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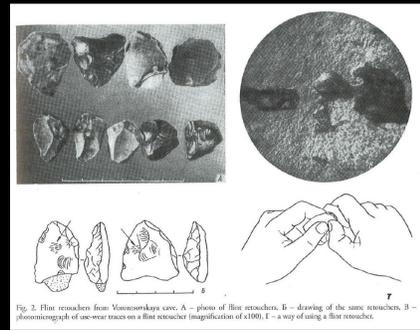
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GESTURE VARIATION IN THE USE OF PALAEOOLITHIC BULB RETOUCHERS. APPLICATION TO THE LATE ACHEULEAN SITE OF JALJULIA (ISRAEL).

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- ◆ Bulb retouchers (« éclats à bulbes piquetés ») were identified by Semenov and Praslov within Middle Palaeolithic assemblages in the 1950's.
- ◆ These pieces present percussion marks (pits) on the ventral surface of flakes (directly on the bulb but not only), similar to those found on bone retouchers.
- ◆ Bulb retouchers were since then recognised in numerous contexts, almost only dated to Middle Palaeolithic in Eastern and Western Europe, North Africa. They were recently identified in the Levant, where their use seems very systematic, especially in Neshar Ramla (Centi et al., 2019).
- ◆ Most of the bulb-retouchers blanks are retouched flakes, such as side-scrapers or convergent tools (Adler, 2002; Centi et al., 2019).
- ◆ The first use hypothesis of A. Semenov was the use in pression/flexion of retouchers. Since then, several experiment have shown their use in direct percussion (Adler, 2002; Mathias & Viallet, 2018; Centi et al., 2019).



Semenov, 1970, 1972

◆ **Objective:** Test the impact of various gestures in the use of bulb-retouchers and on the traces produced.

EXPERIMENT

- ◆ Test of 2 motions (tangential, perpendicular), by mid-experienced knappers, following a number of strokes ; 1 without count to produce side-scrapers ; 1 by "pressure"
- ◆ 4 pieces for each stroke number (100, 200, 400, 800).

N	Length (mm)	Width (mm)	Thick. bulb (mm)	Thick. butt (mm)	Weight (g)	Angle bulb/butt (°)	Angle ventral surface/butt (°)	Raw material type	Retouch gesture	N strokes	Observation
1	77,8	45	17,7	17,7	62	122	110	Mishash	Tangential	200	
2	52,4	31	9,5	6,1	18	126	123	Mishash	Perpendicular	100	
3	54,9	48,3	17,5	15,6	64	126	112	Mishash	Tangential	200	
4	57,5	48,2	17,2	17,2	43	128	128	Mishash	Perpendicular	600	Bad gripping
5	54	42,9	12,1	12,1	27	124	124	Mishash	Tangential	600	
6	53,5	36,6	14,9	10	34	114	114	Mishash	Perpendicular	450	Initially for 600 strikes, but fracture
7	46,3	59	18,5	18,5	43	128	130	Mishash	Flexion/pressure	-	For two flakes. Difficult and not efficient
8	34,6	37,4	15,4	13,4	30	120	114	Mishash	Perpendicular	200	
9	43,7	28,5	12,7	12,7	19	109	92	Mishash	Tangential	200	
10	34,3	48,9	9,1	9,1	15	113	95	Mishash	Perpendicular	200	
11	50,8	36,1	9,6	7,8	19	122	117	Mishash	Tangential	400	
12	60,4	50,2	14,4	14,1	54	122	113	Mishash	Perpendicular	400	Lateral fracture (notch-like) of the bulb-retoucher
13	32,7	36	10,2	9,8	11	110	107	Mishash	Tangential	400	Difficult to handle
14	66	42	19,9	14,3	74	120	120	Mishash	Tangential	> 400	Retouch of several tools during a long period
15	31,5	31,3	12,2	12,2	12	124	124	Turonian	Tangential	100	
16	35	30	16,8	16,8	11	128	128	Turonian	Perpendicular	400	
17	76,4	47,2	12,2	11,9	55	122	110	Mishash	Tangential	600	
18	47,6	28	8,1	8,1	10	131	114	Mishash	Perpendicular	100	Difficult to handle



Tangential

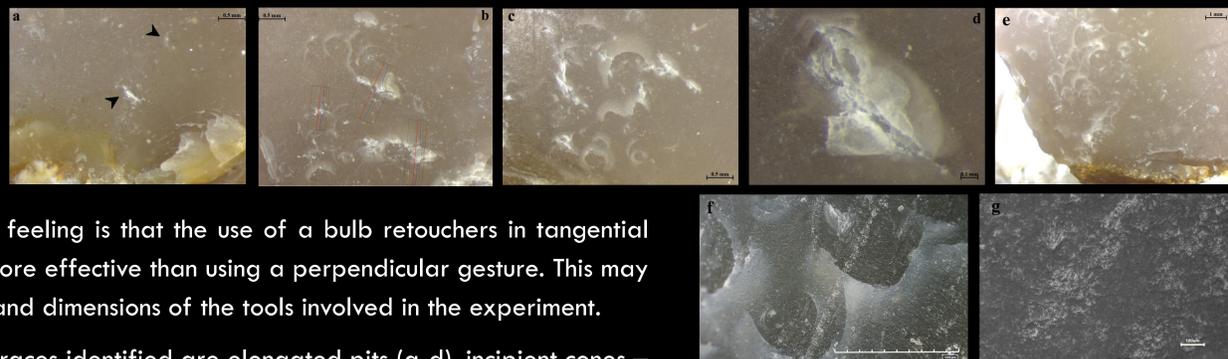
Perpendicular

◆ Observation with stereomicroscope (Zeiss Axio Scope A1, Nikon SMZ-U), metallographic microscope (Nikon Eclipse ME 600).

RESULTS

- ◆ The experimental feeling is that the use of a bulb retouchers in tangential percussion is much more effective than using a perpendicular gesture. This may be due to the mass and dimensions of the tools involved in the experiment.

◆ Main traces identified are elongated pits (a-d), incipient cones – half, whole (b, c, e) and striae (f, g).



ARCHAEOLOGY

- **Perpendicular gesture:** more incipient cones in general, and more circular (full) incipient cone;
- **Tangential:** more pits, and more linear pits. Still sometimes numerous incipient cones.

◆ The intensity of traces is not always correlated with the number of strikes. Other factors may have an impact, such as the energy transmitted, the convexity of the ventral surface or the flint quality.

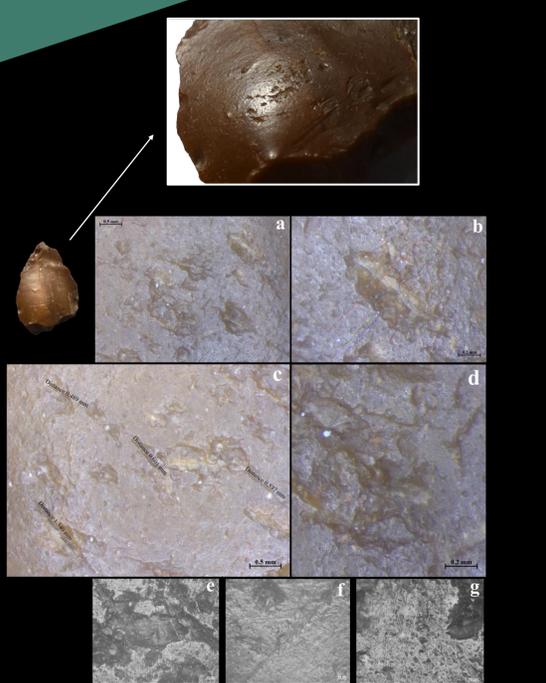
- ◆ Similar elongated pits and incipient cones (mainly semi-circular), and sometimes striae, can be identified on the lithic material.
- ◆ But, more incipient cones produced during the experiment (contrary to what was published before): caused by the skills of the knappers (here, knappers not familiar to the use of retouchers) or a gesture?
- ◆ At Jaljulia, at least 2 of the 5 pieces with percussive marks on the ventral surface can be described as a classic bulb-retoucher, with an intensive use. It constitutes so far the oldest evidence of such pieces, ca. 500 ka in the Levant.
- ◆ A first examination of the lithic material from Qesem cave show their use during the Acheuleo-Yabroudian, with a much better preservation of lithic material and thus a potential to study the microwears and tool functions (cutting-edges).

N	Gesture	Incipient cones	Pitting	Breakage	Observation
1	Tang.	Semi-circular incipient cones	Elongated pits (+), punctiform pits	1 breakage	
2	Perp.	Semi-circular, full incipient cones	1 elongated pit		Bulb very convex
3	Tang.	Numerous incipient cones (all)	Some pits (amorphous, punctiform and elongated) & small pitting concentrated areas		
4	Perp.	Incipient cones (all)	Some linear pits		Flat bulb, less silica in the BM / Crushing marks on the ridge between the ventral surface and the striking platform
5	Tang.	Few incipient cones	Few pits		Fracture close to the bulb linked to repeated impact / crushing marks on the ridge between the ventral surface and the striking platform
6	Perp.	Numerous incipient cones (all)	Few pits (including linear)	1 breakage	Almost no traces
7	Flexion	Semi-circular, circular incipient cones	1 or 2 linear pits		
8	Perp.	Incipient cones (all)	Few pits (including linear)		
9	Tang.	Small incipient cones (very rare)	1 area with intense very small pitting		
10	Perp.	Numerous incipient cones (semi-circular, circular)	Few pits (including linear)		Crushing marks on the ridge between the ventral surface and the striking platform
11	Tang.	Numerous incipient cones (semi-circular, circular)	Some pits (mostly amorphous, few linear)		Crushing marks on the ridge between the ventral surface and the striking platform / irregular bulb surface, 2 large "fascettes"
12	Perp.	Numerous incipient cones (all)	Few pits (amorphous, linear)	1 breakage (notch-like)	Fracture near to the impact area
13	Tang.	Incipient cones (semi-circular)	Numerous pits (mostly linear)		
14	Tang.	Incipient cones (semi-circular)	Numerous pits (mostly linear)		
15	Tang.		Small pittings		
16	Perp.	Few incipient cones (semi-circular)	Rare pits (amorphous)		Small crushing marks on the ridge between the ventral surface and the striking platform
17	Tang.	Numerous incipient cones (semi-circular)	Numerous pits (mostly linear)		Crushing marks on the ridge of the bulb scar
18	Perp.	Small incipient cones	Rare pits (amorphous)		Small crushing marks on the ridge between the ventral surface and the striking platform

EXPERIMENTAL FLAKES USED AS BULB-RETOUCHERS



MISHASH & TURONIAN FLINTS



JALJULIA LATE ACHEULEAN

QESEM CAVE ACHEULEO-YABROUDIAN

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