CHIPPED STONE ARTIFACTS FROM A SPECIALIZED NEOLITHIC CAMP NEAR KHARANEH CASTLE, EASTERN JORDAN

by
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Introduction

The dense and extensive lithic scatter designated Kh-A15 was located in the course of a regional survey of the Kharaneh region of the eastern deserts of Jordan.[1] Intended as a program to investigate the area as a prelude to a campaign of excavations at the enormously rich "Kharaneh Flint Site"[2] mentioned by Harding,[3] the survey discovered a wealth of prehistoric sites ranging from Lower Paleolithic to Neolithic and later times, attesting to a long history of the exploitation of an area of Jordan now characterized by a bleak, barren, and romantically forbidding landscape. One of many sites of its kind found during the survey, Site Kh-A15 was notable in terms of its size, artifact density, and especially the remarkable character of its implement typology. The heavy emphasis on the production of burins at Kh-A15, both in relative and absolute quantities, marks it as a splendid example of a special activity focus called a "burin site",[4] attributed to the preceramic Neolithic period of the arid regions of the eastern Levant[5] and northwestern Saudi Arabia. The increasing number of known burin sites, usually of small size, in the eastern deserts of Jordan[6] and the enigmatic nature of the focus on the production of specific chipped stone tools in this geographically restricted region led the authors to return to Kh-A15 to collect a larger sample of artifacts in order to investigate more fully the cultural implications of burin sites.

Site Setting and Description

Kh-A15 is situated on a level *hamad* plateau between the major east-flowing Wadi Kharaneh and Wadi Janab, approximately 420 m northeast of the early Islamic caravanserai of Qasr Kharaneh. The immediate region is virtually barren of any plantlife, although during and shortly after the December-March rainy season low scrub vegetation can be seen sparsely dotting the shallow basins and drainages and the major wadi margins. Modern rainfall, a strictly winter season phenomenon, provides less than 100 mm of precipitation annually, although winter and spring humidity is sometimes enhanced by periodic dense fog shrouds. Despite the denuded character of the landscape, personal observations in 1980 and 1981 showed that both foxes and raptorial birds find the rodent population of the region sufficiently abundant to sustain their presence, and older local informants and the general folklore of the area speak of former times when gazelle and other desert-adapted grazers and browsers were numerous.

During the survey in 1980,[7] Kh-A15 was noted to cover an elliptical area of some 70 x 50 m, although outside a central area about 30 m in diameter artifact

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[1] Muḥeisen, M., n.d., Survey of the Kharaneh Region. Unpublished preliminary report on file, Registration Centre, Department of Antiquities, Amman, Jordan.

[2] Muḥeisen, M., 1983, *La Prehistoire en Jordanie, Recherches sur l'epipaleolithique.* Ph.D. thesis, Université de Bordeaux I.

[3] Harding, G. L., 1967, *The Antiquities of Jordan.* Amman: Jordan Distribution Agency.

[4] Betts, A., 1982, Prehistoric Sites at Qa'a Mejalla, Eastern Jordan. *Levant 14: 1-34.*

[5] *Copeland, L. in A. Garrard and N. Price, 1977, A Survey of Prehistoric Sites in the Azraq Basin, Eastern Jordan. Paleorient* 3: 109-126.

[6] Betts, A., 1982 (see note 4); Rollefson, G. and Fröhlich, B., 1982, A PPNB Burin Site on Jabal 'Uweinid, Eastern Jordan. *ADAJ* 26: 189-198.

[7] (See note 1).

density dropped perceptibly. It was remarked then that the central concentration of artifacts in fact constituted a "mini-tell", rising barely some 15-20 cm. higher than the surrounding level terrain.

A one-square-meter sounding was sunk into the center of the densest portion of the site, with the following general stratigraphic sequence:

Layer 0: Surface scatter of adjacent worked flints with little or no sediment between the artifacts.

Layer 1: Below the surface flints, a dense, compact layer of worked flints continued to a depth of 5-10 cm.

Layer 2: The Layer 0-1 complex rested on a fine, loose, red silty/sandy soil varying in thickness from 5-10 cm.

Layer 3: Compacted red silty/sandy soil with calcareous concretions, natural tabular flint outcrops and limestones fragments, about 45 cm. thick.

Layer 4: A friable horizon of parent limestone material at least 20 cm. thick. (No deeper sounding was made).

Notably, Layers 2-4 were completely sterile of cultural material, and the compact nature of the artifacts on the surface and in Layer 1 indicated that wind and water deflation had collapsed discrete episodes of a sequence of essentially homogeneous cultural deposits at the site.

The Artifact Sample from Kh-A15

Although a small collection of artifacts was recovered from Kh-A15 during the 1980 survey, the specimens represented a highly selected and probably biased sample of the site's inventory. It was decided that since the central 30 m. area of the site represented the most intensive use of the area, a complete collection of the Layer 0-1 complex from a unit 12 x 12 m. would provide a reasonably sound sample for an analysis of the focus of site activities. It became apparent during the collection process, however, that time for both the artifact recovery in the field and for research of the rapidly accumulating artifact counts was going to be unmanageable. Therefore, only the southwestern half of the 12-m square was completely collected, and as it turned out, even this large sample was beyond the capacities of the authors to analyze completely.

In the SW half (NW corner to SE corner) of the 12-m collection square, 4,315 artifacts were collected. This collection area represented approximately 5% of the entire site area, indicating that roughly 80,000 artifacts remain at Kh-A15. Additional comments on the distribution of artifacts will be discussed below.

Artifact Analysis: Typology and Technology

Due to the time constraints imposed on the authors, even the restricted sample of 4,315 chipped stone artifacts was much too large to analyze completely. As a result, only 1,192 artifacts were subjected to intensive analysis, although the remaining part of the collection is available for later research.

The artifacts in the analyzed sample were analyzed according to technological and typological aspects that are of great value for intersite comparisons. The analyses include modified typological classifications of broad applicability,[8] technological facets relating to methods of production,[9] and to several aspects of artifact description that have not yet been used widely outside of the present study.

It is suggested here that a standard description of burin sites include at least

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[8] de Sonneville-Bordes, D. and Perrot, J., 1954-1957. Lexique typologique du paleolithique superieur. *BSPF* 51: 327-355; 52: 76-79; 53: 408-412; 54: 547-559.

[9] Rollefson, G., 1980, The Paleolithic Industries of 'Ain el-Assad (Lion's Spring), Near Azraq, Eastern Jordan. *ADAJ* 24: 129-144; Rollefson, G. and Frohlich, B., 1982 (see note 6); Rollefson G., Kaechele, Z., and Kaechele, J., 1982, A Burin Site in the Umm Utheina District, Jabal Amman, *ADAJ* 26: 243-247.

the following data: 1) artifact classes; 2) core typology; 3) tool typology; and 4) technological features as are elaborated below. With this basic standard of description, intersite comparisons can be facilitated considerably, and the system suggested here is very adaptable for expansion if future research deems this to be appropriate.

Typology

Only 18 cores or core fragments were found among the collection from Kh-A15, amounting to 1.5% of the analyzed sample. This low relative frequency conforms roughly with the figure from the burin site described from Jebel 'Uweinid[10] and with the classes from the large permanent settlement of 'Ain Ghazal[11]. What is remarkable, however, is the composition of the core types in this small collection.

Table 1. Core types in the lithics collection from Site Kh-A15.

Type	*n*	*%*
Discoidal flake core	1	7.1
Single-face flake core	4	28.6
Single platform flake core	2	14.3
Prismatic blade core	3	21.4
Bidirectional prismatic blade core	1	7.1
Bladelet core	1	7.1
Core on thick flake	1	7.1
Diverse	1	7.1
Subtotal	14	99.8
Core fragments (Indeterminate)	4	(22.8)
Rejected core	1	(5.6)
Total	18	

The core types listed in Table 1 have been defined elsewhere[12], and due to limitations of space they will not be repeated here. Of note among the cores is the relatively high representation of flake cores which contrasts starkly with the proportions of flakes and blades in the sample (see Table 3). Combined with the low percentage of cores in the sample, this situation suggests that the core reduction sequence in the production of debitage and tools is not well-represented in the sampling area, and that the primary locus of tool production took place elsewhere at Kh-A15 or even off the site. This interpretation is supported by other facets of lithic technology discussed in more detail below. It is also notable that among the blade cores (n=4), only one is bidirectional; this is a departure from the case characteristic of Early Neolithic lithic traditions[13].

Table 2. Tool types in the analyzed sample from Site Kh-A15.

Type	*n*	*%*
Atypical endscraper	1	0.2
Endscraper on retouched element	1	0.2
Endscraper on flake	1	0.2
Burin-truncation	8	1.4
Burin-perçoir	1	0.2
Canted dihedral burin	1	0.2
Angle burin on break	8	1.4
Burin on straight truncation	24	4.2
Burin on oblique truncation	29	5.1
Burin on concave truncation	240	42.1
Burin on convex truncation	32	5.6
Multiple burins on truncation	55	9.6
Transverse burin	1	0.2
Angle burin	4	0.7
Indeterminate burin	99	17.4
Straight truncation	3	0.5
Oblique truncation	4	0.7
Concave truncation	20	3.5
Convex truncation	9	1.6
Double truncation	3	0.5
Indeterminate truncation	2	0.4
End-notched blade	6	1.0
Lateral notch	10	1.8
Denticulate	1	0.2
Wedge	5	0.9
Other	2	0.4
Subtotal	570	100.2
Miscellaneous retouch	19	(3.2)
Unclassifiable	3	(0.5)
Total	592	

[10] Rollefson, G. and Fröhlich, B., 1982. See note 6.

[11] Rollefson, G. and Simmons, A., 1985, The Early Neolithic Village of 'Ain Ghazal, Jordan: Preliminary Report on the 1983 Season. *BASOR Supl.* 23: 35-52.

[12] Rollefson, G., 1981, The Late Acheulian Site at Fjaje, Wadi el-Bustan, Southern Jordan. *Paleorient* 7 (1): 5-21.

[13] Moore, A., 1973, The Late Neolithic in Palestine. *Levant* 5: 36-68.

The most remarkable feature of Kh-A15 is revealed in the tool inventory (Table 2). More than seven-eighths of the classifiable shaped tools are burins of various sorts, with burins struck from concave platforms dominating this class of implements (Figs. 1 and 2). It should be mentioned that of "burins on concave truncations", 117 of them (48.8%) conform strictly to the definition, although the other 123 are actually struck from nibbled end-notches (51.2%). Within the type "multiple burins on truncations", 24 of the 55 specimens (43.6%) have one or more nibbled-notch platforms.

While other tool types are in the distinct minority, truncations represent the bulk of the non-burin tools. One wonders whether this class of implements might not actually represent a preliminary but, for unknown reasons, unfinished stage in burin production. Of the 47 pieces with truncations, for example, 27 are either concave or end-notched (57.4%), a relative frequency quite close to the overall burin configuration.

Technology

Technological features relating to the manufacture of the flakes and blades in the analyzed sample from Kh-A15 are presented in Tables 3-5. Once again, most of the terms have been defined elsewhere[14], and they will not be restated here except where amplification is necessary.

Table 3. Techniques and forms represented among the analyzed sample from Site Kh-A15.

Technique	*n*	*%*
Normal flake	59	5.1
High-angle flake	41	3.5
Normal blade	861	73.8
Indeterminate blade	193	16.5
Punch blade	1	0.1
Other	12	1.0
Total	1167	100.0
Blade Directionality		
Unidirectional	888	96.3
Bidirectional	34	3.7
Subtotal	922	100.0
Not Applicable	183	(15.7)
Indeterminate	62	(6.3)
Total	1167	
Form		
Normal flake	188	18.2
Angular flake	65	6.3
Point	2	0.2
1st order blade	290	28.0
2nd order blade	460	44.5
Overshot	28	2.7
Other	1	0.1
Subtotal	1034	100.0
Debris	133	(11.4)
Total	1167	

In terms of flaking techniques, Table 3 reveals that blade production was by far the principal focus of the flintknappers at the site, a surprising disparity in view of the core types (Table 1). It is notable that the "punch blade" technique is negligible at Kh-A15, quite distinct from the case at 'Ain Ghazal[15]. Furthermore, the single punch-blade from Kh-A15 stands apart from the rest of the sample: it is very short, thin and non-cortical, in stark contrast with the other tools.

The external ("dorsal surface") features of the artifacts provide an important source for reconstructing manufacturing techniques. Exterior parallel ridges and parallel negative ripples indicate blade technique, for example. But intent and result are not always congruent, so it is not surprising to see in Table 3 that the predominant incidence of blade technique did not produce a predictably equal number of blades. Accidental "misfires" that resulted in overshot pieces or flakes with non-blade attributes often occurred (a difference significant at beyond the .0000 level in a Chi-Square test). Although ex-

[14] See Note 9.

[15] Rollefson, G. and Abu Ghanimeh, Kh., 1983, Technological Analysis of Blades and Flakes from 'Ain Ghazal. *ADAJ* 27: 461-469.

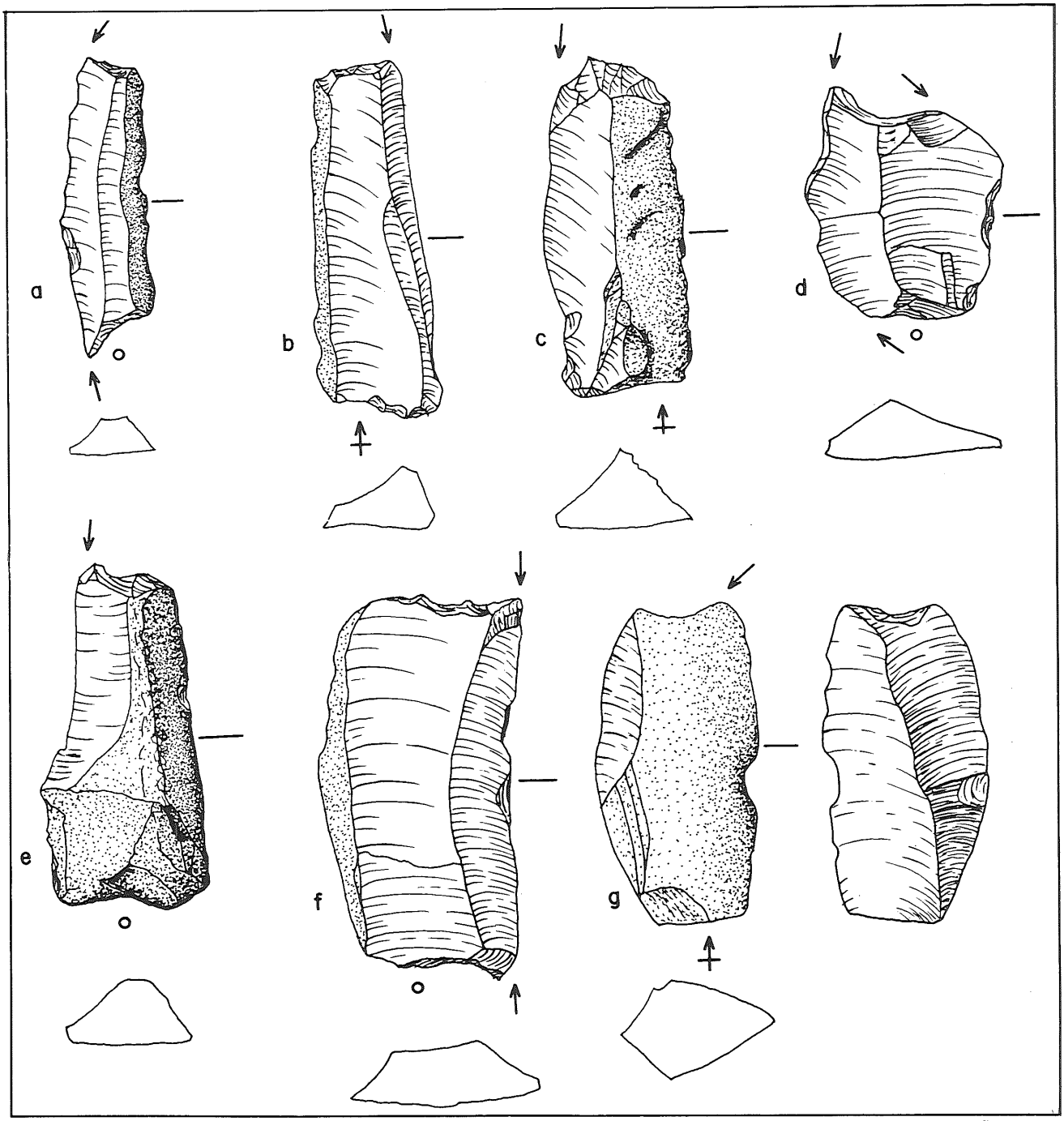

Fig. 1. Burins from Site Kh-A15. a, d-g: on concave truncations (nibbled notches); b: on oblique truncation; c: on convex truncation. (Drawing: R. Erskine)

perimental testing is necessary for confirmation, one might suspect that this variation in design and result is due to the use of hard-hammer technique for blade production, possibly tempered towards a positive result through the use of tabular flint resources in the area of the site.

The exterior surfaces of blades and flakes reveal another aspect of lithic technology: the direction of previous blows to the core before the removal of the artifact in question. Due to the absolutely small number of cores in the sample from Kh-A15, all artifacts bearing evidence of blade technique--including mistakes that resulted in flakes or overshot pieces--were examined to determine if unidirectional or bidirectional blade removal characterized the core from which the artifacts came. The evidence in Table 3 reveals that the overwhelming method of blade removal was unidirectional, supporting the limited core typological data, which emphasizes a major departure from Early Neolithic traditions noted by Moore[16].

[16] See Note 13.

Table 4. Technological data relating to striking platforms among the analyzed sample of artifacts from site Kh-A15.

Platform Type	*n*	*%*
Single facet	355	88.1
Dihedral	36	8.9
Multiple facet	10	2.5
Punch	2	0.5
Subtotal	403	100.0
Missing	764	(65.5)
Total	1167	
Platform Reduction		
None	336	81.4
Light	50	12.1
Moderate	20	4.8
Heavy	7	1.7
Total	413	100.0
Platform Cortex		
None	267	65.6
Partial	28	6.9
Cortical	112	27.5
Total	407	100.0
Platform Attitude		
Low angle	72	17.3
High angle	344	82.7
Total	416	100.0

Other facets of lithic technology are presented in Table 4. Regarding the kinds of striking platforms on blades and flakes, it is clear that platform preparation was minimal: more than seven-eighths of the platforms were single facets, including 112 which were covered with cortex. The remaining platform types are so few in number and sporadic that they appear to be less the results of intent on the part of the flint workers than they are possibly accidental. The average platform dimensions are: for blades, 18.4 mm wide (n=199) and 10.1 mm thick (n=218); for flakes, 19.1 mm wide (n=43) and 11.1 mm thick (n=43).

"Platform reduction" is a technological feature that refers to the final preparation of the core edge just prior to striking off the blade or flake. The degree of platform reduction is evidenced on the basal exterior surface of the artifact by the numbers of small chips that were removed to regularize or emphasize that particular portion of the core platform. "Light" reduction is shown by one to three small negative flake scars; "moderate" by four to six scars; and "heavy" by six or more scars. (Punch technique, for example, is almost invariably associated with heavy platform reduction). As Table 4 shows, platform reduction was not characteristic of the technology employed by the occupants of Kh-A15. In this respect the collection is similar to the burin site on Jebel 'Uweinid[17] but radically different from 'Ain Ghazal[18].

The angle formed between the surface of the platform and the interior surface of the flake or blade was also monitored in the analysis of the Kh-A15 sample. For the purposes of this study, angles greater than 110^0 were considered "high angle", while lesser angles were termed "low angle". The predominance of the larger angles at Kh-A15 is matched by data from other burin sites[19], although no comparative information is yet available from settled village sites such as 'Ain Ghazal.

Table 5. Technological data relating to artifact surfaces in the analyzed sample from Site Kh-A15.

Patina	*n*	*%*
Desert Varnish	1137	95.4
No desert varnish	53	4.5
Indeterminate	2	0.2
Total	1192	100.0
Cortex		
No cortex	283	26.6
Mostly non-cortical	620	58.3
Mostly cortical	161	15.1

[17] Röllefson, G., and Frohlich, B., 1982. See Note 6.

[18] See Note 15.

[19] See Notes 6 and 9.

Cortical	0	0.0
Total	1064	100.0

Natural Backing

	Blades			*Flakes*	
	n	%	X^2	*n*	%
Yes	364	48.5	.001	79	31.2
No	386	51.5		174	68.8
Total	750	100.0		253	100.0

Other features of artifact surfaces provide some information concerning lithic technology and, to a lesser extent, relative dating. In the latter regard, for example, Table 5 presents the incidence of "desert varnish" patina. Clearly, the bulk of the collection is similar in the presence of this distinctive feature, suggesting a general contemporaneity of deposition and exposure to patinating elements. Even so, a small group does not bear this dark brown, glossy patina; among the pieces in this group are the thin burin on a punch blade and two bifaces of Lower Paleolithic age. The formation of desert varnish remains an enigmatic process, however, and the use of this aspect of artifact alteration as a means of relative dating is a tenuous procedure.

The amount of surface cortex on the artifacts relates to methods of artifact production and, at least in the case of Kh-A15, particular designs of tool manufacture. It was remarked earlier that there is a great disparity between the core types in the sample (half involved with flake production) and the observed techniques and forms (90% blade technique, 72% blade forms). The cortex data in Table 5 add a dimension in the interpretation of the sequence of tool manufacure at Kh-A15. Even including the debris in the analyzed sample, no artifact was completely cortical, indicating that flint sources were tested for quality off-site, with primary preparation of cores carried out somewhere beyond the confines of the sampling area. Even mostly cortical flakes and blades (with cortex covering more than 50% of the surface) account for a very small proportion of the analyzed sample, another factor that suggests prepared cores were carried onto the site.

The "mostly non-cortical" category refers to blades and flakes with cortex on less than 50% of the exterior surfaces. Within this category, the cortex was often restricted to one or both steep lateral edges, forming a natural "backing" that evidently served to facilitate the use of the tools. Among the blades, for example, nearly one-half were naturally backed, affording an easily managed, hand-held tool (usually a burin).

It might be mentioned here that of all the tools in the Kh-A15 sample, 12% were on flakes (although flakes made up 27% of the total artifact inventory); blades were the source of just under 90% of the tools (versus less than three-fourths of the total number of artifacts). There is a strong contrast in the incidence of naturally backed flakes and naturally backed blades (Table 5), a difference significant beyond the .001 level in Chi-Square tests. In other words, if tools were made on blades, it was more likely that the tools would be naturally backed than if they were made on flakes.

In summary, one can make the following conclusions about the nature of the occupation at Kh-A15:

1) The relatively high tool: debitage ratio and the intense focus on the production of one tool class indicate that Kh-A15 was the locus of repeated visits of short duration to accomplish a limited range of activities.
2) The original testing of flint resources and initial preparation of cores took place outside the sampling area.
3) Nearly all the artifacts from Kh-A15 are generally contemporaneous, at least in broad cultural terms.
4) The presence of cortex on one or more lateral edges was a design incorporated into the tool manufacturing process.
5) Blade techniques using a hammerstone were dominant at Kh-A15, and single-platform prismatic cores were the resources used, despite the evidence of the core types in the analyzed sample.

Concluding Remarks

Burin sites like Kh-A15 appear to share to a high degree several techno-

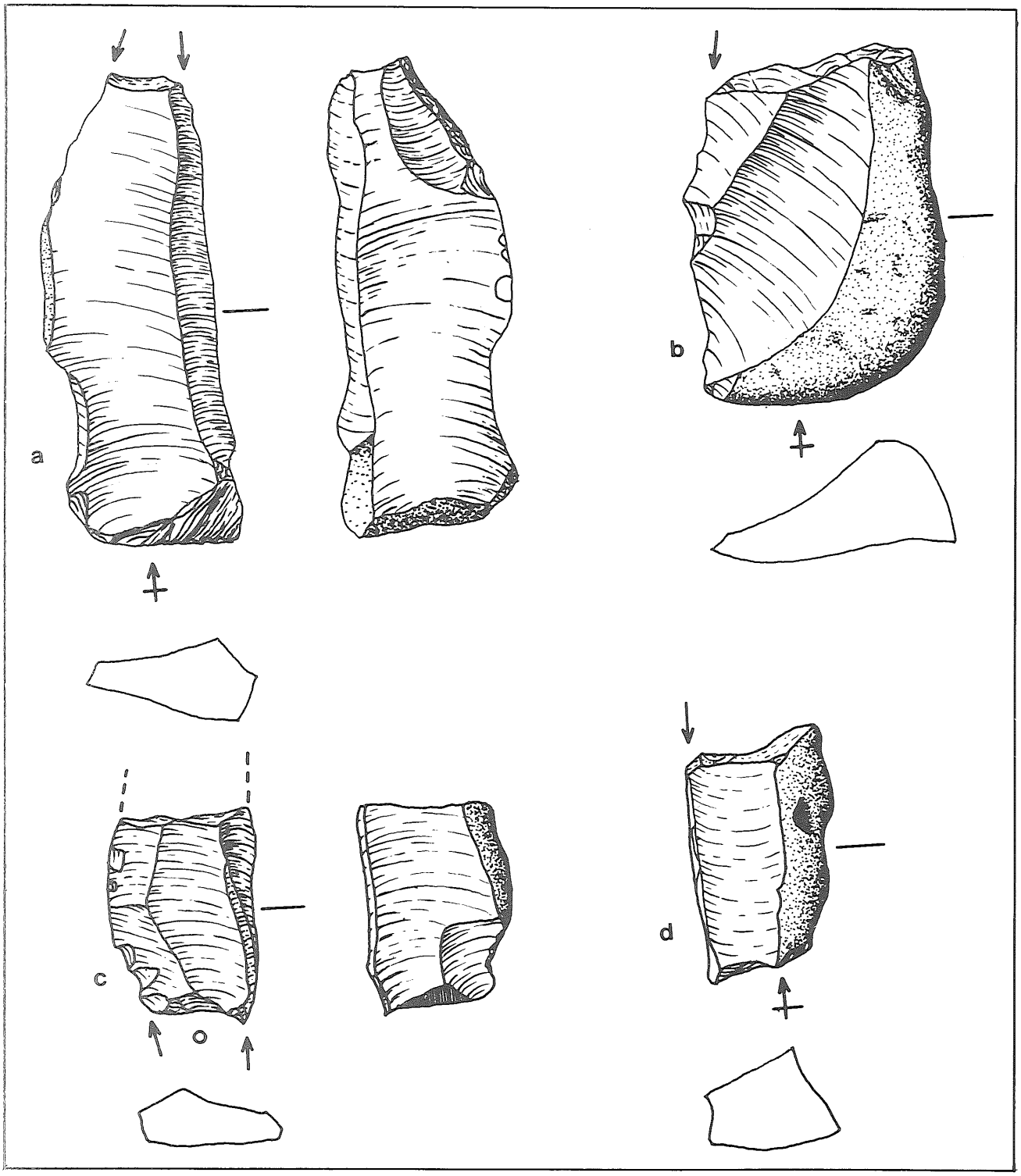

Fig. 2. Burins from Site Kh-A15. a,d: on concave truncations (nibbled notches); b: on oblique truncation; c: multiple burin on concave truncation. (Drawing: R. Erskine).

typological aspects that set them apart from other archaeological phenomena in the Near East. These sites represent a very specialized concentration of activity, one that focused on some as yet unexplained part of a subsistence system that entailed periodic returns to the same location, perhaps to "harvest" a seasonally available resource. Until burin sites are found which have not suffered the degree of deflation witnessed up to now in the eastern and southern deserts of Jordan, the nature of the economic activity that required such a restricted expression of stone tool manufacture will remain speculative.

It must be acknolwedged that the ascription of the burin sites to the Pre-Pottery Neolithic B period on the basis of the burin styles is a very tenuous conclusion. Although burin types conform well in this respect to the Wadi Dhobai evidence, the projectile points from the Dhobaian

industry[20] are not particularly diagnostic of PPNB times, and the industry may belong instead to a later period of Neolithic development. This contention is supported in part by recent excavations at 'Ain Ghazal[21], where tanged projectile points have been found in Yarmoukian contexts, together with a burin assemblage that is characterized by an emphasis on burins on truncations[22]. By contrast, the burins from late PPNB levels at 'Ain Ghazal are predominantly transverse types[23], only one of which was found at Kh-A15.

Recent research has brought to light this curious cultural adaptation, but to date the results of the research have fallen far short of proposing any solid explanations for this unparalleled manifestation. As the problems come into sharper focus, however, it can be hoped that additional exploration and analysis can begin to resolve the present enigmas represented by burin sites.

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[20] Waechter, J. and Seton-Williams, V., 1938, The Excavations at Wadi Dhobai 1937-1938 and the Dhobaian Industry. *JPOS* 18: 172-186.

[21] Betts, pers. comm., has obtained a mid-6th millenium C-14 date for an eastern desert site with many burins on concave truncations, which lends support to a period later than PPNB.

[22] Rollefson, G. and Simmons, A., in press, The 1984 Season at Neolithic 'Ain Ghazal: Preliminary Report. *ADAJ* 29.

[23] Rollefson, G., 1984, 'Ain Ghazal: An Early Neolithic Community in Highland Jordan, Near Amman. *BASOR* 255: 3-14; Rollefson, G. and Simmons, A., 1985 (see Note 11); Rollefson, G. and Simmons, n.d. (see Note 22).

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