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The Sounds of Pounding

Boulder Mortars and Their Significance to Natufian Burial Customs

by Danny Rosenberg and Dani Nadel

Burial and commemorative rites form significant components of many routines and activities accompanying the disposal and remembrance of the dead in numerous past and present societies. Various artifacts seem to have had an important role in burial and commemorative rituals and may have been used to reflect social unity and strengthen group identity. Burial-related paraphernalia clearly gained special importance in the southern Levant with the onset of the Natufian culture (ca. 15,000–11,500 calBP), a culture exhibiting cardinal changes in subsistence economy, social behavior, and symbolism. One hallmark of this culture is the appearance of large boulder mortars, massive implements frequently associated with burials and burial grounds, long accepted as a manifestation of technological skill and petrological knowledge. We report the results of a new study of Natufian boulder mortars and their contexts and present novel relevant data. Our conclusions suggest that Natufian boulder mortars share specific traits that go beyond size as well as use contexts. We suggest that they reflect common practices pertaining to Natufian burial and commemorative ceremonies and can be held as indicators of a south Levantine tradition overriding a variety of territorial and group-specific social and symbolic traits.

Introduction

The Natufian culture is the principal culture of the later part of the Epipalaeolithic period in the southern Levant and has been the focus of many social and economic studies owing to its cultural-historical position, with sedentary and/or semi-sedentary complex hunter-gatherer groups standing on the threshold of agriculture (e.g., Bar-Yosef 1983; Bar-Yosef and Belfer-Cohen 1989, 1991, 2002; Bar-Yosef and Valla 1991; Belfer-Cohen and Bar-Yosef 2000; Boyd 2006; Byrd 1989*b*; Garrod 1957; Hayden 2004; Henry 1989, 1995; Valla 1995*a*; Weinstein-Evron 1998, 2009). In the Levant, Early, Late, and Final Natufian sites are known mainly from the Lebanese Bekaa and Syria in the north to the Israeli and Jordanian deserts in the south and east (Bar-Yosef 1983; Bar-Yosef and Valla 1991; Goring-Morris 1987; Goring-Morris et al. 1999; Henry 1973, 1976; Johnson et al. 1999; Marks 1969; Marks et al. 1971; Schroeder 1991). Natufian hamlets, transitory

camp, and burial grounds differ from one another, specifically in terms of occupation density, the presence and characteristics of architectural features and the variety of material remains (e.g., Bar-Yosef 1981, 1983; Byrd 1989*b*; Henry 1981; Olszewski 1991). The Natufian economy integrated hunting and foraging with the acquisition and production of tools, implements and other items made of flint, basalt, limestone, sandstone, bone, and horns, as well as more exotic raw materials, such as obsidian and sea shells (e.g., Bar-Yosef 2002*a*; Belfer-Cohen 1991*b*; Weinstein-Evron et al. 1995).

Burials in, under, or near dwellings and in separate, distinct burial grounds are one of the key features of this culture and, to date, several hundreds of Natufian burials are known, mainly from the Mediterranean zone. These burials reflect a clear change from previous periods, a feature reflected in the number and density in some sites, accompanied by variability in grave shape, size and construction, the number of interred, patterned orientations in some cases, posture of the corpse, and related offerings (e.g., Bar-Yosef 1981:401, 1983; Belfer-Cohen 1988*a*, 1988*b*; Bocquentin 2003*b*; Byrd and Monahan 1995; Garrod and Bate 1937; Grindel 1998; Murail, Sellier, and Bocquentin 2001; Perrot and Ladiray 1988; Wright 1978). Natufian burials probably signify special emotional ties of people with their ancestors and their homes (e.g., Bar-Yosef 1981:401), as well as a link to specific extramural locations (i.e., separate burial grounds), likely within their hunting and foraging spectra.

Burial paraphernalia and items associated with burial rituals form a complex amalgam in the archaeological record, and it is not always easy to distinguish between different kinds of

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elements found in burial contexts, as some could be no more than background noise or random phenomena. Nonetheless, grave-associated objects bear high potential for our ability to understand burial practices and their social significance as a venue for the renegotiation of evolving and changing identities (Parker Pearson 1999:32). In this paper we focus on one of the key Natufian burial characteristics, namely, the Natufian boulder mortars and their burial contexts (see also Bar-Yosef 2002a:117), assessing their significance for understanding social and behavioral aspects directly pertaining to Natufian funerals and memorial customs.

Natufian ritual and burial customs

Death and its rituals are significant as an anthropological research instrument reflecting not just social values, but in fact are a notable factor in shaping them (Geertz 1973:94–97). Together with other mortuary behavior and practices, these values have long been acknowledged as having both spiritual and material aspects (Binford 1971:16). Natufian mortuary practices and related behavioral patterns have been at the focus of many studies (e.g., Belfer-Cohen 1988a, 1988b, 1991a, 1991b; Bocquentin 2003b, 2012; Boyd 1995; Byrd and Monahan 1995; Garrod 1957; Grosman and Munro 2007; Grosman, Munro and Belfer-Cohen 2008; Lengyel and Bocquentin 2005; Nadel et al. 2013; Wright 1978). However, one of the most intriguing aspects of the Natufian culture, the nature of death-related rituals, such as burial and commemorative rites in both hamlets and burial caves, is still enigmatic in many respects.

Death-related rituals and commemorative events are well-documented in the anthropological literature, which attests to the complexity of these rites (e.g., Bloch 1971; Bloch and Parry 1982; Hayden 2009a; Kim 1994; Parker Pearson 1999). While determining ritual behavior in the archaeological record of the Natufian culture is not easy, these practices and other funerary activities seem to have gained special importance for the Natufian, marking a clear shift from that of preceding cultures of the Epipaleolithic period. The nature of these rituals can be inferred from various lines of evidence, including, for instance, the grave and its surroundings, burial arrangements, handling and rehandling of the corpse (removal of crania, cranial parts, or other parts of the skeleton), and articulation of burial-related paraphernalia.

The complexity of the Natufian burials and burial customs seems to have appeared already during the Early Natufian, as attested in several sites and burial grounds. These are seen, among other traits, in the preparation of the grave, in some highly ornamented Natufian individuals, including adolescents and adults of both genders and in the presence of grave goods (e.g., Belfer-Cohen 1988b; Bocquentin 2003b; Garrod and Bate 1937; Grindel 1998:129–133; Grosman, Munro, and Belfer-Cohen 2008; Nadel et al. 2008, 2013; Perrot and Ladiray 1988; Weinstein-Evron 1998, Weinstein-Evron et al. 2007; Wright 1978). It seems that the later part of the Natufian was

characterized by a shift in burial-related activities and that some mortuary customs underwent changes or disappeared altogether (e.g., the disappearance of personal decoration with beads and the significant increase in skull removal; see Belfer-Cohen 1991b; Bocquentin 2003b; Noy 1989; Noy, Legge, and Higgs 1973).

This shift was probably interlaced with changes in rituals (Goring-Morris and Belfer-Cohen 1997), including those that were part of the burial or commemorative ceremonies or feasts (see also Hayden 2004). Thus, ritualistic focus or behavior may have shifted to burial practices, at least in the Mediterranean core area, when funerals acted as aggregation events (Goring-Morris and Belfer-Cohen 1997; Kuijt 1996 and references therein). In this regard, it was argued that increased funeral rites, ritual behavior, and the production of related paraphernalia during the Natufian were part of the growing need to enhance group cohesion compared with earlier phases of the Epipaleolithic period (Bar-Yosef and Belfer-Cohen 1989:488, 2002:60). If this was indeed the case, specific items made of various raw materials and contextually associated with burials were clearly acting in the same social sphere, reflecting the articulation of group bonding within funeral or memorial contexts. These artifacts must have had a significant role not just as markers of gender, personality, or personal status, but also as instruments acting in favor of the success of the ritualistic acts, aiming to ensure the well-being of the deceased and the livelihood of each participant and the group as a unified and cohesive social unit.

Natufian groundstone assemblages

Groundstone tools are prominent features among the paraphernalia that accompanied Natufian burials. The groundstone tool assemblages show notable changes from earlier Epipaleolithic assemblages and are known mainly from the core area and its margins (e.g., Belfer-Cohen 1988b; Edwards 2013a; Edwards and Webb 2013; Hardy-Smith and Edwards 2004; Perrot 1966; Rosenberg 2004; Rosenberg et al. 2012; Weinstein-Evron 1998; Wright 1991, 1994). The first dramatic shift can be traced to the Early Natufian, in the context of the culture's consolidation stages, which clearly reflects significant social and economic changes of hunter-gatherers shifting toward a sedentary way of life (e.g., Bar-Yosef 1983, Belfer-Cohen 1991a; Valla 1995a).

The changes that characterize Natufian groundstone assemblages include a dramatic rise in overall tool frequencies, typological and stylistic variations, and specific raw material selection, as well as changes in contextual and discard patterns. Considerable developments are also noted for the technological apparatus of tool production and the diversification of production sequences (Wright 1991, 1994). Great investments of time and energy in tool production and finish are often observed with the manufacture of many items carefully and skillfully executed, such as pestles and bowls with high degrees of symmetry (Rosenberg 2004) and intricately dec-



Figure 1. Natufian boulder mortars in el-Wad Cave, D. Garrod's excavations (after Anati 1963).

orated stone objects (e.g., Edwards 2013c; Noy 1991; Perrot 1966; Rosenberg et al. 2012; Wright 1994). The systematic occurrence of polish as a technological, nonfunctional characteristic (mainly on pestles) is also noticeable (Rosenberg 2004). These changes can be credited mainly to the shift in Natufian subsistence economy and social organization, which were influenced by a number of factors, such as the environmental settings of sites, duration of occupation, chronocultural affiliation (Early vs. Late/Final Natufian), and site function (e.g., habitation vs. cemetery), and probably cultural factors as well.

The most common components of Natufian stone assemblages are pestles, followed by bowls/mortars, grinding stones, grooved and perforated items, to name only the main tool types (Rosenberg 2004, Wright 1994). These tools are frequently made of basalt or limestone; however, other raw materials are present as well. Recently, immovable bedrock features have attracted scholarly attention as well, including a variety of installations of different dimensions and shapes (Eitam 2008; Lengyel, Bocquintin, and Nadel 2013; Nadel and



Figure 2. A Natufian boulder mortar in situ at Eynan (courtesy of J. Perrot). A color version of this figure is available online.

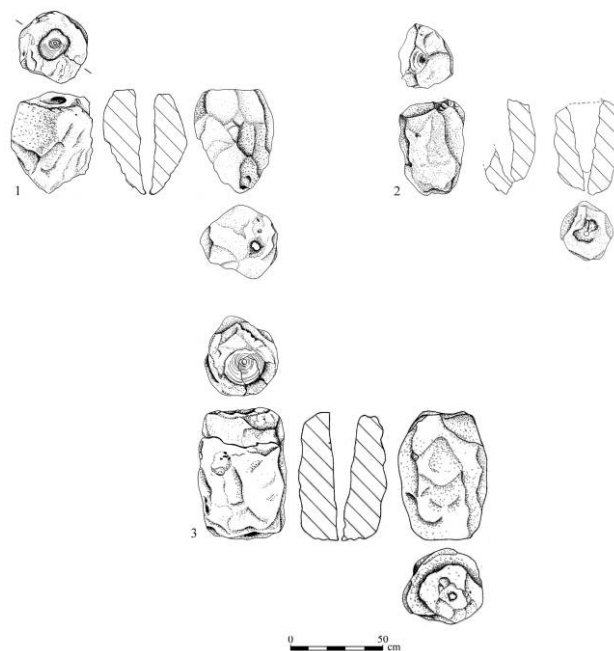


Figure 3. Natufian boulder mortars from Nahal Oren. Note the crude outer surface, the smooth shafts and the holes at the bottom (courtesy of the M. Stekelis Museum of Prehistory, Haifa).

Lengyel 2009; Nadel and Rosenberg 2010; Nadel, Rosenberg, and Yeshurun 2009; Nadel et al. 2008; Power, Rosen, and Nadel 2014; Rosenberg and Nadel 2011a, 2011b). Natufian portable groundstone tools and bedrock features are found in hamlets, transitory camps, and mortuary sites. Portable items are found in a variety of contexts—indoors (e.g., Hardy-Smith and Edwards 2004; Perrot 1966; Rosenberg et al. 2012), incorporated in building construction (Rosenberg 2013 and references therein), near structures, and in grave fills and grave structures (e.g., Belfer-Cohen 1988a; Rosenberg et al. 2012; Stekelis and Yizraely 1963). One of the conspicuous but enigmatic characteristics of Natufian burial grounds and burial locations in general is the presence of massive boulder mortars, often regarded as “stone pipes” or “pipe-mortars” (Bar-Yosef 1983; Bar-Yosef and Goren 1973; Stekelis and Yizraely 1963:12).

Natufian boulder mortars and their contexts

Natufian boulder mortars have been known for decades (e.g., Anati 1963:155; Bar-Yosef 1983; Garrod and Bate 1937:10, 41; Kenyon 1960a, fig. 8, 1960b; Stekelis and Yizraely 1963; Weinstein-Evron 2009, fig. 3.7a); however, they have only been briefly mentioned by most scholars and their social context hardly discussed. These massive mortars are prominent and important components of the Natufian groundstone industry, yet in terms of sheer numbers they compose only a small fraction of it.

Past suggestions regarding their function include sockets

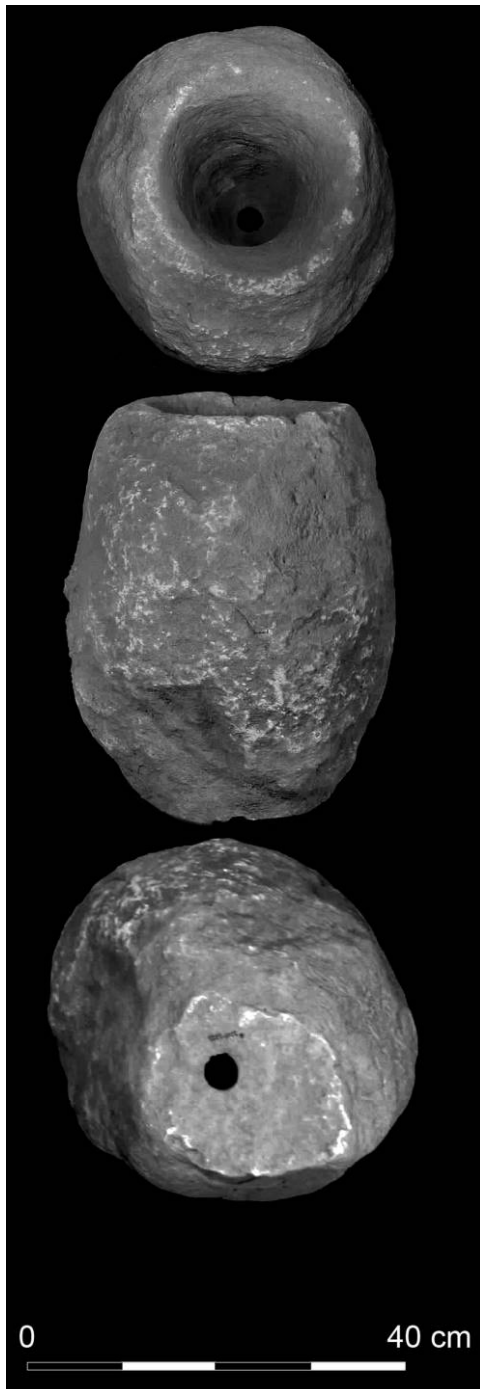


Figure 4. A Natufian boulder mortar (most probably from Nahal Oren, photo by Mariana Salzberger, courtesy of the IAA).

to hold objects upright and “therefore certainly not mortars, reused after being worn right through by use, which would have stopped once a hole was pierced through the base, and for which the depth of the hole would in any case have been unsuitable” (Kenyon 1981:272–273). Kenyon (1981:272–273) also suggested that these may have been used to support a

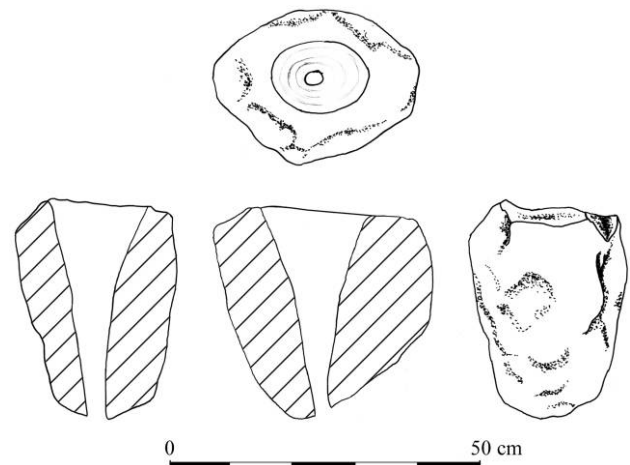


Figure 5. A Natufian boulder mortar from Raqefet Cave. Note the pierced hole at the bottom.

totem pole. Others considered them to be tombstones or grave markers and suggested a connection between the placing of these mortars near graves and Natufian understanding of the soul in the afterlife (Bar-Yosef 1983:15; Stekelis and Yizraeli 1963:11–12). Recently, it was suggested that some of these implements should be considered in the context of brewing beer for feasts (Hayden 2004; Hayden, Canuel, and Shanse 2013).

While many suggestions are not always archaeologically testable, the locations where most boulder mortars were found and their immediate contexts clearly point toward a specific and intimate relation with burial and/or commemorative rites. However, it should be categorically stated at the outset that we do not consider these as grave goods (contra Hayden 2004:273). Rather, we see them as implements essential for the successes of the ritual and, most probably, important for



Figure 6. A Natufian boulder mortar in situ, Locus 2, Raqefet Cave (Scale: 20 cm).



Figure 7. Two Natufian boulder mortars in situ at Jericho. Note a third longitudinal fragment lying horizontally behind the right one. K. Kenyon's excavations (original photo courtesy of S. Laidlaw and University College, London).

the “future” of the deceased or the living community and as implements bearing significant symbolic meanings pertaining to the production of food and the transformation of substances from one state to another. Before delving into the role and significance of the Natufian boulder mortars and in order to enable a clear and coherent discussion, a definition of these items is required. Subsequently, their common characteristics, their geographic distribution and chronology, and the available data concerning their contexts will be presented.

Definition

There is no simple definition for Natufian boulder mortars; however, it is clear that a few common characteristics or traits exist for all of these items, justifying their incorporation into a single typological group. Natufian boulder mortars are potentially “portable” implements, but they are typically massive in terms of size, weight and volume (figs. 1–7; table 1). Some boulder mortars have (from a top view) squarish, round, or oval forms, but mostly they are quite irregular. Boulder mortars frequently weigh 40–100 kg and are commonly 50–80 cm high and 40–60 cm across. Their shafts are often 25–55 cm deep and narrow, ranging mostly from 15 to 25 in top diameter and frequently narrowing toward their inside base. The shafts can contain at least two and usually up to 10 liters of substance or liquid.

The exteriors of the mortars are only minimally shaped. Flaking scars and rare pecking/battering marks and incisions were noted on some boulder mortar exteriors. Thus, based on most known examples, it seems that the appearance of the mortar and its fine-finishing were not of prime importance. Any modification marks, which were documented on some of these exterior walls, reflect mainly a wish to modify the original boulder, and only rarely did the rim receive attention in the form of rounding or flattening (fig. 8).

The fact that the exteriors of these items were hardly worked and are not decorated is one of their principal characteristics. Thus, this artifact type does not very delicate or finely carved stone bowls/mortars, like some of the basalt mortars found at Eynan (Perrot 1966, fig. 15), Hayonim Cave

Table 1. Dimensions of the Natufian boulder mortars discussed in the text

Sites/Data	N	Height (cm)	Boulder diameter/ width (cm)	Shaft depth (cm)	Shaft max di- ameter (cm)	References
Ain Choaab	1	...	...	...	...	Schroeder 1991:74, fig. 16
Jabel Saaidé	7	~35–60	~25–40	~25–40	...	Hayden 2004, fig. 1a–b; Schroeder 1991:72–73, table 14, figs. 10:9, 11–12
Baaz rock shelter	1	~30	~30	...	...	Conard 2006, fig. 8, photo 7
Eynan	2–3?	~32	~30–35	~28	...	Perrot 1966, figs. 10–11, 13; Valla 2009; Valla et al. 2007:194–198, figs. 25–27
Hayonim Cave	...	70–90?	30–40	70–90?	...	Belfer-Cohen 1988b:184–185, 305–306; Bar-Yosef and Goren 1973:60, 63, table 5
Hayonim Terrace	2–3	40–57	~30–45	~47	~20–30	Valla 1986, fig. 1, 1995a, 1995b, pl. 2, 2009, figs. 1–3, 2012a:299–301; Valla, Le Mort, and Plisson 1991
Raqefet Cave	3	~35–45	~35–75	~30–40	~20–30	Noy, Legge, and Higgs 1973; Stekelis and Yizraely 1963; this study
Nahal Oren	15?	~40–80	~30–45	~35–65	~10–20	
Usba	1	...	...	...	...	Nadel et al. 2012, fig. 5
el-Wad	2?	...	...	...	...	Anati 1963:155, lower picture and see Garrod and Bate 1937:10, 41; Weinstein-Evron 2009, fig. 3.7a
Jericho	3	~60–75	~45–50?	~30	~10–20	Dorrell 1983:489; Kenyon 1960a:24, fig. 8, 1960b:A–B, 1981:272, pl. 145a
Shubayqa I	2–3?	30–40	...	...	...	T. Richter, personal communication
Rosh Zin	1	40?	40	20	17	Nadel et al. 2009

Note. Only minimum numbers are listed, as published reports are not always clear.

(Bar-Yosef and Goren 1973), Wadi Hammeh 27 (Edwards and Webb 2013), and other sites. Boulder mortars are mainly found broken or with notable damage, including a breached base (see below). While most of the boulder mortars are made of sedimentary rocks such as limestone or dolomite, a few basalt mortars were also noted (table 2). Boulder mortar bases are roughly U-shaped in cross-section and these, seemingly, were able to support the mortar in an upright position. Nonetheless, at least some of these taper toward a narrowing “pointed” base, and when set vertically they had to be supported by small stones (fig. 9) and/or set in a pit that was later backfilled.

The characteristics of the shafts vary and they can be regular or irregular, round or oval from a top view. The shafts are in many cases narrow compared to the overall diameter of the mortar and, vertically, may have a cylindrical, funnel-like, or tapering profile. In a few examples we noted that the shafts are even “twisted” or curved in their longitudinal profile, which makes efficient pounding a very unlikely activity. The shafts are usually deep and thus extend along most of the boulder’s length, leaving only a relatively thin base. This suggests that in many instances there was a wish to use most of the possible height of the boulder. In this regard it is clear that elongated wooden pestles were better candidates for working as a set with boulder mortars, rather than the common and relatively short Natufian stone pestles that were usually 10–35 cm long (Rosenberg 2004; Wright 1994).

In some cases, the base of the boulder or the lower part of the shaft is breached (fig. 10), a feature that has given these artifacts the common names of “stone pipes” or “pipe-mortars.” However, the breaching of the base is not a characteristic of all known Natufian boulder mortars and, thus, should be considered in a different light. In contrast to the minimal shaping of the exterior of these boulders, it is evident that most of the shafts reflect considerable investment in terms of time and energy. Specifically, this effort is relevant when considering the hewing through the mass of stone at the production stage. Most

of the shafts also feature smoothing and polishing marks, sometimes intensive, likely reflecting their use in pounding, crushing, and/or stirring (fig. 11); some bear incisions and grooving that may reflect production wear (fig. 12).

Chronology

Chronologically, it seems that most boulder mortars should be attributed to the Late or Final Natufian (e.g., Eynan, Nahal Oren, Raqefet Cave; see also Noy 1989:56). However, a few were seemingly found in earlier Natufian contexts. An exceptional example is the large mortar found in Structure 26 at Eynan; it was placed on the floor with Homo 70 (assigned to the Middle Natufian) found directly on the rim (Perrot and Ladiray 1988, fig. 24). Nonetheless, for many boulder mortars there are no direct dates, and we are forced to leave the question of dating open for now. However, in this regard it is still worth mentioning another exceptional specimen found on the el-Wad terrace. This rather large and unusual bedrock mortar or basin features a prominent low rim and was dated by Garrod to the Early Natufian (Garrod and Bate 1937:10, fig. 4a; Weinstein-Evron 2009:51, figs. 3.11a–b). It is possible that this bedrock feature reflects a boulder mortar that was in its preliminary stage of production or a bedrock feature that was meant to depict boulder mortar properties; the juxtaposed burial features seem to strengthen this suggestion.

Geographic distribution

Natufian boulder mortars are found primarily in sites extending from Syria and Lebanon through Mount Carmel in the west and the Jordan Valley in the east (fig. 13). Thus, most of these items are found within the Mediterranean climatic zone and the Natufian core area (e.g., Belfer-Cohen and Bar-Yosef 2000). Boulder mortars were found in Ain Choaab and Jabel Saaïd in Lebanon (Schroeder 1991:72–74, table 14, fig. 10:9) as well as in the Baaz rock shelter in Syria (Conard 2006, fig. 8, photo 7). In northern Israel, a few boulder mortars were noted at Eynan (Perrot 1966, figs. 10–11, 13; Valla 2009; Valla et al. 2007:194–198; figs. 25–27) as well as in Hayonim Cave (Belfer-Cohen 1988b:184–185, 305–306; Bar-Yosef and Goren 1973) and its adjoining terrace (Valla 1986, fig. 1, 1995a, 1995b, pl. 2, 2009, figs. 1–3, 2012:299–301, figs. 1–2; Valla 2012a; Valla, Le Mort, and Plisson 1991).

Mt. Carmel is apparently one of the most conspicuous areas where these are noted, found in Nahal Oren (Noy 1989:56; Noy, Legge, and Higgs 1973; Stekelis and Yizraely 1963:11, pl. 3b–c), Usba Cave (Nadel et al. 2012), Raqefet Cave (Nadel and Lengyel 2009), and el-Wad (Anati 1963:155, lower picture; Weinstein-Evron 2009, fig. 3.7b). Excavation at Tell al-Sultan in Jericho also yielded three boulder mortars (Dorrell 1983:489; Kenyon 1960a:24, fig. 8; 1960b:A–B; 1981:272, pl. 145a). Four other sites are also relevant. One is Shubayqa I in eastern Jordan (Richter et al. 2012), where several basalt boulder mortars were noted; a second is Rosh Zin in the



Figure 8. A close-up view of the rim of a Natufian boulder mortar from Nahal Oren (courtesy of the Institute of Archaeology, Hebrew University of Jerusalem).

Table 2. General characteristics of Natufian boulder mortars discussed in the text

Sites/Data	N	Raw material	Breached base	Shaft: longitudinal section	Shaft: cross-section	Preservation	References
Ain Choaab	1	...	...	...	...	...	Schroeder 1991:74, fig. 16
Jabel Saaïdé	7	Five limestone, one of basalt and one unidentified	2–3	Some are tapering	...	One split longitudinally, one missing its base	Hayden 2004, fig. 1a–b; Schroeder 1991:72–73, table 14, figs. 10:9, 11–12
Baaz rock shelter	1	Limestone	...	...	Round	Whole	Conard 2006, fig. 8, photo 7
Eynan	2–3?	Limestone, porous basalt	...	Straight, slightly tapering	Round, oval	Whole. The largest is standing upright; the porous basalt item is slightly tilted	Perrot 1966, figs. 10–11, 13; Valla 2009, figs. 2–3; Valla et al. 2007:194–198; figs. 25–27
Hayonim Cave	...	Limestone	...	Various	...	Broken	Belfer-Cohen 1988b:184–185, 305–306; Bar-Yosef and Goren 1973:60, 63, table 5
Hayonim Terrace	2–3	Limestone	1?	Tapering	Round, oval	One broken in half and the other with breached base but otherwise intact. Another fragment may be of a large mortar	Valla 1986, fig. 1, 1995a, 1995b, pl. 2, 2009, figs. 1–3, 2012a:299–301; Valla, Le Mort, and Plisson 1991
Raqefet Cave	3	Limestone	2	Tapering	Round, oval	One whole, one fragmented in situ and one fragment	
Nahal Oren	15?	Limestone	Some	Straight, slightly tapering	Round, oval	...	Noy, Legge, and Higgs 1973; Stekelis and Yizraely 1963; this paper
Usba	1	Limestone	Yes	Conical	...	Half	Nadel et al. 2012, fig. 5
el-Wad	2?	Limestone	One?	...	Round?	...	Anati 1963:155, lower picture and see Garrod and Bate 1937:10, 41; Weinstein-Evron 2009, fig. 3.7a
Jericho	3	Limestone?	2?	Shafts are approximately cylindrical, with only a slight splay at the top	Round?	One is whole and the other was cut through and cracked vertically. Another large fragment was also found	Dorrell 1983:489; Kenyon 1960a:24, fig. 8, 1960b:A–B, 1981:272, pl. 145a
Shubayqa I	2–3?	Basalt	...	...	...	...	Richter et al. 2012
Rosh Zin	1	Limestone	...	Conical	Round	Whole with a crack	Nadel et al. 2009

Negev, where a single item was recently noted (Nadel et al. 2009). Another possible (broken) boulder mortar, albeit with no mention in the record, may have been found in Natufian Beidat as part of a hearth or a roasting feature in Area K-2 (Byrd 1989a, fig. 33). A large “cupstone” was also found in sondage XX F at Wadi Hammeh 27 (Edwards 2013b, fig. 3.21); however, it is not clear if the latter object is indeed similar to the boulder mortars discussed here. Nonetheless, in many other Natufian sites, even those attributed to the Late Natufian, no such items were found. In terms of numbers, it seems that even in sites where such items were found they are usually scarce, and it is only rarely that more than two items were found in a single site.

Contexts

Boulder mortars should be considered potentially portable items. However, in most instances it seems that these were affixed somehow or positioned in a manner that suggests spatial permanency. This observation is specifically interesting in light of the fact that at some sites the mortars appear alongside or near bedrock features (e.g., Nahal Oren, Raqefet Cave, Usba Cave), some with similar shaft characteristics. Analyzing their contexts (table 3) and the spatial and temporal relation to other features and artifacts is not an easy task. This is due to the fact that in many instances boulder mortars were found on the surface, in fills (sometimes fills of graves),



Figure 9. A Natufian boulder mortar in situ, Locus 2, Raqefet Cave (note the stones supporting its base).

within walls, or in unknown contexts (e.g., Belfer-Cohen 1988b:184–185, 305–306). This creates difficulty in establishing artifact biographies and use context.

However, in considering the available information, it seems that, by and large, most contexts where these mortars were found, either whole/intact or as fragments, are burials or burial grounds; in some of these contexts boulder mortars were found in clear association with hearths and pavements made of large horizontally placed limestone slabs (e.g., Nahal



Figure 11. A close-up view of the inner shaft of a boulder mortar, Locus 2, Raqefet Cave (note smoothing and polishing).

Oren, Raqefet Cave, Eynan, and Hayonim Terrace). For example, a single item was found above skeletal remains at Jabel Saaïdé (Schroeder 1991:72–73), and a mortar was found sunken in the floor of a stone built structure near a hearth at the Baaz rock shelter (fig. 14, and see Conard 2006, fig. 8). At least one boulder mortar is associated with walls, human burials, and a hearth at Eynan (figs. 15, 16). Another mortar from this site is attributed to the Final Natufian; however, it is smaller, made of vesicular basalt, and has a better finish (Valla 2009). It was found abutting a small wall, a small basin encircled with stones and a small depression containing tilted slabs, but its association with any of the structures is unclear.

Large boulder mortar fragments were found near Grave XVI at Hayonim Cave (Belfer-Cohen 1988b:184–185, 305–306). In addition, on the terrace, two juxtaposed mortars were found in situ, near the burials of an adult and a child (Valla 1986, fig. 1; 1995a; 1995b, pl. 2; 2009, figs. 1–3; 2012a:299–301, figs. 1–2; Valla et al. 1991). One of these, featuring a massive crack, was fixed in a pit, supported with smaller stones and two vertically positioned flat slabs, while another slab was placed horizontally near its rim (figs. 17, 18). The other mortar was found nearby, lying on its side, with its mouth close to the opening of the upright mortar; an additional fragment was found in Locus 4 (Valla 2012a:301, fig. 3).

Two boulder mortars were found in a large natural bedrock basin at the entrance to Raqefet Cave (figs. 19, 20). They were found sunken in the sediments that filled the basin and were supported and fixed in place by smaller stones. Although the rim of the largest was only slightly below the rims of nearby bedrock mortars, their contemporaneity is unclear. Several flat slabs were found set horizontally as a pavement within the fill of the basin and between these two mortars, similar to pavements in other Late Natufian sites. The larger of the two mortars (found split in two along a crack), was placed

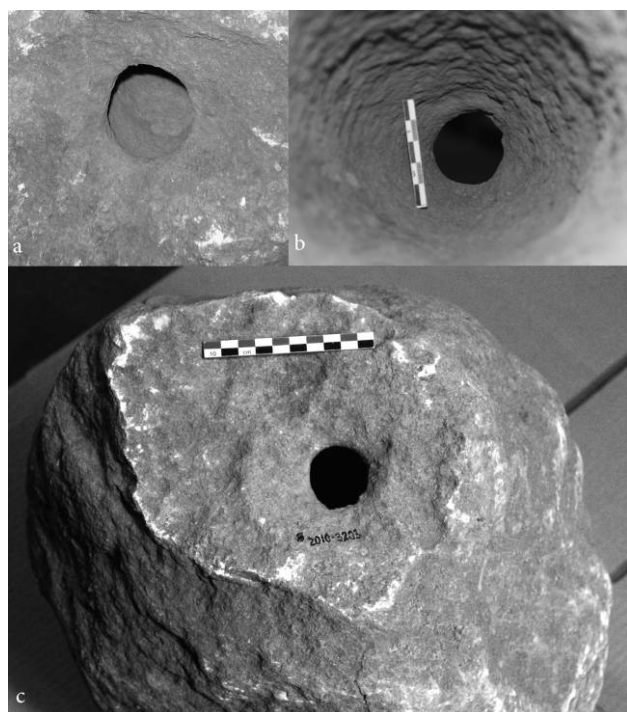


Figure 10. Three views of the breached base of a Natufian boulder mortar from Nahal Oren: (a) the bottom of the shaft; (b) view of the shaft from the top, with a 5 cm scale inside; and (c) the bottom. Note the symmetry and smoothness of the hole, with no cracks or breaks around it.

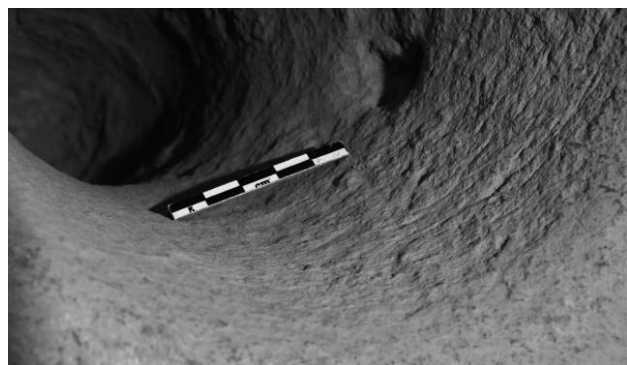


Figure 12. A close-up view of the inner shaft of a boulder mortar, Locus 2, Raqefet Cave. The 5 cm scale is located below original incisions.

near and above a shallow human burial (Homo 12) with three *dentalia* beads placed in or under the nasal openings. This skeleton is missing the lower parts of its legs. The mortar was positioned ca. 20 cm above the place where the feet would have been, and there was a deep bedrock mortar on the rock near its rim. The second, smaller boulder mortar was found about one meter north of the above-mentioned mortar. It is complete and its rim was a few centimeters below the level of the rim of the first mortar. Isolated human bones were found near its base. A few other fragments of boulder mortars were found in various other contexts in the cave, all in association with human burials.

At present, with fifteen examples known to date, Nahal Oren is the Natufian site with the largest number of boulder mortars (Noy 1989:56; Noy et al. 1973; Stekelis and Yizraely 1963:11, pl. 3b–c; personal observations). These were found in various contexts, such as incorporated in grave constructions, in secondary use in walls and near a large hearth, a stone pavement and some silos. Some of these were clearly associated with human burials (figs. 21–23), and a few were sunken in the earth, protruding at the time ca. 20 cm above the surface (Stekelis and Yizraely 1963:11). These boulder mortars include some of the largest specimens known in the prehistoric Levant. Among them, a notable find is a large boulder mortar that was placed above a headless corpse, positioned adjacent to the expected location of the missing skull (fig. 23). At Jericho, two boulder mortars were found near a clay platform (fig. 24), protruding some 15 cm above the contemporary ground level, as part of an enclosure wall. This complex was interpreted as a sanctuary or some kind of a holy place (Dorrell 1983:489; Kenyon 1960a:24, fig. 8, 1960b: A–B, 1981:272–273, pl. 145a).

Discussion

The inclusion of stone bowls/mortars within graves is not unique to the Natufian and early appearances of this phenomena were noted in the past (e.g., Kaufman and Ronen

1987; Maher, Richter, and Stocks 2012 and reference therein). Boulder mortars were clearly a significant component of the Natufian cultural landscape, both in hamlets and graveyards, mainly during the second half of the period. This apparent linkage suggests that boulder mortars had an important role within the context of burial and commemorative ceremonies and, thus, can be used as a tool for interpreting Natufian burial rites and memorial customs. In fact, these mortars bear notable significance for our understanding of Natufian perception of the cycle of life and death and their sense of familial continuity. However, reconstructing the role of the boulder mortars in Natufian funerary practices poses several interpretive challenges, such as limited contextual and spatial data in most sites and the lack of thorough use-wear and residue studies. Nonetheless, the available contextual information and the characteristics of these items enable us to follow several explanatory avenues in order to place them within the framework of Natufian burial practices.

The available relevant data suggest that Natufian boulder mortars are apparently more common in the Late Natufian, when clear changes in other aspects of subsistence and daily life also took place (see Kuijt 2009). These mortars are found mainly, yet not solely, in the Natufian core area. However, in some desert sites large mortars were found as well (e.g., Rosh

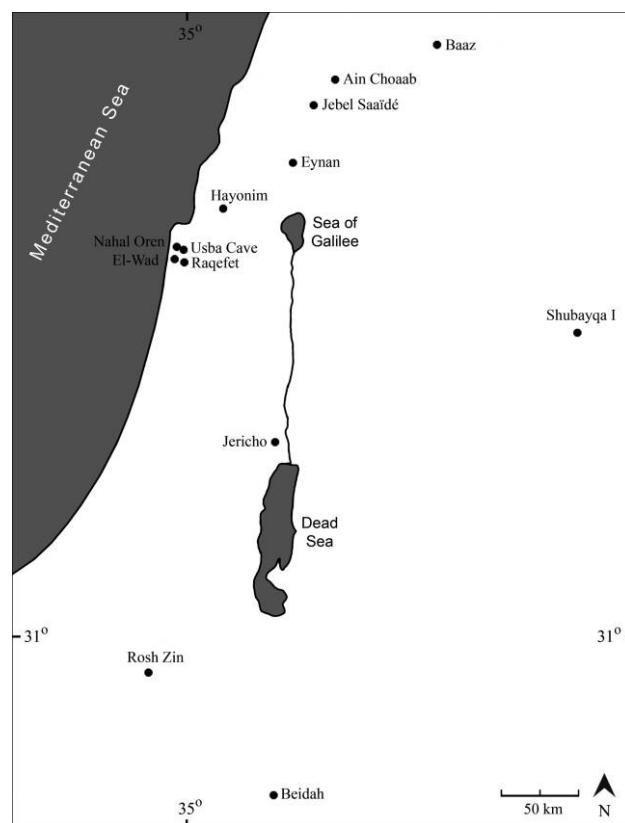


Figure 13. A map showing Natufian sites with boulder mortars mentioned in the text.

Table 3. Context of Natufian boulder mortars discussed in text

Sites/Data	Context	References
Ain Choaab	Unknown	Schroeder 1991:74, fig. 16
Jabel Saaïd	One was found above skeletal remains. Others were noted in unclear contexts.	Schroeder 1991:72–73, figs. 11–12
Baaz rock shelter	Near a hearth.	Conard 2006, fig. 8
Eynan	One in structure 26, near a burial and a hearth. Another was found adjacent to a small wall, a small basin encircled with stones and a small depression containing tilted slabs	Perrot 1960, 1966, figs. 10–11, 13; Valla 2009; Valla et al. 2007:194–198, figs. 25–27
Hayonim Cave	Several fragments some incorporated in the walls of Loci 4 and 6. Five fragments of such implements were found in Locus 9, near Grave XVI.	Belfer-Cohen 1988b:184–185, 305–306; Bar-Yosef and Goren 1973:60, 63, table 5
Hayonim Terrace	Two mortars were found one next the other, near the burials of an adult and a child. One is fixed in a pit, supported with smaller stones and vertically positioned flat slabs. A third mortar fragment was found nearby.	Valla 1986, fig. 1, 1995a, 1995b, pl. 2; 2009, figs. 1–3, 2012a:299–301; Valla, Le Mort, and Plisson 1991
Raqefet Cave	Two mortars were found in situ in Locus 2, a large natural bedrock basin. The larger mortar was found a few centimeters above the remains of Homo 12. The smaller one was found slightly deeper, with a few human bones near its base. A few fragments of boulder mortars were found in various contexts in the cave, all in association with human burials.	
Nahal Oren	Boulder mortars were found near a hearth and silos, as well as a pavement made of flat slabs. At least some of the mortars were found in clear association with burials and one was found to be part of the stone structure surrounding the grave. A few mortars were found sunken in the earth, protruding ca. 20 cm above the surface.	Noy 1989:56; Noy et al. 1973; Stekelis and Yizraely 1963:11, pl. 3b–c
Usba	Near cave entrance.	Nadel et al. 2012, fig. 5
el-Wad	A possible one in Lambert's trench 3 and an additional example in Garrod's excavations near a notable stone basin	Weinstein-Evron 2009, figs. 2.12b, 3.7a; Anati 1963:155, lower picture
Jericho	Near the clay platform as part of an enclosure wall, a complex, possibly a sanctuary or some kind of holy place. The flat, smooth rim areas were exposed some 15 cm above the contemporary ground level.	Dorrell 1983:489; Kenyon 1960a:24, fig. 8, 1960b:A–B, 1981:272, pl. 145a
Shubayqa I	On the surface and near pavements and burials (?)	Richter et al. 2012
Rosh Zin	On the surface	Nadel et al. 2009

Note. Only minimum numbers are listed, as published reports are not always clear.

Zin and Shubayqa I). By the same token, in some Natufian sites within the Mediterranean zone, including Late Natufian burial sites (e.g., Hilazon Tachtit Cave), no such items were found. Moreover, even in sites where boulder mortars are found, in most cases only one to three items were documented. Having said that, a few sites feature larger numbers of mortars, with Nahal Oren being the richest (see Nadel and Rosenberg 2011). Interestingly, the rarity of these implements is true even for the larger and the most intensively excavated sites (e.g., el-Wad and Eynan), which otherwise produced large numbers of groundstone tools and other material remains. This inconsistent frequency distribution may hint that the mortars were in use for a long period of time, signifying the inseparable connection between the generations within the Natufian groups occupying specific territories, hamlets, and separate burial grounds. However, it is possible that the small number of these items in most sites reflects a common use by different groups in aggregation sites (within stone structures or in burial caves and their terraces) where ancestor worship took place. In this case as well, boulder mortars were yet again focal instruments in rituals, symbolizing unity and social cohesion.

Natufian boulder mortars are characterized mainly by their notable size, inner depth, volume and weight. However, these objects seem to have social significance that goes beyond the volume and capacity of the shafts (i.e., function per se), and that contrary to what is commonly thought some were not useable for processing large amounts of material during one processing session (i.e., one filling of the shaft with the processed substance). Thus, it seems that the Natufians wished to create large and cumbersome implements with a strong spatial signature that was more important than the actual pounding or grinding efficiency. However, this is not to suggest that the utilitarian and symbolic use of these items should be perceived as contradictory, on the contrary, we probably should see in these items good examples for complimentary (utilitarian and symbolic) meanings ascribed to specific artifacts.

In terms of raw material, most were made of common, locally available, and easy-to-work limestone, suggesting that the availability and workability were prime factors in raw material selection. Furthermore, considering technology of production, it seems that apart from their shafts, which reflect a high investment in carving, the overall appearance of the mortars and their finish was not of prime importance (al-

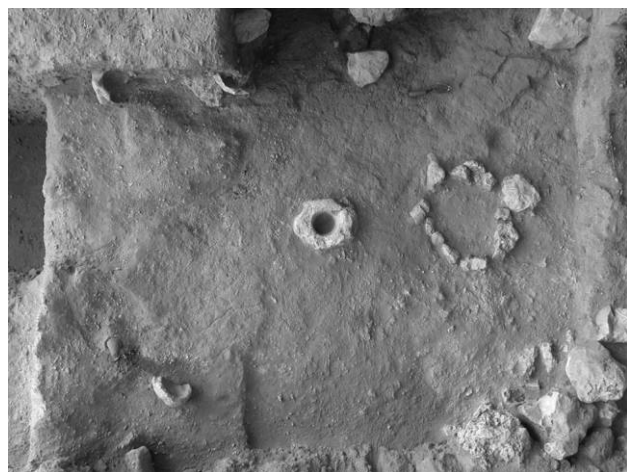


Figure 14. A boulder mortar in situ embedded in the floor of a structure, the Baaz rock shelter (original photo courtesy of N. Conard, the University of Tübingen). A color version of this figure is available online.

though some are exceptional and some rims received greater attention). This leads to the conclusion that the functional role of these items was the main concern of the producers and users alike. However, the characteristics of some of the shafts suggest that certain tools are not optimal for pounding. Thus, we must reconsider the low efficiency of some of these as “working tools” per se, on the one hand, and their close association with burials, on the other. While it is possible that some were used for food processing, probably most of the large specimens were incorporated in ritual, used during the ceremony, either as part of burial acts and/or as components of memorial events that took place at the burial ground.

In terms of preservation, most of the known boulder mortars are found as large fragments, yet the reasons for these breakages are not entirely clear. It should be kept in mind that the mortars have thick walls (sometimes >10 cm) and that an accidental break of such a solid and strong object is possible yet highly unlikely. Furthermore, many of the fragments are similar across the studied area—many of these are longitudinal segments, encompassing the entire profile from rim to base, including about a fifth or a fourth of the rim’s circumference. These two observations appear to be a reflection of a nonrandom phenomenon, and deliberate breakage should not be considered.

A related issue is the specimens with breached bases, some of which were found in situ, buried in the ground (e.g., as in Nahal Oren and Raqefet Cave). While the sequence of events leading to the creation of a hole in the base is unknown, two possibilities should be considered. One is that bases were accidentally broken through during use, as the result of exhausting the base by pounding or similar heavy-duty work (Mellart 1975:30; Schroeder 1991:72). The other is that the holes are the result of deliberate action, presumably before

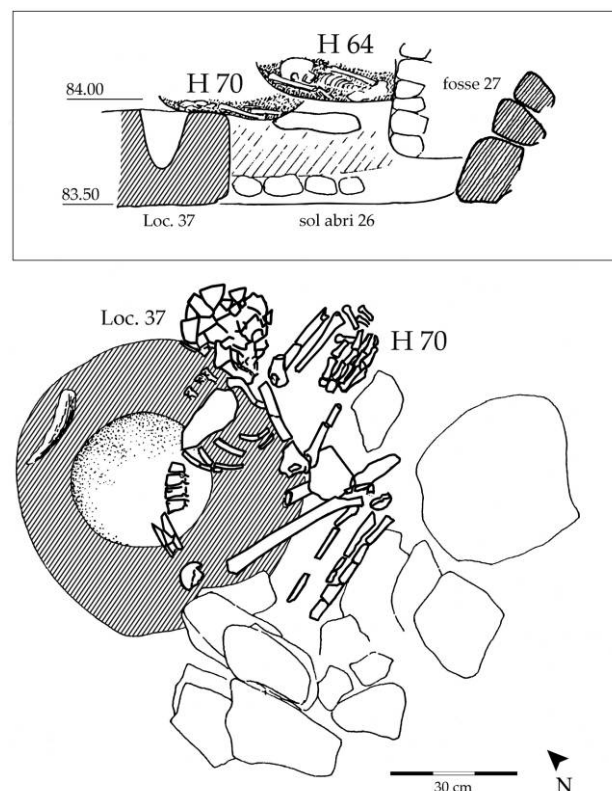


Figure 15. A boulder mortar in situ at Eynan, Structure 26.

the mortar was set in place. Several scholars argue for intentional breakage (Hayden 2011:39, 47; Kaufman and Ronen 1987:340; Schroeder 1991:72). Schroeder (1991:72) mentioned that in one of the mortars a hole has been “intentionally centered in the base as a drainage channel, possibly either to remove material or to permit the passage of liquid through whatever substance was being processed,” while Kaufman and Ronen suggest that these mortars were made and deliberately damaged as funeral offerings (1987:340 and see also Hayden 2011:39).

Continuous pounding can eventually lead to the breaching of a mortar base; however, when the object is set in the ground, such an outcome is unlikely due to the resistance or cushioning offered by the surrounding sediment. The presence of possible flaking scars around some of the holes, the smooth round contour of some of these, and the lack of any cracks leading from the holes into the object suggest that at least in some cases we should consider that holes were intentionally made and not the result of an accidental breakage. This subject must be further explored, as there are ample examples of later archaeological cases where fragmentation of selected objects was directly associated with burials, rituals, and other socially significant aspects (e.g., Chapman 2000).

Thus, to sum up, it seems that we have massive stone utensils that repeatedly appear in Late Natufian sites in small numbers and almost exclusively in burial contexts. These were



Figure 16. The Structure 26 boulder mortar in situ, note the hearth (original photo courtesy of J. Perrot). A color version of this figure is available online.

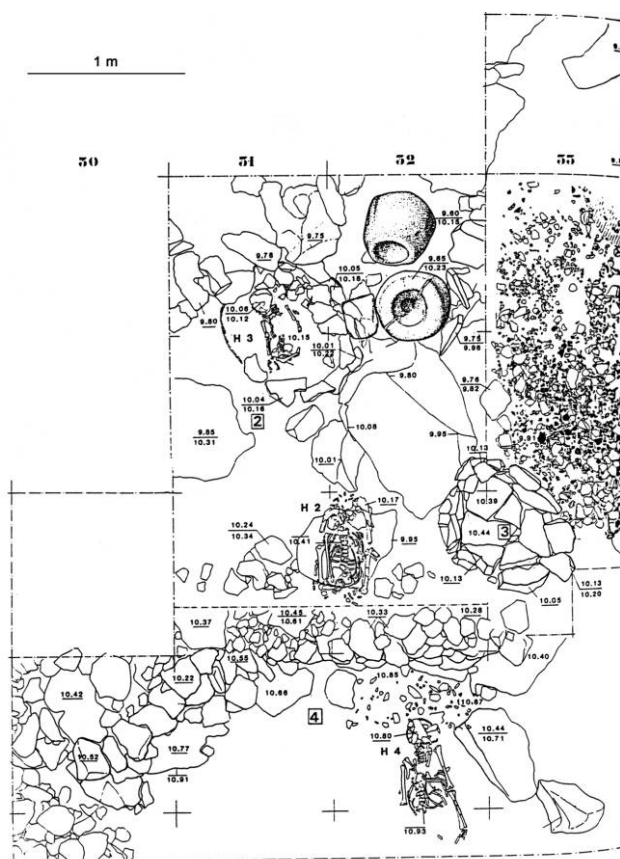


Figure 17. The juxtaposed vertical and tilted boulder mortars at Hayonim Terrace. Note the adjacent burial on the left (after Valla et al. 1991, fig. 1; original photo courtesy of F. Valla).

made of readily available and relatively easy-to-work raw materials. However, they were not the target of meticulous high-quality outside finish that was noted in many Natufian groundstone tools (e.g., pestles and vessels/mortars). Rather, many of the boulder mortars were in use while vertically buried, only slightly protruding above ground (allowing for only their upper part—frequently their better-finished part) to be visible. In some cases these mortars were associated with hearths and slab pavements that were also part of the graveyard landscape.

The significance of the boulder mortars

The onset of the Natufian culture marked a clear shift in social organization, commonly attributed to increasing population densities, changing environment, and resource stress (e.g., Belfer-Cohen 1991a; Henry 1989:49). The “new order” can be seen in the changing nature of hamlets as well as in the material remains (Bar-Yosef 2002b:114; Bar-Yosef and Belfer-Cohen 1991). The Natufians put different emphases on their burial rites, and these reflect changes in the way life and death were perceived. Ritual solidarity organizations may have been common during the Natufian (Hayden 2011:33), and, if so, these may have had significant influence on the way ritualistic behavior was practiced during burials and commemorative rites. By the same token, Natufian burial ceremonies must have played an important role as yet another means to cope with socioeconomic difficulties, reflecting on the changing structure of the social framework both on the intra- and intergroup levels (e.g., Bar-Yosef and Belfer-Cohen 1991).

Natufian boulder mortars played an important and integral role within the framework of growing sedentism and related changes in the social landscape. Moreover, we suggest that these were vital for the articulation and manifestation of this new social organization within the contexts of burial practices as well as funerals and memorial rites. Thus, in many respects



Figure 18. A close up view of the two boulder mortars in figure 17. Note the two vertical slabs abutting the upright mortar from behind and the adjacent horizontal stone (original photo courtesy of F. Valla).



Figure 19. A deep narrow bedrock mortar (bottom right) and the two boulder mortars in situ, Locus 2, Raqefet Cave.

these items can be perceived as ideotechnic artifacts (e.g., Binford 1962:219–220), in the sense of functioning primarily within the ideological context of the social system. The size and weight of the boulder mortars suggest a low degree of mobility. Furthermore, the specific contexts where these were found imply that although potentially portable, boulder mortars were produced and brought to the location where they were set and utilized during a formative event (and not as part of repetitive, recurring events). Thus, even if these were used (and reused) in ceremonies at burial grounds (in the hamlets or burial caves), there was likely a single defining event where the mortar was produced, brought to the site from an unknown location, and set in place—usually in the



Figure 20. A close-up of the same deep narrow bedrock mortar (bottom left) and nearby boulder mortar in situ (center). Note that it is set above a burial (human bones visible at bottom right).

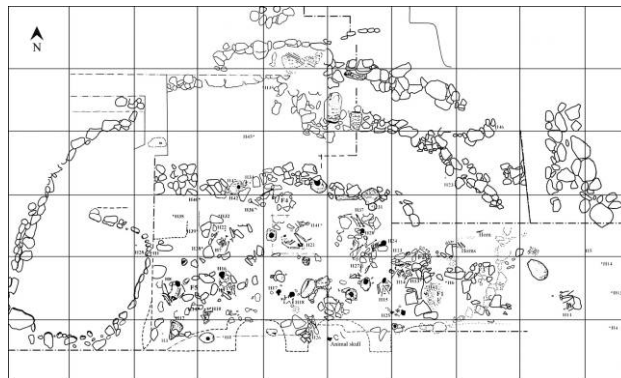


Figure 21. A partial plan of the Natufian graveyard at Nahal Oren. A large hearth surrounded by heavy slabs is on the right and several boulder mortars are near the human skeletons (after Grosman et al. 2005, fig. 8).

graveyard and thereafter partially or completely buried (see also Hayden 2004:276). This important occasion may have been one of the most significant social events, assigning the particular location its seminal cultural and geographic significance. This importance may have been interlaced with a revered persona in the community, such as a group leader or a shaman. As previously mentioned, some boulder mortars were found not just in association with specific human burials, but also in proximity to or as part of spatial arrangements of features that included hearths, walls, and pavements (or settings of flat limestone slabs), sometimes around a hearth. These complexes were part of the burial and the funerary



Figure 22. A broken boulder mortar in situ near a burial pit with a single interment at Nahal Oren (after Noy 1989, fig. 3; courtesy of the Institute of Archaeology, Hebrew University of Jerusalem).



Figure 23. An in situ boulder mortar near a headless skeleton at Nahal Oren (courtesy of the Institute of Archaeology, Hebrew University of Jerusalem).

rituals (e.g., Noy 1989:56; Stekelis and Yizraely 1963:11–12) or alternatively served in memorial ceremonies.

Thus, the social significance of the mortars should be viewed first and foremost as part of the paraphernalia of burial grounds and as reflecting behaviors associated with death. While the location of some of these suggests that they may have been used as grave markers (Stekelis and Yizraely 1963), it seems that, if so, this is only part of a more complex picture and we should seek and adopt additional explanations for their presence in such pivotal contexts. It appears that the low number and the size of these items suggest more communal use, and thus we should analyze them as central elements pertaining to the community, acting in burial grounds for a long duration of time. As noted above, the possibility that these were originally interlaced with the living memory of specific persona cannot be overruled. However, it seems that at some point their significance went beyond potential personal representation, and they may have become synonymous with the community as a whole and/or with the burial location. Furthermore, as Hayden (2004:292) suggests, these can be viewed as evidence (together with skull removal, for instance) of ancestor worship and ownership over specific locations (see also Nadel and Lengyel 2009).

While we are still at some distance from a conclusion regarding what substances were processed in some of these boulder mortars, wild cereals, fruits, nuts, tubers, and acorns (e.g., Hayden 2004 and see also Rosenberg 2008) are all possible candidates (together with meat and human or animal bones) for being processed in funerals and commemorative rites. Another issue, assuming that indeed food was to be processed within selected Natufian boulder mortars, concerns the person for whom it was meant—the deceased or the living. Recent proposals suggest that large Natufian mortars may have been used as part of food preparation during communal events, such as annual feasting (Bar-Yosef 2002a:118; Hayden 2004). Hayden and his colleagues suggest that these were



Figure 24. Two boulder mortars incorporated into a ceremonial (?) complex, Area E, Jericho (original photo courtesy of S. Laidlaw and the University College, London; see also Kenyon 1960a, pl. 8).

incorporated in a beer-brewing process during such events (Hayden 2004, 2011; Hayden et al. 2013). However, the exact substances (grains or other) processed in these mortars still awaits support from residue studies. Moreover, in some cultures death entailed fasting or dietary restrictions for certain periods of time among various sections of the relevant social unit, specifically kin (e.g., Bendann 1930:104–107); these customs yet again raise difficulties for understanding the function of boulder mortars.

Nonetheless, if indeed, as the extant evidence suggests, the boulder mortars were of prime importance for the successful application of rites that took place in some of the Natufian hamlets and burial caves (rites that also included the use of fire and probably feasting), it seems that we should justifiably include them under the broad definition of prestige or status of wealth objects (Bar-Yosef 2002a:117; Hayden 2004:273). The display of wealth reflected by these items (e.g., Hayden 2004) could offer interpretive difficulties, as many were sunken in the ground, and thus most of the object's body was not visible at all. However, it is possible to assert that the common knowledge that pertained to the fact that a meaningful artifact, crucial for the success of the ritual process conducted through funeral and related rites, is buried alongside human burials (e.g., Nahal Oren, Jericho, and Raqefet Cave) was sufficient to project its social value and the lavishness reflected by its size. Regardless of their frequent poor finish and the readily available raw materials from which they were made, it seems that the social importance ascribed to these mortars for the success of the ritual act (pertaining to the burial, commemorative events, or otherwise) supplemented these with special social significance. This importance was directly associated with the functional role the mortars had in the ceremonies and with the probable symbolic value,

projecting on the group amalgam and unity, social bonding, and ancestor worship.

To conclude, it appears that at least in some of the Natufian funerals and commemorative events, rituals that involved pounding of substances, most probably of food stuffs, were practiced. We should also consider a more symbolic use of the boulder mortars, incorporating them in rituals that may have included the imitation of actual processing. Whether in the Natufian hamlets or in separate burial grounds, it seems that at least part of the group participated in these ceremonies that may have included actual or symbolic food processing by pounding. We cannot, however, clearly state which part of the community took part in these rituals or who was leading and maneuvering them. Nonetheless, it seems that the boulder mortars were integral and focal elements during these events. Likely, the sounds of actual pounding accompanying these ceremonies may have been used to signal members of the relevant group that such events were taking place and together with the material processed, designated either to the living and/or the dead. Apparently, boulder mortars had a pivotal role for achieving the goals of the ritual. They were clearly part of a complex array of artifacts and related actions operated by the Natufians to accompany the transition of the deceased from the world of the living to the world of the dead. As such, these should be viewed as *pars pro toto*, representing a narrow window for observing the Late Natufian death-related rituals of a society undergoing profound social, economic, and spiritual changes.

Acknowledgments

This paper is dedicated to the late Jean Perrot. We thank the M. Stekelis Museum of Prehistory, Haifa, the Institute of Archaeology, the Hebrew University of Jerusalem, the Israel Antiquities Authority, the Ashmolean Museum, Oxford, University College, London, J. Perrot, N. Conard, A. Kendel, F. Valla, A. Belfer-Cohen, and S. Laidlaw for their help and their permission to publish photographs supplied by them. Our thanks go also to D. Kaufman and E. Marcus for their important comments on an earlier version of the manuscript. A. Avshalomov drew the Nahal Oren mortars.

Comments

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This is an informative paper, and the authors should be congratulated on highlighting the role of specific groundstone utensils/burials associations in the Natufian discourse. Nevertheless, there are several stumbling blocks in the paper stem-

ming from biases of the authors. This results in a distorted picture of the available data, including those they themselves present.

We suppose that Rosenberg and Nadel did not want to detail the nature of Natufian burials and their uniqueness compared with preceding cultures; but one cannot ignore the emerging picture regarding the complexity of pre-Natufian burial behaviors (e.g., Maher et al. 2011; Richter et al. 2010; and see overview in Goring-Morris and Belfer-Cohen 2013), contra the simplistic statements of the authors. Even the intentional association of groundstone utensils (bowls) with burials is known already from the Middle Epipalaeolithic Geometric Kebaran at both Neve David and Wadi Mataha (Bocquentin et al. 2011; Stock et al. 2005). They also failed to refer to the typological and functional studies conducted on groundstone artifacts by Eitam (2009).

It seems that, in striving to emphasize the coassociation of boulder mortars with burials, which is indeed the case in Raqefet Cave (excavated by Nadel and colleagues), they simply overlook the evidence available elsewhere. The paper is full of bold statements such as “the locations where most boulder mortars were found and their immediate contexts clearly point toward a specific and intimate relation with burial and/or commemorative rites” and “it seems that, by and large, most contexts where these mortars were found, either whole/intact or as fragments, are burials or burial grounds.”

In stressing the ceremonial role of the boulder mortars, they propose that while “it is possible that some were used for food processing, probably most of the large specimens were incorporated in ritual, used during the ceremony, either as part of burial acts and/or as components of memorial events that took place at the burial ground.” Moreover, “these objects seem to have social significance that goes beyond the volume and capacity of the shafts . . . and that contrary to what is commonly thought some were not useable for processing large amounts of material during one processing session. . . . Thus, it seems that the Natufians wished to create large and cumbersome implements with a strong spatial signature that was more important than the actual pounding or grinding efficiency.” Unfortunately, they fail to present any actual evidence or references to support these statements.

Their goal is to convince the reader that “boulder mortars were produced and brought to the location [i.e., burial grounds] where they were set and utilized during a formative event (and not as part of repetitive, recurring events),” and they rhapsodize that “the sounds of actual pounding accompanying these ceremonies may have been used to signal members of the relevant group that such events were taking place and together with the material processed, designated either to the living and/or the dead.” This is all highly speculative.

Moreover, they state that the association of mortars with burials reflects “common practices pertaining to Natufian burial and commemorative ceremonies and can be held as indicators of a south Levantine tradition overriding a variety

of territorial and group-specific social and symbolic traits.” This also simply contradicts the available data.

When checking their table 3, the only Natufian sites with unequivocal evidence for the direct coassociation of boulder mortars and graves are Nahal Oren and Raqefet, both located in the Carmel region. Indeed, it seems that this coassociation is actually a local phenomenon, which accords well with interpretations for regional Natufian traditions that was described in other realms of symbolic and other material culture (Belfer-Cohen and Goring-Morris 2013). The other sites they refer to for supposedly similar coassociations, e.g., Eynan (Perrot and Ladiray 1988), Hayonim cave (Belfer-Cohen 1988a, 1988b) and Hayonim terrace (Valla 2012a) are simply not to be found in the detailed reports. For example, in the section they provide (fig. 15) for Homo 70 at Eynan the burial clearly postdates the mortar; indeed, according to Perrot and Ladiray (1988), structure 26 with the mortar dates to the early Natufian, while the H70 burial belongs to the Middle to Late Natufian phases there. So, too, at Saaïdé (Schroeder 1991) the ascribed coassociation is, at best, tenuous.

Boulder mortars were recovered from many Natufian sites (tables 2, 3), but in most cases they are either not associated with burials (see above) or there are no on-site burials, for example, Usba cave. Boulder mortars were indeed recovered from what can be considered a sacred area in Jericho (as described in the paper), but there are no associated burials.

It seems to us that the solid data the authors present most parsimoniously serve as yet another line of evidence for the pronounced regional variability present during the course of the Natufian. Their detailed discourse on mortars, burials, and social and ceremonial behaviors once again illustrates the complex nature of the Natufian complex foragers.

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Frail Echoes from Natufian Mortar Sounds of Ritual Food Processing

The authors claim that Natufian boulder mortars are ritual objects used for food processing and sound making during funeral or commemorative ceremonies. Although possible and interesting, this suggestion suffers from a lack of clear demonstrative support. Moreover, the brief and approximate synopsis on contextual data that they propose limits the potential interpretations that could have germinated and blots out the fascinating complexity of the Natufian funerary and symbolic systems.

The ritual involvement hypothesis serves as a starting point that is never properly demonstrated but rather set by means of undeveloped assertions. The question of the low efficiency

of the boulder mortars is one of them. The direct link between low efficiency and ritual use is another one. In the same way, if the proximity mortars/burials is mentioned, their real association remains undiscussed. For instance, mortars are described as “near” or “above” some burials in dwelling sites. Is it really surprising to find such relative proximity in Natufian sites well known for their density of occupation and density of graves? Even the case of Homo 70 at Eynan, admittedly found directly above a huge mortar, is most debatable. Indeed, the burial pit was dug in the filling of a Late Natufian house (Perrot and Ladiray 1988:10, 43; Bocquentin 2003b:244) and hit the rim of a much older mortar contemporaneous with an Early Natufian dwelling. The fact that the bones of Homo 70 did not fall within the mortar confirm the former was entirely filled when the cadaver was placed above it. In the case of the funerary cave of Raqefet, the mortar is placed in a pit that cut the legs of one skeleton, away from the main burial ground: can we consider that as a tight link?

On the contrary, the unique open-area cemetery of Nahal Oren provides us with indisputable association data, as mortars are found, not above or near the graves, but inside or immediately adjacent to the burial pits. Several specimens were found in upright position, partly unearthed, and considered *ipso facto* grave markers (Stekelis and Yisraely 1963: 12). This hypothesis makes sense especially in this large-cemetery context. Moreover, their location next to the upper part of the body may indicate that there were specifically head markers allowing skull removal after decay. Having said that, the marker hypothesis might not be exclusive, and the ritual food-pounding hypothesis developed by Rosenberg and Nadel is certainly a potential one. Pounding actually may have also concerned mineral pigments, as do other grinding stones included in graves and for which use-wear and residue analyses have been done (e.g., Belfer-Cohen 1988a:300; Dubreuil 2002; Dubreuil and Grosman 2009).

Nevertheless, this functional hypothesis is, in several cases, in question, as a portion of the grinding artifacts, including upright boulder mortars associated with the graves, are often broken or perforated (likely deliberately, as mentioned by the authors, or maybe “killed,” as proposed by Ronen 2003:64). We should stay open to other possible uses. For instance, the breached bases may have transformed the so called pipe-mortars as libation containers. They may also have been used empty, as a sound box. Direct percussion on a stone pestle placed transversally to the rim may have offered a clear and peculiar resonance (e.g., Caldwell 2013), probably more efficient for gathering the troops than the sound of food pounding. Deeper functional and wear analysis of these items may give keys to interpretation in the near future.

Now, what can be said about the case of mortars, clearly associated with burials but not as stand-up “functional” items? The authors seem to include them in the same interpretative scheme, when their obvious secondary position is testimony of a far different role. In fact, the Natufian corpus provides us with a variety of situations that show a complex relation

between mortars and the dead or death (for a synthesis: Bocquentin 2003*b*). One of these documents, the early Natufian grave of El Wad H57a-g, cannot go unmentioned. Seven individuals were buried simultaneously in two rows placed in circle in the middle of which lay half of a broken deep mortar (fig. 25) (Garrod 1937:125; Weinstein-Evron 2009:87). One of the skeletons, a young adult of unknown sex (Bocquentin 2003*b*:128, 132), was wearing a necklace as well as a headdress made of hundreds of beads, probably covering his eyes as well (Davin 2012). In addition, his head was weighted by a big stone block. Altogether, despite his particular treatment, the higher status of this individual among the others is not obvious. On the contrary, the broken mortar, in its central position, seems to be the focus, but not the actor, of an exceptional ceremony due to (or involving?) this unusual simultaneous death event.

In conclusion, if boulder mortars indeed were part to the funerary system, together with other grinding stones and even raw blocks of stone (e.g., Bocquentin 2003*b*; Valla 2012*b*), their exact contribution remains difficult to determine, and generalization seems inappropriate. Moreover, if more than 450 Natufian skeletons have been unearthed, their direct association with grinding tools is attested for a very small number of them (fewer than 20 cases), and the implication of



Figure 25. El Wad, grave H57a-g, upper row of deposit (Copyright: Musée des Antiquités Nationales, Archives D.A.E. Garrod, ref. 33428-4). This picture shows the grave in the course of excavation. We can see half a boulder mortar surrounded by two exposed skeletons lying on their left side (1 and 2), their knees touching the mortar. The feet of a third individual (4, probably not yet excavated) are seen directly in contact with the feet of 2, while the articulated complete pelvis of a fourth individual (3; femurs are visible as well, but the rest was removed) is found on the skull of 1. For these four individuals at least, the picture confirms that this was a simultaneous burials: all of them were found in anatomical connection, labile joints included, despite their much closer proximity. Except for the decorated cranium, none of these skeletons can be identified in the current anthropological collection of El Wad housed in the Peabody Museum at Cambridge (Bocquentin 2003*a*).

boulder mortars in Natufian burial ceremonies, although significant, should not be overstated.

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Archaeologists tell stories about the past. This is a good thing, since they know the most about the past. Of course, it is also the job of archaeologist to assess whether or not these stories are fact or fiction.

Rosenberg and Nadel's paper argues that large mortars from Natufian sites were made for and used primarily in the context of burial ritual. A few quotations from their paper give an impression of their argument (please read the full paper to contextualize the quotations), for example: "probably most of the large specimens were incorporated in ritual, used during the ceremony"; "these were vital for the articulation and manifestation of this new social organization within the contexts of burial practices as well as funerals and memorial rites"; "mortars should be viewed first and foremost as part of the paraphernalia of burial grounds"; "these were originally interlaced with the living memory of specific persona"; "crucial for the success of the ritual process"; and "Likely, the sounds of actual pounding" accompanied these ceremonies. The paper is an example of "possibilist" archaeology rather than a rigorous test of completing hypotheses. The authors mention that "several hundred" Natufian burials have been documented, while only dozens of large mortars are known. They also add that, in many cases, "boulder mortars were found on the surface, in fills (sometimes fills of graves), within walls or in unknown contexts." These observations contradict and undermine the authors' interpretation. I view Rosenberg and Nadel's hypothesis as remotely plausible for a portion of the boulder mortars, but far from having been demonstrated. Ultimately, I remain highly skeptical. Observations from my excavations in the Fertile Crescent mentioned below do not conform to the expectations one would expect based on the arguments the authors present.

Fieldwork in Damascus Province, Syria, at Kaus Kozah Cave documented a bedrock mortar that had an irregular form that was not ideal for grinding and pounding (Conard et al. 2006). This feature likely reflects an example of a bedrock mortar that started nicely, but as it deepened the makers encountered irregularities in the rock. Most boulder mortars that I have seen were almost certainly hollowed out of limestone through arduous gradual use. Irregularities and structural weakness in the stone itself may have led to the presence of twisted or curved forms and in some cases to breakage. One also finds boulder mortars in all stages of wear, which suggests that people regularly used them, rather than deliberately making nonfunctional mortars for ritual purpose re-

lated to burials. I also do not follow the argument that as one nears the bottom of the mortar they stop to wear. If force is exerted on the stone, it will continue to wear even near the base. Certainly, stone tubes or pipe mortars were at times the product at the end of the cycle of manufacture, use, and discard. However, many mortars were not reduced to tubes, and I am not convinced by the claim that creating tubes was the main point of making mortars. Additionally, how could the sounds of pounding accompany a burial ritual, if the mortars in question were spent stone pipes?

More specifically, if we consider excavations at Baaz Rock-shelter in Damascus Province, Late Natufian people carried a roughly spherical boulder up a steep hill and carefully mounted it in a meticulously laid red-brown, packed clay floor that lay underneath and surrounded the mortar, as well as abutting against the stones of the adjacent fireplace and the stones on the circular periphery of the house (Conard 2006, Conard *et al.* 2013; Stahl Schmidt 2010; see fig. 14). The mortar was used and obtained internal dimensions of about 20 cm in depth and 12 cm in diameter. The mortar was never moved again until 2004, when we removed it and placed it in the collections of the Syrian National Museum. I see no possible way of arguing that this artifact has anything to do with burial rituals. This all the more so since no burials were found at Baaz.

Finally, I want to mention some observations from the other end of the Fertile Crescent. Bedrock and boulder mortars are also common in the foothills of the Zagros. This is the case, for example, at the sites near Sarab Syah in the Dasht-e Rostam (Conard *et al.* 2007). Also at the aceramic Neolithic tell of Chogha Golan dating between 11,700 and 9,600 cal BP, we have documented many boulder mortars of various sizes (Conard and Zeidi 2013). The surface of the site is littered with them. These are not Natufian settings, but these artifacts are found in a wide range of contexts including in middens, embedded in walls, within rubble-fill, and on the surface. At many sites large mortars can be found haphazardly discarded.

Based on my reading of the data Rosenberg and Nadel present, I favor the null hypothesis that the association of boulder mortars with burials is often a matter of chance and the stochastic nature of the discard of cultural debris rather than a reflection of a complex ritual steeped in religious meaning.

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Groundstone Enigmas: Comment on Rosenberg and Nadel

Rosenberg and Nadel have addressed a fascinating and enigmatic topic that holds important implications for studies on the Natufians. The question is what those implications

are. The authors have brought us closer to figuring out the answer, but there remain many unanswered questions. These boulder mortars/stone pipes are some of the most bizarre artifacts made by any hunting and gathering group. The narrowness, even twistedness, of many shafts make them impractical for use as mortars—indeed, how could some of the narrow types even have been carved out? Drills of some sort seem required.

Similarly, the size, weight, and narrowness of many shafts make it seem that removing any solid materials like crushed nuts or grains would be impractical. Hence, Schroeder's intriguing suggestion, echoed by Valla (2009:16), that some of these "mortars" seem best suited for dealing with fluids, especially the breached varieties of stone pipes (and hence my own suggestion of possible use in brewing—Hayden *et al.* 2013). While these suggestions may make sense in terms of the breached, and high-capacity varieties, it is difficult to see why some of the unbreached, narrow, funnel-shaped, low-capacity variants would be useful in dealing with liquids, unless they are simply unfinished versions that were eventually meant to be larger and/or pierced. The apparent use location of some of these tools (buried about halfway in the ground, or buried on an angle; see, e.g., Valla 2009) is also curious. Pestles and mortar/bowls are clearly very different tools and should not be considered with boulder mortars. The mortar/bowls are too small to be used for mass-processing any material but are about the right size for processing condiments or salt, similar to the way this size of mortar and pestle is used in many contemporary preindustrial societies.

So the enigma continues. One possible way of dealing with the many contradictory indications of use is to posit that different types were being used for different functions: for example, narrow, funnel shaped, pierced "mortars" for liquids (possibly set on a wooden frame above a receptacle, and acting as a filter similar to the brewing of coffee from grounds) versus broader, unpierced specimens set on or in the ground for crushing solids, and so on. All may have been used in the same social contexts. Rosenberg and Nadel have certainly made a significant contribution in clearly situating the use of these tools in funerary, ritual, and probably feasting contexts. One must even wonder if most of the Natufian stone structures and caves were not used primarily as seasonal aggregation sites for funerary feasts or other rituals by individual corporate groups or lineages (Hayden 2011:52–53).

Contrary to the authors, I do not think the role of boulder mortars as grave goods can be so easily rejected. The fact that many were costly but intentionally broken indicates to me that they were personal (or corporate) property destroyed upon the death of the owner or principal corporate figure. Such practices are amply documented among complex hunter/gatherers in Northwestern North America, and the costly destroyed property was often left on the ground above the grave (fig. 26), as many of these "stone pipes" seem to have been. In fact, in many areas of the world, including the Torajan Highlands and the Northwest Coast Interior, sec-

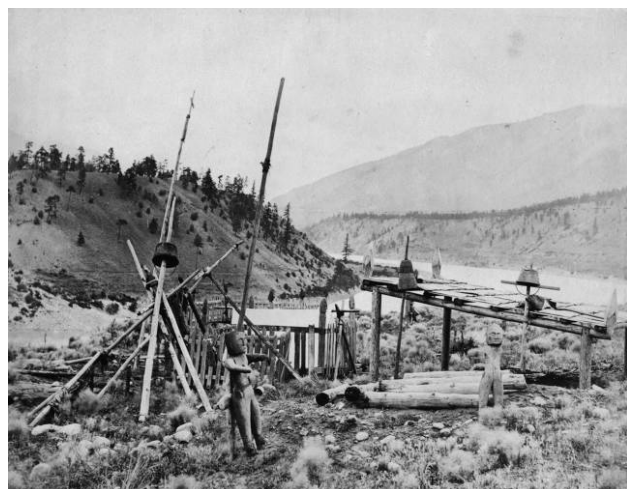


Figure 26. An Indian grave in the Lytton area of the British Columbian Plateau, c. 1866–1870. Of note are all the grave goods on the surface or above the grave. The piercing of pots and kettles, in particular, may provide an analog for breached Natufian mortars, especially since they were important wealth items. In another grave photo from the region, the same photographer noted that there were “several brass and copper kettles disposed about the front part of the grave, but with holes purposefully knocked in them so as to render them unfit for any worldly thief” (text from Royal British Columbian Museum photo PN6573). Photo by Frederick Dally, courtesy of the City of Vancouver Archives CVA3–29. A color version of this figure is available online.

ondary burials occurred because people took years to amass as much wealth as possible for final funerary send-offs that included reburials (e.g., Teit 1900:336; Ostropkawicz 1992:33; Hayden 2009a). In complete contrast to suggestions of reduced funerary displays over time, I would argue that the increased frequency of secondary burials during the Late Natufian represents an increase in resource accumulation for increasingly costly funerary feasts, versus Early Natufian final funerary events that took place before bodies had decomposed.

This brings up one other problematical issue of interpretation: the “communitarian” interpretation of burial (or other) rituals as creating social solidarity and the putative need to increase group cohesion. While there can be no doubt that one component of funerary rituals increased social solidarity and cohesion among the sponsors of the funeral and their supporters, this does not generally transfer to the entire community. Ethnographically, sponsors always seem to represent but one faction in a community and never seem to be motivated by concerns of community solidarity, but rather by concerns of displaying their own success and power to their supporters, to other factions, or to other communities (Hayden, forthcoming). The communitarian model is not grounded in tribal realities in my experience.

In sum, Rosenberg and Nadel have provided an excellent overview of the problem. They highlight an extremely important topic for research and have placed future investigations on

a much firmer footing. I enthusiastically applaud their work and hope that they or their associates will someday be able to examine residues from these enigmatic tools so that we can better understand what they were actually used for.

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The Natufian period represents a major shift in human history. Although the fully sedentary nature of the more stable Natufian occupations is under discussion, numerous and complementary forms of archaeological evidence (i.e., more elaborate architectures, multilayer sites, storage structures, heavy stone tools) show that these last hunter-gatherer populations were in the process of settling down. The new way of life allowed an increase in the number of people inhabiting the Natufian settlements and provoked major shifts in social relationships between coresidents and between hamlets.

During this period, the relationship between the living and the dead was also reelaborated. The existence of sites containing a considerable number of burials is indicative of the new way of being attached to the territory. One of the main trends of this reelaboration of the funerary customs is bringing the dead nearer to the living, through the location of the burials inside the settlements and through the extraction of some body parts (especially the skull), their ritual use, and their secondary deposition.

In this context, the stimulating paper by Rosenberg and Nadel pushes ahead to overcome our static vision of this major aspect of the Natufian period (which also means of the neolithization process, as I am more and more convinced that the seeds of this process are all present in this seminal period) and begin to fill with content the diffuse concept of funerary ritual. They convincingly propose that some funerary feasts were held where some symbolic or real pounding/grinding activities were performed. For this vivid reconstruction they resort to the detailed analysis of one of the more characteristic Natufian tools: the stone boulders. I am aware that the incorporation of use-wear and residue analysis to the authors’ research will improve the reach of their conclusions.

The suggested role of some boulders in funerary rituals seems quite reasonable, especially taking into account the evidence from Raqefet Cave or Nahal Oren. However, I am not so convinced of the proposed mainly ideotechnic nature of boulders as a tool category, in the sense of functioning primarily within the ideological context of the social system. Some of the contexts with boulders cited in the text seem to be related to domestic activities, like the one in the Baaz rockshelter. The boulder in Structure 26 at Eynan is below the burials, so it seems to have been no longer in use when the human remains were deposited over it. In Jericho, the three bored sockets as-

sociated with the clay platform of possible ritual use are not related to burials, so there is no evidence of the funerary character of the putative feasts carried out in this place. All in all, I am convinced of the use of boulders in funerary feasts but not so sure that this was the main use of these tools. In this sense, the statement of the authors against opposing utilitarian versus symbolic objects is pertinent. In fact, the utilitarian or symbolic use of an object can be more contextual than conceptual. Moreover, it seems that, especially during the Natufian, the distance between utilitarian and ritual objects and activities was probably very narrow.

As a second minor objection to this relevant paper, I hesitate to choose specifically boulders as the type of tool associated with funerary rituals, putting aside other similar tools that were also used for pounding, such as the bedrock mortars, which also seem to be associated with some funerary contexts, for example, in Raqefet Cave. Moreover, I wonder if all the boulders related to funerary contexts had the same meaning. Were, for example, the fragments of boulders also related to pounding activities in funerary feasts? As the authors propose, this is an interesting field to be explored further.

One of the main innovations in the Natufian mortuary practices is the organization of cemeteries as specific places for burials. Are these cemeteries also the specific places for the collective funerary feasts the authors are speaking about? I suggest this possibility as the most convincing evidence for the implication of pounding activities in the funerary feasts comes precisely from cemetery sites, such as Raqefet and Nahal Oren.

Finally, the authors suggest that the main role of these rituals was promoting social cohesion, following the premises of processual archaeology. However, at the same time, they open other lines of explanation for this ritual behavior (i.e., ensuring the “well-being of the deceased and the livelihood of each participant”), thus widening the scope of the archaeological interpretation of religion in a wide sense, as a “total social fact” in Maussian terms. This contribution is also welcomed.

Summarizing, I think this is a relevant contribution to our understanding of the social and symbolic world of the Natufian communities, one that opens new lines of research, as the authors are opening a “narrow window” that, I suspect, will give wide access to the complex and suggestive world of Natufian rituality.

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The interpretation of Natufian boulder mortars offered by Rosenberg and Nadel presents an interesting alternative explanation to these enigmatic groundstone features, present, yet understudied, at so many Natufian sites. The authors sug-

gest that these objects share a close relationship to Natufian, especially Late Natufian, human burials and, as such, may offer insights into activities performed as funerary rites. They propose an interesting idea and one certainly worthy of further study. Indeed, it is quite surprising how little research has been done on boulder mortars until very recently (e.g., Nadel and Lengyel 2009; Nadel and Rosenberg 2010).

Perhaps one of the reasons why these features remain so enigmatic is the uncertainty that surrounds their dating, context, and function. To date, none of these features has been directly dated. Dating relies on reconstructing their stratigraphic relationships to other datable deposits and features. With the exception of a few funerary sites, such as Raqefet Cave, human burials and their associated objects are often dug into preexisting deposits, usually disturbing earlier occupation layers, features, and burials. Given the large size of these features, with minimum dimensions (table 1 above) greater than the stratigraphic layers they are associated with (e.g., burials, floors), it is difficult to interpret these objects as grave goods or clearly ascribe them to individual contexts, as the authors themselves mention.

While, as pointed out by the authors, these features are sometimes associated with Late Natufian funerary sites and perhaps even specific burials within these sites, they are also found in a variety of other contexts, including within and between structures at both Early and Late Natufian occupation sites. To complicate matters further, not all Late Natufian funerary sites contain boulder mortars (e.g., Hilazon Tachtit). At some Natufian sites, such as at Shubayqa 1, there are no clear associations between these boulder mortars and human burials, and, in some cases, mortars have been removed from their original context and reused in later structures (Richter et al. 2014). At other sites they are near burials but not clearly in direct association with them, and they are also found in nonburial contexts. It seems unlikely they were buried in graves with particular individuals, as their size and positions indicate they would have been visible and usable after burial. Thus, the variety of contexts within which these features are found reinforces that they were not single-use items but may have served a variety of purposes in a variety of contexts and been used and reused over multiple episodes of site use and reuse, including in burial rituals.

Use-wear and residue studies of the interior and contents (where recoverable) of these features that may shed light onto their function are rare. Portable groundstone objects have all received some degree of attention in this area (e.g., Dubreuil and Grosman 2009); however, the difficulties presented by these large, immobile boulder mortars mean that very few have ever been studied to get at their contents, traces of manufacture, or traces of possible uses. Given the problems inherent in dating these features, their unclear contexts, as well as the rarity of use-wear studies to address what function(s) they may have had, their “meaning” as commemorative mortuary features remains tentative.

We should be cautious about using the terms *funerary* and

commemoration to discuss unknown value systems of the Natufian past. We will likely never know what funerary activities the living would have performed to commemorate the dead beyond the material remains we see in the burials themselves. Thus, our discussions of Natufian funerary activities and performances must remain as a myriad of possibilities supported (or refuted) by archaeological data. The recent paper by Nadel et al. (2013) on a flower-lined grave from Raqefet Cave is a step in this direction, but many more such studies are needed before we can draw any patterns out of the material record to address acts of commemoration. Work on identifying possible feasting events may in the future shed light on aggregations associated with specific rituals or rites (e.g., Hayden 2009*b*; Munro and Grosman 2010; Twiss 2004), but at the moment, there seems little evidence that “funerals” were times for aggregation. There could be a variety of reasons for hunter-gatherers to congregate (Conkey 1980) beyond a need to maintain group cohesion through shared rituals.

Beyond the uncertainties mentioned above, the interpretations offered by the authors highlight some intriguing ideas regarding mortuary practices in the Natufian, including their possible connection to feasting activities and, as the title suggests, notions about the senses (in this case, sound) associated with performative activities. I hope that further study of these features, as well as experimental work related to understanding the experience of making, using and reusing these boulder mortars, will continue to shed light on the relationships and activities between the living and the dead and on the possible functions mortars may have served in ritual contexts. The authors draw attention to the likelihood that the distinctions between the dead and living were not clear-cut, and thus it seems likely that these mortars served multiple functions, some, but not all, of which might have been ritual in nature.

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This is a very interesting paper for which I would like to congratulate the authors. Studies on the rituals of prehistoric societies have benefited greatly from theoretical approaches, notably ethnographic and cultural anthropological research. However, it is also imperative to conduct inductive analysis of the factual evidence obtained from archaeological records. In this paper, the authors have incorporated the available theoretical and field findings in an effective way. This resulted in formulating their unique hypothesis regarding Natufian boulder mortars, whose use and role had been rather unclear.

Based on this hypothesis, the authors argue that the funeral ceremony involving the use of boulder mortars fulfilled an important role in maintaining the social order of Natufian

culture and that this custom was apparently shared among communities of the Natufian core region. In either case, the validity of further discussions depends on whether or not we can accept the hypothesis that boulder mortars played a role in funeral ceremonies.

I believe that the authors have duly scrutinized the available data or excavation contexts that are occasionally found in the excavation reports. This is especially critical in much of the relevant current archaeological literature that rarely provides detailed morphological and quantitative studies as well as use-wear analysis of the boulder mortars. In the hope of possibly acquiring further supporting data, I would like to ask the authors two questions.

The first question concerns a comparison between sites with and without boulder mortars. In this paper, the authors only discuss the sites from which mortars have been excavated. Whether or not an excavated assemblage contains particular stone artifacts should be evaluated by considering various nonsystemic factors such as the scale of excavation and collection methods. In addition, it is useful to compare social contexts between the two groups of sites in the region where the occurrence of boulder mortars is anticipated. Are there any correlations between the occurrence of boulder mortars and, for example, the size of settlement, the number of recovered graves, or the socioenvironmental setting of the site location? Clarifying these issues may yield supporting data for the authors' hypothesis as well as additional insight into the social order maintained by the funeral ceremony using the mortars.

The second question also concerns details regarding the structure of funeral ceremonies. It is unlikely that Natufian rituals used only boulder mortars. Natufian mortuary practices are known for their great variability in such aspects as primary/secondary treatment, grave goods, posture of the buried person, or location in the graveyard. Therefore, what situations might have warranted the use of boulder mortars in funerals? The current data are insufficient for confidently discussing these matters. Nevertheless, incorporation of the additional related data mentioned above would also help the authors make their hypothesis more persuasive.

Given the depth of the social and cultural significance held by funeral ceremonies in any society, it is conceivable that the ideas outlined in this paper might contribute to defining the background regarding the formation of the Natufian and its contemporaneous societies. I have been interested in interpreting the relationship of socioeconomic changes between the Natufian core region and the northern Levant. The excavators of Abu Hureyra, a major settlement in the Middle Euphrates in northern inland Syria, have emphasized differences in its archaeological evidence from the hallmarks of Natufian tradition, for example, the large size of lunates, a dominance of flake tools in the lithic industry, the common occurrence of slabs rather than mortars in the groundstone industry, and the nonuse of stone walls in architecture. This argument should not be regarded as merely

reconstructing particular facets of local Levantine prehistory. Instead, it contributes to a better understanding of the varied paths of social and subsistence changes in the Levantine Epipaleolithic, which eventually resulted in the Neolithisation of this region.

The authors refer to boulder mortars at Baaz Cave, suggesting that the geographical distribution of communities sharing the suggested funeral ceremony spread north of Damascus to central Syria. Indeed, northern Late Epipaleolithic sites such as Dederiyeh Cave and Tell Qaramel have not yielded comparable groundstones. Their absence from Dederiyeh Cave, situated at the northern end of the Levant, is particularly interesting: our analysis of the abundant groundstone artifacts has not revealed any fragments that might have derived from boulder mortars, while this site's other cultural records indicate several similarities to the core region in regard to artifactual assemblages and architecture. The apparently different approach to the funeral ritual in the northern Levantine communities of Dederiyeh and Abu Hureyra can be highlighted, despite sharing other aspects of Natufian life to varying degrees. In summary, this paper opens a valuable discussion that inspires our ongoing attempts to untangle the complicated cultural processes of the Levantine Late Epipaleolithic.

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This article by Rosenberg and Nadel does a nice job of describing the large boulder mortars that are found at some Late/Final Natufian sites, particularly those in the Levantine Mediterranean forest zone. The authors provide a number of specific details and note that not all of these artifacts have accompanying data that allow for exact placement within a given site (i.e., some are surface finds or from unknown contexts). They discuss previous interpretations of boulder mortars—sockets, grave markers, beer brewing—and decide to focus on the potential role of these large mortars in the context of funerary rituals. In doing so, they hypothesize that the broken condition of many of the boulder mortars may be the result of deliberate actions rather than accidents during the use life of the mortars. They note that many of these boulder mortars are placed in (loose) association with burials and suggest that the mortars were used in ceremonies, such as food preparation for feasting, related to the burial of a particular individual. The noise that the pounding made was a symbolic sound that drew together members of the community.

As archaeologists, we hope to use the data gleaned from the archaeological record to better understand past behaviors, and this is certainly the intent of Rosenberg and Nadel. How-

ever, it is one thing to propose an explanation and quite another to achieve confirmation of that idea. This has to do, of course, with how the archaeological record forms, as well as with the fact that we rarely (if ever) recover relatively pristine moments in time (Binford 1981). The Late Natufian sites and cemeteries of the Mediterranean forest area, for example, were likely to have been used and reused potentially over the course of the 1,500 years of the latter part of the Natufian period. Even if each individual site saw only some decades or hundreds of years of visits and revisits, this still amounts to many human generations (Bailey 2007; Holdaway and Wandsnider 2006). The basic point is that the use of sites can be expected to have changed over time; pavements and stone walls that seem to be associated with burials might in fact represent different periods of use, especially as Natufian sites usually produce little in the way of charcoal, thus yielding a date or two rather than a series of dates for more accurate pinpointing of exactly how long a site might have been used and reused. As part of this process, cultural materials present from earlier occupations might be picked up and used by later occupants. The most obvious example is when large ground-stone implements become part of constructed walls or are in fills. Even in the context of the plan maps (e.g., as shown for Nahel Oren and Hayonim Terrace) and the photos of burials in Rosenberg and Nadel, there are numerous boulders seemingly associated with the Natufian burials, only some of which are boulder mortars. Could the boulder mortars/fragments thus simply represent reuse of large stones with no significance whatsoever in the fact that they have mortar holes? That is, they were conveniently at hand and incorporated into burials but have no social meaning in burial contexts. In fairness to Rosenberg and Nadel, they do point out the many inconsistencies in their database for large boulder mortars. It is to be hoped that they can establish more definitive associations for these artifacts with future research.

Finally, the Natufian period, while generally distinct from the preceding Middle and Early Epipaleolithic, is no longer as unusual as earlier literature portrayed it. This is due largely to research in the eastern Levant over the past few decades. 'Uyun al-Hammam during the Middle Epipaleolithic, for example, yielded a cemetery in which probable foxes were buried with some individuals (Maher *et al.* 2011). And in the Azraq region, during both the Middle and Early Epipaleolithic, sites such as Kharaneh IV (Maher *et al.* 2012; Richter *et al.* 2011) and Jilat 6 (Garrard and Byrd 1992) are interpreted as aggregation locales; Kharaneh IV has two hut structures and thousands of Mediterranean and Red Sea shells, as well as some shells from the Indo-Pacific. It is likely that as we are able to discover and excavate additional eastern Levantine sites, the types of cultural materials suggestive of increased social complexity will prove to be more widespread and earlier in time than the Natufian period finds.

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Rosenberg and Nadel challenge us to rethink the role that a group of iconic Natufian objects played during the terminal Pleistocene in the southern Levant. Based on a survey of boulder mortar characteristics and contexts, they argue that these Late Natufian artifacts fulfilled important functions in the preparation of foodstuffs during burial feasts and other commemorative events. What I find especially noteworthy about Rosenberg and Nadel's paper is that their work seems to be part of a gradual shift in the ways in which we have thought about the Late Epipalaeolithic and Early Neolithic in the Levant: whereas two decades ago one would have been hard pressed to find explicit reference to the social role of food preparation and food consumption (except perhaps Hayden 1990), there has been an increasing amount of discussion of the complex interplay between cultivation, domestication and the social role of food preparation and consumption during the transition from hunting and gathering to food production (e.g., Asouti and Fuller 2013; Boyd 2002; Dietrich et al. 2012; Hayden 2003; Hayden et al. 2013; Twiss 2008; Wright 2014). This marks a shift away from treating plants and animals merely as resources that late Pleistocene hunter-gatherers and early Holocene farmers exploited intentionally and opportunistically, toward considering the social contexts and settings in which food preparation and consumption became meaningful social acts. Rosenberg and Nadel's paper therefore makes some important observations about boulder mortars, but while I am generally happy to accept that boulder mortars may have played important roles in such food performances, I want to make two cautionary observations.

Context is, of course, crucial when it comes to interpreting the function of boulder mortars and what roles they may have played in funerary rituals or commemorative events. Rosenberg and Nadel produce some convincing evidence for contextual relationships between mortars and burials at some sites (e.g., Raqefet Cave, Nahal Oren and Jericho), but I am unsure of how far we can or should generalize these observations. Rosenberg and Nadel mention the recent discovery of several boulder mortars at Shubayqa 1 in eastern Jordan (Richter et al. 2012, 2014). At this early and late Natufian site we have to date documented seven boulder mortars, two of which are double mortars and five single mortars. Only one of these was buried, while all others are on the surface. At least two had been moved around recently, one during bulldozing in the vicinity of the site. The buried boulder mortar turned out to have been cut into a basalt boulder that was originally part of a late Natufian dwelling. While this dwelling is associated with subfloor burials, the mortar was very likely created after this building had fallen out of use. So, while in some cases we can see links between boulder mortars and human remains

or commemorative events, detailed analysis on a case-by-case basis, backed up by use-wear and residue analysis, might further clarify the use of boulder mortars at specific sites and in specific situations. This will serve as a useful check to evaluate Rosenberg and Nadel's enticing idea.

My second point of concern is a little bit broader and is not only applicable to Rosenberg and Nadel's paper, but more generally to interpretations of the Late Epipalaeolithic and Early Neolithic archaeology of the Levant. This concern focuses on the use of terminology and concepts imported from ethnographic sources. As scholars have begun to confront the interpretation of social practices in the Late Epipalaeolithic and Early Neolithic more directly, ethnography has served as a stimulating source of ideas. However, at times I feel we could be more rigorous in applying these ideas and terms. Instead, we seem to have ended up with quite a mishmash of phrases and terms whose applicability and relevance to the Late Epipalaeolithic and early Neolithic Levant should not always be seen as a given. The end result is not always a more informed reading of the archaeological context, but more a jumble of near phrases that are in danger of becoming meaningless. It is of course true that feasting, ancestor worship, funerary rituals, and so forth are common features in many ethnographically known hunter-gatherer societies. So are shamans, prestige objects, and ritual gatherings. But I think we need to be very careful not to apply these terms too freely or uncritically to the Epipalaeolithic of the Near East, since one does not necessarily imply the other. Ancestor worship does not necessarily imply feasting, prestige objects do not necessarily imply the presence of leaders, and rituals do not necessarily require shamans. I think it is good to remind ourselves that the appearance of the Natufian "phenomenon" was an extraordinary event that has no parallels in recent or modern complex hunter-gatherer societies. Applying cross-cultural interpretations borrowed from ethnography is therefore extremely difficult and we should exercise great caution when doing so. Despite these caveats I applaud Rosenberg and Nadel's endeavor to offer us a new interpretation of Natufian boulder mortars, which is beginning to open up some new and interesting avenues for further research.

Reply

We greatly appreciate the insightful comments provided by the reviewers and commentators and the opportunity to debate issues concerning Natufian mortuary practices and the role of the boulder mortars within this ritually rich context. The wide range of observations and insights offered clearly depict the complexity of the issue of bringing back to life Natufian burial and commemorative ceremonies through a multidimensional study of silent stone objects. One may find in the current paper and the comments a lively discussion

about Natufian ritual practices, the complex and not self-evident nature of the archaeological remains, and ensuing interpretations. Rightly, several comments address the contextual aspects relating to the boulder mortars, while others discuss their actual role in Natufian burial and commemorative rituals. In this regard, although the archaeological signature of the exceptionally large boulder mortars is very pronounced, it is surprising how little research has been carried out so far on these items and how little we knew until recently of their characteristics and contexts.

The emergence of the Natufian culture, around ca. 15,500 Cal. BP, was clearly a major turning point in the cultural history of the Near East, one that profoundly affected human societies and had major impact on the environment. D. Garrod and R. Neuville, the pioneers of prehistoric research in this area, provided the first definition of the Natufian culture, mainly based on the chipped and ground-stone industries, the elaborate bone tool industry and art manifestations, and, notably, the presence of many burials (Garrod 1932; Neuville 1934). The Natufian culture continued to attract the attention of archaeologists, and a second wave of excavations took place in the 1950s through the early 1970s in Eynan, Nahal Oren, Hayonim Cave, Rosh Zin, and other sites. Later on, especially in the last few decades, work continued in previously excavated sites but also expanded to new sites and new regions, some of the latter located in the northern Levant and eastern Jordan, beyond the original Natufian “homeland” (Bar-Yosef and Valla 1991; Belfer-Cohen 1991; Henry 1989; Richter and Maher 2013; Rodriguez et al. 2013; Tanno et al. 2013). Currently, we have a wealth of data pertaining to the economic, social, and spiritual realms of Early and Late Natufian communities and also to their technological achievements.

In this context, one of the hallmarks of the Natufian culture concerns technological innovations and developments regarding the manufacture and use of large stone objects. This is manifest in limestone and basalt bowls, mortars, and pestles, as well as in bedrock features hewn into cave floors and natural rock exposures. While stone tools, mainly pestles, but also bowls, mortars, grooved pebbles, and others were frequently found in hamlets and seasonal camps, sometimes in large numbers, a unique Natufian type that literally stands out—the massive boulder mortar (sometimes called “stone pipe”)—is less frequent and is underrepresented in most publications. These large Natufian items are unusual in their characteristics, their technology of production, their rarity, and especially their context and association with burials, and they rightly deserve thorough scholarly attention. These aspects were all addressed in this paper, which reports the results of a new study of Natufian boulder mortars, suggesting that these objects share specific traits that go beyond size and contexts and that many were associated with Natufian burial and commemorative ceremonies.

Natufian sites pose many interpretive challenges, specifically the contexts of burials and related material remains. Burial-related items clearly acquired special importance in the

southern Levant with the onset of the Natufian culture, reflecting significant changes in social and symbolic behavior. Natufian mortuary practices and related behavioral patterns have been the focus of many studies, starting with the seminal work of D. Garrod (Garrod 1957), and they continue to form a significant part of any discussion and synthesis concerning this culture. The growing number of views about the Natufian population and their economic and social behavior (see recent papers in Bar-Yosef and Valla 2013) emphasizes that common interpretations in archaeology are inductive. Within this framework, the study of the Natufian boulder mortars and their social role seems to be a worthy endeavor.

These large massive implements are among the hallmarks of the Natufian culture. No doubt, the contexts and social role of the boulder mortars are at times hard to interpret (see also Olszewski, Richter). However, this is true for other types of Natufian material remains as well. It is also true, on a larger scale, for the interpretation of Natufian settlement patterns and the level of sedentism/nomadism as could be concluded from the sites and their characteristic material remains. Indeed, there is a range of views about the nature of Natufian sites. Since these mortars appear only in some of the Natufian sites we must remember that there is no one “form” of “a Natufian type site.” While we see obvious differences between burial caves, habitation sites and temporary hunting or other task-specific sites, we should also acknowledge the great variables found between sites of the same “group.”

Furthermore, one aspect that indeed deserves much attention is the relation between the Natufian “Core Area” or “Homeland” and the northern Levant (Nishiaki) as well as the eastern fringes (Olszewski, Richter). This is indeed relevant to the boulder mortars discussed here, as they form a distinct group of material remains within the Natufian repertoire, crossing almost all ecological and topographical contexts throughout the Levant. Notably, except for the flint industry (e.g., lunates) and a few other types of remains, many aspects of the Natufian material culture do not have such a widespread pattern.

While several previous interpretations and suggestions concerning boulder mortars were offered in the past and discussed in our paper, we strongly believe that some new and fresh hypotheses should also be considered and that the archaeological discussion pertaining to Natufian ritual can benefit from such a discourse. We present a rigorous description of the boulder mortars and some interpretations. Most of the commentators agree that these mortars were highly important artifacts for the Natufians, and some concur that they were incorporated in Natufian burial rites and ceremonies (Bocquentin, Hayden, Ibáñez, Maher). Others still question this link and suggest that we have no sufficient evidence (Belfer-Cohen and Goring Morris), or that it is more a matter of chance to find these mortars in mortuary contexts (Conard). While we never claimed that all the boulder mortars were found in ceremonial or burial contexts, we strongly maintain that most of those found in situ were associated with burials.

This is indeed true for complete or broken specimens found at Nahal Oren and Raqefet Cave, but also for el-Wad, Eynan, Hayonim Cave and Terrace, and other sites.

We include in this group the large mortar associated with Homo 70 at Eynan, bearing in mind the fact that Perrot assigned them to two different levels (i.e., the mortar to the Early Natufian and the burial to the Late Natufian). We claim that the burial was not placed there randomly, exactly above the very rare huge mortar; rather, we think that the burial was intentionally placed above this mortar for reasons specified in our paper. One should remember that at Eynan and other Natufian sites, the building of structures one above the other, for generations, was a common phenomenon. We see this, like other researchers, as direct evidence for continuity of tradition and location-specific memories of individuals or groups. The burials placed under floors at Eynan and other sites are also relevant in this respect. Thus, the Homo 70–boulder mortar association is not our misreading of the past, but yet another example of a long communal memory, on the one hand, and the burial–boulder mortar association, on the other. This example supports our suggestion that the social significance of boulder mortars was long-lasting and was passed from generation to generation.

We can only speculate about other human and inanimate participants in the social context where boulder mortars were manipulated and the complex relations between the Natufians and their dead. Similarly, it is hard to draw firm conclusions concerning sites where such mortars were never discovered (Nishiaki). However, we do show all the data we were able to retrieve from the mortars we personally excavated or analyzed; we also present all of the data, physical characteristics and context, that we could gather from the literature concerning these items. While many of the boulder mortars are no longer available for study (some of the el-Wad and Nahal Oren specimens, for instance), others provide valuable data concerning raw materials, technology of production, size and morphology, shaft characteristics, preservation, and discard patterns. The calls for use-wear and residue analyses (Hayden, Maher) echo our thoughts as well, and while use-wear and residue studies encompass great methodological difficulties for deep mortars and other tool types, we certainly intend to press forward in these directions and try to retrieve such data from the available boulder mortars.

As various commentators (Hayden, Olszewski) are correct to point out, we cannot be certain that some of the boulder mortars did not enter the mortuary context as grave goods or, for that matter, for how long they were in use. Some of the proposals offered in the past regarding the social context of these items suggest that large Natufian mortars may have been used for food preparation during communal events, such as feasting (Bar-Yosef 2002:118; Hayden 2011). We certainly agree that we should also consider such research avenues. Furthermore, the readiness among some of the commentators to see these mortars as part of complex sets of activities and

human interaction, not “just” as food processing implements, indeed accords well with our approach.

What we can say is that many of the known boulder mortars appear to have been active in social events related to Natufian burials or revisiting of specific burial grounds. While support for any hypothesis concerning the actual implementation of pounding within the burial or commemorative rites varies in its strength and relevance, as we noted in our paper, there is good reason to see a strong connection between boulder mortars, the actual burial, the commemorative ceremony or the social interaction that followed or preceded it (e.g., feasting or other sort of social gatherings). Indeed, we should be aware of the fact that some of the boulder mortars could have been first used in a domestic environment as utilitarian items before being relocated into a burial context and that some were never repositioned in such a context at all (e.g., Baaz). However, this does not reflect on those incorporated in rituals or burial events whatsoever. In fact, this possibility is mentioned in our paper and should be taken into account when reconstructing the life histories of these objects.

We leave open for now the question of what was actually processed in these mortars and how it was pounded, bearing in mind the variations in shaft size, depth and characteristics. However, we think that if these were indeed used for pounding foods or other substances during social gatherings that were related to burial of the dead or remembering them, then we cannot leave out the possibility that part of the “package” was also the sounds created by pounding. Pounding almost always produces sounds (as well as scents and color change of the worked substances); this is an outcome of the contact between the pestle and the mortar’s base or walls or the pounded material. The pounding may have had a particular rhythm, known to all and readily recognized by members of the group and even beyond.

Pounding is known to be part of hunter-gatherers audio communication system (Lee 1979); pounding of roasted coffee beans by Bedouins of the Negev Desert, as part of traditional coffee making for guests, is frequently conducted in specific rhythms (involving pounding of the beans and knocking on the mortar’s sides) and is accompanied by storytelling (Rosenberg 2004:146). Thus, we should consider the possibility that there was more to pounding than just the technical aspect of food preparation, especially when it was conducted in a funerary social context. Instead, and while this is not an argument central to this paper, we proposed that the sounds of pounding were part of the burial or commemorative ceremonies (or feasting), as music is commonly an essential component of many social events and rhythmic beat is particularly frequent in such contexts. What role these tunes played and how they were incorporated into these gatherings is beyond our ability to tell.

Natufian boulder mortars clearly stand out as a unique ground-stone tool type, one that has no parallels in earlier or later prehistoric cultures of the Near East and probably one of the best examples for a “communal” object that was owned

by the community and not by a specific individual. It is not surprising that many of these are found in relation to human burials. As we are well aware, and as several commentators noted, there are lacunae in the available data sets. However, hopefully, additional items will be discovered in situ in years to come, and these will be thoroughly studied in terms of context, residue and use-wear analyses.

We appreciate all the comments, which contributed to our main goal of drawing more attention to this important aspect of the Natufian culture, an aspect never or hardly addressed even by some of the most stringent commentators of this paper. We particularly look forward to new information and more studies regarding these intriguing boulder mortars, and hope that the variety of tunes that echoed throughout our paper will be enriched in the future. Hopefully, with the new data and ideas presented in our paper and discussed by the commentators, the boulder mortars will gain their rightful place in future Natufian discussions.

—Danny Rosenberg and Dani Nadel

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