

THE MOUSTERIAN INDUSTRY FROM BISITUN CAVE (IRAN)

H.L. DIBBLE

ABSTRACT. — Bisitun, a Middle Paleolithic cave site in northwestern Iran, was excavated over thirty years ago by C. Coon. Its Mousterian industry, as later described by Skinner, has been thought to be characteristic of other Mousterian industries from that region, what is generally called the Zagros Group Mousterian. The present analysis shows that the Bisitun industry contains some important features that were overlooked by Skinner, including a high frequency of Levallois technique and several truncated-faceted pieces. Because these features have not yet been recognized in other Zagros Mousterian industries, their presence here raises the question of the distinctiveness and homogeneity of this Mousterian Group.

RÉSUMÉ. — Bisitun, site en grotte du Paléolithique Moyen du N. O. de l'Iran fut fouillé il y a plus de trente ans par C. Coon. Son industrie moustérienne, telle qu'elle fut décrite par la suite par Skinner, semblait présenter tous les caractères des autres industries moustériennes de la région, généralement nommées le « Groupe moustérien du Zagros ». Un nouvel examen de cette industrie a permis de montrer que l'industrie de Bisitun présente plusieurs traits non décelés par Skinner : haute fréquence de la technique Levallois et présence de pièces tronquées facettées. Ces caractères n'ayant pas été reconnus dans les autres industries moustériennes du Zagros, leur présence soulève la question de la validité de la distinction de ce groupe moustérien et de son homogénéité.

Bisitun is a small cave located in the Zagros region of northwestern Iran that was excavated in 1949 by Carlton Coon of The University Museum, University of Pennsylvania. At the site Coon uncovered moderately rich deposits of Paleolithic artifacts and one hominid radius fragment. These materials were briefly described in publications on his work in Iran and elsewhere in the Near East (1). A portion of the lithic material that was brought back to the University Museum was later analyzed by Skinner and published as part of his synthesis of some Near Eastern Mousterian industries (2). This report, based on recent examination of the Bisitun material, attempts to clarify certain aspects of the industry that are important to our understanding of its place in the Middle Paleolithic prehistory of that region (3). A report by Nancy Minugh and Erik Trinkaus describing the Bisitun radius fragment is currently being prepared.

July of 1949 Coon excavated an 8 by 2 meter trench which, at its deepest point, was 6.5 meters below the surface. A total of 39 cubic meters of deposit, yielding a total of 6500 lithic artifacts, was removed during the two-week excavation. Nine stratigraphic horizons were more-or-less arbitrarily defined (see Table 1), of which the lowermost five (E+ through G) contained the Mousterian industry described here.

Because no standard Paleolithic typology was widely accepted at the time of his analysis, Coon developed his own descriptive terminology. His three major artifact type categories were "discs" (i.e. small, exhausted Levallois and disc cores), "knives" (primarily single and double scrapers), and "points" (including both true Mousterian points and convergent scrapers). Coon did recognize the presence of Levallois technique and at one point referred to the Bisitun Mousterian as part of the "great Leval-

BACKGROUND

Bisitun cave is located some thirty miles east of Kermanshah at an altitude of about 1400 meters. In

(1) COON, 1951; COON, 1957.

(2) SKINNER, 1965.

(3) I wish to thank various members of the staff of The University Museum and especially Maude de Schauensee for helping me gain access to, and information about, the Bisitun collection; and Ofer Bar-Yosef, Arthur Jelinek and Bernard Wailles for providing useful comments on this paper. Funds for artifact illustrations were generously made available by The University Museum through the Harrison and Members Funds.

TABLE 1

Stratigraphic subdivisions of Bisitun Cave.

Level	Datum (cms)	Description	Industry
A	ca. 20	Grey earth	Historic
B	20-??	Red earth	ceramic
C	??-130	Red earth	non-ceramic
D	130-260	Rockfall	mixed Upper/Middle Paleolithic
E+	260-300	Brown earth	Mousterian
E-	300-350	Brown earth	Mousterian
F+	350-400	Brown earth	Mousterian
F-	400-510	Brown earth	Mousterian
G	510-650	Brown earth	Mousterian

loiso-Mousterian culture" that had been described earlier for other parts of the Near East (4).

Considering the time of his writing one cannot be overly critical of Coon's typological methods, although for comparative purposes it eventually became necessary to analyze the material with a more widely accepted typology. In fact, this same need existed for much of the Paleolithic material from the Near East that had been excavated before and soon after World War II. To meet this need James Skinner, then a graduate student at Columbia University, set out in the early 1960s to personally examine most of the Middle Paleolithic known from this region and to apply consistent typological nomenclature and statistical methodology. In the course of his research he examined the collections from a number of sites, namely Abou Sif, Bisitun, Qafzeh, Tabun, Skhul, El Wad, Erq el-Ahmar, Hazar Merd, Kunji, Shukbah, Shubabiq, and Yabrud.

Based on his analyses, Skinner defined three major typological groups of Mousterian from the Near East, designated Groups A, B, and C (5). Skinner placed the Bisitun assemblage in his Group A, or what is often called the Zagros Group Mousterian because all recognized manifestations of this group came from the Zagros region. In addition to Bisitun, other collections assigned to the Group A Mousterian were those from Shanidar D, Hazar Merd C, and Kunji. The defining characteristics of this group (6) included little or no use of Levallois technique; high frequencies of scrapers and points, many with Quina or demi-Quina retouch; no bifaces; and few denticulates. Although the existence of a distinct Zagros Mousterian is still generally recognized, Skinner's other groups (B and C) are no longer widely accepted. His Group B is now referred to as Yabrudian, or the Yabrudian facies of the Mugharan Tradition (7). Based on its stratigraphic position in the Tabun sequence it is probable that the Yabrudian dates to Stage 5 in the oxygen isotope chronology (8) and therefore probably predates the Levantine Mousterian (9). Group C, as defined by Skinner, generally represents the Levantine Mousterian, though it appears that within this group there is a complex relationship among several temporal and/or regional subdivisions (10).

To a large extent, Skinner's attempts to synthesize the Near Eastern Mousterian were hampered by problems with his primary evidence. These problems

stemmed from the fact that many of these collections had been excavated years earlier and, in many cases, not according to modern standards. This meant, for example, that there was a certain degree of uncertainty regarding the depositional history of the sites and therefore the stratigraphic position of the artifacts themselves. Moreover, many of the collections represented only a portion of the total number of artifacts removed from the sites, the rest having been discarded at the time of excavation. This often led to a form of "excavator bias" in the collections, which seriously distorted the character of the assemblages they represented. Another problem Skinner faced in dealing with older collections was that they were not always stored in the same place. Tabun, one of the major sites represented in Skinner's work, is perhaps the most extreme example of this problem. Jelínek (11) reports that the over 50,000 artifacts retained by Garrod in her excavation of Tabun were deposited in some 40 institutions throughout the world. Skinner was able to examine only six of these scattered collections from Tabun and it is unlikely that that portion accurately reflected in all respects the collection originally retained by Garrod.

It appears likely that Skinner unknowingly faced a similar problem when he examined the material from Bisitun. Coon states in his reports that he did not retain all the artifacts from the excavation but only the retouched pieces and a small percentage of the unretouched flakes and cores. This collection is, and has been since Coon's excavation, housed at The University Museum. From what is possible to reconstruct based on Coon's published reports, University Museum accession records, and analysis of the material, the collection was not completely unpacked and stored as a unit until the mid-1970s, at least a decade after Skinner analyzed it. Given that his total counts (see Table 2) are almost 40 percent less than those observable today, it seems likely that he did not see a significant portion of the collection. Clearly problems like this are an ever present hazard in research on older museum collections. In recognition of these problems The University Museum is now directing a considerable effort toward developing a computerized data base of its entire holdings which will minimize such risks.

It is of considerable interest that an examination of that portion of the Bisitun collection apparently not seen by Skinner reveals many features that change the overall character of the assemblage. While these features are discussed in detail below, it should be borne in mind that the description that follows is still of an older, and possibly biased collection. For this reason more detailed comparisons with other material will not be attempted here.

(4) COON, 1951 : 54. In Appendix II of the report on the industry (Coon, 1951), Movius provides some brief comments on the lithics.

(5) SKINNER, 1965 : 134-176.

(6) SKINNER, 1965 : 135-143.

(7) JELÍNEK, 1981 a : 271.

(8) JELÍNEK, 1981 a; JELÍNEK, 1982; EMILIANI and SHACKLETON, 1974.

(9) See also JELÍNEK *et al.*, 1973; JELÍNEK, 1975.

(10) COPELAND, 1975; COPELAND, 1981; HOURS, COPELAND *et al.* AURENCHE, 1973; JELÍNEK, 1981 a; JELÍNEK, 1981 b; MARKS, 1981.

(11) JELÍNEK, 1975 : 297.

TYOLOGICAL AND TECHNOLOGICAL OBSERVATIONS

Tables 2 through 4 present basic typological summaries of each layer of the Bisitun collection and for the total, and figure 1 presents cumulative

TABLE 2

Tool counts from Bisitun. Skinner's counts do not include Layer G.

	E+	E-	F+	F-	G	TOTAL	%	SKINNER
1. Typical Levallois flake	13	13	54	8	5	93	8.6	-
2. Atypical Levallois flake	2	8	7	2	1	20	1.8	15
3. Levallois point	-	1	1	-	-	2	.2	-
4. Retouched Levallois point	-	-	1	-	-	1	.1	-
5. Pseudo Levallois point	1	-	-	-	2	3	.3	-
6. Mousterian Point	1	5	17	7	-	30	2.8	92
7. Elongated Mousterian point	1	-	10	7	-	18	1.7	94
8. Limace	-	-	2	1	-	3	.3	6
9. Simple straight racloir	14	11	48	38	6	117	10.8	114
10. Simple convex racloir	13	21	62	46	4	146	13.5	71
11. Simple concave racloir	4	2	2	7	2	17	1.6	5
12. Double straight racloir	2	10	29	29	2	72	6.6	57
13. Double straight-convex racloir	3	9	31	31	3	77	7.1	54
14. Double straight-concave racloir	1	-	1	3	-	5	.5	12
15. Double biconvex racloir	6	5	31	15	1	58	5.4	54
16. Double concave racloir	1	1	3	2	-	7	.6	-
17. Double convex-concave racloir	2	19	15	1	-	37	3.4	5
18. Straight convergent racloir	3	4	11	13	-	31	2.9	13
19. Convex convergent racloir	8	11	51	42	1	113	10.4	44
20. Concave convergent racloir	1	3	10	6	-	20	1.8	5
21. Déjeté	-	-	5	6	-	11	1.0	23
22. Straight transverse racloir	-	-	2	1	1	4	.4	-
23. Convex transverse racloir	-	-	1	2	-	3	.3	-
25. Concave transverse racloir	-	1	3	3	-	7	.6	-
26. Abruptly retouched racloir	-	-	1	-	-	1	.1	9
27. Racloir with thinned back	-	-	2	1	-	3	.3	-
28. Bifacial racloir	-	-	1	5	-	6	.6	7
29. Alternate retouched racloir	-	-	1	3	-	4	.4	6
30. Typical endscraper	-	1	2	2	1	6	.6	4
31. Atypical endscraper	-	-	1	1	1	3	.3	19
32. Typical burin	1	3	3	1	-	8	.7	-
33. Atypical burin	-	-	3	6	-	9	.8	5
34. Typical percoir	-	2	5	5	-	12	1.1	-
35. Atypical percoir	-	-	-	1	-	1	.1	5
36. Typical backed knife	-	1	4	1	1	7	.6	-
37. Atypical backed knife	1	-	2	2	-	5	.5	-
38. Naturally backed knife	-	3	2	-	-	5	.5	-
39. Raclette	-	-	-	-	2	2	.2	-
40. Truncation	-	3	8	7	2	20	1.8	-
42. Notch	4	1	5	7	2	19	1.8	-
43. Denticulate	3	3	15	13	2	36	3.3	5
45. Flake with interior retouch	-	-	1	-	-	1	.1	-
48-49. Marginally retouched pieces	2	3	11	11	-	27	2.5	-
51. Tayac point	1	-	-	1	-	2	.2	-
54. End-notched flake	-	-	1	-	-	1	.1	-
57. Tanged point	-	-	1	-	-	1	.1	-
62. Divers	2	1	1	4	-	9	.8	-
TOTAL	88	128	472	355	40	1083	100.0	724
TRUNCATED-FACETED PIECES	7	10	46	48	4	115		
CORES	4	4	30	61	9	108		
FLAKES	45	28	95	51	46	265		

TABLE 3

Typological Indices for complete count (Type I-62).

Layer	Ilty	IR	IAu	I	II	III	IV
E+	19.31	63.63	1.14	19.31	70.45	2.27	3.41
E-	17.18	62.5	.78	17.18	66.40	10.16	2.34
F+	13.13	66.53	1.27	13.34	72.66	6.36	3.18
F-	2.81	75.56	.84	2.81	79.78	7.30	3.65
G	15.00	52.50	2.50	15.00	52.50	17.50	5.00

TABLE 4

Typological Indices for restricted count.

Layer	IR	IAu	II	III	IV	IQ
E+	78.87	1.41	87.32	2.81	4.22	19.64
E-	77.67	.97	82.52	12.62	2.91	16.67
F+	78.89	1.51	86.18	7.53	3.76	21.43
F-	80.30	.90	84.78	7.76	3.88	20.52
G	61.76	2.94	52.50	10.59	5.88	19.05

TABLE 5

Technological Indices. Percent of true blades is based on flaking technique where recognizable on all artifacts.

Layer	IL	IF	IFs	% true blades
E+	45.73	71.76	58.82	2.48
E-	59.57	61.26	57.66	4.96
F+	52.15	67.61	56.06	4.72
F-	46.67	61.94	48.88	4.35
G	24.39	60.98	48.78	0.00

graphs summarizing these data. Technological indices are presented in table 5 (12).

Scrapers

The various scraper types make up the bulk of the industry. In this regard the Bisitun material is typical of other Zagros industries as described by Skinner. The scrapers are virtually all on flakes (primarily Levallois when possible to tell) and generally well-made.

As has been noted elsewhere (13), these scrapers appear to reflect a process of continuous reduction. That is, the single, double and convergent forms may best be seen as stages along a continuum of remodification and reduction rather than as three distinct "types" representing discrete functions or styles. Three aspects of their morphology suggest this interpretation. First, in terms of their dimensions, there are no differences in thickness or width among the three classes of scrapers. The only statistically significant difference among them in dimension is that convergent scrapers are slightly shorter, which is to be expected since they are the only form that

(12) Additional artifact illustrations may be found in the original report of the industry (COON, 1951), pl. I-III.

(13) DIBBLE, 1984.

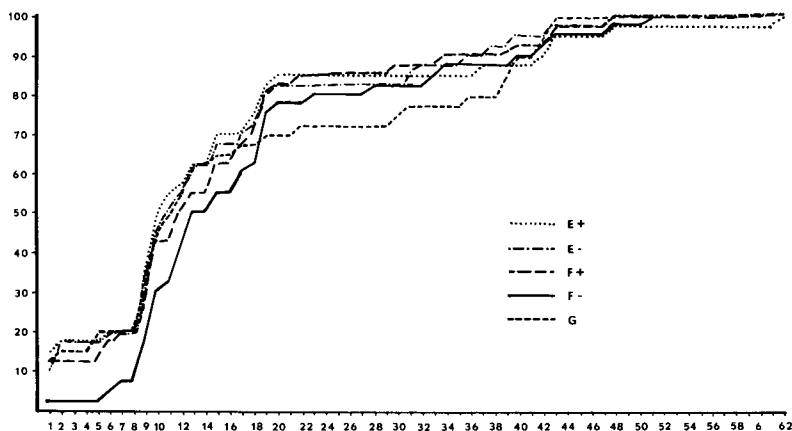


FIG. 1. — Cumulative graph of industries from the Mousterian levels of Bisitun cave.

exhibits retouch (and therefore removal) at the distal end. The similarity in thickness suggests that all of the scraper types reflect the same population of flake blanks, and the same mean maximum widths (in spite of lateral retouch) suggests that the scrapers continued to be resharpened until some minimum width was reached. Second, the frequency distribution of the angles formed by the two sides of double and convergent scrapers as a single group is not significantly different from a normal distribution, which indicates that together they reflect one unimodal population of edge convergences. Third, retouch intensity correlates with scraper class in that single edge scrapers exhibit the lightest retouch; double scrapers have relatively more examples of heavier retouch; and convergent pieces have the highest relative frequency of heavy and Quina, or stepped, retouch. In other words, as one moves along the continuum from the single to double to convergent classes, there appears to be a parallel increase in the utilization of more flake edges for retouch (one retouched edge on single scrapers and two for the double and convergent forms) and more intense retouch on those edges.

Preliminary data on over 1200 scrapers from several Mousterian levels at Combe Grenal suggest that a similar reduction model for scrapers holds for the Mousterian of France. These data show that retouch intensity increases from single to double to convergent types, as it does at Bisitun, and also that retouch intensity correlates with the number of retouched edges. A difference in the French material is that transverse and *déjeté* types do not occur in any frequency at Bisitun. Analysis of other Near Eastern industries should provide interesting information in this regard.

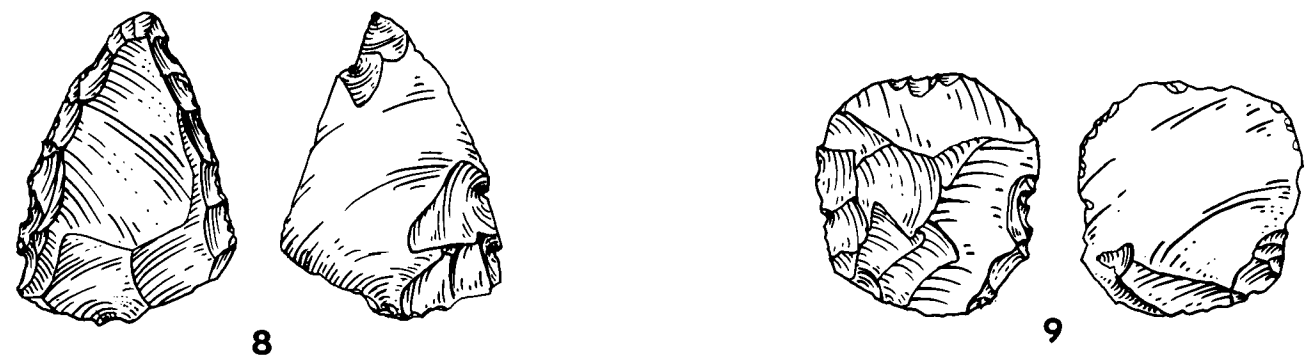
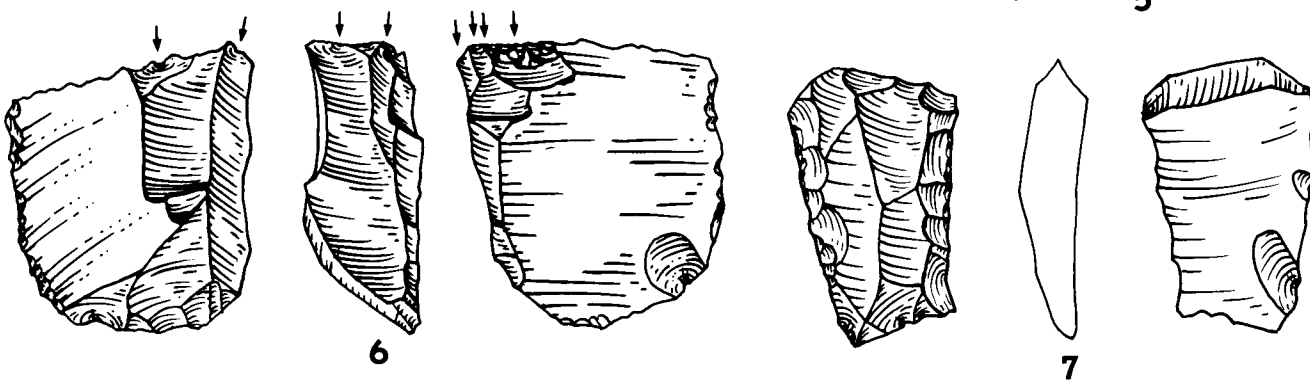
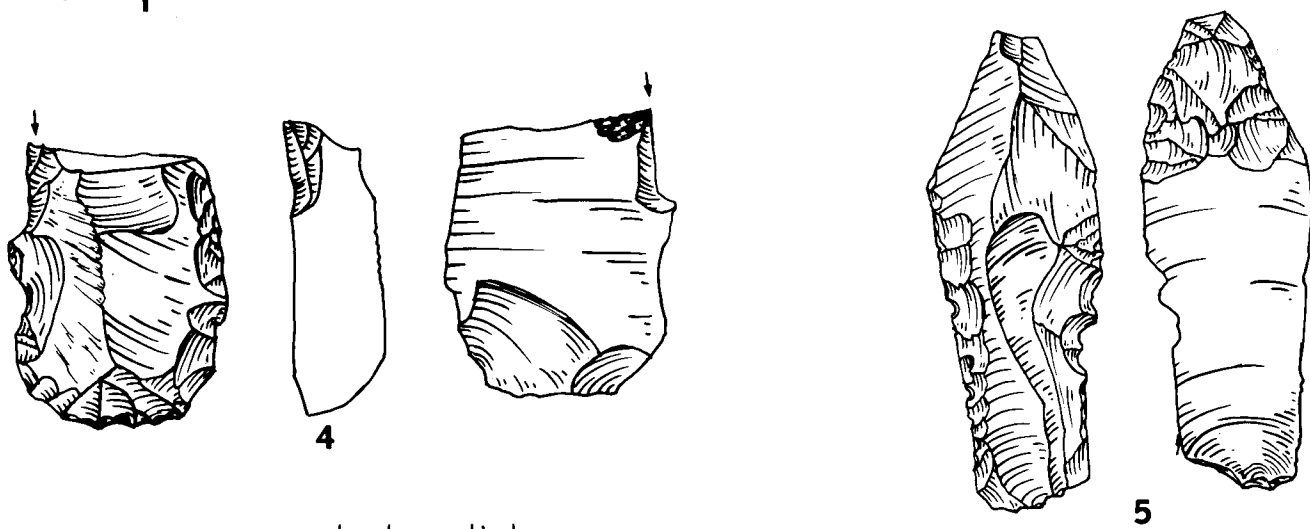
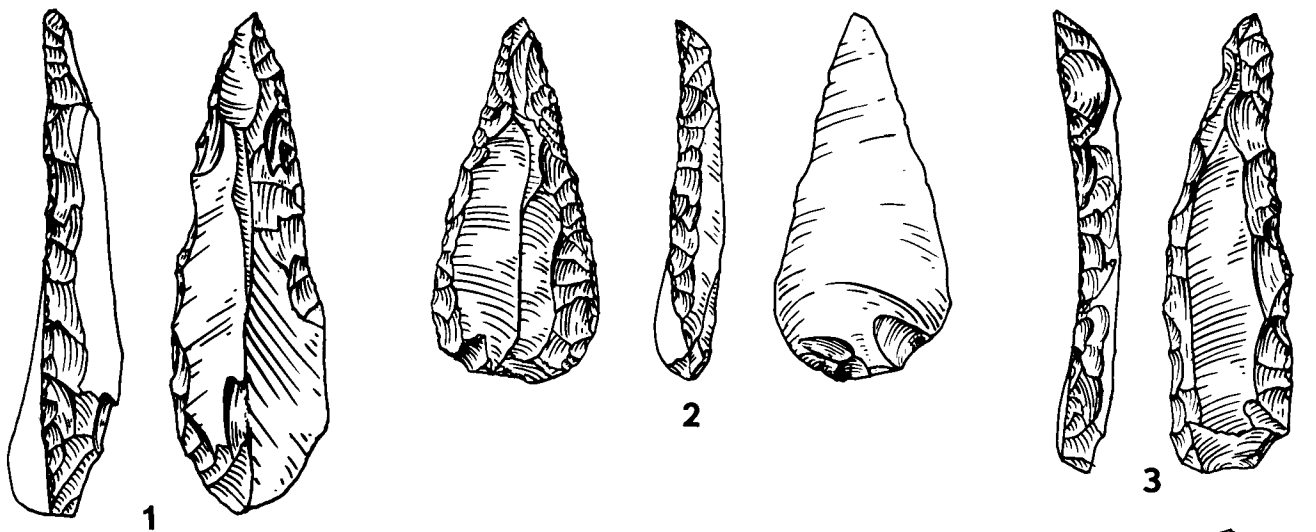
One discrepancy between Skinner's analysis and that presented here is that I have been somewhat more conservative in assigning convergent pieces to "point" categories, as opposed to convergent scrapers. In following Bordes' (14) remarks on the typology, true Mousterian points must appear pointed when viewed from the side as well as the top, and it is from this lateral aspect that many of these pieces from Bisitun were classified as scrapers (see fig. 2 : 1-3). This is, of course, a recognized problem area of the typology and one that should be addressed more definitively in the future. Like the other tools, many of the points are elongate (type 7), probably reflecting to some extent the laminar nature of the flake blanks (see below).

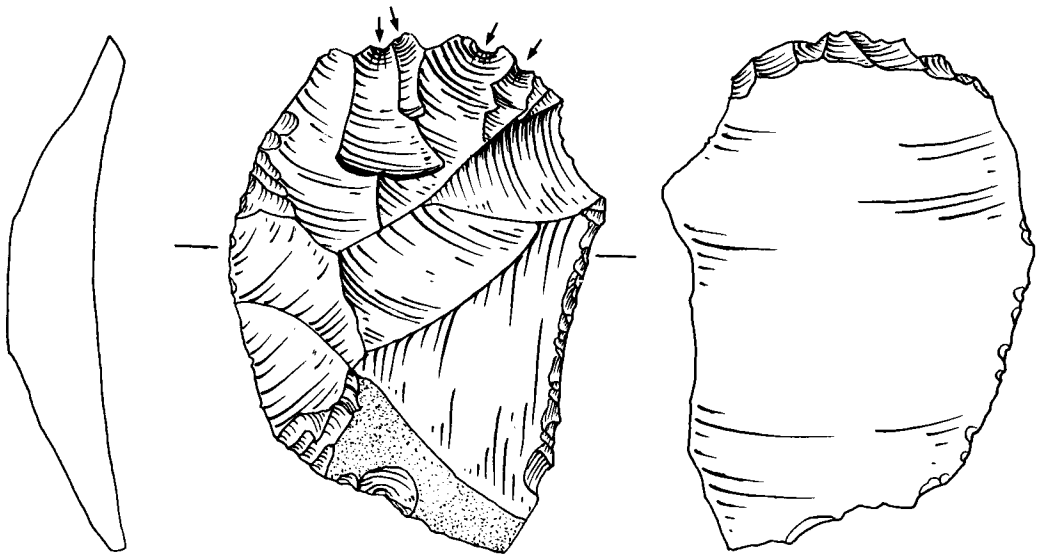
Other Tools

Tools other than scrapers are relatively rare. There are more typical burins in the Bisitun assemblage (i.e. fig. 2 : 4, 6) than were reported by Coon and Skinner, all of which except one are on snapped pieces and all but one on pieces that exhibit other kinds of retouch (primarily scrapers). There are also a dozen typical *perçoirs*, seven of which are made on flakes also modified as scrapers. Backed knives, both typical and atypical, are rare. The percentage of the Upper Paleolithic group, presented in tables 3 and 4, is not very high. Of the notches, eight are Clactonian in technique, and, again, several occur on scrapers. Denticulates are present, though not in high percentages. One interesting piece (fig. 2 : 5) exhibits a flat retouch on the interior surface of the distal end.

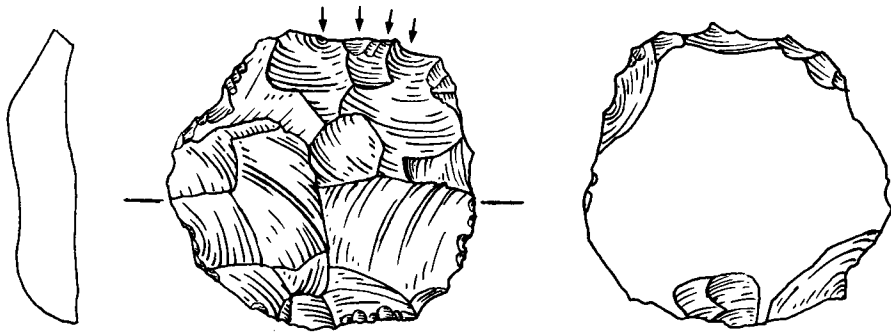
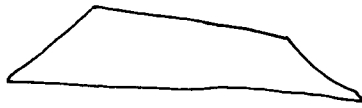
(14) BORDES, 1961 : 27.

FIG. 2. — 1-3 Convergent scrapers; 4,6 burins; 5 piece with inverse retouch on distal end and scraper retouch along left side; 7 burin surface plan, or "inverse chamfrein"; 8 convergent scraper with inverse "Kostienki-type" retouch; 9 small Levallois flake with proximal, inverse truncation. Scale 1 : 1.

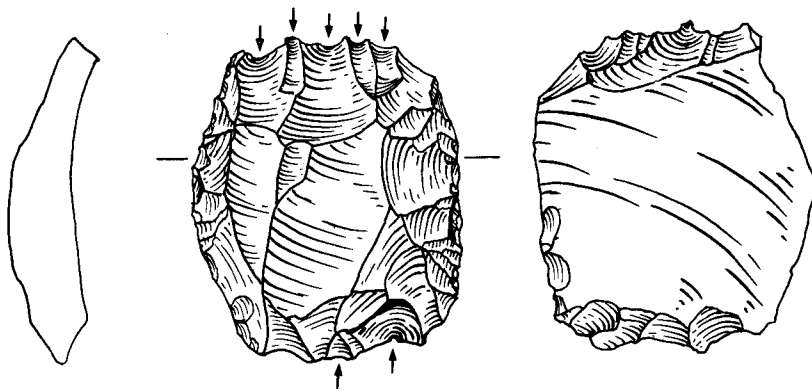




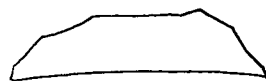
1



2



3



Of special interest is the occurrence of several (N = 115) artifacts that are identical to those at other sites in the Levant and Syria that have been called either truncated-faceted pieces (15) or Nahr Ibrahim cores (16), though they may also be seen as variations of Kostienki Knives or Sinew frayers (17). These pieces are typically characterized by an inverse truncation on the distal or (most often) the proximal end. Usually this truncation then serves as a platform for the removal of one or more small flat flakes from the exterior surface of the flake (figs. 3-4).

The intended use of these pieces is not obvious. The flakes that are removed from the flake surface are so small, generally less than a centimeter, that it is difficult to see this as a method of blank production. Coon (18) referred to this retouch as "trimming on the butt, bulb and shoulder" and suggested that it reflected a modification on the points for hafting purposes. However, this interpretation may not be correct either, for two reasons. First, at Bisitun, and at other Near Eastern sites as well including Jerf Ajla, Nahr Ibrahim, and Rosh Ein Mor (19), this form of retouch occurs on all classes of artifacts, not just the points. It is difficult to visualize all of these tools and unretouched pieces as being equally likely candidates for hafting. In fact, at Bisitun there is no statistical association between the occurrence of this retouch and particular typological classes (see table 6), which suggests that the inhabitants selected blanks randomly for this kind of modification. Second, many pieces exhibit this retouch on both the proximal and distal ends (e.g. fig. 3 : 3), which is not commensurate with normal hafting.

TABLE 6

Association between truncated-faceted pieces and artifact class
($X = 7.74$, $df = 5$, $P > .15$).

Artifact Class	NORMAL		TRUNCATED-FACETED	
	N	%	N	%
Unretouched	231	.20	22	.19
Single Scrapers	280	.24	26	.23
Double Scrapers	257	.22	25	.22
Points & Conv. Scrapers	212	.18	30	.26
Notches and Denticulates	55	.05	6	.05
Other	138	.12	6	.05

(15) SCHROEDER, 1969.

(16) SOLECKI and SOLECKI, 1970.

(17) Kostienki knives are known generally from some Upper Paleolithic industries of Central Europe (OTTE, 1980, especially fig. 5; KLEIN, 1969), though they do occur rarely in the Mousterian of Western Europe (see TURQ and MARCILLAUD, 1976). LEAKEY (1931 : 99-100) applied the term sinew frayer to nearly identical tools made on blade or flake fragments from Late Stone Age (Kenya Aurignacian) of Gamble's Cave II.

(18) COON, 1951 : 57-65.

(19) CREW, 1976 : 109-110.

Another possibility is that this modification was done to achieve a working edge with a particular morphology. As pointed out by Jelinek (personal communication), in most cases this retouch tends to form a kind of denticulation along the exterior side of the truncation, which might have been useful for a specific activity, such as shredding sinew or bark. Perhaps this could be tested through extensive microwear studies. It is noteworthy that this working edge is located on a portion of the flake that is not normally retouched and therefore in no way interferes with the application of retouch on other edges. Perhaps this explains why it randomly crosscuts the other retouched (and non-retouched) categories, and if so, this may be another reflection of relatively high intensity of utilization of raw material in the form of recycling.

There is some variation in the character of the retouch on these pieces. On most of the pieces it is quite abrupt; on other pieces it is smoothly beveled and invasive (e.g. fig. 4 : 2). It is not presently possible to say whether this represents normal variation or if it reflects a number of different uses. There are also a number of pieces that exhibit only a truncation and these have been classified as such, although they too may represent some form of technology in common with the truncated-faceted pieces. While the presence of these pieces at Bisitun has been previously overlooked, it is now clear on the basis of reports cited above that their range extends a great distance beyond the Levant. At present their frequency in other Zagros Mousterian industries is unknown, although at least one example has been observed in the Shanidar material (20).

Debitage

Perhaps the greatest disagreement between this analysis of the Bisitun material and that of Skinner concerns the observed frequency of Levallois technique. Skinner recorded fifteen atypical Levallois flakes, for an ILty of 2.4. There are, in fact, over one hundred recognizable typical and atypical Levallois flakes (see fig. 5), which result in an ILty of 10.6, and a Levallois Index (i.e. including retouched Levallois flakes) for the entire collection of 55.8.

Most of this discrepancy probably is due to Skinner's study of only a portion of the collection, though it may also in part reflect a problem with the definition and/or recognition of Levallois. Skinner (21) realized that his low Levallois Index for the

(20) JELINEK, pers. comm.

(21) SKINNER, 1965 : 139-140.

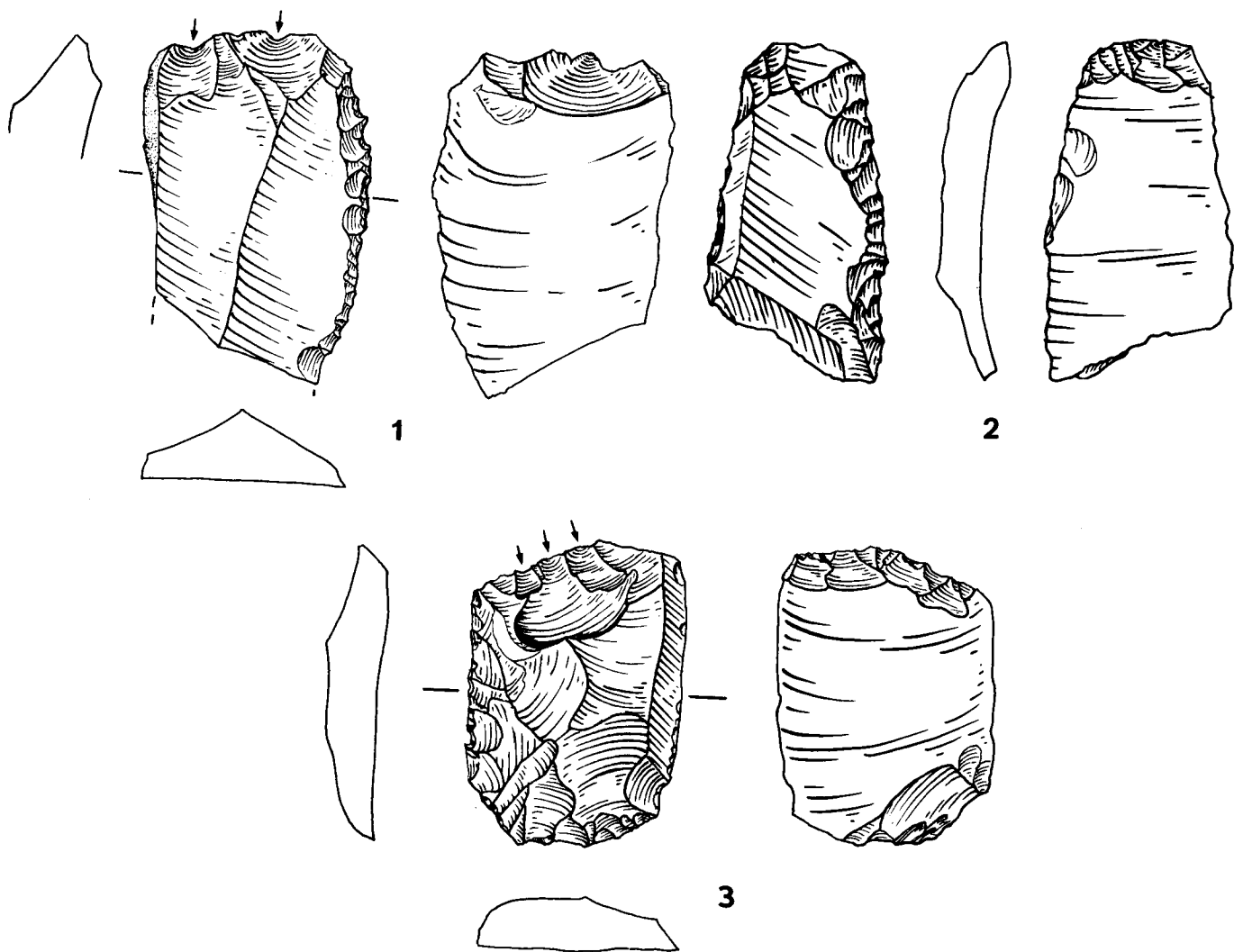


FIG. 4. — Truncated-faceted pieces. Note the fine beveling and lack of exterior flake removals on 2.

Bisitun material was at odds with Coon's original characterization of the industry (see *supra* : 24), and argued that to be recognized as Levallois, flakes must show evidence of radial preparation (versus the single or bi-directional exterior flake scars that are common at Bisitun) or preparation as points; exhibit a high proportion of platform faceting with some frequency of Chapeau-de-gendarme platforms; and that the flakes should be very thin.

Based on a more recent understanding of technological variability among Levallois industries, Skinner's approach to Levallois may be overly conservative. Since the time of his work it has been generally recognized that there are several varieties of Leval-

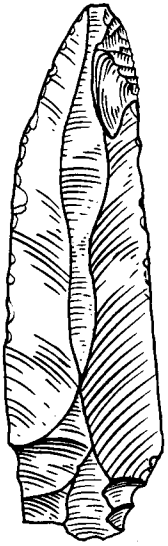
lois technique (22), and in other Mousterian Levallois assemblages from the Near East the use of single and bi-directional preparation is common (23). A lack of Levallois points is also not unusual during certain phases of the Levantine Mousterian at least, such as the Levantine Phase 2 Mousterian (24), though obviously their absence at Bisitun does not

(22) BORDES, 1980.

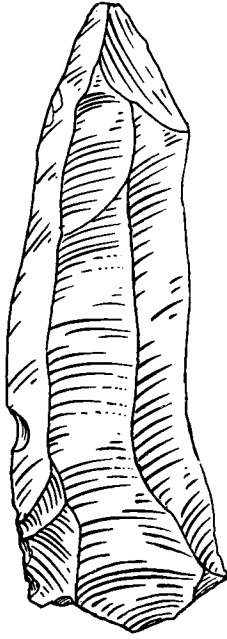
(23) E.g. at Tabun and in other industries from the northern Levant corresponding temporally to Layer D (HOURS, COPELAND and AURENCHÉ, 1973), and the Negev (MUNDAY, 1976 b).

(24) COPELAND, 1975.

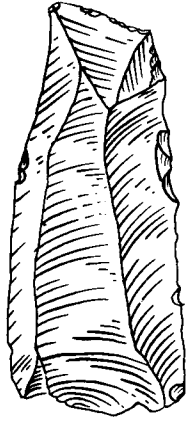
FIG. 5. — Levallois blades and flakes.



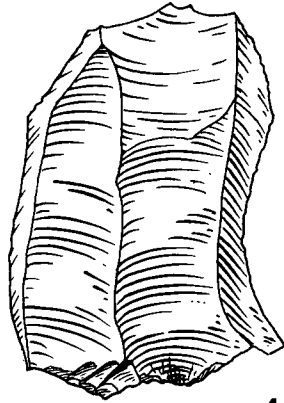
1



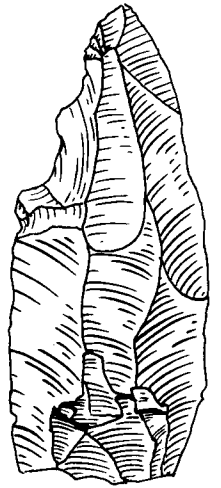
2



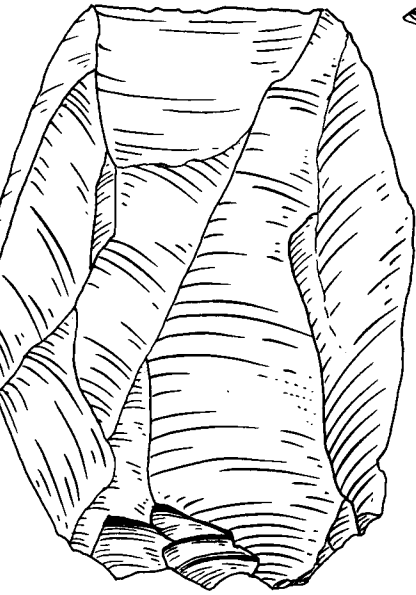
3



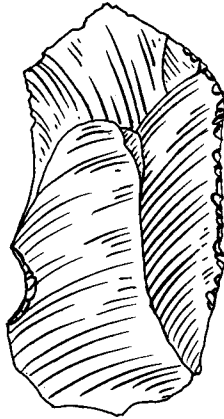
4



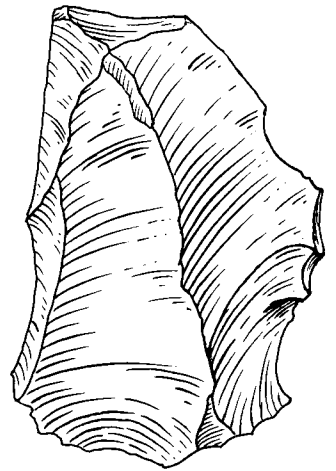
5



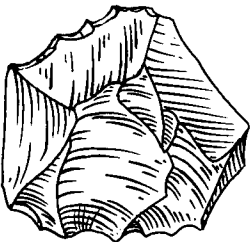
8



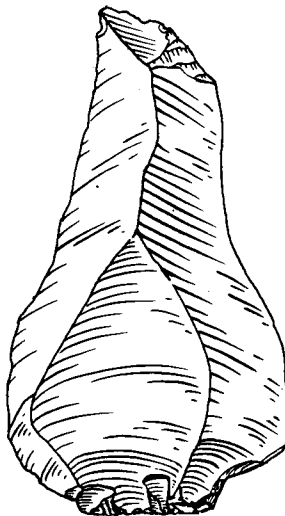
6



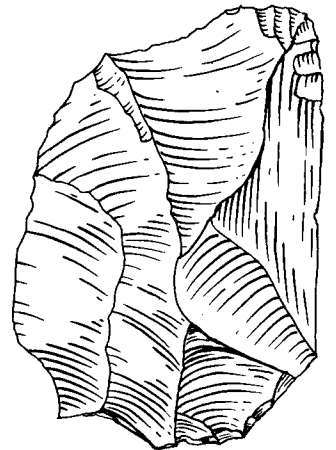
7



9



10



11



imply that this site relates temporally or culturally to those industries. However, given their absence it is also not surprising that Chapeau-de-gendarme platforms, which are usually associated with Levallois point technique, are lacking as well. Finally, the Levallois flakes from Bisitun are not thick (see table 7) and moreover, it has been shown that there is a considerable amount of variation in flake dimension among different Mousterian assemblages (25). While this variation certainly reflects technique, it also reflects other factors, such as raw material. Thus Skinner's criteria for Levallois are not universally valid and this may in part explain the low percentages reported by him.

While the frequency of Levallois technique is not as high as it tends to be in the Levantine Mousterian, it is clearly present at Bisitun in constant and significant proportions. Given this demonstrable presence, the definition and characterization of the "Zagros Group" Mousterian as proposed by Skinner should probably be modified, especially if other Zagros collections prove to contain significant numbers of Levallois flakes.

TABLE 7

Metric summaries of complete artifacts by typological class

TYPE		LENGTH	WIDTH	THICKNESS	N
LEVALLOIS FLAKES	MEAN	53.60	27.11	5.06	92
	(S.D.)	(13.14)	(9.52)	(2.12)	
ALL COMPLETE FLAKES		49.38	24.43	5.22	167
		(14.19)	(9.26)	(2.23)	
SINGLE SCRAPERS		52.68	24.44	5.58	116
		(12.93)	(6.45)	(3.75)	
DOUBLE SCRAPERS		55.56	24.84	5.54	68
		(12.07)	(6.77)	(1.82)	
CONVERGENT SCRAPERS		48.86	22.68	5.48	66
		(12.86)	(5.82)	(2.74)	
CORES		39.55	31.87	14.28	56
		(7.57)	(7.17)	(6.03)	

Metric Analysis

In light of the fact that Coon did not retain the entire Bisitun assemblage, metrical descriptions of the industry should not be taken as conclusive. Table 7 presents summary dimensional statistics on some typological classes of artifacts for which there were sufficient numbers. A possible interpretation of the dimensions of the scrapers is presented above and in another paper (26).

In general, the flaking techniques used at Bisitun involved primarily single or bi-directional preparation, though there is not a very high percentage of true blades (see table 5 and fig. 5 : 1-3). However, in terms of dimensional shape (i.e. relative length to width), the complete flakes are highly laminar (Ilam = 55.1). Retouched pieces retain this elongated

pattern of shape, especially in the points and scrapers. Some very small, radially-prepared Levallois flakes are also present (fig. 5 : 9) though it is likely that many of these were discarded at the site by Coon along with much of the other debitage and cores. The overall width to thickness ratio for complete flakes has a mean of 5.02 and variance of 3.01 (N=167).

The average dimensions of the unretouched flakes do not differ significantly from those of the retouched scrapers. From these data it is not possible to see any definite patterns of blank selection for modification similar to that seen at other sites (27), though clearly the retouched flakes must have been larger prior to retouching. However, it is quite possible that this homogeneity reflects a modality in selection of the unretouched flakes at the time of excavation.

There is, however, a striking difference in the size of unretouched flakes and the mean maximum length of the cores from which they presumably were derived. While some of this difference may be the result of excavator bias, the same has been noted for intact samples from other sites, such as Jerf Ajla. Schroeder (28) suggests that this may reflect a continuous reworking of the cores (both Levallois and non-Levallois) "until they became reduced in size and then abandoned". This would be the simplest explanation for the difference between the mean lengths of cores and flakes and at Bisitun, as at Jerf Ajla, many of the cores, including the Levallois cores, are indeed worked down to a point where further removal would be almost impossible. This raises a question concerning the definition and characterization of Levallois techniques that is addressed in another paper (29).

DISCUSSION

The various layers at Bisitun appear to be quite uniform both typologically and technologically and show no directional change through time. Generally speaking, the industry appears to reflect a high intensity of utilization as seen in the reduction of scrapers and in the number of composite tools.

In many respects the industry from Bisitun appears as Skinner originally described it, with two major exceptions. First is the recognition of a much higher frequency of Levallois. This technique is notably absent in other examples of the Zagros Mousterian as analyzed by Skinner. But its presence at Bisitun either means that this site reflects a specialized activity variant (although such a distinction is not reflected in the rest of the typology) or

(25) DIBBLE, in press.

(26) See also DIBBLE, 1984.

(27) Cf. MARKS and KAUFMAN, 1983 : 76-77; JONES, MARKS and KAUFMAN, 1983 : 292-293.

(28) SCHROEDER, 1969 : 376.

(29) DIBBLE, in press.

that Levallois may have also been unrecognized in other Zagros group industries. Second is the high frequency of "truncated-faceted" pieces. It is not obvious that the retouch found on these pieces represents modification for hafting purposes, nor does it seem likely that they represent cores for obtaining usable blanks. Clearly more comparative work and edge wear analysis should be done on these pieces in order to determine their possible use(s), morphological variation, and interpretive significance. Those from Bisitun are virtually indistinguishable from those illustrated from Jerf Ajla and Nahr Ibrahim, though clearly similar pieces exist from Africa through Europe.

Above all, this report points to the need for further understanding of the Mousterian in the Zagros region. The complete industry from Bisitun exhibits characteristics that are not a part of the original definition of the Zagros Mousterian Group as defined by Skinner. The implications of this are that the Mousterian industries from this area may not be as homogeneous as was originally described. In view of the present impossibility of making new collections from this region, it is hoped that an intensive reexamination of extant collections may add significantly to our knowledge of these interesting industries.

Harold L. DIBBLE
Department of Anthropology
The University Museum
University of Pennsylvania
Philadelphia, Pa 19104, U.S.A.

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