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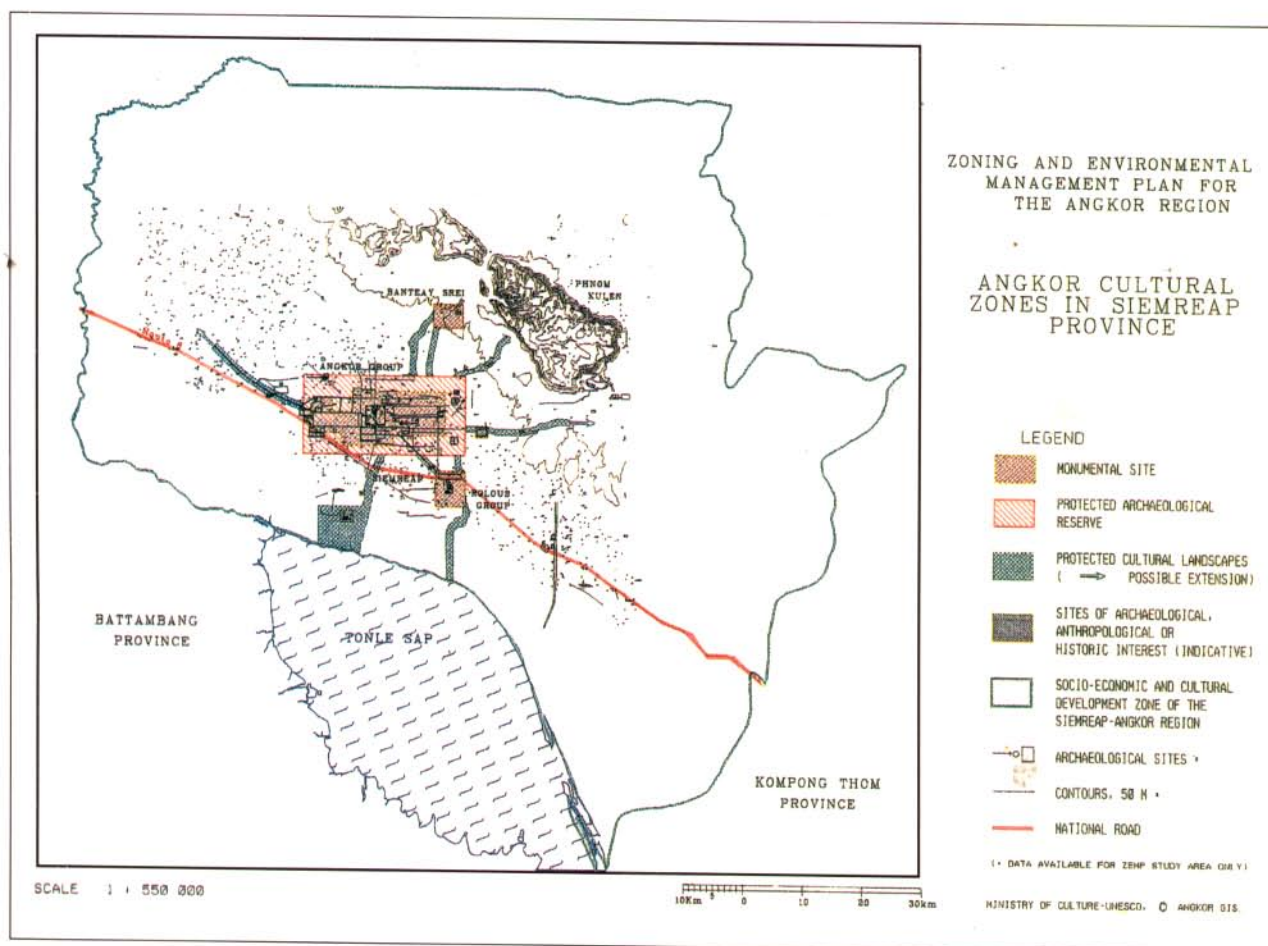
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PROCESSING SEQUENCES IN THE INDIAN LOWER PALAEOLITHIC: EXAMPLES FROM THE ACHEULIAN AND THE SOANIAN

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ABSTRACT

During the Palaeolithic and especially during the Lower Palaeolithic, the prehistoric people of India were making and using two different types of lithic assemblages. To the south of the Indo-Gangetic basin their cultural remains belong to the Acheulian, characterized by the presence of handaxes, sometimes cleavers, and by small tools on flakes or other pieces of stone. To the north of the Indo-Gangetic basin, in the Siwaliks, most of the sites yield Soanian lithic material comprising a majority of cobble tools with no typical handaxes. Flakes and small tools are rare. These two technical traditions evolved separately during the entire Palaeolithic and may be considered as two different technologies, but in both of them three processing sequences can be distinguished which are quite comparable from one tradition to the other. The organisation of the processing sequences appears to be independent of cultural tradition. From this point of view, case studies of an Acheulian assemblage from Rajasthan and a Soanian assemblage from the western Siwaliks reveal clear similarities.

In India, the Lower Palaeolithic is represented by two different cultural traditions, Soanian and Acheulian. The former is specific to Sub-Himalayan India, the latter to Peninsular India. Acheulian industries are characterized by the presence of handaxes and sometimes cleavers. They are known all over Peninsular India, in different types of environments, and their age goes back to more than 0.35 myr (Mishra 1992). Acheulian assemblages proper correspond to the Lower Palaeolithic. During the

RÉSUMÉ

Au Paléolithique et surtout au Paléolithique inférieur, les populations préhistoriques de l'Inde fabriquaient et utilisaient deux types différents d'industrie lithique. Au sud du bassin indo-gangétique, leur vestiges culturels appartiennent à l'Acheuléen, caractérisé par la présence de bifaces, parfois de hachereaux, et par de petits outils sur éclat ou débris. La méthode de taille n'apparaît pas clairement organisée. Au nord du bassin indo-gangétique, dans les Siwaliks, la plupart des sites fournissent un matériel lithique soanien, qui comprend une majorité de galets aménagés et aucun biface typique. Les éclats et petits outils sont rares. Ces deux traditions techniques, qui évoluent séparément durant tout le Paléolithique, peuvent être considérées comme des cultures différentes, mais dans chacune d'elles on distingue trois chaînes opératoires, qui sont tout à fait comparables entre les deux traditions. Si l'organisation des chaînes opératoires est indépendante des traditions culturelles, elle constitue une approche intéressante pour mettre en parallèle différents types d'industrie. De ce point de vue l'étude d'un exemple d'industrie acheuléenne du Rajasthan et d'industrie soanienne des Siwaliks occidentales révèle de nettes ressemblances.

Middle Palaeolithic handaxes decreased in number and finally disappeared, so that flakes and tools on flakes became the nearly exclusive components. The Upper Palaeolithic is later characterized by an increase of blades and tools on blades.

In Sub-Himalayan India, especially in the Siwaliks, the large majority of Palaeolithic assemblages belong to the Soanian and are mostly composed of pebble tools, or rather cobble tools (for they always belong to the size



Figure 1. Map of India showing the locations of the Beas River in the Siwaliks and the village of Didwana in Rajasthan

class of cobbles, i.e. larger than 64 mm), without any handaxes or cleavers. Soanian sites are usually located on river terraces, except for the lowest and most recent one (there are five terraces along each of the main rivers). Therefore, they are later than the last Siwalik Formation (Boulder Conglomerate), whose accumulation stopped with the Siwalik uplift, dated in Pakistan between 0.6 and 0.4 mya (Opdyke *et al.* 1979; Rendell *et al.* 1989). But there is no precise chronology for the Soanian assemblages since datable associated remains are usually lacking. Moreover, the terraces are the results of both climatic and tectonic events and their ages are difficult to establish.

The Soanian tradition covers the entire Palaeolithic in the form of three evolutionary stages. The Early and Late Soan occur on the upper (older) three terraces and the Final Soan occurs on the fourth terrace (younger). Through time cobble tools decrease in number and size and their shaping improves in quality, the proportion of flakes increases, and knapping methods become better

controlled as indicated by the appearance of discoidal cores.

Before the 1970s Sub-Himalayan India was considered to be devoid of Acheulian sites, in agreement with Movius' hypothesis (1944). But handaxes have since been reported from the Siwalik Frontal Range (Kumar and Rishi 1986; Mohapatra 1981; Mohapatra and Singh 1979) and also in Nepal (Corvinus 1989; 1990), China (Huang 1989) and Indonesia (Lumley *et al.* 1993). It would appear that the Movius division is no longer valid.

The occurrence, side by side, of these two cultural traditions raises many questions. Were they really evolving separately? Were they linked to different populations, different environments, different types of raw material? Unfortunately the contextual data are not sufficient, especially from the Siwaliks, to help in answering these questions. But techno-typological study can offer interesting insight into the way prehistoric people managed their lithic resources, according to the accessibility of these resources from an environmental viewpoint.

This paper presents the overall processing sequences inferred for two Lower Palaeolithic assemblages, one Acheulian and one Soanian. The Acheulian industry comes from the site of Singi Talav, near Didwana in Rajasthan (Figure 1), excavated by a team from Deccan College (Pune) under the guidance of V.N. Misra and S.N. Rajaguru. The Soanian assemblage was collected from Beas terraces in the Siwaliks of Northwest India by G.C. Mohapatra of Panjab University, Chandigarh.

THE ACHEULIAN INDUSTRY OF SINGI TALAV

The Singi Talav depression represents the northwestern part of the Didwana plain. It is separated by a long dune from the salt lake of Didwana which occupies the south-eastern part of the plain. In the west it is bounded by a range of metamorphic rocks known as the Balia hills (Figure 2). The site of Singi Talav lies about 3 km away from these hills in the middle of the depression, revealed in the side of a shallow quarry where local people use to mine limestone nodules (*kankar*) for road metal and lime. The *kankar* occurs in a sediment which is the result of pedo-diagenetic transformation of a sandy silt of fluvio-lacustrine and lacustrine origin with a progressively increasing aeolian contribution. Therefore, the prehistoric people settled near a lake with a shoreline which was probably fluctuating according to seasons (Misra and Rajaguru 1986; Misra *et al.* 1982, 1988).

The low energy environment has preserved artefacts *in situ* and it is easy to distinguish two main archaeological levels at about 40 and 80 cm below the surface. The lower level is typically Acheulian, with a good number

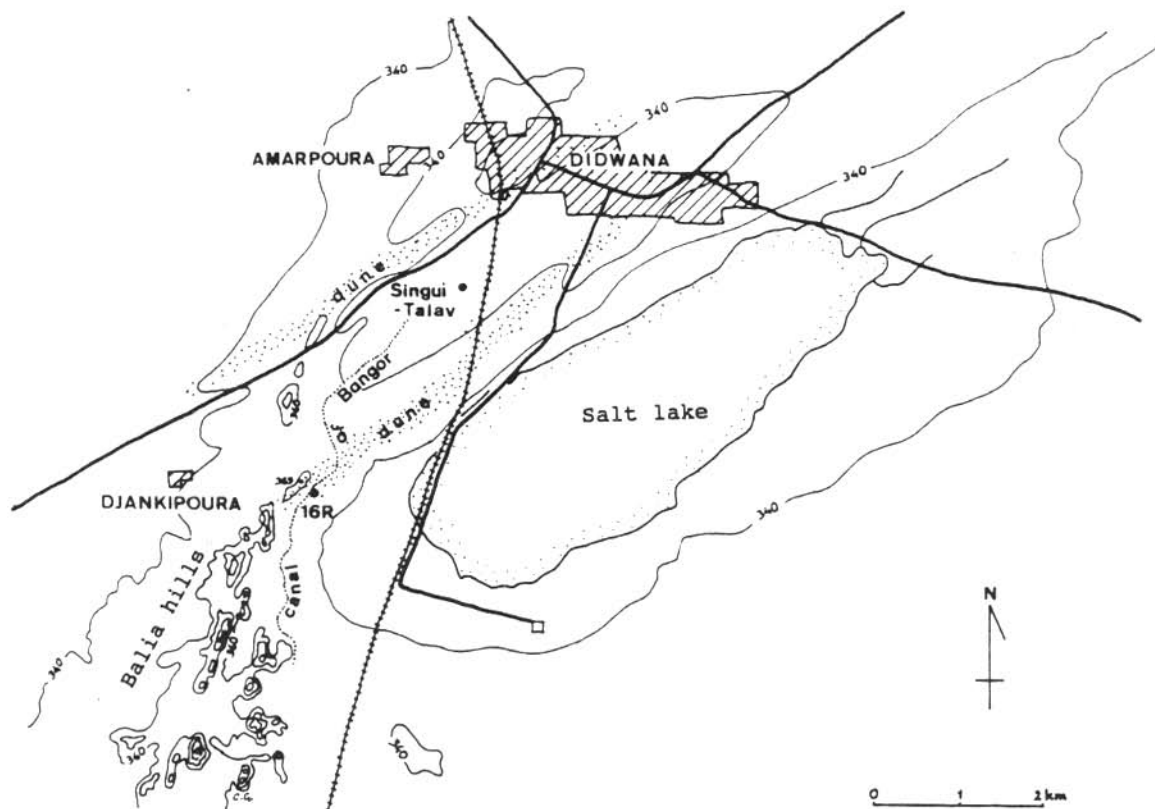


Figure 2. Map of Didwana plain

of rather coarse handaxes. In the upper level handaxes are very few but the rest of the material remains nearly the same. Below these levels artefacts become rare and then disappear. But at a depth of 2 m a few flakes have been found, attesting to the antiquity of human activity in this area (Gaillard 1993; Gaillard *et al.* 1983, 1985). There are no biological remains associated with the lithic industry except for gastropod shells.

The archaeological levels are not precisely dated. However, in the southwest of the plain the site named 16R, located in the longitudinal dune near the point where it joins the hills (Figure 2), has yielded several archaeological levels with thermoluminescence and uranium/thorium dates ranging from 25,000 to 350,000 BP (Raghavan *et al.* 1989). The characteristics of the 16R industry suggest that Singi Talav should be older than 150,000 years, and may be as old as the lower level of 16R.

The Singi Talav lithic industry

The two main levels of Singi Talav have yielded about 1300 artefacts. The primary classification of this assemblage is based on five categories; flakes, debris, small tools on flakes or debris, large cutting tools (handaxes and similar), and large core tools (including cores) which have no morphological or technologically-specific characters (choppers, polyhedrons, spheroids). Unretouched flakes and debris occur nearly in equal numbers and far prevail in numbers over actual tools (Table 1).

Most of these artefacts (about 90 %) are made of metamorphic rocks from the Balua hills, located 3 km away from the site. These rocks are generally fine to medium grain quartzites, sometimes vein quartz. The most common is a grey, slightly schistous quartzite which easily breaks along cleavage planes and is thus available in the form of flat-sided chunks. This physical

Table 1 – Distribution of the main categories of artefacts at Singi Talav.

	Flakes	Debris	Small Tools	Large Cutting Tools	Large Core Tools	Totals
upper layer	167 41.7%	171 42.6%	25 6.2%	4 1.0%	34 8.5%	401
lower layer	357 40.0%	408 45.8%	61 6.9%	24 2.7%	41 4.6%	891

property was well understood by prehistoric people who used to select this raw material from the scree along the hills in order to make handaxes (Figure 3). There are also tools of a homogenous white quartzite and a fine grained quartzite of very good quality for knapping, but these are rare.

Apart from these local rocks from the Balia hills, the site of Singi Talav has yielded artefacts with patches of cortex from river cobbles. At present there is no deposit of cobbles closer to the site than 20 km. Prehistoric people brought such cobbles to the site as hammerstones or cores. Obviously they valued these imported materials for tools since they occur in higher proportions among the small tools than among the blank flakes or debris. Moreover, these people used to select particular types of blank for particular types of tools. Scrapers and denticulated scrapers, the most common tool forms (30%), were generally made on flakes and their retouched sides are often opposite a natural back. Actual denticulates are rare and most were made from imported rocks with cortical patches. End scrapers (25%) were usually made on debris of local stone, except for quartz, and notches mostly on large debris and *becks* on small blanks of quartz (Figure 4).

The prehistoric people of Singi Talav clearly had a good understanding of the quality of their lithic resources. Looking at what remains on the occupation floor in the site it is possible to get an idea about how they used to conceive and work out their tool kit.

Processing sequences at Singi Talav

It is possible to distinguish three processing sequences in this industry (Figure 5A). The sequence leading to handaxes is the most easy to reconstruct for it is linked to one type of rock only, the schistous grey quartzite collected from the Balia hills in the form of flat blocks or small slabs. Flakes from this rock are numerous in the site, suggesting that handaxes were also trimmed there. Only a few of these quartzite flakes were retouched into

small tools, despite being the most frequent material among the debitage.

The working of the imported cobbles represents the second processing sequence. These cobbles were brought either unflaked to be used as hammerstones or already partly trimmed (since no entirely cortical flake was found in the excavation) in order to make core tools. The fine quartzite was mostly knapped on site and in the upper layer it is probable that some flakes of this quality rock were brought to the site to be used as small tools.

The third processing sequence is more generalised and occurs with all the local rocks, except the schistous quartzite, to produce any type of large tool (core tools and large cutting tools) together with flakes and debris, both sometimes retouched for making small tools.

These processing sequences suggest that blanks were selected according to their physical properties and their shapes, fitting as closely as possible to the form of the final tool. For both large and small tools the amount of work applied for trimming or retouching was a minimum. The energy spent on the collection of raw materials, especially cobbles, was probably greater than the energy spent on knapping.

THE SOANIAN ASSEMBLAGE FROM THE BEAS VALLEY

The Soanian collection studied here has been gathered from the three upper terraces of the Beas river, near its confluence with the Banganga. The river terraces in the Siwaliks are composed of conglomerates, gravels and silts. Quartzite cobbles of different sizes occur in plenty and were used exclusively by prehistoric people as raw materials, except in the Final Soan when they preferred silicified limestone. Part of this collection was picked up from the surface and part was excavated from a trench (7 x 7 m) near the village of Dehragopipur. In this trench, the artefacts were in the upper silty layer, which was about 1 m thick, but could have been secondarily redeposited (Mohapatra 1966). There are no dates for this collection.

The Beas lithic industry

The majority of this collection is composed of choppers, mostly unifacial (Table 2), which is characteristic of the Early Soan.

Among the choppers there are a few composite tools having two or more trimmed edges. The majority of the choppers are unifacial, either trimmed on the upper, rounded face (68%) or on the lower, flattest face (15%). The proportion of bifacial choppers is much lower (only

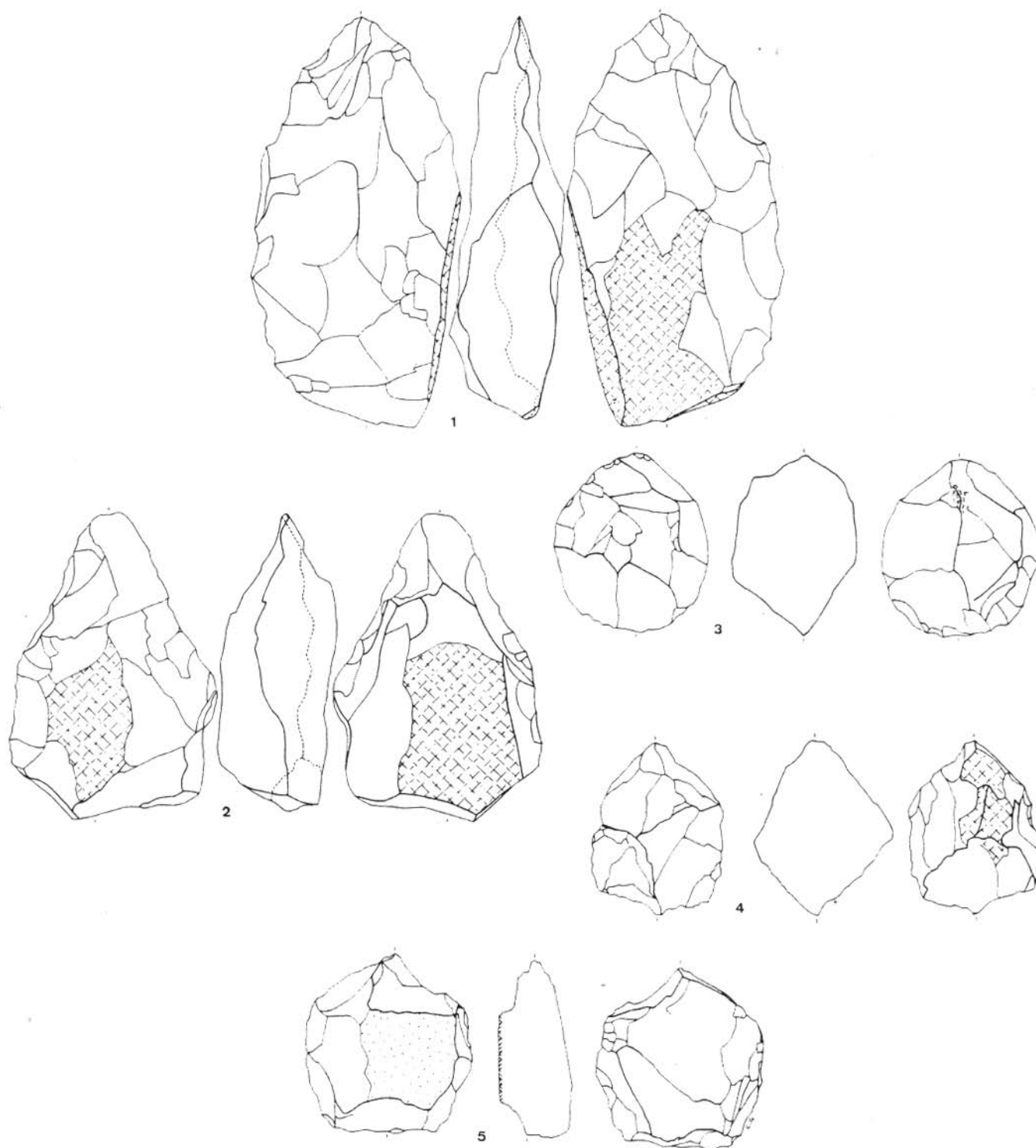


Figure 3. Acheulian large tools from Singi Talav. 1,2: handaxes (with patches of cortex); 3: spheroid; 4: polyhedron; 5: discoidal core on cobble. 47% natural size.

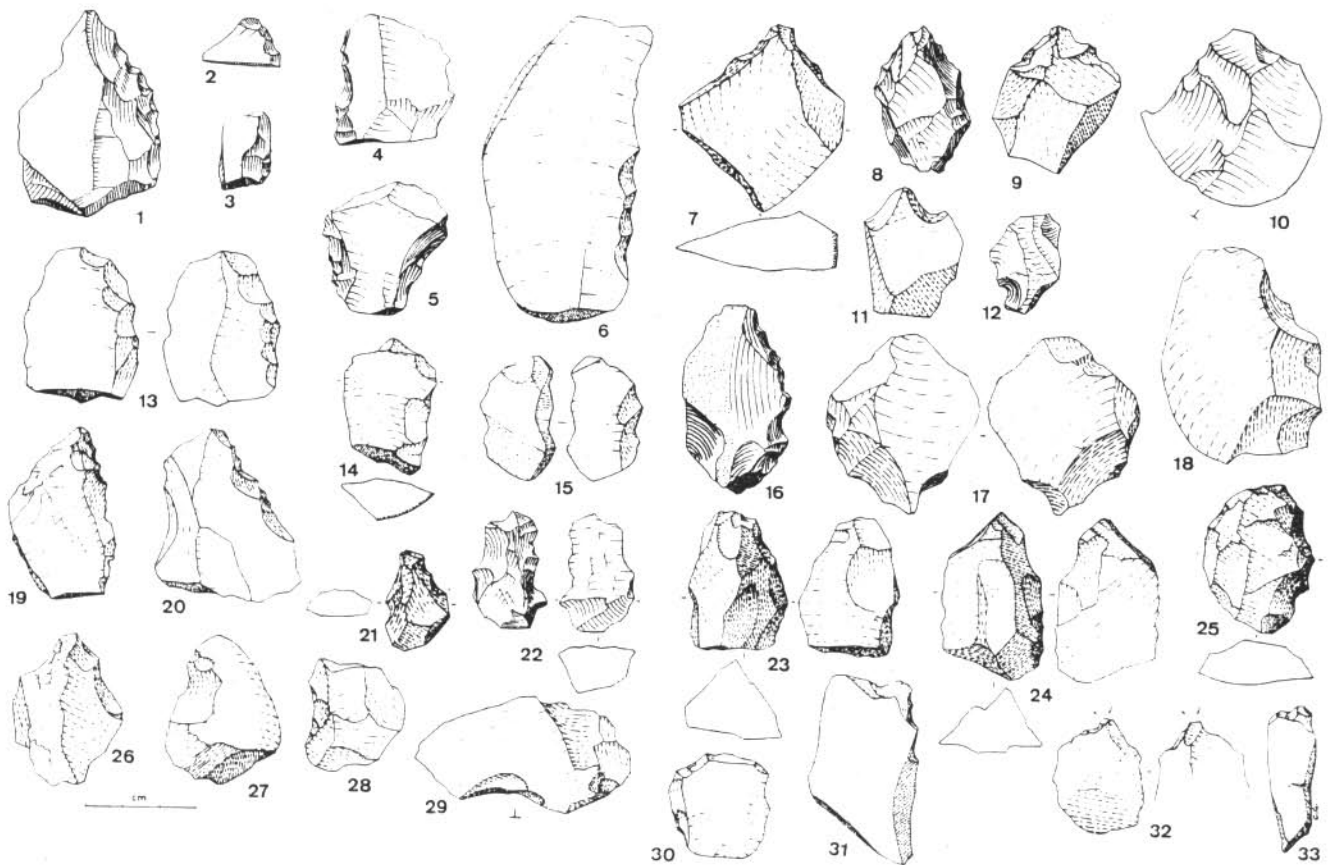
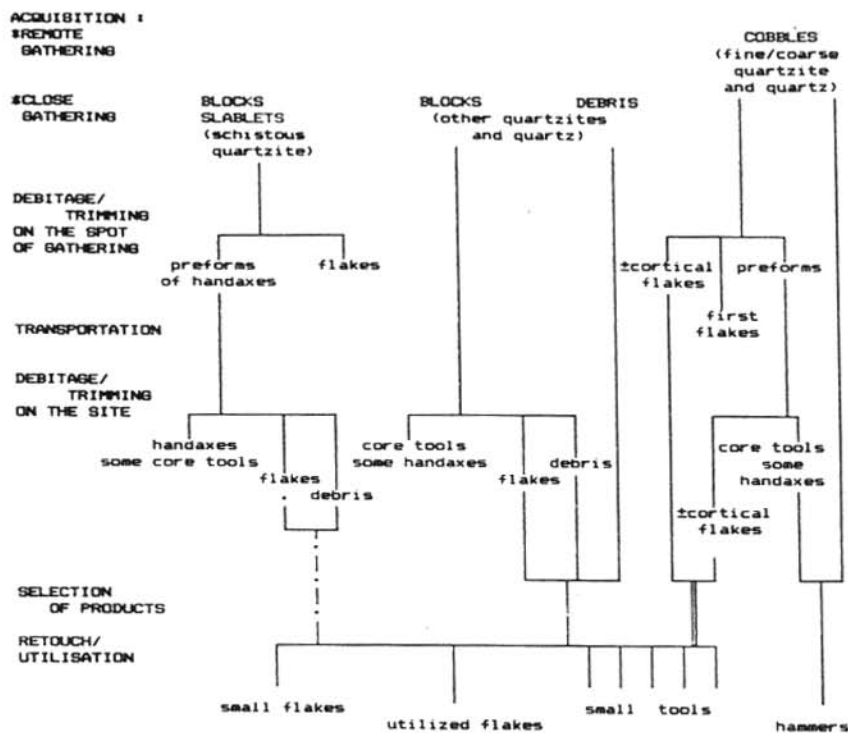


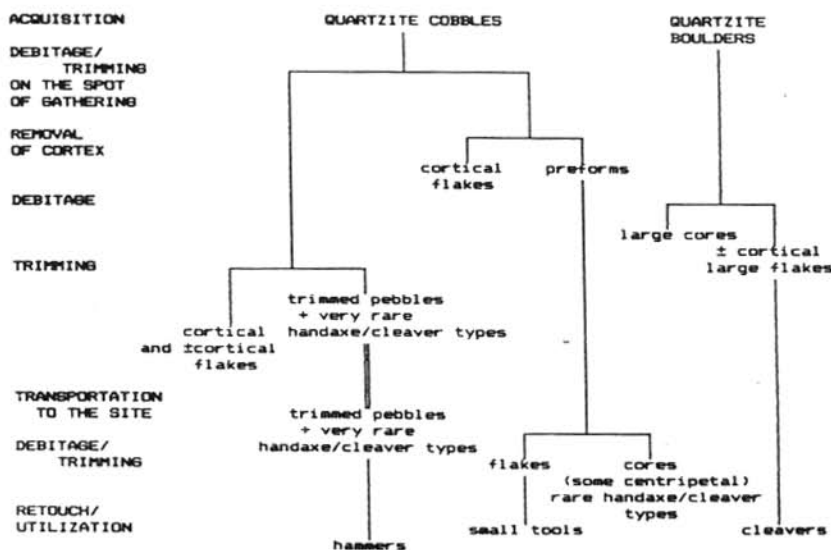
Figure 4. Acheulian small tools from Singi Talav. 1, 3, 6: scrapers; 2, 4, 14, 19, 20: denticulated scrapers; 15, 16, 17, 18: denticulate; 13: double scraper; 22: double denticulate; 5: scraper and denticulate; 8: point; 7, 9, 10, 21: Tayac points; 11, 12, 31: beaks; 23, 24, 25, 30, 33: end scrapers; 26, 27, 28, 29: notches; 32 burin. 54% natural size.

Table 2 – Distributions of artefact categories from the Beas terrasses

	Excavation		Surface		Totals	
choppers	70	63.6%	141	81.0%	211	74.3%
other core tools	12	10.9%	8	4.6%	20	7.1%
large cutting tools	1	7.3%	1	5.8%	2	6.3%
small tools	8	17.3%	10	8.1%	18	11.6%
unretouched flakes	19		14		33	
TOTALS	110		174		284	



(A) PROCESSING SEQUENCES LEADING TO THE INDUSTRY OF SINGI TALAV (DIDWANA, RAJASTHAN) : ACHEULIAN EXAMPLE



(B) PROCESSING SEQUENCES LEADING TO THE INDUSTRY OF DEHRADOIPUR ON BEAS TERRASSES (SINALIKS, NORTHWEST INDIA) : EARLY SOAN EXAMPLE

Figure 5. Processing sequences at Singi Talav (A) and Beas terraces (B).

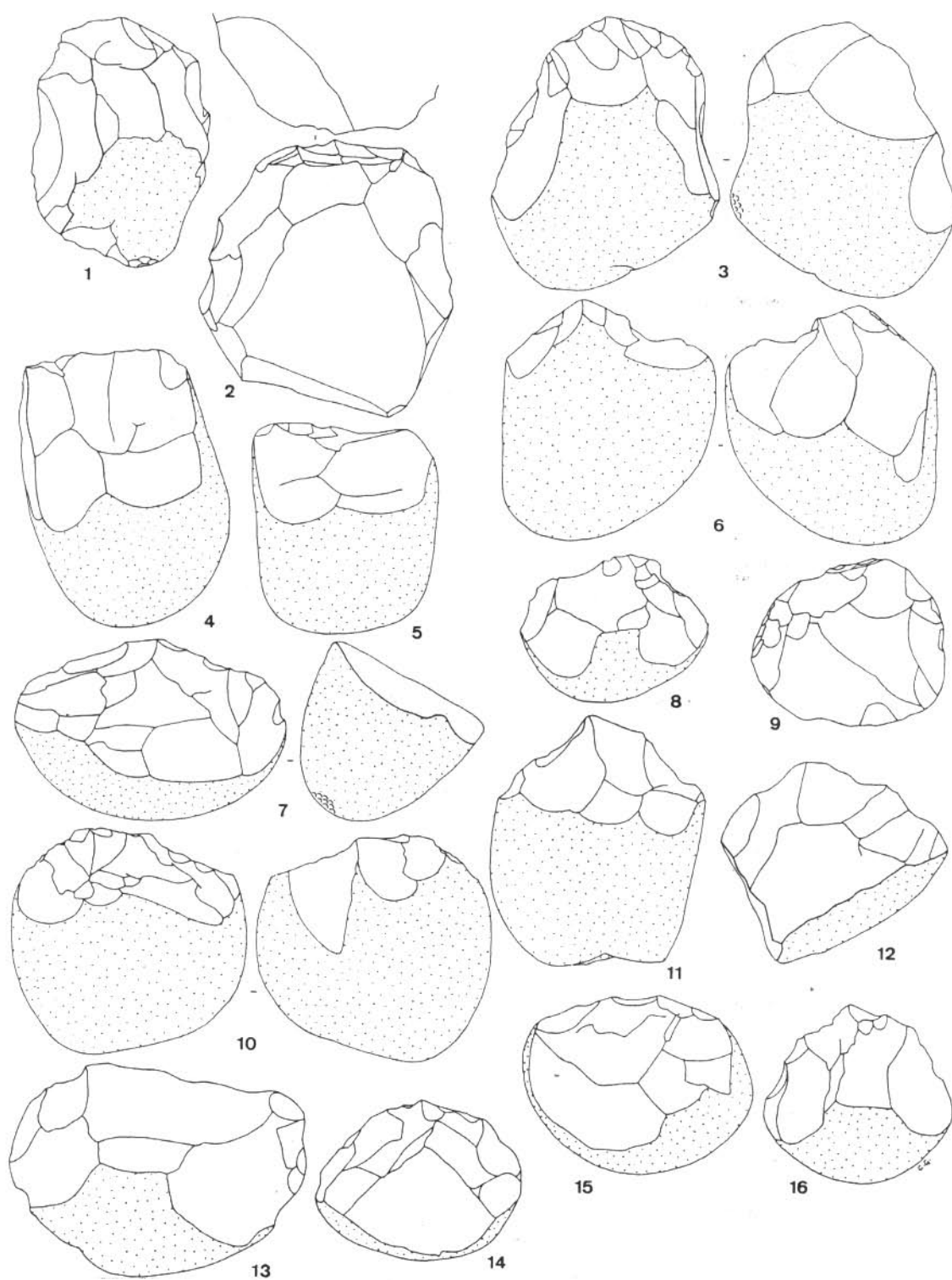


Figure 6. Cobble tools from Beas terraces. 1, 2, 3, 6, 8, 9: long edge with many flake removals; 4, 5: transverse edge; 7, 10, 12: thick and rounded shape; 11, 13, 14, 15, 16: "mean" cobble tools. 38% natural size.

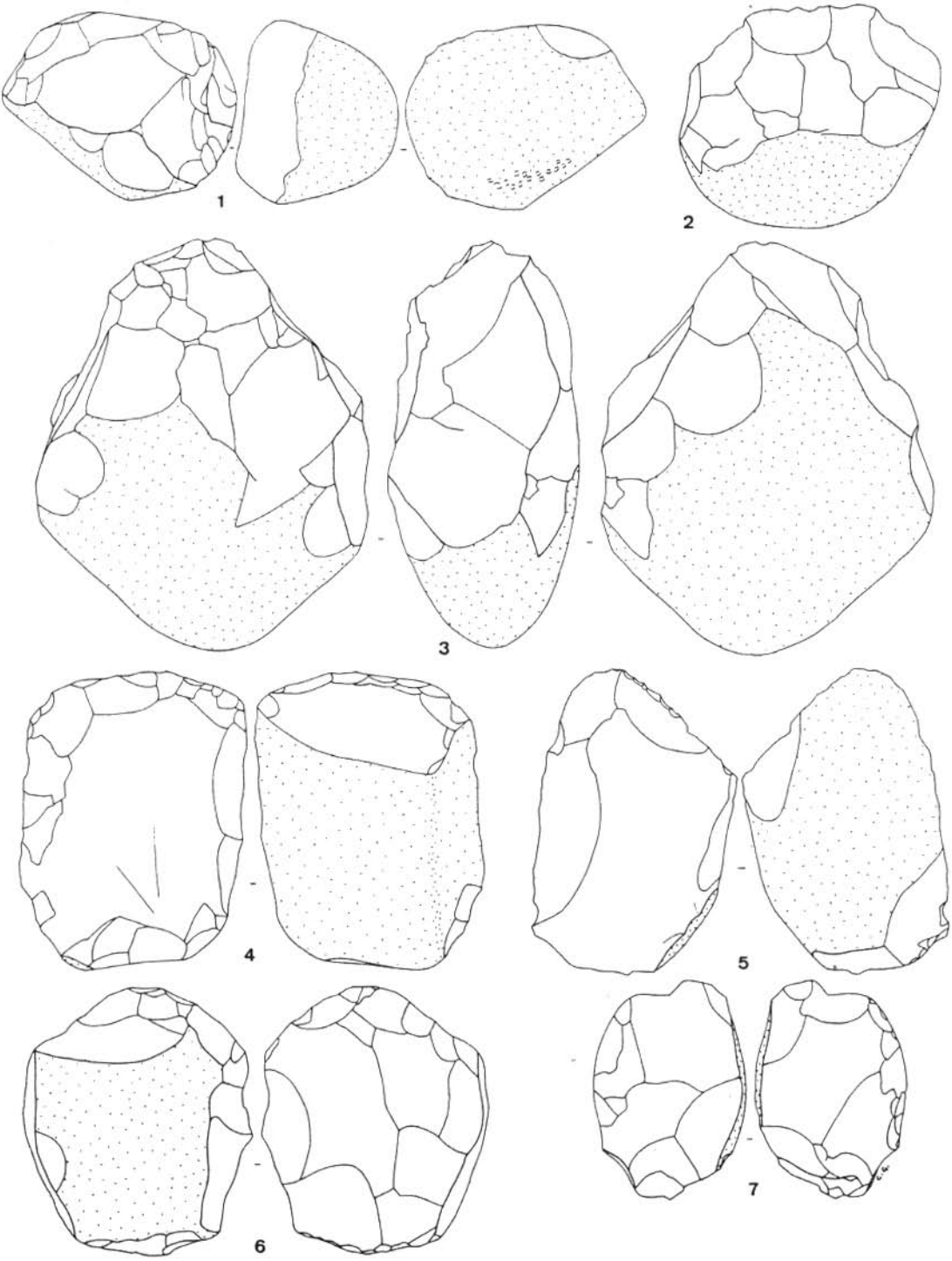


Figure 7. Tools from Beas terraces. 1, 2: cobble tools; 3: double trifacial core on cobble; 4: handaxe; 5: proto-handaxe; 6: discoidal core; 7: bifacial scraper and notch. 38% natural size.

7%). Univariate and multivariate analysis suggests the following categories of choppers (Figure 6):

- choppers with a long edge trimmed by a large number of flake removals,
- elongated end choppers with transverse edges,
- thick rounded choppers,
- "mean" or "middle range" choppers close in shape to the statistical mean, which is in fact fixed by them since they are in the majority.

It should be noted that a few bifacial cobble tools (at least two in this collection) look like handaxes due to their symmetry, although they may also be cores.

Apart from the cobble tools there are some other core tools on which cortex, if any, is very limited. These include three spheroids, one discoidal core (Figure 7-6) and 3 broken cores. Some large tools on flakes are also present; they may be regarded as cleavers (Figure 7-4 and 5), rather simply worked like the types 1 and 2 defined by Tixier (1956) for northern Africa. Such large flakes must have been removed from boulders much bigger than the cobbles mainly used for cobble tools.

These tools related to typical Acheulian types lead us to question the separation commonly accepted between Soanian and Acheulian, and attest that Soanian people were able to make something more than just cobble tools.

Flakes are rare in this collection as in most surface collections and the Levallois method of knapping seems unknown. The large dimensions of the Soan flakes and the dispositions of flake scars on their dorsal surfaces suggest that most did not result from the flaking of cobble tools but came from cores of larger size, not present in the collection.

Soanian processing sequences

Soanian craftsmen produced a diversified industry which was already visualised in their minds at the time of picking up the raw material. They had no choice regarding the lithic nature of this raw material, which is always a fine to medium grained quartzite, but they had to select the sizes of the original blanks according to what they wanted to make. As with the Singi Talav Acheulian, there are three sequences of operation in their activity of stone knapping (Figure 5B). The first was to collect medium-sized cobbles and trim them into cobble tools, the second was to knap big boulders in order to get large flakes and to shape them into tools related to the cleaver type, and the third was to knap large cobbles or boulders in order to get flakes with much less cortex than the flakes coming from the cobble tools. It is possible that sequences two and three really belonged to one overall

sequence, with flakes becoming smaller as the core size was reduced.

It is quite improbable that the collection is representative of a living site, but had it been then most flaking operations were conducted away from the site since only final products are present and all the intermediate stages and rejects are missing. However, in view of the imprecision regarding the original situation of the artefacts and the contemporary environment, it is impossible to get a better understanding of the activity of early Soanian people.

DISCUSSION

From the viewpoint of processing sequences it is possible to establish a parallel between Soanian and Acheulian. In both these industries there are two types of operations, trimming and striking. Trimming is aimed at obtaining cutting edges on blanks available in the close vicinity. The overall shape of the finished tools is not much different from that of the blanks, even in the Acheulian industry from Singi Talav, where most of the handaxes result from a limited amount of work. Striking is oriented towards the production of flakes and some of these flakes, according to size and quality, were taken as blanks and retouched into tools. In both industries a few cores are discoidal but the majority of them, as well as the flakes, reveal an opportunist method of core reduction.

In the Soanian assemblage from the Beas terraces the trimming operations are quantitatively most important, but striking operations are also represented and appear to have the same technical characters as in the Acheulian industry from Singi Talav. In both industries the tools, whether large or small, are not very elaborate. The blanks seem to have been selected by prehistoric craftsmen according to the types of tools they wanted to make. There is no doubt that the plan of an intended processing sequence already existed in their minds at the time of picking up the raw material, even though all processing sequences were quite simple and short. Transportation over long distances made processing more complex in the case of Singi Talav (for the Beas it was not possible to appraise this factor), and the frequency of imported rocks among the tools on flakes increased from the lower to the upper layer.

The degree of complexity may be an interesting index of cultural evolution. It is not only a matter of transportation but also a matter of the number of processing steps between collecting the raw material and discarding the implement. From this point of view, even though there are many unknown environmental data, especially for the

Soanian assemblage, the two industries discussed here seem to belong to the same evolutionary stage.

The question that remains is why Soanian people did not make handaxes when they were evidently able to do so. This feature of their industry may be the result of a cultural option, probably linked to their environment. It would be daring to say that the Acheulian and the Soanian correspond to different cultures for the notion of culture implies many other components of day-to-day life than just stone implements. But let us say that Soanian and Acheulian craftsmen, using almost the same techniques, were following by choice different traditions representing one aspect of their culture.

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