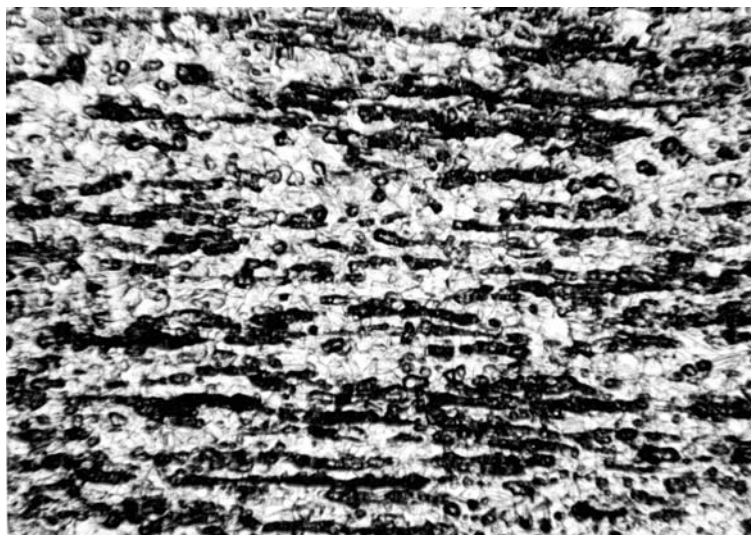
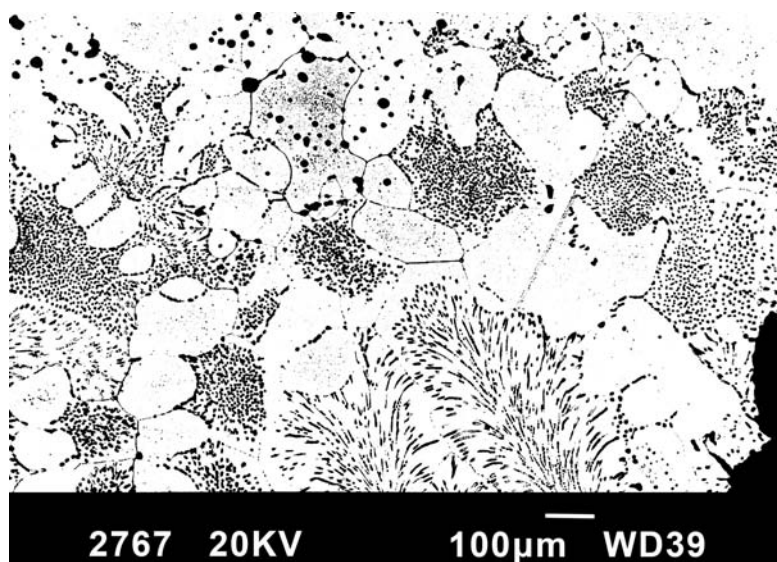


Figure 8.5. Etched surface of awl P30a showing strongly deformed structure. The elongated form of inclusions is a result of hammering. Optical microscope $\times 250$.

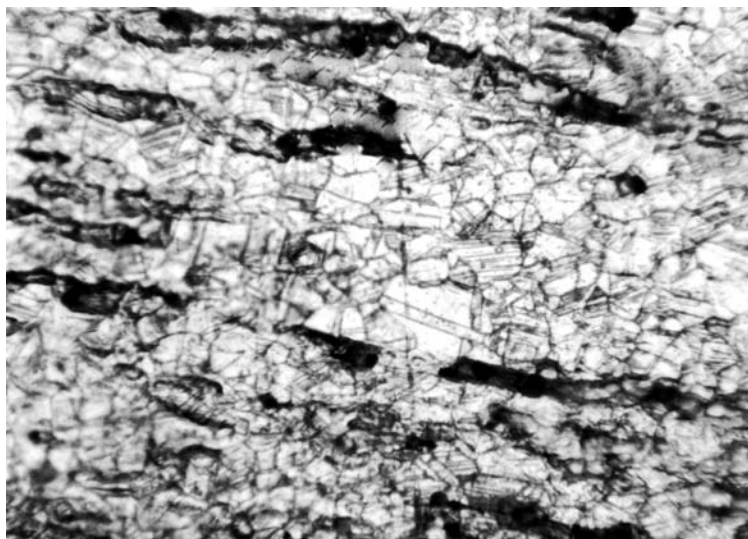


Figure 8.6. Enlargement of Figure 8.5, showing grain structure with annealing twins ($\times 625$).

Figure 8.7. Etched surface of the copper lump I32c. The elongated form of copper-iron inclusions and corrosion cracks suggests hammering, straight twins on the grains show final annealing ($\times 125$),

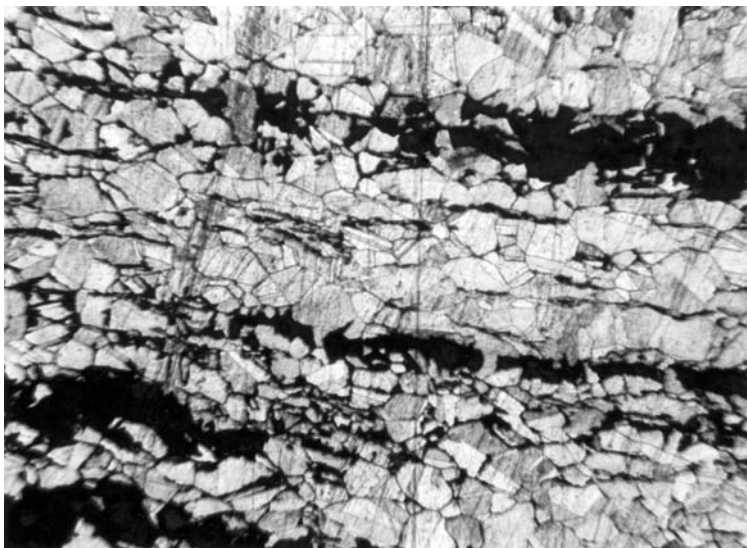
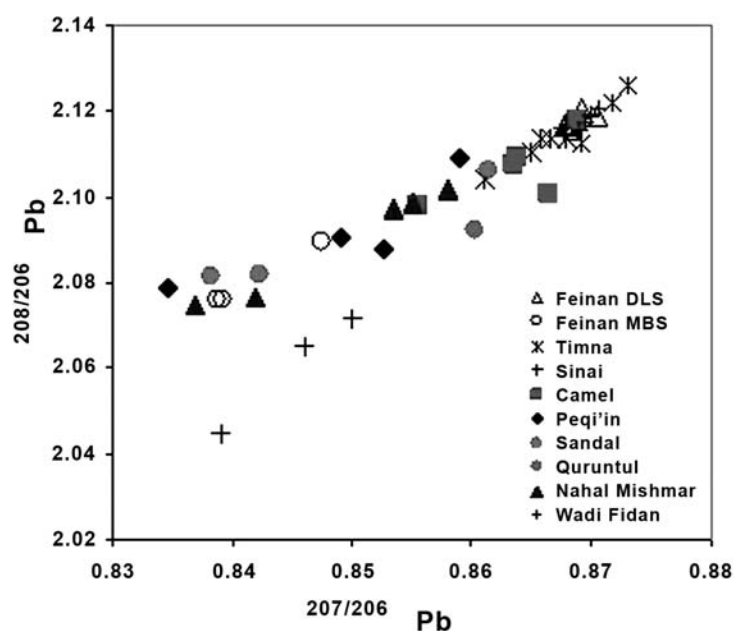


Figure 8.8. Figure 8.7 with large magnification, showing equiaxial grains with twins and elongated intergranular copper sulfide inclusions ($\times 250$).

Table 8.3. Lead Isotope Ratios of Copper Objects from the Camel Site

Sample	$^{208}/^{206} \text{Pb}$		$^{207}/^{206} \text{Pb}$	
Q30b-1	2.1090	0.0030	0.8638	0.0010
P30a	2.1178	0.00004	0.8688	0.0001
Q30b-2	2.0979	0.0007	0.8555	0.0001
I32c	2.1074	0.0001	0.8635	0.0001
L30c-1	2.1008	0.0001	0.8665	0.0001

**Figure 8.9.** Lead isotope ratios for Camel objects in comparison to ores and slag from Feinan, Timna and Sinai and Chalcolithic copper objects from Nahal Mishmar, the caves of Sandal, Quruntul, and Peqi'in, and Wadi Fidan.

reworking of copper, remelting, was probably carried out at consumption sites such as Arad (Ilan and Sebbane 1989). On the other hand, the nature of the artifacts—finished objects, prills, and casting discards—indicates that the inhabitants of the Camel Site were trading in a range of copper products, including production waste. Either they were middlemen trading in every scrap they could lay their hands on, or, alternatively, they were themselves active in production at smelting sites near source areas. Such activities have been documented ethnographically, for example, among the Solubba (e.g., Betts 1989). Either way, we have a clear example of produc-

tion and trade independent of some centralized system.

Notably, given the apparent importance of the metal trade and the assumption that it was one of the prime factors in the very presence of the Early Bronze Age nomadic system in the Negev (e.g., Kempinski 1989; Ilan and Sebbane 1989; Chapter 13), it seems unlikely that Camel Site inhabitants were the primary consumers of these materials. In this the copper trade can be compared to the trade in milling stones (Chapter 7) and beads (Chapter 10).

Beyond the simple presence of copper, and its obvious implications in terms of nomadic partic-

ipation in the copper trade, composition analysis of the copper objects from the Camel Site also reveals a more complex trade system, beyond the focused and directed exchange usually assumed (e.g., Ilan and Sebbane 1989; Kempinski 1989). For example, the variability in composition and structure of the copper objects reflects a surprising range in the technological configuration of the desert copper system. These can be summarized as follows:

The arsenical copper awl P30a reflects either the deliberate alloying of copper with sulfidic ores containing arsenic (e.g., Lechtman and Klein 1999; contra Shalev 1994, who claims all Early Bronze Age copper artifacts are unalloyed copper) or the selection of copper-arsenical sulfidic ores. This either suggests two production processes, one with alloying and one without, or two separate sources of copper (or both). Lead isotope ratios suggest both Timna and Feinan ores as possible sources of copper. The presence of two different levels of iron in the artifacts may reflect differences in purity resulting from differences in the stage of manufacture—that is, initial smelting and later remelting for casting. Thus both awls show low iron content (less than 0.5 percent), whereas three of the copper lumps show more than 1.0 percent iron.

Finally, the repeated episodes of heating and hammering of the awl, indicating the need for reworking, also suggest it was used. In fact, the location of the two awls in Locus 37 coincides with the locus of bead manufacturing on the site, as indicated by a concentration of microlithic flint drills, ostrich eggshell fragments, and beads in various states of completion (Chapter 12). Thus, if the primary purpose of the copper network was exchange, Camel Site inhabitants were nevertheless consumers of, as well as traders in, copper.

It is difficult to evaluate the role of nomads in early metal production in the Levant. Although a major Early Bronze Age II–III copper production center clearly tied to the urban society of the Levantine core zone has been documented at Feinan, no similar evidence for *intensive* exploitation has been found for earlier periods either at Feinan or at the other source areas, Timna and southern Sinai (cf. Beit-Arieh 1974; Rothenberg and Glass 1992). Even with the evidence for Early Bronze Age II Aradian trading posts in

southern Sinai (e.g., Amiran et al. 1973; Beit-Arieh 1981; Stager 1992), the actual evidence for copper production is rather limited. The materials from the Camel Site, as minimal as they are, add an important quantity to the early metallurgy equation. Even a tiny nomadic site in the middle of the desert, removed from the source areas and not even significant in terms of nomadic sites, shows evidence of being engaged in the copper trade. Hundreds of surveyed sites are similar to the Camel Site. Few have been excavated, and, significantly, few excavations have employed sieving for the recovery of material culture. It seems likely that nomads played a role in the development of early Levantine metallurgy.

In terms of the role that metallurgy played in Early Bronze Age pastoral nomadic society, there is no evidence for intense industrial production. In this the metallurgical activities are similar to the diverse range of nonsubsistence economic activities represented at the Camel Site (for example, milling stone production and exchange [Chapter 7], bead production and exchange, and trade in other trinkets [Chapter 10]) that are characterized as cottage industries—extensive and opportunistic rather than intensive. In general, the economy has been characterized as multi-resource (Rosen 2003; cf. Salzman 1972). Thus Camel Site metallurgy seems to fit well into a general pastoral nomadic adaptation.

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THE CAMEL SITE OBSIDIAN ANALYSES, SYNTHESIS, AND IMPLICATIONS

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The use of obsidian as a raw material for chipped stone tools in the Near East has been known since the earliest analyses of Neolithic stone tool assemblages in the region (e.g., Braidwood 1948:120). The special properties of the material—ease of knapping, especial sharpness of edges, and its point source origins—were implicitly recognized very early in the history of work in the region. In the Near East, the analytic potentials of the material were pioneered in the 1960s with the development of methods for compositional characterization and hydration dating. Chemical characterization of obsidian provided precise definition of origins and allowed models of distribution and exchange to be developed (e.g., Renfrew et al. 1966). Hydration analysis, less utilized in the Near East, allowed for independent dating of artifacts (Ambrose 1976).

The recovery of three small obsidian artifacts (Figure 9.1) from the Camel Site constitutes the first discovery of obsidian in Early Bronze Age contexts in the deserts of the Negev and Sinai. However, in light of the well-established presence of obsidian in the Negev during the Pre-Pottery Neolithic B (PPNB) (e.g., Cauvin 1991, 1994; Perlman and Yellin 1980), especially from the site of Nahal Lavan 109 (Burian and Friedman 1988; Burian et al. 1976), the issue of the specific origins

of the three pieces needed to be addressed before conclusions concerning the significance of the discovery could be drawn. Hydration analysis of the artifacts supports an Early Bronze Age attribution. Only after establishing the Early Bronze Age affinities of the artifacts could the significance of the elemental analysis indicating a source in eastern Anatolia, in significant contrast to the exclusively central Anatolian source of Negev PPNB obsidian, be interpreted.

BASIC DESCRIPTION OF THE OBSIDIAN ARTIFACTS

Three small obsidian artifacts were recovered from the Camel Site. The obsidian itself is black with some gray banding. All three were recovered in the southeastern quadrant of the site—in fact, outside the actual architectural remains (Figure 9.2). Interestingly, several unusual small flakes of black flint were also discovered in this area. Dimensions, provenience, and technical type are summarized in Table 9.1. Each piece shows a well-defined bulb of percussion and a narrow striking platform. None show characteristics associated with the more standardized knapping technologies of the third and fourth millennia B.C.E., for example, the bladelet technologies of the

Table 9.1. Summary of Basic Features of Obsidian Artifacts

Provenience Description	Length (mm)	Width (mm)	Thickness (mm)	Mass (g)
M27d upper layer, small blade (USF sample 499)	34	17	4.8	2.34
M28c upper layer, small broken flake (USF sample 500)	25	14	2.5	0.80
J30c surface layer, small broken flake (USF sample 501)	17	19	4.0	0.65

southern Levantine deserts (e.g., Gilead, 1984; Rosen 1997b:65–67). Although one piece (M27d) is technically a blade, it is clear that it is technologically an elongated flake. All three pieces show edge damage caused by trampling and sandblasting, and none show convincing evidence for intentional retouch. Two (M28c, J30c) show broken edges. Dorsal scarring, reflecting previous flake removals, is present on only one piece (M27d). One flake (m28c) has a hinge fracture.

Beyond the specifics of the description of the artifacts, the presence of only three obsidian artifacts on the site and the total excavation of the site with 100 percent dry-sieving through 2–3 mm mesh indicate that the flakes were imported as flakes and not knapped on-site. That is, the absence of obsidian cores and other waste demonstrates that reduction took place elsewhere and that artifacts were imported onto the site as small flakes. A similar case can be made for the few pieces of black flint, also without evidence for on-site production.

COMPOSITIONAL ANALYSIS (R. H. TYKOT)

The three pieces of obsidian from the Camel Site were analyzed as University of Southern Florida samples 499 to 501. Obsidian from geological sources in Turkey is well known at Mesolithic and Neolithic sites in southern Anatolia and the Levant (Cann and Renfrew 1964; Cauvin 1991; Cauvin et al. 1986; Gratuze et al. 1993; Perlman and Yellin 1980; Renfrew et al. 1966, 1968; Wright 1969) and has even been identified as far west as Sitagroi in northeastern Greece (Aspinall et al.

1972). At the same time, obsidian from sources in eastern Turkey and Armenia was distributed to Mesopotamia and also the Levant (Blackman 1984; Gratuze et al. 1993). While the central and eastern Anatolian sources were considered the most likely sources for the Camel Site samples, Aegean, Caucasian, and Red Sea sources were not excluded as possibilities (Williams-Thorpe 1995; Zarins 1990).

Chemical Analysis

Neutron activation analysis has been the most widely used method for the characterization of archaeological materials, but it does not provide bulk compositional data, it is not inexpensive, and commonly it is destructive to artifacts. Furthermore, it has been demonstrated that nearly all the Mediterranean, European, and Near Eastern obsidian sources may be distinguished based on their major element chemistry (Francaviglia 1984; Keller and Seifried 1990; Tykot 1997, 2002). X-ray analysis using the electron microprobe is an optimal analytical technique for obsidian sourcing, as only a tiny 1 mm sample is required for quantitative analysis and the instrumental cost is very low on a per-sample basis. A batch of 18 samples can be prepared and analyzed in several hours. This technique has been used for obsidian sourcing in Europe (Bíró et al. 1986), the Mediterranean (Tykot 1996, 2002), Anatolia (Keller and Seifried 1990), and East Africa (Merrick and Brown 1984a, 1984b).

Samples 1 mm in size were removed from the Camel Site artifacts, mounted in an epoxy disk 1 inch in diameter, and polished flat using

successively finer grinding compounds. Nine elements were then quantitatively determined using an electron microprobe equipped with wavelength dispersive spectrometers. Standard mineral and rock reference materials were analyzed to ensure the accuracy of the analyses and their comparability with other laboratories and other techniques; as few as 100 ppm of some elements are detected, and precision is better than ± 5 percent for most elements—almost always better than the range in variation within a single obsidian source. Two spots 40 microns in diameter were analyzed on each sample to ensure against heterogeneity; the beam was positioned with an optical microscope to avoid analyzing microlite

inclusions. The resulting data were then normalized to 99 percent to eliminate the effects of variable water content and to enable comparison with existing obsidian source databases produced using similar techniques (e.g., Bíró et al. 1986; Francaviglia 1984, 1990a, 1990b; Keller and Seifried 1990; Tykot 1996).

Results

All three Camel Site obsidian artifacts are peralkaline (high alkalies and iron and low aluminum concentrations) (Table 9.2), immediately eliminating most of the Mediterranean and Near Eastern sources. For the remaining peralkaline

Table 9.2. Electron Microprobe Analyses of Obsidian Artifacts from the Camel Site

USF	SiO ₂	Al ₂ O ₃	TiO ₂	Fe ₂ O ₃	MgO	CaO	Na ₂ O	K ₂ O	P ₂ O ₅	MnO	BaO	Total
499a	74.40	11.09	0.10	2.85	0.00	0.08	5.64	4.14	0.01	0.04	0.00	98.35
	74.89	11.16	0.10	2.87	0.00	0.08	5.68	4.17	0.01	0.04	0.00	99.00
499b	74.61	11.08	0.10	2.82	0.00	0.09	5.74	4.07	0.00	0.03	0.05	98.60
	74.92	11.12	0.10	2.83	0.00	0.09	5.76	4.09	0.00	0.03	0.05	99.00
Mean	74.90	11.14	0.10	2.85	0.00	0.08	5.72	4.13	0.01	0.04	0.02	99.00
Std	0.02	0.03	0.00	0.02	0.00	0.00	0.06	0.06	0.01	0.00	0.04	0.00
500a	74.88	10.61	0.13	3.36	0.00	0.13	5.56	4.45	0.00	0.04	0.00	99.16
	74.76	10.60	0.13	3.36	0.00	0.13	5.55	4.44	0.00	0.04	0.00	99.00
500b	74.45	10.57	0.12	3.34	0.00	0.14	5.42	4.49	0.02	0.04	0.00	98.59
	74.77	10.61	0.12	3.35	0.00	0.14	5.45	4.51	0.02	0.04	0.00	99.00
Mean	74.76	10.60	0.12	3.35	0.00	0.14	5.50	4.48	0.01	0.04	0.00	99.00
Std	0.01	0.01	0.01	0.00	0.00	0.00	0.07	0.05	0.01	0.00	0.00	0.00
501a	73.89	10.58	0.12	3.26	0.00	0.16	5.50	4.33	0.01	0.05	0.01	97.91
	74.71	10.70	0.12	3.29	0.00	0.16	5.56	4.38	0.01	0.05	0.01	99.00
501b	73.94	10.42	0.13	3.25	0.00	0.14	5.58	4.38	0.01	0.05	0.00	97.90
	74.77	10.54	0.13	3.29	0.00	0.14	5.64	4.43	0.01	0.05	0.00	99.00
Mean	74.74	10.62	0.12	3.29	0.00	0.15	5.60	4.40	0.01	0.05	0.00	99.00
Std	0.04	0.11	0.00	0.00	0.00	0.02	0.06	0.03	0.00	0.00	0.00	0.00

sources (Pantelleria, Bingöl, Nemrut Dag, and the Red Sea region), analytical data have been published by Gratuze (1998, 1999), Poidevan (1998), and Francaviglia (1990a). Although there are some differences in absolute concentrations of silicon and aluminum between the Camel Site artifacts, attributable to systematic differences in analytical methods, the Bingöl A source (including Cavuslar and Orta Duz) in the Lake Van region of eastern Anatolia is the best match.

HYDRATION ANALYSIS (M. GOTTESMAN)

Obsidian hydration dating converts a hydration layer to an absolute date utilizing an established rate for the inward diffusion of molecular water using the equation $x = kt^{1/2}$, where x is the hydration rind width in microns (μ), k is the hydration rate at a specific temperature/relative humidity, and t is time in thousands of years. Since 1960, obsidian hydration dating (OHD) has seen a number of developments that have increased our understanding of the hydration process (e.g., Friedman and Long 1976). These studies, mostly laboratory based, have addressed the two primary sets of hydration forces: compositional dependence (Friedman and Long 1976; Stevenson and McCurry 1990) and environmental factors (Mazer et al. 1994).

The major tasks in OHD are to determine the rim width and the hydration rate for the specific artifact. The rinds are presently measured by optical microscopy on thin sections. Other methods, including acousto-optical and secondary ion mass spectrometry (SIMS) (e.g., Stevenson et al. 2001) are being developed, and the measurement process is also being constantly improved with computer-assisted imaging. In practice, the accurate determination of the rind width is the greatest variable in OHD due primarily to variable weathering processes.

Hydration Methodology

The determination of hydration rates was based on high-temperature (160 °C) laboratory procedures and then calibrated to ambient site conditions using the Arrhenius equation (Friedman and

Long 1976; Laidler 1984; Lee 1969; Mazer et al. 1992; Stevenson and McCurry 1990): $k = A (RH)^{1/2} \exp E/RT$, where k is the archaeological hydration rate, A is the exponent at 160 °C, RH is the relative humidity, E is the activation energy, R is the universal gas constant, and T is temperature. New obsidian glass flakes were subjected to various temperatures and reaction media over various time depths, and the hydration rate constants (A , E) were calculated (Ambrose 1976; Mazer et al. 1992; Stevenson and McCurry 1990).

Rind width measurement is as follows. A thin section slide is prepared for each sample. The rind thickness was measured by taking five independent measurements under a Jenaval model polarizing light microscope with a Leitz filar micrometer attachment at 625× power. The rind or depth of water diffusion is visible because the rind of obsidian with added external water ions refracts light at a different angle than the internal parent material. The diffused water lowers the density and changes the speed of light passing through the sample. The light wave is bent as it enters the glass and at exiting. This double refraction causes the phenomenon of birefringence. This might be caused by the straining of the glass that results from a slight expansion due to the entrance of molecular water, often referred to as strain birefringence (Ross and Smith 1955). All flake surfaces visible in cross section on the microscopic slide are carefully examined. Usually there are only two surfaces visible, such as the dorsal and ventral surfaces of a flake. In practice, however, more than two surfaces (reuse or retouch edge flake scars) are sometimes found. Only clearly visible intact hydration rinds with well-defined diffusion fronts are measured.

A measurement consists of the average of five measurements made at one point on the hydration rind. Measurements are made for each distinct hydrated surface for which a clear hydration rind is visible. The resulting measurements from various surfaces are themselves averaged if they are within 0.4 microns. If the variability is greater than 0.4 microns, they are reported separately (often diagnostic of reuse). Normally, a reported measurement is either a single or the average of two hydrated layers.

All reported measurements should be accurate to within ± 0.2 microns. Although this measurement error in theory could be used to calculate a confidence range for the date, other factors, such as environmental change over time, may cause variation in hydration rate and deviation between hydration years and calendar years.

Calculation of dates based on the piece-specific rate method uses only the smallest verified rind from each sample, based on the assumption that the smallest measurement is more likely to date the last knapping episode.

The effect of the chemical composition of obsidian on the hydration rate has been addressed theoretically (Ericson 1981) and by correlation of high-temperature hydration rates with glass chemical constituents (Friedman and Long 1976). Recent work by Mazer et al. (1992) and Stevenson et al. (1998) has shown dependence between connate water (OH⁻) of the specific obsidian sample and the rate. Additional work (Stevenson et al. 1993) done on the Coso volcanic field in California showed that the range of natural or connate water varied enough, even within a given volcanic flow, that each artifact needed to be measured. The process of determining the water content via infrared spectroscopy for each sample to be dated would have put a serious damper on the utilization of OHD.

Pioneering work by Ambrose (1979) and Stevenson et al. (1988, 1993, 1998, 2000) established relationships between the rate of hydration, the amount of intrinsic water (probably due to the depolymerizing effect of water ions on the silica matrix), and density. This work (especially Stevenson et al. 1993) also determined that the amount of water varies significantly from sample to sample in a single obsidian source, requiring artifact-specific measurements of this variable (density) for the purpose of rate estimation.

The amount of intrinsic water is the currently identified major internal chemistry factor, and there is a quantifiable proxy relationship between relative density and intrinsic water. The density measurement utilizes the weight in air versus the weight in liquid of each sample of obsidian, taking advantage of the Archimedean principle. This gravimetric method was utilized here. Weights were taken on a scale valid to four decimal places

(with a Mettler AG104 balance), using a heavy liquid to increase surface adhesion and reduce bubbles, thereby reducing errors.

The algorithms that determine how to go from density to water content to effect on hydration rate are available in software from Stevenson. These algorithms include correction factors for calculating density for the special liquid's temperature and for laboratory-to-laboratory calibration using a master quartz wedge.

The rate or speed of hydration (a higher rate means a younger date for a given rim thickness) is affected by the quantity of water ions available in the surrounding atmosphere, referred to as relative humidity (RH). Friedman et al. (1994) review the algorithm defining the relationship between relative humidity and hydration rate.

The other significant environmental factor affecting obsidian hydration is the rate of chemical reaction. This is defined by the Arrhenius equation (Laidler 1984), which requires measurements of the temperature at which the reaction is taking place. Because the temperature at any site changes constantly, a means that "averaged" the temperature, accounting for the greater effect of temperature rise versus temperature drop on the chemical reaction, was developed. This "average" is known as the effective hydration temperature (EHT). The superior method for measuring EHT and RH is via saturated salt cells buried for one year at various depths in a site. The weight change over a year is then used to calculate EHT and RH (e.g., Trembour et al. 1990).

Another method for estimating EHT is to use air temperature data from weather stations using Lee's equation (Lee 1969). However, air temperature is not equal to subsurface temperatures, and our experience indicates that air temperature data used in Lee's equation results in EHTs understated by several degrees. This can have a significant effect on the calculation of dates. Therefore, some reports use an EHT calculated via Lee's equation multiplied by a "correction" factor.

A different type of salt cell may be used to measure RH, another critical variable. Usually, EHT and RH cells are buried in pairs at various depths in a site to provide a profile of environmental variability with depth. In the absence of cell data, RH may be more easily estimated than

EHT, assuming that the RH approaches 95 to 99 percent in most sites below 20 cm. The accuracy of any study of age determination is highly dependent upon this data, which is greatly enhanced if it is from the use of site-specific cells.

The current thinking on obsidian hydration dating is best summarized by three major assumptions (Stevenson et al. 2000):

1. Obsidian sources will have a range of hydration rates that are a function of the variation in intrinsic water content;
2. There is no observable relationship between trace element concentrations and the intrinsic water content;
3. Ambient temperature and relative humidity conditions significantly influence the rate of obsidian hydration.

Thus a piece-specific hydration rate method, applied here, utilizes three analytical procedures:

1. Measurement of the hydration rind thickness;
2. Measurement or estimation of soil temperature and relative humidity;
3. Calculation of rate constants determined from glass composition (the Ambrose/Stevenson relative density/intrinsic water method).

The Samples from the Camel Site

This approach to the estimation of hydration rates differs from earlier methods that were largely or entirely empirical, wherein hydration rim depths were “matched” to associated non-obsidian dating information to create a source-specific hydration rate. This method results in a hydration rate for each artifact. Given the need to test the archaeological associations, hydration rates could not be “matched” to the actual Camel Site date, ca. 3000 B.C.E., for obvious reasons of logic. However, to better control the relative dating of the artifacts, samples were also run from the known-age site of Nahal Lavan 109, an early Pre-Pottery Neolithic B site dating to the first half of the ninth millennium B.C.E. (calibrated),

about whose associations there was no question (Burian and Friedman 1988; Burian et al. 1976).

For this analysis, two or three slides were made for each sample. This was done due to the difficulty in finding a reading from an accurate rind. The sample size is small, and there is obvious “sandblasting” damage to most of the surfaces. The water content was determined gravimetrically, as discussed above. For the environmental factors, RH was estimated to be 97 percent (from salt cell data as measured from similar sites in the California Great Basin). For EHT, the more sensitive and more important factor, weather station data from Mitzpe Ramon was used for the Camel Site, and data from Sderot was used for Nahal Lavan 109. This factor was also compared with similar data from the California Great Basin, Death Valley, and Mojave weather stations and with salt cell data from Inyo-182 (another site in the western Great Basin area).

The results of the obsidian hydration dating for these two sites are somewhat better than simple relative dating. As an absolute dating technique, however, these results are promising but suffer from two major problems, sample size and rind measurement.

For the Camel Site, only three artifacts were recovered and available for measurement. Data are summarized in Table 9.3. The water-content percentages were very consistent, and it is felt that the environmental factors are reasonable, although salt cell data would be preferable. The rind size, however, measures 6.1 microns on OHL 16200, and this is the “cleanest” reading. For 16198 the rind read 5.0 microns, and for 16199 the rind was 5.2 microns, but both are on pieces that showed sandblasting. There is no known method of determining how much of the outer edge has been worn away. We have arbitrarily added 10 percent to the rind readings of three samples (two from the Camel Site and one from Nahal Lavan 109) to provide a perspective on the possible variability in the dates. The resultant range of “roughly usable” dates is 1850 to 5200 B.C.E.

For Nahal Lavan 109, five debitage samples were utilized. Only OHL 16222 had both a rhyolitic-level water percentage (0.1279 percent by weight) and a readable rind of 10.5 microns (dating provided at 10.5 and at 11.6 microns, or plus

Table 9.3. Obsidian Hydration Data Summary

OHL	Grid	USF	Rind (microns)	Mass (g)	EHT	RH %	RH (by Weight)	Hydration Rate	Age BP	B.C.E.
Camel										
16198	M27d	499	5.0	2.34	22.37	0.97	0.1105	6.6	3801	1851
	Upper	499	5.5						4597	2647*
16199	M28c	500	5.2	0.80	22.37	0.97	0.0989	5.5	4943	2993
	Upper		5.7						5981	4031*
16200	J30c	501	6.1	0.65	22.37	0.97	0.0958	5.2	7128	5178
	Surface									
Nahal Lavan 109										
16222			10.5	1.41	26.40	0.97	0.1279	13.0	8536	6586
			11.6						10328	8378*
16223			3.2	2.89	26.40	26.4	-0.0036	13.0	Aberrant	
16224			No hydration value	1.89	26.40	0.97	0.2304	28.7	Aberrant	
16225			4.4	0.54	26.40	0.97	0.3881	52.9	Aberrant	
16226			11.4	2.39	26.40	0.97	6.7352	757.9	Aberrant	
			11.4	2.39	26.40	0.97	0.1279	13.0	9937	7987**

NOTE: EHT for the Camel Site is taken from Mitzpe Ramon. EHT for Nahal Lavan 109 is taken from Sderot.
USF refers to the composition analysis by Tykot.

*Added 10% to rind to adjust for sandblasted surface.

**Water content estimated using sample 16222 measurement.

10 percent, to possibly account for weathering). Samples designated as OHL 16223, 16224, and 16225 had both very erratic water contents and no reasonably sized rinds. Sample OHL 16226 did exhibit a good readable rind at 11.4 microns, but the water content (at 4.5224 percent) is off scale. So to provide at least one other date, the relative density and thus water content of 16222 was used. The result suggests a rough range of 6600 to 8400 B.C.E.

between the Pre-Pottery Neolithic B materials and those deriving from the Early Bronze Age. In other words, the Camel Site obsidian reflects a contemporary connection with Anatolia and not the mere looting or collection of materials from early local sites. This distinction is also supported by the differing water contents of the artifacts, suggesting the likelihood of different sources. The chemical composition analyses conducted by Tykot are also in accord with these conclusions.

Hydration Analysis Summary

For our purposes, the key result of the hydration analysis is the clear distinction that can be drawn

DISCUSSION

The discovery and analysis of three obsidian artifacts from the Early Bronze Age Camel Site offer

several conclusions beyond the linkage with Anatolia (Figure 9.3). In particular, the results indicate that the basic structure of the Negev–Anatolia Early Bronze Age exchange link contrasted in all its particulars—source, route, and function—with that of the Pre-Pottery Neolithic period, the only other period for which obsidian has been recovered in the central Negev.

In terms of sources, Pre-Pottery Neolithic B obsidian from the central Negev, as defined by Nahal Lavan 109 (Perlman and Yellin 1980), derives exclusively from Cappadocia in central Anatolia. In general, southern Levantine Pre-Pottery Neolithic obsidian originates primarily from central Anatolia, although in later periods, the later Neolithic and the Chalcolithic, eastern Anatolian

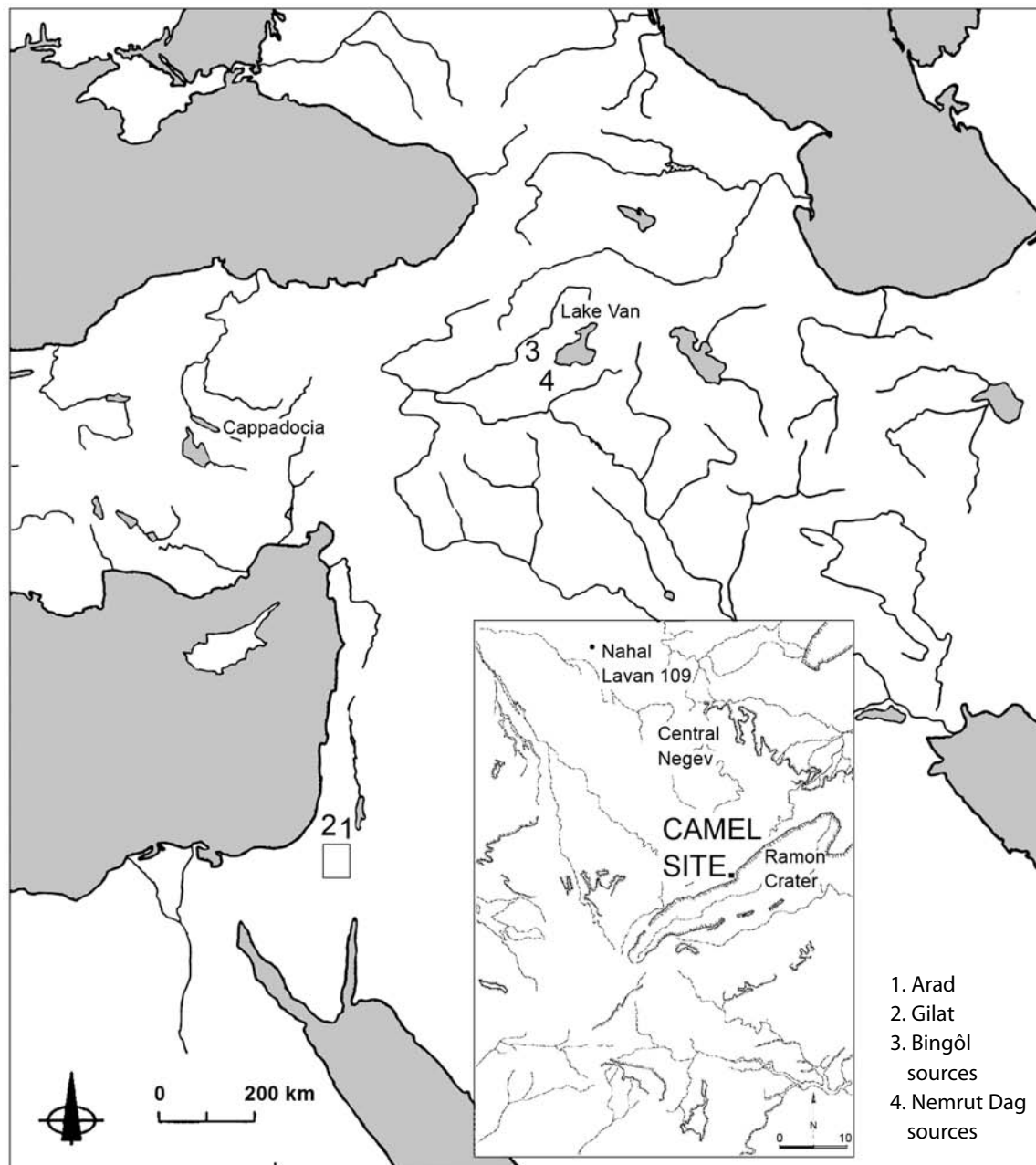


Figure 9.3. Sites and locations mentioned in text.

sources are also evident (e.g., Cauvin 1994: figure 4; Gopher et al. 1998). However, even when eastern Anatolian obsidian is present, as at Chalcolithic Gilat (Yellin et al. 1996), the central Anatolian sources dominate. The contrast with the Camel materials, deriving from the Lake Van area in eastern Anatolia, is obvious.

In terms of route, although the difference in sources between the periods suggests the possibility of different transport routes, the key issue is really that in the Pre-Pottery Neolithic B, one can trace a continuum of obsidian from central Anatolia through the western Levant and down to the deserts of the southern Levant in a fall-off curve interpreted by Renfrew (1975, 1977) as down-the-line trade. That is, there are numerous PPNB sites in Israel and Palestine with obsidian, and there is no major geographic gap in the distribution from north to south. Data from other periods remain too scanty for reasonable reconstruction. Garfinkle (1993) notes the general decline of the obsidian trade with the end of the Pre-Pottery Neolithic.

In significant contrast, Early Bronze Age sites in the southern Levant are lacking obsidian. Even given the very small number of artifacts recovered from the Camel Site, the absence of obsidian from geographically intervening sites, especially from the known desert gateway city at Arad (e.g., Amiran et al. 1997; Finkelstein 1995:67–86; Kempinski 1989), strongly suggests that there was no down-the-line obsidian exchange through the Mediterranean zone of the southern Levant. The only other alternative is a route through the Syrian and Jordanian deserts.

Finally, in terms of function, the differences between obsidian and flint in terms of raw material properties are reasonably straightforward. Obsidian is structurally amorphous. It is thus more easily knapped and capable of achieving a sharper edge than flint. It also tends to have a glossier and smoother surface than flint. Access to obsidian in the Near East is also more restricted than access to flint. On the other hand, flint is a stiffer, less brittle material and is somewhat harder. The larger number and range of flint sources result in greater heterogeneity and hence variability in its basic attributes. These differences are reflected in the archaeological record in what

appears to be a greater preference for obsidian in areas where it is readily available and an added value where it is present but scarce.

In the Neolithic Levant, both materials were exploited in the production of chipped stone tools, in spite of the scarcity of obsidian. Thus PPNB obsidian assemblages, especially as exemplified by the materials from Nahal Lavan 109 (Burian and Friedman 1988; Burian et al. 1976), include a large range of tool types, typologically identical to those made from flint, and the complement of debitage reflecting local production. Obsidian, while probably perceived as something special and perhaps more valuable than local flint, was nevertheless traded and treated as a raw material for the production of tools.

In post-Neolithic times, the range of uses of obsidian broadens, including jewelry, magic, medicine, vessel manufacture, mirrors, and sculpture (Coqueugniot 1998). The three pieces recovered from the Camel Site reflect a fundamentally different phenomenon from the Neolithic. They are not tools in a lithic technological sense; nor can they in any way be interpreted as raw material for tool manufacture. Furthermore, as indicated above, the absence of any production waste in a 100-percent-sieved site (2–3 mm mesh) indicates clearly that they were chipped elsewhere and imported to the site as small flakes. Thus their only value can lie in their trinket status as rare objects and cannot derive from any utilitarian function. In this they are akin to the other trinket-type artifacts recovered from the excavations, including pink quartz crystals, shells and shell beads from the Mediterranean and Red Seas, freshwater mother-of-pearl (Nilotic?), the several black flint flakes found near them, and perhaps small local fossils (Chapter 10). Notably, the Camel Site shows evidence for ostrich eggshell bead production (Rosen 1997a; Chapter 10).

These basic contrasts in the structure of the obsidian trade in turn suggest conclusions concerning both the nature of the obsidian exchange in the different periods and its role in the respective societies. Returning to the general characteristics of ancient Near Eastern obsidian exchange as down-the-line trade (Renfrew 1975, 1977), a key element in this trade is the mobility of the agents of exchange. Bar-Yosef and Belfer-Cohen

(1989) have suggested that hunting parties operated as prime agents in the movement of goods and the exchange of ideas in the Pre-Pottery Neolithic B—in fact, serving as the glue cementing the Levantine interaction sphere into an integrated unit. For our purposes here, the key point is that PPNB mobility—hunting—extended throughout the Levant, even in the Mediterranean farming zone, and it constituted a primary activity among large segments of the population. That is, the proportion of the population engaged in hunting must have been quite high, and thus the movement of goods such as obsidian was relatively straightforward.

In contrast to this system of relatively high-mobility hunting, albeit tethered to sedentary villages, Levantine Early Bronze Age society was primarily urban and sedentary, with an economy based on cereal agriculture, arboriculture, and domestic herd animals. Although one could attempt to make the case that the pastoral component of this society played a role similar to that of the hunters of the PPNB, the parallel is not justified, if for no other reason than the unlikelihood that more than a fraction of the urban Early Bronze Age population engaged in herdsman husbandry (see Khazanov 1984:22 for a definition of herdsman husbandry).

Thus the absence of obsidian in the Mediterranean zone is perhaps comprehensible, a function of increasing sedentism. This would also explain the decline in obsidian exchange in the later stages of the Neolithic and the Chalcolithic. On the other hand, the development of peripheral pastoral nomadic societies on the desert fringes—that is, the Camel Site, both in the east and the south (e.g. Betts 2001; Garrard et al. 1996; Rosen 2002a, 2002b)—provides a rationale for the alternative route suggested earlier and an agency of exchange for that route. As with the PPNB hunters, the high mobility of these early mobile pastoralists offers the means for the movement of obsidian from the Anatolian source area. Unfortunately, we are still lacking the intensive exploration of these regions necessary to confirm this hypothesis.

The significance of the trinket trade for Early Bronze Age desert nomads should not be underestimated. Wiessner (e.g., 1984) has noted the

role of reciprocal exchange among the Kalahari San, providing one of the basic glues of the social system. The scarcity of such artifacts as Anatolian obsidian may suggest that they were valuable. The presence of other beads and trinkets, deriving from a variety of sources, indicates the range and variety of trade connections. The combination of value and variation reflects the importance of the trinket trade to Early Bronze Age desert pastoral society (Chapters 10 and 13). The apparent structural transformation of the obsidian trade from its relatively utilitarian Neolithic antecedents to the Bronze Age trinket trade can be tied to the fundamental evolution of Near Eastern societies from Neolithic farmer-hunters to the complex and variegated societies of early historic times.

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Felix Burian was gracious in allowing us to sample five artifacts from Nahal Lavan 109 for hydration comparison purposes. Chris Stevenson offered important consultation on this work. A basic OHD bibliography is available courtesy of M. Gottesman at www.peak.org/obsidian/index.html. An earlier version of this work was published in Rosen et al. (2005). Mike Gottesman passed away between that first publication of the Camel Site obsidian and this final report in the context of the entire site. He was a good friend and a model of the amateur scholar—professional in every way in his research. He is genuinely missed.

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SHELLS, BEADS, AND OTHER ARTIFACTS

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DANIELLA E. BAR-YOSEF MAYER

Although the number of small objects recovered from the Camel Site (not including ceramics and lithics) is limited, the range in sources, materials, and production systems reflected in these materials is great, rendering these objects far more important than their limited numbers might imply. This is especially so when considered in combination with copper objects (Chapter 8), sandstone milling stones (Chapter 7), and obsidian (Chapter 9), all of which objectively are part of the same set of small objects reviewed in this chapter. Anticipating later discussion (Chapter 13), these materials reflect distant, medium-range, and local trade systems; cottage industry production for internal consumption and cash exchange; and reciprocity exchange. Of course, these systems are also reflected in the larger assemblages of ceramics (Chapter 5) and lithics (Chapter 6), but the documentation of the trinket system adds a new dimension to that of the larger-scale production of stone tools and pots, and the system probably functioned on a different level socially.

OSTRICH EGGSHELL FRAGMENTS AND BEADS

Forty-one fragments of ostrich eggshells (Figure 10.1) were recovered, primarily from in and

around Locus 37 (Chapter 12). These vary roughly between 5 and 50 mm in length and tend to be triangular or rectangular in shape. The rather standardized size and shape, along with the restricted context and their clear use as raw material for bead production, indicate that they were deliberately broken for use in bead production. Although sometimes assumed to have been used as water containers, none of the ostrich eggshell fragments showed the remains of a large round hole, which might indicate earlier use as a storage vessel. Ostriches were known in the Negev through the nineteenth century (Tristram 1884:139), after which they were hunted to extinction.

In addition to the eggshell fragments, six beads representing different stages of manufacture were recovered (Figure 10.2). Figure 10.2:5, right, shows a small eggshell fragment with what appears to be the beginning of a hole on one side and what appears to have been slippage and a second hole made before the piece was discarded. Figure 10.2:4 shows a partially worked ostrich eggshell disk that appears to have been broken before completion. Figures 10.2:2 and 10.2:3 are holed disks. One of them (Figure 10. 2:2, left) seems to have been deliberately colored black, although we cannot rule out post-depositional discoloration. The

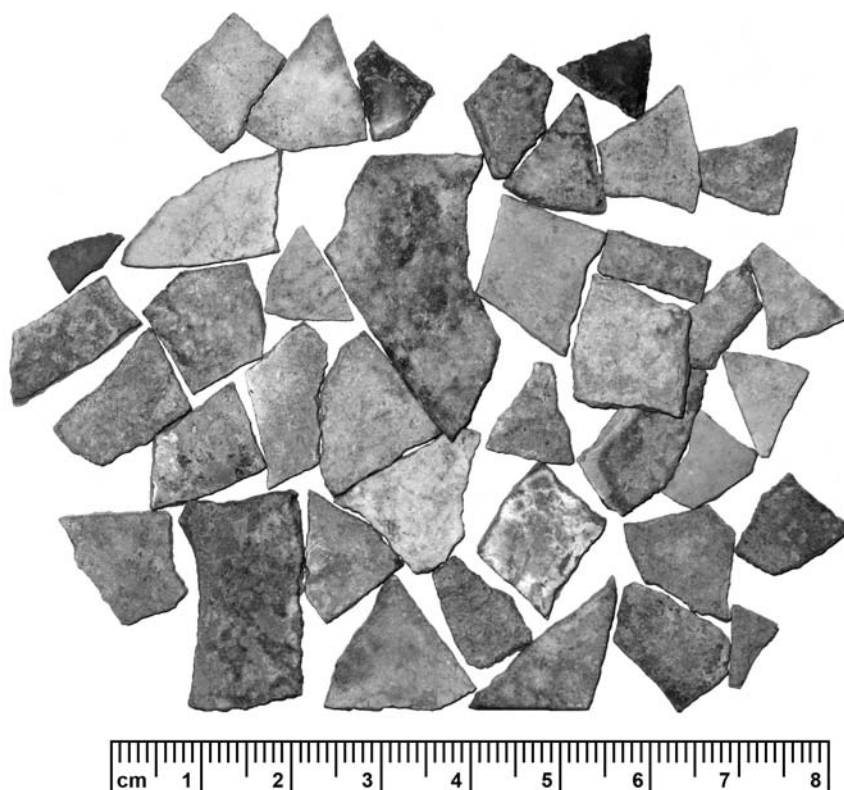


Figure 10.1. Typical ostrich eggshell fragments from Locus 37.

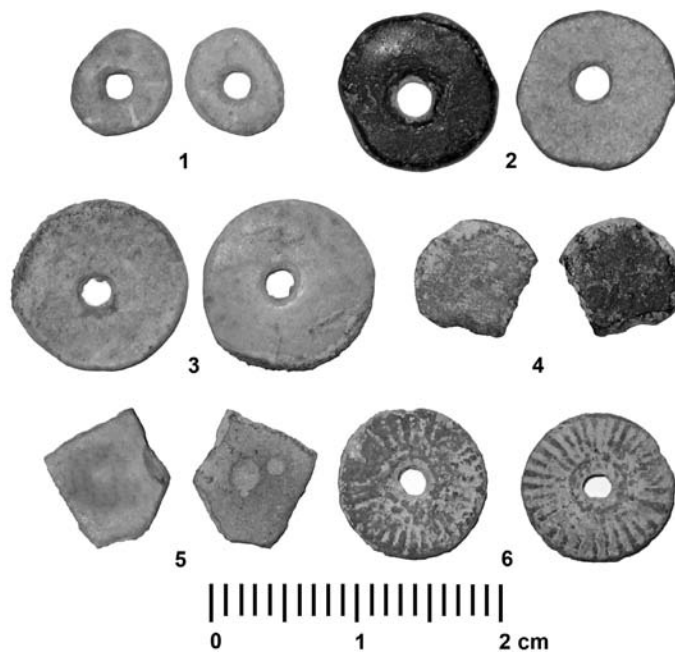


Figure 10.2. Ostrich eggshell beads in varying stages of completion.

holes match the diameter of the microlithic drills recovered from Locus 37 (Chapter 6). Figure 10.2:1-left shows what appear to be the beginnings of grooved decorations that are fully expressed in Figure 10.2:6.

Beads are not an uncommon occurrence in Chalcolithic and Early Bronze Age contexts in the Negev and adjacent areas (e.g., Amiran 1978: 58; Bar-Yosef et al. 1977; Beit-Arieh 2003:224–227; Kenyon 1960:52–180; Macdonald 1932: plates XXI, XXII, XXIV; Saidel 2002; Schaub and Rast 1989:462). Amiran (1978:plate 120.6) illustrates a parallel to Figure 10.2:1 but indicates that the item from Arad is on limestone. No exact parallels to the finished, decorated bead (Figure 10.2:6) have been reported. Ostrich eggshell fragments have been found at some Early Bronze Age and Chalcolithic sites, such as Arad (Amiran 1978: plate 120:8), and in Early Bronze Age sites in southern Sinai (Bar-Yosef Mayer 2003) and the western Negev (Burian and Friedman 1987), but beads of this material have been identified from only a few sites, such as the *nawamis* at Ein Huderah (Bar-Yosef et al. 1977), Rekhes Nafha in the central Negev (Saidel 2002), and a few sites in southern Sinai (Bar-Yosef Mayer 1999:86; also cf. Beit-Arieh 2003: figure 8.2:11). Most sites do not show evidence for manufacture, and the produc-

tion sequence as reflected in the Camel Site assemblage has not been previously documented.

HEMATITE (Y. AVNI AND S. A. ROSEN)

One small piece of worked hematite was recovered from Square N29b upper (Locus 31) (Figure 10.3). It measures approximately $2.5 \times 1.2 \times 1.3$ cm in dimensions and is somewhat wedge shaped. It is smooth on the basal surface, shows striations on the two lateral surfaces, and is irregular and pocked on the upper surfaces. None of these textures is natural, and the piece is clearly worked, although its function is unclear.

Small pieces of hematite can be taken from the iron ore layer resting along an unconformity boundary developed between the late Cretaceous and early Tertiary formations exposed north of the Ramon structure in the vicinity of Har Aricha and Mishor Haruchot, about 5 km north of the Camel Site. Hematite is also found in the Ora Formation from the Turonian age, resting in the same location below the unconformity. Other sources can be found within the *makhtesh* in several units, including the lower Cretaceous Hatira Formation and the Jurassic Mishhor Formation.

Assuming that the piece recovered here is, in fact, a bit of raw material, then given the presence



Figure 10.3. Hematite from the Camel Site.

of hematite objects such as beads at sites farther north, such as Arad (Amiran 1978: plate 120:7), one can conclude that it is likely that this piece was intended as a trade item, perhaps akin in this respect to the recovered scraps of copper (Chapters 8 and 13). Hematite objects have not been recovered at any sites in the desert.

MOLLUSCAN SHELLS (D. BAR-YOSEF MAYER AND S. A. ROSEN)

The eight shells (Figure 10.4) recovered from the Camel Site constitute a small but very varied col-

lection. The materials are summarized in Table 10.1. In particular, shells derive from both the Red Sea (*Nerita sanguinolenta* and Turridae) and the Mediterranean (*Nassarius gibbosulus*, *Cerastoderma glaucum*). *Unio*, mother-of-pearl, reflects an indeterminate freshwater source, obviously not local (the Nile? northern Israel?). The presence of intentional holes in most of the shells clearly indicates their primary use as beads. Shell beads and mother-of-pearl are common in the desert in the proto-urban periods, and Bar-Yosef Mayer (1999, 2002) has suggested that shell beads were of some value in early desert societies, playing the role of a

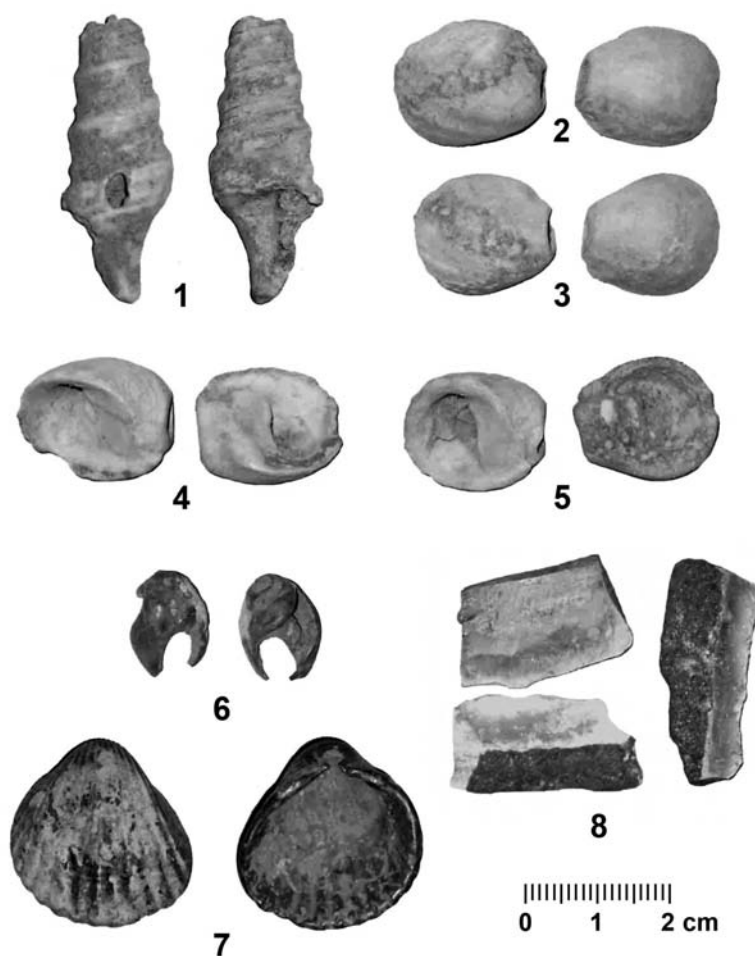


Figure 10.4. Mollusk shells: (1) Turridae; (2–5) *Nerita sanguinolenta*; (6) *Nassarius gibbosulus*; (7) *Cerastoderma glaucum*; (8) *Unio* sp.

Table 10.1. Seashells from the Camel Site

Classification	Number	Provenience	Source	Notes
<i>Nerita sanguinolenta</i>	4	O26b	Red Sea	Intentional holes opposite aperture
<i>Nassarius gibbosulus</i>	1	P28a lower	Mediterranean	Naturally abraded hole in dorsum (burned)
Turridae	1	N27b	Red Sea	Broken
<i>Cerastoderma glaucum</i>	1	P29c lower	Mediterranean	Artificial hole in umba, broken (burned)
<i>Unio</i> sp.	3	Q30a	Freshwater	Fragments, mother-of-pearl

kind of exchange medium, if not a formal currency, in systems of reciprocal exchange.

CRYSTALS, PEBBLES, AND FOSSILS (S. A. ROSEN AND Y. AVNI)

Three small pink quartz crystals (Figure 10.5, left), two white quartz pebbles (not pictured), and one small black pebble (Figure 10.5, right) were found in squares I32d upper, I33b upper, L29a surface, L29d surface, N29c lower, and F34a lower. The crystals measure 14×6 , 18×6 , and 13×6 mm, respectively. The first one is malformed and battered, showing only a crystalline shape at one end. The other two are well-formed crystals, the larger one showing some rounding or battering on the two pointed ends. The quartz pebbles are rounded, 2 to 3 cm in length, and are amorphous in shape.

These pink quartz idiomorphic crystals originated in the lower part of the Middle Jurassic Ardon Formation, composed of limestone and clay. The Ardon Formation was deposited in shal-

low marine conditions and probably contains some gypsum geodes resulting from hypersaline conditions. Later these geodes were replaced by silica fluids as part of the chemical diagenetic transformation that often occurred in the fresh sediment a few meters below the sea-sediment boundary. The silica fluids were consolidated to form the quartz idiomorphic crystals, and the pink color resulted from the iron oxides often involved in shallow marine sedimentation processes. After exposure of the geologic strata, the pink crystals were widespread in the thin cover of the slopes, drifted down the drainage basins in the central part of the Makhtesh Ramon, and were integrated in the alluvial terraces, where they still can be found in large numbers on the present surface. These terraces were probably the main source of crystals for ancient people, who collected them from alluvial terraces rather than mined them from geological sections. The location of these trinkets on the site describes an arc in the southeastern corner of the architecture, in and adjacent to room Loci 32 and 41.



Figure 10.5. Pink quartz crystals (left three) and a black polished pebble (two faces, right).

White quartz crystals can be found locally around the site in a number of locations, although they were most certainly collected and brought to the site. Similarly, the polished black pebble (Figure 10.5, right) is local in origin but was brought into the site.

FOSSIL SHELLS

Four fossil shells (Figure 10.6) were recovered from the site. Three are Echinoidea (Figures 10.6:1–3), and the fourth (Figure 10.6:4) is an unidentifiable fragment. All are local in origin but were collected and brought to the site. Functionally, the Echinoidea may well have served as amulets of some kind, akin to other trinkets.

LIMESTONE LID

A worked limestone disk (Figure 10.7) was found in Square P31d lower. It probably served as a lid

for a container. The raw material is local, and it is clearly chipped around the edges.

SUMMARY

The small finds described here can be classified along several axes: function (raw materials, utilitarian objects, trinkets), origins (local, distant, directional), source (collection, manufacture, trade), and consumption (local, export). These are summarized in Table 10.2, with the obsidian (Chapter 9) added. A range of production investment is also reflected, so that the drilled beads clearly reflect more work in manufacture and value derived from effort, as opposed to value derived from rarity or distance, as with other items. Thus the variability in small finds is evident, and clearly the class is actually artificial. Nevertheless, it reflects a greater complexity in the society represented by the Camel Site than expected or reflected in earlier literature. Besides the semispecialized pro-

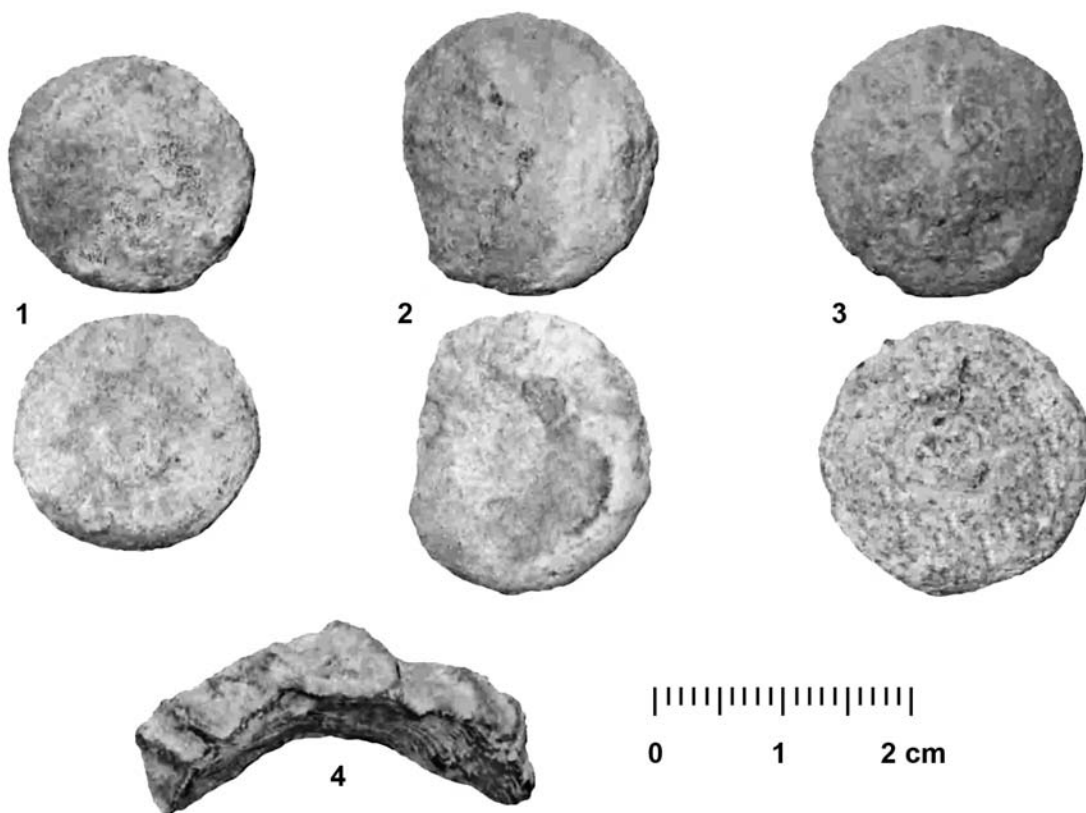


Figure 10.6. Fossils.



Figure 10.7. Limestone lid.

Table 10.2. Summary of Small Finds

Objects	Function	Origins	Source	Consumption
Ostrich eggshells	Raw material	Local	Collected	Local
Drilled beads	Trinkets	Local	Manufactured	Local and export
Hematite	Raw material	Local	Collected and semiworked	Export
Seashells	Trinkets	Distant	Collected or traded, worked	Local and export
Crystals	Trinkets	Local	Collected	Local
Pebbles	Trinkets	Local	Collected	Local
Fossils	Trinkets	Local	Collected	Local
Disk	Utilitarian	Local	Manufactured	Local
Obsidian	Trinket	Distant	Traded	Local

duction for export, as low level as it is, reflected in the beads and hematite (and other aspects, such as the milling stones discussed in Chapter 7), the role of trinkets here is important. Not only do they derive from both local and distant sources but also from a range of locales, indicating exchange connections in literally all directions.

Trinkets and trinket exchange in small-scale societies serve several functions, including self and group identity, promotion of social bonds, and a means of preserving capital (e.g., Hodder 1982; Malinowski 1961:81–95; Marshall 1976; Sahlins 1972; Wiessner 1983, 1984). It is likely that all three functions are reflected here.

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SEDIMENTS AND MICROARTIFACTS FROM THE CAMEL SITE

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Analyses of sediments and microartifacts from the Camel Site were conducted to investigate the past environment, site formation processes, and activities on-site. The various techniques utilized—sediment particle size, magnetic susceptibility, loss on ignition, and microartifact analysis—are standard geoarchaeological techniques (e.g., Goldberg and Macphail 2006; Rapp and Hill 2006; Rosen 1986).

Sediment samples were collected from all loci and all strata, with the intent of examining a range of variables. As it turns out, the first set of samples submitted for analysis, including micromorphological samples, was lost when the analyst abandoned the discipline, leaving no record of his work and no recoverable materials. Thus the work reported on here was based on “leftovers” and ultimately suffers from problems of inadequate sampling. Nevertheless, the data contribute significantly to our understanding of the site and its formation.

THE SAMPLES

Ten samples from the site were analyzed. They were taken from two stratigraphic contexts: the upper layer, consisting of yellow silts, and the lower organic horizon, somewhat darker gray in color. Spatially, the samples analyzed were taken

from both within the architecture and external to it (Figure 11.1).

The two O30a samples are from a large irregular enclosure, Locus 31. Enclosed by round low walls, it is a subunit of the site and slopes toward the west. One sample, O30a upper, was taken from directly beneath a large, unused, and in situ milling stone, placed face down in the locus. The second sample, O30a lower, was taken from the organic horizon just above bedrock.

The sample from L35b upper is from outside the architecture in the open area on the north side of the site, opposite small room Loci 42 and 45 and enclosure Locus 34. The samples were taken adjacent to two used and complete milling stones, found in situ.

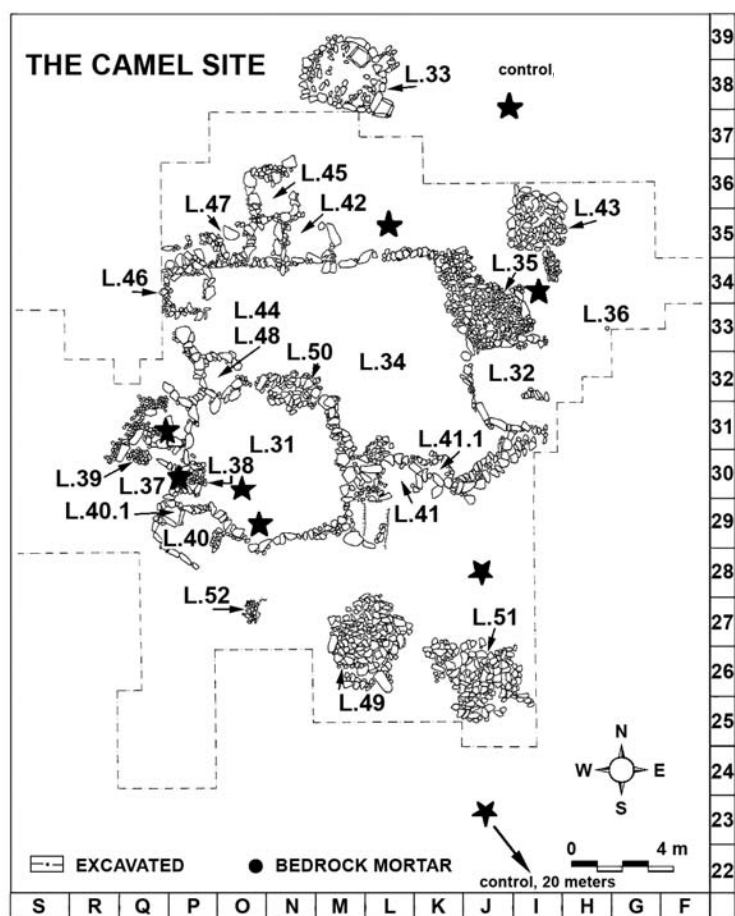
The sample from J28b upper was collected from the open space between Locus 41 and tumuli Loci 49 and 51.

The sample from P30c is from Locus 38, a probable hearth with fire-cracked limestone cobbles, located within enclosure Locus 31.

The sample from O29 lower is from the lower organic layer, adjacent to the grinding stone found in O30a.

The sample from I34b upper was taken from the open area between tumuli Loci 35 and 43, next to hearth Locus 36 and 5 cm above the bedrock.

Figure 11.1. Location of sediment samples analyzed here (*bedrock mortar located at square O22*). The southern control sample was taken 20 m from the star in the direction of the arrow. The northern control sample was taken where indicated.



The sample from Q31 is from the contents of hearth Locus 39, composed of fire-cracked limestone cobbles, inside Locus 37 and stratigraphically later than that locus.

Two geological control samples were examined from off-site—one from 20 to 30 m south-east of the site, and the second from the northern edge of the site.

METHODS

Particle Size Analysis

Particle size analysis measures the size distribution of sediments within the sample. The characteristics of the distribution curve reflect depositional environments and provide information on sources of sediments and the processes through which they were deposited on the site.

Sediment was divided into four general categories of particle size—gravels, sands, silts, and clays—using the Wentworth scale. Gravels (larger than 2 mm in diameter) were measured by hand. Sands (smaller than 2 mm to larger than 0.0625 mm) were sorted through nested sieves into 2 mm, 1 mm, 0.5 mm, 0.25 mm, 0.125 mm, and 0.063 mm fractions. Silts (smaller than 0.625 mm to larger than 0.0039 mm) and clays (larger than 0.0039 mm to larger than 0.00006 mm) were measured according to how fast the particles fell through a given length of a column of water (Stoke's Law). The cumulative weight percentages were plotted against the diameter of the particles to give a cumulative curve for each sample. From these curves, histograms were calculated and examined and the degree of kurtosis determined, reflecting the general mode of sediment deposition (Figure 11.2).

Magnetic Susceptibility

Magnetic susceptibility measures how easily a material can become magnetized (Thompson and Oldfield 1986:25). There is a wide range of magnetic susceptibility values for environmental materials and minerals. Most samples are likely to contain a mixture of minerals, so the significant minerals have to be determined (Dearing 1999: 53). Magnetic minerals, such as magnetite (FeO_4), are ubiquitous and sensitive to environmental changes, making them valuable paleoenvironmental indicators (Gale and Hoare 1991: 202; Thompson and Oldfield 1986:14). Several factors can influence the interpretation of results. Weathering and chemical transformations can concentrate the resistant heavy mineral fraction, which often includes magnetic minerals (Thompson and Oldfield 1986:65). Fire can alter magnetic properties. Above 200 °C, in the presence of organic matter, nonferromagnetic iron minerals start conversion to ferromagnetic minerals (Thompson and Oldfield 1986:75). Organic matter can dilute the intensity of magnetic material, impacting the reading (Thompson and Oldfield 1986:66). The size and shape of magnetic grains influence the magnetic susceptibility. For example, finer sediments show higher susceptibility (Gale and Hoare 1991:204, 205).

All samples from the Camel Site were tested by filling 10 cm³ plastic pots with dry sediment from the 2 mm fraction. Using a Bartington MS2 system, readings were taken using the 0.1 SI range. Air readings were taken before and after the sample readings. Two readings were taken for each sample, adjusted for air and weight.

Loss on Ignition

Loss on ignition measures the amount of organic material in the sediment. In addition to reflecting some measure of human or biotic activity, the amount of organic matter in a sample can affect the magnetic susceptibility. Approximately 500 mg of sediment from each sample was burned in a muffle furnace at 400° C for two hours to remove the organic matter. The percent of organic matter was calculated for each sample.

Microartifacts

The eight on-site samples were examined for microartifacts. Around 500 g of dry sample was weighed into a beaker. A dispersant (sodium hexametaphosphate) and water were added. The sample was stirred thoroughly and left to soak for between 10 minutes and half an hour. After that it was washed through a 125- μ mesh to clean off the clays and silts. Next, what remained in the sieve was dried at 50 °C. Finally, the sample was sorted through nested sieves and divided into fractions of larger than 4 mm, larger than 2 mm, larger than 1 mm, larger than 500 μ , larger than 250 μ , and the pan fraction. All the fractions except the pan were examined for microartifacts, and their artifact percentages were estimated using visual percentage charts (Bullock et al. 1985: figure 24) and a Kyowa optical binocular microscope at 0.7 to 4.5 magnification. While there may be some level of subjectivity in percentage estimation, this methodology has some advantages over other methods. Specifically, individual microartifact counting becomes increasingly difficult for smaller fractions, while comparing the weights or densities of microartifacts does not account for differences in properties between microartifact categories.

RESULTS

Particle Size Analysis (Figure 11.2)

O30a (under Grinding Stone). The grain size frequency curve (Figure 11.2) for this sample is between platykurtic and normal, indicating it is not well sorted. The pebbles and gravels are angular and slightly blunted, while the grains are mostly dull and become more rounded as they decrease in size. The shape of the histogram suggests a mixture of loess and sheet wash, possibly from sediment being eroded and washed downslope in heavy rain. The higher percentage at the fine end of the scale could represent fine silts that were held in place by the grinding stone.

O30a Lower. In contrast to the previous sample, the curve for O30a lower is leptokurtic, suggesting that the sample is poorly sorted. This idea

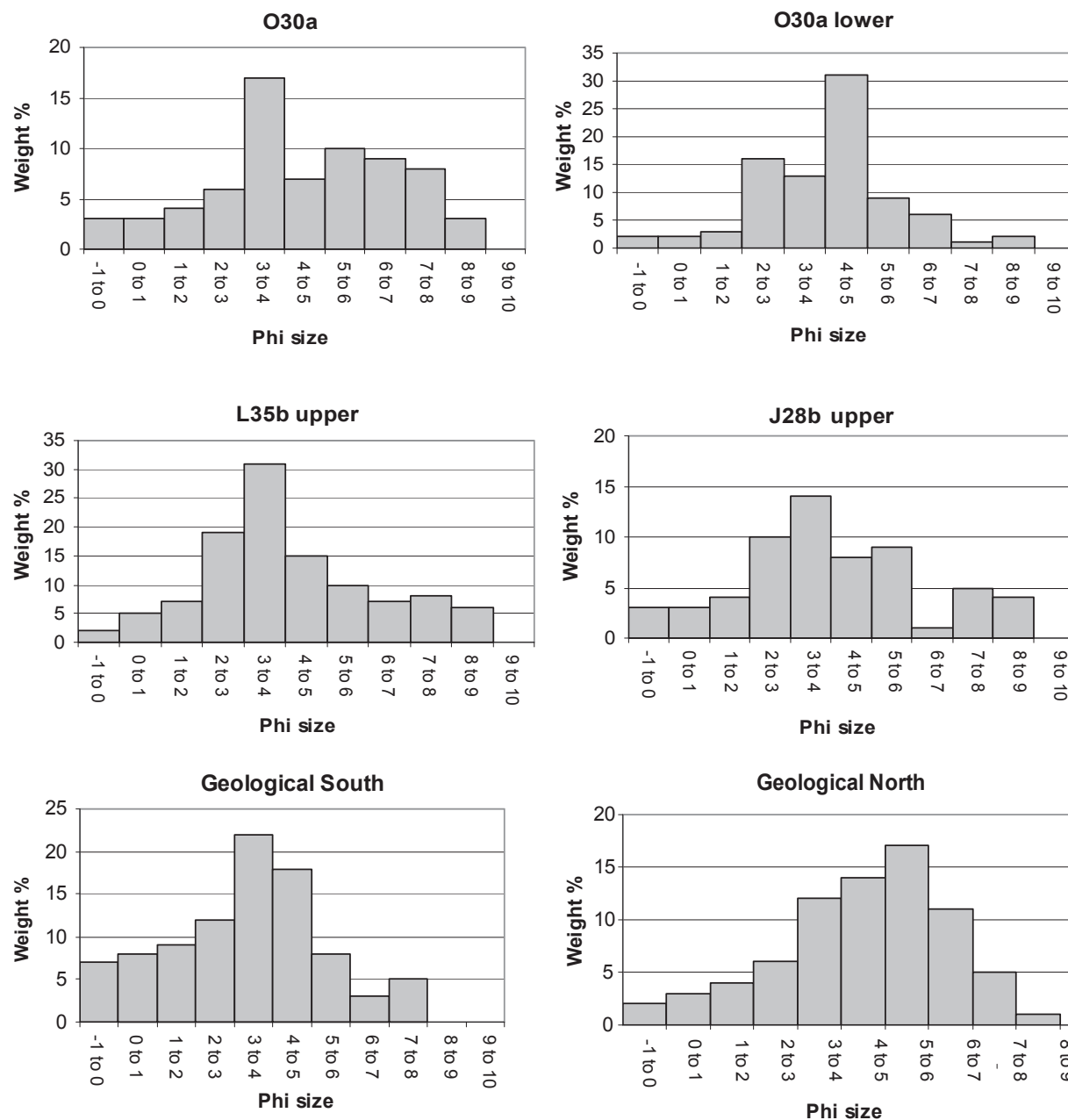


Figure 11.2. Sediment grain size histograms.

is supported by the presence of angular pebbles. The peak is at the sand/silt border. This also suggests a mixture of loess and sheet wash. This sample is from the darker organic level in the center of an enclosure (Locus 31). The sediment here would have been incorporated with any anthropogenic and organic residues, which could explain the contrast with the sample from under the grinding stone.

L35b Upper. The kurtosis for this sample is leptokurtic, indicative of poor sorting. The grav-

els and pebbles are angular, and there is a greater range of sizes, especially gravels. There were more of them than in the other on-site samples. The sample is from the upper level outside the enclosures. The angularity, coupled with the poor sorting, indicates sediment washing in quite rapidly. The nearby wall may have acted as a trap, restricting sediment—for example, the gravels—from moving farther, the poor sorting reflecting the accumulation from sheet wash episodes over a period of time.

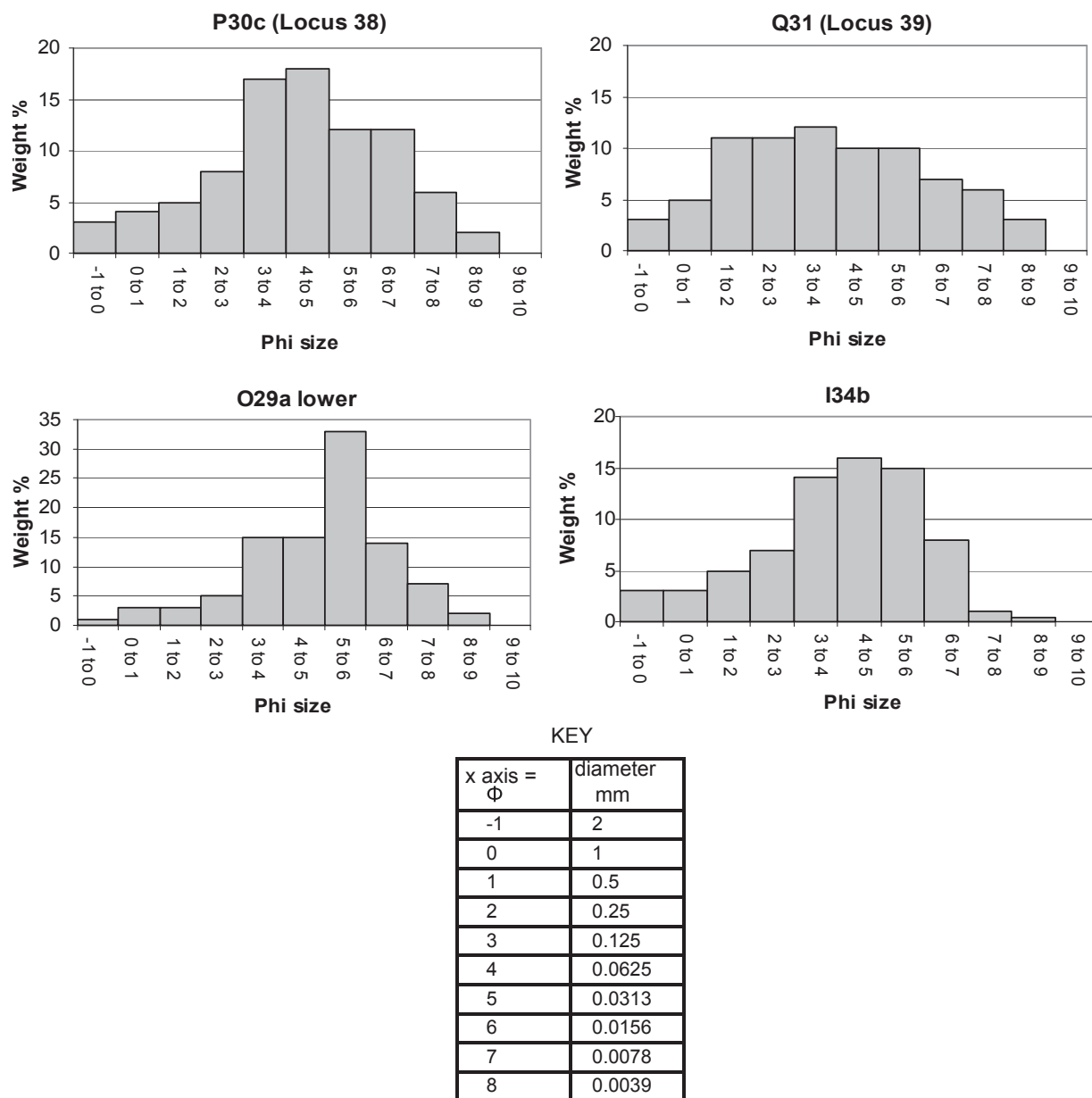


Figure 11.2. (continued) Sediment grain size histograms.

J28b Upper. The grain size frequency curve is quite platykurtic, suggesting the sample is well sorted. This sample is from an open area outside the rooms and enclosures. It should be in the path of any flow downslope yet contains well-sorted sediments, suggesting that any movement was quite gentle. There is nothing to hold the sediments in place.

Southeastern Geological Control. The grain size frequency curve for this off-site sample is normal, and the sediments moderately sorted. The gravels

were angular and slightly blunted, indicating that they had been washed in quite rapidly, probably by sheet wash. The geological sample has a higher weight percentage of coarse sands and a lower percentage of fine fractions than the on-site sediments. This may be the result of erosion of finer fractions. On-site the loess is reworked into the sediments, and the structures prevent some erosion, especially upslope, while away from the protection of the structures, the finer fractions are more likely to be blown or washed away.

Northern Geological Control. The kurtosis of the geological sample from the north of the site is mesokurtic, indicating moderately well-sorted sediments. This distribution suggests a similar sediment depositional environment to the geological sample taken from the south of the site. However, the geological sample taken from the south of the site has a higher weight percentage of coarse sands, while the geological sample taken to the north shows greater similarity to several on-site samples, in particular P30c and I34b.

P30c (Locus 38). The grain size distribution is mesokurtic, indicating moderately well-sorted sediments. Moderately well-sorted sediments are possibly indicative of gentle colluvial flow. The grain size distribution contrasts with Locus 39, which is also interpreted as a possible hearth area. The curve and histogram for Locus 38 are similar to the geological samples and to I34b. This potentially undermines the interpretation of Locus 38 as a hearth. The curve and histogram for Locus 38 seem to be more representative of a general sedimentary signature common to many samples analyzed from the upper sedimentary layer.

Q31 (Locus 39). The grain size distribution is platykurtic, indicating that the sediments are well sorted. The grain size frequency curve is straighter and less like a loess curve than the other samples. This contrast may be due to anthropogenic inclusions relating to this context's interpretation as a hearth. This sample was highly compacted in contrast to the other samples, which correlates with the different sedimentary analysis results.

O29a Lower. The grain size distribution is platykurtic, indicating that the sediment is well sorted. The grain size distribution contrasts with the poorly sorted sediments from O30a lower, which is also from the lower level in Locus 31. However, both samples have comparatively high silt levels. This similarity perhaps relates to the lower-layer context of these samples, which contains an organic component. Organic and anthropogenic inclusions may affect the sedimentary analyses, resulting in variable results in sorting levels.

I34b Upper. The grain size distribution is mesokurtic, indicating moderately well-sorted

sediments, possibly indicating gentle colluvial flow.

The histograms and curves for the geological sample from the north of the site, P30c (Locus 38) and I34b, are very similar. This similarity suggests that the sedimentary makeup of the upper layer within the site is like that of sediments external to the site. The grain size frequency for each is mesokurtic, indicating that they are moderately well sorted. That the geological sample from the north of the site and I34b are moderately well sorted differs from the poorly sorted sediments of L35b, which is also to the north of the site. Moderately well-sorted sediments are possibly indicative of gentle colluvial flow. In each sample the gravels are subangular and slightly blunted, indicating that they washed in quickly.

Although it is difficult to ascertain clear patterns in the grain size analysis of the sediments from the Camel Site, there are nevertheless two important conclusions to be drawn. The dominance of fine sands and silts in all contexts reflects the natural matrix of the site sediments. The scarcity of clays is a general reflection of the loess origins of the sediments and absence of pedogenesis on the site. In general, the grain size analysis supports the stratigraphic interpretation of the site matrix as loess reworked by sheet wash and affected by other processes. The variability between samples indicates that human activities were substantial enough to affect the basic configuration of the sediments, even if in most cases it is difficult to specifically define the processes that caused this variation.

Magnetic Susceptibility

Magnetic susceptibility readings are summarized in Table 11.1 and Figure 11.3. The two off-site geological samples recorded the lowest values. One was taken from 20 to 30 m southeast and upslope of the site, and the second from just northeast of the site, also upslope, so both are unlikely to have been significantly anthropogenically influenced. In contrast, the higher values of all the on-site samples most likely indicate human impact. There is little variability between the on-site magnetic susceptibility readings. L35b upper has the highest value; although it is not a hearth,

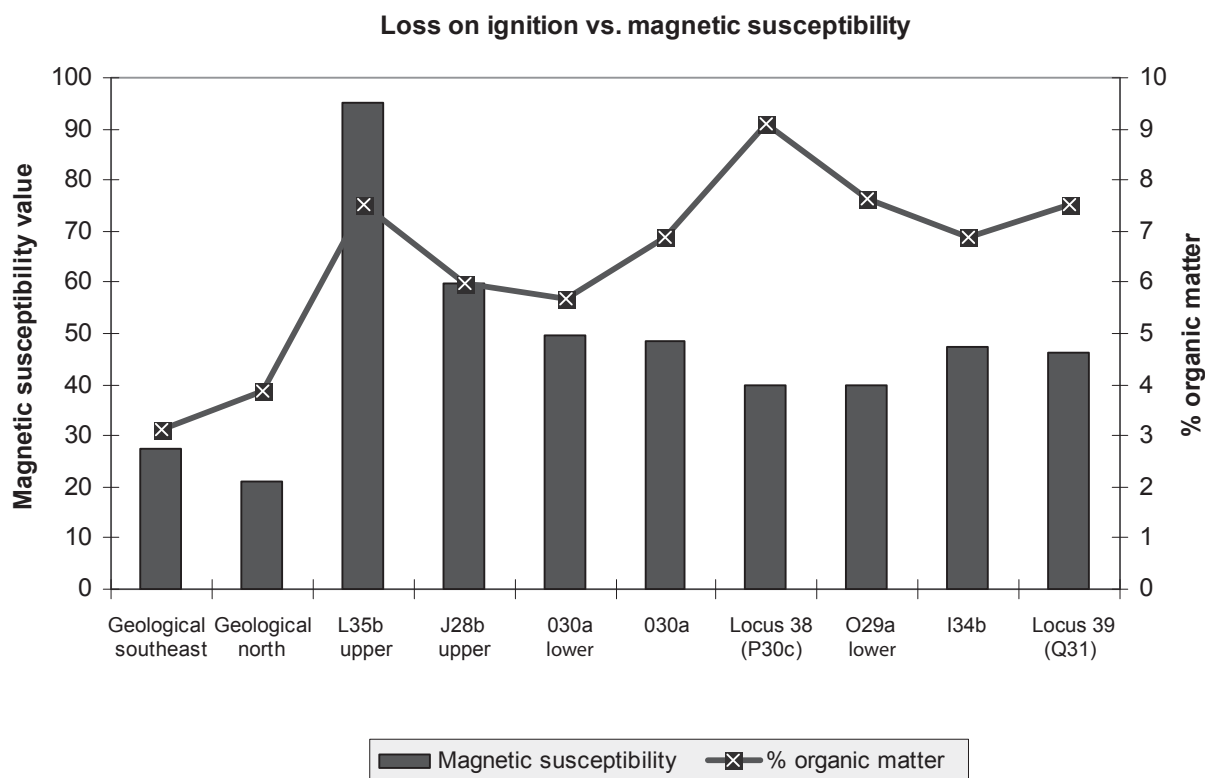
Table 11.1. Magnetic Susceptibility and Organic Matter Result

Sample	Magnetic Susceptibility	% Organic Matter
Geological north	21.12	3.87
Geological-southeast	27.32	3.11
L35b upper	95.15	7.52
J28b upper	59.78	5.96
O30a lower	49.68	5.67
O30a under grinding stone	48.44	6.87
Locus 38 (P30c)	39.8	9.09
O29a lower	39.71	7.63
I34b	47.55	6.89
Locus 39 (Q31)	46.16	7.51

some burning could have taken place here, as demonstrated by the presence of charred wood and some bedrock discoloration. Positioned outside the entrances to the rooms (Loci 42 and 45), close to the enclosure wall, and near the discovery of in situ milling stones, the sample from L35b undoubtedly reflects some specific activities.

Loss on Ignition

The results of the loss on ignition test demonstrated generally low proportions of organic matter (Figure 11.3). This suggests minimal influence on magnetic susceptibility. The geological samples contained the least organic material. In arid, exposed environments such as the Negev, biotic activity is limited and soil formation is slow, and in an exposed area, soil would likely erode rapidly, leaving little organic material (e.g., Butzer 1982: 90). The higher values of all the on-site samples most likely indicate human impact. There is some slight variation between the on-site samples. Most of the samples from the enclosure—O30a under

**Figure 11.3.** Magnetic susceptibility and loss on ignition.

the grinding stone, O29 lower, and P30c—contain comparatively higher levels of organic material; O30a lower has a slightly lower reading. Higher levels from samples within Locus 31 suggest that the organic element may be attributable to the inclusion of dung. It is possible that some of this organic material is also reworked into the upper level.

That P30c has the highest level may derive from Locus 38's possible function as a hearth. A moderately high percentage of organic matter found in L35b may reflect the presence of a fire nearby. Similar organic levels from I34b perhaps reflect proximity to hearth Locus 36, and those from Q31 (Locus 39) may reflect inclusions relating to hearth material or organic matter; the lower organic level is also associated with Locus 39.

Microartifacts

Rock. All samples consisted predominantly of rock, in particular dolomites, limestone, and calcarete, which are probably natural to the site. Smaller amounts of flint and sandstone are also present. Two notable samples are Q31 and I34b. Fire-cracked rock (limestone) is found in Q31, and its presence was the basis on which Locus 39 was identified in the field as a hearth. There is a high proportion of limestone in I34b, likely caused by either the inclusion of limestone bedrock material due to the shallow depth of the sample or inclusions from tumulus Locus 43.

Flint. The lithics present are all flint. Distributions by size category are detailed in Figure 11.4. Samples from O30a, O30a lower, and L35b have no flint present. Tiny amounts, and only in one size fraction, are present in samples from P30c (Locus 38), J28b, and O29a lower. The sample from Q31 (Locus 39) has a moderate amount of flint present. The sample from I34b has a relatively high proportion of flint microartifacts, throughout different size fractions, perhaps due to proximity to the lithic production area adjacent to Locus 36. These distribution patterns fit well with the spatial analysis detailed in Chapter 12.

Sandstone. There are two possible explanations for the presence of sandstone grains. First, sandstone wears down heavily during food pro-

cessing and can produce high rates of particle detachment (Wright 2005:323). Second, the deliberate grinding of rough-outs constitutes the final stage in milling stone manufacture, known to have occurred on the site. There is no sandstone present in samples from O30a, O30a lower, or J28b upper. Samples from O29a lower and P30c (Locus 38) have tiny amounts (0.5 to less than 1 percent) across several size fractions. One larger flake (larger than 4 mm) is present in L35b upper. Q31 (Locus 39) has a moderate amount present throughout the different size fractions. As shown in Figure 11.4, some samples have greater percentages of sandstone in the sand-sized fractions, and they probably reflect areas of production, since processing cereal and plant foods would presumably produce a lower proportion of larger sand grains as waste. Thus for sample I34b, the presence of only ferruginous sandstone, throughout different size fractions, may indicate that this area is a location of sandstone grinding, the final stage in the reduction process, to be distinguished from the chipping process identified in the southwestern corner of the site. Given the presence of sandstone microartifacts throughout the site, post-depositional processes may well have distributed the material beyond the working areas.

Two different types of sandstone are found in the microartifact analysis: a ferruginous sandstone, redder in color, and a nonferruginous type, darker in color and with clearer and more sharply edged quartz crystals. These correspond to the different types of sandstone reflected in the petrographic analysis (Rosen and Schneider 2001; also Chapter 7). Magnetic material was identified, using a magnet, in the smaller fractions of all samples except L35b. The majority were quartz sand attached to an iron oxide matrix. The rest were larger fragments of ferruginous sandstone (cf. FitzPatrick 1980: table 2.1; Kirkaldy 1963:149). This correlates with microartifact analysis that shows low levels of sandstone fragments (0.5 percent in the smallest two fraction sizes) in most samples.

Ceramics. Ceramic distributions by size category are summarized in Figure 11.4. The 4 mm fraction of J28b contained two weathered, reddish yellow sherds. They were not friable, but in places the clay was not completely oxidized, indicating

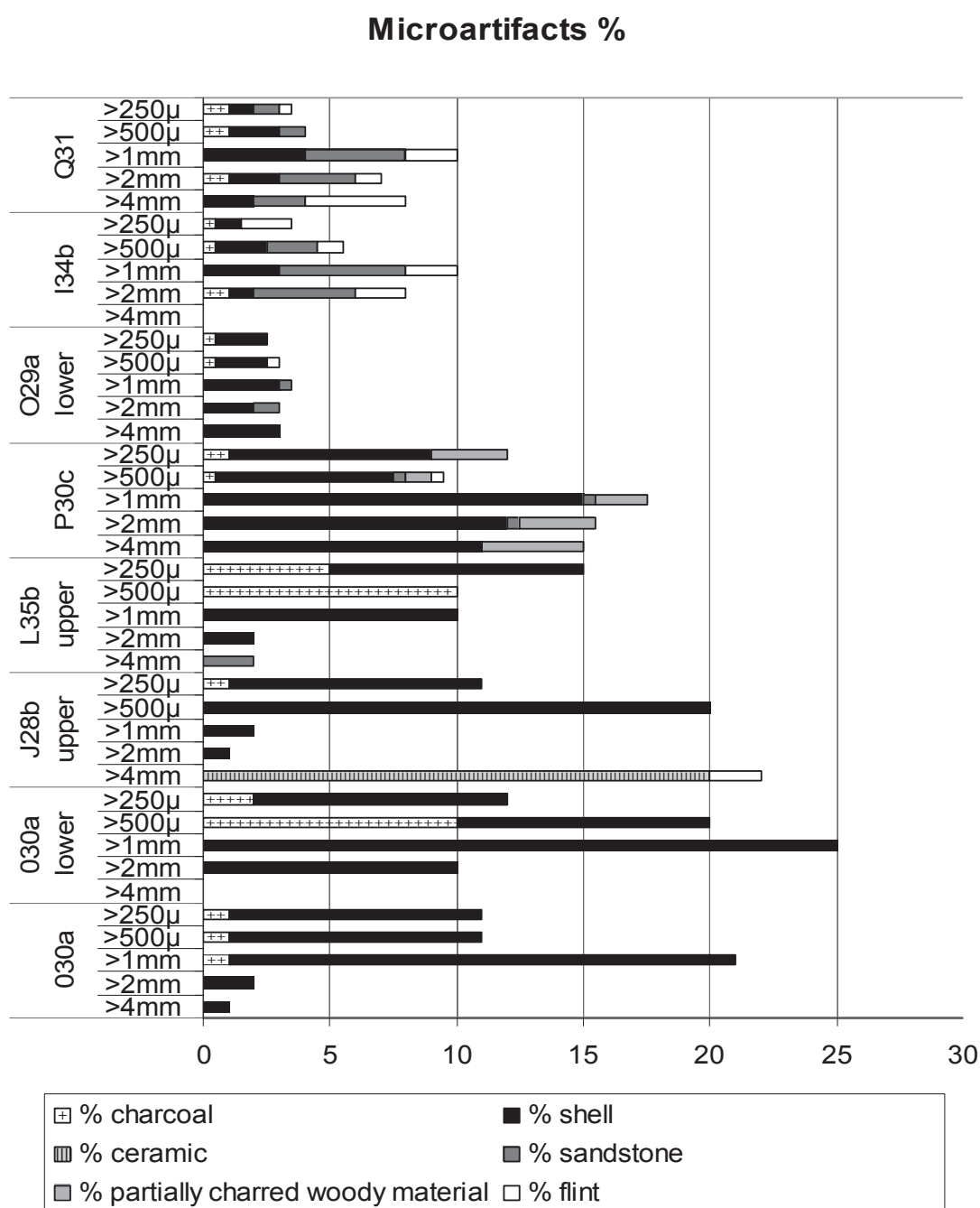


Figure 11.4. Microartifacts percentage.

that the temperature was not consistently high during firing. They contained quartz inclusions in the temper, suggesting that they were not made locally. Other sherds found at Camel contain arkose temper (Chapter 5). Pottery fabricated with this temper during the Early Bronze II

can originate from southern Sinai (Porat 1989) or from Feinan in southern Jordan during the Intermediate Bronze Age (Goren 1996). No pottery was found in the other samples.

Shell. Large amounts of shell were present in all the on-site samples. Shell distributions by size

category are summarized in Figure 11.4. All the identifiable shells were land snails. Some fragments, present in all samples, were gray or black but did not appear to be charred. None of the fragments appeared to be worked. There was no ostrich shell or seashell. It seems unlikely that any these shells were being used for bead making, as they are very small and show no evidence of being worked. Land snails are a common local occurrence.

Charcoal. Charcoal distributions by size category are summarized in Figure 11.4. The highest percentage of charcoal was 10 percent in the 500- μ fractions of O30a lower and L35b. The charcoal in all samples came from fractions less than 2 mm, suggesting that it may not be from a primary deposition but possibly blown or carried in from other contexts or that any larger fractions have washed away or degraded. Samples from I34b, Q31 (Locus 39), and O30a have lower levels of charcoal, but charcoal is distributed through a greater range of size fractions. P30c, O29a lower, and J28b upper have negligible amounts of charcoal. Although P30c (Locus 38) has low charcoal levels, a high amount of partially charred woody material is present (recorded separately from the charcoal). Further testing would be needed to establish whether or not the woody material is contemporaneous to the site, but it does have a high level of carbonization, indicating that it may be archaeological (E. Asouti, personal communication). The majority of the charcoal consisted of fragments of woody material. This is probably wood from dried scrub, such as *Artemisia* (Danin 1983:37). However, some charred seeds were also present. The L35b larger-than-500- μ sample contained four charred Liliaceae fragments, identified as *Muscari* (S. Colledge, personal communication), growing wild locally, and one indeterminate seed (S. Colledge, personal communication, 2008). O30a contained several fragmented seeds, but they were too weathered for identification. Unfortunately, without proper radiocarbon assays, it is impossible to determine how old these materials really are. Given that a C14 determination from an apparently in situ sample proved it to be modern, the assumption of antiquity cannot be made.

DISCUSSION AND CONCLUSIONS

Site Formation

The basic matrix of the site is reworked, re-deposited aeolian loess on eroded limestone bedrock. The structures trap sediments eroding downhill in sheet wash—for instance, against the outside wall of the large enclosure (L35b). Inside the enclosures, the organic residues from human occupation have been incorporated into the matrix. This can be seen in the elevated magnetic susceptibility readings when compared with the off-site samples. Outside the protection of the structures, erosion can take place.

Activities

The samples demonstrate the possible location of activity areas on-site. The relatively high proportion of sandstone fragments in some samples (O29a and Q31) suggests the final stages of milling stone manufacture and probably some use, notably away from the primary reduction area in the southwestern corner of the site. Higher magnetic susceptibility in some samples also suggests variability in activities between different areas of the site. The comparatively low levels of microartifacts in P30c and Locus 38 suggest that the enclosure area (Locus 31) was not used for general artifact manufacturing activities, as also reflected in the general spatial analysis (Chapter 12). This would accord with the possibility of this space being used as an animal pen.

The microartifact histograms show different levels of microartifact types associated with different samples. Relative frequencies of microartifact types can be compared between different size fractions within a sample and between different samples, and data can also be contextualized with the location of samples. Thus the highest levels of charcoal and fire-cracked rock in Locus 39 confirm the locus as a hearth. Similarly, the high proportions of flint microartifacts and sandstone from I34b suggest lithic production, and possibly milling stone grinding, in proximity to hearth Locus 36. This, along with findings from Locus 39, suggests that the production of certain

artifacts may have taken place close to hearth areas.

Fuel

Given the presence of wood charcoal and that the phytoliths from hearth areas were woody (A. Rosen, personal communication, 2008), it is likely that brush was being used for fuel. The general scarcity of grass phytoliths, which would be expected to be present in dung, suggests that dung was not a primary fuel.

Seasonality

Assuming that the seeds are to be associated with the occupation of the site (and are not modern intrusions), and given that *Muscari* germinate between November and January and flower in the early spring (Doussi and Thanos 2002:193), the charred seeds from L35b suggest that occupation took place after the seeds on the plant had been produced. Late spring would be an ideal time to pasture herds, as spring growth on vegetation would be established, providing grazing, and water would still remain from winter flooding.

CONCLUSIONS

Even given the sampling limitations indicated in the introduction, the sediment analyses have provided important confirming data, as well as new conclusions. In general, the particle size analysis confirms our understanding of the basic processes of site formation: loess deposition, occupation, and post-depositional reworking (Chapters 2 and 3). Of course, documentation of spatial variation in activities on the site is almost trivial in light of the strong patterns in the macroartifacts (Chapter 12). Nevertheless, all the analyses reviewed here confirm variation from sample to sample, most of it deriving from human activities. Notably, the hearths are confirmed as hearths. Analyses of charcoal and the few botanical remains suggest hypotheses concerning fuel exploitation and perhaps seasonality, which fit well with earlier ideas, even if they do not truly stand alone.

Even more importantly, some patterns are new. In particular, the spatial distinction that can

be drawn between sandstone flaking and grinding documents the final stage in the *chaîne opératoire* of milling stone production and thus is an important addition to a previously little explored industry.

ACKNOWLEDGMENTS

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THE ORGANIZATION OF SPACE AT THE CAMEL SITE

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Exploration of the potential of detailed spatial analysis using small units of area (small relative to the usual 5×5 m squares common in Near Eastern archaeology) was one goal of excavations at the Camel Site, to which end the site was excavated in 1×1 m squares, as described in Chapter 1. Distributional analyses of material culture have long been a part of archaeology (e.g., Blankholm 1991; Carr 1984; Cauvin and Coqueugniot 1989; Hietala 1984; Hodder and Orton 1979; Kroll and Price 1991; Simek 1989; Whallon 1973) but have rarely been conducted in studies of post-Paleolithic archaeological sites in the Negev (for exceptions, see Rosen 1997:119–27; 2001; for Paleolithic studies, see Goring-Morris 1988; Hietala 1983; Rosen 2000). Unlike Paleolithic sites that lack architecture, for later sites with architecture, the basic structural frameworks are essentially dictated by the walls (at least in our perceptions). Thus the goals of distributional analyses are the reconstruction of site organization beyond that dictated by the physical structure of the site. To a degree, the intent is to determine where different activities were conducted on the site and to ascertain whether these activities were patterned, or spatially constrained by the architecture or perhaps by behavioral norms. Furthermore, identification and reconstruction of activity areas would

also allow distinction between otherwise similar architectural features.

In fact, such studies really analyze patterns of discard that in some cases may preserve the spatial associations of the original activities (e.g., O'Connell 1987; O'Connell et al. 1991). In others they may reflect patterns of waste disposal also incorporating significant cultural meaning (e.g., Hodder 1987). In still others, material culture distribution may reflect a complex set of processes, including remains of successive activities, either homogeneous or heterogeneous, selective patterns of discard or cleaning, and post-depositional processes (e.g., Schiffer 1987). Sorting out these different phenomena can play an important role in helping us understand site function and the organization of behavior, as well as provide insights into deeper structures and meanings embedded in ancient lifeways.

METHODS

Two methods were employed in the analysis of spatial patterning: the construction of artifact distribution maps, and conjoinable piece analysis of the lithic assemblage from selected areas of the site. The program Corel Draw Spectral Graphs (Corel Draw 3.1) was used to construct grid den-

sity maps according to different material culture variables keyed to the coordinate system of the site (cf. Rosen 2000). In essence, this is a geographic information systems (GIS) study conducted before the ready availability of such programs as ArcView. The 2 m general grid was used in the analysis to increase artifacts per square (cf. Whallon 1973), making contrasts between concentrations clearer. These density maps were then superimposed on the architectural plans. This system provides a direct and untransformed reflection of the actual data generated from the excavations, unlike, for example, programs such as Surfer that convert data into topographic density maps using various algorithms. This system also avoids issues of interpolation, which can be problematic in low-density distributions. Distribution maps of the different material cultural variables were then interpreted with respect to the architecture and one another.

Conjoinable piece analysis was undertaken both to attempt detailed reconstruction of lithic technologies (e.g., Goring-Morris et al. 1998; Volkman 1983) and to examine the spatial configurations of lithic production (e.g., Czesla et al. 1990). Given the relatively large size of the site and the assemblage, detailed analysis was restricted to a single selected locus and adjacent squares with high lithic densities. Notably, given the very low number of refits, the efficacy of the method for reconstructing lithic technology (as opposed to drawing conclusions concerning spatial aspects) was nil.

DISTRIBUTION MAPS

Distribution maps were constructed for the following variables (defined and reviewed in earlier chapters):

Lithic Waste Variables (Chapter 6)

1. Chips (all nonretouched flint materials less than 2 cm in maximal dimension)
2. Chunks (all amorphous lithic waste greater than 2 cm in maximal dimension)
3. Flake and mixed cores
4. Blade cores
5. Primary (decortication) flakes
6. Simple (secondary) flakes

7. Blades (nonretouched)

8. Bladelets (nonretouched)

Lithic Tools (Retouched Pieces) (Chapter 6)

1. Microlithic drills (total)
2. Microlithic drills divided into the following morphological types: single shoulder, double shoulder, straight bit, triangular, fragments, and unfinished
3. Awls
4. Microlithic lunates (transversal arrowheads)
5. Scrapers total and divided into steep scrapers and tabular scrapers
6. Retouched blades
7. Retouched bladelets
8. Choppers
9. Ad hoc tools
10. Total tool distribution

Sandstone Materials (for Milling Stones and Milling Stone Production) (Chapter 7)

1. Small sandstone waste (less than 2 cm in maximal dimension)
2. Large sandstone waste (greater than 2 cm in maximal dimension)
3. Milling stones and broken milling stones (distinguished but presented on one map)

Other Material Culture

1. Ostrich eggshell fragments (Chapter 10)
2. Copper objects (Chapter 8)
3. Beads (finished and unfinished together) (Chapter 10)
4. Ceramics (Chapter 5)

Reviewing the overall patterns of distribution (see especially Figures 12.1–12.3), several immediate and generalizing conclusions can be drawn. Beyond the obvious and strong clustering of the material culture on the site, different components of material culture cluster both in different places and in different patterns. This suggests in general, and is supported in detail below,

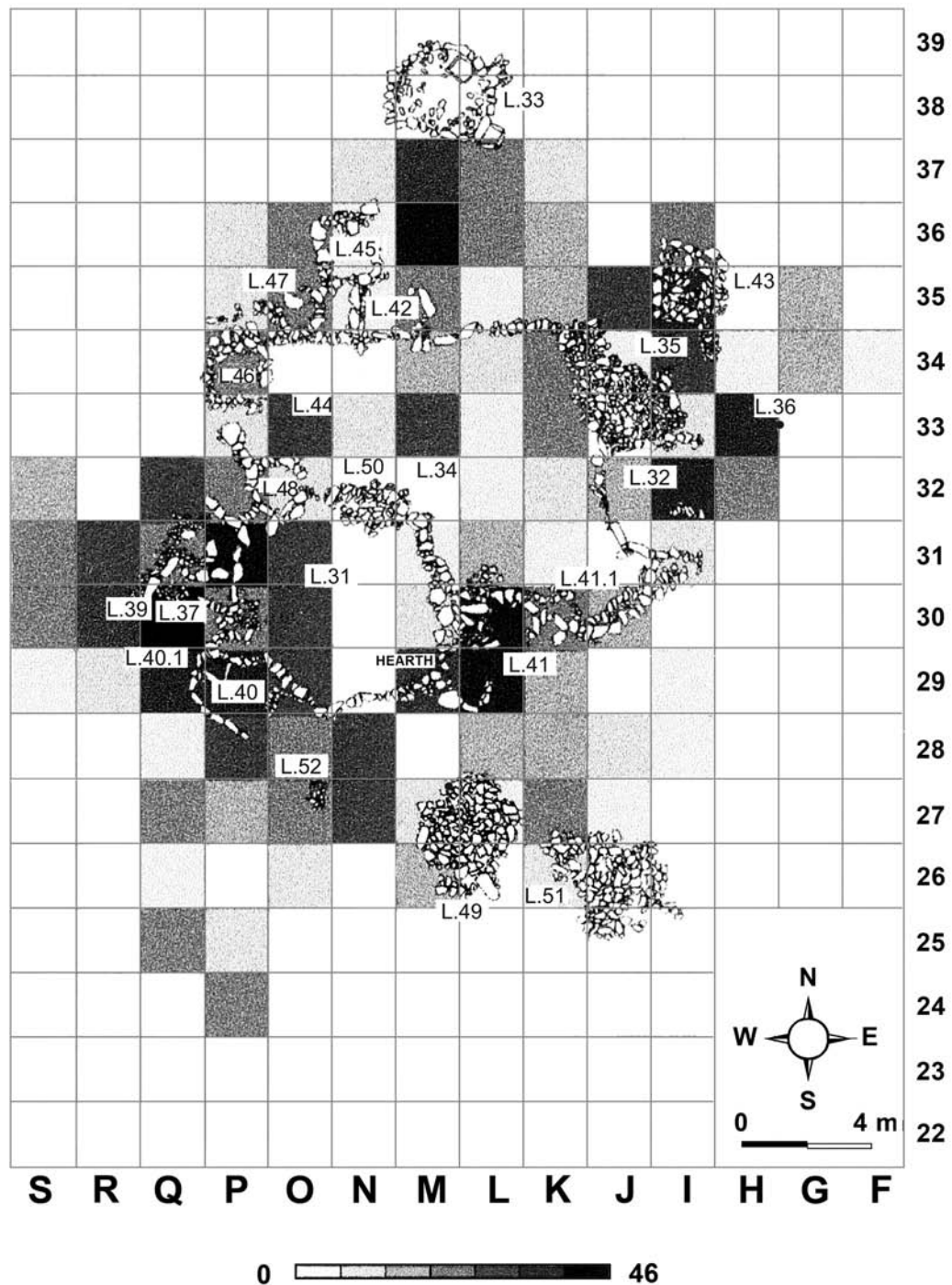


Figure 12.1. Lithic tool distribution.

that different activities took place in different areas of the site and that discard patterns for different materials also differ. Furthermore, relating to the architecture, the material culture residues exhibit patterns suggesting that Loci 32,

37, and 41, generally interpreted as “habitation” structures, served as foci of site activity. Loci 42 and 45, smaller structures in the northern part of the site, show lesser levels of activity, and the two enclosure Loci, 31 and 34/44, show lower densi-

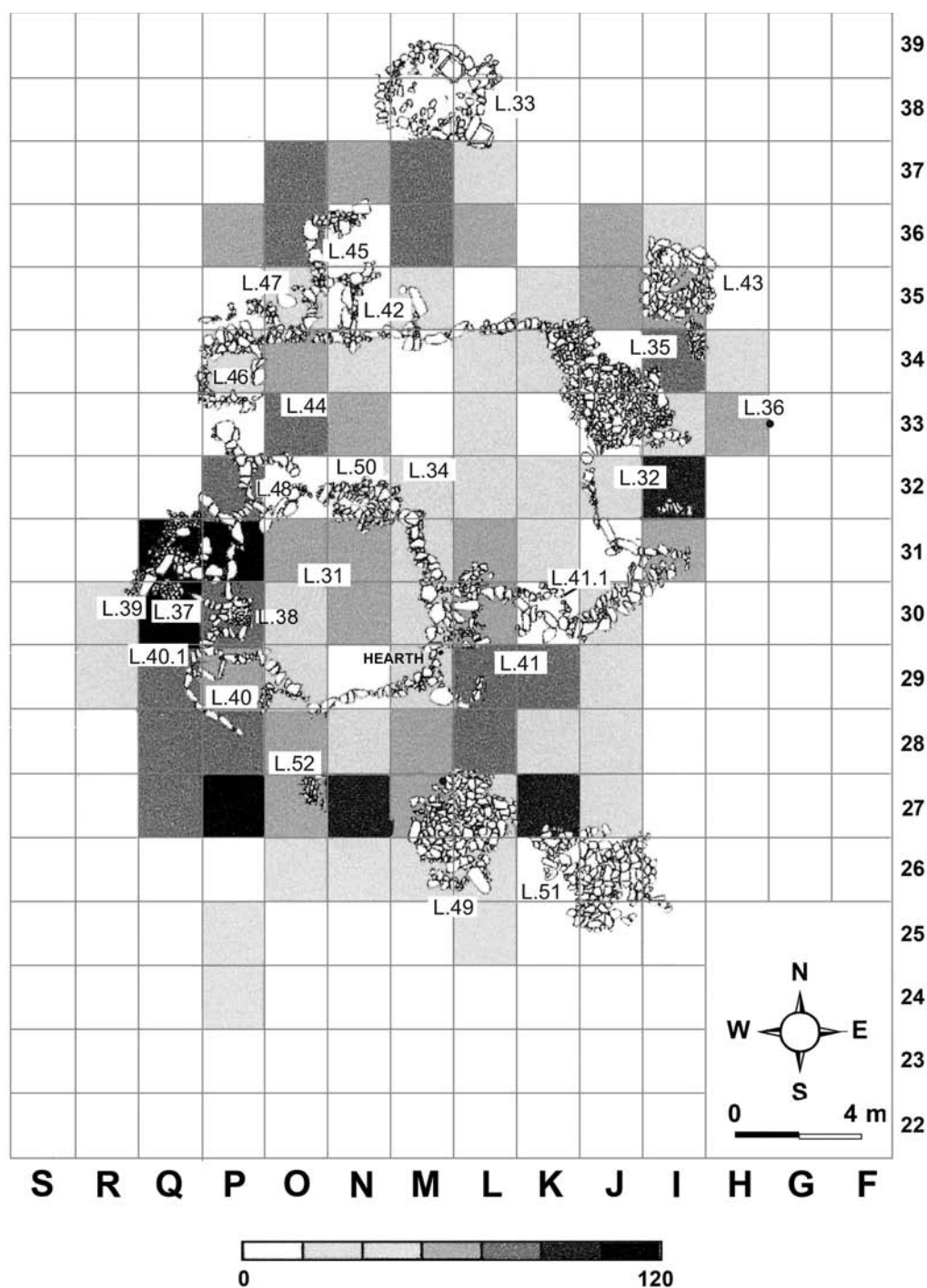


Figure 12.2. Flake distribution.

ties of material. Finally, the presence of concentrations of material culture outside the architecture, all around it, indicates both that activities were not restricted to areas defined by the architecture and that methodologically, these areas require no less attention than areas within the walls.

Lithic Waste Variables

The different lithic waste categories (defined in Chapter 6) are numerically the largest material culture classes from the site. Obviously, they reflect the waste products associated with the production of chipped stone tools. Barring major processes of

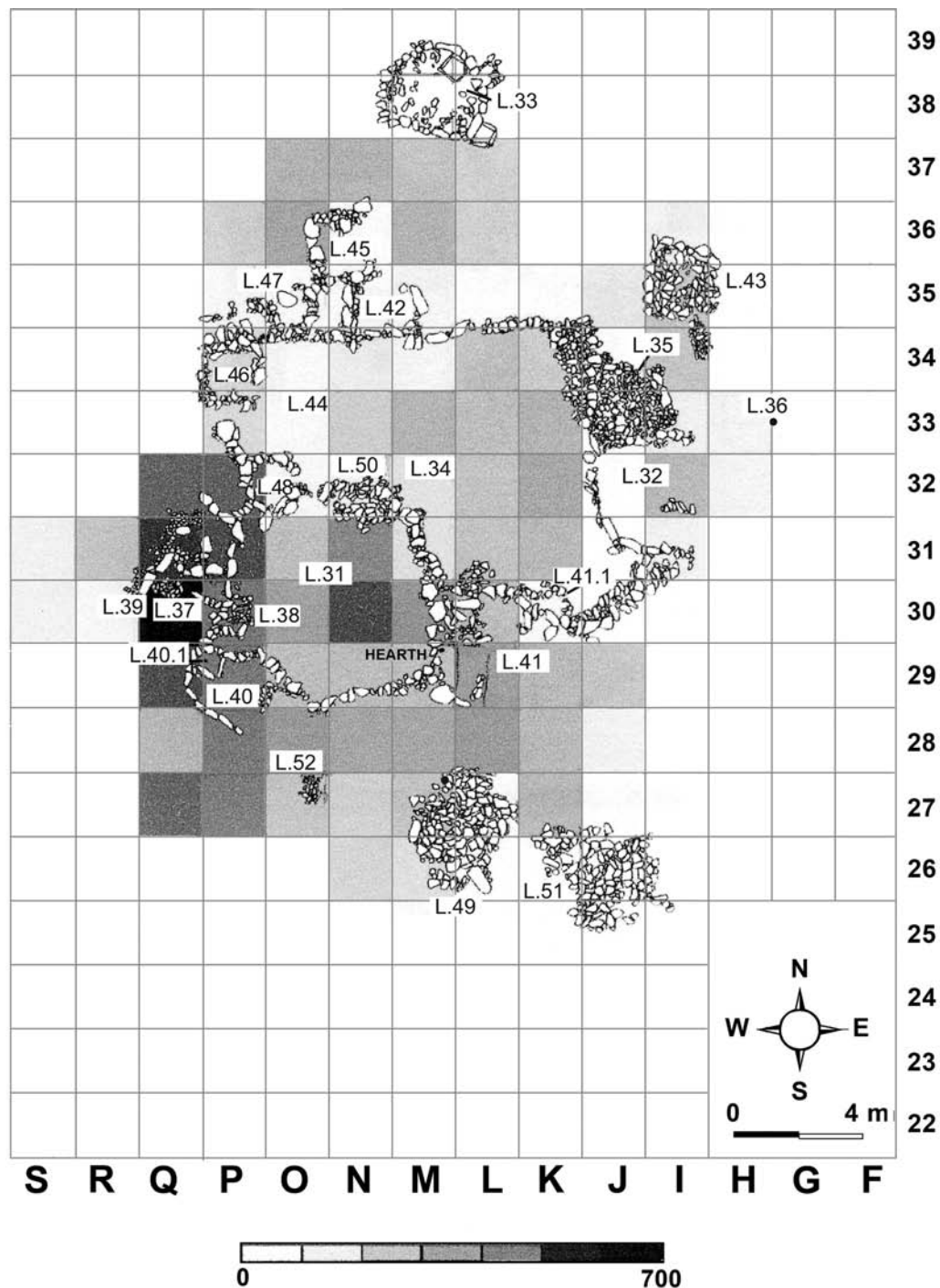


Figure 12.3. Distribution of chips.

redeposition, including intentional cleaning and clearing of site areas, concentrations of lithic waste can be attributed to areas of lithic manufacture, and indeed the patterns evident in Figures 12.1–12.3 strongly suggest spatial clusters of flint tool production. This said, anticipating the section on con-

joinable pieces, the low number of refits suggests a need for caution in interpretation here.

Beginning with the three largest categories—flakes (Figure 12.2), chips (Figure 12.3), and chunks (Figure 12.4) (the two debris classes)—there are important contrasts between

the distributions. The chip distribution is clearly dominated by a single mode located around Locus 37 (Q30), with decreasing densities as one moves away from this focal point. The effect of walls on the lowered densities is to be noted here, creating what appear to be dips in lithic density but that are, in fact, caused by the physical presence of architecture. Thus the chip distribution seems to reflect intense lithic reduction around Locus 37 and general background activity elsewhere on the site.

This pattern contrasts strongly with that of the chunks, which shows what appear to be three concentrations, one around Locus 37 but not as focused as in the chip distribution, one just outside Locus 41 (K29), and one somewhat more diffuse concentration, in an arc from Locus 32 (I32) around the northeastern edge of the site. The northern part of the site, around Loci 42 and 45, also shows increased numbers of chunks. The concentration around Locus 41 is most dense, thus also in contrast with the chips. The flake pattern is similar to that of the chunks (Figure 12.4), although the relative dominance of the concentrations around Loci 37 and 41 is reversed. The distribution patterns in the north and east are also similar.

To explain these patterns effectively, it is necessary to examine the core distributions (Figures 12.5, 12.6), which in fact closely match those of the flakes and the chunks, only lacking a strong concentration of material near Locus 41. Considering that these three categories reflect the production of blanks, the basic shapes from which other tools are produced, and chips reflect both later stages of blank modification and post-depositional factors (such as burning and trampling), the contrast in distributions makes sense. The absence of a core cluster near Locus 41 is perhaps explained by the higher density of chunks, often core fragments or only marginally reduced blocks of raw material—that is, incipient cores. Thus four general areas for lithic reduction, each associated more or less with a habitation structure (room Loci 32, 37, 41, and 42/45), can be identified. These differ in levels of intensity of exploitation. The apparent absence of discrete clusters of chips may reflect their size and consequent differential susceptibility to movement compared to the larger and more

massive pieces, thus blurring what may have been initially more discrete clusters. That such movement took place is clear from the reconstruction of site formation processes. Alternatively, the presence of two hearths, Loci 38 and 39, in and adjacent to Locus 37, may have produced more chips. There was, however, no clear evidence to this effect.

Taking this analysis one step further, cores and debitage can be subdivided to ascertain if spatial distinctions existed in terms of specific types of lithic production. Although the overall reconstruction of lithic technology at the Camel Site, and the Timnian culture in general, shows a generalized flake technology, with blade and bladelet tools produced as a by-product of this basic ad hoc mode of manufacture, nevertheless, specific products such as arched backed blades, micro-lithic drills, and lunates require more specific blank types for their production.

Examining the distribution maps of flakes and primary flakes (Figures 12.2, 12.7), the general products of Timnian technology, the distribution patterns are similar to those of the cores, chunks, and flakes. However, examination of the distribution of blades and bladelets (Figures 12.8, 12.9), and blade and bladelet cores (Figures 12.5, 12.6) suggests that the production of these blanks was more spatially specific. Blade and bladelet cores (analysis was restricted to those cores showing exclusively blade or bladelet scars on the striking face) are restricted to only two clusters: a primary cluster by Locus 37 and a secondary cluster near Loci 45 and 42. In close accord, bladelets also concentrate around Locus 37, with a hint of a slightly higher density in the northern part of the site, as with the blade/bladelet cores. That is, if the evidence for blade and bladelet production (concentrations of blades/bladelets and appropriate cores) is always found with evidence for flake production, the opposite is not true. Production of blades and bladelets was spatially more restricted. The blade distribution shows concentrations in Locus 37 and Square H35, adjacent to tumulus Locus 43, perhaps to be attached to the general activities outside Locus 32. Although both of these can be thus interpreted as attached to general knapping loci, the concentration in Square N30, in the middle of enclosure Locus 31, does

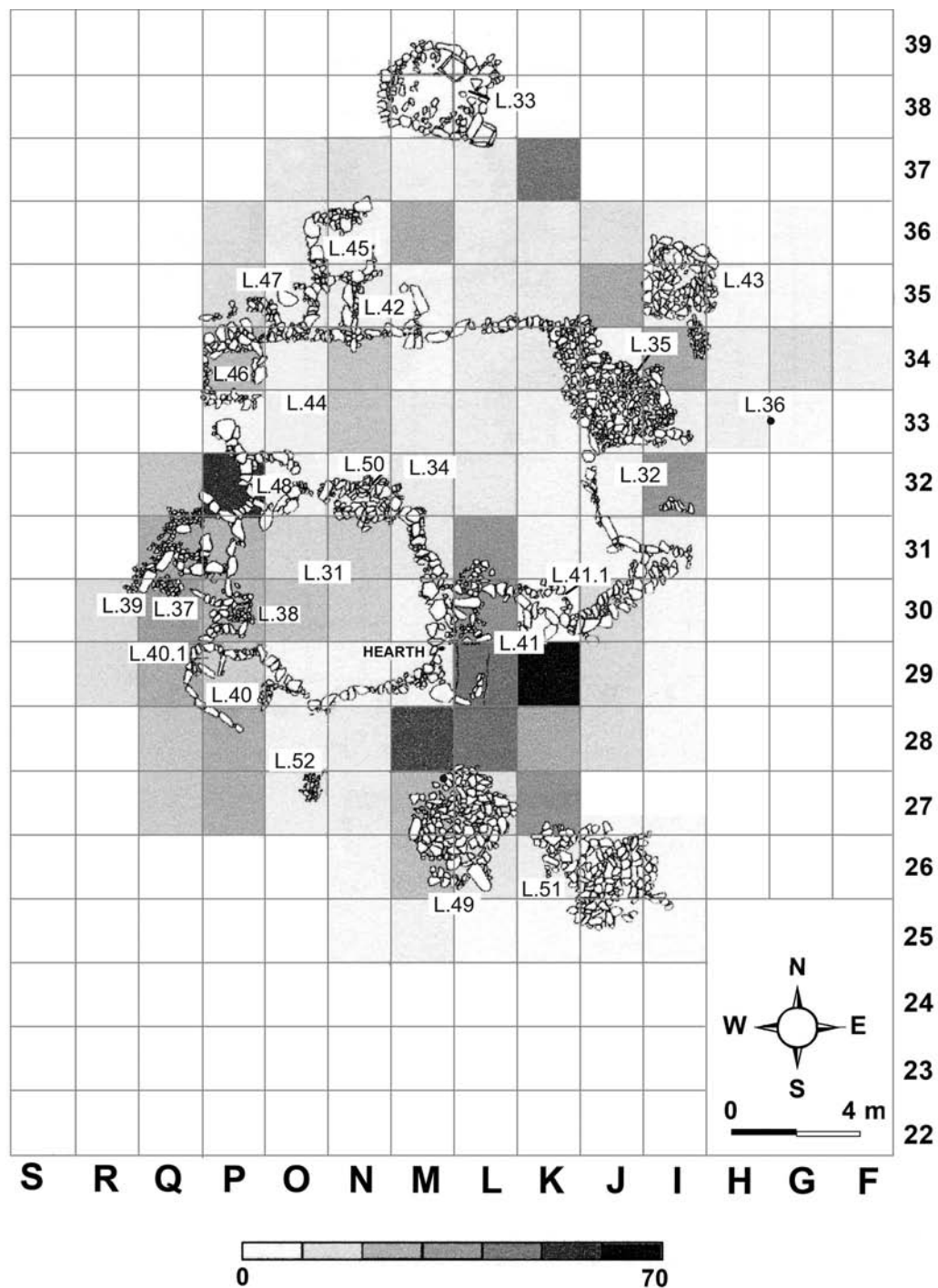


Figure 12.4. Distribution of chunks.

not correspond to any other concentration. Given the fact that nine blades were found here, the absence of appropriate cores in spatial association and the absence of associated blade tools (suggesting discard after use) suggest a single activity episode, perhaps the preparation or modification of a hafted bladed tool such as a compos-

ite sickle or cutting implement. The blades were not produced in these squares, as one may assume when debitage is spatially associated with cores; thus they were actually brought to these microlocations. Unfortunately, no other artifacts are found in association, rendering further explanation difficult.

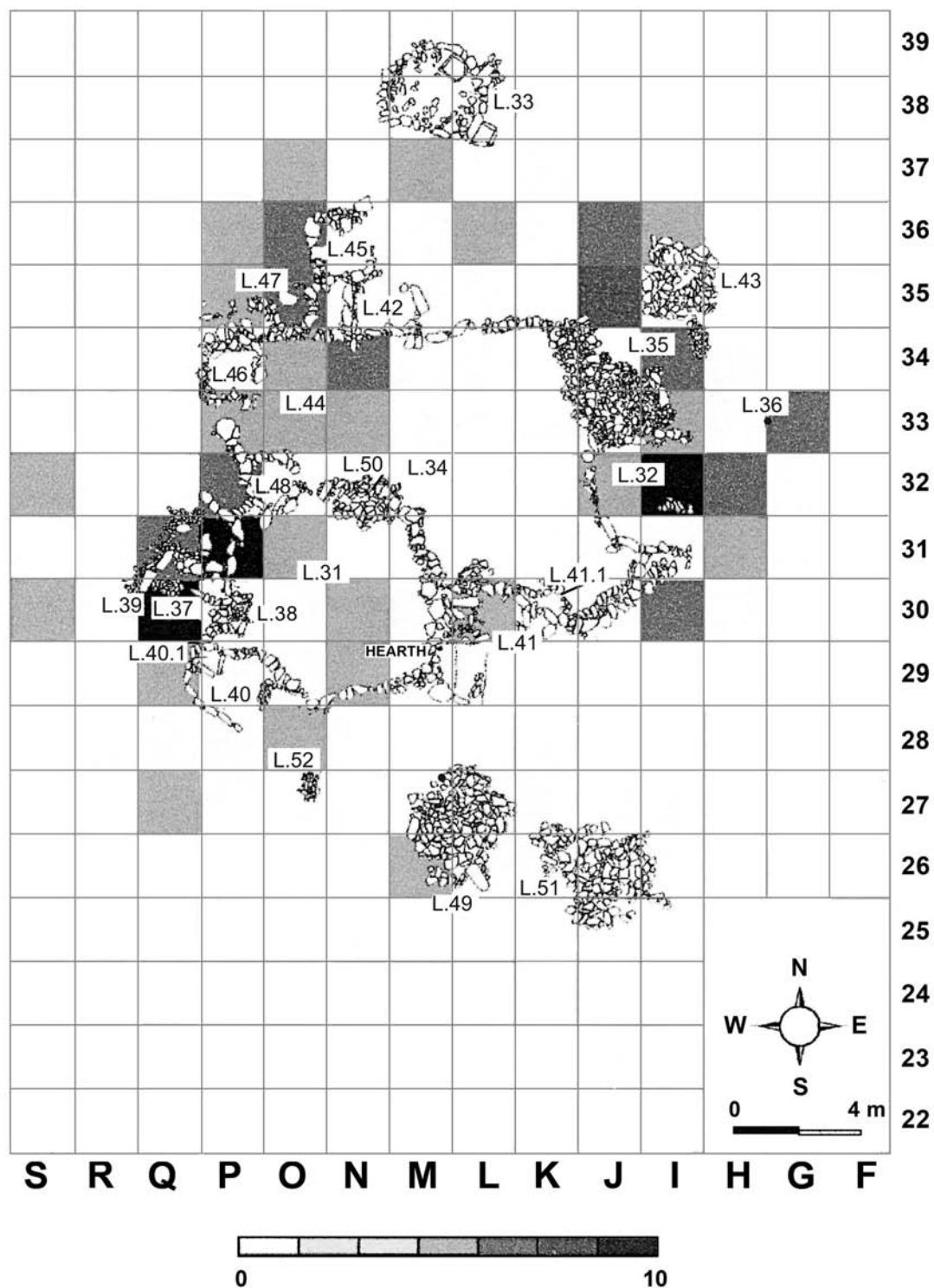


Figure 12.5. Flake core distribution.

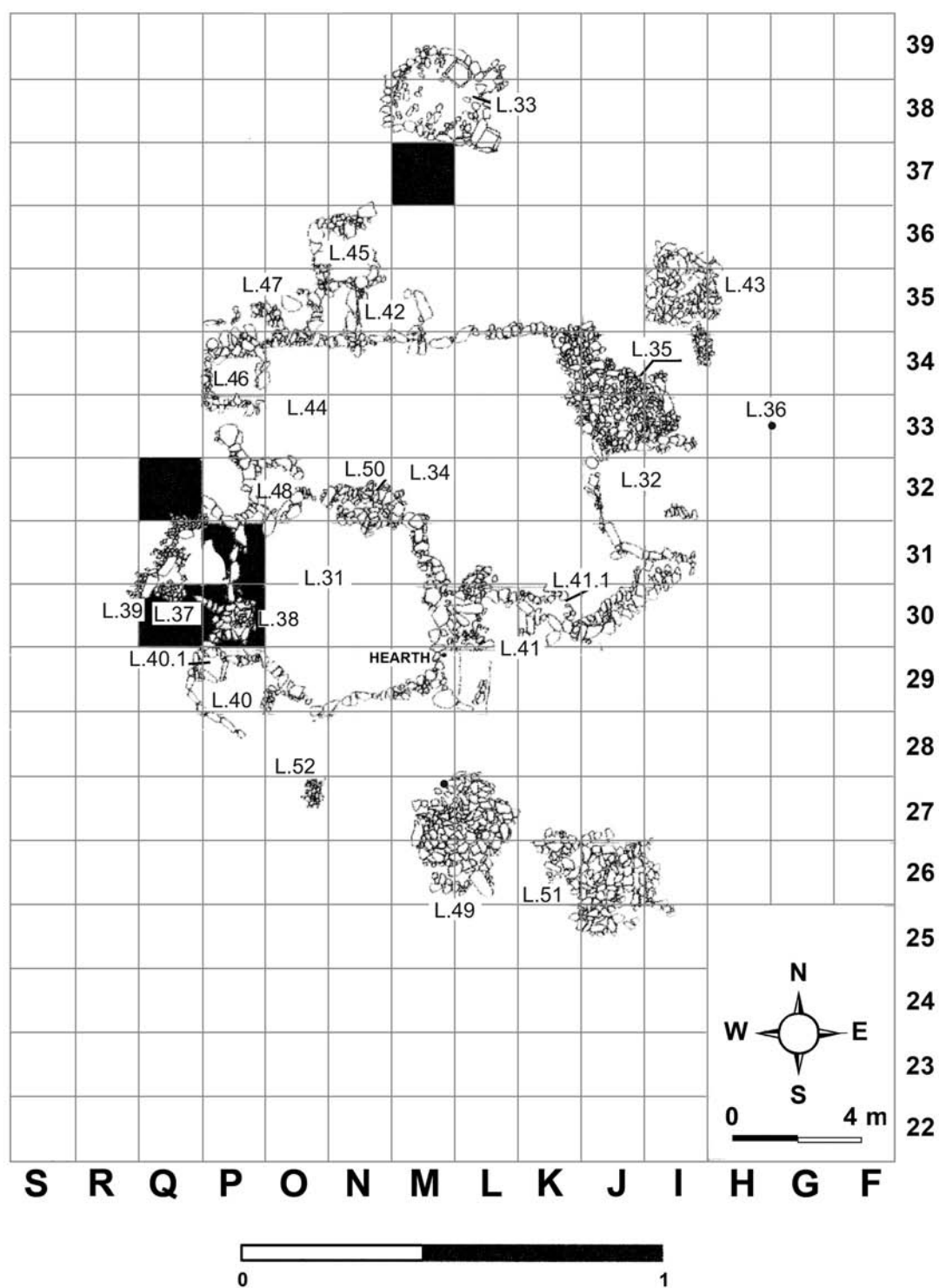


Figure 12.6. Blade core distribution.

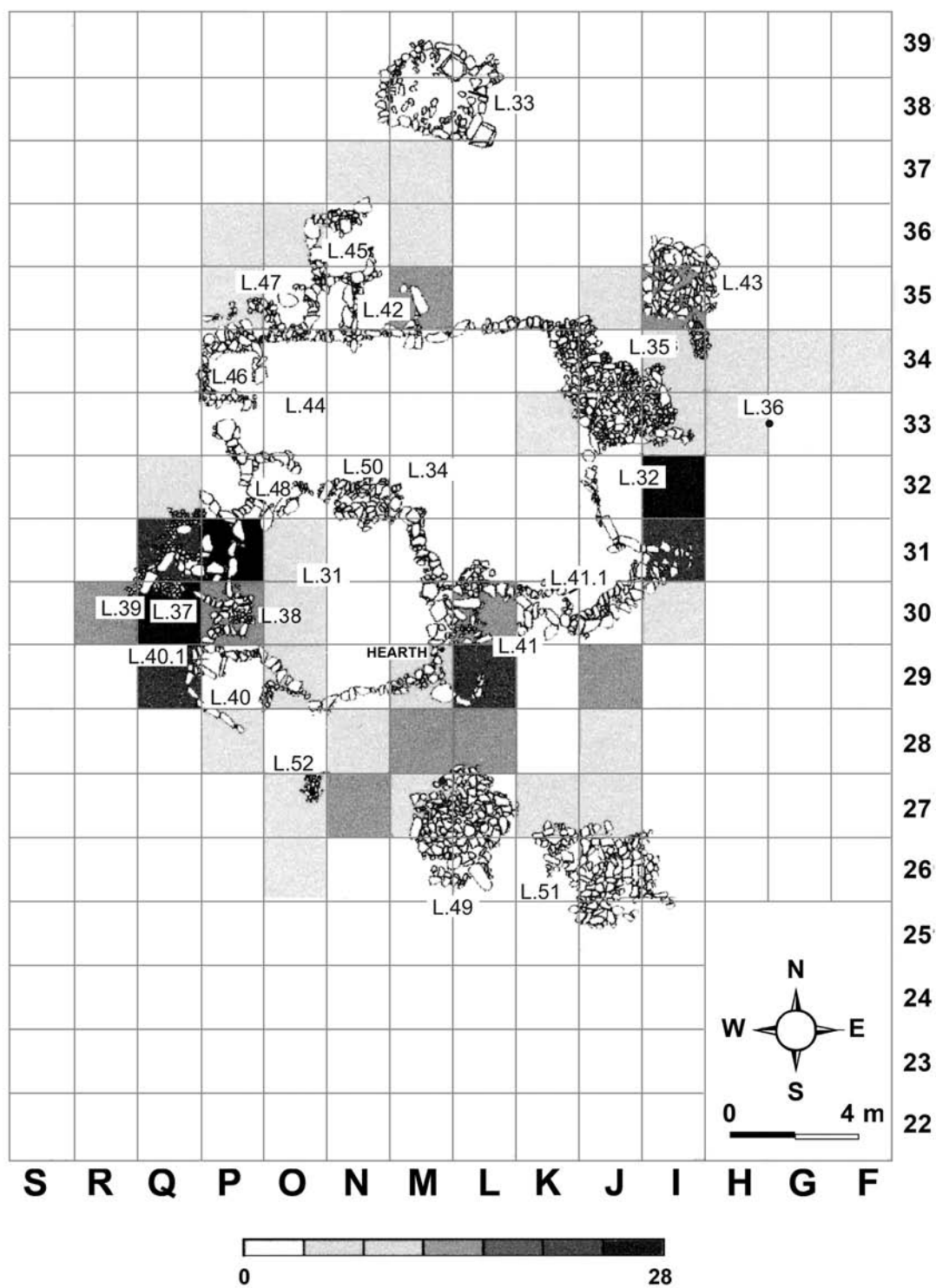


Figure 12.7. Primary flake distribution.

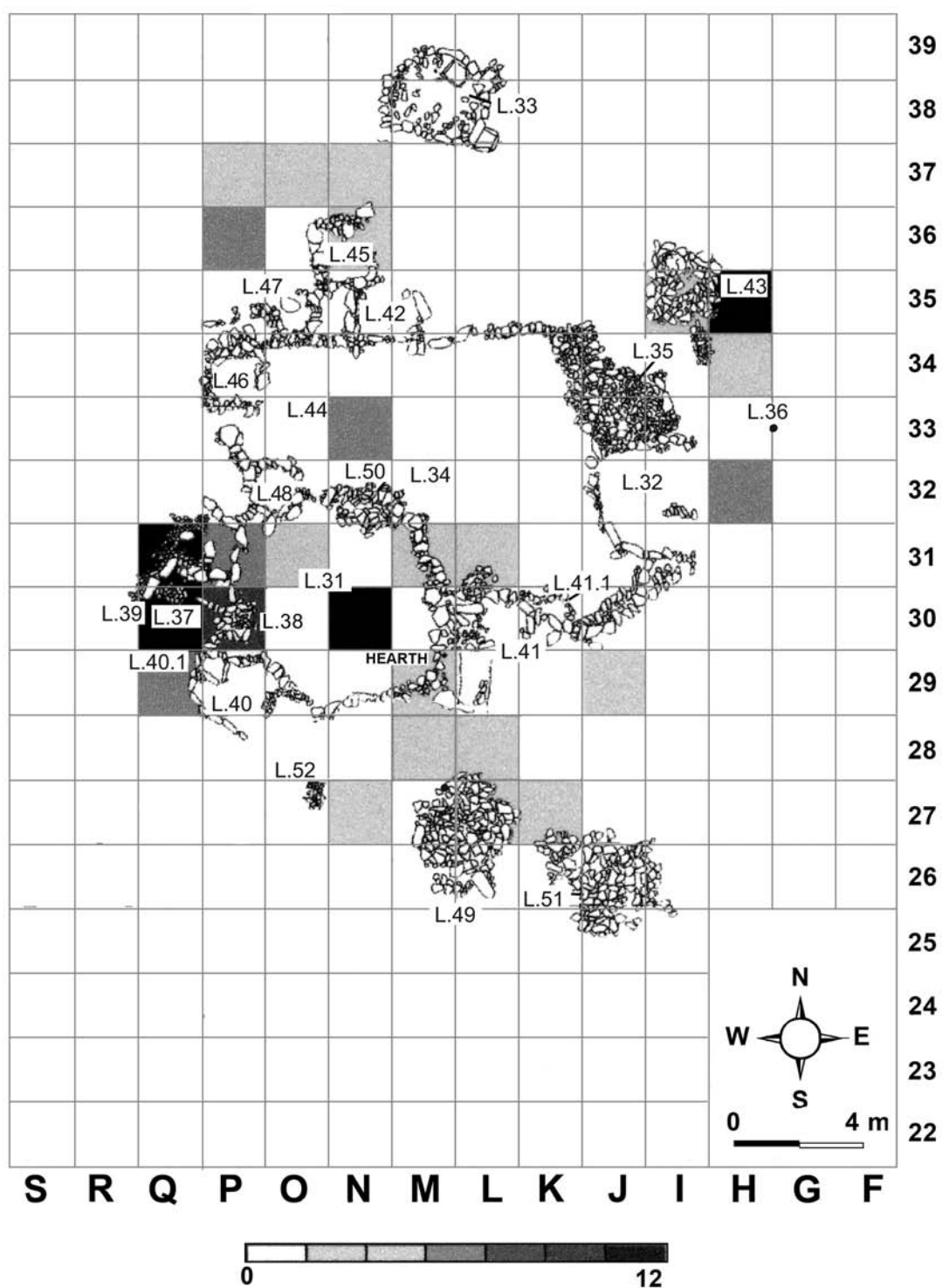


Figure 12.8. Blade distribution.

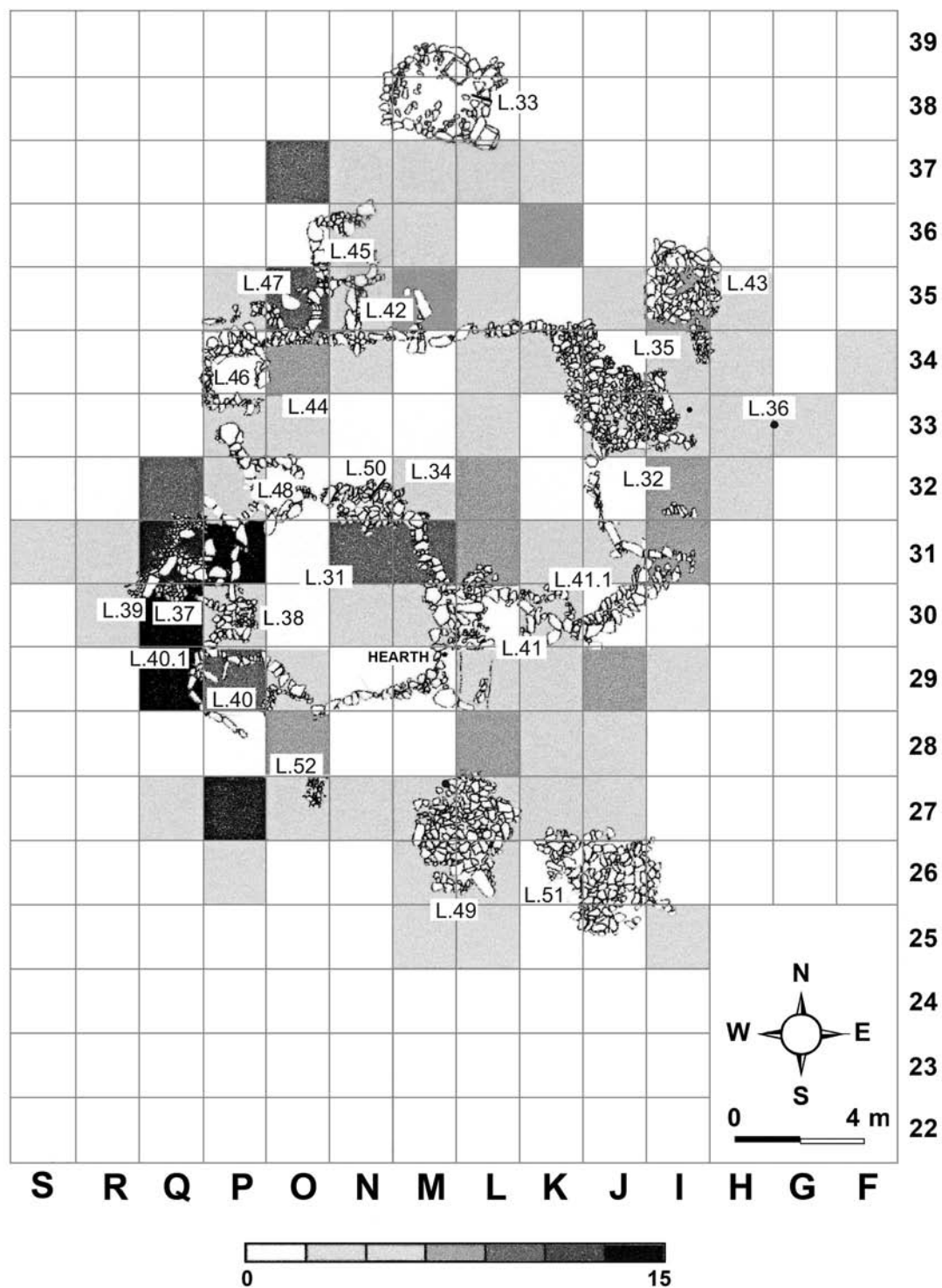


Figure 12.9. Bladelet distribution.

Lithic Tool Distributions

If waste distribution at the Camel Site seems to reflect general knapping loci, tool distributions are somewhat more complex and may reflect locus of manufacture, locus of use, and/or locus of discard/loss (see Chapter 6 for definitions of types). In most cases, these functions seem to coincide (an important statement in itself), but different tool types reflect different use-life cycles. In general the tools cluster around habitation loci (Figure 12.1), but like the debitage, there is variability in the specific tool distributions.

Two tool classes, scrapers and ad hoc tools (retouched pieces, notches, denticulates), are grouped together because they are technologically similar and are often lumped together in a general ad hoc category. Both show patterns similar to those of the general debitage pattern (Figures 12.10, 12.11), with minor variations. Both show concentrations coinciding with the general lithic waste around Loci 37, 41, and 42/45, as well as concentrations in the southern part of the site, O-N 27–28. The scrapers do not show a concentration near Locus 32, but the steep scrapers (Figure 12.12) are concentrated in this locus. The scrapers do show a cluster in the middle of Locus 34/44. The number of ad hoc tools is also limited in Locus 32. The general distribution of these artifacts appears to correspond to their generalized domestic functions (e.g., McConaughy 1979; Rosen 1997). In general, although not always, these tools seem to have been discarded where they were made, and one might assume that use occurred in the same locale.

In contrast, microlithic lunates, which functioned as transverse arrowheads, show no concentrations (Figure 12.13). They are scattered randomly around the site and thus probably reflect loss and not function or manufacture.

Retouched bladelets also show a distinctive distribution (Figure 12.14), almost totally restricted to the northern part of the site. It is difficult to explain this pattern given the higher density of bladelets, the blanks on which the retouched pieces were made, on the southwestern side of the site. In contrast to this, retouched blades (Figure 12.15), concentrating around Loci 37 and 32, correspond to two of the clusters of unretouched blades (Figure 12.8), suggesting that

they were made, used, and discarded in the same place. As indicated above, no retouched blades were recovered in the middle of enclosure Locus 31, contrasting with the cluster of unretouched blades.

Borers show three clusters around Loci 32, 37, and 41 (Figure 12.16), all habitation structures. As with ad hoc tools, these probably served a range of domestic functions, and the association is not unusual.

The microlithic drills present the clearest and most easily interpretable distribution patterns, coinciding with other elements of a bead-making industry. Two clusters are evident in Figures 12.17–12.19: a primary concentration in Locus 37 and a secondary locus just east of Locus 32, adjacent to hearth Locus 36. Beyond this, examining the drill fragments and the unfinished drills (Figures 12.18, 12.19), the pattern is somewhat more complex, with almost all the unfinished drills located in Locus 37 but most of the broken drills located by Locus 32. That is, manufacture, use, and discard seem to have taken place in Locus 37, but only use and discard occurred by Locus 32. Speculating, the higher proportion of broken drills by Locus 32, especially in light of the lower number of drills in that concentration, suggests two different bead makers, that of Locus 32 of lesser skill.

Sandstone

The three categories of sandstone artifacts (see Chapter 7 for definitions; flakes are included in the chunk category) show three distinct distribution patterns, and indeed four patterns if one distinguishes broken from complete milling stones. Large sandstone pieces (flakes and chunks greater than 2 cm) concentrate almost exclusively in the southwestern corner of the grid (Figure 12.20). This concentration undoubtedly reflects a reduction area for shaping the imported blocks into a general milling stone shape. The more general scatter of chips (Figure 12.21), with foci near Loci 37, 32, and 41, suggests that finer-scale reduction, like much of the other activity, took place by the habitation structures. Interestingly, microartifactual bits of sandstone were found in all but one of the site samples and were not present in the control sample off-site (Chapter 11), suggesting that use or final

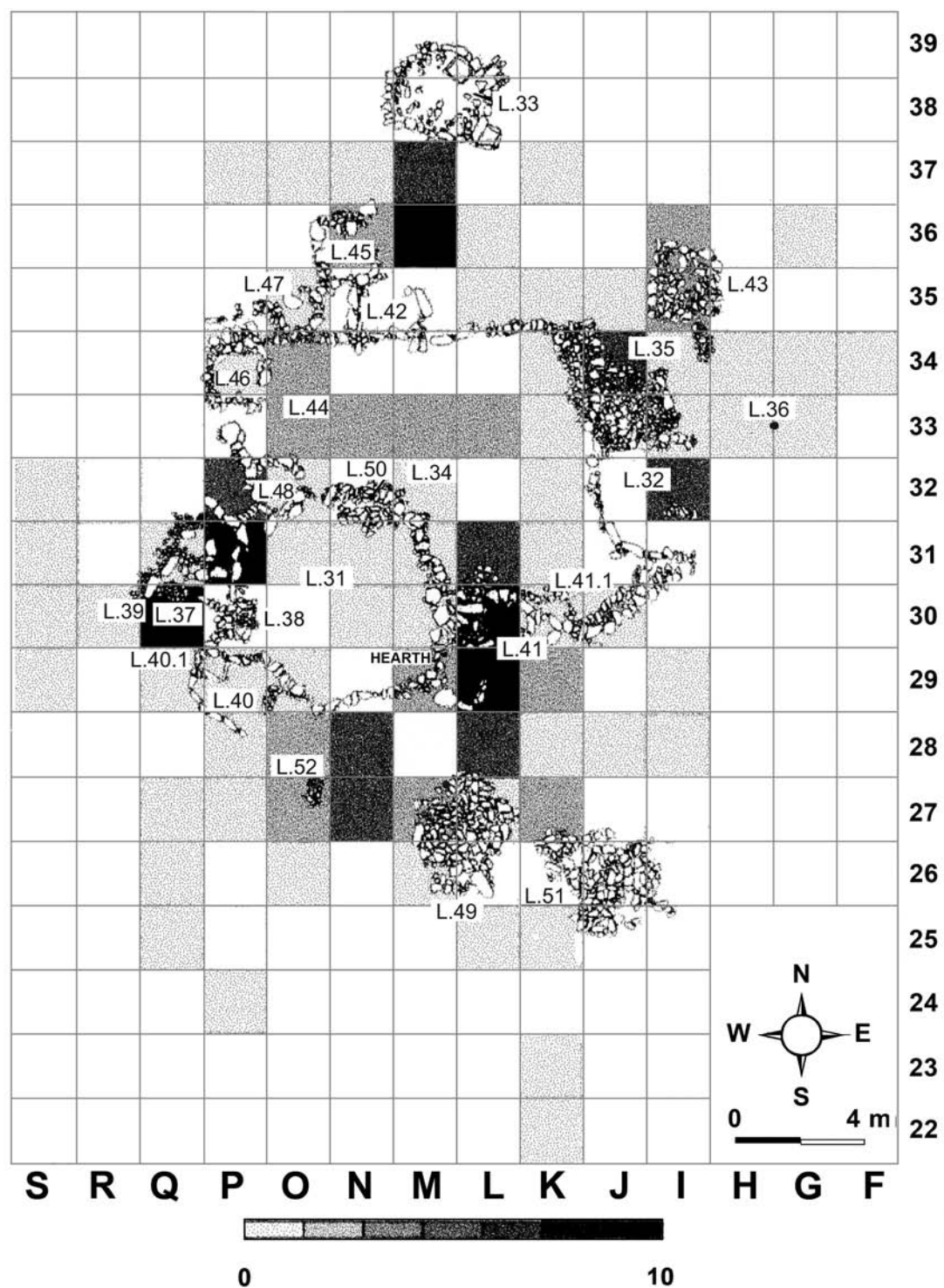


Figure 12.10. Ad hoc tool distribution.

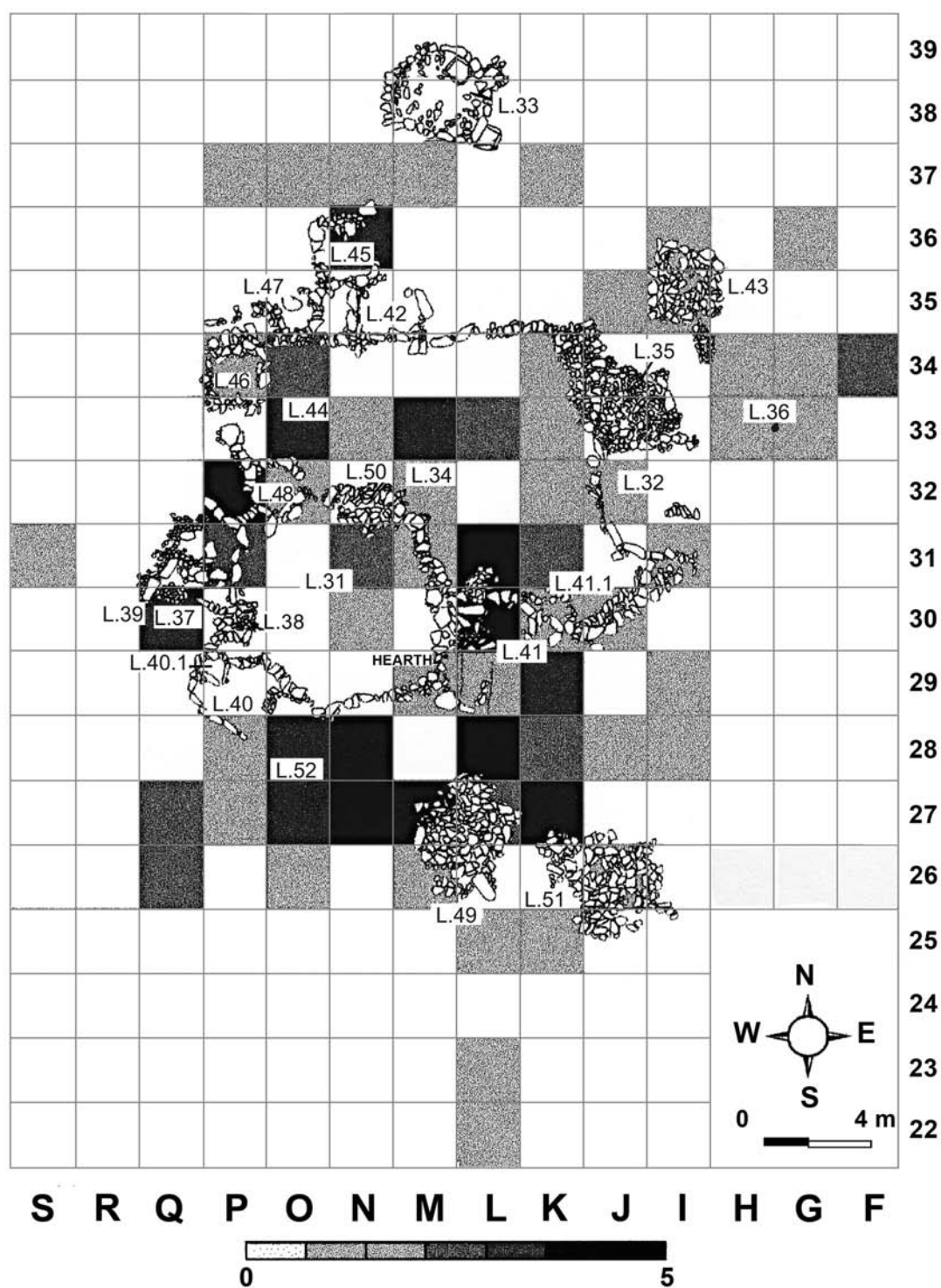


Figure 12.11. Scrapper distribution.

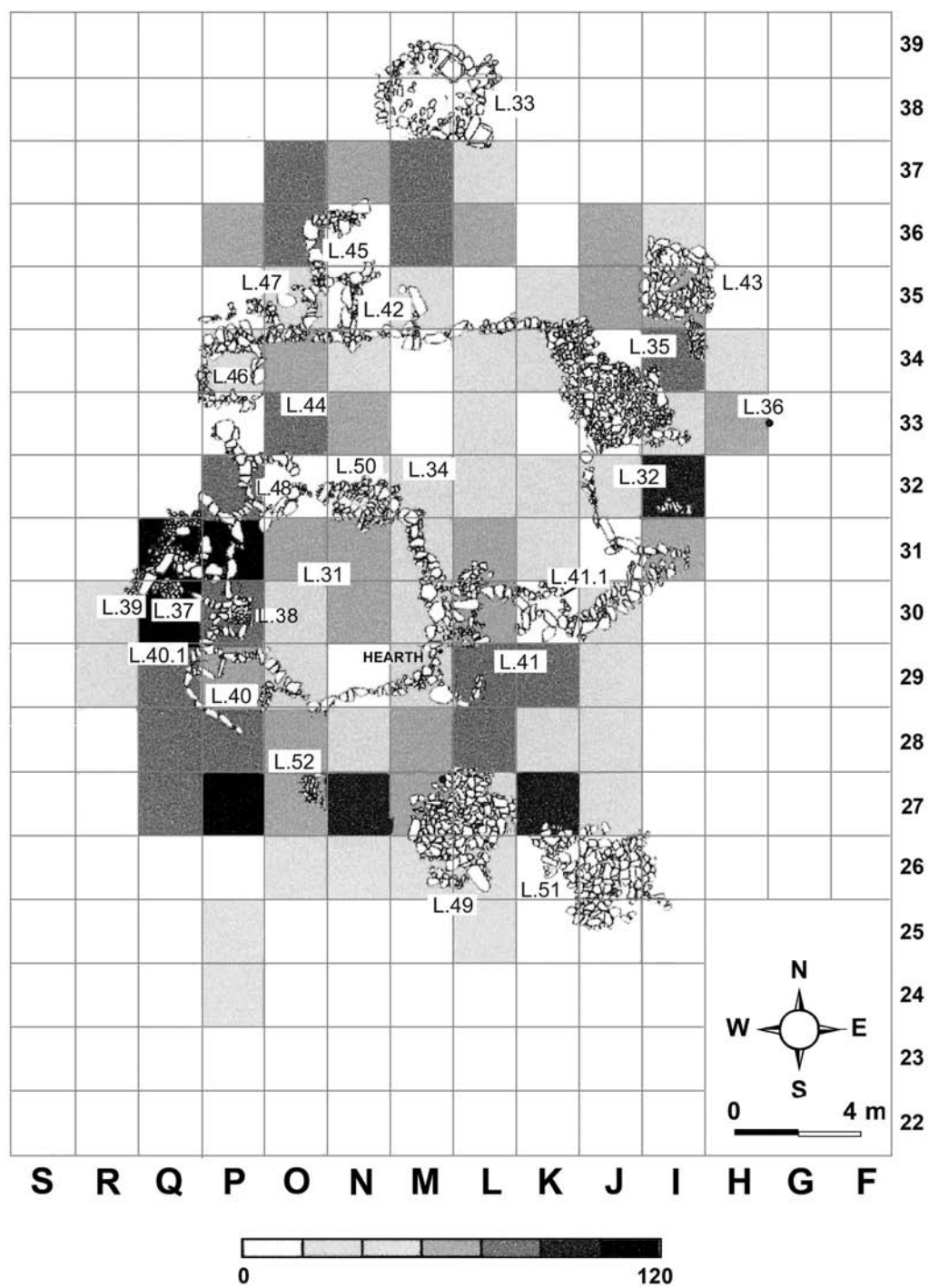


Figure 12.12. Steep scraper distribution.

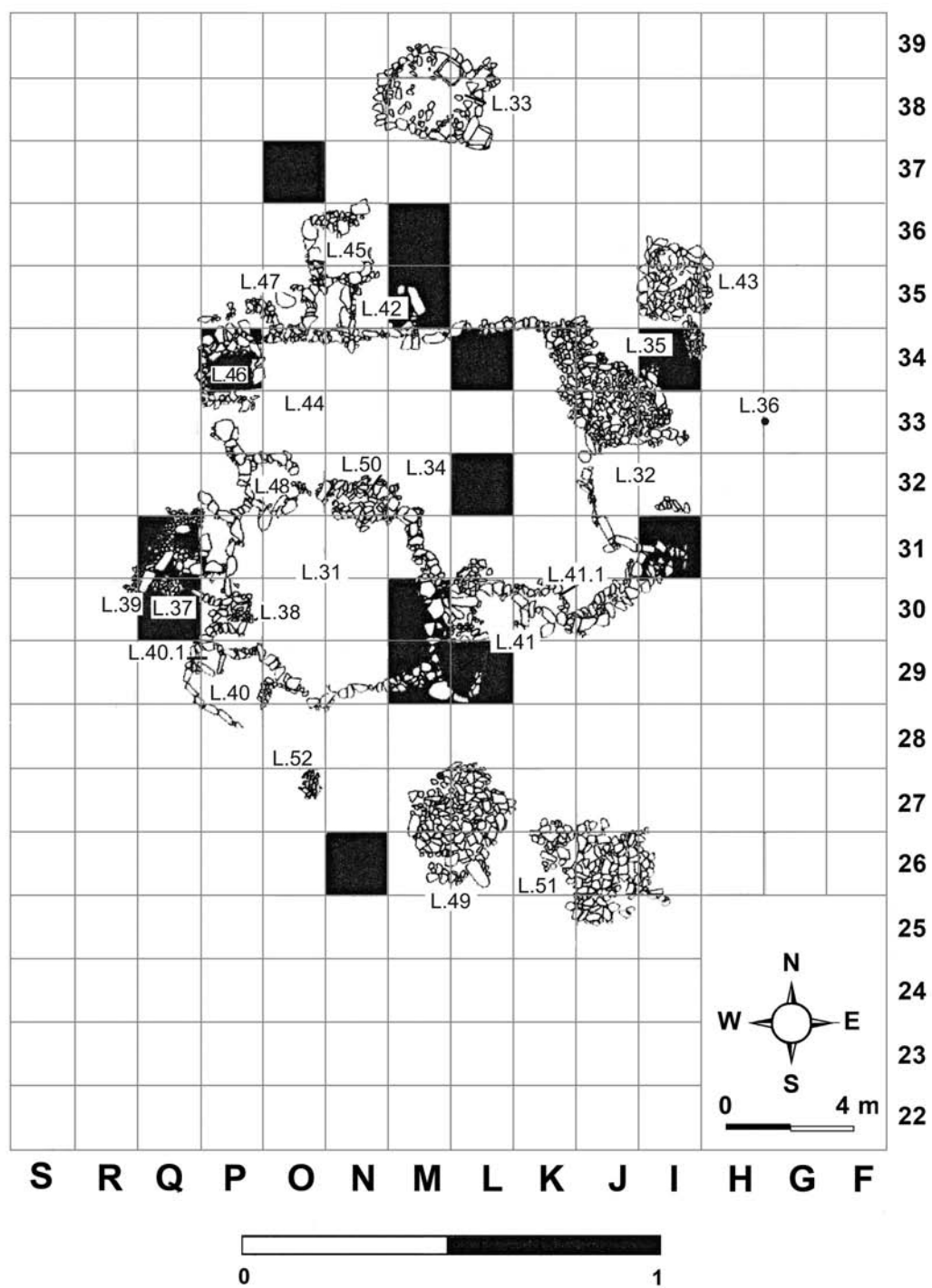


Figure 12.13. Lunate distribution.

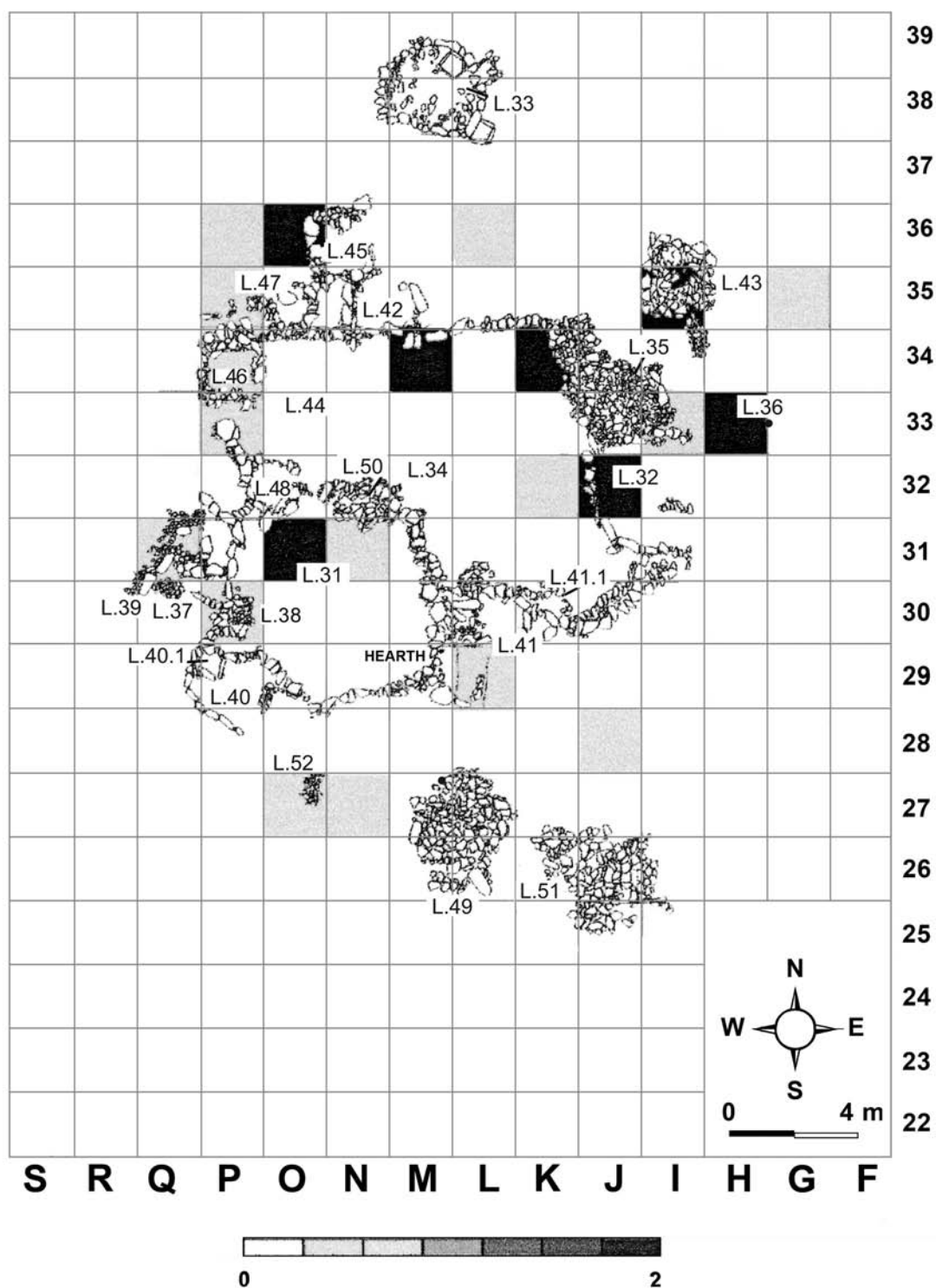


Figure 12.14. Retouched bladelet distribution.

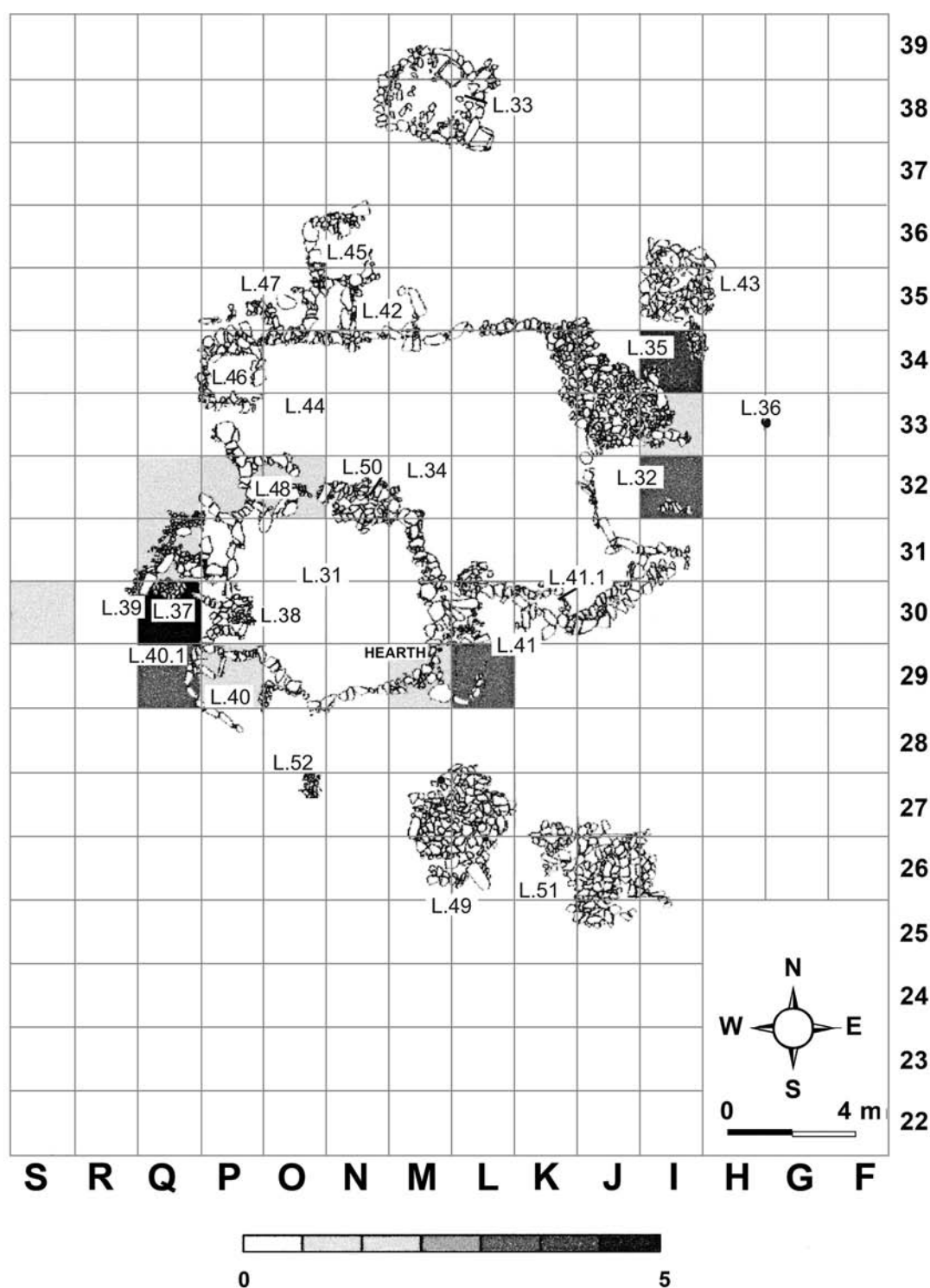


Figure 12.15. Retouched blade distribution.

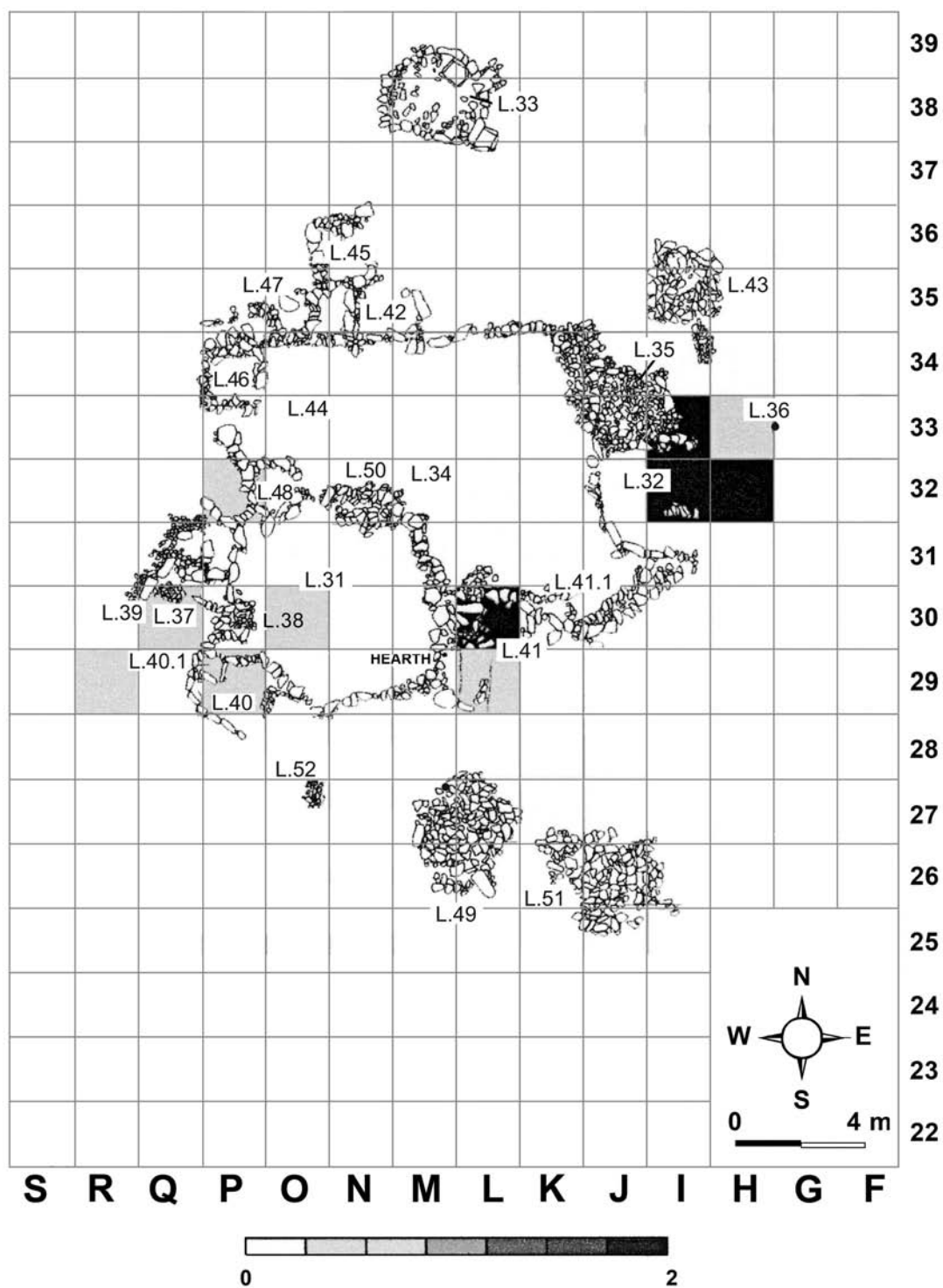


Figure 12.16. Borer distribution.

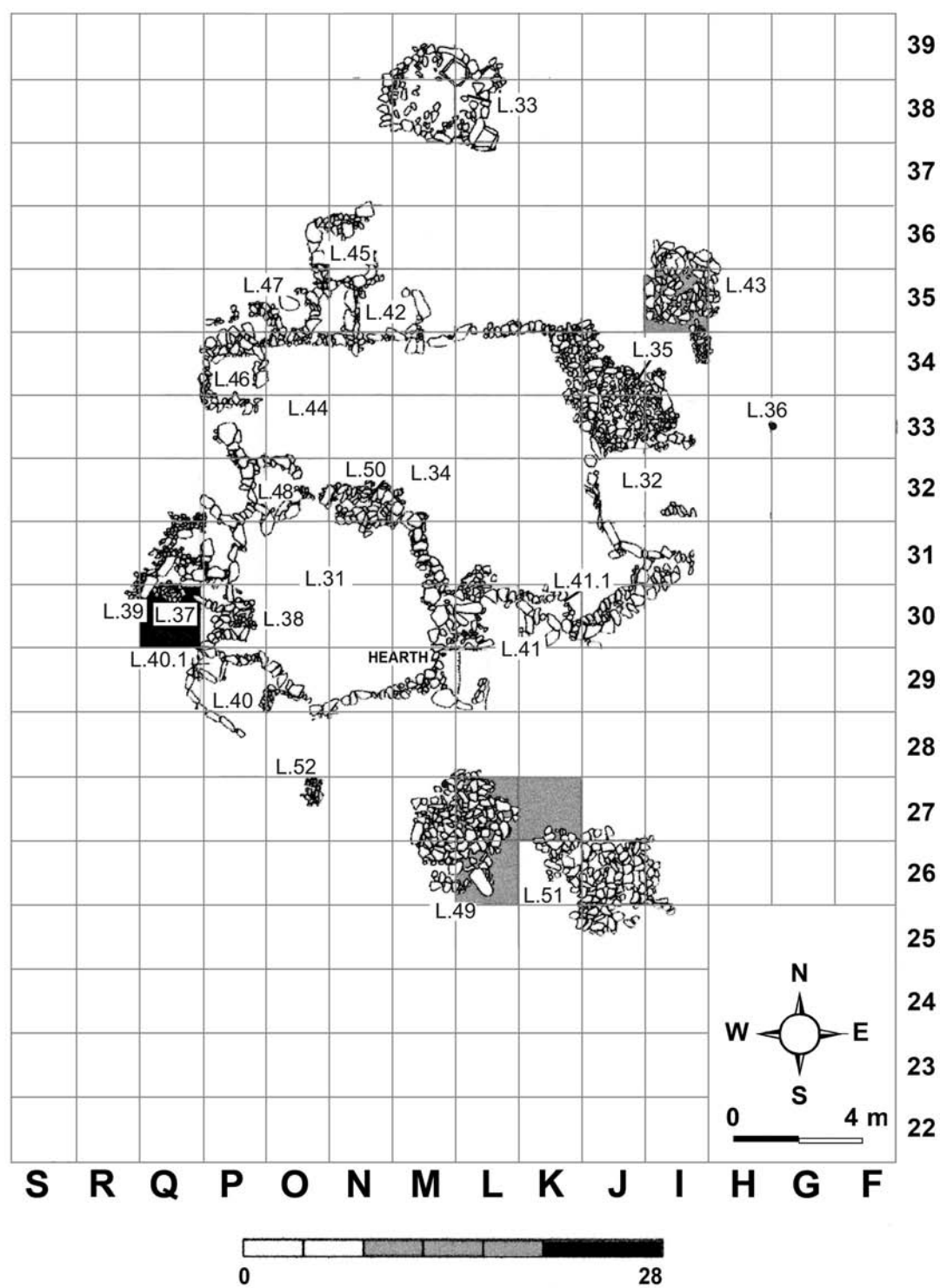


Figure 12.17. Complete drill distribution.

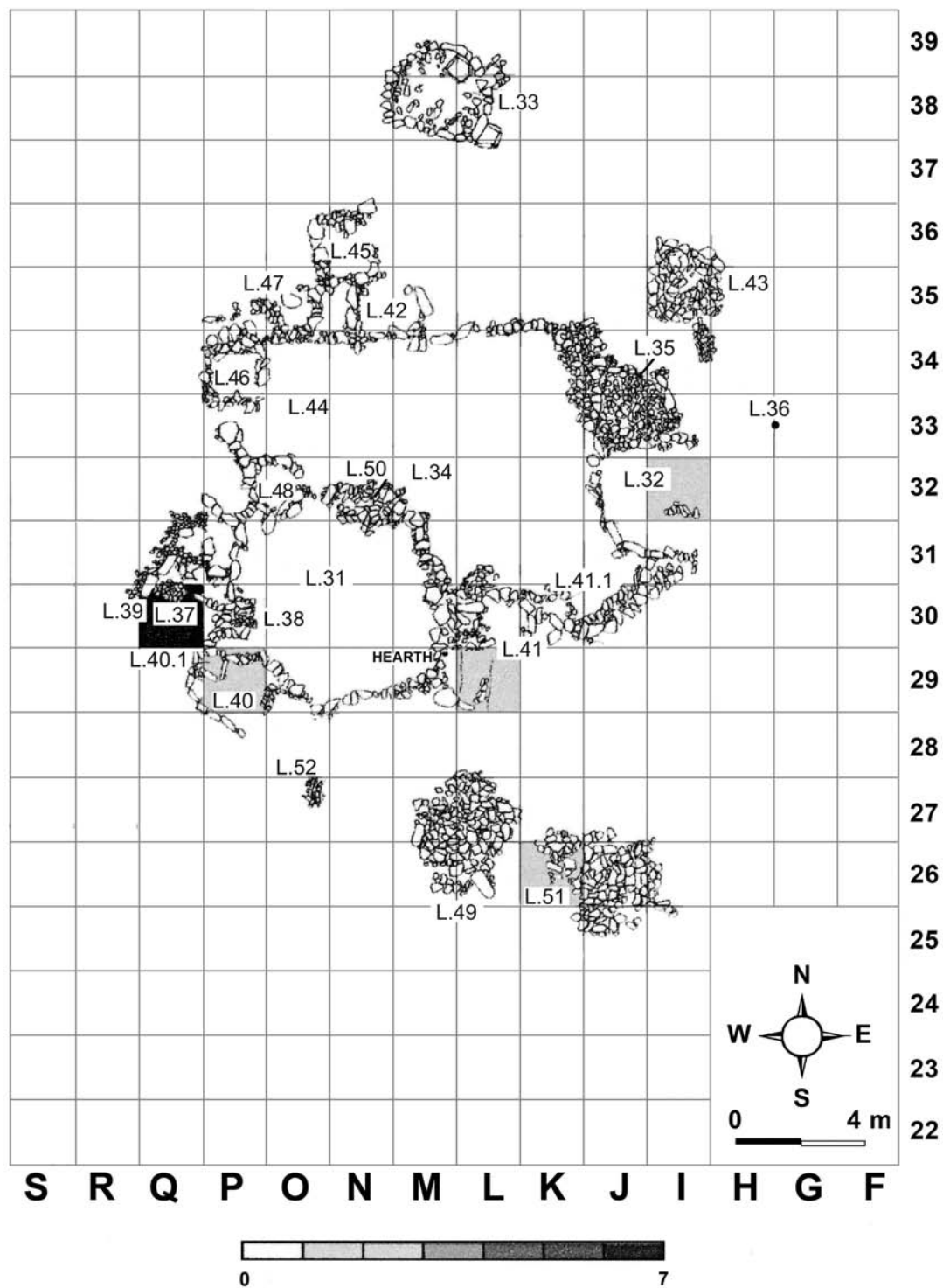


Figure 12.18. Unfinished drill distribution.

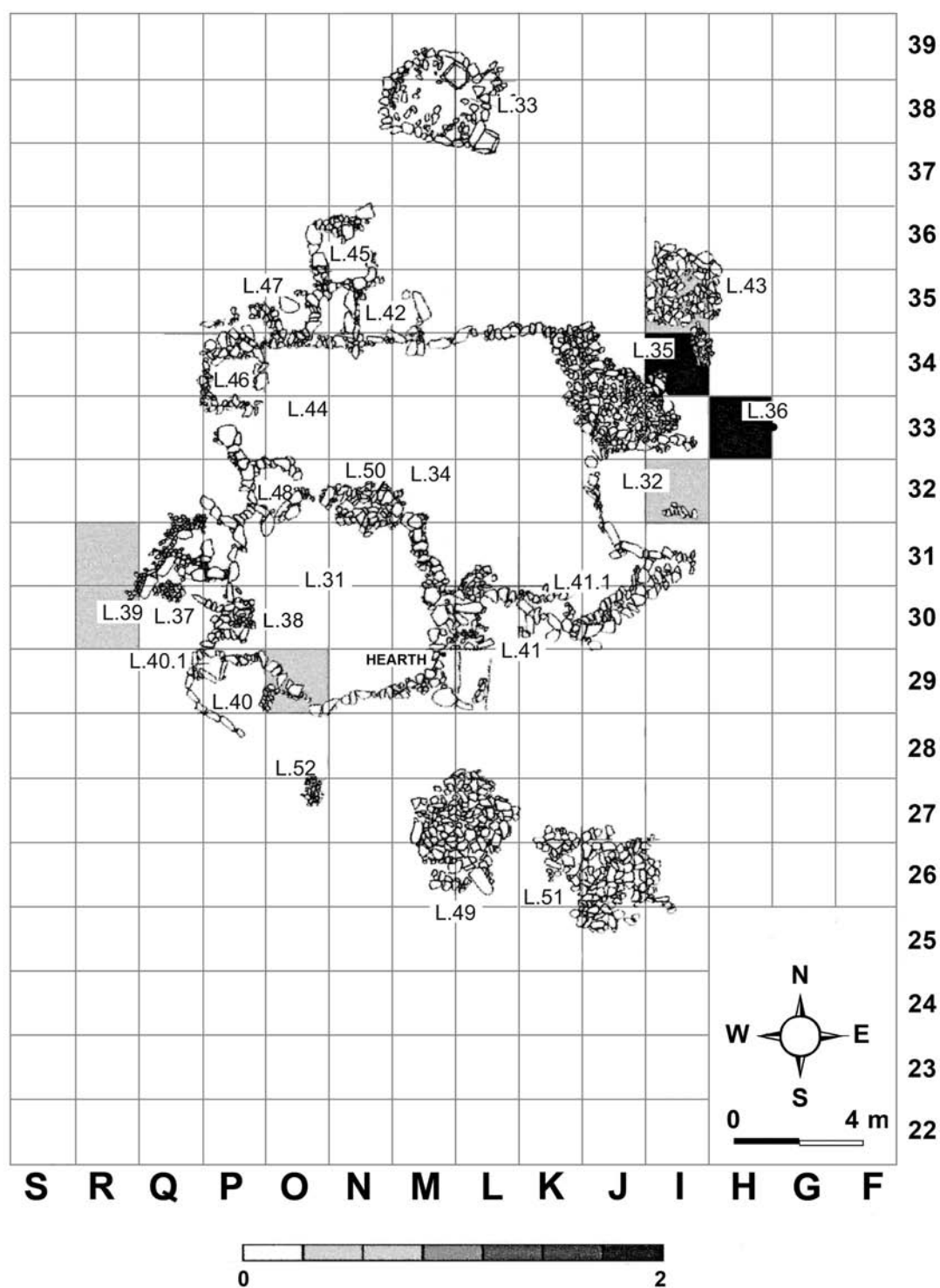


Figure 12.19. Drill fragment distribution.

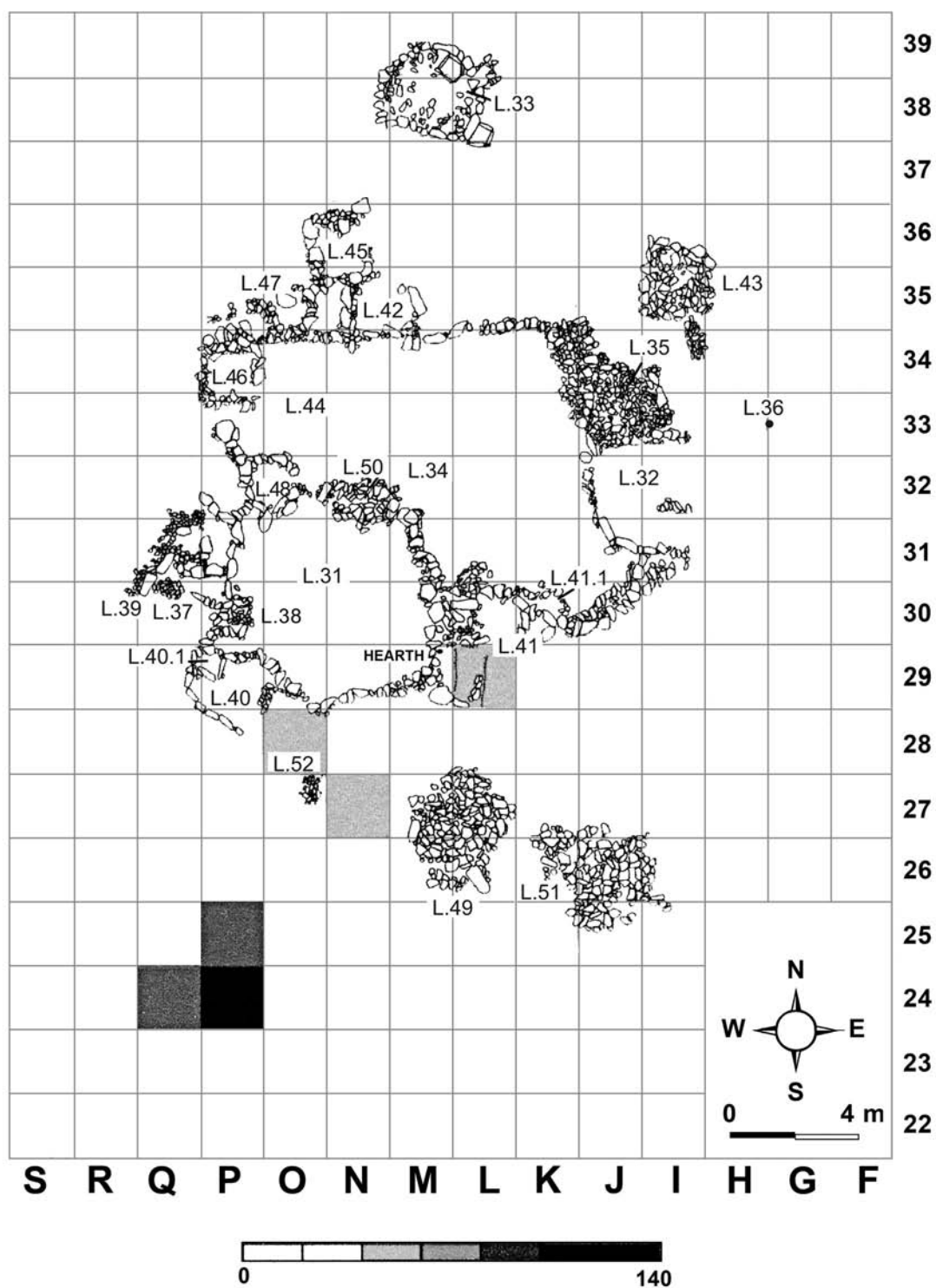


Figure 12.20. Sandstone chunk distribution.

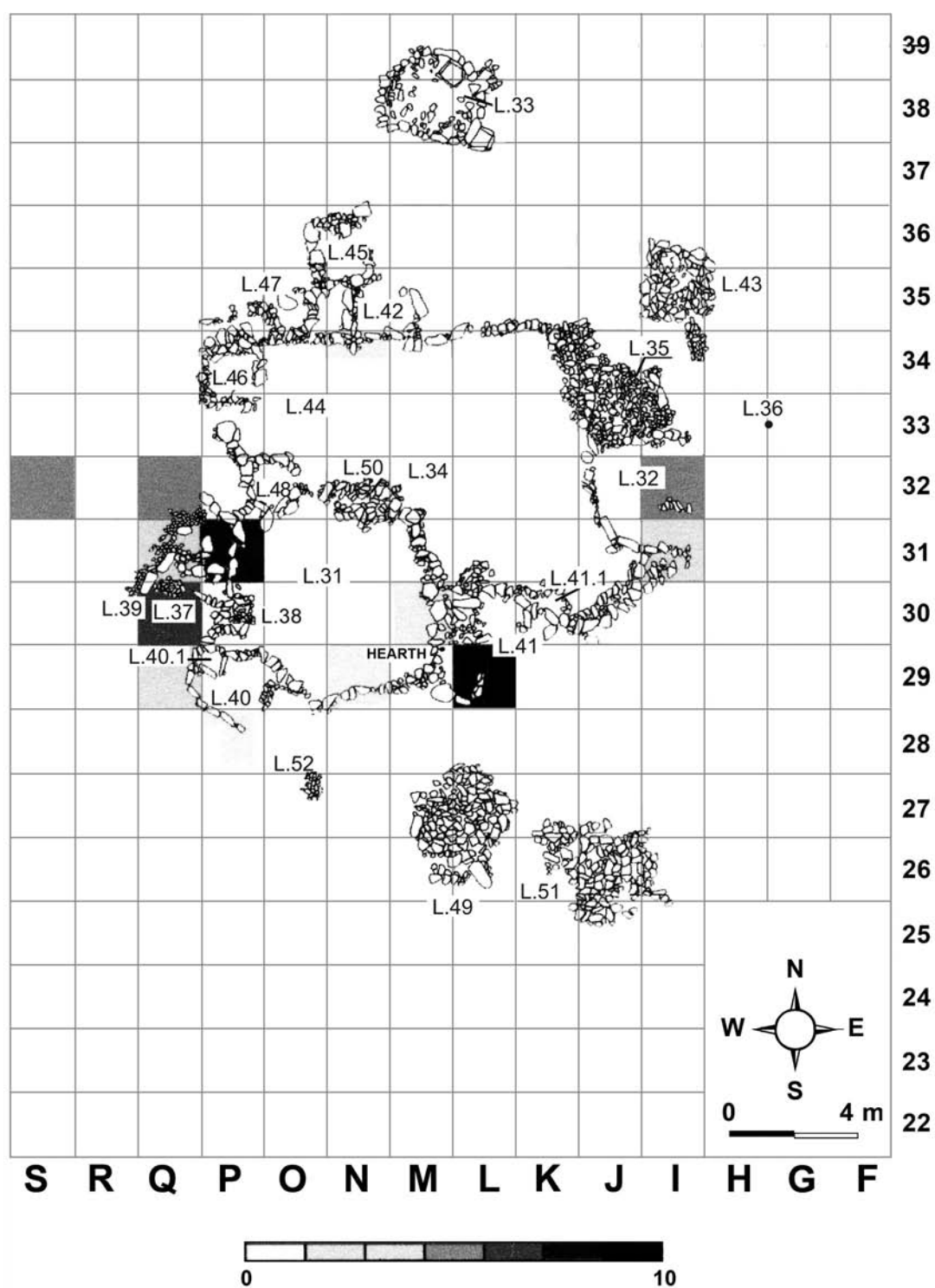


Figure 12.21. Sandstone chip distribution.

grinding was not restricted to these loci. The milling stones themselves (Figure 7.8; Table 7.2) show a generally dispersed pattern, but almost all the broken milling stones are found incorporated into walls. Three of the complete milling stones were found face down, suggesting storage/abandonment, as opposed to discard.

Ceramics

Potsherds (see Chapter 5 for a review of types) were found primarily outside the architecture, with the greatest density in the southwestern corner of the site (Figure 12.22). No patterns concerning types or the distinction between Early Bronze Age II and Early Bronze Age IV sherds were evident. Unlike the previous components of material culture, the sherds seem to reflect discard and not use. Given the absence of evidence for manufacture of pots on the site, and the greater bulk and value of pottery relative to most of the material culture recovered, the absence of complete pots in situ probably also reflects an orderly and planned abandonment of the site. The concentration of sherds outside the architecture suggests a midden deposit whose organic components have long since washed out.

Other Material Culture

Copper objects (Figure 12.23; see Chapter 8 for definitions) cluster around the occupation structures. The presence of both awls in Locus 37 suggests their possible connection to the bead-making industry; perhaps they were used as percussors for the pressure retouch in making the microlithic drills. Ostrich eggshell fragments (Chapter 10) also cluster around Locus 37, and they are obviously the raw material from which the drilled beads were manufactured (Figure 12.23).

The three pieces of obsidian (Chapter 9) were found in the southern part of the site, outside the architecture, not far from the cluster of *Conus* shell beads (Figure 12.23; Chapter 10). Given the low numbers of these pieces, discard was probably a unique and perhaps unintentional episode, and it is difficult to assign deeper meaning to the distributions.

CONJOINABLE PIECE ANALYSIS

Given the general presence of all elements of the lithic reduction system in and around Locus 37, specifically squares O-P-Q 29–32, and the high density of lithic materials in this locus, conjoinable piece analysis focused on this area of the site (Figure 12.24). Table 12.1 lists the specific pieces refitted, and Figure 12.24 presents the mapping of the conjoinable pieces. One tool from L31a was also conjoined by chance. Similarities in raw material strongly suggest that other pieces derive from the same pieces of raw material and might be conjoined were the missing pieces between them present, but there is no way to either quantify or confirm such impressions. In terms of comparison with other sites where refitting has been conducted, assumed conjoins based on raw material similarity are incomparable. They are not included in this analysis.

Of the 6,126 lithic artifacts recovered from these squares, only 43—0.7 percent of the total lithic assemblage—could be conjoined to form 20 larger pieces, this including the additional piece from Square L31a (Figure 12.24). Of these, all but three were of only two artifacts, the exceptions each consisting of three pieces that fit together. The majority of conjoins (64 percent) were of broken pieces and thus did not reflect the actual reduction sequence. No cores were refitted to flakes, and only one tool fit another flake. In two instances (Figures 12.25:8, 12.25:15), patina between conjoined pieces contrasted significantly, indicating differences in post-depositional processes acting on the two pieces. As per Table 12.1, 11 refits, including 4 that connected between the surface crust and the lower horizon, a depth difference of at least 10 cm, spanned different layers of the site.

Even given the spatial limitations of the conjoinable piece analysis carried out for the Camel Site assemblage, several conclusions can be drawn. Most significantly, the number of conjoins is very low and is dominated by broken pieces as opposed to remains of knapping. That is, in spite of the high density of lithic materials in and around Locus 37, and the clear evidence for the production of microlithic drills in the locus, the debitage recovered seems to be only a relatively

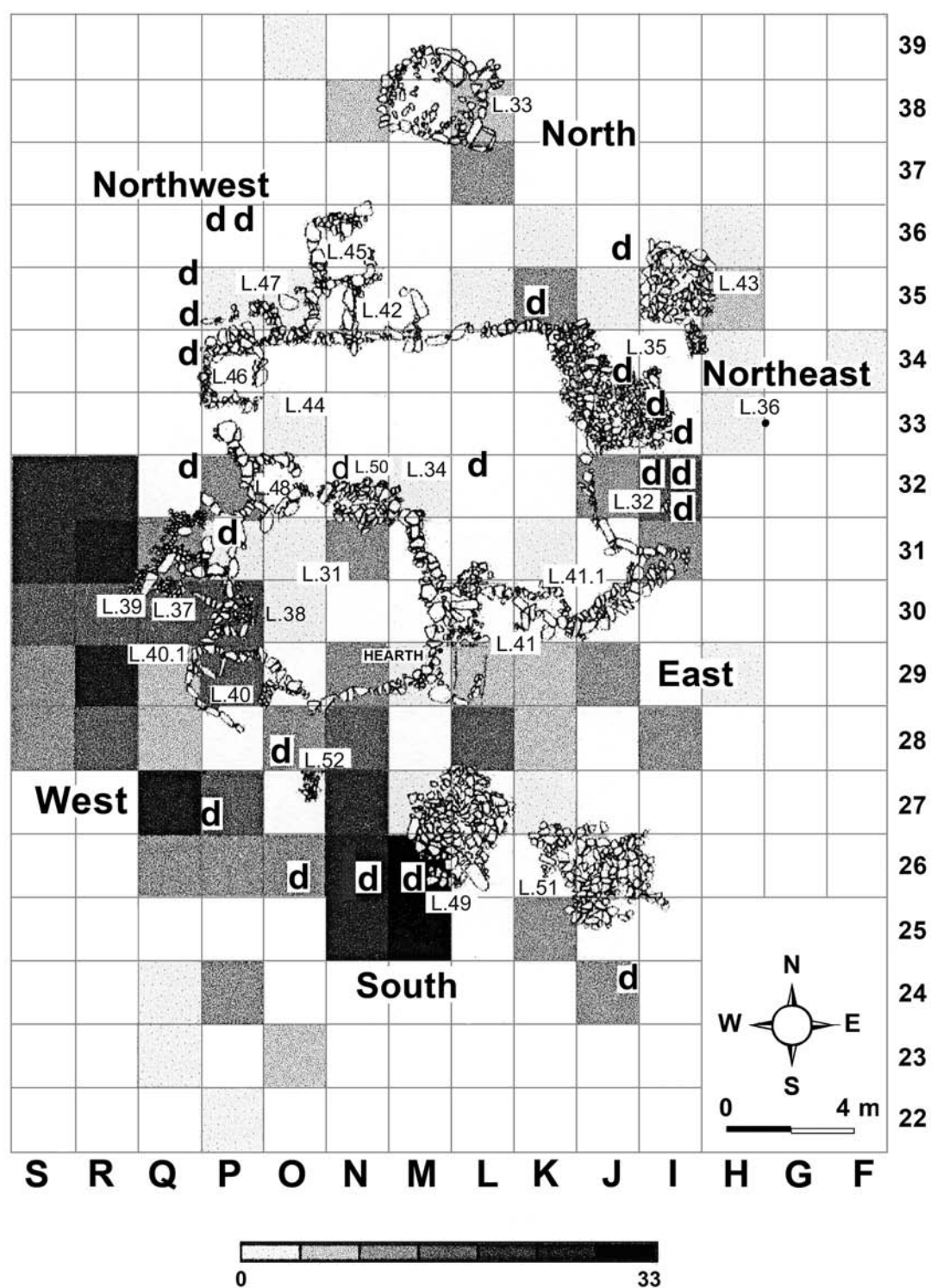


Figure 12.22. Potsherd distribution.

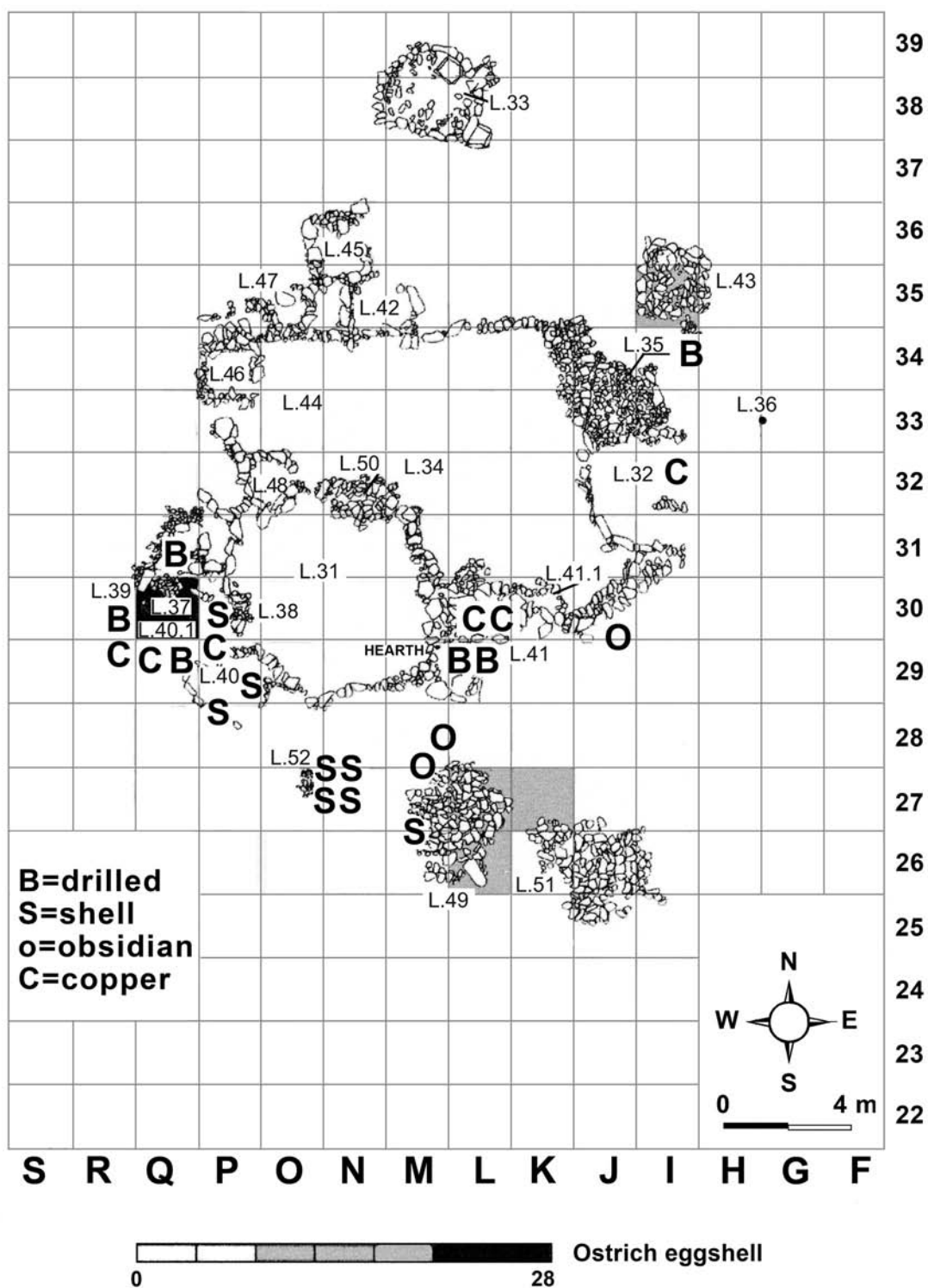


Figure 12.23. Distribution of ostrich eggshell fragments and other material culture.

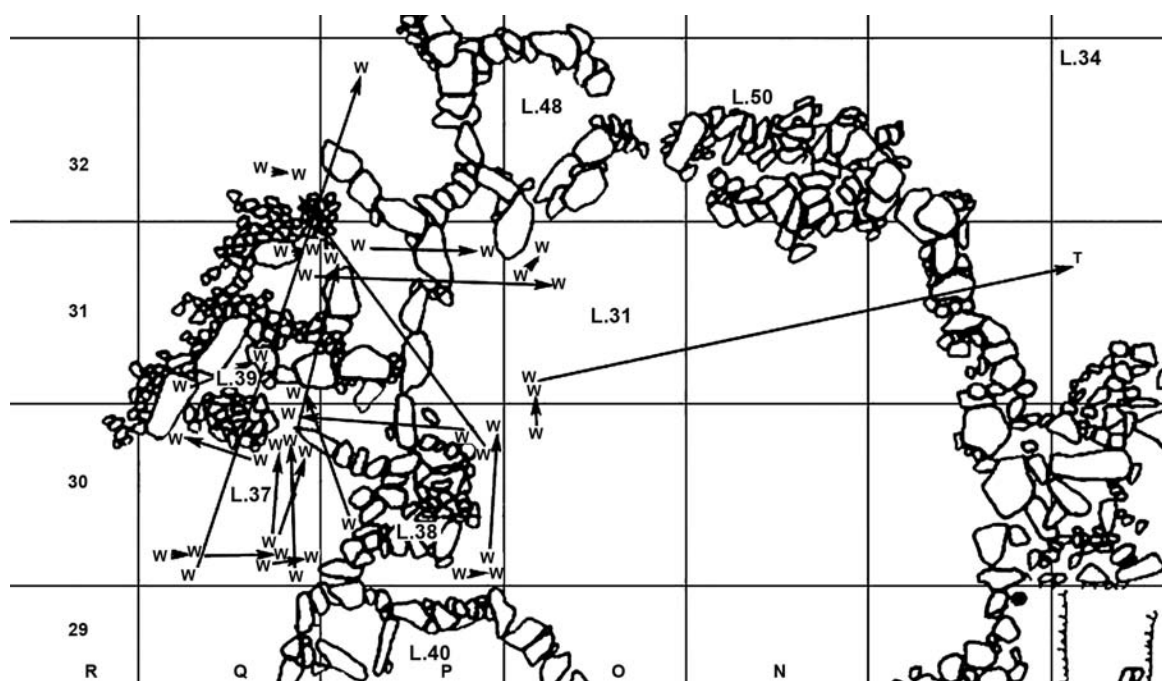


Figure 12.24. Map of conjoinable pieces. W=waste; T= tool.

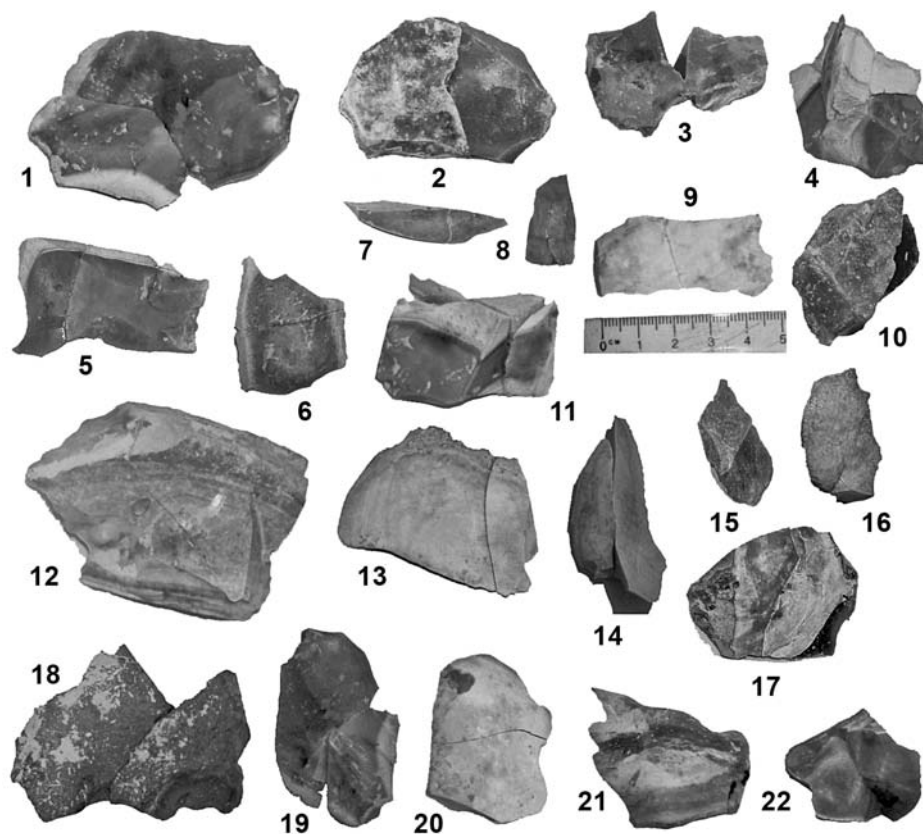


Figure 12.25. Conjoinable pieces from in and around Locus 37.

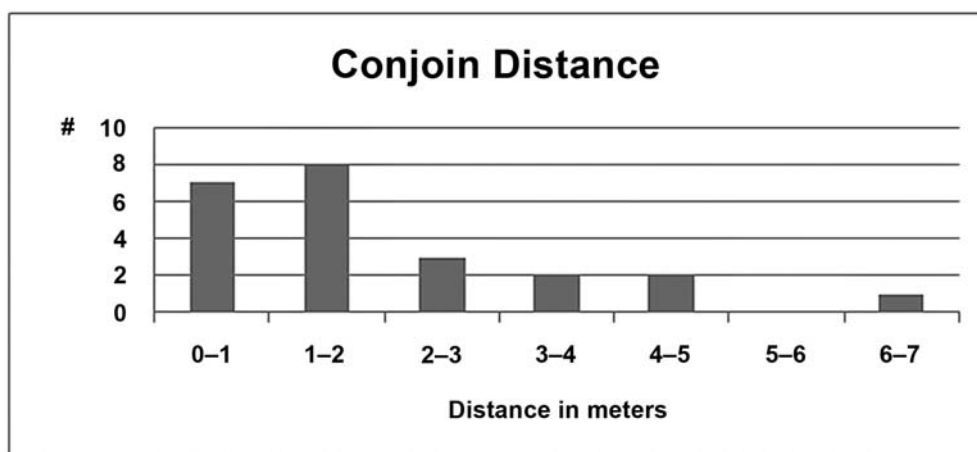


Figure 12.26. Histogram of distance between conjoinable pieces.

Table 12.1. Conjoinable Pieces

Piece 1	First fit	Second fit	Piece 1 Class	Piece 2 Class	Distance 1	Distance 2
P31a	Q30b lower	Q30d	Waste	Waste	4.12	1.00
Q30c surface	Q30d lower	Q30c surface	Waste	Waste	2.24	3.83
Q30b surface	Q30b upper	Q30d lower	Waste	Waste	0.00	1.00
P30d upper	P30b upper		Waste	Waste	1.00	
O31c upper	L31a lower		Waste	Tool	6.08	
P30d lower	P30d lower		Waste	Waste	0.00	
O31c upper	O30a upper		Waste	Waste	1.00	
Q30c surface	P32a lower		Waste	Waste	4.12	
Q31b upper	Q31b upper		Waste	Waste	0.00	
Q31d surface	Q31c		Waste	Waste	1.00	
Q31a lower	Q31a upper		Waste	Waste	0.00	
Q30b upper	P30b lower		Waste	Waste	2.00	
P30c lower	Q31d lower		Waste	Waste	2.24	
Q32d upper	Q32d upper		Waste	Waste	0.00	
P31b	P31a		Waste	Waste	1.00	
Q31b lower	O31a lower		Waste	Waste	1.00	
P30b lower	Q32d upper		Waste	Waste	3.61	
Q30d	Q30d		Waste	Waste	0.00	
P29a surface	P29a surface		Waste	Waste	0.00	
Q30a upper	Q30b lower		Waste	Waste	1.00	

small proportion of the original assemblage, to judge by our ability, or rather inability, to refit. This suggests a complex set of discard behaviors and post-depositional processes, including cleaning and perhaps curation of selected pieces. The high proportion of interlayer refits suggests a high degree of trampling (cf. Villa 1982) and reworking of sediments, this in spite of the apparent integrity of the general concentrations of material. All of this is probably tied to the cyclical or seasonal nature of site occupation and perhaps also the secondary occupation of the site at the end of the third millennium B.C.E., in the Early Bronze Age IV (Chapters 3, 4, and 10).

SUMMARY AND CONCLUSIONS

Conclusions can be drawn from the spatial analysis of the material culture from the Camel Site on two levels. The analysis shows clear patterns, reviewed below, in terms of the basic organization of the site. In light of these, methodological conclusions can also be drawn concerning the excavation and analysis of similar sites.

Refit patterns (Figures 12.24, 12.26; Table 12.1) show relatively limited dispersion. Of the 23 linkages, 15 were 1 m or less in distance.¹ On the other hand, seven connections spanned walls, suggesting deliberate transport and not natural movement, for which the walls would constitute a barrier.

If in terms of the organization of space, the architecture provides the basic structure of the Camel Site, on the other hand, spatial analysis of the material culture demonstrates that similar architectural features do not necessarily encompass identical activities and that similar activities may occur in areas that are not identical architecturally. Thus bead making occurred in only one habitation structure (Locus 37) but also seems to have occurred around a hearth (Locus 36). Lithic reduction occurred in many areas of the site but at different levels of intensity, with different stages of reduction occurring at different intensities in different clusters. Similarly, the initial flaking of blocks of sandstone in milling stone production seems to have occurred in an area just south of the site, but finer work seems to have been spread out over a greater area. Similar dis-

tinctions can be drawn for other elements of material culture.

The conjoinable piece analysis complements the spatial distribution study, providing an even finer grain to the study, suggesting patterns of discard and formation processes related to site use, seasonal reuse, reoccupation in the Early Bronze Age IV, and probably post-depositional processes such as trampling and slope wash. The contrast with Paleolithic sites is of interest, suggesting at some level a greater intensity and perhaps complexity of occupation at the Camel Site. The complexity of these processes belies the apparent simplicity of the site itself.

All of this goes to emphasize the importance of relatively fine-grained provenience and collection in the investigation of these sites. Although the concentrations of sandstone and drills would undoubtedly be noted using some less rigorous or fine-grained system of documenting provenience, the subtleties of the distributions, the distinctions between primary and secondary activities and between different stages of lithic reduction, would not have been evident. These add significantly to our understanding of how the site functioned and was formed.

ACKNOWLEDGMENTS

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NOTE

- 1 Distances were measured between the center points of the subsquares in which the artifacts were found.

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THE CAMEL SITE IN PERSPECTIVE

STEVEN A. ROSEN

As indicated in Chapter 1, excavations at the Camel Site were undertaken with three primary goals: (1) an assay in field and analytic methods; (2) a contribution to the substance of Early Bronze Age archaeology in the Negev—that is, new data; and (3) an exploration of an early pastoral society from both a historical and an anthropological perspective to gain insights on the larger phenomenon of early desert nomadism. The substance of the materials recovered from the Camel Site (the physical remains of the site, the material culture, and analyses of sediments) is presented in the body of this work. In this concluding chapter, the field methods are evaluated, and the site is placed in some larger historical and anthropological perspective.

FIELD AND ANALYTIC METHODS

The use of the small grid enabled quantitative spatial analyses, allowing the definition of small-scale variation in artifact distributions. Although such obvious concentrations as the bead production area in Locus 37 and the sandstone reduction area south of the architecture (squares QP24–26) might well have been recognized without fine gridding, smaller-scale phenomena, such as the drill concentration around Locus 36, and the abil-

ity to pinpoint and differentiate concentrations within loci would not have been possible without the grid. More subtle variability, such as contrasts in lithic type frequencies between areas on the site or the recognition of a probably deflated midden west of the site (Chapters 5 and 12), would perhaps have been accessible using artifact frequency tables according to loci but would have been difficult to evaluate in terms of absolute densities, making their significance impossible to evaluate. The generally lower level of discard in the enclosures is an important functional statement, as are the specific locations of the clusters of different artifacts. These reconstructions would not be possible without the use of the fine-scale grid.

Figure 13.1 presents a standard 5 × 5 m grid system superimposed on the plan of the Camel Site. While few archaeologists have actually formally adopted such a system for desert excavations, a brief discussion is worthwhile. Even given the exposure of much of the architecture above the surface, visible before excavation, the adoption of such a system would have resulted in serious information loss and in lesser flexibility in the actual management of the excavation. Although it might be argued that balks can be removed, they are more often left as witness sections, thus leaving 40

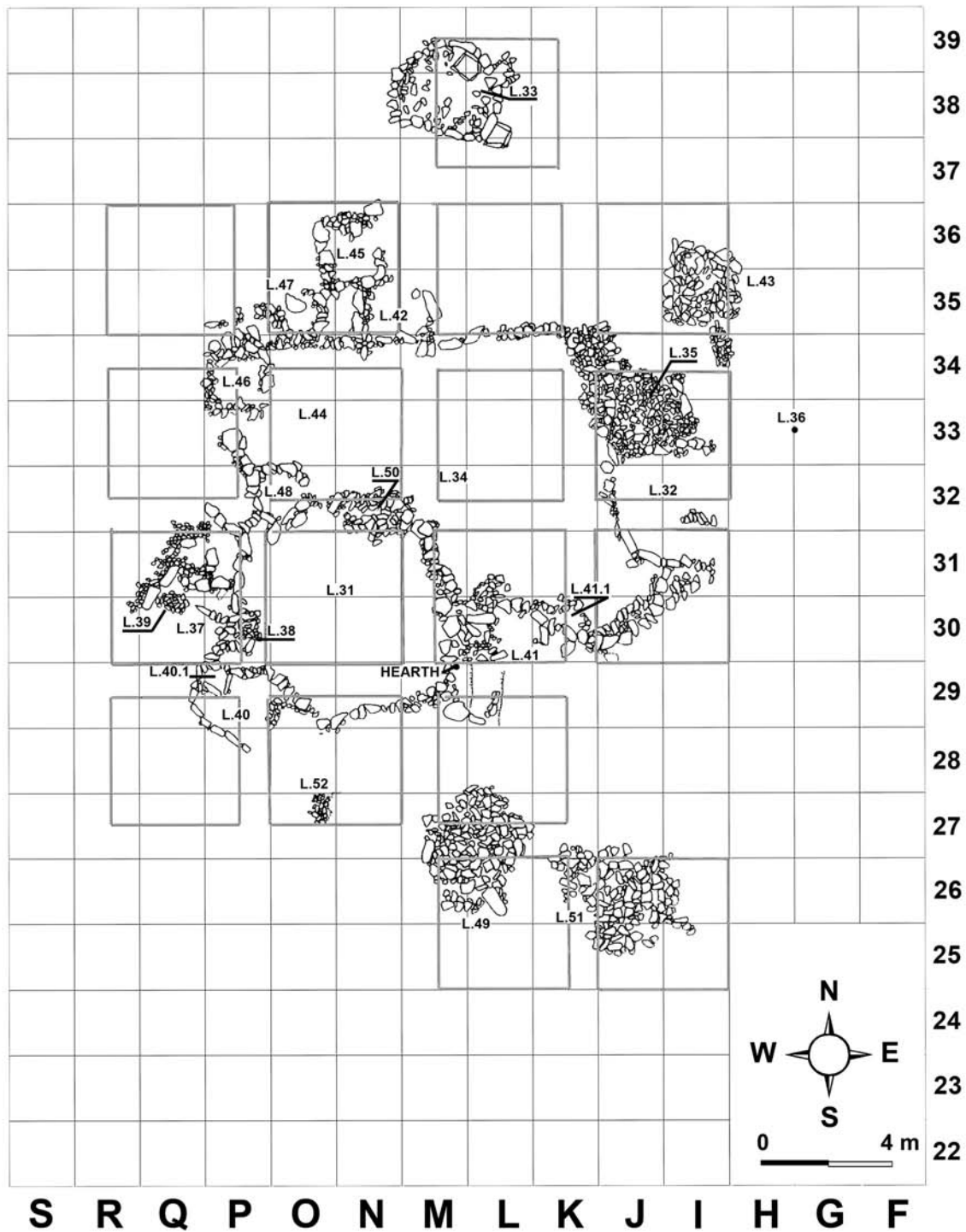


Figure 13.1. Camel site architecture with superimposition of 5×5 m grid system with 4×4 m excavation squares.

percent of an area unexcavated. On large-scale excavations with massive and regular structures, architecture can often be reasonably extrapolated. On small-scale sites with less massive and less reg-

ular architecture, this is simply not possible. It is not clear that the general plan of the structures would have been evident if only the 4×4 m grid (5×5 m less the balks themselves) had been exca-

vated. Even given the surface remains, many details of the architecture were not evident before excavation. Notably, excavation of balks is also always difficult in terms of reconstruction of artifact contexts both stratigraphically and horizontally. This would have been of some importance for the spatial analyses conducted here. Of no less importance is the ability to easily extend the excavation to incorporate areas beyond the initial exposures. This was easily accomplished using the small grid system but would have been awkward and time-consuming using a standard 5×5 m grid. The advantage of the 5×5 m system is in the formal and systematic recording of sections, and in retrospect, a more formal system of section recording would have been preferred to the ad hoc field decisions utilized here. Of course, it is to be stressed that this is not meant as a critique of 5×5 m grids in large-scale village and town excavations.

Sediment sieving through 2–3 mm mesh proved to be one of the most important methods of the excavation. Crucial artifacts, such as the copper prills, would not have been recovered without sieving. Other small artifacts, found in higher numbers (for example, microlithic drills, lunates, beads, ostrich eggshell), most likely would have been recovered but in significantly lower numbers, affecting our understanding of the functional configuration of the material culture assemblage. In this context, the collection of all lithic waste needs to be stressed as well. Tiny artifacts, such as broken drill bits, aided us both in understanding the quantitative structure of the assemblage and in reconstructing the organization of discard. In general, lithic waste plays a crucial role in our comprehending the structure of activities on the site (as well as in defining the lithic technologies). This is perhaps beating a dead horse, but given the even greater role that lithic analysis plays in the analysis of desert sites, it is still worth emphasizing.

Stratigraphic excavation according to natural layers and documented by ad hoc section drawings allowed reconstruction of site formation processes. Although the small size of the site, its shallow depth, and the crude nature of construction ultimately limited the utility of the section drawings in terms of establishing an absolute or overall chronology of construction, apprehension

of processes such as sheet wash and the stepped aspect of the bedrock is crucial to understanding artifact distributions and site organization.

All these field methods taken together also provided an opportunity to conduct conjoinable piece analysis (refitting) of the lithic assemblage in selected areas of the site. The fact that only a low proportion of pieces could be conjoined is not a failure of the method but a statement concerning site formation processes, discard, and loss of materials. In spite of the superficial resemblance to earlier prehistoric sites, the basic formation processes differ in important ways, most notably in the apparent occasional cleaning that seems to have occurred as a part of discard processes.

If assaying other methods of analysis (quantitative analysis of the material culture assemblages, sediment analysis, chemical and petrographic analysis of material culture, etc.) was not explicitly included in the goals of the research, it is not because they were not used or are not useful but because they have already been adopted in the practice of Negev archaeology. Even so, these other methods were considerably enhanced by the field and collection methods outlined above in the choice and quantity of materials. None of these methods are innovations in the sense that they present something archaeologically new. Nevertheless, there is a methodological polemic here. First, there has been little or no discussion of methods in the post-Neolithic archaeology of the Levantine desert regions, and this has been to the detriment of the work conducted. Second, given the relative poverty of material culture and architecture in these sites, especially in comparison to village and urban sites in the Mediterranean region, the uncritical adoption of methods taken from core zone historical-period archaeology will unavoidably miss out on data necessary for fuller comprehension of the periphery. Furthermore, the methods offered here are not complete either, but represent only a work in progress. Future work on similar sites should incorporate a more complete geoarchaeological program. In an ideal world, analyses of organic remains, bones, and botanical remains should also play a larger role, but these rarely preserve in the shallow sediments of most Negev sites. Beyond the Negev and the

Near East, in the post-Paleolithic periods and in regions where large and complex sites tend to dominate archaeological attention, the investigations at the Camel Site suggest that there is much to be learned by investing in the exploration of small sites, *with the appropriate methods*. There is greater potential in these sites than is usually assumed.

HISTORICAL AND ANTHROPOLOGICAL CONTEXTS

Chronologically, the Camel Site reflects a primary occupation in the early third millennium B.C.E., as determined both by the C14 and the material culture, and a secondary presence at the end of the third millennium B.C.E., dated by reference to the ceramics and undated by absolute means. In terms of culture history, two sequences are of relevance here (Figure 1.2). The northern sequence is based on culture-stratigraphy in the settled zone, chronologically linked to the Egyptian sequence and applied to the Negev using index fossils whose chronological context has been established external to the desert (e.g., Amiran 1969; Amiran et al. 1973; Kantor 1992; Stager 1992). This sequence is the traditional Syro-Palestinian one dividing the fourth and third millennia into the Chalcolithic period (ending in the beginning of the fourth millennium B.C.E.) and the Early Bronze Age I, II, III, and IV (EB IV is equivalent to the Middle Bronze Age I, the Intermediate Bronze Age, the Early Bronze–Middle Bronze, etc.). Complementing the northern sequence, a southern sequence, dubbed the Timnian (see discussion in Chapter 1) shows internal development in a trajectory quite distinct from that of the north. Thus, as reviewed in Chapter 4 (“Chronology”), the two occupations at the Camel Site can be attributed to the Early Bronze Age II and the Early Bronze Age IV (the Intermediate Bronze Age, etc.) in the northern sequence and the Late Timnian and Terminal Timnian (Rosen 2011) in the southern sequence. This period is especially notable for the expansion of Mediterranean zone influence on the desert, seen in the greater quantities of goods moving between the desert and the settled zone, in the greater diversity of those goods, and indeed in the

presence of trade stations or “Aradian colonies” in the desert (Beit-Arieh 1986, 2003).

Culturally, the Camel Site represents the local manifestation of the Late Timnian culture (Rothenberg and Glass 1992), contrasting in notable particulars with Aradian sites in the desert. Architecturally, it lacks the distinctive elements of Aradian sites, such as the rectilinear architecture, high stone walls, and internal benches found at such sites as Nebi Salah and Sheikh ‘Awad (Beit Arieh 2003). Saidel (2002b) has noted significant differences in ceramic typological diversity between Arad and Aradian sites (high diversity, high number of types) and Timnian sites (low diversity, fewer types present). The presence of microlithic lunates (transverse arrowheads) in medium frequencies also contrasts with the assemblages from Aradian sites, where arrowheads are rare to absent. Unfortunately, it is difficult to compare other aspects of the lithic industries due to two problems of sampling. On one level, localization of activities such as bead making suggests that some activities may not have occurred on some sites; there is little evidence for bead production at Arad and associated sites. On another level, lithic collection methods at the Camel Site were generally more rigorous, and many of the smaller lithic types may be underrepresented at other sites. Indeed, the general intensity of occupation seems to differ as well, with Aradian sites seemingly showing much greater density of material culture, in spite of the greater intensity of collection at the Camel Site. This is especially evident in the ceramic assemblages (since ceramics seem less affected by different collection methods).

Given this contrast with contemporary Arad and associated sites, and indeed with the northern agricultural zone in general, the Camel Site provides an opportunity to examine the Timnian culture in some detail. Emphasis will be placed on subsistence, exchange systems, social organization, and ideology.

Subsistence

Given the scarcity of organic remains (in spite of assays in flotation!), evidence for the reconstruction of subsistence is indirect, consisting of material culture and architecture and inferred func-

tions, larger archaeological contexts, environmental and paleoenvironmental background, and ethnographic analogy. Each of these realms of evidence must be examined critically, and none are without significant drawbacks. Nevertheless, together they suggest a picture of a mobile pastoral society that may have also engaged in gathering and import of grain.

In terms of material culture, subsistence can be inferred from milling stones, arrowheads, and sickle segments (that is, their scarcity). Milling stones undoubtedly reflect plant food processing. Both archaeologically and ethnographically, the saddle querns and rubbers found at the Camel Site suggest grinding of seeds and grain (Chapter 7 and references), but it is difficult to determine whether the plants processed were gathered locally or imported. The absence of mortars and pestles, excepting the single bedrock mortar south of the site, is notable but difficult to interpret. The scarcity of sickle segments (less than 2 percent of the tool assemblage) contrasts significantly with sedentary agricultural sites farther north, as well as contemporary sites in the Uvda Valley farther south (Rosen 1997:126–131), which show medium and high sickle percentages (greater than 5 percent), indicating more intensive reaping. In fact, the low frequency of sickle segments from the Camel Site matches assemblages from other sites in the central Negev, all showing few sickles and suggesting little or no systematic agriculture in the general region (Rosen 1997:127). A key point is that the area of low sickle proportions is sandwiched between areas of medium/high proportions in the north and south (in the Uvda Valley, a special microenvironment allowing agriculture [Avner 1990]), indicating that the contrasts are not geographic or cultural but functional. That the sickles in the Uvda Valley are typologically similar to those of the Camel Site, and contrast with the Canaanean sickles of the northern areas, also supports a functional as opposed to cultural interpretation of the quantitative differences.

The presence of arrowheads (microlithic lunates) suggests that hunting played some role in subsistence as well, although their use as weapons cannot be discounted. On the other hand, the total absence of chipped stone arrowheads in the

northern settled zone, where warfare was clearly prevalent (to judge from Early Bronze Age fortifications), suggests that if flint arrowheads were used for warfare at the Camel Site, they might also be present in northern assemblages, thus indirectly supporting the idea that they were primarily used for hunting.

Architecturally, the internal enclosures at the Camel Site are typical of Timnian sites and can be interpreted as animal pens (e.g., Haiman 1992, 1996; Kozloff 1981). The stratigraphy associated with these enclosures, the organic horizon beneath the upper loess horizon, has been interpreted as a leached-out dung layer (Rosen 2003), and Kozloff (1981) has identified dung horizons in similar sites in Sinai. Then again, it has proven impossible to define a sedimentological or chemical signature from the Camel Site sediments to clinch the argument.

The generally “scrappy” nature of the architecture, at least as compared to the sedentary architecture of the Mediterranean zone, and the numerically relatively poor material culture assemblage associated with the site suggest that occupation was short-term. Specifically, only 31 diagnostic sherds were recovered, contrasting greatly, for example, with the Aradian sites of southern Sinai (Beit-Arieh 2003). Even the lithic assemblage, seemingly large, is actually rather limited when considering that a typical desert Pre-Pottery Neolithic B lithic assemblage, also deriving from a mobile society, might comprise more than 150,000 lithic artifacts (e.g., Gopher 1981, 1994). The nature of the site and its remains suggests seasonal exploitation, with cyclical returns (cf. Haiman 1992, 1996), but it is not possible to ascertain the season of occupation based on the material remains (but compare to Henry 1992).

Recent research on preserved dung layers in rock shelters in the vicinity of the Camel Site also has implications for season of occupation. Preserved dung pellets dating to the Early Bronze Age have been recovered from two nearby shelters: the Atzmaut shelter (2 km distant) and the Ramon shelter (5 km distant). In both cases, analyses of protein content of the pellets (Rosen et al. 2008) has indicated an early winter exploitation, the very high protein levels indicating a high

density of lipids in the plants, an attribute restricted to the beginning of the growing season. If one can assume that the rock shelters were exploited at the same time as the site occupation, then one can conclude an early winter occupation for the site. On the other hand, if the few seeds recovered are really to be associated with the occupation, then perhaps late spring is a more appropriate conclusion (Chapter 11).

Larger archaeological contexts suggest mobile pastoralism as the dominant subsistence mode for the Negev in the Early Bronze Age. The few contemporary faunal assemblages from the desert (Henry and Turnbull 1985; Horwitz and Tchernov 1989) indicate a predominance of goat and sheep, introduced into the desert at least three millennia earlier. Contemporary rock-shelter deposits dominated by layers of goat and sheep dung, dated by radiocarbon, also indicate the predominance of goat/sheep pastoralism (Babenka et al. 2007; Rosen et al. 2005; Rosen et al. 2008). As above, sickles are rare to absent at virtually all sites south of Arad (except the Uvda Valley sites). Hunted animals were present in these sites but only in small numbers. Variability in size of sites, keyed to ecological zones, suggests seasonal patterns of aggregation and dispersion (Haiman 1992, 1996; Henry 1992, 1995:369; Henry and Turnbull 1985; Kozloff 1981). The largest sites from this period are located in the western uplands of the central Negev (Haiman 1992), suggesting aggregation, perhaps in the spring, the period of best grazing.

Environmental and paleoenvironmental reconstructions support these reconstructions. The average rainfall around Mitzpe Ramon today is only around 100 mm per annum, far less than adequate for even opportunistic dry farming. Notably, although recent Bedouin have farmed the region, this has been on the basis of runoff irrigation technology, based on relict terrace systems pioneered in the region at the earliest during the Iron Age. Even given the likelihood of a climatic amelioration sometime during the late fourth or early third millennium B.C.E. (e.g., Bookman et al. 2004; Enzel et al. 2003; Frumkin et al. 1994; Rosen 2007:80–89), the region would have remained a desertic steppe, not conducive to systematic farming (e.g., Babenko et al. 2007).

Without adopting social or cultural analogies from the modern Bedouin, the desert imposes constraints even on recent populations with significantly enhanced technologies of adaptation. Ethnographically, the recent indigenous populations of the Negev, the Bedouin (e.g., Abu-Rabi'a 2001; Kressel 2003; Marx 1967), were originally mobile pastoralists. As above, although the Bedouin today engage in farming in the Negev Highlands, it is based on classical-period terrace remains and import of water using modern irrigation and is primarily a twentieth-century phenomenon. Bedouin farming in the nineteenth century seems to have been restricted primarily to the grasslands of the northern Negev, although by the 1920s and 1930s it had penetrated as far south as the Sede Boqer area (e.g., Kirk 1938, 1941). The recent Bedouin also engaged in seasonal migration, exploiting the upland areas during the early spring, reflecting an environmental factor as opposed to a strictly cultural one.

It is also notable that modern Bedouin have a sophisticated knowledge of plant and animal resources. Hunting continued to be practiced into the twentieth century, and gathering of plants, especially for fuel (Danin 1981) and medicinal purposes, is well known. It is reasonable to assume similar basic knowledge and environmental parameters for earlier groups, at least as working hypotheses.

Exchange and Trade

There is evidence for diverse types of trade and exchange at the Camel Site. These systems will be reviewed according to the materials traded, and then summarized.

The three obsidian chips found at the Camel Site derive from eastern Anatolia. They seem to represent the end point of a down-the-line trade system in trinkets and not raw material, and in this they contrast with earlier Neolithic obsidian trade systems.

Seashell beads originate from both the Mediterranean and the Red Seas and perhaps, in the case of the mother-of-pearl, from Egypt. It is impossible to determine with certainty whether the seashells were obtained directly from beaches during the seasonal round or through exchange.

However, the very low numbers of these artifacts suggest that they were acquired through reciprocal exchange; an expedition to the seashore would seemingly have resulted in larger numbers. The mother-of-pearl was almost certainly a trade object.

The three pink quartz crystals derive from a source in the Makhtesh Ramon and thus probably do not reflect imported trade items. They may have been traded out, since a brief reconnaissance of the source suggests that it would have been easy to collect a larger number. The fossil seashells and the black pebble, probably collected locally, likely represent a similar phenomenon.

The single worked lump of hematite, with a possible source near Har Aricha, only a few kilometers north of the Camel Site, is probably indicative of some kind of opportunistic exchange system, given the presence of hematite mace heads in Early Bronze Age assemblages farther north. Although clearly worked, the piece cannot be placed in a *chaîne opératoire*, and the nature of the exchange cannot be reconstructed. Notably, no finished hematite objects have been recovered at any desert site.

On the other hand, it is possible that the hematite is attached to the copper trade system, well attested in the prills, awls, and copper lumps found at the Camel Site. There is no evidence for either smelting or melting at the site, so these objects (excluding the awls, which may well have been part of an active tool kit) probably reflect a scavenging and exchange system. It is also possible that inhabitants of the site engaged in opportunistic production of copper objects in the course of a seasonal round, which took them to one of the copper source areas (Feinan, Timna). However, if the Camel Site inhabitants were manufacturing copper objects, trade in scraps seems unlikely, given the need to exploit all copper and the added value of finished goods. The variability in composition of the copper objects also suggests that they were obtained from more than one source or supplier, again emphasizing the opportunistic aspect of acquisition.

Ostrich eggshell beads were also manufactured on the site, but unlike milling stones, the entire manufacturing sequence, including the production of the drills for holing the beads, took

place on-site. As with the milling stones, no evidence for bead manufacture is present at Arad, or at other southern urban sites for that matter, microlithic drills being a feature almost exclusively associated with desert lithic industries in this period, in spite of the common occurrence of holed beads. While one cannot establish with certainty that Aradian beads originated at the Camel Site, the abundance of drills at the site and the scarcity of the finished beads themselves suggest some production for export. Given the well-established connections with Arad, the conclusion that beads were produced for both local use and export seems reasonable.

Tabular scrapers are the only chipped stone tools imported to the site. The closest source areas lie in the western Negev, in the Har Safun and Har Qeren area (Rosen 1997:75), and other quarry sites are located farther afield. As with other objects, it is not possible to determine whether these objects were obtained directly or through exchange, but the presence of large numbers of tabular scrapers at Arad and other northern sites indicates that they were traded out of the desert and into the Mediterranean zone, presumably by agents similar to the inhabitants of the Camel Site. The fall-off nature of the tabular scraper trade has also been explored, suggesting a primary contact/consumption zone in the Negev (and other source regions) and secondary consumption areas (Rosen 1997:75).

The milling stone production and exchange system contrasts in many of its particulars with that of copper. The sources for the milling stones were the nearby Makhtesh Ramon sandstones. Blocks were quarried at source sites, transported to the Camel Site, where they were shaped and finished, and then either used or exported to Arad or other sites. Transport must have required the use of donkeys, given the 28 kg mass of the finished but unused milling stone found on the site (and an assumed mass of more than 40 kg for the original block). The presence of numerous sandstone milling stones at Arad, the relatively great distances to available sources from Arad, and the total absence of production waste at Arad indicate clearly that these implements were imported to this site. Importantly, production at the Camel Site (and other sites, for example, Rekhes Nafha

[Saidel 2002a]) is not intensive but is extensive or opportunistic, and in this aspect it is similar to the metal trade, in spite of other structural contrasts.

Petrographic analysis of ceramics indicates that ceramics were either local or derived from areas farther south, strengthening the southern connection. It is unlikely that they were trade items per se, although some may have contained transported goods. Function is utilitarian.

Figure 13.2 summarizes the basic exchange connections that can be associated with the Camel Site. Three basic zones of activity can be defined. An inner circle, 5 to 10 km in radius from the Camel Site, comprises a zone of direct exploitation. It includes the basic raw materials directly available to inhabitants of the Camel Site while they were present at the site. It can be defined by reference to typical distances of hunter-

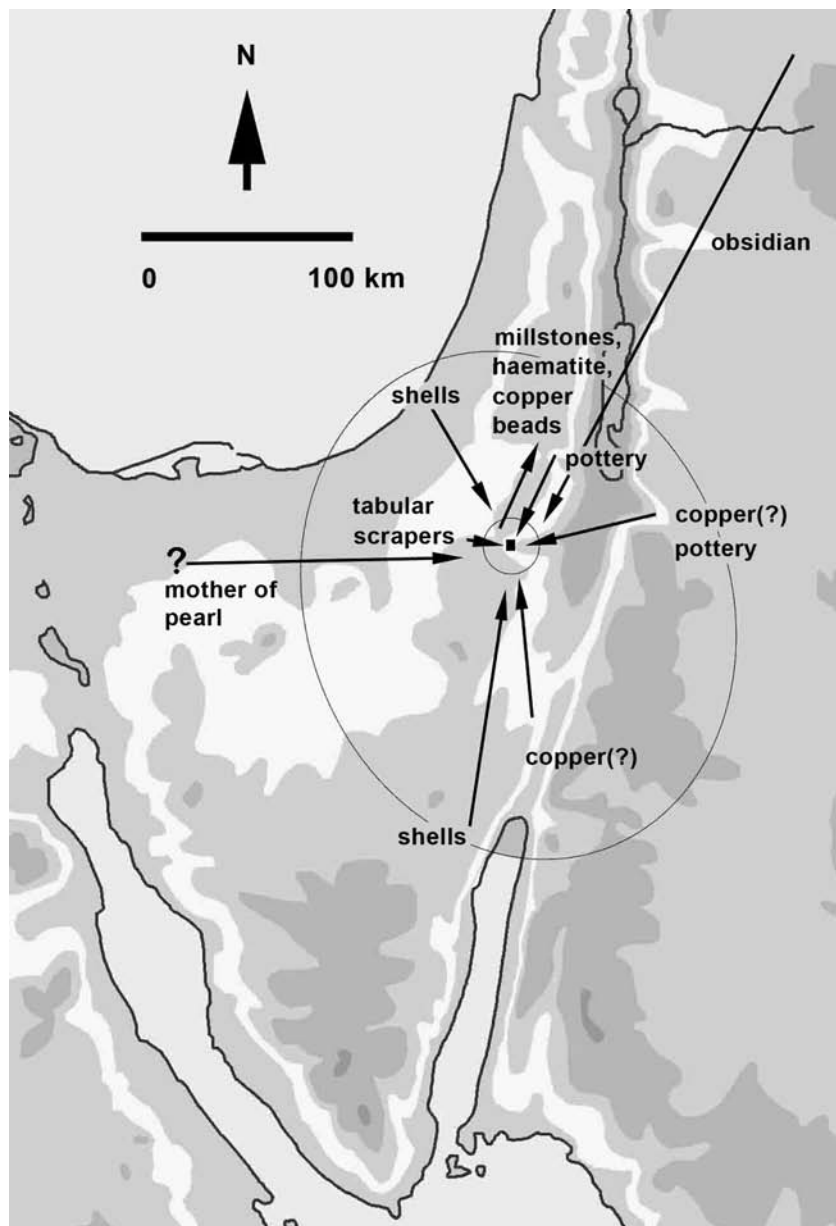


Figure 13.2. Trade systems of the Camel Site.

gatherer site catchments (e.g., Higgs 1972) but more importantly by reference to the actual materials recovered from the excavations, especially sandstone, quartz crystals, hematite, and most of the flint. Tabular scraper source materials are located somewhat beyond these resources. The outer circle is defined by the material resources which can be assumed to have been actively collected by Camel Site inhabitants, based on reconstructions of the actual production systems, or perhaps represent the zone of direct contact and exchange. Thus, as reviewed above, it is likely that the Camel Site folk had direct access to copper sources and most certainly were in contact with the town of Arad. The question of whether they reached the Mediterranean and/or the Red Sea cannot really be answered but is within the realm of reason. Ethnohistorically, the town of Gaza served as the market for the Bedouin of the Negev and southern Sinai, so the reconstruction presented here falls within the parameters of modern mobile pastoralists in the region (e.g., Rosen and Goodfriend 1993; Yisrael 2006). Finally, an outer zone, represented most especially by the obsidian but perhaps by other objects such as the mother-of-pearl, represents the region of indirect contact. It is likely that objects from the Camel Site, such as tabular scrapers produced by

Negev nomads but exchanged into areas farther north, also penetrated this outer zone.

Table 13.1 summarizes the different trade systems according to the following variables: import/export, distance, state of completion, quantity/mass, and function. Based on this summary, two different modes of exchange are indicated. The first, incorporating the obsidian, the seashell beads, and the quartz crystals (and perhaps the fossil shells), seems to reflect internal exchange, of small and relatively rare items whose meaning is attached to personal display or prestige. The mode of exchange may be classified as some kind of reciprocity or gift giving. The second mode, which can be classified as a kind of barter system for some kind of income, relates more to production and export and is primarily connected to utilitarian and symbolic functions.¹ It includes the copper scraps, milling stones, hematite, and perhaps the tabular scrapers and ceramics. The ostrich eggshell beads may function on both levels. One of the salient aspects of this system is the link to a larger external market, apparently with Arad as the focal point.

The two modes of exchange reflect two basic economic levels on which the inhabitants of the Camel Site, and for that matter Late Timnian society, operated. Basic modes of reciprocal exchange

Table 13.1. Camel Site Exchange Systems

	Import	Export	Distance	Completion	Quantity	Mass	Function
Obsidian	x		Long	Unworked	Low	Low	Prestige
Seashell beads	x	?	Medium	Semiworked	Low	Low	Prestige
Quartz crystals	x	?	Short	Unworked	Low	Low	Prestige
Hematite		x	Medium	Semiworked	Low	Low	Symbolic?
Copper scraps		x	Medium	Semiworked	Low	Low	Utilitarian
Copper awls	x	?	Medium	Finished	Low	Low	Utilitarian
Eggshell beads		x	Medium	Finished	Medium	Low	Prestige
Tabular scrapers	x	?	Medium	Finished	Medium	Medium	Symbolic?
Milling stones		x	Medium	Finished	Medium	High	Utilitarian
Ceramics	x		Medium	Finished	Medium	Medium	Utilitarian

continue to cement relations between individuals and small groups, as is common anthropologically to most small-scale societies (e.g., Hodder 1982; Malinowski 1961:81–95; Marshall 1976; Sahlins 1972; Wiessner 1983, 1984). External relations with larger-scale economies are evident in the barter system, and the links to sedentary society were more intensive than in earlier periods. Finally, neither system can be classified as intensive. Exchange still functioned at a low level, albeit one with profound impact on Timnian society itself.

Given the flow of barter goods (as opposed to gift giving) from the desert into Arad, the question of what flowed into the desert must also be addressed. The presence of petrographically northern ceramics constitutes one type of direct evidence for flow into the desert but is somewhat difficult to interpret. Ethnographically recent Bedouin groups were dependent on the settled zone for agricultural produce, most especially flour/grain, when they were not farming themselves, although given the problems of organic preservation, there is little further direct evidence bearing on this issue. Using the ethnographic case as a working hypothesis, the presence of used milling stones at the Camel Site, and at most Early Bronze Age sites in the central Negev (e.g., Haiman 1992), nevertheless suggests the use of grain and, in the absence of agriculture, its import. Of course, the absence of phytolith evidence of cereals undermines such an interpretation but contradicts the presence of the milling stones. Comparing the Camel Site to excavations conducted at sites in the central Negev from preceding phases, neither Kvish Harif (Rosen 1984) nor Mitnan II (personal observation) contained proper milling stones. This suggests a change in relations. Hopefully, future research will clarify this issue.

Social Organization

The social organization of Late Timnian society is reflected at the Camel Site in the structure of production, site and activity organization, and the size of the site and its role relative to other sites within the Timnian system. Each of these represents a different aspect or component of Timnian society, but together they provide a general picture of a two-tiered tribal society based on do-

mestic production and consumption, and cottage industry.

Two modes of manufacture can be reconstructed at the Camel Site. This is especially evident in the chipped stone assemblage but can be seen in other components of material culture as well. Although both are essentially domestic, they differ in degree of specialization and attach to different functions and goals. At the lowest level, the ad hoc stone tools show no specialization or sophistication in production. They appear to have been manufactured quickly, used, and discarded. Evidence for their manufacture is distributed over the entire site, and both use and production can be categorized as “general domestic.” Raw materials are local.

In contrast, the evidence for the manufacture of microlithic drills is restricted to one locus, and the use of these tools to two loci. These tools entail a more elaborate *chaîne opératoire* and are clearly task specific, related to the production of ostrich eggshell beads, the evidence for whose manufacture is limited to the primary microlithic drill production locus (Locus 37). This concentration/restriction of bead manufacturing indicates a low-level form of production specialization. It is likely that the beads were produced for both internal and external consumption. They thus constitute a cottage industry, a level of manufacture clearly beyond that of the ad hoc tools.

A similar mode of specialization can be reconstructed for the milling stones, whose waste products are concentrated in a single area just south of the architecture of the site. As with the beads and drills, the restricted spatial distribution of these materials suggests low-level specialization, and the evidence for export indicates production beyond the goals of domestic consumption. Again as with the beads, milling stone production is not intensive but nevertheless seems integral to the economy of the site. In both cases, export seems to have been one goal of the manufacture.

It is important to emphasize that despite the structural differences between the production of ad hoc tools on one hand and microlithic drills, ostrich eggshell beads, and milling stones on the other, none can be characterized as intensive production. All fit into different components of a basically domestic mode of production.

Site structure and the organization of activities on the site match the two tiers reconstructed for production (and, for that matter, exchange). Although the architecture itself shows little sign of differentiation, artifact distributions reflect production patterns. Some tool types show general distributions over most of the site, suggesting use and discard over most areas of the site. This has already been indicated for the ad hoc tools (and their associated waste) but is also true for arrowheads. Other types reflect restricted activities. The production loci for beads and milling stones have already been mentioned and are the most important evidence for specific activity zones. However, the high concentration of ceramics on the west side of the site indicates a specific midden area, and the central location of the enclosures, presumably animal pens, also structures the site in a focused manner. That is, there are specific areas designated for specialized activities or functions, as well as areas of general domestic activities.

Beyond these two tiers of organization, gender distinctions most likely crosscut site structure. It is tempting to speculate that sandstone reduction, especially in the early stages of the *chaîne opératoire* (that is, quarrying, block transport, and perhaps initial shaping), was a male activity and that bead making a female one. The spatial distinctions may play a role here. In this context, the fact that the bead makers were also clearly chipping the drills is of interest, and if bead making was a female activity, then we also have evidence for women chipping formal stone tools (as opposed to ad hoc tools). Ethnographically, milling is indeed generally associated with women (Wright 2000). Similarly, hunting was likely a male activity (e.g., Gurven and Hill 2009), although the use of desert kite gazelle hunting drive traps (one located less than 10 km from the Camel Site) may have been general community affairs. Ethnographically, trinket and jewelry consumption is a female attribute among Bedouin women. This said, the modern Bedouin are far removed historically and culturally from Timnian pastoralists, and ethnographic analogies here can really only suggest hypotheses; they cannot truly lend support to gender hypotheses here.

From a larger perspective, beyond the internal organization of the Camel Site, site size is also

an important indicator of social organization. Basically, at 400 m², and less if only the architecture is considered, the Camel Site falls into the general size range of “band-level” groups, with 10 to 25 people inhabiting a site with three to five domestic huts (depending on how we define the different structures attached to the periphery of the enclosures). However, this conclusion is deceptive. In terms of size, the Camel Site seems to define the lower end of domestic compounds of the Timnian/Early Bronze Age in the Negev and Sinai. In this sense, it may reflect some basic unit or building block of the society—perhaps, stretching the analogy, some early equivalent to the extended household common to pastoral groups throughout Asia, the Near East, and North Africa. Clearly, we are dealing with some unit beyond the Western nuclear family. On the other hand, in the higher regions 20 to 30 km west of the Camel Site, Haiman (1992) has documented sites with multiple compounds (also see Kozloff 1981), each individual compound similar in scale to the Camel Site. These aggregate sites most likely correspond to some higher level of social organization, perhaps reflecting some ancient equivalent of tribes, lineages, or sections. It is difficult to be precise, but again, the system appears to be basically two tiered.

History: The Rise of Multiresource Nomadism

The social and economic reconstructions suggested above reflect a specific historical circumstance, the intersection of two cultural trajectories previously operating more or less independently of one another. From the Mediterranean perspective, the beginning of the third millennium B.C.E., the Early Bronze Age II, saw the evolution of the earliest Levantine urban societies from their village predecessors in the Chalcolithic and Early Bronze Age I (fifth and fourth millennia B.C.E.) and their expansion into the adjacent desert regions in pursuit of resources, most notably copper. This expansion is evident at two levels: in the founding of stations and “Aradian” outposts along trade routes and in southern Sinai (e.g., Beit Arieih 2003), and in the establishment of Arad as a desert gateway town (Amiran et al. 1997; Finkelstein

1995), the apparent focus for the Timnian pastoralists in their increased contacts with Mediterranean society.

If Levantine Mediterranean society seems to have evolved toward complexity along a particular trajectory (and the impact of Egypt must be considered integral to that trajectory), then that of the desert evolved differently (Figure 1.2). From the early crystallization of Timnian society in the sixth millennium B.C.E.—in northern terms the Pottery Neolithic (without pottery in the south)—to the fourth millennium B.C.E., population levels in the desert are low,² material culture systems, especially lithics, are relatively stable, and architecture is static. Subsistence is based on herding and gathering, and contacts with the settled zone are sporadic and nonsystematic. At the point of intersection between the two cultural-geographic systems, the impact of the emerging Mediterranean city-states on the desert tribes was profound. Restricting discussion to the central Negev, population increased exponentially in the Early Bronze Age, to judge from survey data (Figure 13.3). Most of this increase should probably be attributed to the Early Bronze Age II,³ and it is accompanied by an expansion of Timnian society geographically, with penetration (presence of sites) well north of earlier periods (Rosen 2009).

This population increase is also accompanied by the added layer of economic activity described above, the cottage industries reflecting the partial integration of Timnian production and exchange into the urban economic system focused at Arad. If the hypothesis concerning import of grain is correct, then this too constitutes a major change compared to earlier periods and may be a primary factor enabling the population increase.

Of note here is the diversity of economic activities in the desert. Even if one assumes that the *raison d'être* of Aradian presence and contacts in the desert was copper, the expansion of Timnian production and barter to include milling stones, ostrich eggshell beads, and perhaps hematite, as seen at the Camel Site, is crucial to comprehension of the Timnian adaptation at this point in time. Trade in these items did not exist in earlier phases. Furthermore, if the production/exchange systems represented at the Camel Site seem quantitatively limited, it is worth remembering that hundreds, perhaps thousands, of milling

stones are present at Arad. Cumulatively, this trade was important, even if not intensive.

Summarizing all of this, the input of an expanding core zone stimulated economic intensification in the desert. This is seen both in increased volume of exchange and increased diversity of production. Beyond providing a market for materials and services, settled zone economic input into the desert most likely consisted of import of a range of goods, the most obvious of which was ceramics but that likely included agricultural products. This effective change in carrying capacity, in the sense here of how much population could inhabit a region, essentially allowed the increase in population levels required by market demands. In this we may trace the rise of economic asymmetry. Once population passed a basic herding-gathering carrying capacity and depended on imported goods—read grain—the desert tribes were no longer economically autonomous. This was achieved through the development of a range of economic activities and can be subsumed under what Salzman (1972) called multiresource nomadism. Khazanov (1984) has demonstrated that this type of dependence relationship is typical of pastoral nomadic societies, and although he dates its origins a couple of millennia later (Khazanov 2009), the basic ideas of asymmetry and dependence seem in place already in the Negev in the third millennium B.C.E.

The final point to be considered is the abandonment, reoccupation, and final abandonment of the Camel Site and how these indeed reflect larger phenomena. Of course, abandonment has a somewhat different meaning when referring to repeated-use campsites, but the intent is the cessation of that pattern of use. If the initial occupation at the Camel Site reflects the expansion of the Timnian culture in response to emerging northern (Aradian) markets, its abandonment, probably in the twenty-seventh/twenty-eighth century B.C.E., can be attributed to the decline of those markets and the consequent collapse of the trade system associated with them. Arad was abandoned in the twenty-seventh century B.C.E. (Amiran et al. 1997), perhaps eclipsed by Bab edh Dhra on the other side of the Dead Sea. Regardless, the abandonment of Arad seems to have been accompanied by, and probably engendered a significant decline in, Timnian presence in the

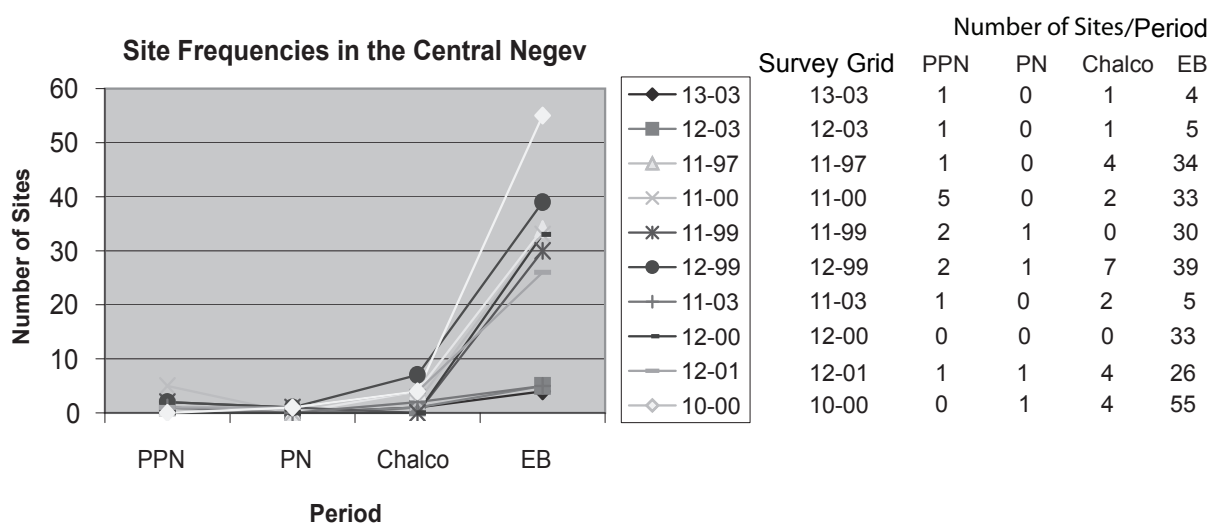


Figure 13.3. Increase in number of sites in the Early Bronze Age in the central Negev based on Archaeological Survey of Israel monographs. Hyphenated numbers (e.g., 13-03, etc.) refer to 100 km² survey grid units.

central Negev. This makes good sense if indeed the trade connections resulted in a higher effective carrying capacity. Once the herding-gathering population/subsistence threshold was exceeded, a decline in trade would entail a decline in carrying capacity, ultimately resulting in out-migration given an inelastic environment. In a sense, the dependence relationship between the desert pastoralists and the core area is proven by the collapse.

The reoccupation of the site during the latter half of the third millennium B.C.E. seems to have been ephemeral. The site seems to have been at the edge of a distribution centered farther north, on what appears to have been an east-west axis (Cohen 1992; Goren 1996; Haiman 1996). Although usually referred to as Early Bronze IV or Intermediate Bronze Age (also Middle Bronze I and Early Bronze–Middle Bronze), defined primarily on ceramics, the lithic assemblages of this period show a clear continuity with earlier phases of the Timnian, and architecturally these sites share little in common with those of the Mediterranean zone. The reoccupation of the central Negev in this period has been attributed to increased copper trade, especially from Feinan, and the materials from the Camel Site suggest a general pastoral adaptation around that trade system (Saidel 2002a). The final abandonment of the site corresponds to another general decline in settlement in the central Negev.

FINAL COMMENTS

The Camel Site represents a specific set of historical and environmental circumstances, resulting in a similarly specific archaeological configuration. Although it would be a mistake to assume that it is unique, it would also be foolhardy to claim, based on the experience of the Camel Site, that a similar archaeology of nomadism can be developed everywhere. The preservation, to different degrees, of campsites is determined by a range of factors, not the least of which is the presence of materials that preserve in their specific environments. Smith (2008) is undoubtedly correct in his assessment of the severe problems of preservation of South African pastoral encampments (also Robertshaw 1990), due essentially to the absence of stone and inorganic materials both for tools and building materials. In other areas, like the Mediterranean zone, farming and development, over the course of millennia, have destroyed much, maybe most, of the pastoral archaeological record (although rock shelters have been remarkably little explored by historical-period archaeologists). On the other hand, given the common and traditional “nomads do not leave remains” approach to archaeology, the converse statement, that sometimes they actually do, is in fact the much more powerful. It argues that all things being equal, nomads *do* leave remains and that it is only in special circumstances that archaeologists have difficulties dealing with

the phenomenon. In the Negev, there are thousands of sites like the Camel Site, ranging from the origins of desert pastoralism, ca. 6500 B.C.E., through recent times. A similar situation obtains throughout the rocky deserts of the Near East and North Africa. The potentials here are enormous.

Without making any claims concerning other regions, as long as one assumes that there are no nomadic remains worth investigating, the prophecy is self-fulfilling. The point need not be belabored.

When the Camel Site was first discovered, in 1981, the town of Mitzpe Ramon was still several hundred meters east of the site. In the following decades, and after the excavations described here, the expansion of the town has brought it to the

very edge of the site, and the site was damaged by a tractor collecting construction fill. Although the site is now protected by a stone barrier, plans have been made for the construction of a housing development on the ridge where the site rests, entailing its destruction. In the event that the site had not been excavated earlier, it would have been the subject of a salvage excavation, but its excavators would not have had the luxury of evaluating field methods over the course of several seasons of work. We have been fortunate that we have been able to excavate well in advance of the bulldozer, making visit and revisit as we sought to understand and interpret the archaeological remains.

In the past two years, residents of Mitzpe Ramon have expressed interest in preserving the



Figure 13.4. The Camel Site in Mitzpe Ramon—ancient and modern. *Drawing by Helena Sokolovsky.*

site and creating an educational center focused on it. The intent is to present an example of the very early history of the town, and of people who lived there 5,000 years ago. As a result of their efforts, the site has been rezoned as a “green area” (Figure 13.4). This will hopefully be the next stage in the archaeology of the Camel Site.

NOTES

- ¹ I distinguish between symbolic and prestige items as follows: Prestige items reflect personal identity, ranking, or prestige. Symbolic functions more reflect office or public function. Obviously, there is overlap between these.
- ² To be precise, areas south of and not including the Beersheva Basin.
- ³ It is notoriously difficult to date desert survey sites precisely to subphases within the Early Bronze Age. Nevertheless, relying on the diagnostics that have been recovered, most sites, although certainly not all, can be attributed to the EB II.

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