ANNALS OF THE NÁPRSTEK MUSEUM 13 • PRAGUE 1985

YOUNG ACHEULEAN HANDAXES FROM TAMANHINT AND WĀDĪ ADH DHAMRĀN (FEZZAN, LIBYA)

PAVEL MRÁZEK

Introduction

Occurrence of Acheulean stone industry is known from many places of Fezzan (Ziegert 1978, Svoboda 1980, Mrázek 1985 and others). The most frequent type of human final product from these sites was a handaxe. This artefact is considered a nearly universal tool of its time. Its shape was improved and refined during a long-termed development. In the submitted work, the size and shape of handaxes coming from two archaeological sites of the Libyan Sahara have been evaluated (Fig. 1), Apart from this, petrographical and chemical composition and technological properties of the raw material are determined, as well as the weathering effect on the handaxe surface.

Location and description of the archaeological sites

SITE 332-1 — Tamanhint

Location: SE rim of the sand sheet Ramlat az Zallāf, 10 km W of the Tamanhint oasis, 18 km NE of the Sabhā town, 2 km NW of a prominent inselberg.

Coordinates: 14° 31′ 30″ E, 27° 11′ 10″ N

Position: Artefacts repose on an extensive plain covered with coarse-grained eolian sand and relics of calcareous and gypsiferous crust. On the crust surface, frequent biogenic structures are visible, e. g. imprints of plant stalks and roots. Thickness of the crust layer reaches up to 1 m. The crust is periodically covered with medium-grained eolian sand of small seif dunes.

Finds: Young Acheulean handaxes prevail (Figs. 7—14, Plates 1—2). Beside those, 1 cleaver with unifacial trimming, 18 polyhedral hammers and several Aterian artefacts were found: 3 points indistinctly tanged, 2 oval scrapers and several flakes.

SITE 336-7 — Wādī adh Dhamrān

Location: Northern part of the wādī, 40 km SE of the Sabhā town, 65 km NE of the Ghodwah oasis.

Coordinates: 14° 46′ 20″ E, 26° 50′ 15″ N

Position: Artefacts repose on the surface of a low gravel terrace at the bottom of the wādī, partly crustified (calcareous gypcrete).

Finds: Young Acheulean handaxes prevail (Fig. 15, Plate 2). Beside those, 4 cleavers, 6 polyhedral hammers and 3 chopping tools were found. Aterian industry is represented by 2 lithic balls with peripheral groove and 1 discoidal core with 8 triangular flakes.

Statistical analysis of size and shape of handaxes

Methods

On each archaeological site one square sized 20 × 20 m was chosen to study a sufficient number of handaxes. From each square, 75 pieces of handaxes were measured. The following sizes and shapes on each handaxe were determined (Fig. 2):

— total length (l),
— maximum width (w_{max}),
— maximum thickness (t_{max}),
— width in five periodical intervals (w_1 to w_5),
— position of the maximum width,
— position of the concave arching of the side edge — both numbered according to the number of the sixth of the length from the distal end,
— shape of side profile: lentiform, turtleform or cuneiform,
— degree of trimming: rough — without an areal retouche, the size of planes after trimming exceeds 30 mm; medium — partly with the areal retouche namely on the distal end; fine —

Plate 1. Handaxes of various sizes and shapes from Site 332-1 — Tamanhint.

Plate 2. Handaxes of various shapes from Site 332-1 — Tamanhint (1—4) and Site 336-7 — Wādī adh Dhamrān (5).

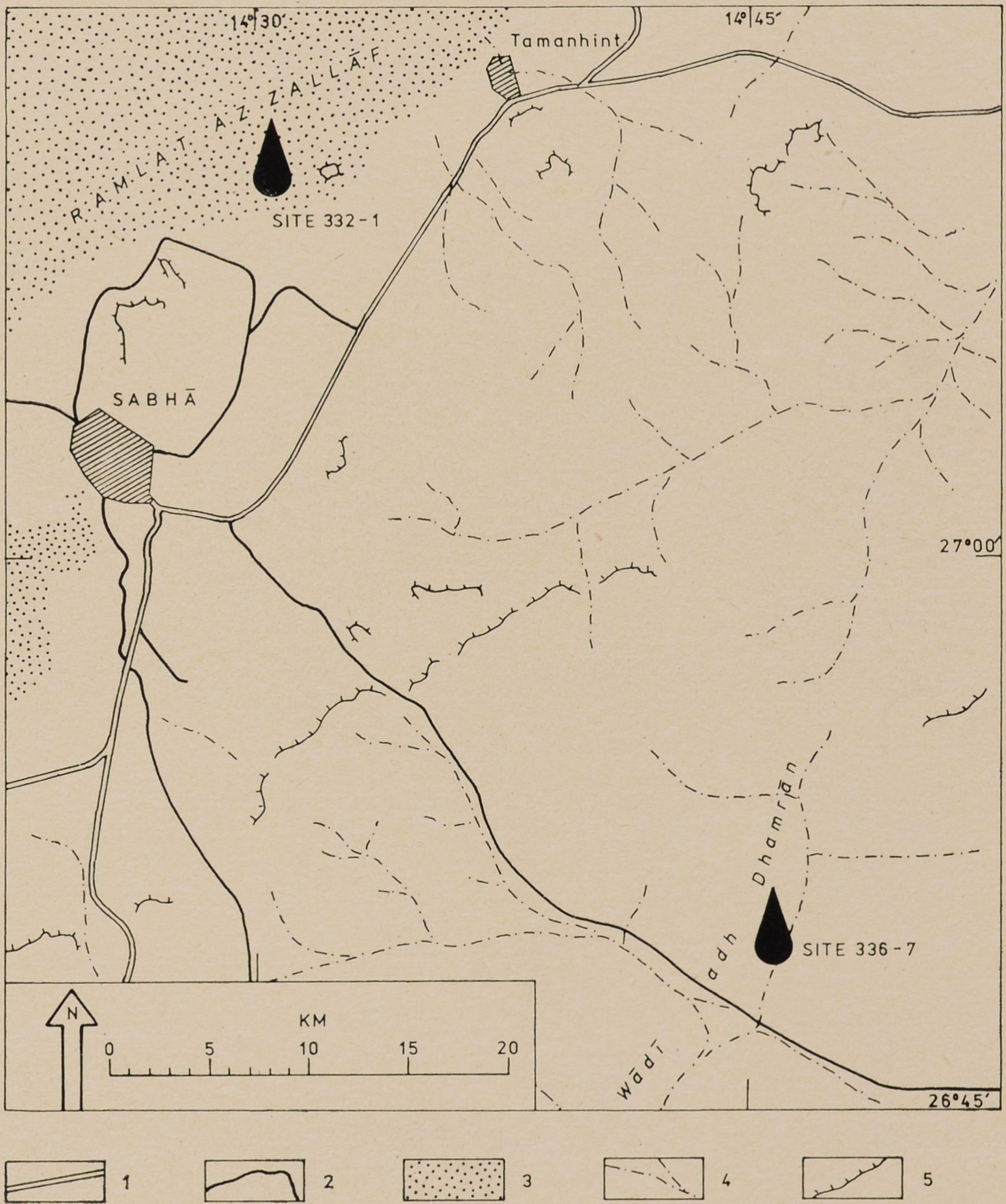


Fig. 1: Location map of the investigated archaeological sites. Explanations: 1 — main road; 2 — secondary road; 3 — sand sheet; 4 — wādī; 5 — escarpment.

with the areal retouche only, planes after trimming are mostly integrated,

— edge angles (ε_1 and ε_2) informationally only (see Fig. 2).

Some additional data were calculated from the measured values:

— angle of the side edge convergence in the first sixth of the length in the frontal profile (point angle φ). Real angle of the side convergence in the frontal profile cannot mostly be measured directly because of the frequent rounding of the distal end,

— angle of the changing of the side edge convergence in the frontal profile ($\Delta\varphi/_2$),

— ratio of w_{max}/l and w_{max}/t_{max},

— arithmetical means and standard deviations for values l, w_{max}, t_{max}, w_1 to w_5, φ, w_{max}/l and w_{max}/t_{max},

— correlation coefficients $r_{w.\,l}$, $r_{w.\,t}$ and $r_{l,\,t}$.

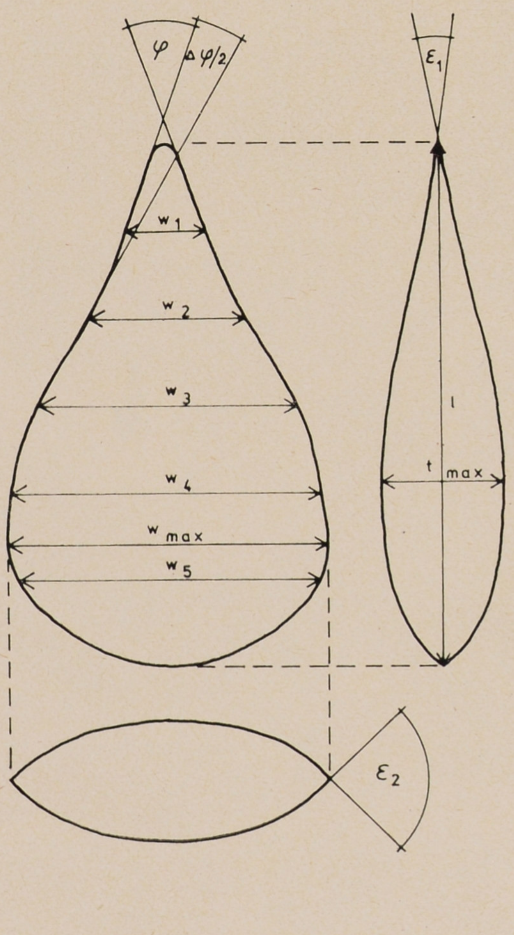


Fig. 2: Location and indication of the measured sizes and deduced shapes on the investigated handaxes. For explanation see text.

The measured and derived data are tabelled for each site separately (Tabs. 1 to 5). Distribution of frequencies of values l, w_{max}, w_{max}/l and $\Delta\varphi/_2$ is expressed in diagrams for the artefact groups with various shape of the frontal profile as well as for the whole set of data (Figs. 3 to 6).

Data

The handaxes from both sites are similar in the most of their size and shape parameters. The differencies found are not important.

Concerning the size, part of handaxes from the Tamanhint area, namely those roughly trimmed, are rather bigger than those from Wādī adh Dhamrān. According to the smaller variance of the sizes, the size of the handaxes from Wādī adh Dhamrān is more unified. The rations w/l and w/t are there smaller namely for the fine- and medium-trimmed artefacts (Tab. 1).

Medium-trimmed handaxes are the most common. In Wādī adh Dhamrān the higher portion of the rough tools was found, while the finely trimmed artefacts occur more often in the Tamanhint area. The refined trimming made it possible to obtain the sharper angle of the work edge and the general flattening of the tool. For example, the arithmetical mean of the values of the point angle ε_1 measured on chosen 22 fine- and medium--trimmed handaxes is 23°, while the roughly trimmed handaxes have the angle ε_1 in range of 30 to 45°. Similar values can be found in case of the side edge angle (ε_2) — 50° and 60 to 75° respectively.

The lentiform side profile of the handaxes prevails regardless of the degree of accuracy of their trimming, but in case of the fine-trimmed tools, the percentage of the lentiform profiles distinctly increases on the both sites (Tabs. 2 and 3). These handaxes were made by a steep trimming of cores. On the other hand, those of turtle- or cuneiform side profile may have been prepared from big flakes.

The maximum width (w_{max}) is usually located in the fifth and less in the forth sixth of their length. Other position is exceptional (Tab. 4, Fig. 3).

The side edges of many handaxes are more or less concavely arched in frontal view. The angle of the direction change of the side edge ($\Delta\varphi/_2$) reaches up to 19° (Fig. 4). The arching position is mostly in the second, less in the third sixth of the artefact length (more frequently in the Tamanhint area). The position in the first or fifth sixth occurs very rarely.

In the both sets of the studied handaxes, only one piece from the Tamanhint area and nine pieces from Wādī adh Dhamrān were damaged, mostly with broken point.

Discussion

The similarity of the size and shape of the handaxes from both areas under study may testify the approximately synchronous manufacturing of the stone industry there (Tab. 1, Figs. 3 to 6).

In Wādī adh Dhamrān, the smaller standard deviations of the tool sizes than those of the Tamanhint area are found not only for single groups of uniformly trimmed handaxes but also for the whole sets consisting of variously trimmed tools. This fact together with a shape simplicity of the frontal profile (Tabs. 4 and 5) allow us to assume that handaxes with varying degree of trimming from Wādī adh Dhamrān may have been manufactured according to a uniform model but under various circumstances, e. g. for sudden needs and short-termed using, they had to be prepared as a rough tool. The assumed existence of the uniform model for the handaxe formation, on the contrary, makes it possible to suggest a nearly simultaneous production of more or less perfectly trimmed tools. Although the rough artefacts have always been considered older than the finely trimmed tools, some exceptions may also be accepted. In the Tamanhint area, on the other hand, more variable shapes of all types of handaxes could have been developed during the longer-termed occupation as the significant values of the standard deviation demonstrate.

Similar assumption may be deduced from the statistical evaluation of the data documenting the shape of the frontal profile, especially concave arching of the side edges. Independence of the occurrence of this shape element on the degree of trimming (Tab. 5) makes also possible to infer the special purpose of the sharper tipped handaxes made simultaneously with those with oval arched side edges.

The concave arching of the side edge exists prevalently on the shorter and medium-sized artefacts (Figs. 5 and 6). This fact allows to refuse the idea that the oval shaped handaxe is the

		332-1 — Tamanhint				336-7 — Wādī adh Dhamrān			
		trimming			Total	trimming			Total
		rough	medium	fine		rough	medium	fine	
l mm	x	144	116	134	124	118	111	120	115
	σ	32.2	31.8	44.8	37.3	22.6	29.4	34.4	28.5
w_{max} mm	x	82	74	78	76	69	65	71	67
	σ	13.3	16.2	19.7	17.1	12.0	14.4	10.7	13.2
t_{max} mm	x	37	28	25	28	30	25	27	27
	σ	12.1	8.5	6.2	8.9	6.3	7.0	5.9	6.9
w_1 mm	x	38	34	30	34	34	28	32	30
	σ	12.4	10.8	11.4	11.2	11.0	8.6	6.2	9.2
w_2 mm	x	54	52	48	50	48	42	46	44
	σ	14.6	13.6	14.8	14.0	12.6	12.8	8.4	12.2
w_3 mm	x	70	66	64	66	60	56	60	58
	σ	16.6	15.8	17.0	16.2	12.8	14.4	9.0	13.2
w_4 mm	x	80	72	72	74	66	64	68	66
	σ	14.6	16.0	19.4	16.8	12.0	14.8	10.8	13.4
w_5 mm	x	72	64	70	66	58	56	62	58
	σ	10.8	15.8	18.6	16.6	11.6	11.4	11.2	11.6
w_{max}/l	x	0.57	0.63	0.59	0.64	0.59	0.59	0.61	0.60
	σ	0.09	0.10	0.09	0.13	0.09	0.07	0.10	0.08
w_{max}/t_{max}	x	2.33	2.71	3.07	2.77	2.36	2.64	2.74	2.58
	σ	0.57	0.47	0.48	0.53	0.58	0.44	0.52	0.52
φ°	x	76	80	70	76	80	76	76	78
	σ	16.1	15.8	16.4	16.6	14.8	11.8	11.6	12.8
linear correlation coefficients	w, l	+ 0.46	+ 0.87	+ 0.91	+ 0.85	+ 0.70	+ 0.90	+ 0.78	+ 0.82
	w, t	+ 0.50	+ 0.77	+ 0.77	+ 0.66	+ 0.24	+ 0.78	+ 0.65	+ 0.62
	l, t	+ 0.80	+ 0.76	+ 0.74	+ 0.68	+ 0.41	+ 0.80	+ 0.68	+ 0.67
frequency	pcs	8	45	22	75	22	29	14	75
	%	10.7	60.0	29.3	100.0	29.3	52.0	18.7	100.0

Tab. 1. Fundamental statistical values of shape and size of handaxes under study. For explanation of symbols see Fig. 2.

Side profile		332-1 — Tamanhint trimming rough	medium	fine	Σ_S	336-7 — Wādī adh Dhamrān trimming rough	medium	fine	Σ_S
lentiform	pcs	6	32	20	58	12	29	12	53
	%	8.0	42.7	26.7	77.3	16.0	38.7	16.0	70.7
turtleform	pcs	1	9	2	12	9	4	1	14
	%	1.3	12.0	2.7	16.0	12.0	5.3	1.3	18.7
cuneiform	pcs	1	4	0	5	1	6	1	8
	%	1.3	5.3	0.0	6.7	1.3	8.0	1.3	10.7
Σ_T	pcs	8	45	22	75	22	39	14	75
	%	10.7	60.0	29.3	100.0	29.3	52.0	18.7	100.0

Tab. 2. Relationship of degree of trimming and shape of side profile expressed as frequencies.
Σ_T — sum of handaxes of different degree of trimming
Σ_S — sum of handaxes of different side profile

Ratio of side profile frequencies	332-1 — Tamanhint trimming rough	medium	fine	Total	336-7 — Wādī adh Dhamrān trimming rough	medium	fine	Total
lentiform / turtleform	6.0	3.6	10.0	4.8	1.3	7.3	12.0	3.8
lentiform / cuneiform	6.0	8.0	—	11.6	12.0	4.8	12.0	6.6
lentiform / turtle- + cuneiform	3.0	2.5	10.0	3.4	1.2	2.9	6.0	2.4

Tab. 3. Relationship between ratios of side profile frequencies and degree of trimming.

			332-1 — Tamanhint					336-7 — Wādī adh Dhamrān				
			Fw				Total	Fw				Total
			3	4	5	6		3	4	5	6	
F_A	1	pcs	—	1	—	—	1	—	—	—	—	—
		%	—	1.3	—	—	1.3	—	—	—	—	—
	2	pcs	—	5	15	—	20	—	11	17	—	28
		%	—	6.7	20.0	—	26.7	—	14.7	22.7	—	37.3
	3	pcs	—	—	8	—	8	—	—	7	—	7
		%	—	—	10.7	—	10.7	—	—	9.3	—	9.3
	4	pcs	—	—	—	—	—	—	—	—	—	—
		%	—	—	—	—	—	—	—	—	—	—
	5	pcs	—	1	—	—	1	—	—	—	—	—
		%	—	1.3	—	—	1.3	—	—	—	—	—
F_O		pcs	1	24	19	1	45	2	22	16	—	40
		%	1.3	32.0	25.3	1.3	60.0	2.7	29.3	21.3	—	53.3
ΣFw		pcs	1	31	42	1	75	2	33	40	—	75
		%	1.3	41.3	56.0	1.3	100.0	2.7	44.0	53.3	—	100.0
$\Sigma Fw/\Sigma A$			—	4.4	1.8	—	2.5	—	3.0	1.7	—	2.1

Tab. 4. Relationship of two types of side convergence changes in the frontal profile of handaxes expressed in pieces and in per cent of each statistical set.

F_A — frequency of position of concave side edge arching in the sixth No.

F_O — frequency of the handaxes without concave side edge arching

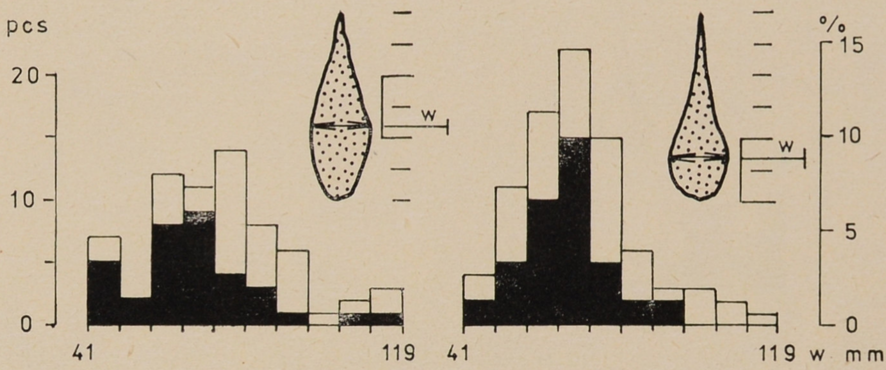
F_W — frequency of position of the maximum width (point of the maximum convex side edge arching) in the sixth No.

Σ_A — sum of the handaxes with concave side edge arching in each category of the maximum width position.

			332-1 — Tamanhint				336-7 — Wādī adh Dhamrān			
			trimming			Total	trimming			Total
			rough	medium	fine		rough	medium	fine	
F_A	1	pcs	—	1	—	1	—	—	—	—
		%	—	1.3	—	1.3	—	—	—	—
	2	pcs	3	9	8	20	5	15	8	28
		%	4.0	12.0	10.7	26.7	6.7	20.0	10.7	37.3
	3	pcs	2	4	2	8	4	2	1	7
		%	2.7	5.3	2.7	10.7	5.3	2.7	1.3	9.3
	4	pcs	—	—	—	—	—	—	—	—
		%	—	—	—	—	—	—	—	—
	5	pcs	—	1	—	1	—	—	—	—
		%	—	1.3	—	1.3	—	—	—	—
F_O		pcs	3	30	12	45	13	22	5	40
		%	4.0	40.0	16.0	60.0	17.3	29.3	6.7	53.3
ΣF_T		pcs	8	45	22	75	22	39	14	75
		%	10.7	60.0	29.3	100.0	29.3	52.0	18.7	100.0
$\frac{\Sigma F_T}{A}$			1.6	3.0	2.2	2.5	2.4	2.3	1.6	2.1

Tab. 5. Relationship of the degree of trimming and position of the concave side edge arching expressed in pieces and in per cent of the whole set of the handaxes.

F_A — frequency of position of concave side edge arching in the sixth No.
F_O — frequency of the handaxes without concave side edge arching
F_T — frequency of the handaxes of different degree of trimming
Σ_A — sum of the handaxes with concave side edge arching in each trimming category.



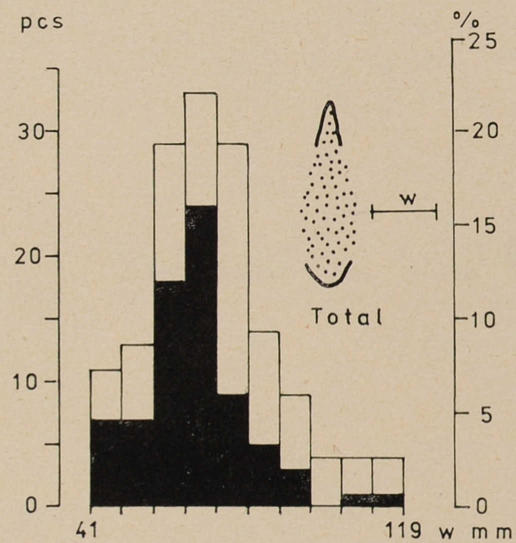


Fig. 3: Histograms of the artefact widths in dependence on the maximum width position and total. For explanations see Fig. 5.

shortened final stage of the artefact shape reached in course of the renewing and consequently shortening of the worn or broken pointed end.

Another evidence for the purposeful arrangement of the handaxes form may be found in the frequency distribution diagrams in Figs. 3 and 5 showing how a small group of handaxes markedly differ from the majority of tools in their lengths and less distinctly in the widths.

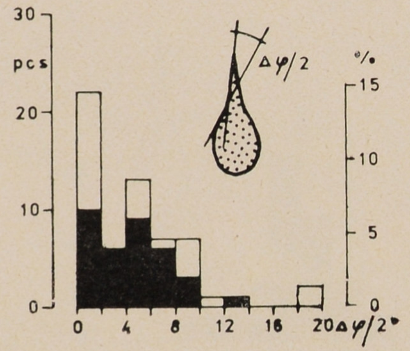


Fig. 4: Histogram of the angles of the side convergence changes. For explanations see Fig. 5.

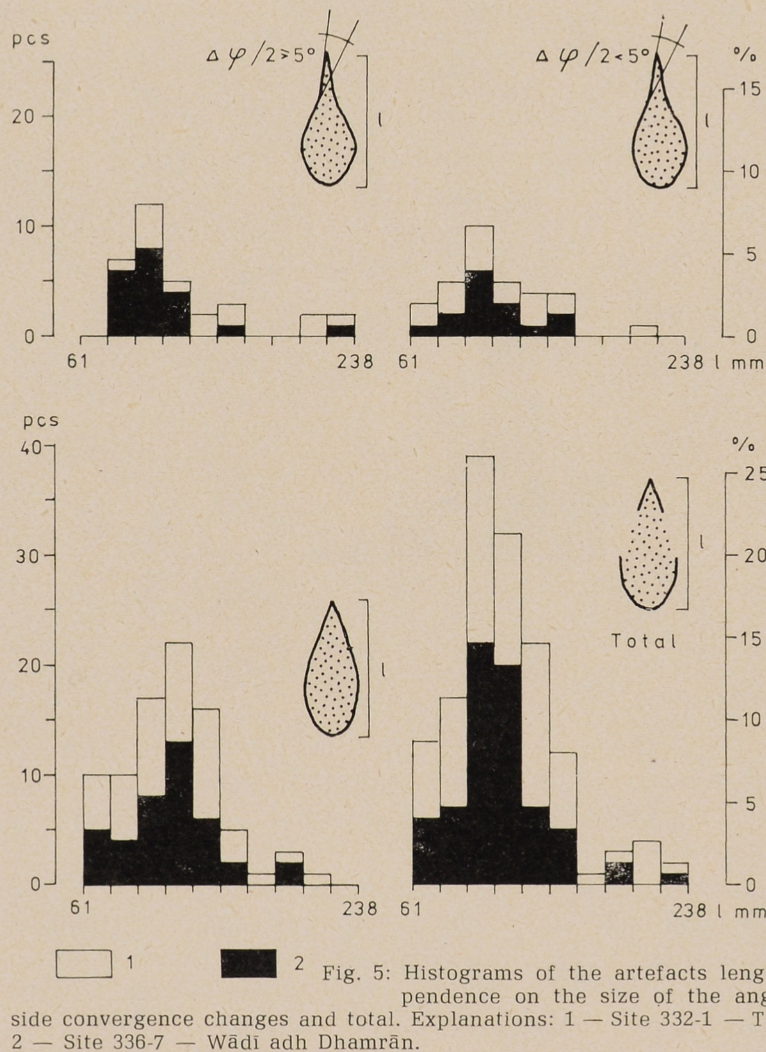


Fig. 5: Histograms of the artefacts lengths in dependence on the size of the angle of the side convergence changes and total. Explanations: 1 — Site 332-1 — Tamanhint; 2 — Site 336-7 — Wādī adh Dhamrān.

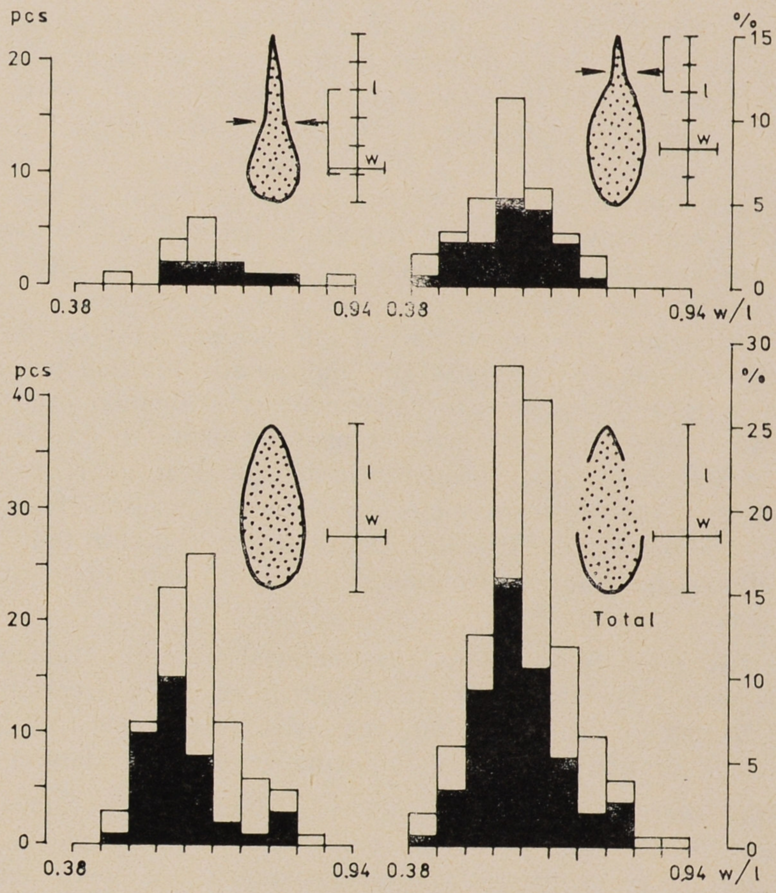


Fig. 6: Histograms of the width/length ratios in dependence on the position of the side convergence changes and total. For explanations see Fig. 5.

Summing the above depicted data and their interpretation we can conclude, that the Saharan Young Acheulean handaxes may have been used as an universal tool till to very late time due to their variable and purposeful forms manufactured by a special trimming.

Raw material

The choice of the raw material for the manufacturing of the handaxes was limited on the rocks from the nearest vicinity of the sites. The geological situation of both sites is similar.

On the site 332-1 — Tamanhint, the source of the raw material was found on a prominent mesa 2 km SE of the area under study. According to Seidl and Röhlich (1984) the prevalent rock type is well lithified quartzose sandstone of the Jarmah Member (Mesák Formation, Jurassic). Structure of the rock is cross-bedded to laminated. Clastic quartz grains sized from 0.04 to 3 mm and sporadic polyaggregate quartz grains are subrounded, poorly to medium sorted. The matrix is usually argillaceous to silty forming streaks and laminae. Cement of intergranular quartz particles is common. The upper part of the rock sequence on the top of the inselberg was altered and additionally lithified probably during Upper Cretaceous to Palaeogene crustification processes (Mrázek 1984). For the artefact manufacturing this rock was obviously preferred. It is quartzitic sandstone to quartzite (silcrete, duricrust) or ferruginous sandstone (ferricrust). The petrographical description of both rocks is similar to that of the above mentioned area but with higher contents of quartz or Fe-oxides in cement (Tab. 6).

Two main types of the raw material from the Tamanhint area were tested for some technological assessing according to the British Specifications for Aggregate Testing (British Standards Institution 1975). The following values were determined:

— the aggregate impact value (AIV) gives a relative measure of the resistance of a rock to sudden shock or impact which in some rocks differs from the resistance to a slowly applied compressive load,
— the aggregate crushing value (ACV) gives a relative measure of the resistance of the rocks to crushing under a gradually applied compressive load,
— the moisture content (W_n),
— the water absorption (W_a),
— the dry volume mass (ρ_d).

The resultant AIV and ACV are presented in percentage of fines in the primary mass passing the sieve 2.36 mm after disintegration of sample during the test (Tab. 7). The technological parameters of the raw material can be classified as better than the average in its shock and pressure resistance. The AIV and ACV of similar rocks in a broad vicinity range from 10.8 % to 32.5 % and from 19.8 % to 37.5 % respectively (Mrázek 1984).

Sample No.	1	2
SiO_2	69.72	85.44
TiO_2	0.05	0.13
Al_2O_3	0.33	2.98
Fe_2O_3 tot.	25.01	5.42
MnO	0.02	0.02
MgO	< 0.01	0.14
CaO	0.35	1.61
Na_2O	< 0.40	< 0.40
K_2O	0.08	0.06
P_2O_5	0.19	0.08
L. o. i.	4.30	3.00
Cl	< 0.01	< 0.01
SO_3	0.02	0.78
Total	100.07	99.66

Tab. 6. Chemical composition of raw material for the handaxes manufacturing from site 332-1 — Tamanhint. Rock specification: 1 — ferruginous sandstone (ferricrust); 2 — quartzitic sandstone (silcrete). Chemical analyses — Laboratory of Geoindustria Prague.

		Sample 1		Sample 2	
		part I	part II	part I	part II
AIV	A	615.0 g	560.0 g	530.0 g	530.0 g
	B	90.4 g	87.0 g	72.3 g	68.0 g
	C	524.0 g	472.5 g	457.0 g	461.5 g
	F	14.7 %	15.5 %	14.0 %	13.0 %
	F	15.1 %		13.5 %	
ACV	A	2560.0 g	2460.0 g	2180.0 g	2050.0 g
	B	550.0 g	540.0 g	480.0 g	440.0 g
	C	2009.0 g	2405.5 g	1698.0 g	1609.0 g
	F	21.5 %	22.0 %	22.0 %	21.5 %
	F	21.7 %		21.7 %	
W_n		0.06 %		0.07 %	
W_a		1.32 %		2.68 %	
ρ_d		2796 $kg \cdot m^{-3}$		2279 $kg \cdot m^{-3}$	

Tab. 7. Results of the technological tests of the raw material for the handaxes manufacturing from site 332-1 — Tamanhint. For sample specification see Tab. 6.

AIV — aggregate impact value (%)
ACV — aggregate crushing value (%)
A — mass of surface-dry sample (g)
B — mass of fraction passing the sieve 2.36 mm (g)
C — mass retained on the sieve 2.36 mm (g)
F — percentage fines $\frac{B}{A} \times 100$ (%)
W_n — moisture content (%)
W_a — water absorption (%)
ρ_d — dry volume mass ($kg \cdot m^{-3}$)
Technological tests — Laboratory of Geoindustria Prague.

The rock bedding and the grain-size variability do not influence the raw material solidity which is unvarying. Thus, the orientation of the rock structures, except for frequent joints, is not important for the procedure of the handaxe manufacturing.

On the site 336-7 — Wādī adh Dhamrān, a similar raw material was used from the side valley debris. Slightly argillaceous to quartzitic sandstone is slightly porous, medium-grained and well lithified. It belongs to the Awbārī Member (Mesák Formation, Jurassic to Lower Cretaceous, according to Mrázek 1984). Clastic quartz grains sized from 0.04 to 2 mm are mostly rounded, some of them are subangular. They show incomplete owergrowths. Matrix is kaolinitic, sometimes replaced by ferruginous substance. Quartzose cement is granular with drusy structure in free voids. Some voids are filled with secondary calcite.

The technological properties seem to be similar to those from the Tamanhint area.

Single small handaxes were made from yellowish white fine-grained quartzite (silcrete) of the same lithostratigraphic unit.

Weathering of handaxes surface

The surface of all handaxes was strongly affected by long-termed weathering. In the course of the investigation of the surface alteration of the artefacts, the primary position of the find must necessarily be regarded. Most of the artefacts lie on the sandy or calcareous ground periodically covered with eolian sand. The upper face of the handaxes have been polished by deflation and patinated. The tools made from dark ferruginous rocks are brownish black to reddish brown varnished while the surface of those formed of light siliceous rocks is slightly corroded and polished only. The lower face of the artefacts has usually preserved a primary harshness sharpened by leaching out the easy-soluble rock components. The small voids of the rock are secondary filled with calcite or gypsum. In some cases, the slight lightening and the increase of porosity can be observed.

Conclusions

Statistical evaluation of size and shape of 150 Young Acheulean handaxes from the archaeological sites Nos. 332-1 — Tamanhint and 336-7 — Wādī adh Dhamrān is performed. In addition, the results of the investigation of their raw material and surface weathering are presented. Following conclusions are established:

1) The handaxes manufacturing on the both sites was probably synchronous, but in the Wādī adh Dhamrān it might have taken a rather shorter time interval.

2) On the both sites, the size and shape variability of the handaxes may be considered not only a result of the time development, but also a result of the purposeful trimming of the

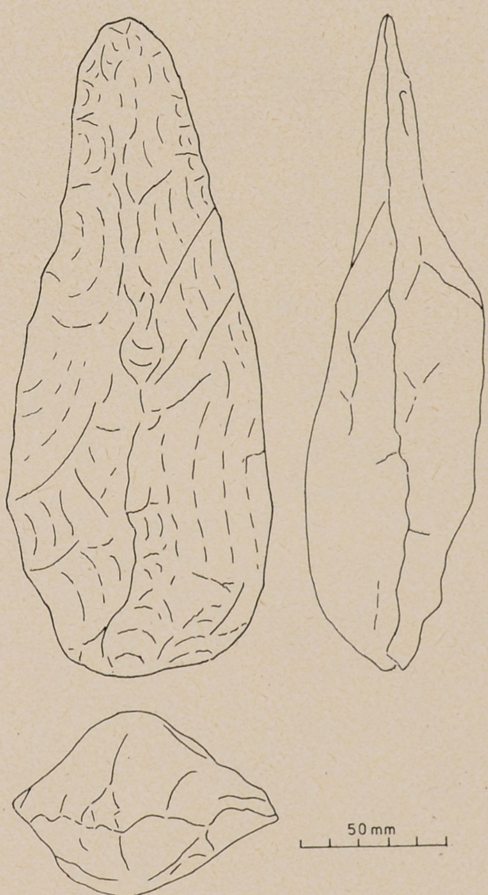


Fig. 7: Handaxe roughly trimmed. Site 332-1 — Tamanhint. Dark brown ferruginous sandstone. Dark brown patinated, polished.

Fig. 8: Handaxe roughly trimmed. Site 332-1 — Tamanhint. Greyish brown porous ferruginized argillaceous sandstone. Slightly brown patinated, the inferior face crustified.

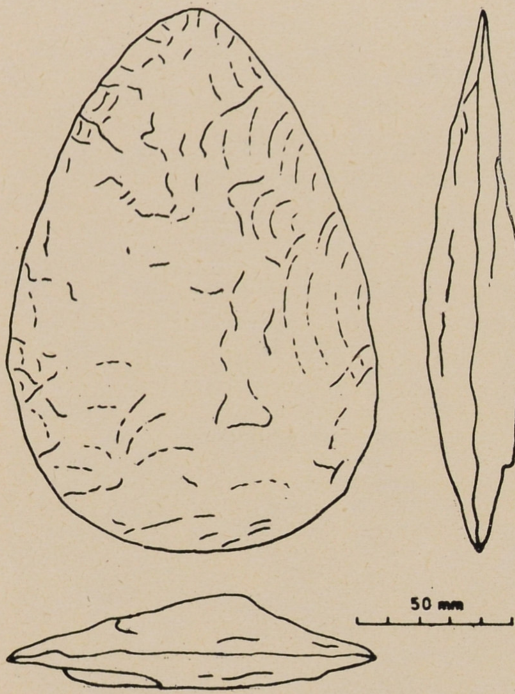
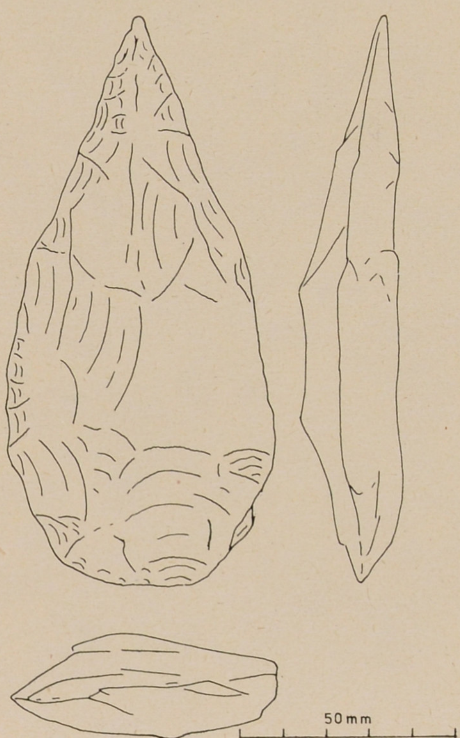


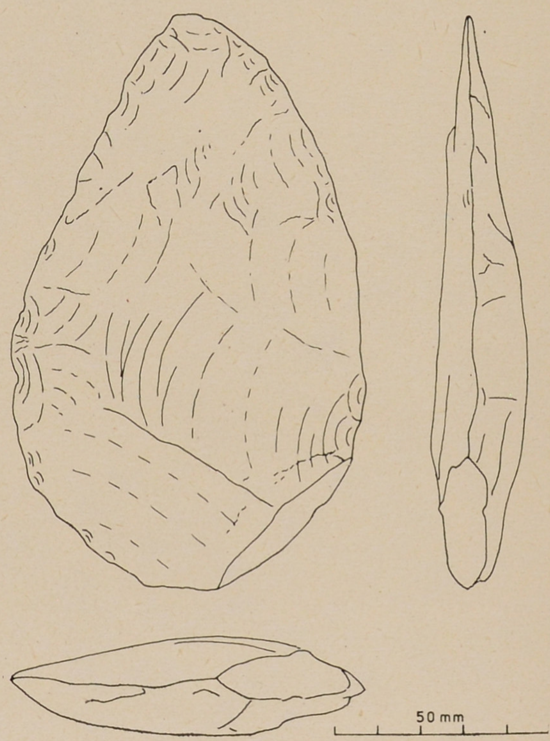
Fig. 9: Oval handaxe finely trimmed. Site 332-1 — Tamanhint. Orange yellow quartzitic sandstone. Upper face slightly polished.

Fig. 10: Oval handaxe medium trimmed. Site 332-1 — Tamanhint. Dark brown ferruginous sandstone. Black patinated.

Fig. 11: Sharply pointed handaxe medium trimmed. Site 332-1 — Tamanhint. Dark brown ferruginous conglomeratic sandstone. Variegated, predominantly brown and rusty patinated, polished.

Fig. 12: Handaxe, medium trimmed from a big flake. Stroke platform is preserved. Site 332-1 — Tamanhint. Creamy yellow quartzose sandstone. Slightly polished.





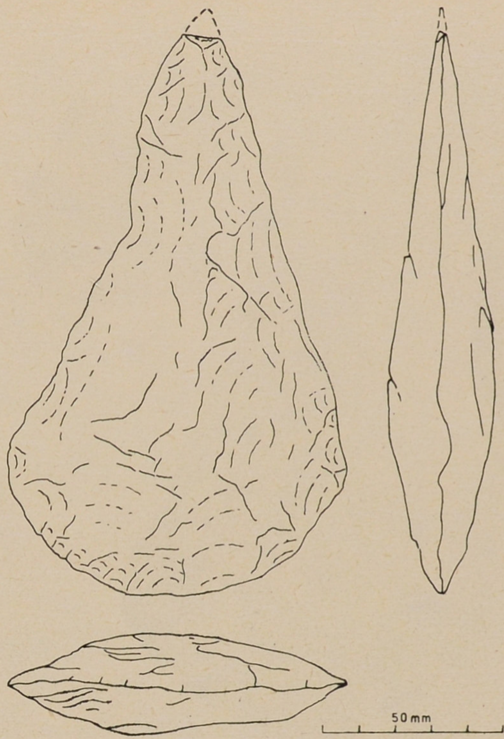


Fig. 13: Handaxe finely trimmed. Site 332-1 — Tamanhint. Rose yellow quartzose sandstone. Slightly polished.

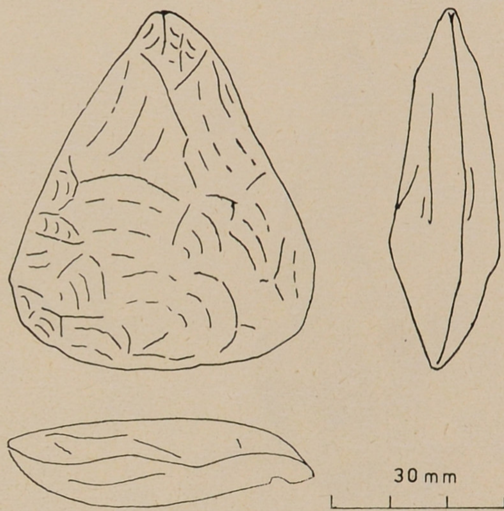


Fig. 14: Small handaxe finely trimmed. Site 332-1 — Tamanhint. Greyish brown quartzitic sandstone. Polished.

Fig. 15: Handaxe roughly trimmed. Site 336-7 — Wādī adh Dhamrān. Brown ferruginous sandstone. Reddish brown patina, upper face polished.

Plate 1. Handaxes of various sizes and shapes from Site 332-1 — Tamanhint.

Plate 2. Handaxes of various shapes from Site 332-1 — Tamanhint (1—4) and Site 336-7 — Wādī adh Dhamrān (5).

tools marking the advanced specialisation in the Young Acheulean.

3) Following purposeful signs of the handaxes are supposed:

— the degree of trimming,
— the frontal profile, either with the concave arching of the side edges consequently forming the sharp and narrow point or of the oval profile with spoonform point,
— the length and less probably the width of the handaxes.

4) The handaxes were made from the local raw material — argillaceous, ferruginous or quartzitic sandstones to quartzite of the Mesák Formation (Jurassic to Lower Cretaceous).

5) The handaxes surface was affected by the weathering in dependence on the position of the artefacts. Their upper face was polished and/or dark patinated, while the lower face was slightly leached out.

R e f e r e n c e s

British Standards Institution (1975): Methods for sampling and testing of mineral aggregates, sands and fillers. Part 3. Mechanical properties. — London.

Mrázek P. (1984): Geological map of Libya 1 : 250,000, Sheet: Tanahmú NG 33-6, Explanatory Booklet. — Industrial Research Centre, Tripoli.

Mrázek P. (1985): New archaeological finds in Wādī adh Dhamrān (Fezzan, Libya). — Annals of the Náprstek Museum, 12, 169—201. Prague.

Seidl K., Röhlich P. (1984): Geological map of Libya 1 : 250,000, Sheet: Sabhā NG 33-2, Explanatory Booklet. — Industrial Research Centre, Tripoli.

Svoboda J. (1980): Le gisement Acheuléen de Germa, wadi Ajjal, Libye. — Anthropologie (Brno), 18, 2—3, 209—223.

Ziegert H. (1978): Die altsteinzeitlichen Kulturen in der Sahara. In: Sahara, 10 000 Jahre zwischen Weide und Wüste (R. Kuper ed.), 35—47. — Museen der Stadt Köln.

© NÁPRSTEK MUSEUM PRAGUE, 1985