

TRUNCATED-FACETED FLAKES FROM LEVANTINE MOUSTERIAN ASSEMBLAGES

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INTRODUCTION

It is the purpose of this paper to provide new data on the truncated-faceted flakes in the Levantine Mousterian assemblages from the Keoue Cave, Lebanon.

T-F flakes (truncated-faceted flakes) were first described and illustrated by B. Schroeder (1966, 1969, pp. 396-403) in his analysis of the Levantine Mousterian assemblages from Jerf Ajla, Syria. According to his comprehensive descriptions, the process by which they are produced can be summarized as follows: one or more ends or sides of a flake are first truncated-faceted, then one or more secondary flakes are removed from the dorsal and/or ventral surface of the primary flake, using the t-f surface as a platform.

After his first report, the presence of these flakes has been reported from several Levantine Mousterian sites, e.g. Nahr Ibrahim, Ras el Kelb, Yabroud Shelter I (Solecki and Solecki, 1970), Naamé (Fleisch, 1971), Douara (Akazawa, 1974), Kebara (Schick and Stekelis, 1977), Bezez (Copeland, 1983), and some open sites in the Negev desert (Crew, 1976, Munday, 1976, 1977). This kind of flake is now recognized as one of the most common elements of the Levantine Mousterian (Crew, 1975, p. 434)*.

However they have only been thoroughly analyzed or described from Jerf Ajla (Schroeder, 1969), Nahr Ibrahim (Solecki and Solecki, 1970) and Rosh ein Mor (Crew, 1976). It is impossible, therefore, to compare t-f flakes, or to resolve the problem which Solecki and Solecki (1970, p.137) pointed out; whether t-f flakes could be used as a cultural or chronological marker within the Levantine Mousterian tradition. Although L. Copeland (1975, p. 330) says t-f flakes are more common in her Tabun C Type Mousterian, more concrete data is needed to confirm her view. Moreover the functions of this technology, whether as cores or not, are not fully understood. Functional differences between t-f

technique and normal retouch or core techniques have been unexamined.

Though this paper does not directly address these problems, I describe the technological context of the t-f flakes from Keoue Cave in detail, in order to provide new data for future investigations.

MATERIAL

Keoue Cave was excavated in 1970 by the Tokyo University Scientific Expedition to Western Asia, under the direction of Dr. H. Watanabe (Watanabe, 1970). It yielded about two thousand stone artifacts which can now be classified as Levantine Mousterian. Though they belonged to four different geological strata, they share highly homogeneous techno-typological characteristics (Watanabe, 1970, Anzai, 1983, p.118). For this reason, and to insure a large enough sample size, they are grouped together for the analysis here.

Among all the stone artifacts in the cave, only thirty six complete t-f flakes were found, and these comprise the main material studied in this paper**. Emireh points or t-f specimens without secondary flake scars were not studied here. In order to better describe

Table 1. Summary of the artifact characteristics examined in this paper

	T-F Flakes n=36	Cores n=40	Unretouched Flakes n=40	Retouched Flakes n=40
Length	42.42mm (10.777) ⁽¹⁾	33.80mm (9.729)	39.06mm (10.474)	44.20mm (9.571)
Width	33.47mm (7.489)	32.85mm (8.440)	24.71mm (8.568)	33.53mm (8.296)
Thickness	8.53mm (2.360)	16.75mm (5.735)	6.71mm (2.389)	8.13mm (2.267)
No. of Secondary Flakes	2.39 (1.379)	—	—	—
Length of Secondary Flakes	22.64mm (8.285)	23.05mm (6.003)	—	—
Flake Angle	66.25° (10.715)	72.90° (11.187)	105.50° (8.649)	109.38° (9.350)
Flake Method (L/N-L) ⁽²⁾	16/14	—	23/17	27/13
Tool Type (+/-)	20/16	—	—	—
Double Patina (+/-)	4/32	3/37	—	3/37

(1) standard deviation

(2) Levallois/Non-Levallois

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the technological characteristics of the t-f flakes, unretouched flakes, retouched flakes and cores were also examined. Each numbers forty and was chosen from the total Keoue specimens as random samples.

ANALYSIS

The technological attributes examined in this study are listed in Tables 1 and 5. If a significant attribute could not be ascertained the value was left blank on the sheet.

BLANK SIZE

The maximum length, width and thickness of the specimens were measured to examine the nature of selection of blanks for t-f flakes (Tables 1-4). In comparing the measurements of t-f flakes with those of unretouched flakes, a general trend emerges; the lengths of the t-f flakes are similar to ($t=1.377, df=74, p>.1$)**, and their widths and thicknesses are larger than those of the unretouched flakes (width : $t=4.722, df=74, p<.001$; thickness : $t=3.335, df=74, p<.01$). It should be added here, the lengths of the t-f flake blanks are generally regarded to have been larger than those of the t-f flakes, since most of the blanks were reduced in length by proximal and distal modifications, as will be discussed later. The implication of this is the need for relative larger, thicker flakes to execute the t-f technique.

This trend is also seen in the relationship between retouched and unretouched flakes (length : $t=2.291, df=78, p<.05$; width : $t=4.677, df=78, p<.001$; thickness : $t=2.727, df=78, p<.01$). Perhaps this reflects blank choice standards are similar for t-f and retouched flakes.

METHOD OF BLANK PRODUCTION

Each flake was examined, except six t-f flakes that were heavily modified, to see whether their blanks were produced by a Levallois technique. Table 1 shows that only more than half of the t-f flakes were detached by a Levallois technique. In contrast to this, the proportions of Levallois blanks reached ca. 60% for unretouched and retouched flakes.

These differences may reflect blank selection for t-f technique by the Keoue people, but the chi-square tests indicate they are not significant (unret. : $\chi^2=.121, df=1, p>.7$; ret. : $\chi^2=1.452, df=1, p>.2$).

LOCATION OF TRUNCATED-FACETED MODIFICATION

The t-f locations of the t-f flakes are classified into various types shown in Table 5. It is clear that proximal t-f is dominant (47%) while the others are not so numerous.

LOCATION OF SECONDARY FLAKE REMOVAL

Frequencies of various types of secondary flake removal-locations are quite similar to t-f locations described above (Table 5). Proximal removal accounts for 50% of them. This

Table 2. Length of the materials examined in this paper

Length	T-F Flakes	Unret. Flakes	Ret. Flakes	Length	Cores
22—30(mm)	8.3(%)	17.5	7.5	≤ 25 (mm)	10.0(%)
31—39	36.1	40.0	22.5	26—31	42.5
40—48	25.0	25.0	27.5	32—37	22.5
49—57	16.7	12.5	37.5	38—43	15.0
58—66	11.1	2.5	5.0	44—49	7.5
67—75	2.8	2.5	0.0	50—55	2.5
mean	42.42(mm)	39.06	44.20	mean	33.80(mm)

Table 3. Width of the materials examined in this paper

Width	T-F Flakes	Unret. Flakes	Ret. Flakes	Width	Cores
13—19(mm)	2.8(%)	27.5	5.0	20—26(mm)	25.0(%)
20—26	13.9	35.0	17.5	27—33	27.5
27—33	30.6	25.0	30.0	34—40	37.5
34—40	41.7	7.5	30.0	41—47	5.0
41—47	5.6	2.5	12.5	48—54	2.5
48—54	5.6	2.5	5.0	55 \leq	2.5
mean	33.47(mm)	24.71	33.53	mean	32.85(mm)

Table 4. Thickness of the materials examined in this paper

Thickness	T-F Flakes	Unret. Flakes	Ret. Flakes	Thickness	Cores
2—3(mm)	0.0(%)	5.0	0.0	6—9(mm)	10.0(%)
4—5	5.6	30.0	7.5	10—13	30.0
6—7	22.2	35.0	37.5	14—17	20.0
8—9	44.4	15.0	32.5	18—21	17.5
10—11	19.4	12.5	20.0	22—25	12.5
12—13	5.6	2.5	2.5	26—29	7.5
14—15	2.8	0.0	0.0	30 \leq	2.5
mean	8.53(mm)	6.71	8.13	mean	16.75(mm)

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Table 5. Location of Truncated-Faceted technique

	Truncated-Faceted								
	Proximal	Distal	Unilateral	Opposed	Bilateral	Ninety-degree	U-shaped	Square	Total
Secondary Flake Removal	Proximal ¹⁷ (17, 0) ⁽¹⁾	—	—	—	—	¹ (1, 0)	—	—	¹⁸ (18, 0)
	Distal	⁴ (2, 2)	—	¹ (1, 0)	—	—	—	—	⁵ (3, 2)
	Unilateral	—	² (1, 1)	—	¹ (0, 1)	—	¹ (0, 1)	—	⁴ (1, 3)
	Opposed	—	—	¹ (1, 0)	—	—	—	—	¹ (1, 0)
	Bilateral	—	—	—	¹ (1, 0)	—	—	—	¹ (1, 0)
	Ninety-degree	—	—	—	—	¹ (1, 0)	—	¹ (1, 1) ⁽²⁾	² (2, 1)
	U-shaped	—	—	—	—	—	⁴ (3, 2)	—	⁴ (3, 2)
	Square	—	—	¹ (1, 0)	—	—	—	—	¹ (1, 0)
	Total ¹⁷ (17, 0)	⁴ (2, 2)	² (1, 1)	³ (3, 0)	² (1, 1)	² (1, 1)	⁵ (3, 3)	¹ (1, 1)	³⁶ (30, 8)

(1) surface of secondary flake removal (dorsal, ventral)

(2) bifacial removal of secondary flakes

similarity reflects the relationship between the two modifications: the t-f surface serves as a platform for secondary flake removals. Their correlation is shown as a diagonal arrangement in the table. It should be noted that there are some exceptions, for example opposed modification.

SURFACE OF SECONDARY FLAKE REMOVAL

The t-f flakes that retain secondary flake scars on their dorsal surfaces outnumber those with scars on their ventral surfaces (Table 5). There are only two bifacial removed t-f flakes.

There does not seem to be any significant relationship between the removed surface and the locations of t-f and secondary flaking. It may be worthy of notice, though, that all proximally modified specimens are flaked on only their dorsal surfaces.

NUMBER OF SECONDARY FLAKES

The number of secondary flake scars on a t-f flake varies from one to six (Table 6). Over half of the specimens have one or two flake scars, and the mean is 2.39.

Table 6. Number of secondary flake scars on T-F Flakes

Number	T-F Flakes
1	25.0(%)
2	41.7
3	13.9
4	11.1
5	2.8
6	5.6
mean	2.39

Table 7. Length of secondary flake scars on T-F Flakes and Cores

Length	T-F Flakes	Cores
6—12(mm)	11.1(%)	2.5
13—19	19.4	30.0
20—26	47.2	32.5
27—33	13.9	32.5
34—40	5.6	2.5
41—47	2.8	0.0
mean	22.64(mm)	23.05

SIZE OF SECONDARY FLAKE

The size of secondary flake scar on a t-f flake is crucial to judge whether the t-f flake worked as a core. To examine this I measured the maximum length of the largest secondary flake scars on all of the t-f flakes and compared them to the length of the unretouched and the retouched flakes, and to the maximum length of the main flaking scars on the cores (Tables 1, 2 and 7). An interesting feature can be noted in Table 7; the mean length of secondary flake scars is not different from that of flake scars on the cores ($t=.245, df=63.2$,

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$p > .8$). But this does not show that t-f flakes had the same function as cores. Most of the cores were reduced in size through continuous flaking, while the t-f flakes did not undergo such a reductive process. In fact the mean length of secondary flake scars is significantly smaller than the mean length of the unretouched ($t=7.522$, $df=74$, $p < .001$) and the retouched flakes ($t=10.444$, $df=74$, $p < .001$) (Table 1). It also should be noted, however, that secondary flake scars on t-f flakes vary in length from 8 to 45 millimeters. Some of the t-f flakes which have large enough flake scars could have functioned as cores.

FLAKE ANGLE OF SECONDARY FLAKE

The angle of a t-f surface to a secondary flake surface was estimated in a five degree increment using a steel goniometer. The mean angle is 66.25 degrees and is smaller than the mean flake angle of the cores ($t=2.640$, $df=74$, $p < .02$) (Tables 1 and 8). While the latter has the relationship of supplementary angles to the mean flake angles of the unretouched and the retouched flakes, the former does not. It may reflect some technological differences between the flaking technique of t-f flakes and that of cores, or it may come from smallness of the sample size or from measurement error.

Table 8. Flake angle of the materials examined in this paper

Angle	T-F Flakes	Cores	Angle	Unret. Flakes	Ret. Flakes
41— 50(°)	13.9(%)	2.5	130—139(°)	2.5(%)	2.5
51— 60	22.2	12.5	120—129	5.0	10.0
61— 70	33.3	25.0	110—119	35.0	25.0
71— 80	25.0	47.5	100—109	42.5	45.0
81— 90	2.8	7.5	90— 99	12.5	17.5
91—100	2.8	5.0	80— 89	2.5	0.0
mean	66.25(°)	72.90	mean	105.50(°)	109.38

TOOL TYPE

There are only twenty t-f flakes associated with other tool types (Table 1). They consist of eleven sidescrapers, three naturally backed knives, two denticulates, one endscraper, one burin, one notch and one perforator. One characteristic feature is the dominance of side-scrapers, although twenty specimens are too small of a sample size to be classified in detail according to any typology.

DOUBLE PATINA

Schroeder observed in the Jerf Ajla sample that t-f technique frequently occurred on

specimens with double patina, indicating the reuse of existing blanks (Schroeder, 1969, p. 400). In the Keoue sample, four pieces with double patina were noted among the thirty six t-f flakes. This frequency is only slightly higher than those of cores and retouched flakes, and has no significant difference between the latter ($\chi^2 = .295, df=1, p > .5$) (Table 1).

DISCUSSION

Relatively larger, thicker flakes were preferred for blanks of t-f technique in the Keoue sample. This selection of blanks for the technique should reflect its function. Solecki and Solecki (1970) proposed several possible functions: flake thinning, core preparation and making crenulated edges. These cases are similar to the Keoue sample, some specimens with proximal modification (Figure 1. nos. 1-2) seem to be thinned flakes, possibly for hafting or holding, and some flakes with one large and several small secondary flake scars (Figure 1. no. 6) seem likely to be cores, though this discrimination may be arbitrary. These functions are not inconsistent with the blank selection for relatively larger, especially thicker flakes.

Apart from their function as cores, the t-f technique is regarded as a retouch technique for the shaping of thick and irregular blanks, and as one of the traditional Mousterian technologies. But the t-f technique is concerned with the volume of flake blanks while normal retouch techniques are concerned with the outline and edges of flake blanks.

Already existing flakes indicated by double patina, according to Schroeder (1969), could have been used as blanks. But with the sample examined here, no verification on this point could be made. If valid, though, the selection of existing flakes may support the Munday's (1976, p.133) view that t-f technique was used as one of the methods of extending flint productivity.

The basic technology of the t-f flakes from the Keoue is similar to the technology of t-f flakes from other sites described before, Nahr Ibrahim, Jerf Ajla and Rosh ein Mor. Several differences can be seen in the t-f locations and the association of tool type and t-f technique among these sites.

Schroeder reported that the frequencies of t-f locations in the Jerf Ajla sample were as follows: proximal t-f specimens accounted for 57.6%, distal for 18.8%, opposite for 11.1%, sides for 6.3% and core-like for 6.3% (Schroeder, 1969, p.401). In the Rosh ein Mor sample, proximal modifications are dominant and account for 74.8% of it, distal for 13.7%, opposite for 6.1% and change-oriented for 5.3% (Crew, 1976, p.109). When we compare these two data with the Keoue data shown in Table 5, even though their classification systems are not exactly the same, a notable difference can be seen in the frequencies of proximal

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Table 9. Association of tool type and T-F Technique (Rosh ein Mor and Jerf Ajla data are from Crew, 1976, p. 110, Table 5-27)

Tool Type	Rosh ein Mor n=250	Jerf Ajla n=139	Keoue n=20
Sidescraper	6.4(%)	34.8	55.0
Endscraper	11.9	7.6	5.0
Burin	23.2	15.1	5.0
Naturally Backed Knife	5.6	21.2	15.0
Notch	33.2	4.5	5.0
Denticulate	9.2	12.1	10.0
Others	10.0	4.5	5.0

t-f specimens. Frequencies of proximal t-f specimens in the Jerf Ajla and the Keoue samples comprise only around 50%, while proximal t-f specimens are remarkably dominant in the Rosh ein Mor. The data from Keoue seems to have a more possible relation to Jerf Ajla than to Rosh ein Mor. But it can be pointed out that there is a difference between Keoue and Jerf Ajla in the frequencies of multiple t-f; sides and core-like t-f specimens. There are more multiple t-f specimens in the Keoue sample than in Jerf Ajla.

The associations between tool type and t-f technique in the three samples are shown in Table 9. Here, too, a relationship can be recognized between Keoue and Jerf Ajla in the greater frequency of sidescrapers and the lower frequency of notches, compared to Rosh ein Mor, though there are some discrepancies.

The results of the comparisons of t-f flakes from the three samples seem to indicate that Keoue has possible cultural affinities with Jerf Ajla, and not with Rose ein Mor. However, it is difficult to determine whether these results are significant, because of the smallness of Keoue sample size, and the scanty comparative data from the other Mousterian sites in the Levant. In addressing cultural relationships, the consideration of the complete material culture including t-f technique, is essential. As of yet all the stone artifacts from Keoue have not been fully analyzed (Watanabe, 1970, Anzai, 1982, 1983). The only point that is stressed here, is the presence of variability and similarity in the t-f technique among the Levantine Mousterian assemblages, as born out in the above comparisons.

In this paper, t-f flakes from the Keoue Cave were analyzed. Though t-f flakes have been known from many Levantine Mousterian sites, few have been fully described. The

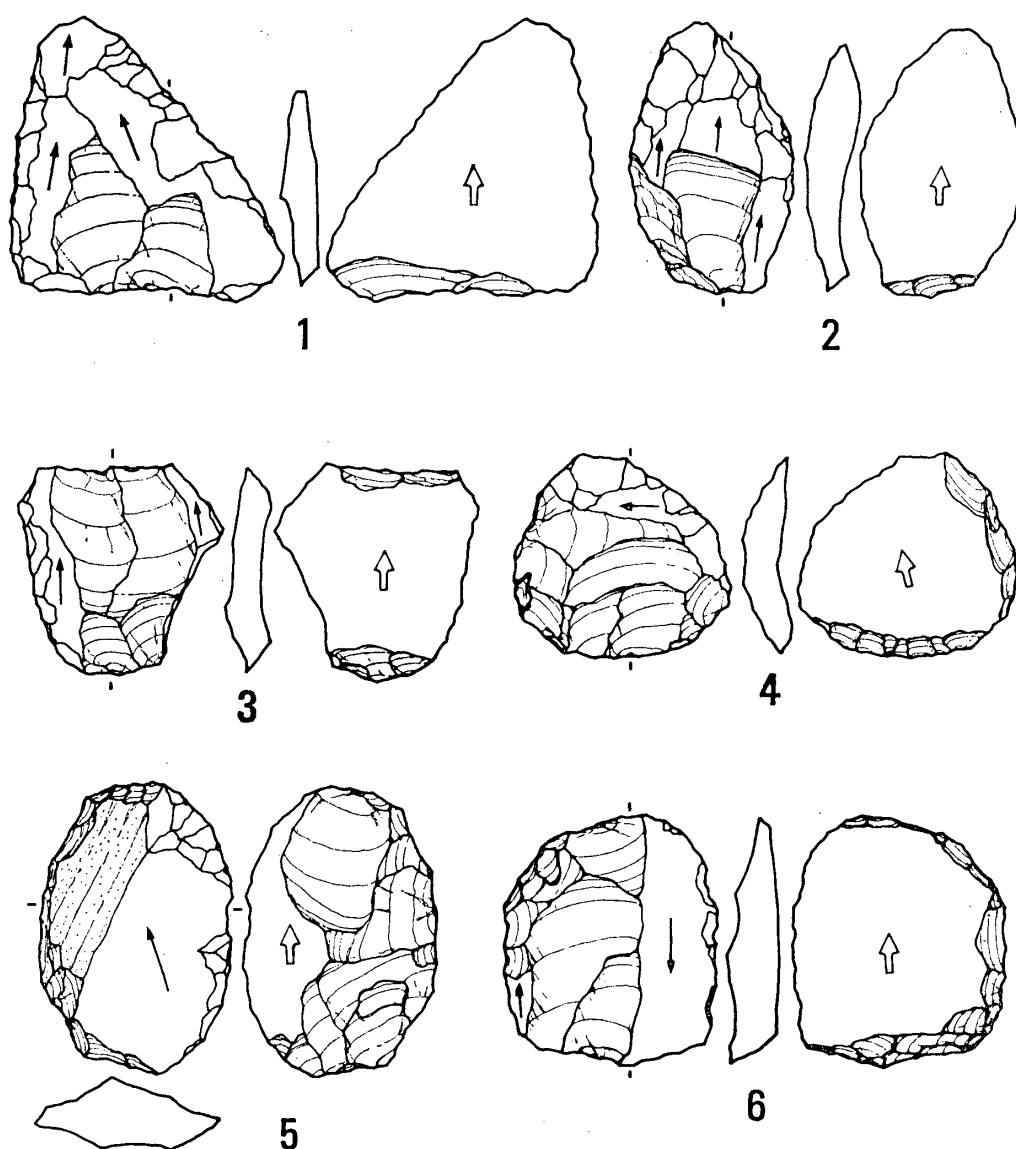


Figure 1 T-F flakes from the Keoue Cave (scale 2/3) nos. 1, 2-Proximal t-f. no. 3-Opposed t-f. no. 4-Ninety degree t-f. no. 5-U shaped t-f, ventral mod. no. 6-U shaped t-f, dorsal mod.

(↑ core preparatory scar, ↑ positive scar, □ retouch scar)

details or the contexts of this technique in many sites are not clear. One of the major reasons for the sparse attention surrounding t-f flakes is their omission from the system for techno-typological study, constructed by F. Bordes (1961). His system is widely accepted in the study of Levantine Mousterian, but has its sample based on French materials. When we apply his system to other regions, for example the Levant, there are some needed revisions. T-f flakes stand prominently among them.

Variability of Levantine Mousterian assemblages has long been discussed by many researchers (e.g. Hours et al., 1973, Copeland, 1975, 1981, Munday, 1979). But the problems

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on their chronological sequence, regional difference and functional variation remain open. A study of t-f flakes could have the possibility of giving us a method for solving these problems. Hopefully in the future more attention will be focussed on t-f flakes, and more comparative data will be compiled in order to elucidate these problems.

Notes * Though Newcomer and Hivernel-Guerre (1974) emphasize a wide spread of this technique over a temporal and spatial range (see Turq et Marcillaud, 1976), t-f flakes are highly common in the palaeolithic tradition of Levantine Mousterian.

** The results of statistical tests are given by the presenting values of the test statistics.

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