A Preliminary Report of the 1994 Excavations on the Rohri Hills

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A PRELIMINARY REPORT OF THE 1994 EXCAVATIONS ON THE ROHRI HILLS (SINDH – PAKISTAN)

SUMMARY – *A preliminary report of the 1994 excavations on the Rohri Hills (Sindh – Pakistan).* During the 1994 fieldwork season, excavations were carried out at Site 480. The site consists of a flint blades workshop characterized by a scatter of debitage products and cores. The preliminary results of the technological, refitting and spatial analysis of the flint artefacts and the reconstructed working sequence at this site are illustrated. The chronology of the workshop, in the absence of organic material suitable for absolute dating, is suggested by comparing the blade products with those found from the excavations of the main centres of the Harappan Civilization.

THE EXCAVATION OF SITE 480 (F. N. and E. S.)

Site 480 was recorded during the 1993 survey as a bladelet workshop (Biagi and Pessina, 1994). It is located in the neighbourhoods of the Shrine of Shadee Shaheed, along the southern edge of the westernmost terrace of the Rohri Hills, approximately 400 metres south-east of Sites 58 and 59, excavated the previous year (Biagi and Pessina, 1994). Its geographical coordinates are: 27°25'47.9" Lat. N, 68°51'11.1" Long. E. From the surface, it looked like a small scatter of debitage resulting from a blade-core reduction activity (fig. 1). For this reason it was selected for a complete excavation in order to collect a set of data to be compared with those obtained from the excavation of Sites 58 and 59.

As mentioned above, the workshop looked like a dense scatter of chipped artefacts, among which a cluster of cores was visible (fig. 2a) near a larger concentration of debitage residuals (fig. 2b). The workshop occupied a sub-rectangular area cleared from the stones that cover the surface of the terrace (fig. 3). Near Workshop 480, other cleared zones with heaps of limestone blocks on their sides indicate the presence of quarry-pits, located along the edge of the same terrace.

In correspondence with the scatter of artefacts, a grid of 1x1m squares was positioned in order to cover a surface of 6x7m.

Due to the high number of artefacts, it was impossible to record each piece *in situ*. Therefore it was decided to record only the cores and the core fragments. The remaining artefacts were collected from quadrants of 50x50 cm each. After the surface finds were collected, a layer of sand lying underneath, rich in flint artefacts (layer 1), was excavated over 16 square metres. This layer filled a shallow depression which was part of a larger area whose surface had been cleared from stones (figs. 3 and 4).

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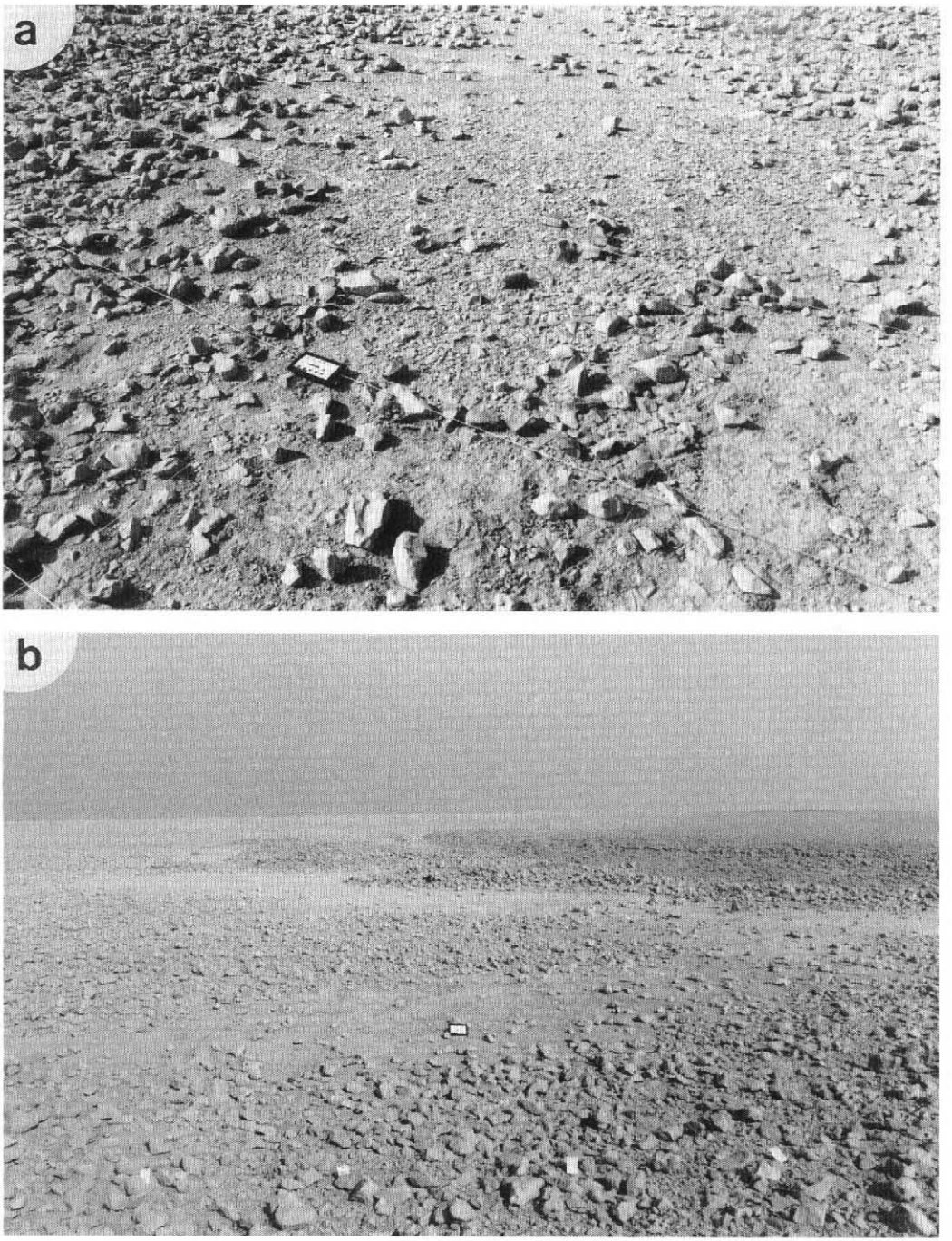

Fig. 1 - Workshop 480: a) view of the surface before the collection; b) general view of the workshop and the neighbouring quarry-pits (in the background) *(photos by F. Negrino and E. Starnini).*

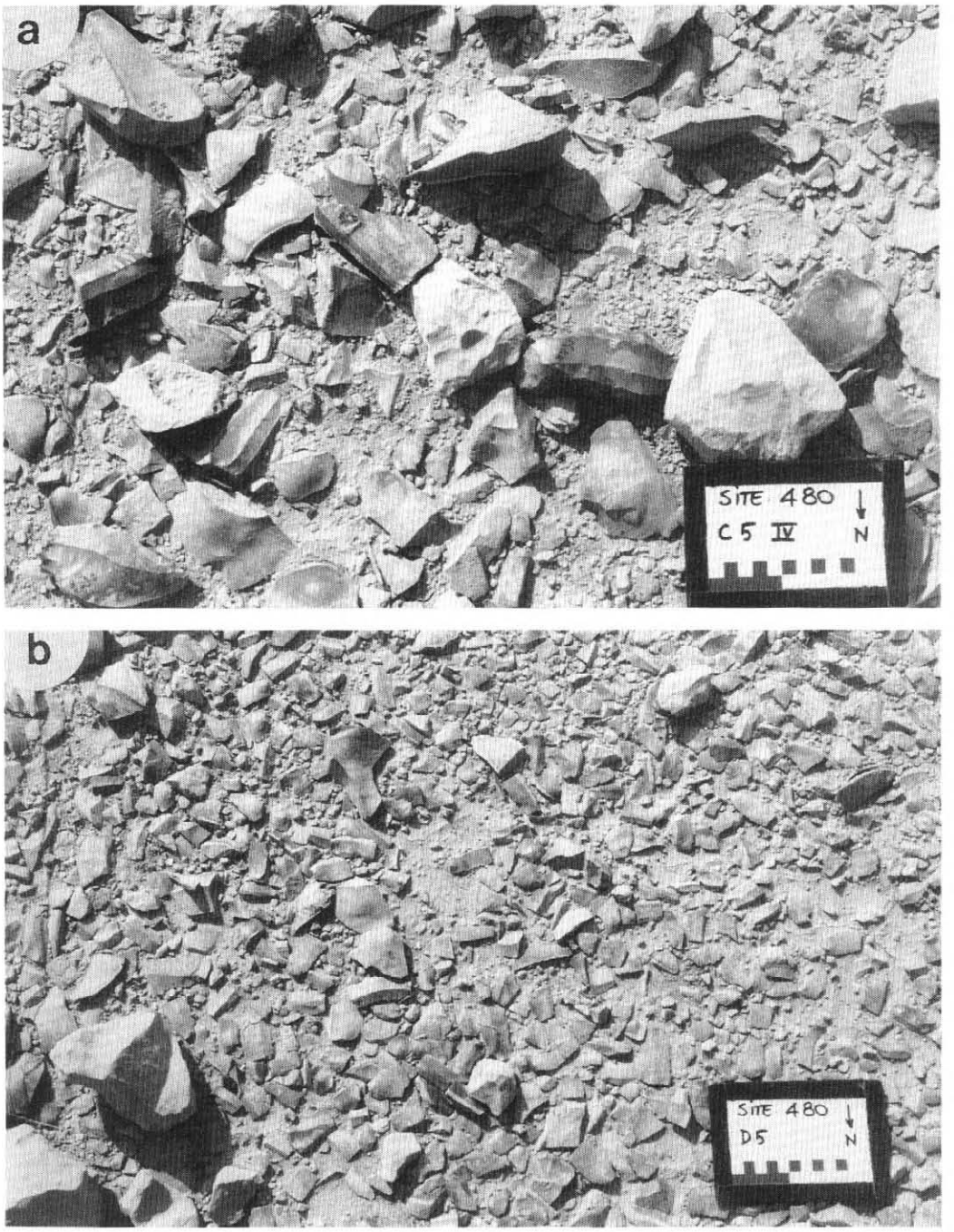

Fig. 2 - Workshop 480: a) close view of the core cluster in square C5, quadrant IV; b) close view of the debitage products scatter in square D5 *(photos by F. Negrino and E. Starnini).*

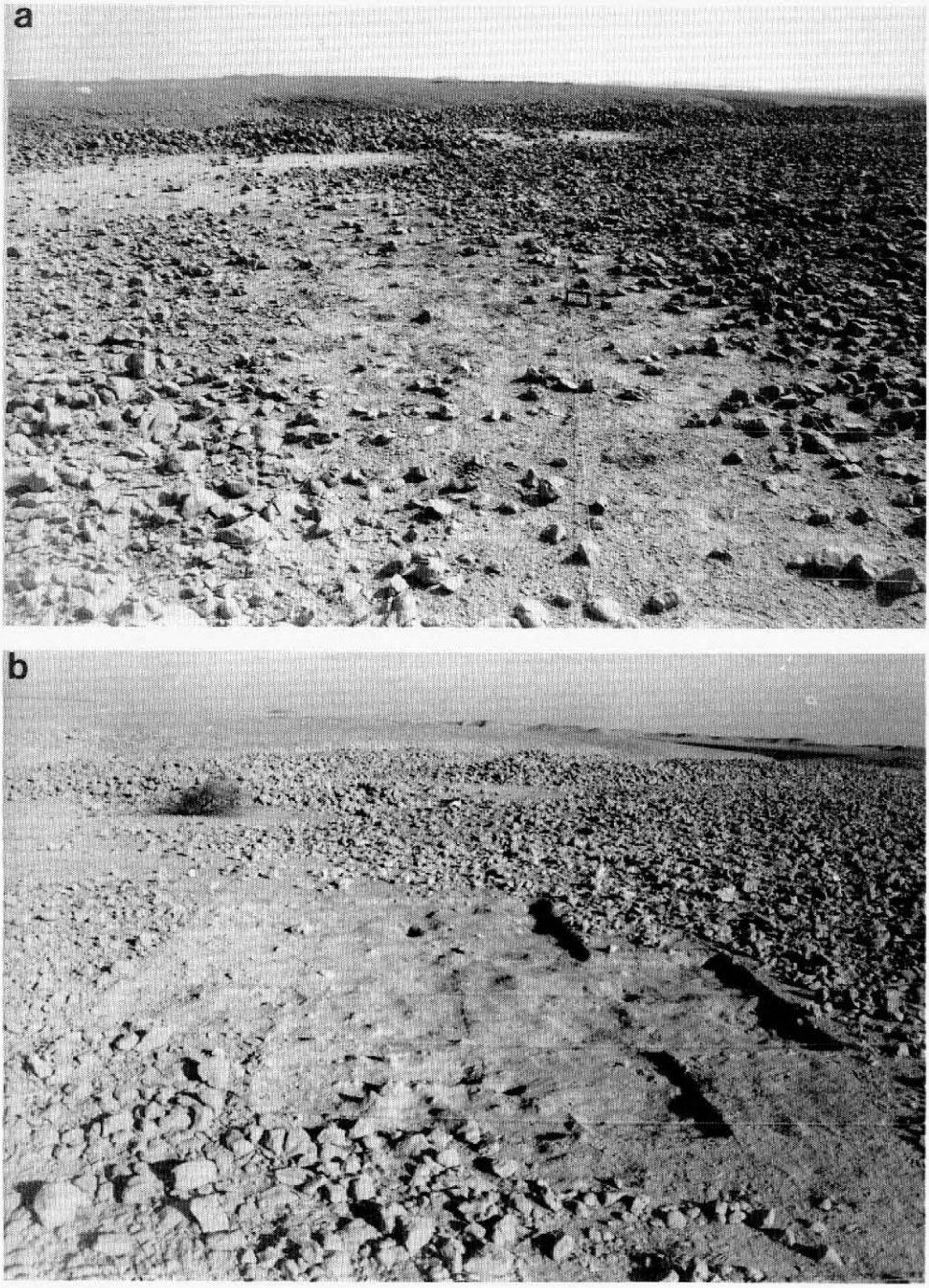

Fig. 3 - Workshop 480: a) general view of the surface after the collection of the flint artefacts; b) general view after the excavation of layer 1 *(photos by F. Negrino and E. Starnini).*

The area selected for excavation coincides with the concentration of chipped artefacts. In fact it was clear from the surface collection and from the excavation of the most peripheral quadrants that only a few artefacts had been scattered out of the investigated zone.

Due to the loose nature of the sediment and the size of the chipped artefacts, the use of a sieve for the recovery of the artefacts was not necessary.

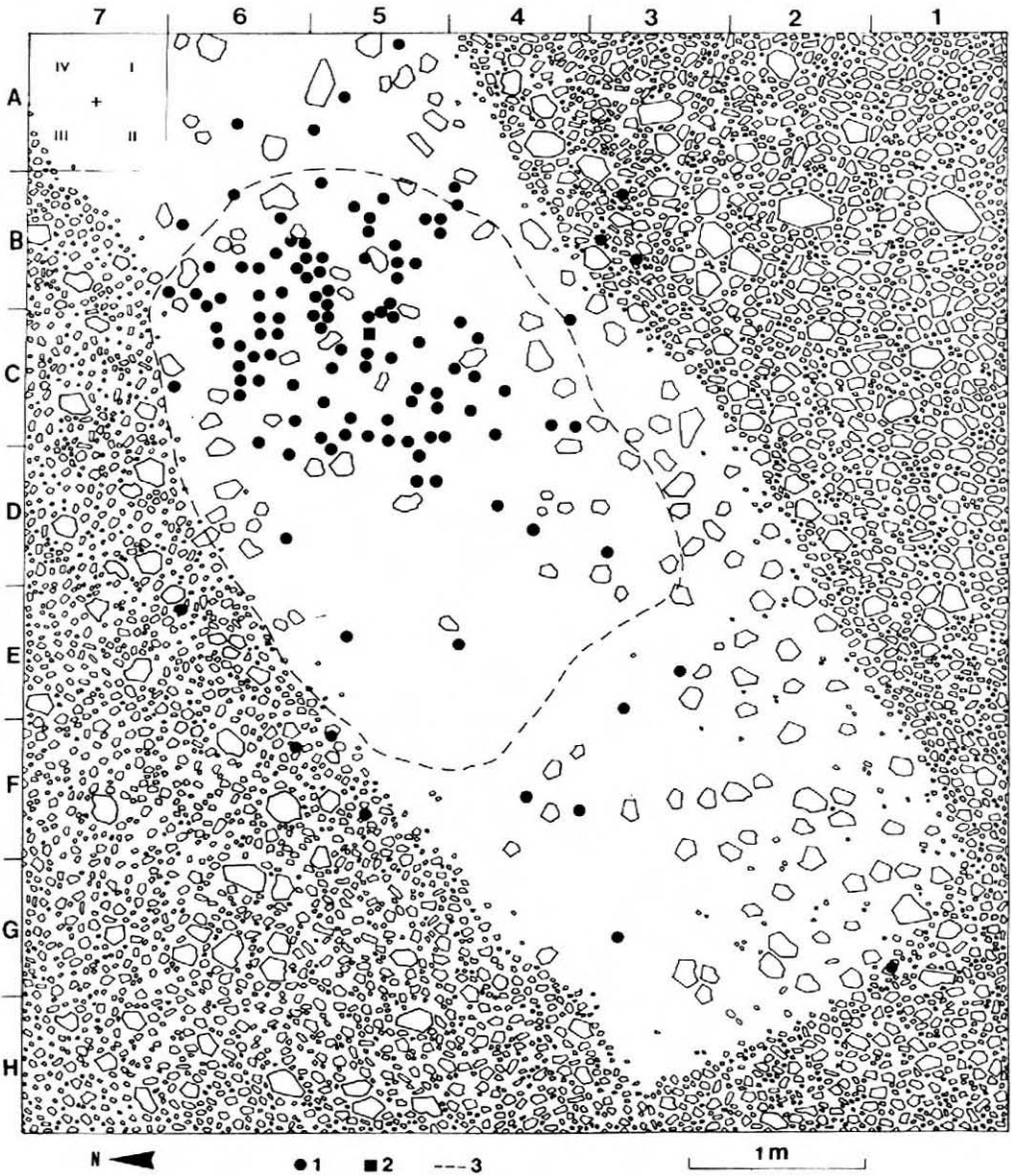

Fig. 4 - Workshop 480: map of the investigated area. 1) cores; 2) hammerstone; 3) limit of the debitage products scatter *(drawn by F. Negrino).*

THE FLINT ASSEMBLAGE

TECHNOLOGICAL ASPECTS (E. S.)

The workshop yielded a total of 35,283 chipped artefacts and one small hammerstone. The artefacts comprise 13,880 unretouched blades (39.3%), 21,117 unretouched flakes (59.9%), 107 crested blades (core trimming blades) (0.3%), 44 core tablets (0.1%), 26 core tip rejuvenation blades (0.1%) and 109 cores (0.3%) (fig. 5a). No retouched artefact has been found.

995 blades are complete (7.2%) and 12,885 fragmented (92.8%), while among the flakes 2629 (12.4%) are complete and 18,488 fragmented (87.6%).

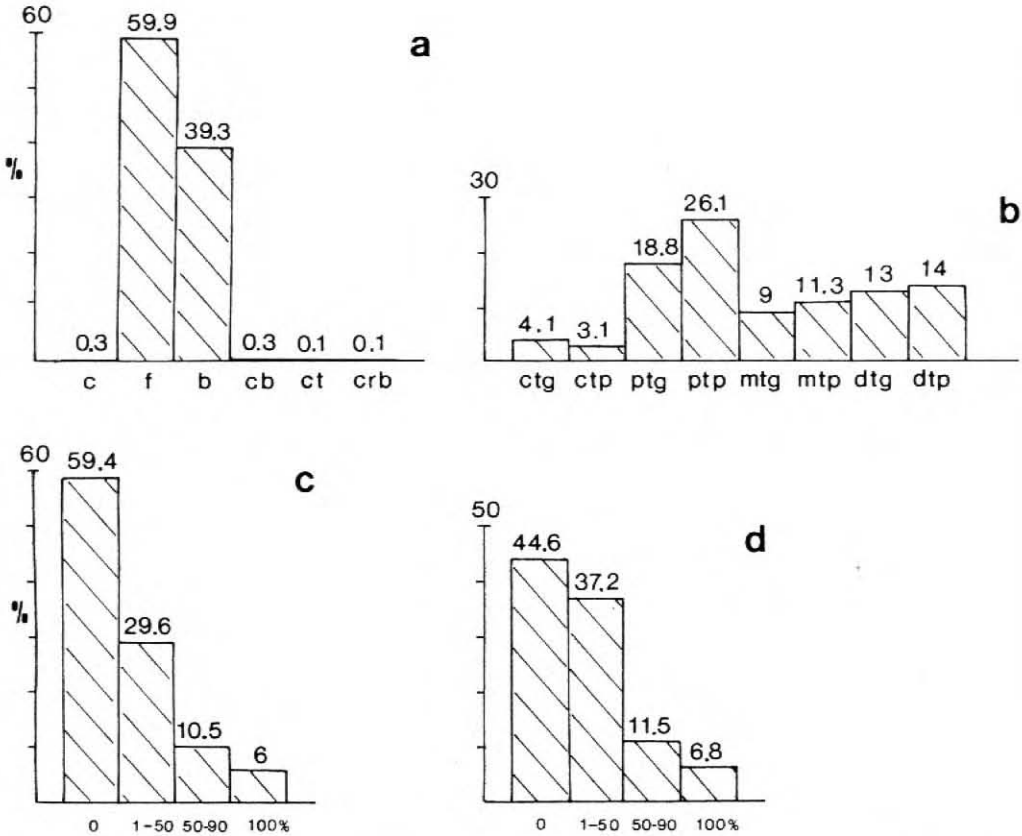

Fig. 5 - Workshop 480: a) percentages of the different debitage products: c=cores, f=flakes, b=blades, cb=crested blades, ct=core tablets, crb=core tip rejuvenation blades. b) percentages of the laminar products according to their section: ctg=complete blades, triangular cross-section, ctp=complete blades, trapezoidal cross-section, ptg=proximal fragment, triangular cross-section, ptp=proximal fragment, trapezoidal, mtg=mesial fragment, triangular, mtp=mesial fragment, trapezoidal, dtg=distal fragment, triangular, dtp=distal fragment, trapezoidal. c) Ratio of the uncorticated/corticated laminar products according to the percentage of the dorsal surface covered by the cortex. d) Ratio of the uncorticated/corticated flakes according to the percentage of the dorsal surface covered by the cortex *(drawn by E. Starnini).*

The corticated artefacts are 17,343 (49.2%), 11,705 of which are flakes and 5638 blades. They have been subdivided into 3 groups according to the extension of the cortex on the dorsal face (figs. 5c and 5d). There is an increase of the 100% corticated artefacts among the flakes; this is not surprising, for it is the result of the first stage of decortication of the flint nodules.

In order to understand the debitage technique employed and to define the characteristics of the final products exported, all the blade residuals have been quantified and subdivided according to their section and condition as indicated in table 1 below.

Table 1 – Distribution of the blades and blade fragments according to their section and condition

	TRIANGULAR		TRAPEZOIDAL		TOTAL	
	N.	(%)	N.	(%)	N.	(%)
COMPLETE	564	(4.1)	431	(3.1)	995	(7.2)
PROXIMAL FRAGMENTS	2608	(18.8)	3622	(26.1)	6230	(44.9)
MESIAL FRAGMENTS	1257	(9.0)	1566	(11.3)	2823	(20.3)
DISTAL FRAGMENTS	1804	(13.0)	2028	(14.6)	3832	(27.6)
TOTAL	6233	(44.9)	7647	(55.1)	13,880	(100.0)

As a result the percentage of the complete blades is very low (7.2%) (fig. 5b); they are often irregular or corticated and this can explain their discard. The proximal segments are the most represented fragments; this fact has been interpreted as a result of accidents that had occurred during the blade debitage. Regarding the shape of the section, there are no relevant differences between the percentages of the triangular and trapezoidal specimens. The typometrical analysis of the complete blanks has been conducted by Biagi *et al.* (1995) in comparison with Workshops 58 and 59 (Biagi and Pessina, 1994).

Technical elements related to the preparation and the rejuvenation of the blade-cores are some crested blades, 74 of which have unidirectional removals and 33 bidirectional removals, and 44 core-tablets, 24 of which are partial (fig. 11/1). In addition there are 26 plunging blades, most of which are very thick, removing a consistent part of the core tip.

The cores are 109 in total, attesting different stages of utilization. Most of them (68) are subconical and subpyramidal, with an average length of 10 cm. They are all exhausted blade-cores, in general with a flat striking platform (figs. 6; 8; 9; 12 and 13).

The characteristics observed from both the blades and the cores such as the rather straight and parallel blade arrises, the striking angle measuring some 90°, the absence of evident ripples on the lower face, and a small, relatively marked bulb, would indicate the use of the pressure technique (Inizan *et al.*, 1992). However, the presence of bulb scars and radial, proximal, microfractures has often been observed on the blade products. This latter particular would suggest that the blades were more probably obtained with a copper punch by indirect percussion (F. Briois, pers. comm. 1995).

Other 22 cores are of the same type as the above-mentioned, but show evident traces of re-shaping (figs. 9/2; 13/2-5; 14-17/1, 2 and 18/2-4) obtained with direct percussion, probably with a hammerstone or with another blade-core, as attested by 3 cores and one small flint pebble, all with hammering traces (fig. 11/2). There are 7 more cores at the same stage of re-working on which the presence of blade scars is no longer visible. They all are connected with the preparation of oval-shaped, smaller-sized, pre-cores (fig. 18/2-4). A half of an oval pre-core is also present (fig. 18/5) as well as a small bladelet core (fig. 18/6), both indicative of the first stages of the operative chain of the bullet cores (Biagi and Cremaschi, 1991: 98, fig. 6; Biagi *et al.*, 1996). It is worth mentioning

that similar re-working attempts of large blade-cores inside a small bullet-core workshop were observed at Site 58 (Biagi and Pessina, 1994). To conclude, there are also 9 cores or pre-cores of irregular shape, with wide flake removals.

Refitting (F. N.)

Refitting, i.e., fitting together of flint or stone artefact, is used increasingly as a powerful mean for the analysis of the technological, spatial and stratigraphic aspects of the chipped stone assemblages (Cziesla, 1990).

The potential of this assemblage for conjoining the artefacts appeared immediately high but difficult, due to its two principal characteristics, i.e., a) the fact that the assemblage represents a closed system but in the meantime is composed of a very high number of artefacts and b) of the same raw material. However, after the excavation, each piece was washed and marked with the grid coordinates. The refitting process involved the following stages:

1) the original grid of the site was reconstructed in the laboratory of the Institute of Archaeology of the Shah Abdul Latif University and all the chipped artefacts recovered from the site,

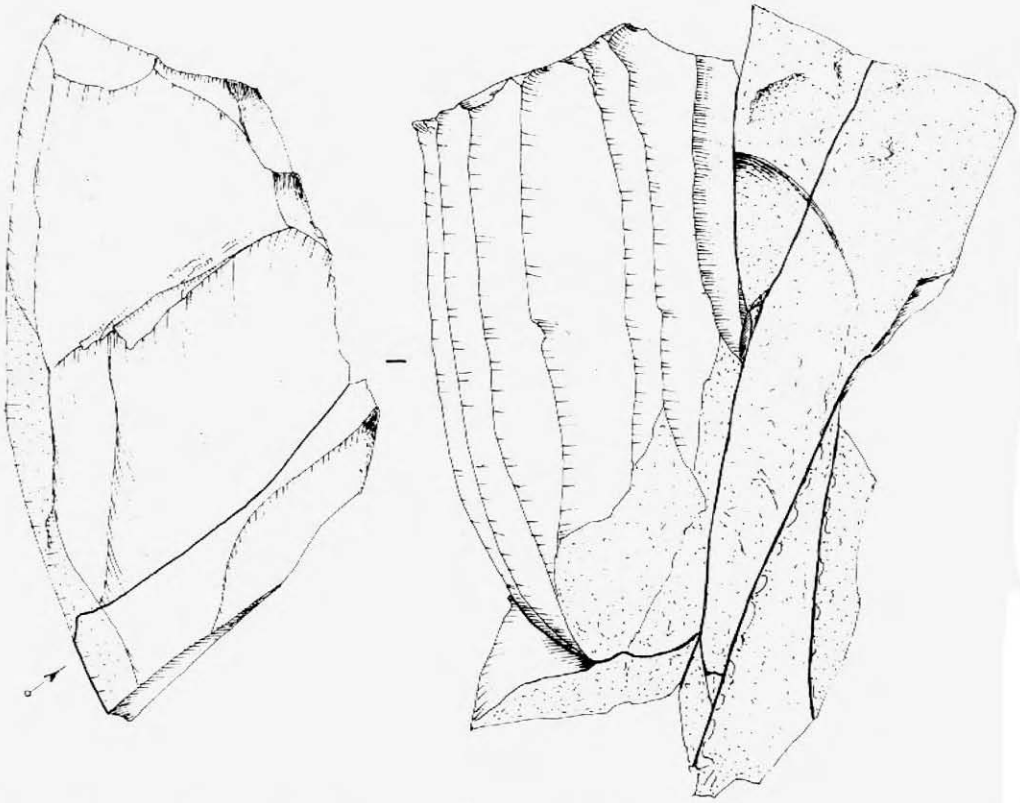

Fig. 6 - Workshop 480: core 70 with refitted flakes (2:3) *(drawn by G. Almerigogna).*

excluding, at the moment, the chips and the blade fragments, were rescattered back to their original squares and quadrants in the grid; the cores and the core fragments were separated and the artefacts such as decortication flakes and core rejuvenation products were assembled;

2) starting from the squares where the cores were found, we moved further on till the edges of the grid looking for refitting pieces;

3) each reconstructed core or reduction sequence was recorded, drawn and photographed;

4) distribution and dispersion maps were prepared, to indicate the spatial relationship of the cores and their preparation or reduction products (fig. 19).

5) The nature of the products which were refitted to the cores was analysed, accordig to their size and distance. From some of the core fragments or flakes that were not exactly mapped, an average distance was calculated on the basis of their quadrant of provenance.

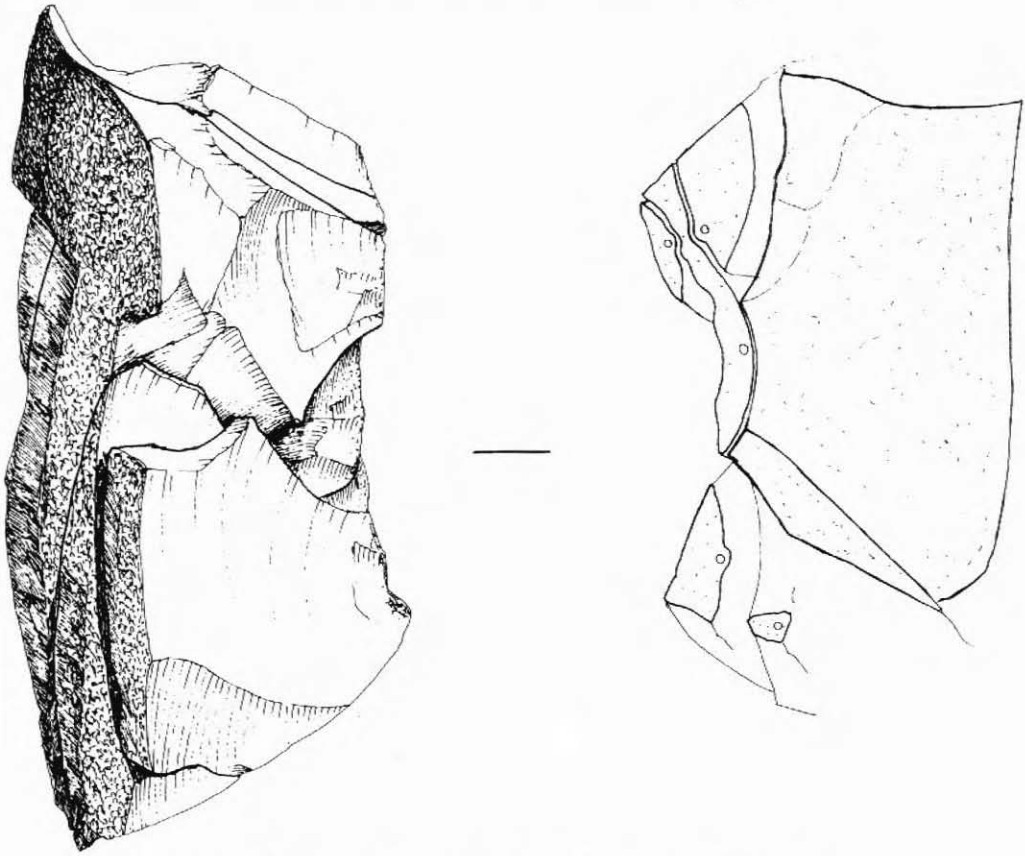

Fig. 7 - Workshop 480: core 70 with refitted flakes, lateral view (2:3) *(drawn by G. Almerigogna).*

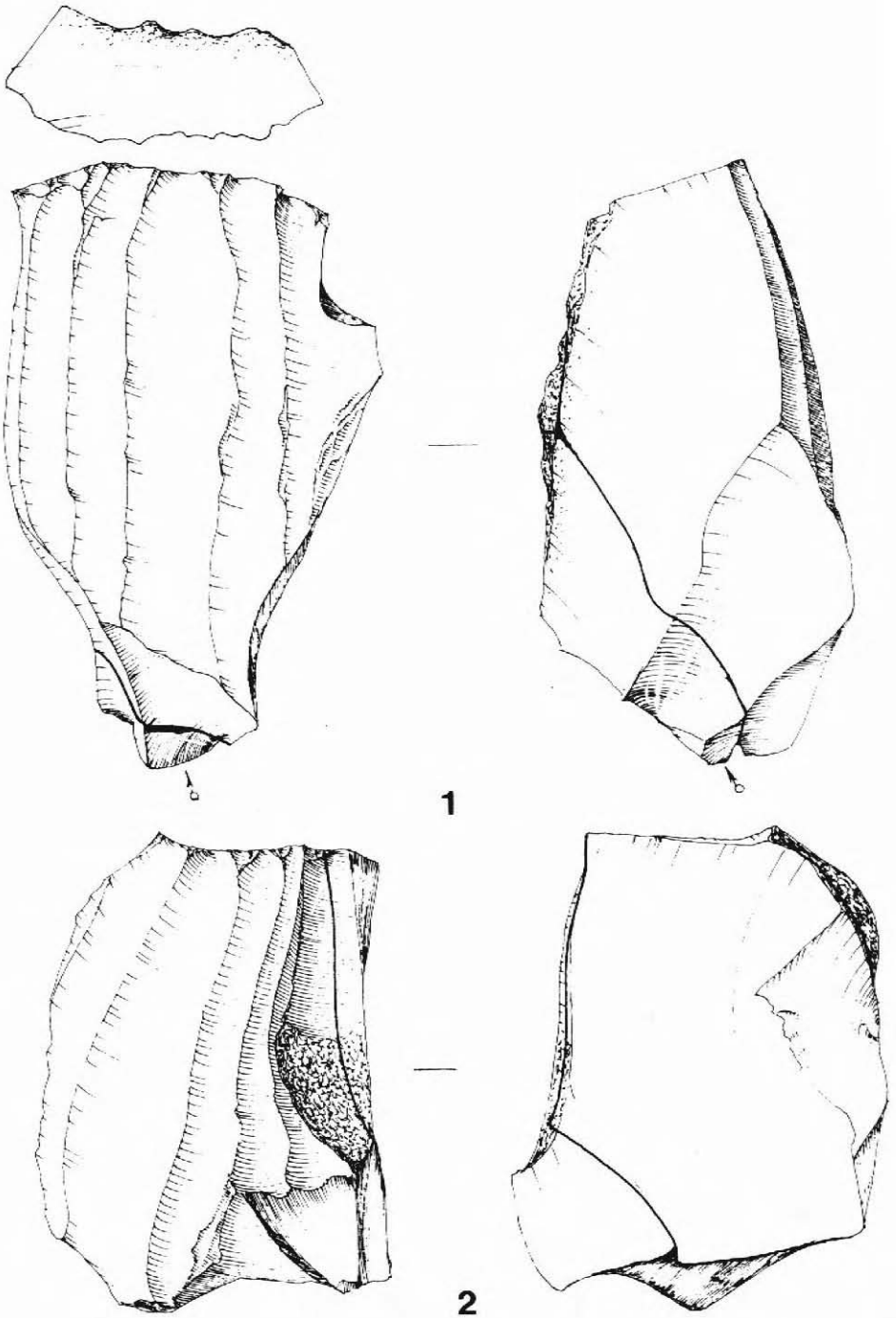

Fig. 8 - Workshop 480: core 71 with refitted flake (1); core 73 with refitted flake (2) (2:3) *(drawn by G. Almerigogna).*

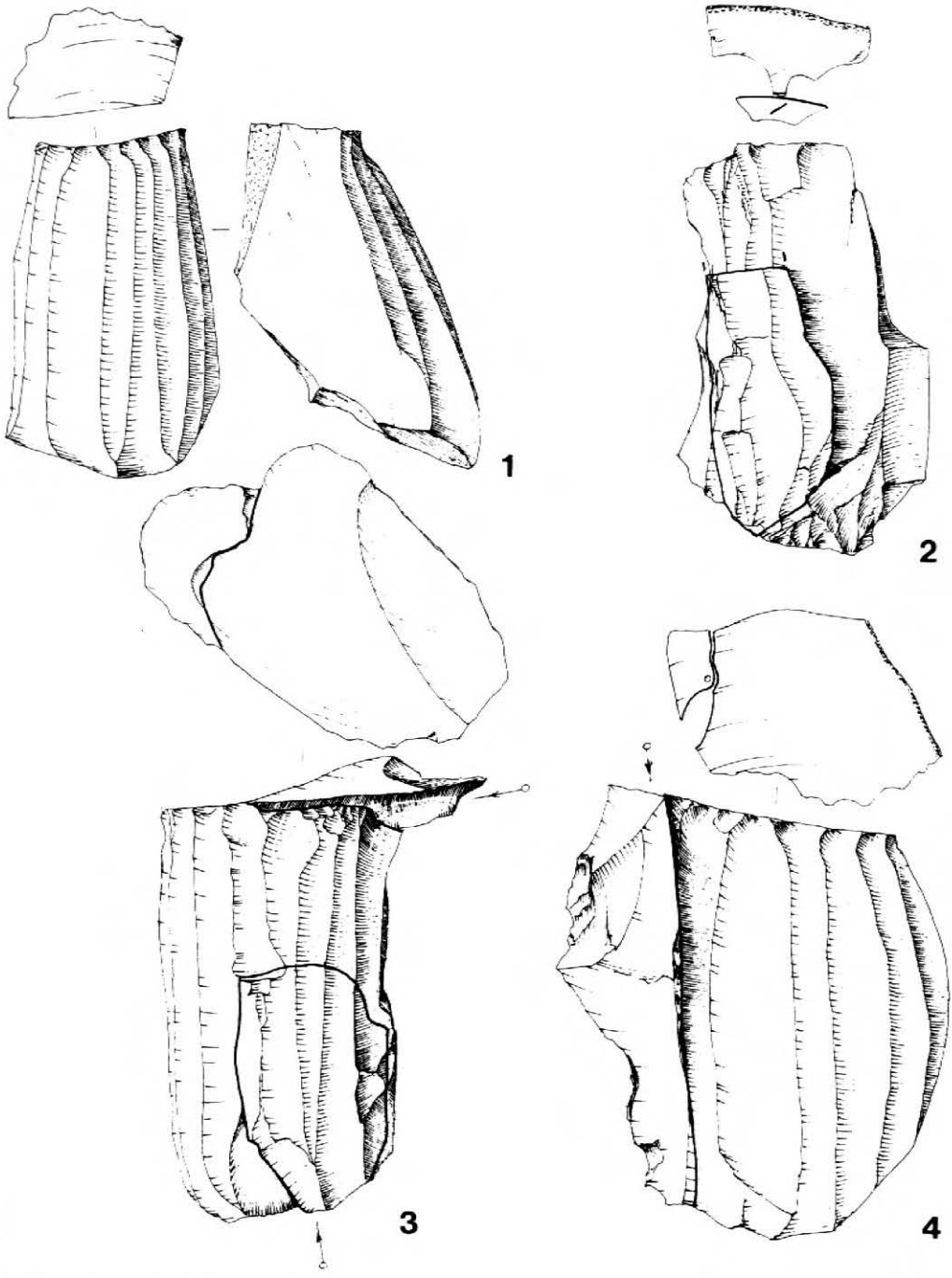

Fig. 9 - Workshop 480: blade core (1); blade core with large flake refitting removal (2); cores 80 and 91 with refitted flake (3 and 4) (2:3) *(drawn by G. Almerigogna).*

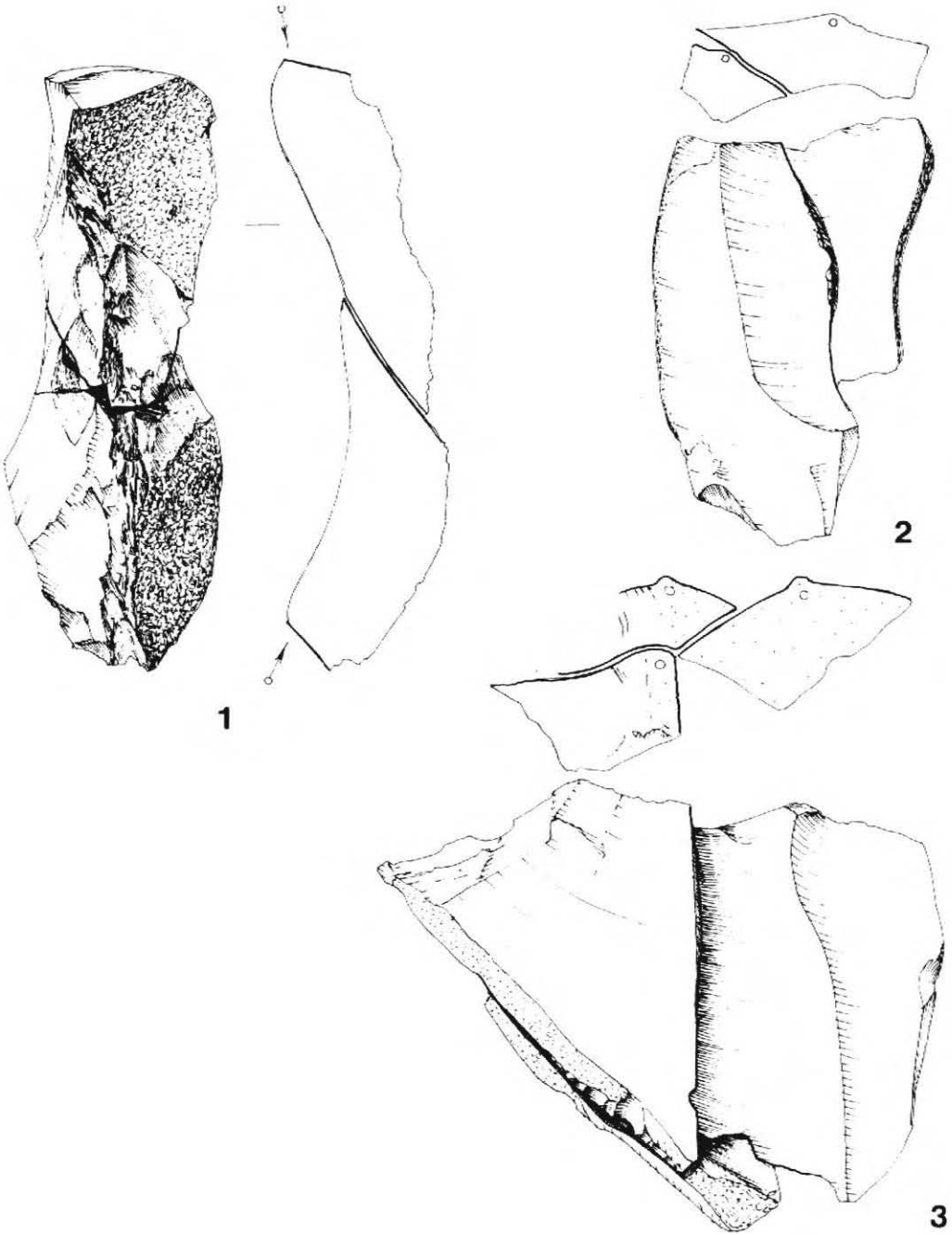

Fig. 10 - Workshop 480: refitted flakes (1 and 2); core-preparation refitted flakes (3) (2:3) *(drawn by G. Almerigogna).*

THE OPERATIVE CHAIN AT SITE 480 (F. N.)

The preliminary study of the assemblage permitted the definition of two working stages occurred in the workshop: one connected with the production of blades longer than 8 cm (fig. 20a); the second with the re-use of the abandoned cores of the previous manufacture, for the re-shaping and preparation of smaller-sized bladelet cores (fig. 20b).

At the first stage the flint nodules, extracted from the nearby quarry-pits, were decorticated and shaped into pre-cores. Connected with this operation are several decortication flakes, often of large dimensions and characteristic technological artefacts, such as the crested blades. The pre-cores were then utilized for the production of blades.

From each of these cores some 20 regular blades were obtained and exported from the site, as results from the refitting (figs. 6; 9/3, 4; 11/1). The high number of proximal fragments, in comparison to the mesial and distal ones, demonstrates that at least 2000 blades, without bulb, were exported from the workshop. Considering the proportion of the total number of proximal fragments (6230) and that of the cores (109), it is evident that these latter are underepresented. In addition we have to consider that the number of the complete, exported blades cannot be quantified.

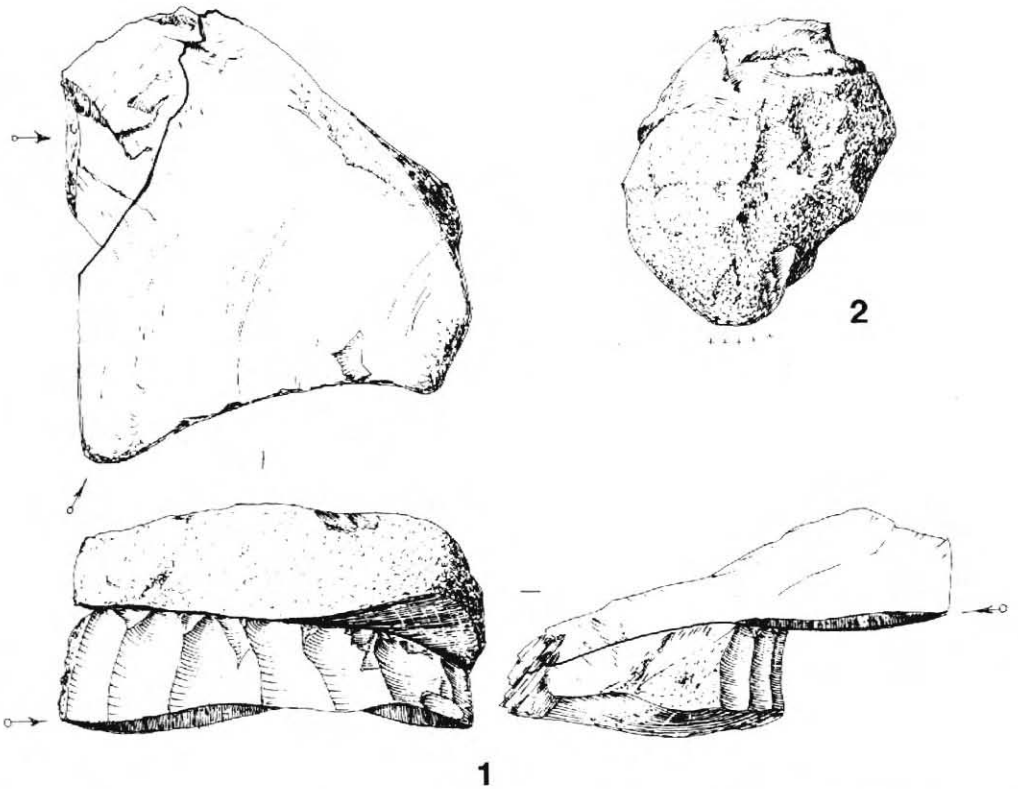

Fig. 11 - Workshop 480: core tablet with refitting flake (1); chert pebble used as hammerstone (2) (2:3) *(drawn by G. Almerigogna).*

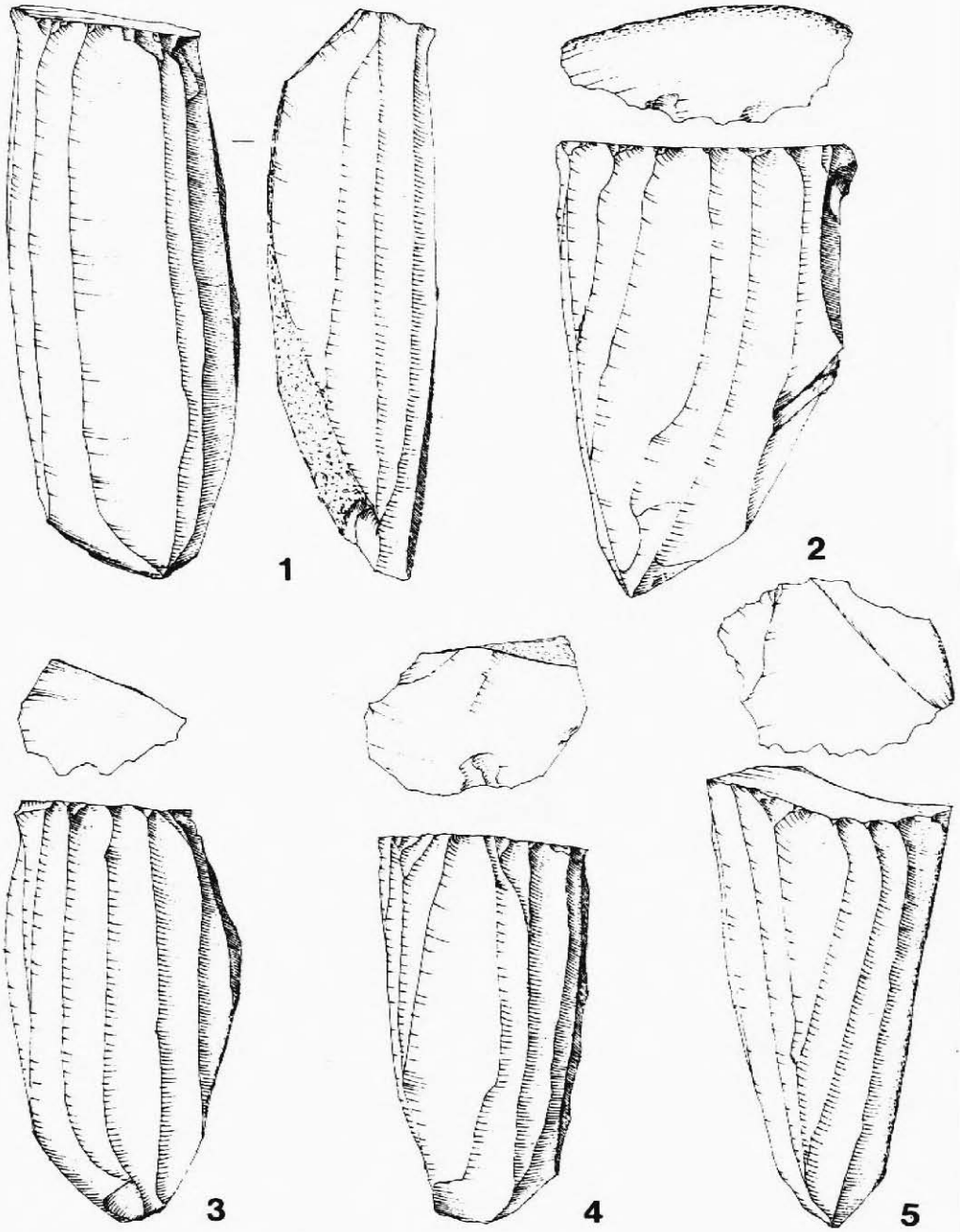

Fig. 12 - Workshop 480: blade cores (1-5) (2:3) *(drawn by G. Almerigogna).*

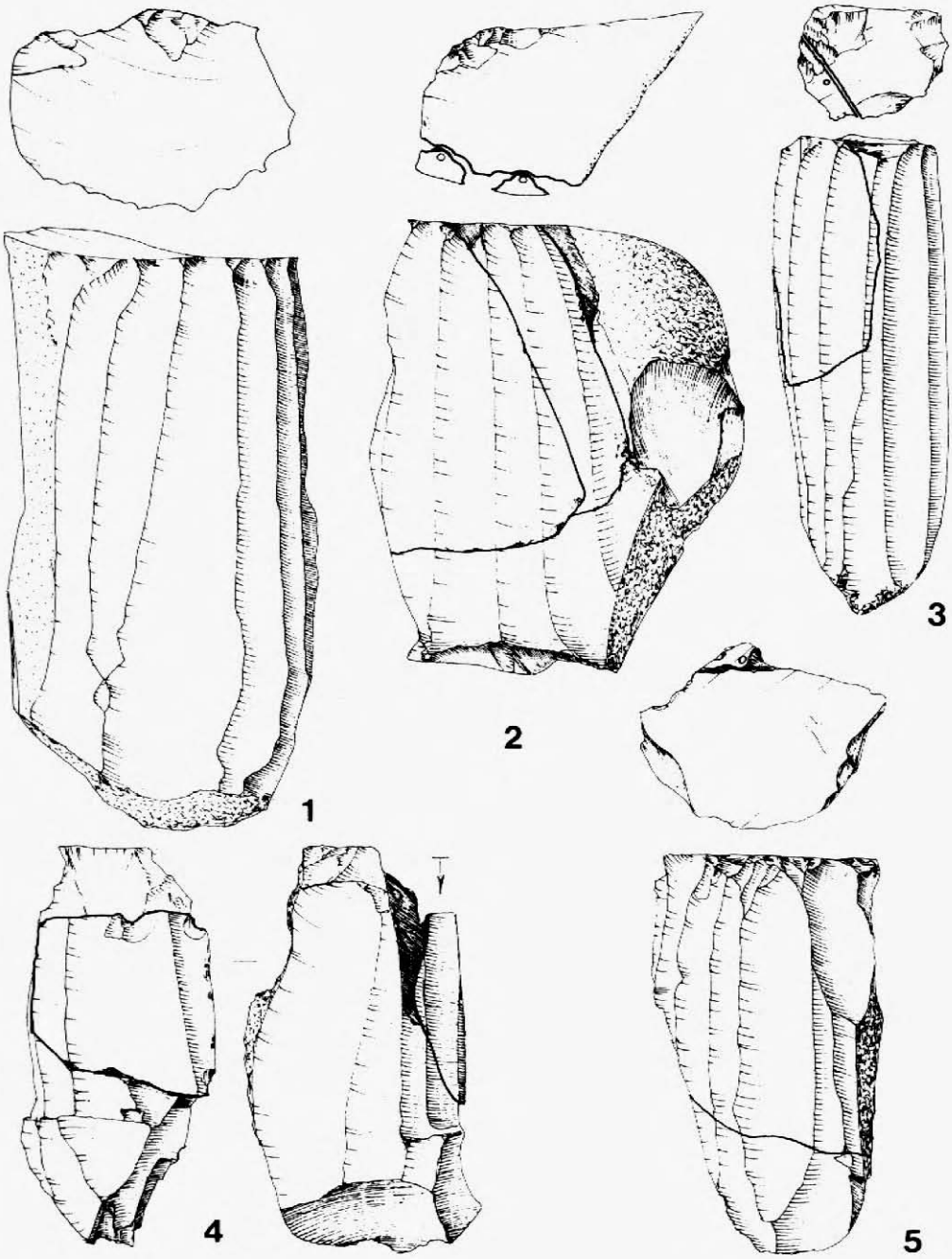

Fig. 13 - Workshop 480: blade core (1); blade cores with large flake refitting removals (2-5) (2:3) *(drawn by G. Almerigogna).*

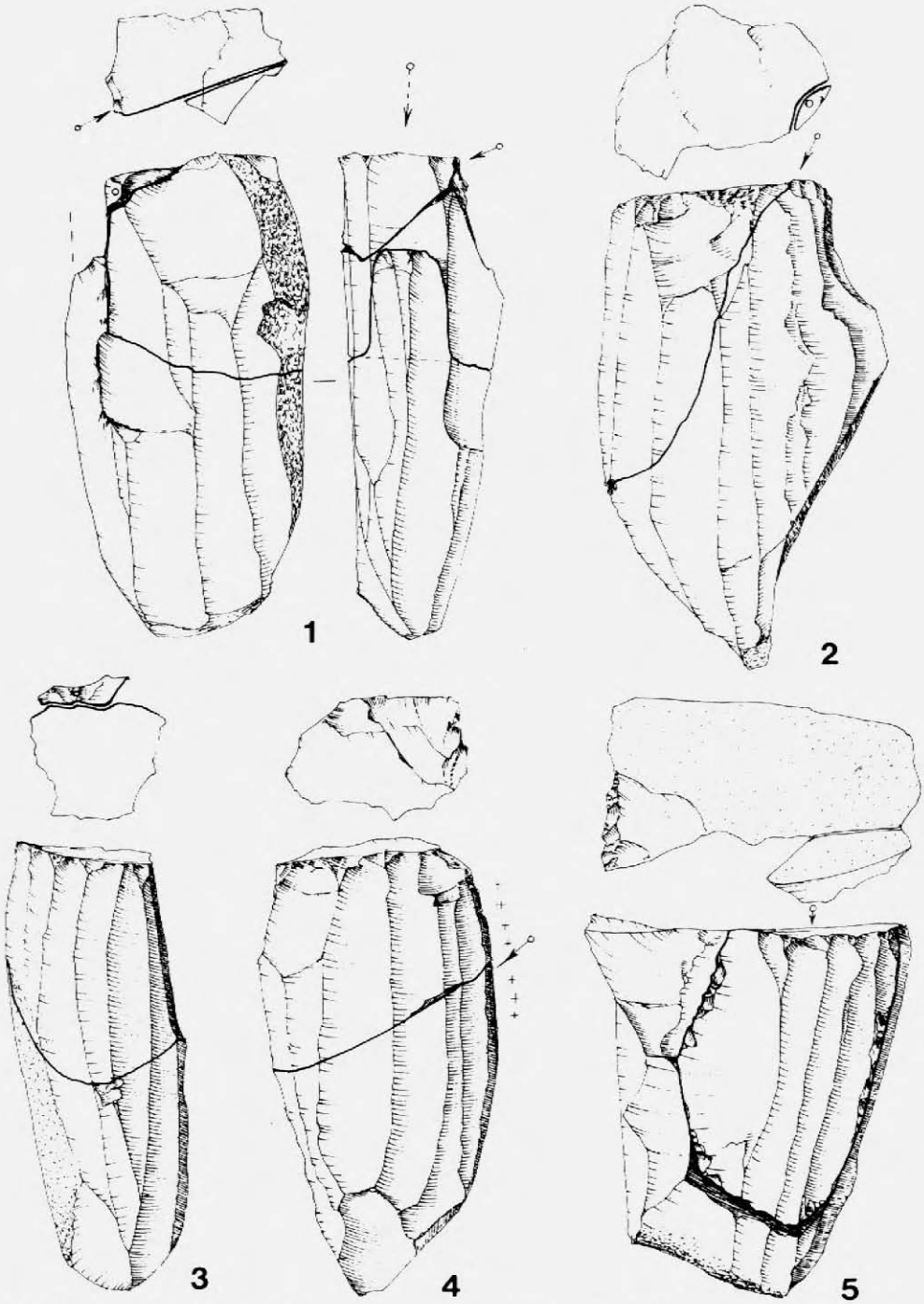

Fig. 14 - Workshop 480: blade cores with large flake refitting removals (1-5) (2:3) *(drawn by G. Almerigogna).*

After some time, that we can not quantify at this stage of the research, some of the abandoned cores of the workshop have been re-worked, obtaining oval bifacials (fig. 18/2-4), from which smaller sized pre-cores have been prepared (fig. 20b); one of these latter, together with a bladelet core, has been found in the periphery of the investigated area (fig. 18/5 and 6). To this episode can be attributed the loss of some of the cores of the previous workshop.

After the abandonement of the site, the workshop was partially covered with eolic sand that filled all the depressions of the original surface. The artefacts lying on its surface are more fragmented than those from layer 1, perhaps due to later trampling.

SPATIAL ANALYSIS (E. S.)

As mentioned above, the surface of the workshop looked like a dense, oval, scatter of debitage products, among which a cluster of cores was visible.

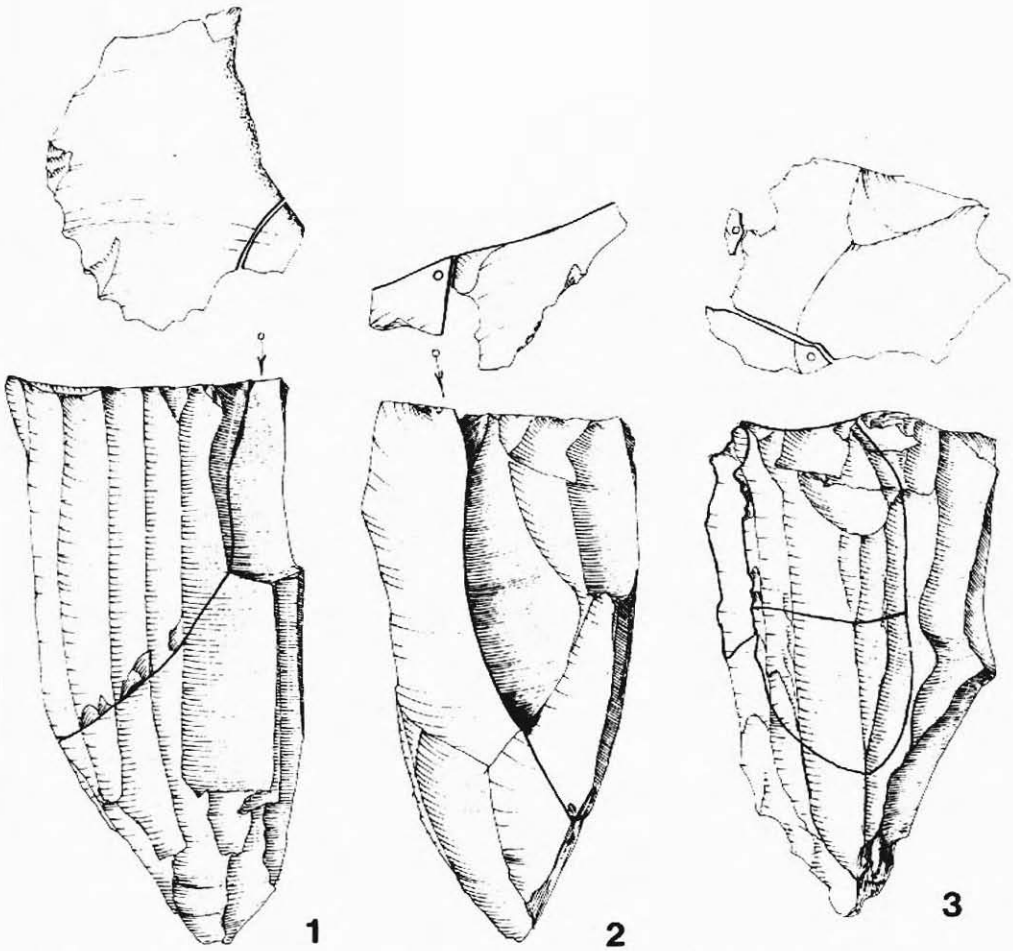

Fig. 15 - Workshop 480: blade cores with large flake refitting removals (1-3) (2:3) *(drawn by G. Almerigogna).*

The spatial analysis shows that the majority of the products deriving from the decortication of the nodules are distributed in layer 1, clustering in particular in squares C-E/4-6 (fig. 21/a1 and b1).

Slightly westward are distributed the products resulting from the laminar debitage (fig. 21/a2 and b2), whose main concentration is in squares D-E/4-5. It coincides with the area of dispersion of the proximal blade fragments, supporting the hypotesis of an accident occurred during the debitage rather than an intentional break.

As mentioned above, all the exhausted cores were found clustered in the adjacent squares, namely B-C/5-6 (fig. 22/a1 and b1).

As regards the core rejuvenation flakes and blades, they are scattered all around the spot of laminar debitage products (fig. 22/a2 and b2).

The surface dispersion of re-worked cores and core-flakes clustering in squares B-C/5-6 is the result from the second stage of utilization of the area, referred to the exploitation of the abandoned cores (fig. 22/a1).

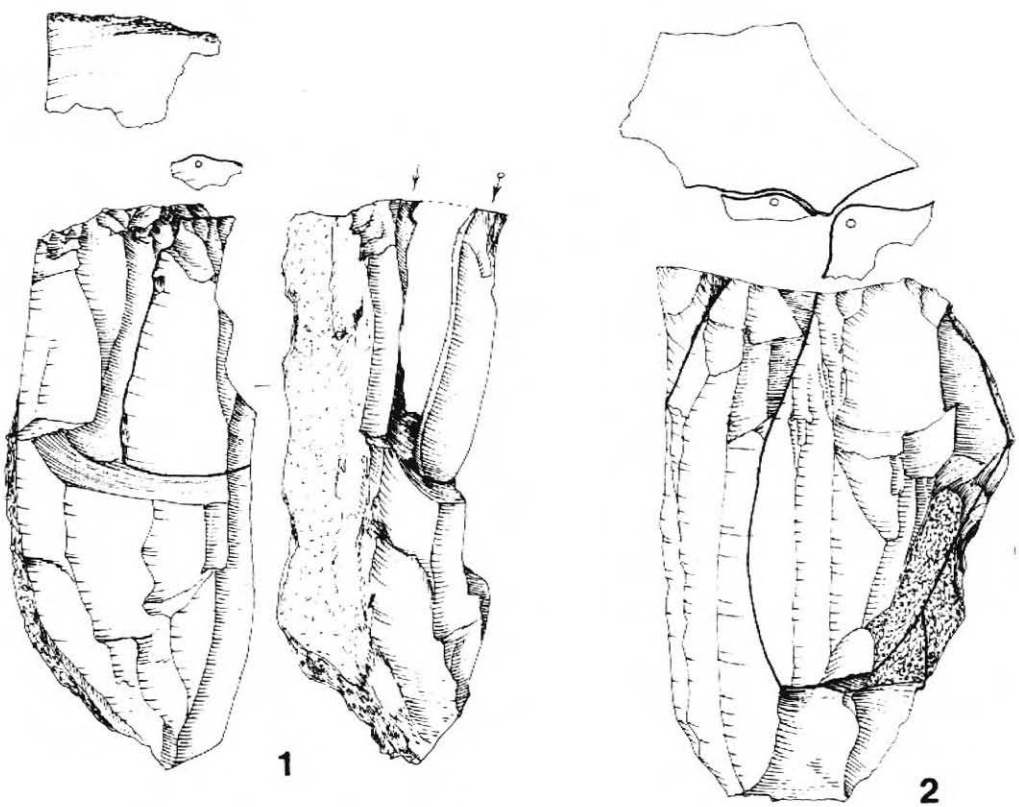

Fig. 16 - Workshop 480: blade cores with large flake refitting removals (1 and 2) (2:3) *(drawn by G. Almerigogna).*

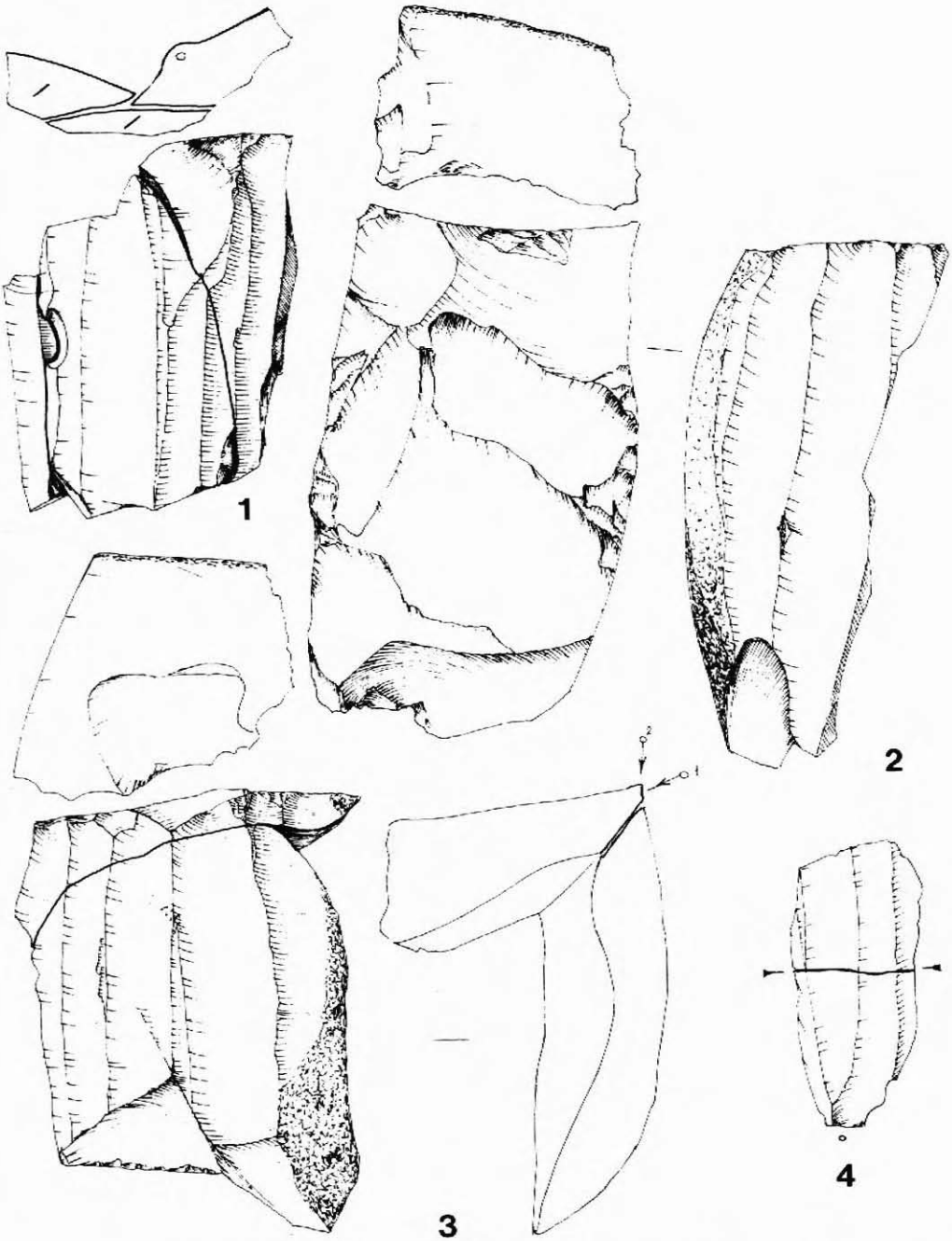

Fig. 17 - Workshop 480: refitted core-flakes (1); partially re-shaped core (2); refitted core-flakes (3 and 4) (2:3) *(drawn by G. Almerigogna).*

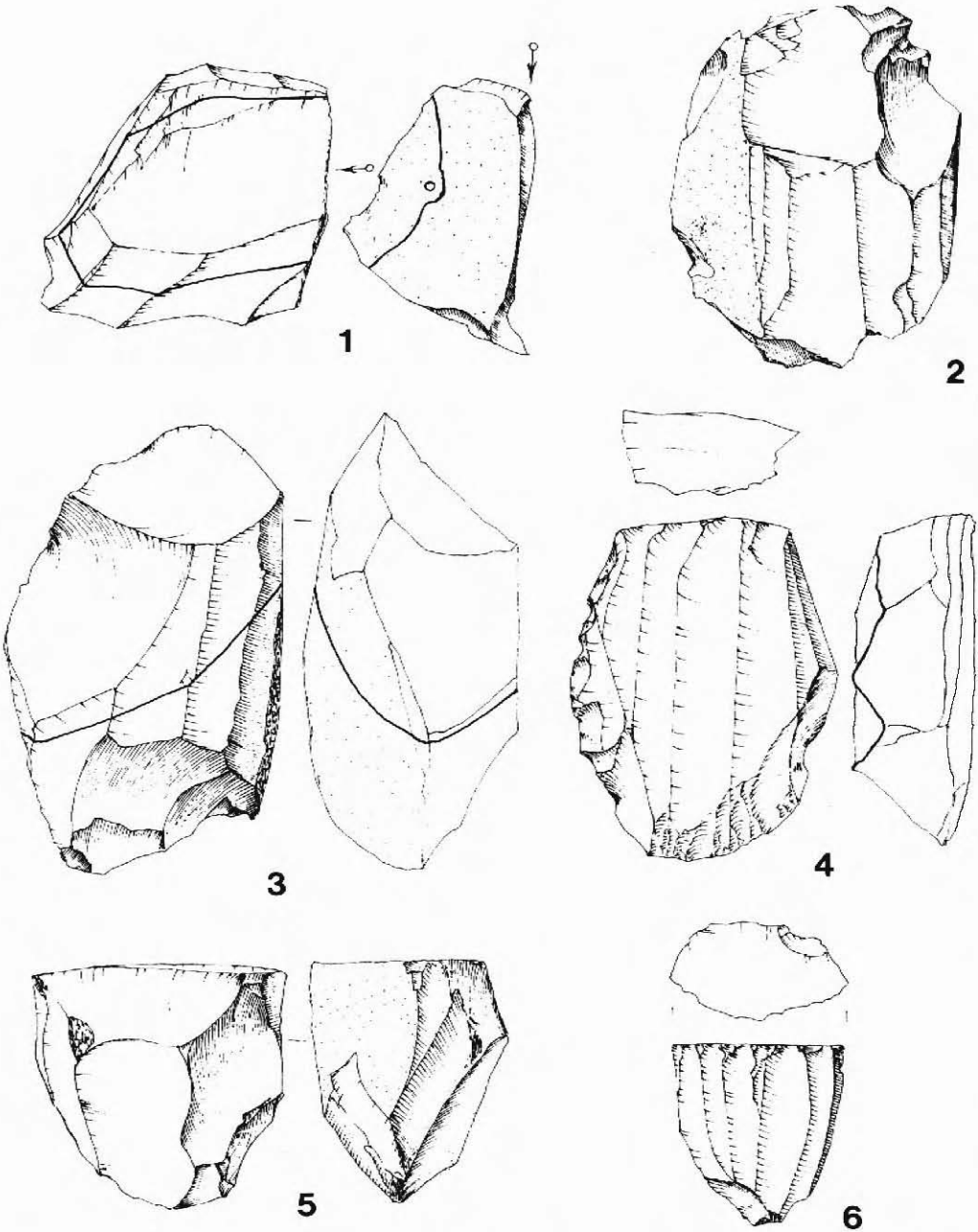

Fig. 18 - Workshop 480: refitted core flakes (1); re-shaped cores (2-4); small pre-core (5); bladelet core (6) (2:3) *(drawn by G. Almerigogna).*

CONCLUSION (F. N. and E. S.)

The preliminary study of Workshop 480 allowed the definition of the different stages of the operative chain of a flint blade workshop as well as of the technology applied in the core reduction activity.

The first results of the quantitative analysis indicate that the best laminar products were exported from the site. This workshop seems to be the result of a short-term chipping activity carried out by a very small number of flint knappers.

The final product of this workshop, represented by a few thousands regular blades, whose length was some 10 cm in average, was probably exported to the urban centres of the Indus Valley. This is confirmed by the comparison with the flint assemblages from the main centres of the Harappan Civilization. From a typological point of view, very similar products have been observed in the collections from the excavations of Kot-Diji (KHAN, 1981), Mohenjo-daro (KENOYER, 1994),

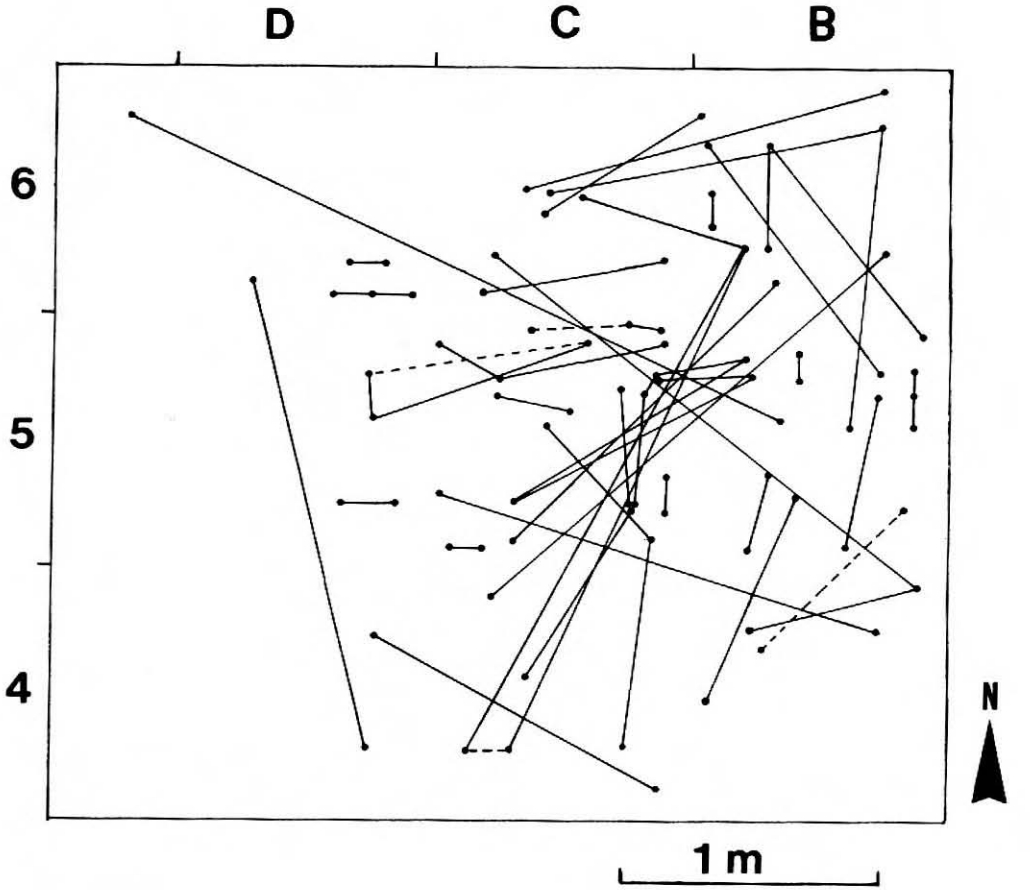

Fig. 19 - Workshop 480: dispersion map of the refitting artefacts. Interrupted lines indicate conjoining fractures *(drawn by F. Negrino).*

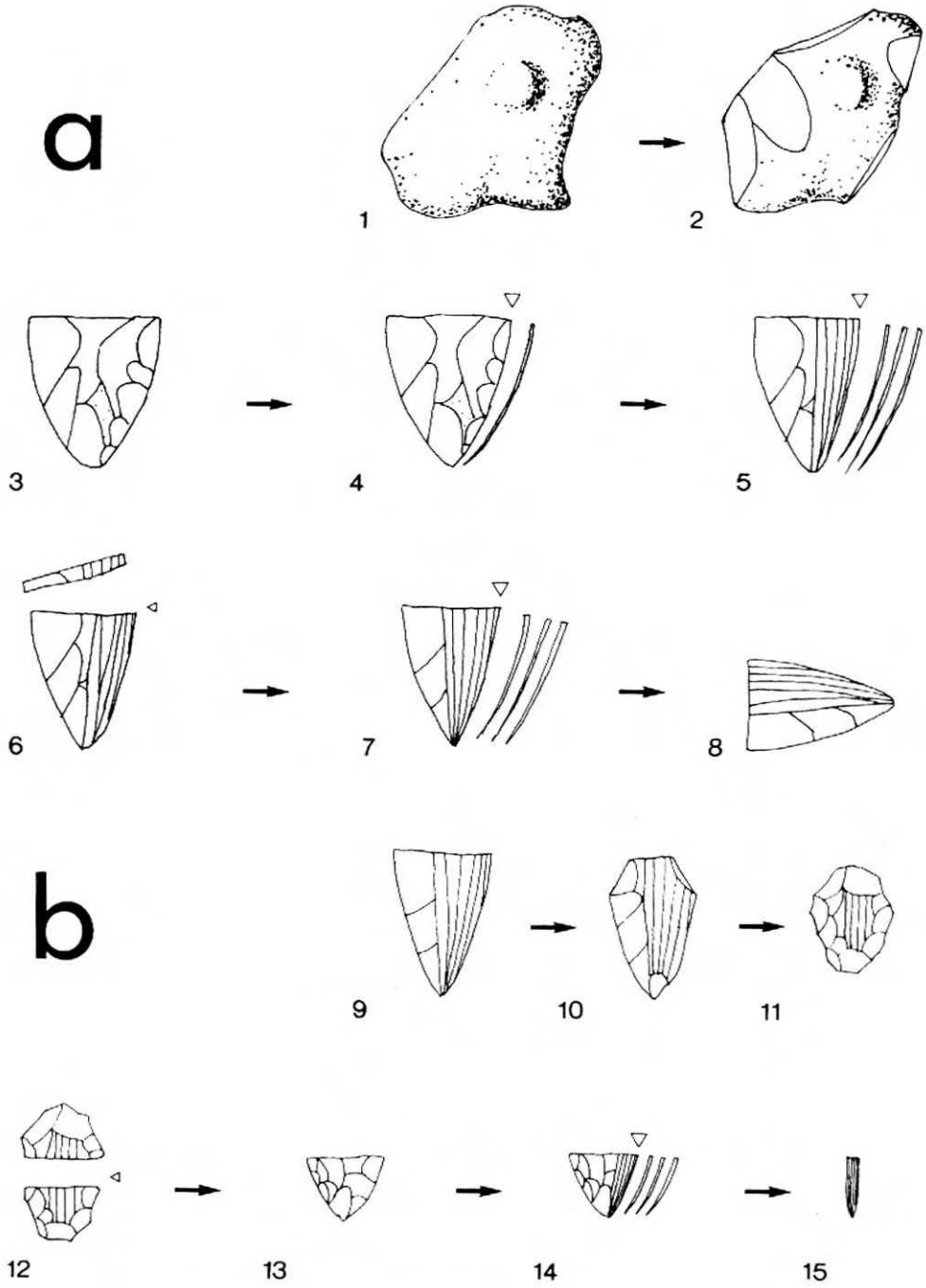

Fig. 20 - Workshop 480: operative chain reconstructed from the artefacts evidence *(drawn by F. Negrino).*

Nausharo and Harappa.

On the other hand, we have noted that a pressure technique employing a metal point for pressing (ANDERSON-GERFAUD *et al.*, 1989), identical in the results to that used for the production of bladelets from the small-sized bullet-cores (PELEGRIN, 1988), was employed also for the production of large blades. This is testified by some long bullet-cores from the workshops around Rohri (ALLCHIN, 1976: 478) which were unfortunately destroyed at the beginning of the decade, and from Unnar (fig. 23), actually in the collections of the Department of Archaeology of the Shah Abdul Latif University, Khairpur. Therefore two possibilities are open:

1) that two slightly different technologies were contemporaneously in use for the same purpose;

2) that the two technologies correspond to two different periods of flint exploitation and lithic production on the Rohri Hills. This second hypothesis seems more probable to the present Authors.

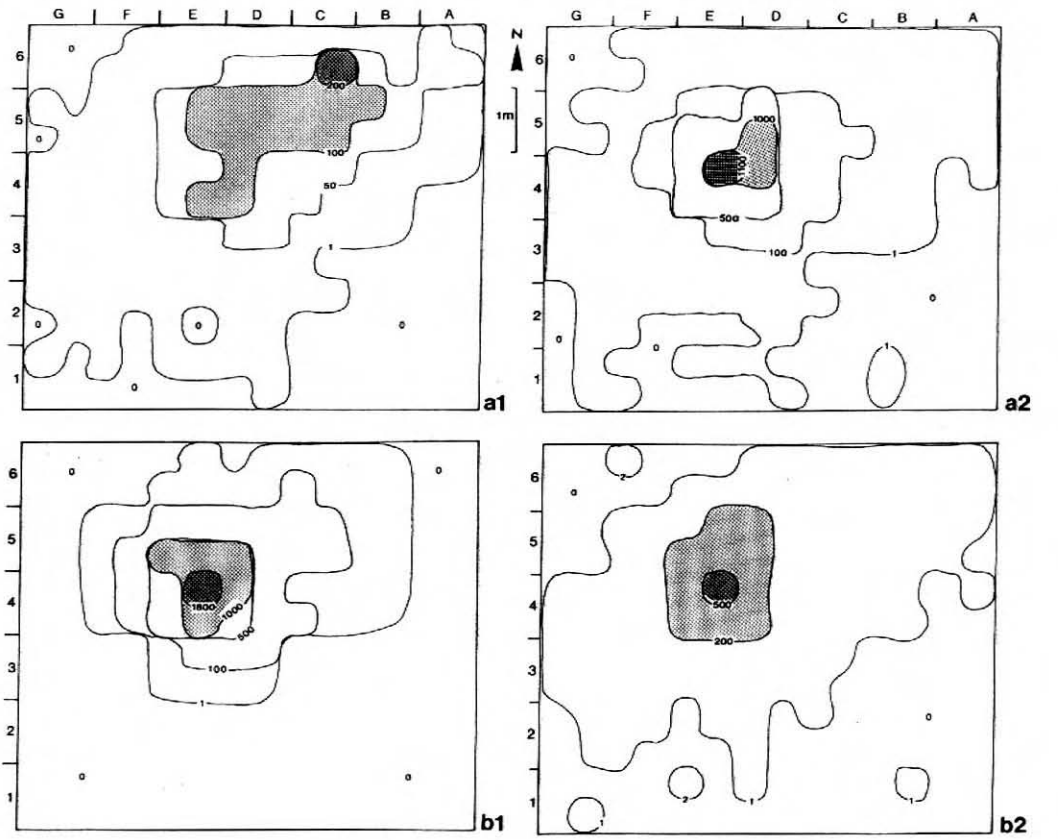

Fig. 21 - Workshop 480: dispersion maps of the flakes according to density contour lines (numbers indicate absolute values): a1) surface layer, b1) layer 1; dispersion maps according to density contour lines: a2) laminar products, b2) proximal laminar fragments (from surface layer+layer 1) *(drawn by E. Starnini).*

Thus, if the second hypotesis is correct, the long bullet-cores from Rohri and Unnar (fig. 23) might be contemporary with the workshops with small-sized bullet-cores of the region around Shadee Shaheed. Bullet-cores obtained by pressure technique come from the Mature Harappan phase of Harappa and Mohenjo-daro (KENOYER, 1984). Nevertheless it is still unclear when this technology was first in use (PELEGRIN, 1988) and to which exact period is to be attributed the other blade-production technology attested at Workshop 480.

At this stage of our research, the chronology of Workshop 480 can only be suggested on the basis of the similarities between its blade products and those of the Harappan centres. In fact no other cultural or chronological indicator comes from the workshop, nor any organic material suitable for 14C dating.

The aim of further research is the achievement of data allowing the definition of the relative and absolute chronology of the different workshops, in particular the study of the relationships between the production of blades from the large cores and that of bladelets from the bullet-cores.

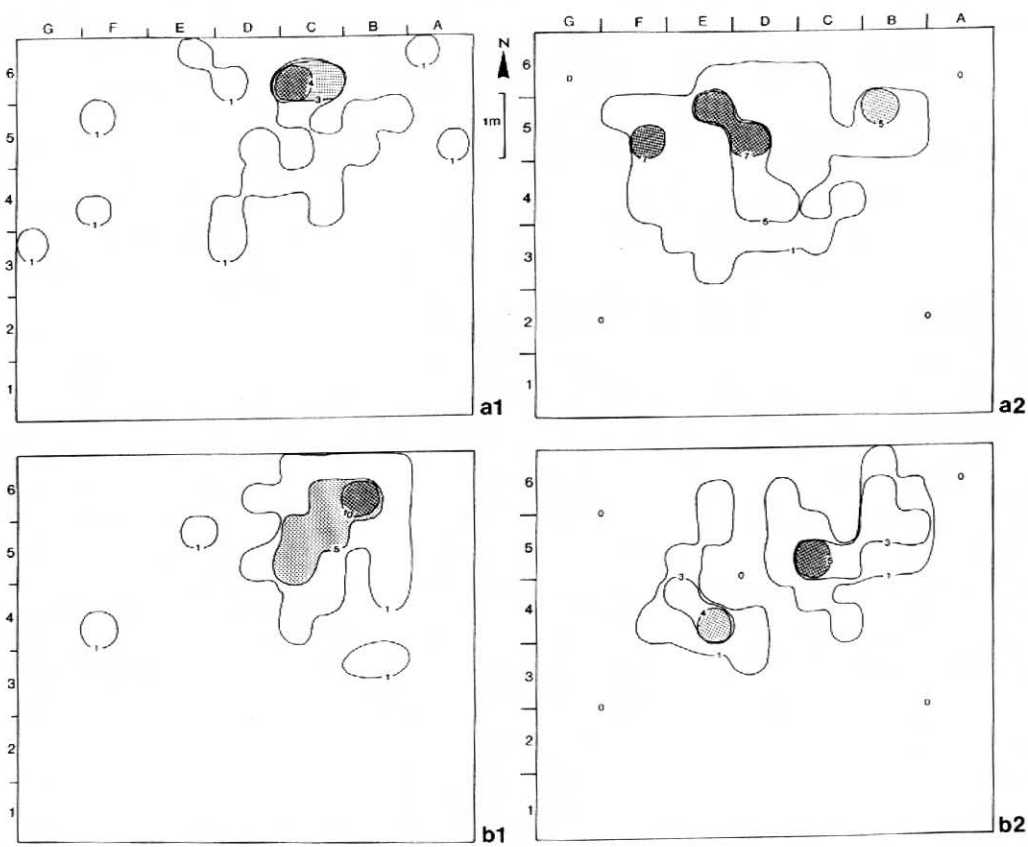

Fig. 22 - Workshop 480: dispersion maps according to density contour lines (numbers indicate absolute values): a1) re-shaped, flaked cores, b1) complete cores; a2) crested blades, b2) tablettes *(drawn by E. Starnini).*

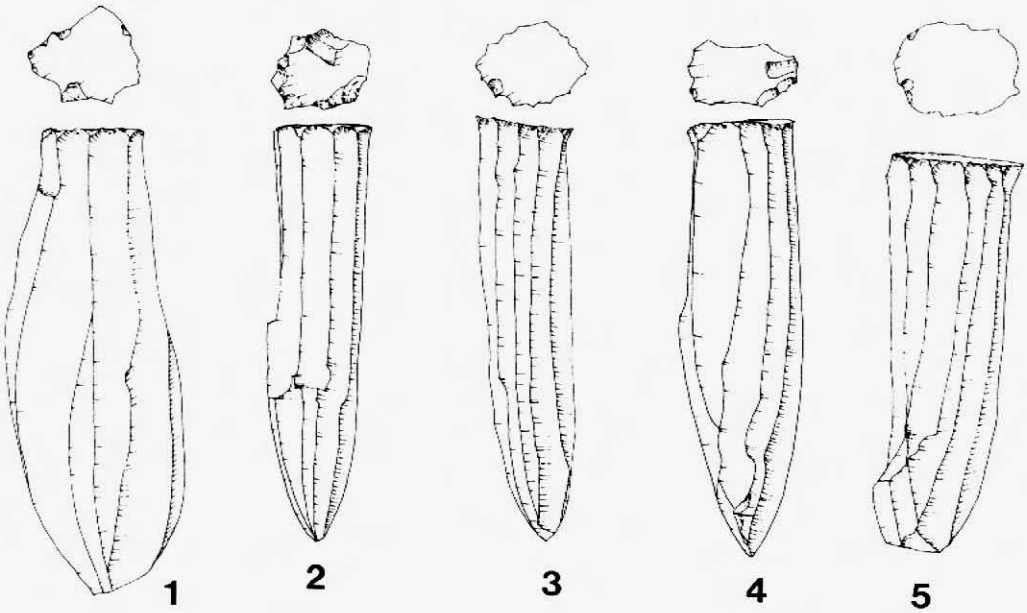

Fig. 23 - Long blade bullet-cores from Rohri (1-4) and Unnar (5) in the collections of the Department of Archaeology of the Shah Abdul Latif University, Khairpur (inv. no.: 1=RH775, 2=RH769, 3=RH768, 4=RH770) (2:3) *(drawn by E. Starnini).*

To conclude, the future elaboration of all the data and measurements recorded during our stay in Khairpur, will allow more detailed comparisons between Workshops 480, 58 and 59 (Biagi and Pessina, 1994) and the other Harappan lithic complexes from the Indus Valley (Kenoyer, 1984; Cleland, 1987).

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REFERENCES

ALLCHIN, B. 1976 – *New discoveries of Palaeolithic sites in the Plains of Sind and their geographical implications.* The Geographical Journal, 142 (3): 471-489.

ANDERSON-GERFAUD, P., INIZAN, M-L., LECHEVALLIER, M., PELEGRIN, J. and PERNOT, M. 1989 – *Des lames de silex dans un atelier de potier harappéen: interaction de domaines techniques.* Comptes Rendues de l'Academie des Sciences de Paris, 308, Series II: 443-449.

BIAGI, P. and CREMASCHI, M. 1991 – *The Harappan flint quarries of the Rohri Hills (Sind-Pakistan).* Antiquity, 65 (246): 97-102.

BIAGI, P., NEGRINO, F. and STARNINI, E. 1996 – *New data on the Harappan flint quarries of the Rohri Hills (Sindh – Pakistan).* VII International Flint Symposium. Warszaw (in press).

BIAGI, P., OTTOMANO, C., PESSINA, A. and SHAIKH, N. 1995 – *The 1994 Campaign on the Rohri Hills (Sindh – Pakistan). A preliminary report.* Ancient Sindh, 2: 13-40.

BIAGI, P. and PESSINA, A. 1994 – *Surveys and excavations in the Rohri Hills (Sindh-Pakistan): a preliminary report on the 1993 campaign.* Ancient Sindh, 1: 13-75.

CLELAND, J.H. 1987 – *Lithic Analysis and Culture Process in the Indus Region.* In JACOBSON, J. (ed.) *Studies in the Archaeology of India and Pakistan:* 91-116. Aris & Phillips, Warminster.

CZIESLA, E. 1990 – *On refitting of stone artefacts.* In CZIESLA, E., EICKHOFF, S., ARTS, N. and WINTER, D. (eds.) *The Big Puzzle. International Symposium on Refitting Stone Artefacts.* Studies in Modern Archaeology, 1: 9-44. Holos, Bonn.

INIZAN, M.L., ROCHE, H. and TIXIER, J. 1992 – *Technology of Knapped Stone.* CREP, Meudon.

KENOYER, J.M. 1984 – *Chipped Stone Tools from Mohenjo-daro.* In LAL, B.B. and GUPTA, S.P. (eds.) *Frontiers of the Indus Civilization:* 117-132. New Delhi.

KHAN, F.A. 1981 – *Kot Diji Culture – Its Greatness.* In DANI, A.H. (ed.) *Indus Civilisation. New Perspectives:* 15-24. Quaid-i-Azam University, Islamabad.

PELEGRIN, J. 1988 – *Débitage expérimental par pression*. Technologie Préhistorique, Notes et Monographies Techniques, 25: 37-53. CNRS, Paris.

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