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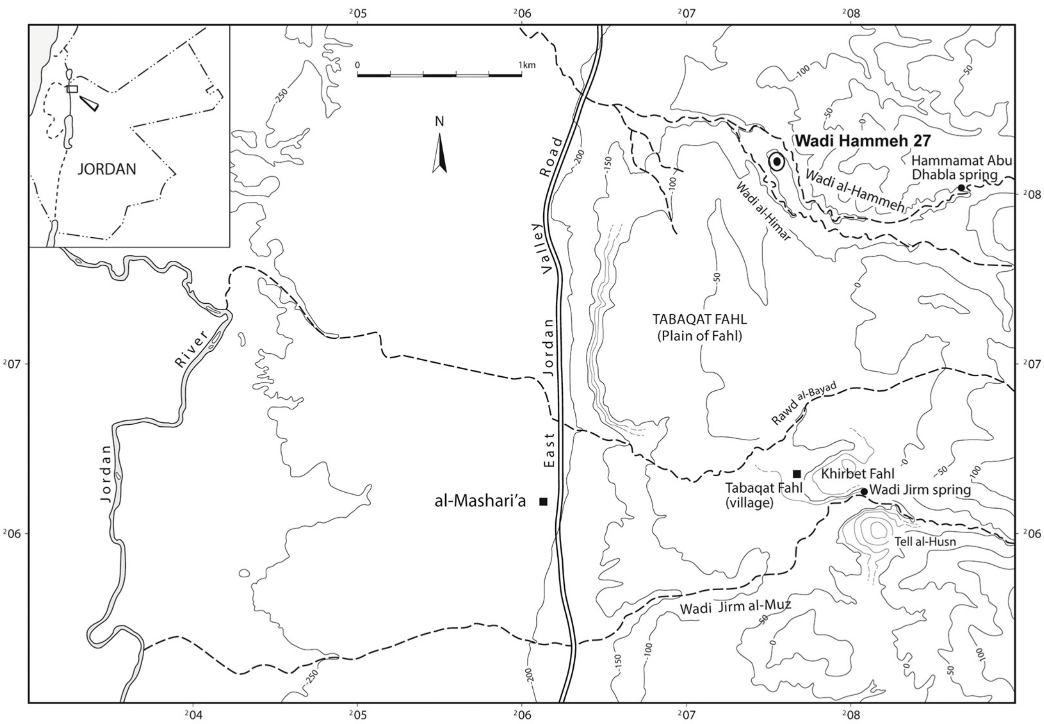
Five Hundred Years of Technological Change and Continuity at an Early Natufian Settlement: The Lower Lithic Assemblages of Wādī al-Ḥammeh 27

Introduction

The site of Wādī al-Ḥammeh 27, situated atop a narrow plateau at the junction between the wadis al-Ḥammeh and al-Ḥimar at the eastern edge of the Jordan Valley (Fig. 1), represents a classic example of an Early Natufian architectural 'base-camp' settlement. It was originally excavated in the 1980s by Phillip Edwards as part of the broader University of Sydney Pella excavations, with this stage of investigations being primarily focused on uncovering a broad exposure of the final, Phase 1 occupational surface, ultimately resulting in two exceptionally large, curvilinear stone structures (Structures 1 and 2) being uncovered (Edwards 2013b). In contrast, investigations into the underlying deposits were limited to a single sondage in Area XX F of the site (Edwards 2013a: 47). While the sondage succeeded in establishing the stratigraphy of the site, including secure radiocarbon dates spanning a 500-year period between 12,500–12,000 cal BC (Edwards 2013a: 62–3), the lithic samples collected from the earlier phases were far smaller than the large Phase 1 collection (Edwards 2013c), limiting the range and resolution of investigations into diachronic technological and typological change onsite.

Excavations resumed at Wādī al-Ḥammeh 27 for three seasons between 2014–2016 as part of the 'Ice Age Villagers of the Levant: sedentism and social connections in the Natufian Period' ARC Discovery grant (Edwards *et al.* 2018a). In contrast to the original project, these renewed excavations were focused on uncovering a broader exposure of the three lower structural phases, with excavations focused on a broad area immediately to the east of the XX F sondage. The results of these excavations are detailed in Edwards' chapter within the current volume. All four lower structural phases are associated with rich artefactual assemblages, including

Studies in the History and Archaeology of Jordan XIV:
Culture in Crisis: Flows of Peoples, Artifacts, and Ideas
Amman: Department of Antiquities, 2022



1. Location of Wādī al-Ḥammeh 27 in north-east Jordan.

substantially larger samples of flaked stone artefacts than had been available from the corresponding deposits in the previously excavated sondage.

Investigations into flaked-stone technological developments within the course of the Early Natufian period have been hampered by several factors, with the ongoing excavations of el-Wad Terrace in the Mount Carmel region providing the only other example of a detailed, intra-site diachronic study being performed at a 'base-camp' site (Kaufman *et al.* 2015; Weinstein-Evron *et al.* 2018). These limitations have included the excavation methods utilised being far too broad to allow any sort of interpretive resolution, such as in the case of Perrot's (1960) excavations of 'Ayn Mallaha, or the presence of significant assemblage intermixture, as at Hayonim Cave (Bar-Yosef and Goren 1973: 54; Belfer-Cohen 1988: 47). In contrast, the fine-scale excavations utilised at Wādī al-Ḥammeh 27 combined with its clearly stratified architectural sequence makes Wādī al-Ḥammeh 27 an ideal candidate to investigate whether technological or typological changes are detectable within a single Early Natufian settlement. This viability is further emphasised by the fact that Wādī al-Ḥammeh 27 was established directly upon a three meter deep layer of limestone travertine (Edwards 2013a: 33), preventing any artefactual contamination from the underlying Kebaran site of Wādī al-Ḥammeh 26.

The Assemblages

The renewed excavations at Wādī al-Ḥammeh 27 produced a wealth of flaked stone artefacts, with a total of 490,891 flaked stone artefacts recovered from 7 m^3 of sediment. This assemblage was catalogued in its entirety over a ten-month period in Amman, and one-third of the intact debitage, cores, and retouched artefacts from each phase were subject to detailed attribute analysis. The Area XX D lithics previously analysed by Edwards (2013c) was employed as a Phase 1 comparative assemblage, as this was of a comparable size (n=91,671) to each of the newly uncovered assemblages.

The Phase 4 deposits presented the smallest artefact assemblage, both in terms of total artefact count (n=71,296) and artefact density (50,926 artefacts per m^3). Artefact densities were highest in the Lower (72,925 per m^3) and Upper (86,803 per m^3) Phase 3 deposits, before declining somewhat in Phase 2 (60,109 per m^3). The assemblages were primarily uncovered in the context of dense, midden-like primary refuse deposits which were allowed to accumulate in a domestic setting. This pattern indicates that the lack of refuse disposal described in Phase 1 by Hardy-Smith and Edwards (2004) is not reflective of the final abandonment of the site, but was a continuous characteristic throughout its occupation.

Raw Material Usage

The cherts utilised at Wādī al-Ḥammeh 27 remain consistent across the four assemblages, with the majority of artefacts manufactured from fine grained, homogenous, yellowish-brown cherts. These are consistent with the Muwaqqar Chalk Marl type 4 (MCM-04) cherts previously identified as being favoured by the Natufian inhabitants of Wādī al-Ḥammeh (Edwards *et al.* 2018a: 249, 2018b: 263), demonstrating that they possessed access to a reliable source of this material throughout the span of its occupation.

A much smaller number of artefacts were manufactured from a translucent chert resembling chalcedony, consistent with one of the chert varieties found in a primary context in local Amman Silicified Limestone (ACL) outcrops (Edwards *et al.* 2018b: 261–2). Pieces manufactured from these cherts almost exclusively took the form of small flake and bladelet cores and their associated debitage, an unsurprising find given that this type of brecciated chert tends to fracture into blocks no larger than 5 cm in maximum dimension (Edwards *et al.* 2018b: 262). The ultimate aim of this parallel *chaine opératoire* appears to have been the manufacture of lunates, as geometric microliths were the only class of retouched artefacts to be manufactured from this chert type in any significant frequency. Artefacts manufactured from translucent cherts were most common in Phase 4 (4.1%, n=47), before abruptly dropping in Lower Phase 3 (1.9%, n=20), with this percentage remaining largely static across the subsequent two assemblages.

Debris and Debitage

Each lithic assemblage at Wādī al-Ḥammeh clearly represents a complete reduction sequence, with each corresponding artefact class—from the initial large, cortex-rich primary flakes down to the minute composite tool fragments and pressure flaked debris—being produced onsite as part of a 'Juncture 1' assemblage (Pecora 2001). Each assemblage between Phase 4 and 2 is numerically dominated by debris artefacts, with chips and chunks consistently comprising three-quarters of each assemblage (Table 1). The remainders of each assemblage are mostly comprised of debitage artefacts, with the percentages of cores and retouched artefacts consistently hovering at 0.2% and slightly over 1% of each assemblage respectively.

The lower phases at Wādī al-Ḥammeh 27 are characterised by large numbers of flakes measuring less than 2 cm in maximum dimension, which comprise one-

Table 1. The Wādī al-Ḥammeh 27 assemblage (Phase 1 data from Edwards 2013c).

	Phase 4		Lower Phase 3		Upper Phase 3		Phase 2		Phase 1 (XX D)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Debris										
Chunks	3,649	5.1	13,582	8.5	11,422	6.5	13,166	15.9	12,830	14.0
Chips	49,067	68.8	102,529	63.9	121,683	69.1	49,472	59.6	37,256	40.6
Sub-total	**52,716**	**73.9**	**116,111**	**72.4**	**133,105**	**75.5**	**62,638**	**75.5**	**50,086**	**54.6**
Debitage										
Flakes	1,248	1.8	2,691	1.7	2,919	1.7	1,554	1.9	10,174	11.1
Flakes (< 2 cm)	6,724	9.4	15,113	9.4	14,081	8.0	6,658	8.0	1,736	1.9
Broken flakes	4,003	5.6	12,282	7.7	11,343	6.4	4,383	5.3	16,220	17.7
Blades	16	0.0	28	0.0	27	0.0	24	0.0	160	0.2
Bladelets	335	0.5	664	0.4	768	0.4	505	0.6	2,873	3.1
Broken blades and bladelets	4,104	5.8	9,207	5.7	9,192	5.2	4,897	5.9	7,346	8.0
Bladelets (< 2 cm)	574	0.8	1,015	0.6	1,106	0.6	540	0.7	169	0.2
Core trimming elements	252	0.4	610	0.4	506	0.3	198	0.2	158	0.2
Burin Spalls										
Plain	170	0.2	314	0.2	468	0.3	346	0.4	520	0.6
Truncation	103	0.1	173	0.1	194	0.1	74	0.1	89	0.1
Microburin technique										
Microburins	1	0.0	2	0.0	14	0.0	15	0.0	64	0.1
Piquant triédres	2	0.0	1	0.0	1	0.0	2	0.0	1	0.0
Sub-total	**17,532**	**24.6**	**42,100**	**26.2**	**40,619**	**23.1**	**19,196**	**23.1**	**39,283**	**43.1**
Cores	121	0.2	278	0.2	307	0.2	166	0.2	368	0.4
Retouched tools	927	1.3	1,945	1.2	2,180	1.2	950	1.1	1,707	1.9
Total	**71,296**	**100.0**	**160,434**	**100.0**	**176,211**	**100.0**	**82,950**	**99.9**	**91,444**	**100.0**

third of each debitage assemblage between Phase 4 and 2. While some of the smaller, more extensively worked flake cores would have produced flakes falling within these dimensions, experimental studies have demonstrated that such microflakes are often created as knapping by-products (Shott 1995: 63–6; Edwards 2013c: 121). It is thus highly likely that large proportions of these artefacts represent a form of knapping shatter rather than intentionally produced debitage blanks. These pieces are supplemented by consistently large quantities of broken flakes and broken blades and bladelets. Conversely, intact debitage objects are relatively uncommon, with flakes comprising slightly under 2% of each assemblage, while the proportions of intact bladelets range between 0.4% and 0.6% of each assemblage.

The only incremental typological shifts in the debitage assemblages related to the burin spalls. The proportions of these artefacts gradually increase over time, correlating neatly with the rising share of burins in the corresponding retouched tool assemblages. This correlation is further strengthened by an increased emphasis on 'plain' spalls over the 'truncation' variety, corresponding with the shifting emphasis towards dihedral burins between Phases 4 and 2.

The dimensions of the analysed debitage artefacts remain largely consistent across the four analysed assemblages. The flakes analysed exhibit a wide range of dimensions, ranging from 8.7 mm to 71.7 mm in length and weighing between 0.2 to 66.6 g. The mean dimensions and weight of the flakes nonetheless remain relatively low, with the wider range of dimensions representing variation amongst the largest outliers. Plain platforms were the most common type in all four assemblages, ranging from 27.0% of the Phase 4 flakes to 30.8% of those from Phase 2. These are supplemented primarily by flakes with punctiform platforms in Phases 4 (19.8%) and Lower Phase 3 (18.2%), before being replaced by flakes with absent platforms in Upper Phase 3 (16.2%) and Phase 2 (19.5%). Flake shapes vary in each phase, with no single type reaching a quarter of each assemblage. The most common shape also varies by phase, with ovoid flakes being the most common type in Phase 4 (24.4%), canted flakes in Lower (23.9%) and Upper Phase 3 (24.3%), and rectangular flakes in Phase 2 (23.1%). Flakes with a unidirectional dorsal scar orientation characterise each assemblage, with this dominance steadily rising from 41.1% in Phase 4 to 52.7% of the Phase 2 flakes. These are supplemented primarily by flakes with 90º change of orientation layouts, which consistently comprise a third of each assemblage. The number of dorsal scars on flakes remains largely static, with an average of four scars on the Phase 4 and 3 flakes, before dropping slightly to three scars in Phase 2. The amount of cortical coverage on flake dorsal surfaces remains consistently low, with around 60% of each flake assemblage completely lacking cortex on their dorsal surface. Flakes with feathered terminations dominate each assemblage, ranging from 56.5% in Phase 4 to 48.2% of Upper Phase 3.

A combination of Marks' (1976: 372–3) *sensu lato* and *sensu stricto* definitions were utilised for the blades and bladelets, with both types being defined primarily by their length being twice that of their width, while a length of 50 mm serves as a dividing line between the two debitage types. The division between identifying a blade or a bladelet is thus purely an etic one, with the lower range of blades and upper range of the bladelets both straddling the 50 mm mark. Despite this, the size of the bladelets is largely homogenous over time, with the length, width, thickness, and weight for the bladelets exhibiting low standard deviation levels. Some attributes vary across phases, with absent platforms being most common in Phase 4 (30.6%) and Phase 2 (31.1%), punctiform platforms being most common in Lower Phase 3 (36.2%), while punctiform and crushed platforms are equally as common in Upper Phase 3 (28.6%). Other attributes retain a dominance across time, with feathered terminations and unidirectional dorsal scar orientations characterising each bladelet assemblage. Bladelets with cortex are consistently scarce, with three-quarters of each bladelet assemblage being completely free of cortex. At the same time, small numbers of bladelets with cortex running along one lateral margin are present in each assemblage, demonstrating that a portion of each bladelet assemblage was produced through the primary reduction of small, cortex-rich cobbles, rather than being restricted to the secondary stage of larger, more intensively worked blocks of chert.

Several key variations are observed between the final Phase 1 assemblage and the four earlier assemblages. Debris artefacts are notably less common in Phase 1, comprising slightly over half of the assemblage. This decline is reflected purely by a drastic decrease in the proportion of chips, while the proportion of Phase 1 chunks (14.0%, n=12,830) remains consistent with the preceding Phase 2 assemblage (15.9%, n=13,166). These proportions of chunks nonetheless represent a notably increased representation compared with the Phase 3 assemblages, suggesting that a shift in refuse disposal strategies occurred between the occupation of Structure 3 and the two larger structures occupied in the final two phases.

While broken debitage artefacts outnumber their intact counterparts in each assemblage, this dominance is noticeably less pronounced in the Phase 1 assemblage. This abrupt shift is particularly evident when examining the blades and bladelets of each assemblage, which drop from a consistent breakage rate of over 90% between Phase 4 and 2, to slightly over 70% in Phase 1 (Table 2). The flakes exhibit a similar pattern, if not as pronounced, with the percentage of broken flakes ranging between 73.8% and 82% in the lower four assemblages, before dropping to 61.5% of the total number of flakes in Phase 1.

The replacement of essential tools in a permanently occupied setting is often far less expensive than in mobile, rotational societies, due to the ability of sedentary communities to maintain a stockpile of cores or debitage blanks for immediate replacement whenever the need arises (Bamforth 1991: 229). These stockpiles may subsequently be affected by the process of 'draw down', wherein an existing stockpile is depleted in the lead up to a planned abandonment of the site (Deal 1985: 269; Schiffer 1987: 97). The increased proportions of debitage surviving intact as *de facto* refuse in Phase 1 at Wādī al-Ḥammeh 27 may thus represent an example of stockpiling, indicating that the final abandonment of the site was executed with an anticipated return, which never

Table 2. Percentage of broken debitage at Wādī al-Ḥammeh 27. Flakes and bladelets under 2 cm in length excluded.

	Flakes		Blades and bladelets	
	No.	% broken	No.	% broken
Phase 4	5,251	76.2	4,455	92.1
Lower Phase 3	14,973	82.0	9,899	93.0
Upper Phase 3	14,262	79.5	9,987	92.0
Phase 2	5,937	73.8	5,426	90.3
Phase 1 (XX D)	26,394	61.5	10,379	70.8

manifested for reasons unknown. This idea is supported by the comparatively large number of discrete *de facto* refuse clusters which were recovered in a functional context in Phase 1. These caches included the only large, finely-worked basaltic mortars to be recovered intact from the site as a whole (Edwards and Hardy-Smith 2013), with the caching of such high value, relatively immobile objects onsite serving as an ethnoarchaeological benchmark for episodes of seasonal abandonments with an anticipated return (Graham 1993).

By-products relating to the microburin technique remain exceedingly rare throughout the archaeological sequence of Wādī al-Ḥammeh 27, a find consistent with the broader Early Natufian archaeological record between the Northern Jordan Valley and Mt. Carmel regions (Belfer-Cohen and Goring-Morris 2013: 550; Grosman 2013: 623). Nonetheless, the representative percentage of these pieces does slightly increase over time at Wādī al-Ḥammeh 27, rising from three pieces in Lower Phase 3 (0.007% of the debitage) to fifteen in Upper Phase 3 (0.037%). This rises further in Phase 2 (0.089%, n=17), before peaking in Phase 1 (0.165%, n=65). This increased share nonetheless remains dwarfed compared to the proportions of microburins at contemporaneous Natufian sites in southern Jordan and the Negev, suggesting that use of this technique remained adventitious throughout the occupation of Wādī al-Ḥammeh 27.

The percentages of burnt artefacts remain consistent across the four analysed assemblages, both in terms of the overall percentage of burnt artefacts as well as by artefact type. For example, the chips and chunks consistently exhibit rates of burning unrivalled by any of the debitage types, with the percentage of burnt debris only slightly falling below 70% in Lower Phase 3. Conversely, the intact blades and bladelets consistently exhibit some of the lowest percentages of burnt artefacts, indicating that a conscious effort was made to keep these pieces intact.

Cores

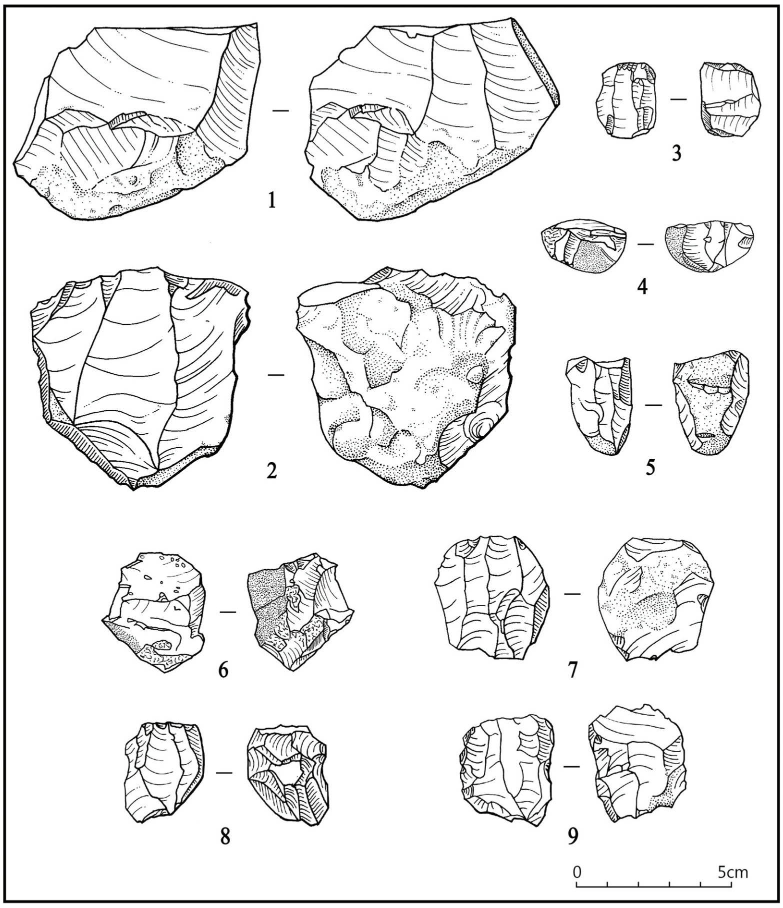
The identification of bladelet cores was made on a fairly liberal basis, with the presence of a single flake scar with bladelet dimensions serving as the diagnostic benchmark. As such, many of the bladelet cores at Wādī al-Ḥammeh 27 actually feature a combination of flake and bladelet scars, and would thus fall under the label of 'mixed cores' in certain typological systems. As with the debitage, the division between blade and bladelet core was ultimately an arbitrary, etic one, being measured purely through the length of the longest flake scar.

Bladelet cores are consistently the most common group of cores in each assemblage at Wādī al-Ḥammeh 27 (Table 3). The extent of this dominance varies significantly over time, with a unidirectional increase in bladelet cores at the expense of the flake cores. The proportions of these two core groups remain static between Phase 4 and Upper Phase 3, with bladelet cores comprising slightly over half of each assemblage, core fragments excluded. Conversely, there is a marked emphasis on bladelet cores beginning in Phase 2, where they comprise slightly under three-quarters of the intact cores. This trend continues in Phase 1, which was comprised almost entirely of bladelet cores. The proportions of extant blade cores remain insignificant over time, indicating that these pieces were consistently being further worked in order to knap microliths, as originally suggested by Edwards (2013c: 145–6) for the Phase 1 assemblage.

Amongst the flake cores, the proportions of the multiple platform type (Fig. 2:6) steadily rise between Lower Phase 3 (35.5%, n=27) and Phase 2 (51.7%, n=15) at the expense of the change of orientation and

Table 3. Core types at Wādī al-Ḥammeh 27 (Phase 1 data from Edwards 2013c).

	Phase 4		Lower Phase 3		Upper Phase 3		Phase 2		Phase 1 (XX D)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Flake Cores										
Single Platform, Unfacetted	3	2.5	7	2.5	11	3.6	3	1.8	0	0.0
Single Platform, Facetted	2	1.7	13	4.7	15	4.9	3	1.8	0	0.0
Opposed Platform, Same Side	2	1.7	2	0.7	3	1.0	1	0.6	0	0.0
Opposed Platform, Opposite Side	3	2.5	3	1.1	1	0.3	2	1.2	0	0.0
Opposed Platform, Combination	4	3.3	4	1.4	1	0.3	1	0.6	0	0.0
Change of Orientation	10	8.3	18	6.5	20	6.5	4	2.4	0	0.0
Multiple Platform	14	11.6	27	9.7	39	12.7	15	9.0	1	0.3
Other	1	0.8	2	0.7	0	0.0	0	0.0	4	1.1
Sub-total	**39**	**32.2**	**76**	**27.3**	**90**	**29.3**	**29**	**17.5**	**5**	**1.4**
Blade Cores										
Single Platform, Unfacetted	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3
Single Platform, Facetted	0	0.0	0	0.0	1	0.3	0	0.0	0	0.0
Opposed Platform, Same Side	0	0.0	0	0.0	0	0.0	1	0.6	0	0.0
Opposed Platform, Opposite Side	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Opposed Platform, Combination	0	0.0	1	0.4	0	0.0	0	0.0	0	0.0
Change of Orientation	0	0.0	0	0.0	1	0.3	1	0.6	0	0.0
Multiple Platform	2	1.7	1	0.4	0	0.0	0	0.0	0	0.0
Other	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Sub-total	**2**	**1.7**	**2**	**0.7**	**2**	**0.7**	**2**	**1.2**	**1**	**0.3**
Bladelet Cores										
Single Platform, Unfacetted	8	6.6	12	4.3	24	7.8	18	10.8	91	25.1
Single Platform, Facetted	10	8.3	23	8.3	22	7.2	8	4.8	31	8.5
Opposed Platform, Same Side	5	4.1	5	1.8	7	2.3	8	4.8	18	5.0
Opposed Platform, Opposite Side	2	1.7	4	1.4	5	1.6	3	1.8	4	1.1
Opposed Platform, Combination	2	1.7	2	0.7	3	1.0	4	2.4	2	0.6
Change of Orientation	9	7.4	37	13.3	30	9.8	16	9.6	44	12.1
Multiple Platform	15	12.4	21	7.6	19	6.2	19	11.4	31	8.5
Other	0	0.0	0	0.0	0	0.0	0	0.0	33	9.1
Sub-total	**51**	**42.1**	**104**	**37.4**	**110**	**35.8**	**76**	**45.8**	**254**	**70.0**
Core Fragments	29	24.0	96	34.5	105	34.2	59	35.5	103	28.4
Total	**121**	**100.0**	**278**	**99.9**	**307**	**100.0**	**166**	**100.0**	**363**	**100.1**

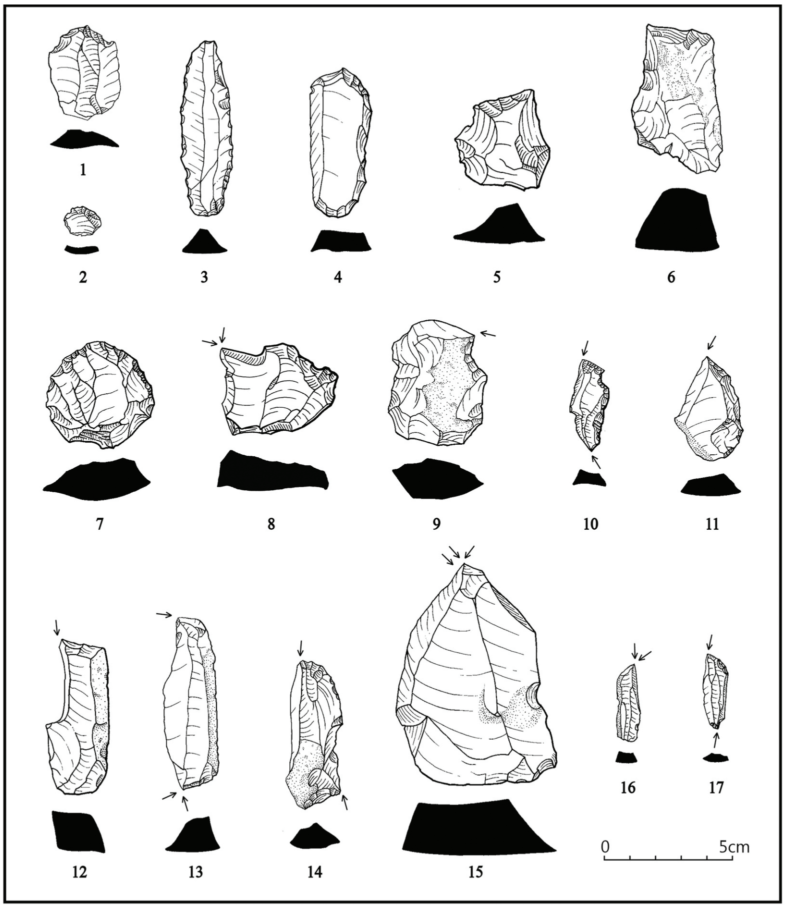


2. Cores from Wādī al-Ḥammeh 27: 1. Single platform flake core, facetted (Phase 4); 2. Single platform blade core, facetted (Upper Phase 3); 3. Change of orientation bladelet core (Phase 2); 4. Single platform bladelet core, facetted (Phase 2); 5. Single platform bladelet core, unfacetted (Upper Phase 3); 6. Multiple platform flake core (Phase 2); 7. Opposed platform bladelet core, same side (Phase 2); 8. Multiple platform bladelet core (Phase 2); 9. Opposed platform bladelet core, same side (Phase 2).

opposed platform (combination) types. In addition to their overall decline in number, an overall trend towards smaller flake cores is observable. This drop corresponds with a decline in the mean number of flake scars they possessed, falling from 12 in Phase 4 to nine in Phase 2. Scar patterning on the flake cores also varied over time, with divergent scar patterns being consistently outnumbered by parallel and convergent patterns between Phase 4 and Upper Phase 3, before abruptly rising in the Phase 2 assemblage. This change indicates that the flake cores present in Phase 2 represent a more expedient knapping strategy, placing further emphasis on bladelet production in the later phases.

At the same time, the percentage of unfacetted single platform bladelet cores (Fig. 2:5) rises between Lower Phase 3

(11.5%, n=12) and Phase 1 (35.8%, n=91) at the expense of the change of orientation type (Fig. 2:3). Single platform bladelet cores are likewise the most common bladelet core orientation in Phase 1, albeit to a greater extent (48.0%) than in any of the underlying assemblages. Bladelet core dimensions remain largely static, being consistently smaller than their flake core counterparts in each assemblage aside from Phase 2, where the two core groups are similar in size. Scar numbers likewise remain consistent, with bladelet cores possessing convergent patterns dominating each assemblage. Bladelet cores tended to retain less cortex than the flake cores, indicating an overall greater core reduction intensity. This was particularly prevalent with the change of orientation and multiple platform bladelet cores, which featured mean areal coverages of 10.9% and 9.6% respectively. The single bladelet cores



3. Scrapers, multiple tools, and burins from Wādī al-Ḥammeh 27: 1. Endscraper (Upper Phase 3); 2. Thumbnail scraper (Phase 2); 3. Endscraper on retouched blade (Lower Phase 3); 4. Sidescraper (Phase 2); 5. Rounded scraper (Phase 2); 6. Narrow carinated scraper (Upper Phase 3); 7. Nucleiform scraper (Upper Phase 3); 8–9. Burin/scrapers (Phase 2); 10. Burin/notched piece (Lower Phase 3); 11–12. Burins on oblique truncation (Phase 2); 13. Double mixed burin (Upper Phase 3); 14. Double burin on truncation (Upper Phase 3); 15. Dihedral burin (Lower Phase 3); 16. Offset dihedral burin (Upper Phase 3); 17. Double burin on truncation (Upper Phase 3).

Table 4. Retouched tool groups at Wādī al-Ḥammeh 27 (Phase 1 data from Edwards 2013c).

	Phase 4		Lower Phase 3		Upper Phase 3		Phase 2		Phase 1 (XX D)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Scrapers	38	4.1	45	2.3	69	3.2	31	3.3	92	5.4
Multiple tools	43	4.6	83	4.3	73	3.3	21	2.2	5	0.3
Burins	126	13.6	283	14.6	406	18.6	157	16.5	400	23.4
Retouched blades	14	1.5	27	1.4	18	0.8	13	1.4	65	3.8
Truncations	21	2.3	91	4.7	88	4.0	14	1.5	37	2.2
Non-geometric microliths	104	11.2	184	9.5	239	11.0	108	11.4	404	23.7
Geometric microliths	147	15.9	311	16.0	336	15.4	201	21.2	253	14.8
Notches & Denticulates	117	12.6	223	11.5	279	12.8	148	15.6	228	13.4
Awls and Borers	12	1.3	14	0.7	14	0.6	19	2.0	34	2.0
Bifacial Tools	2	0.2	3	0.2	5	0.2	0	0.0	10	0.6
Retouched flakes	42	4.5	85	4.4	97	4.4	33	3.5	91	5.3
Retouched fragments	250	27.0	589	30.3	550	25.2	204	21.5	59	3.4
Informal tools	11	1.2	7	0.4	6	0.3	1	0.1	29	1.7
Total	**927**	**100.0**	**1,945**	**100.3**	**2,180**	**99.8**	**950**	**100.2**	**1,707**	**100.0**

conversely exhibited a significantly higher mean cortex coverage (20.0%). A small portion of the single platform bladelet cores (6.3%) featured cortex on over half of their total surface area, demonstrating that the chert cobbles utilised for these pieces were specifically selected for immediate bladelet production, rather than being reduced from a larger block as part of a two-stage process, as observed by Edwards (2013c: 145) for the Phase 1 assemblage.

Retouched Artefacts

Scrapers (Fig. 3:1–7) are consistently uncommon at Wādī al-Ḥammeh 27, reaching their greatest proportions in Phase 4 (4.1%) and Phase 1 (5.4%; Table 4). Despite these low numbers, each assemblage was typologically diverse, indicating a consistently low degree of standardisation. The dominant scraper type fluctuated by phase, with basic endscrapers and sidescrapers being tied for the most common types in Phase 4 (18.7%, n=7), while the Lower Phase 3 assemblage was characterised by an unusually high percentage of broad carinated scrapers (33.3%, n=15). Sidescrapers are likewise the single most common type in Upper Phase 3 (21.7%, n=15), before being surpassed by endscrapers in Phase 2 (19.4%, n=6), and especially Phase 1 (51.1%, n=47). Scraper dimensions are controlled primarily by the debitage blank utilised, with scrapers manufactured from medium-large flakes being predominant in each assemblage, followed by a smaller number of scrapers made on long, fairly thick blades.

Table 5. Blank selection for retouched artefacts at Wādī al-Ḥammeh 27.

	N	Flake		Blade		Bladelet		Other		Indeterminate	
		No.	%	No.	%	No.	%	No.	%	No.	%
Scrapers											
Phase 4	18	13	72.2	0	0.0	0	0.0	3	16.7	2	11.1
Lower Phase 3	28	21	75.0	3	10.7	0	0.0	2	7.1	2	7.1
Upper Phase 3	27	19	70.4	0	0.0	0	0.0	7	25.9	1	3.7
Phase 2	19	14	73.7	3	15.8	0	0.0	2	10.5	0	0.0
Multiple tools											
Phase 4	28	17	60.7	1	3.6	1	3.6	2	7.1	7	25.0
Lower Phase 3	41	20	48.8	9	22.0	2	4.9	2	4.9	8	19.5
Upper Phase 3	28	16	57.1	4	14.3	1	3.6	2	7.1	5	17.9
Phase 2	15	11	73.3	0	0.0	1	6.7	1	6.7	2	13.3
Burins											
Phase 4	95	45	47.4	14	14.7	3	3.2	11	11.6	22	23.2
Lower Phase 3	103	45	43.7	8	7.8	3	2.9	10	9.7	37	35.9
Upper Phase 3	113	64	56.6	13	11.5	9	8.0	10	8.8	17	15.0
Phase 2	53	21	39.6	8	15.1	8	15.1	3	5.7	13	24.5
Geometric microliths											
Phase 4	102	0	0.0	0	0.0	54	52.9	0	0.0	48	47.1
Lower Phase 3	103	0	0.0	0	0.0	62	60.2	0	0.0	41	39.8
Upper Phase 3	105	1	1.0	0	0.0	64	61.9	0	0.0	40	38.1
Phase 2	62	1	1.6	0	0.0	38	61.3	0	0.0	23	37.1
Notches & denticulates											
Phase 4	33	18	54.5	1	3.0	12	36.4	2	6.1	0	0.0
Lower Phase 3	39	21	53.8	0	0.0	17	43.6	1	2.6	0	0.0
Upper Phase 3	34	19	55.9	2	5.9	11	32.4	2	5.9	0	0.0
Phase 2	23	8	34.8	3	13.0	12	52.2	0	0.0	0	0.0
Awls and borers (all phases)	24	3	12.5	12	50.0	6	25.0	2	8.3	1	4.2

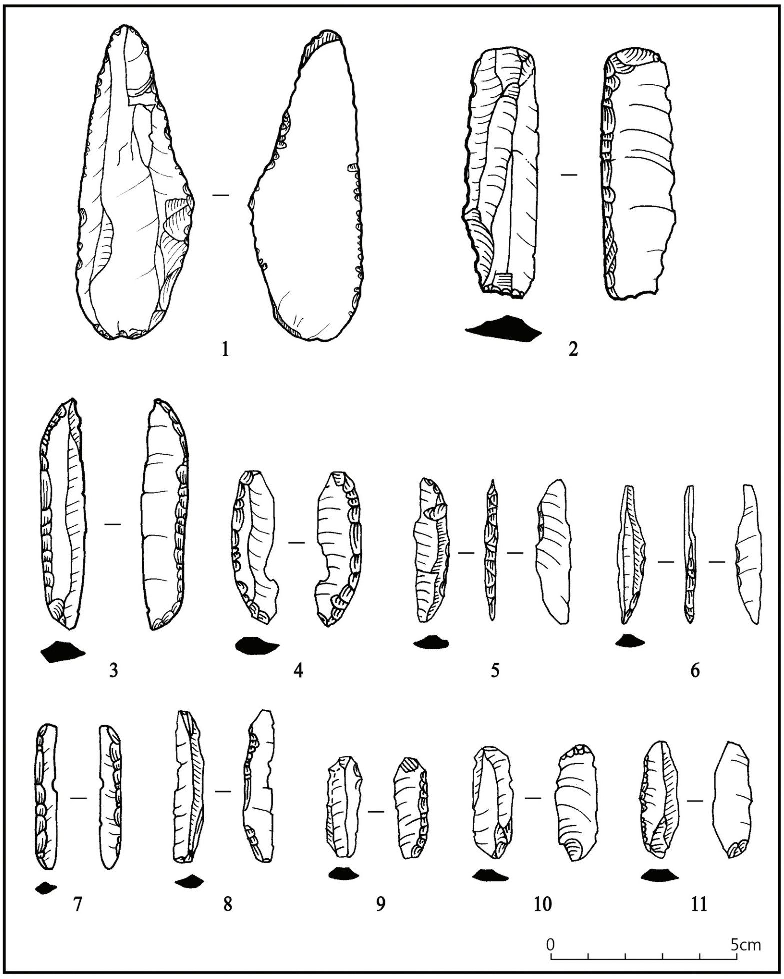
Multiple tools (Fig. 3:8–10) reach their greatest proportions in Phase 4 (4.6%), before gradually declining over time to the point of being almost absent from Phase 1 (0.3%). The blanks utilised for these pieces also varied over time, with the proportion of multiple tools manufactured from flake blanks rising from 50% in Lower Phase 3 to just three-quarters of those in Phase 2 (Table 5).

Given that all three multiple tool types represent burin hybrids ('burin/scraper', 'burin/notched piece', and 'burin/truncation') their decline has several implications. Numerous ethnographic and experimental studies (Keeley 1982: 799; Shott 1995: 58; Tomka 2001: 211–2) have demonstrated that many flaked stone tools that may at first glance appear as handheld tools actually function more efficiently as hafted composites, these including end-scrapers, knives, awls, and picks. At the same time, the modifications applied to a tool in order to facilitate hafting may often be indistinguishable from regular scraper or burin retouch (Keeley 1982: 801). The possibility is thus raised that many of the multiple tools and double burins in Early Natufian assemblages may actually represent examples of hafted tools. This identification is strengthened by the seemingly superfluous nature of many of the notches and truncations seen on many of the scrapers and multiple tools. If this identification is valid, the decline in multiple tools in favour of greater proportions of burins would represent a shift towards non-composite, relatively expediently manufactured burins in the later occupational phases.

The proportions of burins (Fig. 3:11–17) grow incrementally over time, increasing from 13.6% of the Phase 4 tools to 23.4% of those from Phase 1. They also comprise the most common tool group in Phase 1 and Upper Phase 3 (18.6%). The single most common burin type is consistently the 'burin on natural surface', a type which also incorporated burins struck from a snap or the original platform of the blank. These pieces comprised between 17.3% (Lower Phase 3) and 23.9% (Upper Phase 3) of each burin assemblage. The burins exhibit a greater degree of variability in blank selection than the scrapers or multiple tools. While flakes are still the preferred blank in each assemblage, they only comprised a majority in Upper Phase 3 (56.6%), with burins on flakes being noticeably less common in Phase 2 (39.6%). These are supplemented primarily by pieces with an indeterminate blank, while burins manufactured from blades are relatively uncommon, reaching their greatest proportion in Phase 2 (13.2%).

At the same time, however, a drastically different picture is revealed when the burins are abridged by mode of retouch. The Phase 4 assemblage exhibits a clear bias towards pieces struck from a truncated end, with these five types comprising just under half (45.2%, n=57) of the burins from this phase. This dominance subsequently declines incrementally across the following three assemblages, reaching their low point in Phase 2 (26.1%, n=21). This decline in truncation is mirrored by a gradual increase in the proportion of dihedral burin types between Phase 4 (11.9%, n=15) and Phase 2 (25.5%, n=40), where the two retouch modes occur in roughly even numbers. However, the proportion of truncation burins surges again in Phase 1 (45.8%, n=183), although this primarily corresponds with a decline in the 'double mixed burin' type between Phase 2 and 1, rather than a relapse in the proportion of dihedral burin types. The burins themselves exhibit a wide variety of sizes, ranging from 17.5 mm to 107.4 mm in length, although this variation has little diachronic or typological bearing.

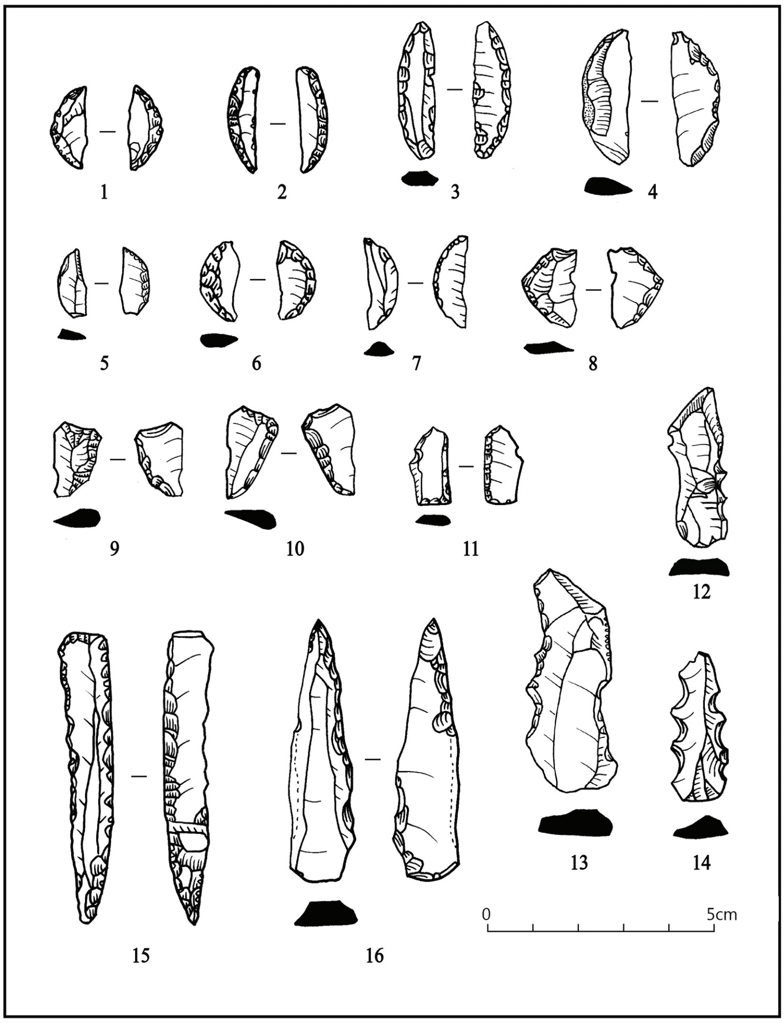
Retouched blades (Fig. 4:1–3) are consistently rare in the lower assemblages of Wādī al-Ḥammeh 27, with this tool group never reaching 2% of any tool assemblage between Phase 4 and 2. Conversely, the proportion of retouched blades was almost doubled in Phase 1 (3.8%, n=65). The 'Helwan blade' type is consistently represented in each assemblage. Pieces belonging to this type almost certainly represent composite sickle elements which happened to exceed 5 cm in length, a notion which is supported by their relatively gracile form compared to other artefacts in this tool group. Other blades, particularly those



4. Retouched blades and non-geometric microliths from Wādī al-Ḥammeh 27: 1. Blade retouched on both edges (Phase 2); 2. Inverse retouched blade (Upper Phase 3); 3. Helwan blade (Upper Phase 3); 4. Helwan bladelet (Phase 2); 5. Curved backed bladelet (Phase 2); 6. Narrow, curved, pointed backed bladelet; 7. Helwan bladelet (Phase 2); 8. Inverse bladelet (Upper Phase 3); 9. Inverse bladelet (Phase 2); 10. Convex truncation bladelet (Phase 2); 11. Obliquely truncated retouched bladelet (Upper Phase 3).

belonging to the 'blade retouched on both edges' type, represent some of the largest retouched pieces to be recovered from the site, and most likely served as handheld knives.

The proportions of non-geometric microliths (Fig. 4:4–11) remain largely static across the lower assemblages, ranging from 9.5% in Lower Phase 3 to 11.4% in Phase 2, before abruptly surging in Phase 1 (23.7%). Helwan bladelets remain the most common type across each assemblage, comprising around a quarter of each assemblage between Phase 4 (29.8%, n=31) and Upper Phase 3 (26.8%, n=64). This dominance of Helwan retouch subsequently rises in the



5. Geometric microliths, denticulated pieces, and awls from Wādī al-Ḥammeh 27: 1–3. Helwan lunates (Phase 2); 4–5. Inverse lunates (Phase 2); 6. Helwan lunate (Lower Phase 3); 7. Alternating lunate (Phase 2); 8. Isosceles triangle (Upper Phase 3); 9–10. Scalene triangles (Upper Phase 3); 11. Irregular microlith (Phase 2); 12–13. Denticulated pieces (Phase 2); 14. Denticulated piece (Lower Phase 3); 15. Helwan retouched awl (Phase 2); 16. Alternately retouched awl (Phase 2).

Phase 2 assemblage (39.8%, n=42), before becoming further emphasised in Phase 1 (47.5%, n=192).

Geometric microliths (Fig. 5:1–11) are the most common formal tool group in Phase 4 (15.9%), Lower Phase 3 (16.0%), and Phase 2 (21.2%). As with the non-geometric microliths, lunates with Helwan retouch are consistently the most commonly occurring type, albeit to an even greater extent than was seen with the microliths. The Helwan lunates further reflected their non-geometric counterparts in that a noticeable rise in their proportions occurred between Upper Phase 3 (61.9%, n=208) and Phase 2 (73.1%, n=147). Conversely, lunates with alternating retouch are found in their greatest proportions in the earliest two assemblages (14.9%–14.8%), before exhibiting a decline across Upper Phase 3 (9.2%) and Phase 2 (6.3%). Lunates with abrupt retouch are twice as common in Phase 1 than in any of the earlier assemblages—a notable find given that such lunates characterise most Late Natufian assemblages (Yaroshevich *et al.* 2013). Lunates at Wādī al-Ḥammeh 27 are overwhelmingly manufactured from bladelet blanks, with only two geometric microliths—an Upper Phase 3 irregular microlith and Phase 2 isosceles triangle—being conclusively identified as flake products.

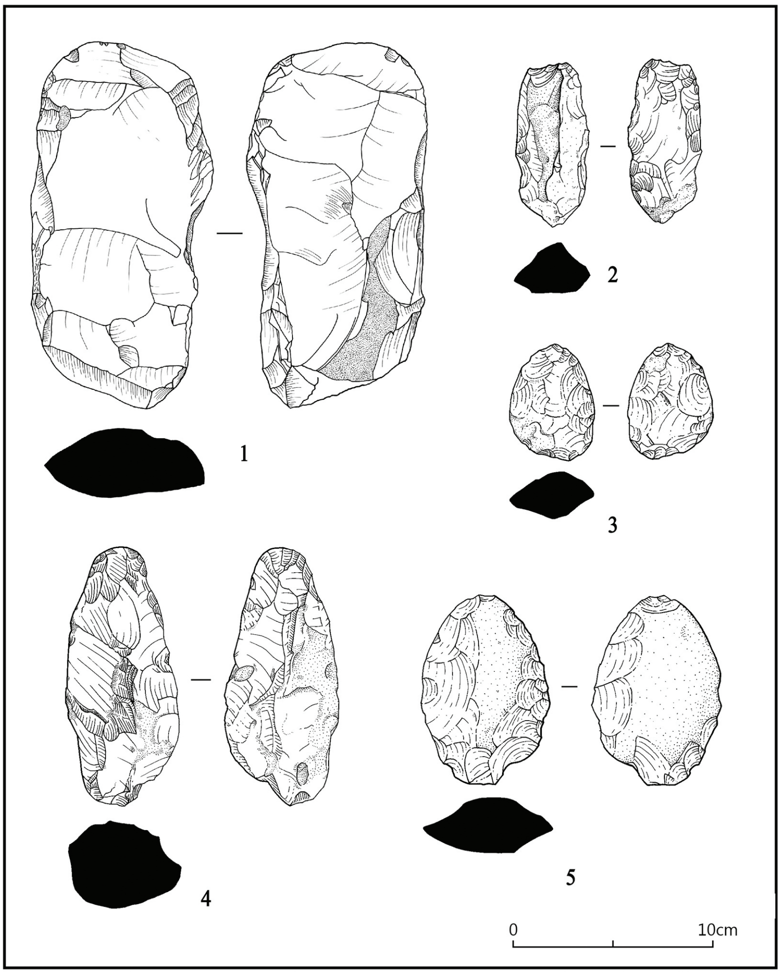
This being said, the blanks utilised for over one-third of the geometric microliths (40.6%) were listed as indeterminate due to the intensiveness of the retouch involved in their manufacture, and as such microflakes may have played a slightly larger role than it appears at face value.

The proportions of notched and denticulated pieces (Fig. 5:12–14) remains largely static over time, ranging between 11.5% (Lower Phase 3) and 15.6% (Phase 2) of each assemblage. The 'piece with small notch' types declines in prominence over time, being the most common type in this tool group between Phase 4 (40.2%, n=47) and Upper Phase 3 (31.9%, n=89), before declining to their lowest point in Phase 1 (7.5%, n=17). Denticulated pieces are instead the most common type in Phase 2 (35.8%, n=53), while pieces with multiple notches characterised Phase 1 (41.2%, n=94). This typological shift corresponds with an unambiguous change in blank selection, with flake preferred for the Phase 4 and 3 assemblages, before being surpassed by bladelet blanks in Phase 2.

Awls and borers (Fig. 5:15–16) occur in consistently low numbers throughout time at Wādī al-Ḥammeh 27, never exceeding 2% of any tool assemblage, with the overwhelming majority manufactured from blade (52.0%) or bladelet blanks (24.0%). While burin spalls are rarely utilised as blanks for retouched tools at Wādī al-Ḥammeh, a few examples are found in the form of a small number of 'trihedral awls' in the Phase 4 and 3 assemblages, which were retouched from all three facets in order to create a rounded bit.

The single most numerous tool group in each assemblage between Phase 4 and Phase 2 are the 'retouched fragments', which comprised between 20–30% of each lower assemblage at Wādī al-Ḥammeh 27. This tool group represents the pieces bearing retouch which are too fragmentary to be safely assigned to a formal type, including the 'broken retouched blade', 'broken backed blade', 'broken retouched bladelet', and 'broken backed bladelet types. Most are clearly microlithic in origin, and most likely reflect refuse from the maintenance of composite sickles and projectiles (Neeley and Barton 1994: 284; Shott 2007: 138)

Bifacial tools (Fig. 6) are rare at Wādī al-Ḥammeh 27, with only ten examples being recovered during the three seasons of renewed excavations. Of note was a large tranchet axe recovered from Upper Phase 3; the only example of this type to be recovered from the lower deposits of Wādī al-Ḥammeh 27. Measuring 19 cm in length and weighing over a kilogram, this was the second largest flaked stone artefact to be recovered from Wādī al-Ḥammeh 27, being only slightly outsized by a similar axe from Phase 1 (Edwards 2013c: 172). This artefact was discovered as part of the lower course of an elongated stone feature (Feature 6), providing a rare example of a flaked stone artefact being recycled as an architectural component, something that was mostly applied to groundstone artefacts at Wādī al-Ḥammeh 27. Also notable are two small, ovoid bifaces, from the Phase 4 and Lower Phase 3 deposits respectively. The pieces are unique in that they are the only artefacts to be manufactured from quartzite from the



6. Bifacial tools from Wādī al-Ḥammeh 27: 1. Tranchet axe (Upper Phase 3); 2. Pick (Lower Phase 3); 3. Irregular quartzite biface (Lower Phase 3); 4. Pick (Lower Phase 3); 5. Irregular quartzite biface (Phase 4).

entire Wādī al-Ḥammeh 27 ensemble, the lack of corresponding debris or debitage indicating that they were imported to the site as finished products. They are also the smallest bifaces to be recovered from Wādī al-Ḥammeh 27, with the Lower Phase 3 specimen being only 42 mm in length.

Evidence of Heat Treatment

The presence of dual lustre (a combination of lustrous and dulled flake scars) has been recognised as one of the most reliable means of identifying that an artefact has been heat treated (Delage and Sunseri 2004: 165; Domanski and Webb 2007: 156–8). Artefacts featuring dual lustre are particularly prevalent in the Phase 4 assemblage, where they comprised 7.5% of the analysed debitage sampled (Table 6). This proportion drops in the Phase 3 assemblages, before all but disappearing in Phase 2, where they comprise only 1.6% of the debitage. Conversely, the percentage of cores and retouched tools exhibiting dual

Table 6. Percentage of analysed artefacts featuring dual lustre.

	Phase 4		Lower Phase 3		Upper Phase 3		Phase 2	
	No.	%	No.	%	No.	%	No.	%
Flakes	33	7.6	8	3.2	12	4.4	3	1.8
Blades	1	11.1	2	13.3	1	7.7	0	0.0
Bladelets	16	7.0	7	3.4	9	4.3	1	0.8
Core trimming elements	5	7.7	7	10.6	8	14.0	1	4.3
Total debitage	*55*	*7.5*	*24*	*4.5*	*30*	*5.4*	*5*	*1.6*
Cores	8	11.9	17	16.2	11	10.3	1	2.0
Retouched artefacts	22	6.5	29	6.9	25	6.4	3	1.3
Total	**85**	**7.6**	**70**	**6.6**	**66**	**6.3**	**9**	**1.5**

lustre remains largely static between Phase 4 and Upper Phase 3 assemblages, before abruptly plunging in Phase 2. These trends are consistent with the Phase 1 assemblage, where evidence of heat treatment was similarly limited (Edwards 2013c: 144).

These figures, of course, cannot be viewed as absolute measurements of the number of artefacts knapped from heat-treated cores, as the degree of core reduction intensity would have resulted in many heat-treated artefacts retaining none of the original, dulled surface from when the core was subjected to heat treatment. Furthermore, many of the cherts utilised at Wādī al-Ḥammeh 27 are fairly lustrous in their natural state to begin with. As such, the percentage of artefacts featuring dual lustre cannot be viewed as an absolute measurement of the number of heat-treated artefacts, but rather their lowest range. The decline in heat treatment at Wādī al-Ḥammeh is consistent with the broader archaeological evidence, with evidence of this technique being absent from most Late Natufian assemblages in the Jordan Valley (Delage and Sunseri 2005: 164). The apparent decline in the application of heat treatment between Upper Phase 3 and Phase 2 is curious, however, given that one of the primary benefits of heat treatments is to reduce the tensile strength of the raw material utilised (Patterson 1995: 72). This process would have thus significantly aided the knapping of gracile bladelets and the pressure flaking of Helwan retouch (Delage and Sunseri 2005: 164), both of which occurred in greater frequencies in Phase 2 compared to the underlying deposits.

Wādī al-Ḥammeh 27 in a Broader Context

The composition of the Wādī al-Ḥammeh 27 retouched artefact assemblages unsurprisingly bears the most resemblance to the toolkits from other large Early Natufian settlements situated between the Northern Jordan Valley and Mount Carmel (Table 7). The proportions of burins at Wādī al-Ḥammeh 27 are exceptionally high for an Early Natufian site (particularly in its later phases) with only Hayonim Cave exhibiting a larger proportion of this tool group. This fact is notable given that these two sites present the highest densities of carved and incised artistic artefacts for the

Table 7. Proportions of retouched artefact groups between assemblages, in percentiles.

	Wadi Hammeh 27 (Phases 3–4)	**Wadi Hammeh 27 (Phases 1–2)**	Ain Mallaha (IVa)	Azariq XV	Beidha (Area C-01)	Dederiyeh Cave (Phases 1–2)	El-Wad Terrace (Phases W-3–W-7)	Hayonim Cave (Phases 1–2)	Jeftelik	Tabaqa	Wadi Judayid 2	Yutil al-Hasa (Area D)
Scrapers	**3.0**	**4.6**	2.0	9.8	5.9	8.2	1.3	7.1	18.4	8.5	1.9	1.3
Multiple tools	**3.9**	**1.0**	0.6	0.9	1.1	0.0	0.2	3.7	0.0	0.4	0.3	0.3
Burins	**16.1**	**21.0**	10.2	2.3	6.4	2.5	14.3	28.3	3.6	2.6	3.1	5.6
Retouched blades	**1.2**	**2.9**	2.1	5.1	-	-	-	1.0	-	4.1	0.2	5.0
Truncations	**4.0**	**1.9**	3.0	0.9	8.1	1.3	2.5	2.1	3.6	3.0	5.2	2.3
Non-geometric microliths	**10.4**	**19.3**	16.3	22.3	5.4	26.4	16.1	16.2	14.5	25.2	2.9	28.5
Geometric microliths	**15.7**	**17.1**	9.7	25.6	27.4	41.5	21.2	7.0	15.8	30.0	60.5	21.2
Notched and denticulated pieces	**12.3**	**14.2**	13.9	23.7	15.0	8.2	2.9	5.0	3.6	12.2	9.6	17.5
Awls and borers	**0.8**	**2.0**	3.1	0.0	1.6	2.5	2.0	3.3	2.8	0.4	1.8	1.3
Bifacial tools	**0.2**	**0.4**	0.3	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0
Retouched flakes	**4.4**	**124**	3.3	0.9	9.1	6.3	38.6	14.9	32.1	8.9	14.5	9.9
Informal tools/ Varia	**0.5**	**4.7**	2.8	4.2	1.6	2.5	0.9	8.2	5.6	0.0	0.2	0.3
Retouched fragments	**27.5**	**9.9**	32.6	4.2	18.3	0.6	-	-	-	3.3	-	6.3
Artefact no.	**5,052**	**2,657**	1,764	215	186	159	3,613	1,876	468	270	651	302
Reference	-	-	Valla 1984: 40–42	Goring-Morris 1987: 488–489	Byrd 1989: 53	Nishiaki *et al.* 2017: 16	Kaufman *et al.* 2015: 148	Belfer-Cohen 1988: 80	Rodríguez *et al.* 2013: 67	Olszewski 2013: 420–421	Henry 1995: 324	Olszewski 2013: 420–421

Early Natufian period (Major 2018: 138), suggesting that burins were regularly utilised for the manufacture of these pieces at both sites. The proportions of burin spalls in the Wādī al-Ḥammeh 27 debitage assemblage are also consistent with other assemblages with large burin assemblages (Valla 1984: 34; Belfer-Cohen 1988: 70; Kaufman 2015: 148), indicating the burins themselves were routinely manufactured onsite.

The proliferation of small-medium unretouched flakes in assemblages where bladelets were favoured as blanks for tools is a phenomenon well attested to in the Late Epipalaeolithic Levant (Byrd 1988: 260; Byrd and Colledge 1991: 267). Assemblages from similar architectural Early Natufian sites in the Jordan Valley and along the Mediterranean coastline are likewise numerically characterised by flakes (Valla

Table 8. Debitage ratios from various Early Natufian assemblages (rounded).

	Debitage no.	Core no.	Tool no.	Cores: debitage	Tools: debitage	Cores: tools
Wadi Hammeh 27 (XX D Phase 1)	**39,510**	**368**	**1,707**	**1:107**	**1:23**	**1:5**
Wadi Hammeh 27 (XX F Phases 2–4)	**119,447**	**872**	**6,002**	**1:137**	**1:20**	**1:7**
ʿAin Mallaha	11,496	142	1,764	1:81	1:7	1:12
Beidha (Area C-01)	2,025	42	186	1:48	1:11	1:4
El-Wad (Phases W-3–W-7)	47,171	1,191	3,613	1:40	1:13	1:3
Dederiyeh Cave (Phases 1–2)	934	28	159	1:33	1:6	1:6
Hayonim Cave (Phases 1–2)	14,902	753	1,876	1:20	1:8	1:2
Tabaqa	5,391	62	270	1:87	1:20	1:4
Wadi Judayid 2	12,107	209	651	1:58	1:19	1:3
Yutil al-Hasa (Area D)	2,857	44	302	1:65	1:9	1:7

1984: 34; Belfer-Cohen 1988: 70; Kaufman *et al.* 2015: 148). While it is possible that some of these were retroactively selected to serve as expedient cutting tools (Holdaway *et al.* 2015: 46–7) as was the case with slightly under 10% of the Early Natufian flakes from Ain Mallaha (Valentin *et al.* 2013: 222), it seems most likely that the majority of these pieces were simply unwanted refuse, and further attest to the widespread lack of refuse disposal in the Early Natufian period.

The core to debitage ratios at Wādī al-Ḥammeh 27 are extremely high compared with other Early Natufian sites (Table 8), with ʿAyn Mallaha exhibiting the second highest ratio (1:80) for an architectural site. Conversely, the core to debitage ratios at al-Wad Terrace (1:40) and Hayonim Cave (1:20) were notably lower. This variation may be indicative of considerable inter-site variation in core reduction intensity, different refuse disposal strategies, or a combination of the two factors.

The inter-assemblage consistency at Wādī al-Ḥammeh 27 is curious in the case of the Phase 4 assemblage, wherein the same range of knapping activities were carried out in order to manufacture a largely similar range of tools, despite the complete absence of lithified domestic architecture seen in subsequent phases. It is possible that Wādī al-Ḥammeh 27 served much the same function in Phase 4 as sites like Kebara Cave or Late Natufian Nahal Oren, which likewise exhibit burial grounds accompanied by thick artefact deposits indicative of a significant domestic occupation (Bocquentin and Bar-Yosef 2004: 20–1; Grosman *et al.* 2005: 17). Alternatively, it is entirely possible that main Phase 4 domestic settlement is located slightly outside the limited sample area, with this settlement being either reorientated or expanding in size to encompass the area of the XX F cemetery in later phases.

Blade and bladelet based assemblages have been associated with mobile, rotational hunter-gatherer economies due to their low weight and ease of retouch into a wide range of tools (Delage 2005). Likewise, numerous studies have advocated for a positive relationship between a ready access to high quality raw materials and the utilisation of informal knapping strategies (Parry and Keely 1987; Andrefsky 1994) or the production of expedient, unhafted tools (Keeley 1982: 803). Such models are clearly not applicable to the archaeological situation at Wādī al-Ḥammeh 27, however, with the increased reliance on bladelet cores in the latest two phases instead coinciding with increased levels of architectural permanence, while no evidence exists for a restricted access to the high-quality cherts favoured for knapping. Instead, this increased production of bladelet cores was most likely driven by a functional prerequisite for the creation of hafted tools (Jeske 1989: 36), in this case composite sickles. At the same time, this shift in targeted blank production would not have hindered their hunting capacity to any large extent, as evidenced by the increased proportion of lunates identified as bladelet products in the later phases.

Acknowledgements

Acknowledgements are first and foremost owed to Dr. Phillip Edwards for giving me the privilege of being a member of his dig team during the renewed excavations at Wādī al-Ḥammeh 27, as well as covering the travel and accommodation costs for my subsequent data collection. Acknowledgements are also due to Alladīn Maadi and Salem Alhiwaat for their assistance in transporting the assemblage between Pella and Amman, to the American Center of Research (ACOR) for providing an ideal research environment for my ten months of research in Amman, and to the locals of Ṭabaqat Fahl for sorting the bulk of the wet sieved material.

The research presented in this paper was carried out as part of my ongoing Ph.D. at La Trobe University, which was financed by the La Trobe University Graduate Research School and the Transforming Human Societies Research Focus Area.

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