THE BROKEN RECORD: THE NATUFIAN GROUNDSTONE ASSEMBLAGE FROM EL-WAD TERRACE (MOUNT CARMEL, ISRAEL) – ATTRIBUTES AND THEIR INTERPRETATION

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Abstract

The groundstone assemblage of the recent excavations at el-Wad Terrace, one of the largest known from the Natufian, includes a variety of implements such as grinding stones, pestles, vessels, and grooved items. Many flakes and fragments were also found during the fine-sieving of the sediments and most of these are probably tool fragments. The size of the assemblage, as well as the chronological and contextual control, make it one of the most significant Natufian groundstone assemblages in the southern Levant and offer insights into hunter-gatherer groundstone preferences and conventions at the end of the Pleistocene. Some of these functional and stylistic preferences in the el-Wad Terrace assemblage concern tool production (investment in meticulous finishing) and discard (the vast majority of the tools are highly broken), raw material selection (preference for compact basalt of non-local provenance), tool morphology and size (high levels of uniformity). Together with practical concerns (e.g., the high quality of the imported basalt), this can be a result of a number of social factors, including long-distance trade-exchange and aspects concerning group identity and social cohesiveness.

Key words: Natufian Culture, Southern Levant.

INTRODUCTION

The Natufian culture of the Terminal Pleistocene, which culminates the Epipaleolithic cultural sequence in the southern Levant, is generally regarded as a complex, sedentary society of hunter-gatherers on the threshold of agriculture (e.g. Bar-Yosef, 1998, 2002; Belfer-Cohen, 1991a; Garrod, 1957; Henry, 1991; Valla, 1995). These communities, which played an integral role in the transition from simple hunting and gathering groups to the food producing societies of the Neolithic, constitute an important part in the significant social and economic changes hunter-gatherer groups underwent during this period, moving toward more sedentary life-ways (e.g. Bar-Yosef, 1983, 1998, 2002; Belfer-Cohen and Bar-Yosef, 2000; Byrd, 2005; Garrod, 1932, 1957; Henry, 1989, 1995; Wright, 1978).

El-Wad has long been regarded as one of the key Natufian sites since its first excavation in the early 20th century (Garrod and Bate, 1937; Weinstein-Evron, 2009). The site, a large Natufian base camp in the Mediterranean eco-zone, ca. four kilometres from the present Mediterranean shore, is characterized by stone structures, dense occupational layers, habitation floors, numerous burials and rich finds of all realms of Natufian material culture (lithics, bone tools, decorative and art objects, ochre). El-Wad thus offers an excellent opportunity to explore various aspects of this culture and to focus attention on specific elements of Natufian life.

One of the most conspicuous and intriguing elements of material culture of this entity, one that holds information regarding numerous aspects of Natufian lifeways, is the groundstone assemblage. The Natufian industry markedly differs from earlier ones in various aspects, such as assemblage size, tool frequencies and typological variability as well as technological aspects. Natufian groundstone tools were already mentioned in
the early publication of the pioneering work of D. Garrod in the cave of Shukba (Garrod, 1932, 1942). However, to date, only a few Natufian groundstone assemblages have been published in detail, while most received relatively little scholarly attention (yet see Belfer-Cohen, 1988a; Rosenberg, 2004; Samzun, 1994; Wright, 1993). This leaves important aspects such as the characteristics of specific assemblages, typological, technological and raw material preference, preservation and discard patterns, poorly understood.

Many of these questions are crucial to our understanding of the way Natufian groups exploited their environment, modified natural resources (e.g. lithic, faunal and vegetal), the manner in which they were using space within their habitation sites and various stylistic and discard patterns. The present paper focuses on the groundstone assemblage retrieved during the renewed excavations at el-Wad Terrace (1994–2010 seasons). Thus it also includes items incorporated in the previous publication of the site (Weinstein-Evron et al., 2007). The paper includes a detailed analysis of various aspects pertaining to this industry, and discusses them against the background of the broader context of the Natufian groundstone industry and its contribution to the characterization of this unique culture. We start with a short introduction to the site and history of excavations, followed by a descriptive account of the groundstone assemblage integrating technological, typological and other kinds of data collected during the analysis. Finally, the discussion will attempt to set the assemblage in a broad perspective, highlighting its significance to our understanding of the Natufian groundstone industry.

**THE SITE**

The site of el-Wad is situated on Mount Carmel, northern Israel (Fig. 1) at the outlet of Nahal Me’arot (Wadi el-Mughara) to the Mediterranean coastal plain. It is part of the recently declared UNESCO World Heritage Site complex (http://whc.unesco.org/en/list/1393) that includes also the caves of Tabun, Jamal and Skhul (Garrod and Bate, 1937).

El-Wad is a large cave with an adjacent terrace containing a long and rich Early, Late and Final Natufian sequence. The site was first investigated by Lambert in 1928 (Weinstein-Evron, 1998, 2009), but became well-known as a result of the 1929–1933 excavation campaigns of Garrod (Garrod and Bate, 1937). Garrod’s finds from el-Wad were the foundation of her subsequent definition and interpretation of the Natufian culture, as a transitional phase between foraging and fully agricultural life-styles (Garrod, 1932, 1957). The terrace was later revisited (Valla et al., 1986) as was the cave (Weinstein-Evron, 1998). The renewed excavation was initiated in 1994 and focused on the north-eastern part of the terrace (Fig. 2; see Weinstein-Evron et al., 2007, in press; Yeshurun et al., in press).

The renewed excavation on the terrace is on-going and so far an area of ca. 70 m² was exposed with the attained thickness of Natufian sediments ranging between ca. 0.5 to 1.5 meters. The excavation grid consists of 1 m² squares sub-divided into 50×50 cm units that were excavated in maximum thickness of 5 cm spits, corresponding to the natural slope of the terrace and taking into account archaeological features. Specific features were designated as loci. All sediments were wet sieved through 0.5 and 0.1 mm screens. Structures, burials and a high density of finds, specifically flint and groundstone tools, bone tools, bone and shell ornaments, ochre and a rich faunal assemblage were retrieved during the renewed excavation. These provide a complimentary picture of the finds discovered during the earlier excavations at the site and broaden our knowledge regarding the nature and intensity of the Natufian occupation.

The site has long been known to provide a stratigraphic sequence representing all Natufian phases (Early through Late and Final). A composite stratigraphy of the site, based on a compilation of data from all excavations (Weinstein-Evron, 2009; Weinstein-Evron et al., in press) suggests an ephemeral occupation at the base of the Early Natufian (designated Early Early Natufian or EEN), followed by a prolific burial phase comprising almost 100 individuals (Middle Early Natufian or MEN) and culminating with the Late Early Natufian (LEN), the ‘classic’ Early Natufian layer of the site, with its varied architectural features (Figs 2, 3). This phase appears as a massive, >1 m thick accumulation of repeated occupations. Overlying this architectural phase are
Fig. 1. Location map of el-Wad and selected other Natufian sites
Fig. 2. Top: the previous and current excavations at el-Wad cave and terrace, showing the Late Early Natufian – the reconstructed architectural level throughout the site, consisting of three complexes delimited by a large curvilinear wall (after Weinstein-Evron et al., in press). Bottom: a plan of the recent excavation in the NE terrace, showing the two lowermost attained phases of the Early Natufian: Phase W-6 in the West Area (stony floors and living surfaces connected with Wall I and overlying Structure II) and Phase W-7 in the East Area (stony floors (e.g. SLIII) and living surfaces connected to Structure II, also inside the Wall I complex)
The Natufian groundstone assemblage from el-Wad terrace

The renewed excavation has exposed an architectural complex in Phases W6-7, composed of a 9-meter long curvilinear wall (Wall I) encompassing a sequence of at least ten architectural sub-phases, each defined by a thin stony floor. In the area enclosed by Wall I, several partially preserved stone structures and stone-rich ‘living floors’ have been excavated, although the configuration and divisions between these features are not always clear. In Phase W7, Structure II is enclosed by Wall II, ca. 3 m in length (Figs 2, 3). Three successive ‘pavements’ were defined within this structure to date, thereby attesting to repeated use. Structures’ contours were defined by the outlines of the walls and the spatial extent of the stone-rich levels (some of which clearly abut the walls; Fig. 2 bottom). The stony and stone-poor matrices inside the Wall I complex contain a huge density of finds, at least some of which present signs of being in primary deposition, and taken to represent general non-clearing of habitation refuse (Yeshurun et al., in press). Thirteen radiocarbon measurements on charcoals and ungulate bones yielded a calibrated age range of 14,660–14,030 BP (±1σ) for Phases W-6-7 and a range of ca. 15,000–13,000 BP (±1σ) for the entire Unit 2 accumulation (Weinstein-Evron et al., 2012). No radiometric evidence is yet available from clear Late Natufian contexts in the NE Terrace, although the Early Natufian–Late Natufian transition may be indicated by the upper dates from Phases W1 and 3 (ca. 13,500–13,100 BP).

The density of finds in the Early Natufian layer is extremely high, but human remains are virtually absent. The stone structures, numerous living floors, density and diversity of finds and the absence of burials indicate that this part of the site was used primarily for habitation and daily activities in the later parts of the Early Natufian or the Late Early Natufian, namely Phases W7 to W3, in Unit 2 (Weinstein-Evron et al., in press; Yeshurun et al., in press). The major part of the stone tool assemblage dealt with in this paper is derived from these phases, where they were found in several discrete types of Early Natufian architectural contexts: inside Structure II, including stony floors and between-floor fills; outside Structure II, in levels corresponding to some or all of the dwelling floors; in and above Locus 67, a massive stone pile lying northwest of the Structure II area; and in Locus 25, an amalgamation of stones outside of the living compound demarcated by Wall I. As for the Late Natufian, part of the assemblage was presented in Weinstein-Evron et al. (2007). These finds are incorporated in this paper.

THE GROUNDSTONE ASSEMBLAGE

Natuﬁan groundstone tools were already mentioned from previous excavations at el-Wad (Garrod and Bate, 1937: 10; Valla et al., 1986; Weinstein-Evron, 1998, 2009: fig. 2.20). In these excavations groundstone tool types consist of vessels, mortars of various sizes, including the well-known ‘boulder-mortars’ or ‘pipe-mortars’, pestles, grooved items and others. Unfortunately, we do not have a clear picture concerning the groundstone assemblage found during the early excavations at the site (i.e. Garrod and Bate, 1937); however, from the little we know, we can assume that large numbers of tools were found during these
Fig. 3. A section through the NE terrace excavation, corresponding to the N-O line in Figure 2. Note the stone architecture (Walls I and II) in the lowest attained levels (W6-W7). The inset depicts the proportions of Helwan lunates, abrupt lunates and microburins in each phase (after Weinstein-Evron et al. 2012)
pioneering excavations. Other finds, from later excavations are predominantly small, and were retrieved from limited excavated volumes (Valla et al., 1986; Weinstein-Evron, 1998). The assemblage below includes only items found during the renewed excavations, and thus its conclusions should perhaps not be taken to represent the entire habitation at el-Wad, but this specific locale within the site.

Retrieval of the data, research methodology and presentation of the data

Groundstone items were collected in the field, tagged and bagged, each item with its individual chrono-stratigraphic information, provenance and registration data. Items were not washed so as to enable future residue analyses. In a few cases, when items were recovered from designated contexts, soil samples were collected from their immediate vicinity. All items were transferred to the Laboratory for Groundstone Tools Research at the Zinman Institute of Archaeology, University of Haifa for study, where they are currently stored.

In the laboratory, each item received a catalogue number and its contextual data was uploaded to a digital database. Attribute analysis was conducted on all items. Each type or subtype was examined according to its specific characteristics and was checked against a specifically constructed, pre-established set of relevant attributes and factors (following Rosenberg, 2011). These include raw material selection, preservation and fragment characteristics, cross-sections and metrics (length, width, thickness and weight), number of operative faces and their convexity, production marks, apparent use-wear (micro- and macroscopic use-wear analyses are still in progress) and number and location of scars. Raw material identification was conducted by naked-eye or with the aid of magnifying glass, and thus while we use terms such as ‘basalt’ (a frequently used terminology for many igneous rocks in the southern Levant) and ‘limestone’ (a term frequently used for various sedimentary rocks in the southern Levant), mineralogical and geochemical studies are needed for a more accurate rock determination. A geochemical study, aiming at identifying the provenance and variability of basaltic tools is underway. Each tool type will be presented below and its characteristics will be discussed. As noted above, most of the assemblage is attributed to the Early Natufian which will be the focus of our discussion. Description of the Late Natufian finds and items found in other contexts will follow the main body of data.

RESULTS

The groundstone tool assemblage of el-Wad Terrace (Tables 1, 2) is one of the largest Natufian groundstone assemblages presently known (n = 565). The average density of items is 18.7 tools
per m$^3$. Notably, most of the items were retrieved from the Early Natufian layer ($n = 335$, 59.3\% of the assemblage) while only a few ($n = 30$, 5.3\% of the assemblage) were found in a clear Late Natufian context. The remaining implements are divided between items found in stratigraphic units defined as transitional or undetermined Early/Late Natufian ($n = 75$, 13.3\% of the assemblage) or were found in ill-defined contexts or on the site’s surface (combined here together, $n = 125$, 22.1\% of the assemblage). While most of the discussions regarding the groundstone assemblage will focus primarily on the finds from the Early Natufian layer, those from other contexts will also be reviewed in order to present a comprehensive view of the entire assemblage.

### Lower grinding tools

Of the lower grinding stones retrieved ($n = 8$, 1.4\% of the assemblage, Tables 1, 2; Fig. 4) two were found in the Early Natufian, one in the Late Natufian and five were found in unclear provenances. All items are broken. In terms of contexts, one of the Early Natufian items was incorporated into the wall of a small round structure (Locus 24), which is part of a well-preserved surface that includes built round installations and ‘refuse concentrations’, while the other item was found above a stony layer (Locus 46) within Structure II.

The Early Natufian items are made of limestone (Table 2), while the remainders are made of

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**Table 2**

Frequencies of tool types and raw materials

<table>
<thead>
<tr>
<th>Type\Raw Material</th>
<th>Compact Basalt</th>
<th>Porous Basalt</th>
<th>Limestone</th>
<th>Sandstone</th>
<th>Unidentified</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Grinding Stones</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td></td>
<td>8</td>
<td>14</td>
<td>1.4</td>
</tr>
<tr>
<td>Upper Grinding Stones</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11</td>
<td>1.9</td>
</tr>
<tr>
<td>Vessels</td>
<td>20</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>25</td>
<td>34</td>
<td>4.4</td>
</tr>
<tr>
<td>Bowlets</td>
<td>2</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td>4</td>
<td>0.4</td>
</tr>
<tr>
<td>Pestles</td>
<td>128</td>
<td></td>
<td></td>
<td>1</td>
<td>129</td>
<td>137</td>
<td>22.8</td>
</tr>
<tr>
<td>Grooved Items</td>
<td>14</td>
<td></td>
<td></td>
<td>3</td>
<td>17</td>
<td>20</td>
<td>3.0</td>
</tr>
<tr>
<td>Weights</td>
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<td></td>
<td></td>
<td>1</td>
<td></td>
<td>7</td>
<td>0.2</td>
</tr>
<tr>
<td>Varia</td>
<td></td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>16</td>
<td>26</td>
<td>2.8</td>
</tr>
<tr>
<td>Various Tools and Unclassified Fragments</td>
<td>312</td>
<td>5</td>
<td>14</td>
<td>2</td>
<td>23</td>
<td>356</td>
<td>63.0</td>
</tr>
<tr>
<td>Total</td>
<td>485</td>
<td>9</td>
<td>34</td>
<td>4</td>
<td>33</td>
<td>565</td>
<td>100</td>
</tr>
<tr>
<td>%</td>
<td>85.8</td>
<td>1.6</td>
<td>6.0</td>
<td>0.7</td>
<td>5.8</td>
<td>100</td>
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compact basalt (n = 5) and porous basalt (n = 1). These Early Natufian items include a quern fragment with convex-concave cross-sections and a grinding slab fragment with a bi-plano or slightly plano-convex cross-section (Fig. 4). Both items represent only a small part of their original size and their grinding surfaces are flat or slightly concave. The Late Natufian item is a fragment of a lower grinding tool, bearing a concave grinding surface.

**Upper grinding tools**

Of the upper grinding stones retrieved (n = 11, 1.9% of the assemblage, Tables 1, 2; Figs. 5, 6) seven were found in Early Natufian units while the rest were found in unclear provenances (Table 1). One of the latter was incorporated in the fills of an
Early Bronze Age grave that cuts through the Natufian layers (Weinstein-Evron et al., 2007). The Early Natufian items were found in phases with massive domestic architecture, Phases W-6 (n = 3) and W-7 (n = 4) at the attained bottom of Unit 2. Six items were found in the area defined as ‘exterior area’ (i.e. outside of Structure II). One was clearly found on a ‘living surface’ adjacent to a built installation (Locus 57), one is associated with Structure II and one was found inside a large concentration of stones and various artefacts (Locus 63). The seventh item was found above one of the floors attributed to structure II (Locus 65).

The seven Early Natufian items (Figs 5, 6) include cobbles used in grinding or burnishing (n = 6) and a fragment of a larger plano-convex processor. Two items are whole and the rest are fragments, usually broken across their width. Apparently all represent small items (the complete items are 3.1 and 5.6 cm long) made of limestone (Table 2). Two may represent burnishers that were used to shape other items, perhaps tools made of bone or wood (Fig. 6).

Most cobbles are thicker than 3 cm, although thinner items are present as well. Cross-sections are usually plano-convex and two have bi-plano cross-sections. All have one active face, usually flat or slightly convex, smoothed and sometimes polished (in two examples grinding marks in the form of striations were noted). In five of these the
face opposite the active face is smoothed, although presently it is hard to determine if this smoothing is natural, intentional or a result of friction caused by the hands of the users.

Vessels
The vessels or vessels/mortars \((n = 25, 4.4\%\) of the assemblage; Tables 1, 2; Figs 7–10) include six that were found in the Early Natufian (Fig. 7: 1–5), two in undetermined Early/Late Natufian units (Fig. 7: 6, 7), and 17 from unclear loci and on the surface (Figs 8 and 10). One of the latter was found in Garrod’s backfill and a few may actually belong to the Final Natufian. The Early Natufian items were found in Phase W-5 (4 items), and in Phase W-6 (1 item). Significantly, a complete vessel, probably in its primary position, was found inside a stone circle (Locus 37; see Fig. 2 bottom, feature in Squares K-L8) whose base probably corresponds to Phase W-7. This feature

Fig. 8. Vessels from unclear contexts
may abut younger phases as well. All Early Natufian items were found inside the area demarked by Wall I on living surfaces while a few were located near installations and one was found near a refuse area.

Four of the Early Natufian vessels (Table 2) are made of compact basalt, one of limestone and for one the raw material is unclear. Items from other contexts are primarily made of compact basalt \((n = 16)\) while three are made of porous basalt. Other than the vessel found in Locus 37, all are broken, frequently preserving only small parts of the original vessel and thus reconstruction of the complete vessels is not always possible. It seems that both upright and globular variants are present and that at least a few items represent vessels with thick walls and (mainly) rounded rims. Most exhibit meticulous finishing. Pecking is evident on a few of the items, as well as smoothing on the outer and inner walls (although it cannot be said with certainty if smoothing was conducted before or during use of the vessels). Two items bear polish on their external walls, one of which is a small shallow plate or platter.

The complete vessel was found upside down on a living surface (Fig. 9). It is a bowl, 23.8 cm high, fashioned from a basalt boulder with a cavity, 4.8 cm in depth. The wall narrows toward the base, yet most of the items’ exterior seems hardly modified. On the upper face, a narrow (ca. 1.5–2.5 cm wide) deep (ca. 1 cm) groove was formed probably by pecking. This groove marks the cavity on the boulder’s upper face. The rim is rounded but uneven and the small cavity’s volume is ca. 200 cc. Apart from the hollowed cavity and groove it seems that not much effort was invested in shaping this vessel.

One of the interesting items found in the post-Natufian, Unit 1 is a compact basalt pestle fragment modified into a miniature mortar (Fig. 10). The conical cavity encompasses most of the fragment’s thickness and it is smoothed. This item closely resembles modified pestle fragments that were altered to be used as miniature vessels, predominately known from Pre-Pottery Neolithic A sites (e.g. Dorrell, 1983: fig. 222: 19, 20; Rosenberg and Gopher, 2010: fig. 9.4: 3, 4) and it is yet another corroborative evidence of the use of el-Wad Terrace during the earlier phases of the Neolithic period, together with a basalt axe (see below) and a few indicative flint tools, particularly arrow heads (Weinstein-Evron, 1998; Weinstein-Evron et al., 2007).

**Bowlets**

The bowlet fragments \((n = 2, 0.4\% of the assemblage; Tables 1, 2; Fig. 11)\) were found in the Early Natufian Phases W-5 and W-6. Contextually, one was found inside Structure II and the other on a living surface near two heaps of refuse. Both items were apparently made on limestone cobbles but they are badly damaged and it is hard to reconstruct their original shapes or cavities (one of the items is considerably larger than the

![Fig. 9. A vessel/mortar found in situ, turned upside down in Locus 37](image.png)

![Fig. 10. Vessel/pestle from unclear context (note scale)](image.png)
other). Nonetheless, it seems that the cavities were not very deep and it is possible that at least one of these had a breached base.

**Pestles**

Pestles (n = 129, 22.8% of the assemblage; Tables 1, 2; Figs 12–19) are by far the most dominant tool type in the groundstone assemblage (except for unidentifiable tool fragments, most of which were probably detached from pestles – see below). Most of these were found in the Early Natufian (n = 90, Figs 13; 14: 1–4; 15: 1–5; 16: 1–4, 17; 18: 1–3) while the rest were retrieved from the Early/Late Natufian units (n = 6), Late Natufian (n = 7, Figs 15: 6; 16: 4) or from unclear contexts and the surface (n = 26, Figs 14: 5, 6; 15: 7, 8; 16: 5, 6; 19). The Early Natufian items were found mainly in Phase W-6 (n = 45) but also in other phases, such as W-5 (n = 12) and W-7 (n = 10).

**Fig. 11.** Bowlets: Early Natufian bowlet fragments

**Fig. 12.** Pestle fragments *in situ* on an Early Natufian living surfaces
Contextually, many of these were found on the stony surfaces or incorporated in their matrix (Fig. 12), sometimes in association with installations. A few were found in association with refuse concentrations. Nearly all items belonging to Phases W-6/7 were found within the ‘living area’ demarcated by Wall I, not beyond (south of) it (see Fig. 2 bottom). Within the Wall I enclosure, pestle fragments were abundant, either inside Structure II or outside of it. Notably, four pestle fragments were found in association with a human burial (H132) cut into Phase W-6 from later Natufian levels.

All pestles are made of compact, usually fine-grained basalt, apart for one of unidentifiable material (Table 2). All pestles were found broken (the only intact item, Fig. 16: 5, was found in an unclear context). The fragments usually preserved only a small part of the original tool. Opposite-end fragments are frequent (n = 43, Figs 13–17). Nonetheless, body fragments (medial pestle fragments, that by definition represent two or more
breakage episodes, Figs 17, 18) are the most common within the pestle assemblage of all phases (n = 78). The remainder are pestle fragments that could not be classified. Notably, active-end fragments (the main pounding end of the pestle) are altogether missing from the el-Wad Terrace groundstone assemblage.

Relatively few pestle fragments preserved the entire diameter, while others preserved only parts of the tool circumference (mainly one-half to
one-quarter of the diameter). Pestles that retained their full circumference mostly show perfect or near-perfect roundness of their cross-sections, although some have oval cross-sections. Some of the fragments are thin and elongated and are clearly the result of different breakage mechanisms than the round medial segments. It is of note that some of the small, usually thin fragments recorded as unclassified fragments, may in fact be pestle fragments, however they are too small to enable a clear conclusion in this regard.

Typologically, pestle fragments seem to represent mainly cylindrical pestles (with a conical component noted as well), but this conclusion is tentative due to their state of preservation. Also, it is impossible to reconstruct pestle lengths as most fragments are very small (these are usually 2–4 cm thick). Most pestle fragments weigh between 50 and 250 g and their diameters are mostly in the 4.0–5.5 cm range. It seems, however that most pestles represent items of similar size (and form), albeit a few are smaller or larger.

Pestle opposite-end diameters mainly range between 2.0 and 5.0 cm. Some of the opposite-ends slightly ‘bulge’ from the pestle profile and are mainly convex (although flat and flat-convex ends are also present). It seems that these pestles with bulging opposite-ends sometimes received special care (see also Rosenberg, 2004). Technologically, many of the pestles show pecking marks,

Fig. 15. Pestles (opposite-end fragments): 1–5. Early Natufian pestle fragments, 6. Late Natufian pestle fragment, 7, 8. Pestle fragments from unclear context
Fig. 16. Pestles: 1–4. Early Natufian pestle opposite-end fragments, 5, 6. A whole pestle and a pestle opposite-end fragment from unclear contexts.
Fig. 17. Pestles (body fragments): Early Natufian pestle body fragments
Fig. 18. Pestles (body fragments): 1–3. Early Natufian pestle body fragments, 4. Late Natufian pestle body fragment
although these small pitted areas on the pestle surface are frequently worn down. Many of the fragments are smoothed (n = 104) and a considerable number show polish on their bodies (n = 68). At least for some of the items, these typical wear marks may have come from prolonged, continuous use (from the contact with the hand of the user) rather than from intentional smoothing/polishing, whether decorative or functional (i.e. making the grip more comfortable).

Possible soot marks were found on a single fragment and red ochre was noted on one or possibly two of the pestles (the second is unclear). The single decorated pestle fragment noted (Fig. 19) was found during cleaning of a cavity in the terrace bedrock, close to the cave entrance. It is engraved with a meander-like decoration, with vertical and longitudinal grooves forming the meander. The grooves are ca. 3.0–5.0 mm wide and 1.0–2.0 mm deep and the ‘meander’ was carved in 90 degree angles. Similar motifs are well known from the Natufian and appear on vessels/mortars, stone slabs and bone items (e.g. Edwards, 1991: fig. 6: 7, 8; Noy, 1991: fig. 4: 1; Perrot, 1966: fig. 15; Garrod and Bate, 1937: pl. III, fig. 2: 17; Weinstein-Evron et al., 2007: fig. 10: 3).

**Grooved items**

Of the grooved stones found (n = 17, 3.0% of the assemblage, Tables 1, 2; Figs 20, 21) eight were found in the Early Natufian (Fig. 20: 1–8), one in an Early/Late Natufian context (Fig. 20: 9), one in the Late Natufian (Fig. 20: 10), and the rest were found in unclear provenances or on the surface (Fig. 21). The Early Natufian items are found in the architectural Phases W-6 (n = 3) and W-7 (n = 5). Three of these were found in the area defined as an ‘exterior’ area associated with Structure II (Phase W-7) and the rest were found within Structure II (two items in Phase W-7 and two items in Phase W-6) just above or incorporated in the stony layers.

Of the Early Natufian items, seven are made of compact basalt and one is made of a sedimentary rock. Compact basalt is also dominant in the remainder. As most items are broken, reconstruction of their actual size is difficult, but it is clear that all reflect small, hand-held items (prudently we can suggest that, when complete, most were ca. 5–10 cm long, ca. 3–7 cm wide and ca. 3–4 cm thick). Most items were broken across their width and some were broken at more than one point, preserving less than half of the original blank. The eight Early Natufian items include five broken oval pebbles of various sizes and three items that are in fact reused pestle/upper grinding stones (Fig. 20: 1) or pestles (n = 2; Fig. 20: 5, 6) that were turned into groove-bearing items.

Of note is a single elongated, irregular pebble made of soft sedimentary rock that may have been exposed to considerable heat as its surface is crumbly (Fig. 20: 8). It is broken across its width and parts are also missing from the base. The groove runs along the long axis of the pebble and it is irregular in width and depth. Near the groove there are striations as well as a few carved signs (a ‘horseshoe’ and a small dent near its base) and other carvings are noted, as well as a striation and various grooves. A few grooves are seen on the base which is damaged and bearing black stains, probably soot marks.

Most items bear a single groove. An exception is a single square fragment which displays two grooves on two different faces (Fig. 21: 7). For many of these tools it is not clear whether the groove should be classified as having a V-shape or U-shape cross-section. Therefore it is not yet possible to distinguish shaft straighteners, whetstones or sharpeners. The grooves of the Early Natufian items were placed on the body, across
Fig. 20. Grooved items: 1–8. Early Natufian grooved items, 9. Early/Late Natufian
the fragment or over the opposite-end of the pestle. Similar items were found in less clear contexts as well (Fig. 21: 2, 3, 5, 6). The single Late Natufian grooved item (Fig. 20: 10) is made on a compact basalt pestle end-fragment, carved along its length. It has a wide and relatively shallow U-shaped cross-section.

The measurable groove widths range between 0.9 and 2.7 cm. Both relatively shallow and deep grooves appear (measurable groove depths range between 0.9 and 1.1 cm). It is unclear if the grooves extended from side to side, as the items are broken. When at least one end of the pebble is preserved, the grooves were initiated at or near

Fig. 21. Grooved items: Grooved items from unclear contexts
the extremity. In most items the groove was placed across the longer axis of the pebble. Ochre was noted in the groove and on the body of one item. While macro- and microscopic examination is still on-going, we can state at this stage that many of the grooves bear striation marks on their sides (n = 5) as well as polish on the walls or on the base of the groove (in four and five items, respectively).

Perforated items
A single perforated item was found (0.2% of the assemblage; Tables 1, 2; Fig. 22). It was found in an Early Natufian context (Phase W-6) inside the area demarcated by Wall I. It is a complete quasi-oval limestone weight weighing 2.1 kg. The blank is a large pebble bearing a hole in its center. Apart from the drilling of the hole, it seems that no further modification was carried out. The shaft is round or slightly oval near the openings and it is smooth. Notably, it is unclear if it was drilled from both sides (bi-polar drilling) or from one side only. Both apertures are of similar diameter (4.2 and 4.3 cm) and the minimum diameter (near the middle of the aperture) is 2.4 cm, bracketing the possible thickness of the rope or the pole that was inserted.

Varia
Of the 16 items included here as varia (2.8% of the assemblage; Tables 1, 2; Figs 23, 24: 1), eight were found in Early Natufian context, three in Late Natufian context and the rest in unclear provenances. The Early Natufian items were
found in phases W-3 (n = 1), W-4 (n = 1), W-5 (n = 1), W-6 (n = 3) and W-7 (n = 2). Among others, these include an Early Natufian bifacially ‘flaked disc’ made of compact basalt (Fig. 23: 1). This item somewhat resembles those of the Neolithic period (see Rosenberg et al., 2008). However, it is clearly different in terms of morphology and technology of production. The dorsal face of this plano-convex item is highly flaked while the ventral is less so. A bowlet/weight made of limestone that was found associated with the Natufian burial of H132 (Fig. 23: 2) was noted, as well as a broken small, thick disc made of compact basalt, that could possibly be a reused pestle (Fig. 23: 3), found also in an Early Natufian context.

The three Late Natufian items are two pebbles made of compact basalt and a limestone fragment, bearing clear modification marks, for which

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**Fig. 23.** Varia: 1. Early Natufian ‘flaked disc’, 2. Early Natufian bowlet/weight, 3. Early Natufian round disc, 4. A basalt axe found in unclear context
no clear function could be ascribed. Of the items found in unclear context, suffice it to mention a partly polished compact basalt axe with a damaged active end and base (Fig. 23: 4) that resembles items produced at the basanite bifacial quarry and production site of Giv’at Kipod (Rosenberg et al., 2008) as well as a broken compact basalt pebble with a slightly concave surface that is stained with red ochre and covered with possible cutting or grooving marks (Fig. 24: 1).

Various tool fragments

One of the most interesting aspects of the assemblage, which indeed seems to be directly related to the meticulous retrieval method, is the presence of many small flakes, fragments and chips, mostly representing unidentified tool fragments (n = 356, 63% of the assemblage; Tables 1, 2; Figs 24: 2, 25). Most of these were found in Early Natufian contexts (n = 211) while the rest were retrieved from the Early/Late Natufian (n = 66), Late Natufian (n = 18) or from other, unclear contexts and on the surface (n = 61). Nearly 20% of the Early Natufian items were found in the area defined as associated with the inside of Structure II, while ca. 30% were found in the ‘external areas’, related to this structure, and most remaining items were found in Early Natufian levels underlying these architectural features.

These are mainly small and sometimes tiny flakes, chips and fragments; however some are larger pieces or tool segments. Most are made of compact basalt (n = 312). A few were made of porous basalt (n = 5), limestone (n = 14), sandstone (n = 2) or other, unidentified raw materials (n = 23). Over 20% of the assemblage bears clear polish signs and smoothing was noted on a similar number of items. Clear pecking was noted on a few items. Many of the small items included here seem to represent flakes, chips and fragments that were detached from pestles, either during use or, more likely, after the tool went out of use as a pestle (as if it was used as a hammerstone). In terms of size, these are usually 10–50 mm across and most are thin (1–5 mm thick). Some are elongated and many have a curved outline, polish and smoothing marks, which strengthens the notion that these were indeed fragments detached from pestles. In a few cases clear flaking or rarely ‘retouch’ was noted on the fragments (Fig. 24: 2). Some of the items bear bulbs of percussion, a
clear ventral face and/or preparation of a ‘striking platform’ (Fig. 25) suggesting planned removal of a blank or tool. Rare examples can be regarded as blades, but these are crude and clearly do not reflect intention to produce elongated or other regular blanks (Fig. 25: 2).

**DISCUSSION**

Natifian groundstone assemblages reflect a dramatic change from earlier periods, mirroring the accumulation of social and economic processes that characterized the Natufian communities of the Terminal Pleistocene in the southern Levant. Natufian groundstone studies have gone a long way since the early days of research. Advances were made in various aspects such as typological and morphological variability, technology of production, functional studies and raw material provenance determination and other realms (e.g. Belfer-Cohen, 1988a, 1991b; Dubreuil, 2004; Nadel and Rosenberg, 2010; Rosenberg, 2004; Rosenberg and Nadel, 2011; Weinstein-Evron et al., 1995, 1999; Wright, 1991, 1993). These studies demonstrated the potential embedded in the study of these material-culture items, which remain largely unexplored. The novel patterns in Natufian stone exploitation go hand in hand with the appearance of substantial stone architecture, distinct cemeteries, rich bone and shell industries and commensal animals (e.g. Bar-Yosef, 1983, 1998, 2002; Belfer-Cohen and Bar-Yosef, 2000; Byrd, 2005; Garrod, 1932, 1957; Hayden, 2004; Henry, 1989, 1995; Tchernov, 1991; Wright, 1978).

Bearing this in mind, the groundstone assemblage retrieved during the renewed excavations at el-Wad Terrace offers an excellent opportunity to delve into some of the key issues at the center of Natufian groundstone research, reflecting on our understanding of hunter-gatherer behaviour on the verge of agriculture. Some of these aspects which will be discussed below include chrono-typological variations, raw material selection and tool preservation, discard patterns and technology of production. Significantly, a thorough comparison between Natufian assemblages is a difficult task as many of these are only partly published and frequently the methodology of analysis was not specified. Another factor that hampers meaningful comparisons is the lack of clear and coherent typological definitions (but see Wright, 1992; Rosenberg, 2004). In light of these difficulties, our discussion will focus on aspects stemming from the el-Wad Terrace groundstone assemblage, while comparisons to other assemblages will be offered only when the relevant data are available.

**Temporal variability**

Most of the tools found in clear contexts were retrieved from the Early Natufian layers (ca. 60% of the assemblage) and this should come as no surprise as most of the excavated (undisturbed) volume was attributed to the Early Natufian, based on the characteristics of the lithic assemblage and supported by radiocarbon determinations.

While we cannot offer a substantial comparison between the Early Natufian and Late Natufian phases at the site (due to the small size of the Late Natufian assemblage), it should be noted that the Late Natufian layers did not contain any upper grinding stones, vessels, bowlets or weights, all present in small numbers in the Early Natufian. The high diversity of items in the earlier contexts suggests that most of the groundstone-related phenomena were already present during the earlier parts of the Natufian (see also Garrod, 1957; Wright, 1991). It may also suggest some kind of temporal variability between the assemblages. Nonetheless, it is more than probable that the fact that the Early Natufian excavated volume is considerably larger than that of the Late Natufian layers contributes to this apparent picture differences.

**Assemblage size and typology**

This is one of the largest Natufian groundstone assemblages presently known in the southern Levant (e.g. Wright, 1991: tables 5, 6) encompassing over 560 artifacts. However, it seems that in terms of its Minimum Number of Tools (MNT), the assemblage reflects a much smaller inventory as most items included are small fragments, flakes and even chips. These ‘waste’ items were mainly detached from tools and do not necessarily reflect on-site production. Thus, we cannot postulate that this large assemblage reflects intensive use of stone rather than a prolonged use of tools that entered and re-entered the archaeological record through various discard, recycling and post-depositional mechanisms.
The dramatic rise in the number of groundstone tools in the Early Natufian, relative to earlier periods, was suggested to reflect intensification of labour in plant processing, perhaps as a result of sedentism (Wright, 1991: 38, 1993: 95). However one must bear in mind that this notable increase in potential ‘food processing tools’, reflected in assemblages such as el-Wad Cave and Terrace, Hayonim Cave, Wadi Hammeh 27 and others, was also noted for other tool types (e.g. grooved items) that are clearly not related to food processing.

Nonetheless, the notable increase in the overall number of groundstone tools that goes hand in hand with the appearance of substantial stone architecture, distinct cemeteries, rich bone and shell industries and commensal animals unmistakably signifies an important change vis-à-vis the way local hunter-gatherer communities exploited their environments. No doubt that some of these aspects relate to food processing, yet it seems that these tools reflect a much more versatile functional world. Furthermore, the increase in numbers of tools is mainly noted in the core-area of the Natufian homeland, while in many sites in the marginal areas that lack some of the principal features of Natufian base camps of the Mediterranean eco-zone, the numbers of groundstone tools remain relatively low throughout the later parts of the Epipalaeolithic period (e.g. Wright, 1994 and references therein).

Returning to the assemblage under discussion, in terms of typological variability, the assemblage is dominated by pestles, a characteristic known from many other Natufian sites (e.g. Belfer-Cohen, 1988a: 187, table V-1; Edwards, 1991: table 1, 2007; Garrod and Bate, 1937; Rosenberg, 2004; Wright, 1991). This is true for both Early and Late Natufian layers at el-Wad Terrace. Pestle fragments comprise over 25% of the total groundstone assemblages in the Early Natufian layers, but when only clearly identified tools (excluding unclassified fragments, flakes or chips) are considered, this figure rises to over 70%. Furthermore, although we cannot confidently establish this, it seems that many of the Early Natufian unidentified tool fragments (n = 211) are in fact stone ‘splinters’ detached from basalt pestles.

While the state of fragmentation prevents us from ascribing many of these pestles into clearly defined typological groups, it seems clear that both conical and cylindrical variants are present. Despite the fact that statistical analyses are not relevant to the el-Wad Terrace assemblage as most pestle are only small fragments usually reflecting only a small part of the original tool, cylindrical pestles form the bulk of the pestles found in earlier excavations at the site (Garrod and Bate, 1937; Weinstein-Evron, 1998) and were claimed to dominate the assemblages of Eynan, Wadi Hamah 27 (Wright, 2000: fig. 4c, d) and Hayonim Cave, although conical pestles form an important component in many assemblages as well (Belfer-Cohen, 1988a; Rosenberg, 2004: table 1). In terms of cross-sections, pestles with round cross-sections dominate the assemblage and opposite-ends are mainly convex, similar to other Natufian assemblages (see Rosenberg, 2004: tables 4 and 6). The state of pestle preservation prevents clear typological distinctions between Early Natufian and Late Natufian pestles. It also seems that while diameters vary among the measurable pestle fragments at el-Wad Terrace, in general, most of them fall within the 4–6 cm diameter range. While this can reflect preference for certain pestle specification (we have no way to reconstruct the length of the items), it can also be a result of preservation patterns and the fact that most pestle fragments are body and opposite-end fragments.

Other tool types are represented in very small numbers. However, we should note that also in the case of the Early Natufian assemblage of el-Wad Terrace, as in other Early Natufian assemblages, we are dealing with a relatively varied collection of tools, more diversified than most of the assemblages known from earlier periods in this area (e.g. Wright, 1991). In fact, some of the tool types and variants are unknown from earlier sites. The assemblage includes unambiguous grinding tools, vessels and ‘bowlets’ that may or may not be considered as mortars, as well as grooved items (‘shaft straighteners/polishers), a single weight and other items of unknown function. One should also acknowledge in this regard the assemblages found in the early excavation at the terrace and within the cave. These excavations revealed groundstone tool assemblages that share characteristics with the assemblage under discussion (Garrod and Bate, 1937: 10; Valla et al., 1986; Weinstein-Evron, 1998, 2009: fig. 2.20). How-
ever, differences are also noted, such as the presence of limestone ‘boulder mortars’ or ‘pipe mortars’ and a slab bearing a cup-mark that was found within the cave (Anati, 1963: 155 lower picture; Weinstein-Evron, 2009: figs 3.4: a, 3.7: a).

While it is clear that pounding activity is primarily reflected in the composition of the assemblage (i.e. pestle fragments) the low number of vessels/mortars compared to pestles is clear. Several possibilities can account for this. One is that each vessel/mortar was used with several pestles as a set (at different times or for processing of different substances). Another possibility is that some of the Early Natufian pestles were used in the bedrock features excavated by Garrod (Garrod and Bate, 1937: plate V) and assigned to the Early Natufian. Weinstein-Evron et al. (in press) suggest that Garrod’s bedrock-features complex predated the ‘architectural’ phase of the Early Natufian at the site, which is the lowest thus far attained by the recent excavation; however, the connection between the various excavations at the site is naturally difficult to establish with certainty. Additional possibilities are that some of the stone pestles were employed within wooden mortars or, alternatively, taken from the site, perhaps with specific pestle fragments (see below). While we cannot offer a clear answer for this question, it seems that we should re-consider the role of mortars and pestles made of perishable materials. We can only assume that, as in many communities (even today), wooden mortars fulfilled an important component in the daily food processing as well as for special occasions (e.g. Baudais and Lundstöm-Baudais, 2002: figs 5, 6; Ertug-Yaras, 1997, 2002: plate 6).

Another issue worth mentioning here is the relative paucity of decorated, incised groundstone artifacts in the el-Wad Terrace assemblage and the rarity of items bearing ochre stains (whether on their operative faces or on non-functional parts) which are usually taken to represent a symbolic context and ritual use of groundstone tools. While present in a number of Natufian sites (e.g. Belfer-Cohen, 1988a, 1991b: 574-577; Edwards, 1991: 129; Garrod and Bate, 1937: 41, plate XV: 4; Noy, 1991: 558; Perrot, 1966; Weinstein-Evron, 1998: 105, 2009: fig. 2.20), decorated tools and ochre-stained tools are relatively uncommon in most Natufian groundstone assemblages (although these clearly reflect a dramatic shift from earlier Epipalaeolithic assemblages). This may imply that most of the symbolic significance of these tools was reflected within the common memory of the group that pertains to the functionality of the tool and the persona or family to which it belonged (Rosenberg, 2013). The rarity of decorated items corresponds with other aspects of material culture in the Early Natufian sequence of the NE Terrace excavated to date, notably the absence of burials and the extreme rarity of figurines and decorated bone artefacts.

**Raw material selection and provenance**

Raw material selection suggests clear preference for compact basalt for most tool types (85.8% of the tools are made of this raw material). An exception is the upper grinding elements (mostly small variants that seem to be related to various tool modifications rather than to food processing) and the two bowlets. Notably, lower grinding elements and vessels reflect a clear preference for compact basalt, although porous basalt and limestone were noted as well.

The most striking evidence for compact basalt preference comes from the pestles and the grooved items. In both groups the vast majority of the tools were made from this raw material. Interestingly, similar preference for basalt for the production of pestles was noted at Hayonim Cave, where nearly 80% of the pestles are made of basalt. However at Hayonim Cave, over 20% were made of limestone (Belfer-Cohen, 1988a: 187; and see Rosenberg, 2004: table 2 for slightly different observations). The preference for compact basalt at el-Wad Terrace was also noted in the large number of unidentified tool fragments, small flakes and chips that were likely detached during or after use. The fact that compact basalt was the raw material from which most of the tools at el-Wad Terrace were made cannot be seen as random or arbitrary but, rather, as a clear selection of raw material suitable for the production of specific tool types. Similar preference for basalt was noted at other Natufian sites as well and indeed seems to reflect a widespread cultural phenomenon. It should be regarded in the same vein as other cultural preferences noted among Natufian hunter-gatherers, specifically in the base camps of the Mediterranean eco-zone (e.g. production of
flint lunates, preference for dentalium shells or even the high frequency of gazelle within some of the assemblages) and treated by similar analytical and interpretive tools.

Thus, this dominance of basalt, mainly compact and non-porous, seems to reflect both technological advantages of the raw material, as well as stylistic and other merits that encouraged Natufian communities to employ tools of this raw material. The value attached to compact basalt could indeed be directly or indirectly related to the costs of transporting raw material from its sources or workshops. However, it can also reflect a combination of several factors that include also the exchange in itself (see also Weinstein-Evron et al., 2001), production costs, and the effort and knowledge invested in the production of the tools, the specific function of the tools or others.

While it is clear that the basalt sources for these tools are not to be found in the relatively old Cretaceous basalt outcrops of Mount Carmel (see Weinstein-Evron et al., 1995, 1999), the sources of this durable raw material have yet to be determined and only general geographic areas have been suggested for the basalt sources based mainly on K/Ar dating. Furthermore, as only a few tools were sampled with no geochemical comparisons to field data, we still lack detailed information regarding the mineralogy and chemistry of the basalt used for tools at the site and their compatibility with potential sources. To make progress in this area of research we need to advance geochemical studies that will seek identification of the potential sources of the basalt and the compatibility of specific tools to these sources as well as to test geochemical variability within specific tool types and assemblages (Gluhak and Rosenberg, 2012; Rosenberg and Gluhak, in press). These sources often show considerable mineralogical and chemical variability as well as a range of ages (Gluhak and Rosenberg, 2012; Ilani et al., 2001; Mor, 1986, 1993; Weinstein et al., 2006) and thus enable identification of specific basalt sources and a reconstruction of raw material/tool movement or exchange, and possible identification of specific quarries and workshops exploited by Natufian groups.

Preservation and discard patterns

One of the most striking observations regarding the el-Wad Terrace groundstone assemblage is its high level of fragmentation. Most identified tools are not only broken, but also reflect preservation of only small parts of the original tool and the presence of very small tool fragments. This may indicate intensive post-discard damage, seen also with the faunal remains that were deposited in these intensively-used domestic contexts and suffered from trampling and indirect burning (Yeshurun et al., in press). Additionally, this state of preservation may reflect intensive use and reuse, due to the high value of the distant raw material/tool. Fragmentation can also mirror intentional breakage, however, use and reuse seem to be the main agents influencing the degree of preservation and characteristics of the fragments. Interestingly, of Hayonim Cave pestles, ca. 30% are complete while the rest are fragments (Belfer-Cohen, 1988a: 187-188, table V-2; and see Rosenberg, 2004: table 3 for slightly different observations). In addition, at Hayonim Cave most of the pestle fragments preserved relatively large parts of the original tools (Rosenberg, 2004) while at el-Wad Terrace relatively small parts of the original tool were usually preserved.

Pestles in this regard are the most apparent tool type which reflects such an intensive rate and state of fragmentation. Several important observations can be made when looking at the condition of the pestles. First, most of the assemblage clearly went through severe fragmentation and damage processes. The possibility of damage seems to be strengthened by the high percentage of body fragments in the assemblage, suggesting two or more breakage episodes for each body fragment/pestle. The typical transversal breakage could also have resulted from using the pestle as a hammer, holding it at one end and striking a stone or flint nodule (D. Rosenberg, pers. obs.). Thus, if ruling out substantial post-depositional factors as dominant agents in preservation characteristics, the discard patterns observed suggest that pestles were probably intensively used and reused after they were no longer utilized as pounding implements. Another possibility is that they underwent intensive fragmentation probably after they went out of use.

The fact that no clear pestle active-ends were found suggests intentional removal of specific parts of the pestles from the site and seems to support the notion that pestle discard was selective
and not arbitrary. The reason for this is unclear and was not recorded previously (yet see Rosenberg, 2004). However, it may relate to the fact that this tool extremity was in contact with the processed materials, gaining special significance. This fact, in turn, gave this part of the pestle special meaning, leading to its removal from the site (perhaps for caching in a designated place?) while the remaining pestle fragments were discarded within the habitation area along with other kinds of organic and non-organic refuse. Notably, in the Hayonim Cave pestle assemblage, active-ends are extremely rare too (ca. 2% of the pestles). However, while at el-Wad Terrace most pestle fragments are body fragments and opposite-end fragments are less frequent, at Hayonim Cave, opposite-end fragments are more common than body fragments (46% and 31.5% of the pestles, respectively), suggesting a different discard pattern.

Technology of production
The wet sieving with a 5 mm mesh ensured the systematic recovery of small fragments, flakes and chips and other possible debitage items. However, the fact that we found no blanks or tool preforms at the site, and that most of the small basalt components within the assemblage should in fact be regarded as tool fragments (presence of pecking, smoothing and/or polish), clearly points toward off-site production, possibly at the source of raw material. This suggests that basalt tools were produced elsewhere and brought to the site as final products, either when the group returned from foraging or through exchange with other groups (those that control the raw material sources or mediators; Weinstein-Evron et al., 2001).

In terms of technology, it seems that the assemblage does not show any particular differences from other Natufian assemblages (see Rosenberg, 2004; Wright, 1992). Most tools reflect the later stages in the production sequence. Thus, many tools clearly show the tendency to produce items with fine finishing that was executed with great care. This, for instance, is reflected in the desire to produce pestles with perfect, or near perfect roundness and the use of smoothing and especially polish. While in some pestles smoothing of the body and/or polish could reflect use (due to the contact with the hands of the operator) rather than a technological attribute, for many it is clearly intentional. Some pestle opposite-ends were stylistically shaped in a specific round form, creating a ‘dome shape’. Pecking and sometimes battering were also observed, however flaking, that presumably was an integral part of early stages of the production sequences of several tool types (Rosenberg, 2004; Wilke and Quintero, 1996) was masked by later activities. Incising may be indicated in the production of the grooved items, but pecking may have been used for the early stage of groove formation.

Raw material properties (texture, homogeneity, grain size etc.) dictate many of the decisions taken throughout the production sequence. The fact that most tools were made on compact basalt suggests that this material provided good control during the process. This enabled production of tools with similar dimensions and indeed, it is clear that pestles were principally made with similar body and opposite-end diameters (we have no evidence in this regard concerning the working ends in the present assemblage). Stemming from this is the possibility of some kind of technological ‘specialization’ which was raw-material dependent, a notion which may be pertinent to this particular assemblage, as well as to other aspects of Natufian material culture.

Spatial and contextual analyses
A few high-resolution spatial analyses of Natufian groundstone items were conducted in the past. At the Early Natufian site of Wadi Hammeh 27, 28% of the total groundstone assemblage of Phase 1, and 86% of the basalt assemblage of this phase were found within one of the two structures identified (Hardy-Smith and Edwards, 2004: 274). At el-Wad Terrace, the lowermost attained phases of the Early Natufian, Phases W-7 and W-6, exhibit clear living floors and surfaces delimited by Wall I, as well as several contexts related to the sometimes less-well defined Structure II, thus enabling a reasonable comparison between several types of accumulations (Yeshurun et al., in press). These include several relatively distinct contexts (Fig. 26): the interior of Structure II (stony floors); the levels outside of Structure II; Locus 67 (the large pile of stones in squares PQ-8-10) and the area outside the architectural complex delimited by Wall I, mainly squares PQ-5 (Locus 25).
The grounds tone tools of el-Wad Terrace were found mainly within the matrix composing the stony layers that were identified during the excavations and between these layers. They were found in the area between Walls I and II as well as north and north-west of Wall II which, at least in part, relate to internal contexts. However, even when we use pooled loci to test for spatial distribution of tools from the Early Natufian phases W6-7 (Fig. 26), it is hard to conclude with confidence if more tools and fragments are found within or outside structures as the overall outline of Structure II is unclear and thus the occupation area of this structure is uncertain. The results show that the density of groundstone items is modest in all pooled loci, not exceeding 24 items per cubic meter (including all groundstone items and tool fragments of all sizes and forms).

Clear caches or true clusters of groundstone items were not found at this part of the site, contrasting with their presence in other Natufian sites. Such groundstone tool clusters (usually only a few tools were recorded for a given cluster) were found, with various compositions of tool types and numbers, at Hayonim Cave and Wadi Hammeh 27 (e.g. Bar-Yosef, 1991: 88-89; Belfer-Cohen, 1988a: 190; Edwards, 1991: 129, fig. 5: 1, 2; Hardy-Smith and Edwards, 2004: table 2; and see also Wright, 2000: table 2).

Of note are six groundstone items found in association with the Early Natufian burial of H132 (cut into Phase W-6), one of which was found within the skeleton and the rest were found close to it. These tools include four basalt pestle fragments, an unidentified tool fragment and a small limestone bowl/weight that was classified as varia. These items are added to a considerable number of Natufian groundstone items found in graves (e.g. Bar-Yosef, 1983: 15; Belfer-Cohen, 1988a, 1988b: 305-306, fig. 3; Boyd, 2001; Byrd

Fig. 26. Spatial distribution of groundstone items in Early Natufian Phases W-6 and W-7

The Natufian groundstone assemblage from el-Wad terrace
and Monahan, 1995; Garrod and Bate, 1937: 15; Noy, 1989; Ronen, 2003; Stekelis and Yizrely, 1963; Valla et al., 1991: fig. 1; Weinstein-Evron et al., 2007; Weinstein-Evron, 2009; Wright, 1978; Wright, 2000). However, as in many other examples it is not clear whether these relate to ritual activity associated with the burial of the dead or whether it reflects remains of the grave construction or fills (see e.g. Perrot and Ladiray, 1988). Nonetheless, one should bear in mind that while Natufian sites with dense accumulations and habitation remains and burials (as at el-Wad) feature relatively high frequencies of groundstone tools, sites that are primarily burial grounds such as Hilazon Cave (Dubreuil and Grosman, 2009) and Raqefet Cave (Nadel et al., 2008) contain relatively small numbers of portable groundstone tools. Interestingly, the latter two sites show variability in other important components of the groundstone assemblage (i.e. the bedrock features), pointing to the complexity involved with the ritual activities taking place in these sites such as funerals, commemorations and other ceremonies.

Although it was claimed that most evidence for food processing during the Early Natufian comes from within structures and that during the Late Natufian more evidence for food processing is found in open areas (Wright, 2000: 93-94), it seems that we are still lacking sufficient information in this regard, a situation that can partly be attributed to the fact that many Natufian excavations focused on the study of structure interiors and that frequently we are dealing with fragments and not complete tools found in situ in operative condition. Nonetheless, it is clear that during both the Early and Late Natufian, as is evident in el-Wad Terrace as well as in other sites, at least part of the processing be it food-related or procedures related to other substances, were conducted outside structures. In many instances, processing took place in bedrock installations near the structures (e.g. Garrod and Bate, 1937; Goring-Morris et al., 1999; Nadel and Lengyel, 2009; Nadel et al., 2009; Rosenberg and Nadel, 2011; Samzun, 1994), a situation that will change during the Pre-Pottery Neolithic A period, with increasing processing taking place within the structures (Rosenberg, 2008; Rosenberg and Nadel, 2011).

Finally, when reviewing the spatial patterning of the groundstone distribution at el-Wad Terrace, we must bear in mind that we are dealing with discarded, small and fragmented items in almost any category, thus we cannot treat any of the groundstone find spots as distinct activity areas or processing loci. Apart from the single whole vessel found turned upside down during the renewed excavations, inside a small round feature (Locus 37), probably situated in the Wall I living area but not inside an apparent structure, the only clear primary use context we may consider is the few bedrock features found during the initial excavations near the cave entrance (Garrod and Bate, 1937 and also Weinstein-Evron et al., in press).

CONCLUSIONS

The ‘broken record’ of the el-Wad Terrace groundstone tool assemblage presents in many respects similar patterns to other Early Natufian groundstone assemblages, specifically observed in the dominance of basalt pestles, the high frequencies of basalt tools in general and the small number of items that were decorated. Added to this are the bedrock features found during the early excavations on the terrace, west of the location of the renewed excavation. The preference for basalt was noted in sites close to the potential source of basalt as well as for those located in areas far from the potential sources of this raw material as is the case of el-Wad. While this seemingly promotes the notion that basalt was preferred for its functionality and durability, the fact that hard rocks suitable for pounding can be found near the Natufian sites (e.g. limestone and dolomite) suggests that we should consider additional reasons beyond mere functionality and durability influencing this raw material selection. In this regard we should remember that while basalt was favoured in many instances, other raw materials clearly form an integral part of the assemblages.

It seems that as we see at el-Wad Terrace, some tool types, specifically pestles, reflect Natufian conventions in the production and style of groundstone tools (similarity in raw material selection, tool morphology, size and finishing). These similarities were noted in the past within assemblages found at Natufian base camps and were suggested to reflect similarity in rules tied to food sharing (Wright, 2000: 97). Whether this suggestion is valid is hard to test, however it is
clear that at el-Wad Terrace and other Natufian sites, stylistic conventions of tools in terms of raw material, tool morphology, size and finishing can be discerned. This in turn can be a result of a number of social factors, including aspects concerning group identity and social cohesiveness (Belfer-Cohen, 1991a; Weinstein-Evron, 2009).

The dominance of pounding implements in the assemblage is noteworthy, specifically the high frequency of pestles found as small fragments. At present a binary functional division between food processing tools and tools used for preparation of other substances is not applicable and it is possible that similar tools may have been used for the processing of several raw materials. However, the pestle discard patterns at el-Wad Terrace suggest that processing tools had important intrinsic worth. These ascribed values, which may have been related to the processing action, to the processed substance or to the characteristics of the tool itself (e.g. raw material and technological knowhow), led to the (intentional?) fragmentation of pestles into small pieces and to the removal of pestle active-ends from the site. The remaining pestle segments were randomly discarded in the living area, tossed with other refuse items and animal bones, possibly at or near the place of use/modification. This, perhaps, was part of an event ‘ending the item’s life’, whether because it was broken while in use, ‘contaminated’ for some reason or because of the death of its user/owner.

It is clear today that the later parts of the Epipalaeolithic period reflect a dramatic rise in the number, size and variability of groundstone tool assemblages, notably in the base camps of the Mediterranean eco-zone. These assemblages clearly reflect a significant leap also in terms of the complexity of production and tool finishing, specifically pestles and vessels/mortars. The renewed excavations of el-Wad Terrace provide a wealth of information regarding various socio-economic aspects of the Natufian culture, particularly for the Early Natufian. In this paper we have focused on one aspect of the Natufian at el-Wad Terrace, the groundstone assemblage. As we have shown above, this assemblage reflects several distinct features, while in many respects it supplements other well-known Natufian assemblages. On-going study will focus on investigations of residue and use-wear and on attempting to test raw material variability within the basalt tools as well as sourcing the provenance of these tools. Together, these studies will enable a better understanding of Natufian life-ways and will enrich our comprehension of the social and functional factors influencing hunter-gatherer groups on the threshold of agriculture.

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The Natufian groundstone assemblage from el-Wad terrace 125


ILANI S., HARLAVAN Y., TARAWNEH K., RABBA I., WEINBERGER R., IBRAHIM K.,


