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REVISITING THE ACHEULIAN SITE OF SINGI TALAV AT DIDWANA (RAJASTHAN) 35 YEARS LATER

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Abstract

The Acheulian site of Singi Talav, southwest of Didwana (Rajasthan) was excavated under the direction of V.N. Misra and S.N. Rajaguru from 1981 to 1985. It yielded two main archaeological layers composed of sandy silt where the good preservation of lithic artefacts attests minimal reworking. This type of deposit covering several tens of square kilometres was subsequently dated to 800 ka. Occurrence of fossil gastropods almost exclusively in the occupation layers at Singi Talav suggest that the Acheulian human groups settled on the shore of a pond, in a playa far away from any perennial river.

There was no raw material in the immediate surroundings to make stone tools. The closer sources were outcrops of metamorphic rocks in a hill 3 km away from the site; quartzite, schistose quartzite, and quartz were differently selected for; large cutting tool or globular core tool production. The archaeological assemblage is typically Acheulian, especially from layer 4 where handaxes account for 2.7% of the artefacts while cleavers are very few.

In the last few decades many more Acheulian sites have been documented in South and East Asia and their chronological frame gained accuracy. Compared to the Lower and Early Middle Pleistocene assemblages, Singi Talav stands apart and shows particularities like the low rate of flakes in support of the large cutting tools. These features may be related to the nature of raw materials, to the function of the site, the local environment, etc. It illustrates the variability of the Acheulian tool kit and the difficulty in defining what actually is the Acheulian.

Introduction

After precursory work conducted by V.N. Misra (Misra 1962), research in prehistory of the Thar Desert developed in the 1970s along with studies of the Quaternary geology and palaeoclimate launched by the Geological Survey of India (Agrawal and Pande 1977, Allchin and Goudie 1974, Allchin *et al.* 1978, Krishnamurthy *et al.* 1981, Misra *et al.* 1980, Singh *et al.* 1974, Singhvi *et al.* 1982, Wasson *et al.* 1983). Since then, Quaternary studies in the Thar Desert went on to generate more accurate data on the palaeoenvironment and human adaptations within their chronological framework (Achyuthan 2003, Achyuthan and Rajaguru 1998, Achyuthan *et al.* 2007, Blinkhorn 2013, Blinkhorn *et al.* 2013, 2015, Dhir and Singhvi 2012, Dhir *et al.* 1994, 2004, Rajaguru *et al.* 2014, Singhvi and Kar 2004, Singhvi *et al.* 2010).

Focus on the region of Didwana started in the early 1980s after the discovery of handaxes as part of road metal during field work. Exploration of this region, especially in the area south of Didwana confirmed a wealth of Palaeolithic tools. Several localities were

thus excavated in the shallow depression of Singi Talav and its fringes including Indola-ki-Dhani, Singi Talav, Bangor Canal, 16R (Misra *et al.* 1982) between 1981 and 1985. Singi Talav was the richest and best preserved, and apparently is the earliest of these sites. Various studies, especially in geology provided rich information regarding the palaeoenvironment (Courty *et al.* 1987, Misra 1989, 1995a, b, Misra and Rajaguru 1986, 1988, 1996, Misra *et al.* 1988, Raghavan and Courty 1987, Raghavan *et al.* 1991). Early peopling was also studied, at least from the techno-cultural view point as only lithic material was preserved (Gaillard 1993, Gaillard *et al.* 1985, 1986).

At the time of excavation and subsequent studies, Singi Talav was considered an Early Acheulian site though no radiometric date was available. Then a multidisciplinary project on calcretes of the Thar Desert brought to light the early age of some of these calcretes (Kailath 2000, Dhir *et al.* 2004); this allowed assessing the archaeological levels of Singi Talav to date back to the end of the Lower Pleistocene, around 800 ka (Gaillard *et al.* 2010). Such an early date for the Acheulian in

India was strongly questioned (Chauhan 2010) until the publication of the results obtained at Attirampakkam, 1.5 Ma (Pappu *et al.* 2011), despite the average date of 1.2 Ma already published for Isampur (Paddayya 2002) and despite a few Acheulian sites of peninsular India found to occur in deposits with reversal palaeomagnetism (Sangode *et al.* 2007) or in association with a tephra layer assigned to either the Old Toba Tephra, eruption D, around 800 ka or the Middle Toba Tephra, eruption C, around 530 ka (Westaway *et al.* 2011). Comparison of the lithic industry from Singi Talav with assemblages from sites of a similar age leads to interesting observations.

The Singi Talav depression

The shallow depression of Singi Talav, southwest of Didwana is filled up with a clayey-silty-sandy deposit turned into nodular calcrete

due to pedogenic processes. This carbonate-rich formation was initially named 'Amarpura Formation' as it was especially well developed in the Amarapura quarry, some 1.5 km north of Singi Talav (Fig. 1) where nearly 10 m deep sections were exposed (Misra and Rajaguru 1986, 1988, Misra *et al.* 1982, 1988). Further interdisciplinary studies on the Thar Desert related this formation and the corresponding landform to sheet wash aggraded plains where deposits had accumulated through sheet flows or shifting channels of small streams (Dhir *et al.* 2004). These sheetwash deposits, like other types of deposits in the Thar Desert, have evolved into calcretes rich in calcareous nodules (locally named 'kankars') due to fluctuation of the ground water (Dhir *et al.* 2004). Such evolution of the sediments indicates that the Thar Desert was undergoing a semi-arid climate with seasonal rainfalls



Fig. 1: Map showing Didwana-Baliya

during the Lower Pleistocene and most part of the Middle Pleistocene (Dhir and Singhvi 2012). Dryer conditions resulting in aeolian sand accumulations only started some 200 ka ago yet in alternation with wetter phases of stabilisation of the landscape (Singhvi *et al.* 2010).

At places, calcrete formations of the Thar Desert are more than 1 Ma old. In the Amarpura quarry, a date of 797 ka was obtained from a sample collected one meter below the sharp contact between the calcrete formation and the overlying sand cover (Kailath *et al.* 2000). Topographic measurements at the time when excavation was going on at Singi Talav along with sedimentological studies had allowed to correlate the archaeological layers with the middle part of the Amarpura quarry; therefore the archaeological layers of Singi Talav date back to more than 800 ka.

The depression of Singi Talav was, and still is a playa. Nowadays it hosts a shallow pond after the monsoon (Fig. 1) which gradually shrinks in the dry season. Sieving of sediment samples from the archaeological excavation as well as from several spots around the quarry (Fig. 2) allowed a detailed description of their

granulometric and chemical composition (Gaillard 1993, Raghavan *et al.* 1991). It showed that the proportion of fine sand started increasing from the layer 5 upwards, just before the deposition of the main Acheulian layers 4 and 3 (Fig. 3): input of windblown sand was more in these upper layers. The lower layers 11 to 6 were more silty and clayey suggesting that the environment was more humid, and the playa of Singi Talav might have been a permanent lake with minimal source of sand nearby.

Sieving of these sediment samples also showed that small gastropod shells (Fig. 4) occurred in the main archaeological layers, especially in layer 4, and only near the location of the site; these were almost absent at other spots of the quarry. These fossils belong to the Bithyniidae (shells and opercula) and Planorbidae (shells) families. Presently these molluscs live in shallow lakes, ponds, swamps or muddy rivers, and can survive in the mud during dry seasons (Petney *et al.* 2012). Bithyniidae, at least, still occur (in 1985) in the seasonal pond of Singi Talav. These gastropod fossils suggest that a shallow lake, possibly seasonal existed at Singi Talav at the time when prehistoric groups carrying the Acheulian technological tradition occupied the region. However, the environment was already semi-arid at the end of the Lower Pleistocene (Dhir and Singhvi 2012); and if there had been a drainage system in this region, it was already disorganised due to slow tectonic tilting (Bakliwal and Wadhawan 2004). The many lakes along the eastern margin of the Thar Desert, including the Didwana salt lake may be remnants of these ancient water courses. The human groups, of course nomadic at that time, knew of sources where they could get water. These groups used to settle on the banks of the Singi Talav Lake though no stones were readily available for making their tools: water mattered more than raw material.

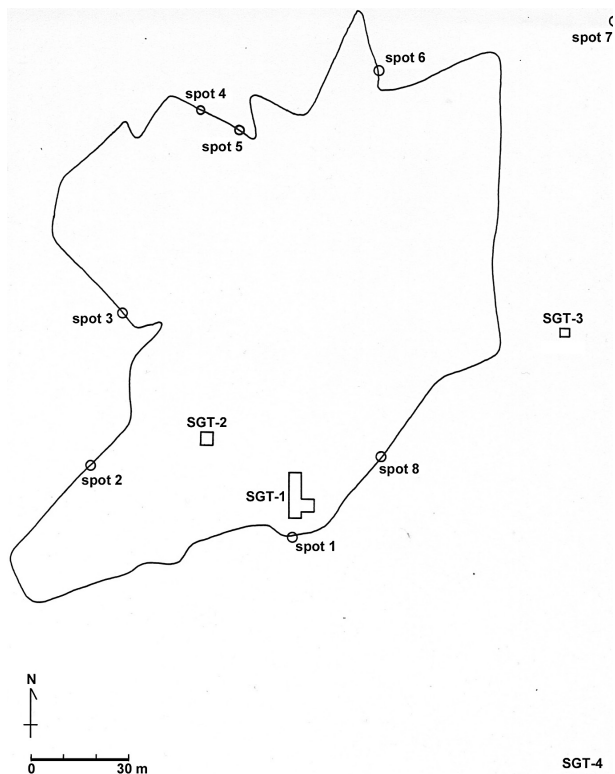
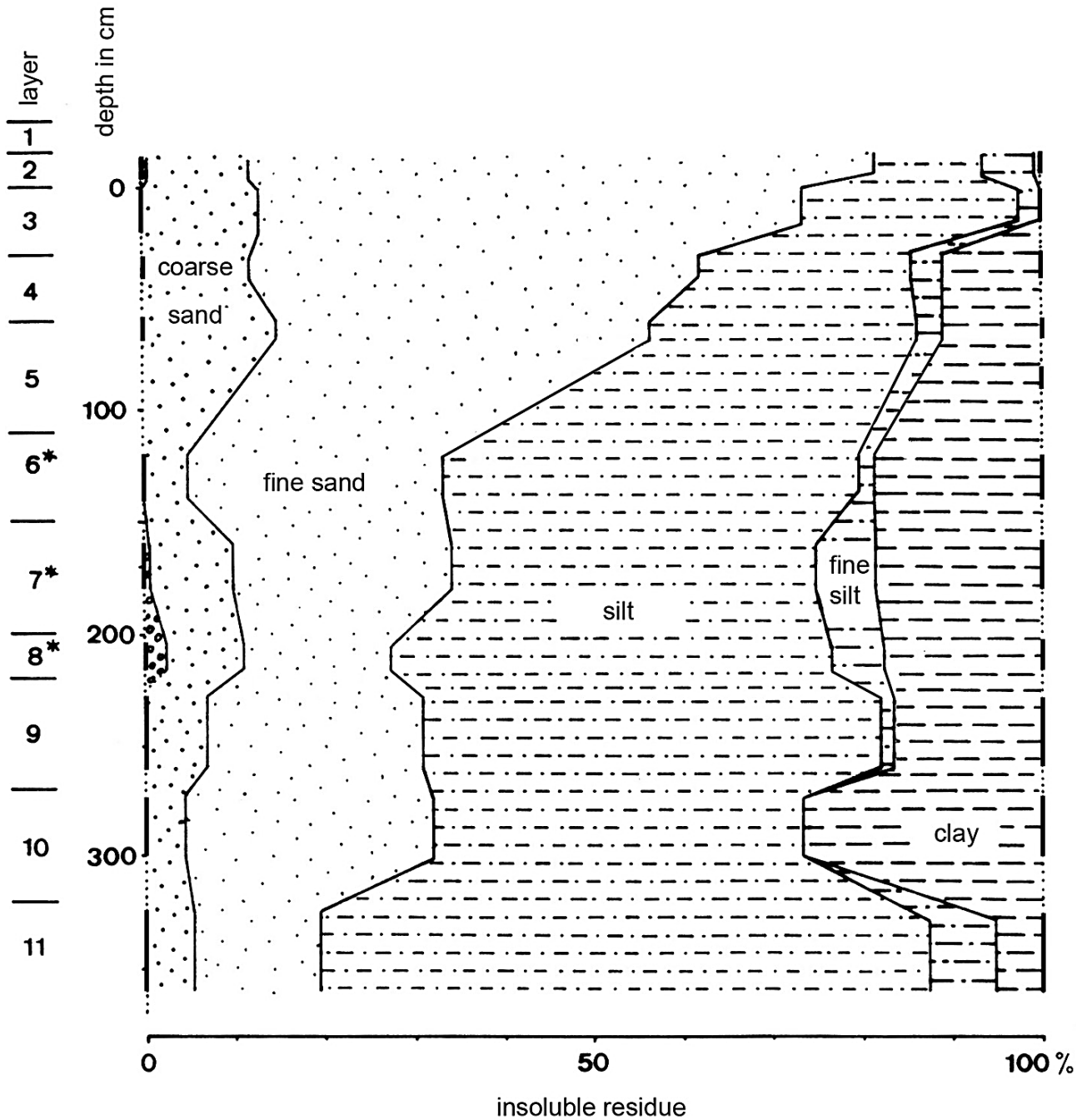


Fig. 2: Map showing Quarry SGT

The excavation at Singi Talav

As the calcretes at Singi Talav are geologically evolved, with well developed calcareous nodules, they are quarried by the local people for different purposes such as metalling the roads or preparing lime. Such exploitation



* calcrete nodules only (instead of whole sediment as for other samples)

Fig. 3: SGT - grain size analysis

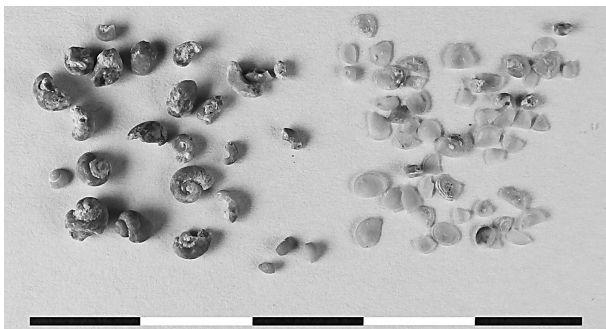


Fig. 4: Gastropods

was especially prosperous in the early 1980s at Amarpura, while at Singi Talav the quarry was hardly more than 1 m deep because the sediment was getting more clayey downwards (Fig. 5). The spread of this nodular material including handaxes along the roads of the region lead V.N. Misra and his team to discover the site. Many stone tools were left by the villagers on the edge of the quarry as unwanted components.



Fig. 5: SGT – excavation

Excavation was conducted on the southern margin of the quarry (Fig. 1) from 1981 to 1985 under the direction of V.N. Misra and S.N. Rajaguru. It extended on 72 m² to an average depth of nearly 1m as no significant archaeological material occurred below 80cm. Five layers were identified in the excavation (Fig. 6). In addition, a trial pit of 2 x 2m dug to a depth of 3.60 m, up to the water table allowed distinguishing 6 more layers. The entire stratigraphy of Singi Talav was described in detail before the pit was back-filled (Gaillard 1993, Raghavan *et al.* 1991). The main archaeological horizons were at the base of layers 3 and 4; they yielded a typical Acheulian assemblage of which most of the components were in mint condition save a few that were slightly abraded. Above them a rich level of extremely abraded lithic artefacts was observed at the top of the Amarpura Formation, at the interface with the overlying surface sand (layer 2). These artefacts were too abraded to be studied but included many elongated flakes and a few blades suspected to belong to a much

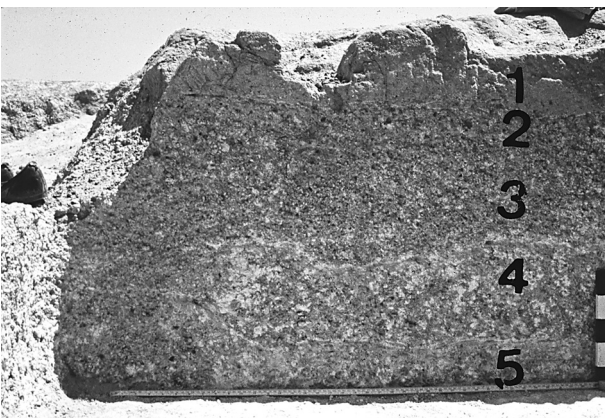


Fig. 6: Section of SGT excavation

later technological stage than the Acheulian, probably the Middle Palaeolithic or even the early Upper Palaeolithic. Below layer 4, some slightly abraded artefacts were found in layer 5. In the trial pit, a few flakes in mint condition occurred at a depth of 2 m at the base of layer 7.

The Acheulian assemblage from Singi Talav

A total of 1475 artefacts were excavated from the layers 3 to 5 at Singi Talav (Table 1). They included a large majority (85%) of flakes and fragments. Fragments are rock pieces not having any of the characteristic features of flakes like striking platform, striking point, and flaked surface. Their high proportion is related to the raw materials, mostly quartzites of various shades from dark grey to white, and quartz along with a few pieces of schist. For all these rocks including the local quartzite, flaking is difficult to control as it often has a schistose structure. Most of these raw materials originate from the metamorphic hills near Baliya (Fig. 1) about 3km from Singi Talav where they occur in plenty in the screes. A few artefacts (about 5%) are also made on river cobbles whose closest source known presently is near Jayal, about 20 km southwest of Singi Talav. Some of the flakes and fragments are retouched into small tools, mostly scrapers. Among the larger tools (significantly longer and especially thicker than the small tools) there is a significant proportion of large cutting tools, mainly handaxes with a few picks and cleavers. The core tools are diversified and often bifacial or multifacial rather than unifacial like the choppers are. Many of them may be proper cores meant to produce flakes, but as they have some cutting edge they have been classified as if they were tools.

Besides the small tools and large tools, it seemed relevant to distinguish a group of medium tools, having dimensions similar to those of the small tools but features of the large tools, like small chopping tools for instance (Tables 2 and 3).

Flakes

On the basis of their dimensions and especially their length, the flakes can be separated into

Table 1:

depth in cm (from top of Amarpura formation)	archaeo-logical layer	unbroken opercula	broken opercula	shells (whole or fragments)	others
Sampling from the excavation SGT-1					
0-12	3	2	26	7	1
23-36	4	10	51	9	0
35-65	4	8	38	25	1
43-53	4	21	136	13	2
65-85	5	2	17	2	0
80-97	5	2	9	0	1
85-110	5	8	51	0	0
120-145	6	0	2	0	0
125-130	6	0	3	1	0
270-300	10	0	0	1	0
Trial trench SGT-2					
30-90		1	13	1	0
Trial trench SGT-4					
87-130		17	37	13	1
Sampling around the quarry					
Spot 1, 56-65		4	94	2	1
Spot 5, 0-25		1	7	0	1
Spot 8, 0-20		0	2	0	1
Spot 8, 20-40		4	8	1	0

Table 2:

	blank flakes	blank fragments	tools on flake or fragment	handaxes & picks	small cores	cores and core tools	total
	n	n	n	n	n	n	
layer 3	167	171	25	4	8	26	401
layer 4	357	408	61	24	18	23	891
layer 5	61	101	4	0	0	7	173
							1465
	%	%	%	%	%	%	
layer 3	42	43	6	1	2	6	100%
layer 4	40	45	7	3	2	3	100%
layer 5	35	59	2	0	0	4	100%

two groups. The smaller ones, measuring less than 20 mm in length probably resulted from the final shaping or possibly re-sharpening of the large tools; and the longer flakes, with an average length of 32 mm would be proper debitage products. Only 3% of the flakes have a length twice that of the width (blade-shape). All the flakes usually show a plain striking platform forming an angle of 110° with the flaking surface. However, the flakes in schistose grey

quartzite have wider angles and frequent breaks at the distal end; they mainly result from the shaping of handaxes at the site itself that are mostly made from this schistose quartzite.

Fragments

The fragments are more often on quartz than the flakes, especially in layer 3. This is probably related to the mechanical properties of this rock that shatters at the time of knapping. The

Table 3:

	layer 3	layer 4
Total number of artefacts	401	891
Small tools	25 6%	61 7%
side scraper	2	7
denticulated scraper	3	6
denticulate	0	3
notch	2	8
beak	1	7
end scraper	4	7
burin	0	3
convergent tool/point	5	5
composite tool	8	15
Medium tools/small core tools	8 2%	18 2%
micro-chopper	2	0
micro-chopping tool	2	7
micro-discoid (bifacial)	0	4
micro-spheroid with edge (bifacial)	1	0
micro-spheroid without edge (multi-facial)	0	1
micro-polyhedron (multi-facial)	2	3
micro-core (multi-facial)	1	3
Larger core tools: total	26 6%	23 3%
chopper	0	0
convergent chopper	1	0
chopping tool	2	5
double chopper / chopping tool	1	4
atypical chopper	2	1
atypical chopping tool	4	1
discoid (bifacial)	1	3
spheroid with edge (bifacial)	5	3
polyhedron (multi-facial)	1	2
core (multi-facial)	5	1
single removal	3	2
hammerstone	1	1
Large cutting tools	4 1%	24 3%
handaxe (bifacial)	3	18
uniface	0	1
pick	0	1
proto-handaxe (atypical handaxe)	1	1
cleaver	0	3

fragments have an average maximal length around 27 mm, with unimodal distribution. They are more abraded than the flakes. Less

than one third of them are fresh against more than 50% of the flakes, with about 30% from both groups being slightly abraded. The rest

are moderately or even highly abraded. Some fragments are highly abraded, therefore unidentifiable flakes. This abrasion indicates that the site is not strictly in a primary situation.

Small tools

Small tools comprise side scrapers, side denticulated scrapers, convergent scrapers, atypical end scrapers, and notches (Table 3): their typology is diversified and not standardised. They were equally made on flakes or fragments, apart from the side scrapers that preferred flakes. Nonetheless, larger blanks were selected for manufacturing these tools, as their average length is around 43mm (against 32 and 27 mm for un-retouched flakes and fragments respectively). The raw materials used are preferably of good quality like fine grained quartzite and quartz. The schistose grey quartzite, so common among the blank flakes is rare among the small tools and this further supports the assumption that flakes of this rock mainly result from the shaping of large cutting tools.

Smaller core tools/medium tools

The most common tool type of this group is the micro-chopping tool (Table 3) which may be understood as a thick bifacial scraper roughly shaped by small bifacial removals. The occurrence of polyhedrons and cores is also to be noted, and in layer 4, that of micro-discoids. A large majority of these tools were made from fragments, while only 15% of them are made from cobbles. They are hardly longer than the small tools (average length: 46 mm) but quite thicker (30 mm against 16mm for the small tools). They are mainly shaped by bifacial or multifacial removals; these removals reach an average number of 8. Some of these medium tools (1/4) bear percussion marks.

Larger core tools

Chopping tools are the most frequently occurring type of the larger core tools (34%). Indeed the distribution of the tool types is comparable between the small core tools and the larger ones, except the higher frequency of the spheroids and cores among the larger variety (Table 3). Two third of these tools are

made from blocks while the rest are from cobbles. They have a mean length of 77 mm with a thickness of 50mm. Although they are bigger than those in the former tool group, their shaping only requires 9 removals on average. They often show percussion marks (1/3 of them), either on the ridges or on the faces. It is to be mentioned that the cores are quite few; they have been grouped with the core tools as both proper cores (flake production process) and core tools (shaping process), both have produced flakes. Both look similar and the cores have the same multi-directional flaking as the polyhedrons, but with less regular shapes. Correlatively, some of the core tools considered as tools rather than just cores may actually be cores but have a prominent edge assumed to be functional.

Large cutting tools

The large cutting tools from Singi Talav excavation (and also from the quarry) are mostly handaxes and a large majority of them originate from layer 4 (Table 3). Cleavers are rare. All of them are usually made from blocks or slabs of schistose grey quartzite from the Baliya Hills; only a few specimens are made from large flakes of the same rock (4 handaxes and 2 cleavers) or from well silicified quartzite collected further away in the form of cobbles (one handaxe). The blocks or slabs were selected from the scree and split into suitable sizes. This operating process does not provide ready-made cutting edges since schistosity planes are parallel and not converging like the two faces of a flake. Thus it is not favourable for cleaver production but it results in pieces of geometric shapes easy to turn into pointed handaxes with minimal shaping. The large cutting tools sharply differ from the core tools by their dimensions which are higher for the length (113 mm on average) and lower for the thickness (38 mm). Moreover, their shaping, although minimal, implies much more investment: 18 removals on average for both faces, including the smaller removals less than 20mm long.

Quartz crystals

It is interesting to note that six quartz crystals were found in layer 4 of Singi Talav. They

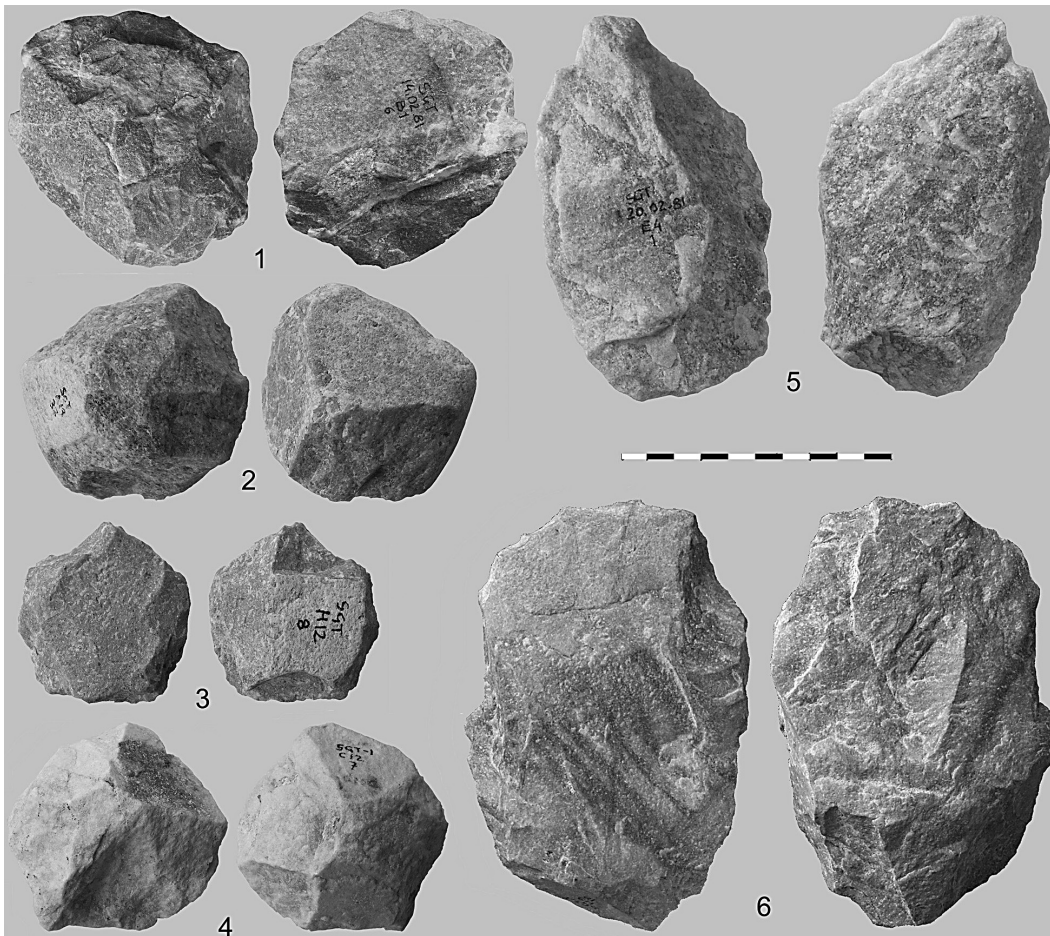


Fig. 7: Cores and Cleavers

were not utilised except one of them showing some micro-chipping at the point (D'errico *et al.* 1989). This is not the only one site where odd objects are found in the Acheulian context (Moncel *et al.* 2012), and this attests some non-utilitarian concern in the hunter-gatherer human groups as early as the end of the Lower Pleistocene.

Processing sequences and artefact movements

The Acheulian assemblage found at Singi Talav did not move much after abandonment by prehistoric dwellers, as it was in the context of a low energy sedimentation process. Therefore, it can be considered as a reliable image of what people left after their departure from the site. This assemblage indicates that different raw materials were selected according to the type of artefact to be made. Flakes were produced from rather homogenous quartzites, mostly local (Baliya Hills) and sometimes from cobbly

gravel outcrops (at least 20 km away). None of these rocks allowed an easy production of large flakes (> 10 cm). The majority of large cutting tools were made from the schistose grey quartzite, locally available and easy to split into small geometric slabs requiring minimal work to be shaped into pointed handaxes. Cleavers are very rare, possibly due to the difficulty in obtaining large flakes from the local rocks. The core tools were made on various types of quartzites, preferably in the form of cobbles for the spheroids.

An interesting question to raise is whether the artefacts were produced at the site itself or were they imported from elsewhere (from the source of raw material or from another settlement). Considering the number of removals on the large tools according to their raw material, it appears that the flakes on coarse quartzite, with or without cortex, are much fewer than expected from the shaping of large tools. This rock was undoubtedly

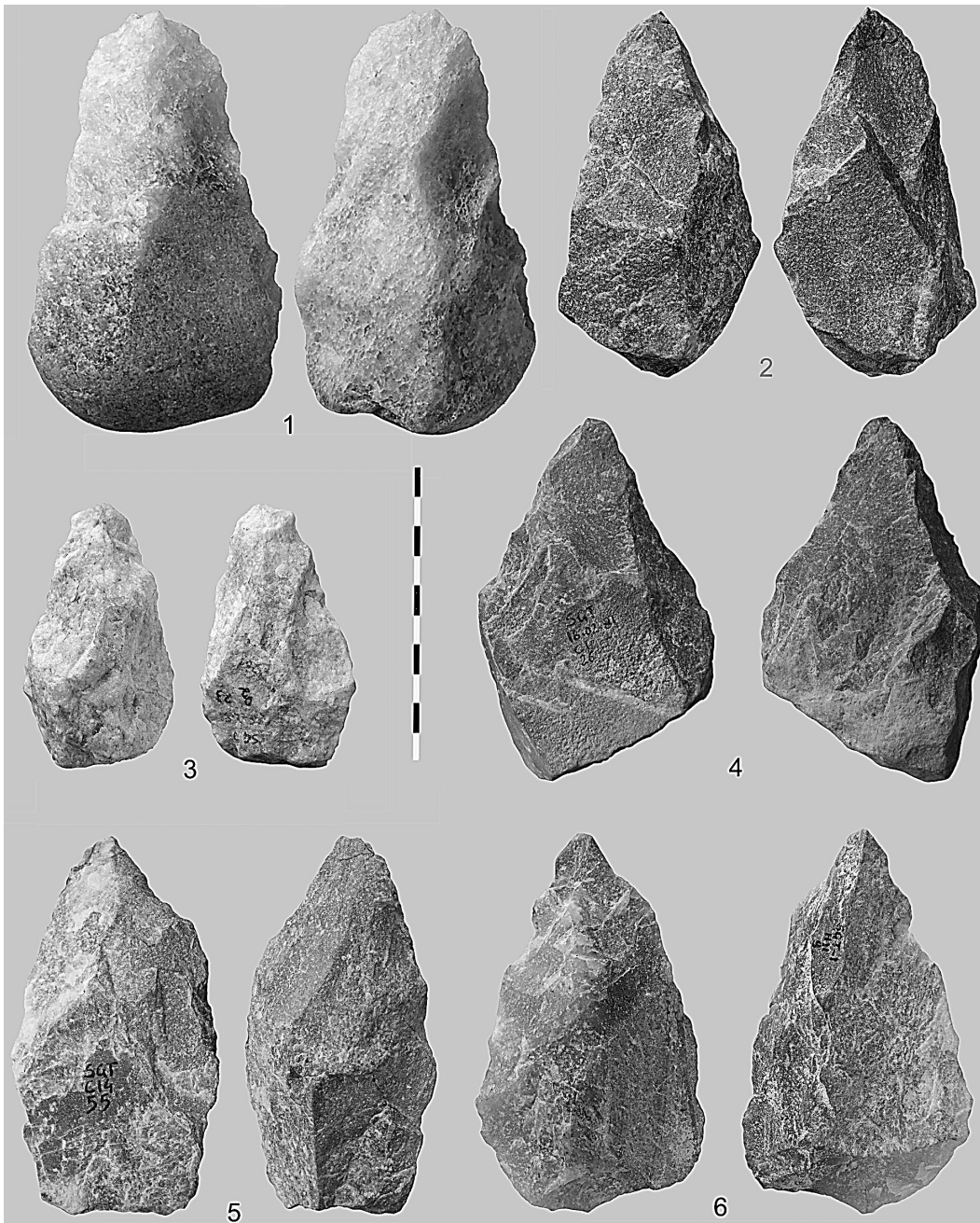


Fig. 8: Handaxes

collected far away (20 km at least) in the form of cobbles. It was preferred for making larger core tools and was not suitable for debitage due to its coarseness. Obviously the larger tools were shaped before being brought to the site of Singi Talav. Similarly, flakes in schistose grey quartzite, the rock systematically preferred for handaxes and cleavers, are quite few in layer 4 when compared to the number of removals shaping these large tools. Therefore these were probably shaped, at least partially, at the spot of raw material collection, in the Baliya Hills.

On the contrary, in the layer 3 cortical flakes on fine grained quartzite are more than expected suggesting that this good quality rock was carried to the site in the form of whole cobbles and then knapped for flake production at the site until the cores were exhausted.

The Acheulian assemblage from Singi Talav in the South Asian context

In South Asia a few Acheulian sites belong to the Lower Pleistocene or beginning of the Middle Pleistocene. They yield assemblages in which

debitage products do not imply standardised core reduction methods, and where the large cutting tools, especially handaxes and cleavers result from minimal shaping, however prepared on well selected blanks, either large flakes or suitable cobbles or slabs. These large tools are bigger in size than in the later stages of the Acheulian and they characterise the early Acheulian (Paddayya 2007, Shipton *et al.* 2014).

Attirampakkam

The earliest of these sites is Attirampakkam (Tamil Nadu) where layers 8 to 6 in trench T8 yielded 3528 artefacts dated to around 1.5 Ma (Pappu *et al.* 2011). Sedimentological features of these layers indicate a local water body with regular flooding within the Kortallayar River valley (Pappu *et al.* 2003). Fine coarse-grained quartzite cobbles and boulders were available in the nearby hills not less than 3km for the site. The assemblage is mainly comprised of 'waste flakes' (70%), besides retouched flakes (15%), utilised flakes (10%), large flakes (4%) and a few tools on cobbles. Large flakes were produced off-site then brought to the site where all of them were modified mainly into handaxes, sometimes into cleavers and often minimally trimmed into 'cleaver-flakes'. Shaping of these large flakes and of some cobbles resulted in the production of all the other flakes at the site; proper cores seem to be absent.

The situation and behaviour of prehistoric groups settled at Attirampakkam, layers 8 to 6, compares well with that of Singi Talav. The difference regarding the lithic assemblage mainly rests on the absence of large flakes in the latter site, which may be linked to the quality of the raw materials.

Isampur

The site of Isampur (Karnataka) belongs to a rich complex of Lower, Middle, and Upper Palaeolithic sites in the Hunsgi Valley. It yielded Acheulian remains of the earliest populations in the valley dated to around 1.2 Ma (Paddayya *et al.* 2002). These people had settled near a palaeo-channel, probably providing them water during their stay, and right on the weathering bedrock of silicified limestone. This rock was

an excellent raw material for their tools but was not exclusively used as nearly 20% of the assemblage was made from chert or quartzite collected elsewhere in the valley. This site is considered as a factory site and also a living site. Among five trenches, Tr. 1 was the richest; it yielded 13,043 artefacts, of which 92% are "incidental" products (small flakes and debris including products from sieving > 5 mm). The shaped tools comprise 48 handaxes, 15 cleavers, 18 knives, 3 discoids, 14 chopping-tools and 65 scrapers. Half of the handaxes are made from slabs or cobbles, while the other half are made on flakes. Cleavers and knives are mostly on flakes. These larger tools are mostly in silicified limestone, except the ones on quartzite cobbles, while the smaller tools like scrapers, usually on flakes (49/65) are on chert or quartzite (Paddayya 2004, 2007).

It is difficult to compare this assemblage composition with that from other sites as the systematic sieving of the dugout earth has resulted in an overwhelming amount of small chips and debris. In any case, the diversity of the large tools has to be noted. The small tools are well represented and they mostly consist of scrapers. Shaping of the large tools uses both kinds of supports: large flakes knapped from the local rock and selected cobbles or slabs.

Chirki on Pravara

Near Nevasa (Maharashtra), several localities have yielded Acheulian assemblages, especially Chirki and Laxmi Nala. At the latter site, the clayey layer overlying the Acheulian-bearing cross-bedded sandy gravel has provided a reverse palaeomagnetic signal suggesting it was deposited during the Matuyama chronology before 780 ka (Sangode *et al.* 2007). At the site of Chirki, several trenches were excavated in the 1960s, attesting human occupation (Corvinus 1983). From the richest of these trenches, Tr. VII, 1455 artefacts referring to the Acheulian technical tradition were dug out of the lowest layer 3. They were imbedded in colluvial bouldery rubble deposited on a platform of the basaltic bedrock along the Pravara River and subsequently covered by cross-bedded sandy gravels, sands and clays. Prehistoric populations settled on this platform near the

river and produced their tool kit from the locally available rocks: basalt, either vesicular or red in colour, or compact and grey dolerite from a dyke located a few kilometres away but also occurring in the rubble, as well as different varieties of chert. Nearly half of the light-duty artefacts (< 80 mm) are on chert. They consist of flakes (about 50%) obtained from multi-directional cores without planned method of reduction, a few cores and retouched tools, and of a large amount of various fragments. The heavy-duty tools (> 80 mm) are mainly of basalt or dolerite. They represent 2/3 of the assemblage, which is exceptionally high even for excavated Acheulian material. Nearly two third of them are shaped, usually on flakes but also on cobbles. The cleavers are the most common tools and they result from different methods of production that appear quite smart; they usually derive from large flakes or very large flakes (Corvinus 1983). Handaxes are slightly less numerous than cleavers; some specimens are made from cobbles and others on flakes. Besides these classical types of large cutting tool, some picks, knives, and large scrapers also occur. Cobble tools represent about 12% of the heavy-duty artefacts. They mainly include chopping tools (bifacial), polyhedrons, spheroids, and cores. As in many early Palaeolithic assemblages it is difficult to distinguish the proper cores from the core tools. The remaining heavy-duty artefacts (30%) consist of unmodified flakes, flake fragments and chunks (Corvinus 1983).

This site stands apart due to the importance of the heavy-duty component and especially the handaxes and cleavers. It may be a specialised site. However, it is to be kept in mind that the vesicular basalt and even the compact basalt get weathered very fast and that any minor reworking would totally erase artefacts made from these rocks, especially the smaller ones, from the archaeological record (Mishra 1982). Nonetheless, the assemblage from Chirki may be qualitatively compared to that from Singi Talav due to the typological variety of heavy-duty tools, although knives are missing at Singi Talav. As for the methods of production, they are characterised by large flakes that provide blanks for the large tools; this is not the case at Singi Talav.

Conclusion

The site of Singi Talav represents the settlement of hunter-gatherers producing and using tools of the Acheulian industry, especially in layer 4. The lithic assemblage is well preserved as it was covered by fine silty-sandy sediments in a low energy environment. However, some artefacts are abraded, due to either wind or water, and these may not be in a primary position. Unlike the other early Acheulian sites in peninsular India, Singi Talav was located in a playa away from any river. Acheulian making people had settled here, near a lake or pond that was probably seasonal, given the type of gastropods living in it. They had no raw material available in the immediate surroundings of the site and they had to carry it from at least 3 km away. They preferred to settle near the water rather than near the source of raw material and therefore this was probably a living (habitation?) site. These nomadic people must have had a good knowledge of all the water holes of the region. The many lakes on the western margin of the present day Thar Desert might have been vital landmarks for them. The ancient drainage system of which these lakes are remnants might have been less disorganised than now and at least not covered with aeolian sands, thus making the water supply easier and the region more hospitable.

At Singi Talav, the tool kit was mainly made from the semi-local rocks but some good quality quartzite was brought from at least 20 km away for the manufacture of smaller flakes and tools. The larger tools, especially the handaxes were not shaped at the site but elsewhere, probably near the source of raw materials. This Acheulian assemblage is not representative of the 'Large Flake Acheulian' (LFA; Sharon 2007), unlike most of the early Acheulian assemblages in South Asia usually produced from raw materials which are easier to master like homogenous quartzite or doleritic basalt, and if necessary collected slightly away from the living sites for their better quality. Originality of the large cutting tools from Singi Talav may be linked to the raw materials. At all the sites large cutting tools are associated with a variety of other tools probably related to the activities performed at the site. The assemblage composition,

its technology and typology may depend on many factors, especially the type of site, its environment, and the available raw materials all together related to the routes followed by human groups when moving from site to site. Too many of these factors are unknown and a comparison between assemblages always leads to the conclusion that beyond some common tool types, the Acheulian assemblages are quite diversified.

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