ACHEULIAN CULTURE IN THE UPPER KRISHNA BASIN, PENINSULAR INDIA: NEW INSIGHTS

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Abstract

Upland Deccan is a part of the ancient landmass of Peninsular India, consisting of erosional rocky terrain drained by allochthonous and autochthonous rivers. Tectonically the region is relatively stable. All the rivers of this region are presently eroding their beds, consequently exposing the older deposits. Geomorphologically, the landscape is dominated by pediments with inselbergs, tors, and broad box-shaped valleys drained by channels with highly seasonal discharge. The present bedrock channels are ungraded with conspicuous knick points almost up to their confluence with trunk streams. Waterfalls, incised meanders, deep coalesced potholes are significant erosional features observed in most of the streams. Regolith cover consists of laterites, vertisols and colluvio-alluvial deposits occurring in foot slopes of pediment scarps and on the banks of bedrock streams. The exposed thickness of colluvio-alluvial deposits rarely exceeds 20 m on both banks of streams and their lateral extent is 1.5 to 2 km. Acheulian sites in this region have been a part of academic discourse since early 1950s. Key Acheulian sites such as Gangapur and Chirki-on-Pravara in the Godavari basin, Bori and Morgaon in the Bhima basin and Yedurwadi in the Krishna basin have been fairly well studied; these will be discussed briefly in this paper. The main focus of this paper is new discovery of Acheulian sites in the overlooked Upper Krishna basin. A few unconvincing reasons such as unsuitable raw material i.e. basalt, dense vegetation, humid environment were cited for absence of Acheulian record in this region. The present study has successfully brought to light a number of promising Acheulian sites from the Krishna River, Bavdhan nala and Urmodi River basins in the Satara district of Maharashtra. The Acheulian

assemblages have been collected from varied geomorphic contexts such as coarse channel gravel, cobbly-rubble, breccio-conglomerate and oligomict conglomerate. The assemblages comprises of > 300 artefacts, dominated by cleaver-flakes. Locally available basalt in the form of core stones, boulders, cobbles, and blocks is the exclusive raw material exploited for manufacturing the flake based artefacts. The geomorphic contexts and typo-technological study has lead to the conclusion that the study area has been occupied by the early hominins at least since the Middle Pleistocene period. The present study is first of its kind which has established the presence of older sediments (> 100 kyr) in this region.

***Key Words*:** rivers, Geomorphologically, bedrock channels, Acheulian sites

Introduction

Northern Deccan or Upland Deccan (16° to 20°N; 74° to 76°E) is a part of the ancient landmass of Peninsular India. It consists mostly of erosional rocky upland covering west and south central Maharashtra, and north western Karnataka. Summer monsoon rainfall between June and September is the major source of water. Climatically, the region is labelled as semi-arid, with the annual rainfall varying from 400 mm to 1000 mm, and is largely covered by dry deciduous to thorny and scrub forests. Morphologically, it is a rolling upland plateau with an average elevation of about 500 m AMSL. The plateau has developed over Pre-cambrian and Cambrian metamorphic rocks such as gneiss, schist, quartzite and Deccan Trap basalts of the Cretaceous-Eocene age. Northern Deccan is drained by easterly flowing rivers such as the Godavari, Bhima, Krishna, Ghataprabha and Malaprabha. These rivers have their catchments in the Western Ghats with an average rainfall of > 3000 mm per annum. The main water divides separating these rivers have preserved denudation surfaces that have elevations of 1000 m, 800 m, 600-700 m and 400-500 m AMSL (Kale and Rajaguru 1987). Tectonically the region as a whole is relatively stable. The present paper largely will focus on the Krishna basin within Satara district limits and its implications on Acheulian studies in peninsular India, based on recent findings by the author (Joglekar 2019).

It was previously suggested that the basalt rock is not suitable for making stone tools, thus no intensive surveys were carried out in this region as contrast to Kaladgi region and other parts of peninsular India (Pappu 1974). Robert Bruce Foote had reported more than 500 sites pertaining to Palaeolithic and Neolithic cultures in peninsular India, except the Deccan trap region (Foote 1916). Acheulian studies in the Deccan trap region commenced with the discovery

of Lower Palaeolithic artefacts during the construction of a dam at Gangapur on Godavari River in Nashik district (Sankalia 1952). This discovery led to subsequent investigations in the Deccan Upland region resulting in detection of a number of important Acheulian sites in Pravara, Ghod, Karha and Krishna basins such as Nevasa (Sankalia 1956), Chirki-on-Pravara and other localities such as Hathi Well, Barot Garden and Baku Pimpalgaon (Corvinus 1981, 1983 and other references of Corvinus used therein), Bori (Kale et al. 1986a), Morgaon (IAR 1988-89:64) and Yedurwadi (Kale et al. 1986b) (Fig.1). These findings and further studies (for updated review refer- Deo and Joglekar 2021) confirmed that early hominins occupied this region at least since late Early Pleistocene period and continued in Middle Pleistocene (Deo and Rajaguru 2014 and references used therein). The source region of the Krishna River had not yielded convincing Acheulian sites, although a small number of stray artefacts were collected from secondary context indicating the potential for further surveys (Pappu 1974). A few studies related to Quaternary period were carried out by scholars (listed below) in this region. These studies did not yield any rich Acheulian site suggesting that early hominins occupied this region sparingly, also Early and Middle Pleistocene sediments are not well preserved in this area.

Quaternary Studies in the Upper Krishna Basin

A few scholars had carried out studies pertaining to Quaternary period and Palaeolithic cultures in the Krishna basin within Satara district. Preliminary survey between Wai and Mahuli yielded only microlithic sites (Malik 1959). Rajaguru suggested that the exposed (max. 20 m) colluvio-alluvial deposits around Wai, were not older than early Late Pleistocene (<100 kyr BP). The basal part of silt unit at Asle on the right bank of Krishna River yielded shells embedded in the thin gravel lenses, dated to 10 kyr by C-14 dating method (Rajaguru 1970). Quaternary deposits around Wai and Dhom area were studied with a report of fossilised tusk of elephas sp. along with fresh water shells dated to 33 kyr by C-14 method. These were buried under 10 m thick deposit colluvio-alluvial fill exposed during the foundation trench of Dhom dam (6 km upstream of Menavali) on the river Krishna (Corvinus et al. 1972-73). This hypothesis was later confirmed, as the calcrete was dated to 75 kyr using Ur-Th method (Joshi and Kale 1997). Umarjikar (1983) carried out Quaternary geological studies in the Upper Krishna Basin reporting the litho-units from sites such as Menavali (Krishna River), Atit, Valse (both Urmodi River), etc.

Yet a few Lower Palaeolithic/Acheulian artefacts were reported from Pachwad, Songaon and Limb (Pappu 1974), and re-investigated reporting one large flake from Pachwad (Kulkarni et al. 2008). Another site at Nisre on the right bank of Koyna River was reported later (Joglekar et al. 2011). Broadly it was concluded that this region had rarely preserved Early and Middle

Pleistocene sediments and cultural material. Some other reasons such as 1) Focus on sedimentary studies, 2) limited understanding of variation in Acheulian assemblages, 3) impetus on Historical archaeology, 4) natural factors such as exfoliation, thermal breakages and colluvium deposits were rightly pointed for not finding of convincing Acheulian sites in this region (Joglekar 2019).

The author carried out intensive field investigations in the Krishna basin within Satara district, followed by analysis of lithic assemblages. These will be elaborated here.

Findings

The upper Krishna basin area was selected for intensive survey as it had indicated presence of Acheulian culture on a smaller scale. The main aim of the study was to identify Acheulian artefact-bearing localities and contextualize them geomorphologically and archaeologically. Reconnaissance of previously known find spots was carried out during the initial stages. These early visits were not fruitful as no artefacts were found from those known spots. Hence, newer spots in the Urmodi River were visited along with two spots in the Bavdhan nala, and Menavali on the left bank of Krishna River around 3 km upstream of Wai. These explorations were fairly productive as good numbers of Acheulian artefacts were collected from varied geomorphic contexts from these localities (Joglekar and Deo 2015; Joglekar et al. 2016; Joglekar 2016, 2018, 2019) (Fig.2). The geomorphological observations and lithic assemblages will be elaborated here.

Geomorphological Observations

The main aim was to identify Acheulian artefact-bearing locations in the study area and confirm their geomorphic context. As a result of exhaustive field surveys it was observed that Acheulian artefacts are largely in the secondary context i.e. from the loose channel gravel from all the sites (Fig.3), while a very few artefacts were collected from cemented gravel/conglomerate (from Menavali and Atit 1) (Fig.4), cobbly-rubble context (from Atit 2) (Fig.5) and weathered relict gravel as observed at Nisre (Fig.6). The recently discovered sites include Menavali on the Krishna River, two localities in the Bavdhan nala (Pandhrewadi and Bavdhan), and Shahapur, Vechale, Valse, Majgaon, Atit (1, 2, 3) and Nisrale in the Urmodi River valley. The Krishna River originates from Mahabaleshwar area about 1371 m AMSL in 18° 1' north latitude and 73° 41' east longitude, about 6 km west of Jor village. Bavdhan nala is a southerly tributary (lower order stream) of Krishna River in the Wai taluka of Satara District. The nala has its major source of catchment from the Pachgani range (1293 m AMSL). The Urmodi a right feeder of the Krishna rises near Kas plateau about 1260 m (AMSL) in Jaoli. The catchment of all these rivers has laterite capping the basalt formation. Thus at all the sites loose gravel comprises of basalt, laterite and siliceous clasts in varied proportion.

Broadly these sites can be divided in three categories on the basis of their contexts, which are as follows:

The first category consists of the transported secondary sites where the artefacts are associated with fluvial gravels. Majority of artefacts in the present study were collected from this category of sites. The artefacts are found clustered within gravel bars or are part of the channel bed. These are the most disturbed sites where the original site context is unidentified. The original site could have been near the channel bed, as on the channel bank (like Atit 2) from where the artefacts were sorted, washed and re-deposited in the channel bars. Most of the artefacts recovered from this context have rounded facets and polished surfaces (highly abraded), while a good number of artefacts have sub-angular to sub-rounded facets indicating that they have not been part of long distance transport (slightly to moderately abraded). Seasonality of the river has led to formation of gravel bars. These bars would not allow for free and easy movement of artefacts in the stream bed (this is also attested by the presence of impact scars and scratches on the artefacts caused as a consequence of clast collision). Geomorphologists too have verified that clasts tend to cluster together when they come in proximity to one another in flowing water which results in the formation of bar deposits (Leopold et al. 1964; Reineck and Singh 1980). Similar observations were made for archaeological material as well where experimental studies have shown that artefacts tend to accrue wherever there are obstructions in the stream channel in the form of bars, depressions and meanders (Shackley 1978; Schick 1984). Topographical hindrances like closed nature of the valley, low relief, uneven landscape, etc also would have ensured that the artefacts could not undergo long distance transport from their original area of discard by the seasonal stream processes. These all factors are applicable in the case of present study area. The total length of the Urmodi River is 88 km, while Bavdhan nala is a small stream covering a distance of less than 30 km; similarly the site at Menavali is located within first 30 km from the origin of the Krishna River. Thus it can be suggested that the artefacts were collected from secondary context but were not transported for longer distances. The artefacts are more abraded due to flow of water over the artefact-bearing gravel bars, but fairly less rolled attesting the observation. The rivers are competent only to transport finer sediments, thus preserving the large sized artefacts within the gravel bars.

The second category includes the sites having conglomerate as the artefact-bearing horizon. The artefacts have been part of this conglomerate as a secondary deposit as in the case of Menavali and Atit 1. The artefacts most probably were a part of the weathered bedrock surface elsewhere like at Atit 2. These artefacts over the time got assimilated into the gravel, which after cementation turned into conglomerate. These conglomerates are of different types, in the present study area oligomict and breccio-conglomerate were observed yielding artefacts

(classification of conglomerates based on Nichols 2009). The conglomerates are not commonly observed in the study area, these have been seen as relict feature at only few spots. Several artefacts are encrusted with carbonate accretions, suggesting that the assemblages were subjected to continuous cycles of wetting and drying. The discard of artefacts on the fluvial conglomerates provided a surface on which easy movement and transport of artefacts under stream action was restricted and resulted in the local re-working and limited movement of the artefacts. Limited stream action was a result of high bedrock on the banks, low velocity of the flow and seasonally fed river. The artefacts which get released from the conglomerate become part of the loose gravel as observed at Menavali and Atit 1.

Third category includes only Atit 2 which is most probably closest to the original context. The artefacts collected from this spot are fairly near to their position of discard (fairly less displaced by fluvial process). The capping finer sediment seems to have been partially stripped of by flooding during seasonal rains, resulting in the winnowing away of the very smaller/ micro debitage components of the assemblage. The location is ideal as it is in the vicinity of water source, flora and fauna as food supply, and easily available raw material. Acheulian localities in the Hunsgi-Baichbal valleys are principal example of such primary to semi-primary occupations with limited disturbance as far as Krishna basin is concerned (Jhaldiyal 2008).

Lithic Assemblages (Figs.7-10)

The stone artefacts were collected from above mentioned sites mostly from secondary context. All the artefacts are made from locally available basalt (coarse grained to fine grained), dominated by medium grained variety. The Menavali assemblage comprises of 86 artefacts (52 cleaver/cleaver-flakes, 17 flakes, 8 large cutting tools (LCTs), 1 handaxe, 7 cores/flake cores, 1 unfinished tool). Bavdhan nala from two localities yielded a total of 57 artefacts (28 cleaver/ cleaver-flakes, 17 flakes, 4 LCTs, 3 cores/flake cores, 3 probable anvils, 2 picks). The assemblage from 6 sites in the Urmodi river valley was studied altogether. It comprised of 175 artefacts (77 cleaver/cleaver-flakes, 60 flakes, 19 LCTs, 7 cores/flake cores, 7 unfinished tools, 1 bolas, 1 handaxe/pick, 2 hammerstones, and 1 spearhead like flake with a tang). The flakes from all these assemblages comprise of side flakes, end flakes, corner flakes, kombewa flakes and flake indeterminate. Two cleavers and a single cleaver-flake were collected from Nisre, while a single large flake was reported from Pachwad; site at Limb yielded four large flakes of Acheulian tradition. Overall the assemblages are dominated by large flakes and also comprises of typical Acheulian artefacts thus it is classified as (>10 cm) Large flake Acheulian artefact assemblage as suggested by Sharon (2010). Although a few small flakes were collected and recorded, these were in

negligent number. Secondary flake scars on the cores and large flakes suggests that the smaller flakes were mostly part of trimming and thinning process rather than those being used as in case of Yedurwadi (Joglekar and Deo 2019). The large flakes were detached from locally available core stones (>15 cm), boulders and cobbles of basalt. Exfoliation i.e. onion peel weathering of basalt has been observed in the study area, core stones are a product of such weathering. These types of core stones are harder as compared to outer surface of basalt. Core stones have been also exploited at Morgaon for large flake detachment (Mishra et al. 2009).

A variety of large/giant core (>20 cm) exploitation methods were adopted by the early hominins in the Acheulian technology in different regions of the old world (for detailed review- Sharon 2007). Although no giant cores are part of the present collected assemblage, yet the exploitation of giant cores is a certainty as the assemblage is large flake based. Cobble opening flake and Victoria West Technique are the most commonly observed methods in the present assemblage with a few specimens of other techniques like Kombewa core method, Bifacial core reduction method, Sliced slab method and Tabelbala-Tachenghit core method were also evidenced. Knapping features such as rounding of ventral surface, steps, irregular surface, striations/ripples, etc were observed on some of the artefacts (Joglekar 2016, 2019).

The artefacts have a range of patina which is a result of different geomorphic contexts and formation processes (for details- Joglekar 2020 (in press)). The types of patina includes Medium light gray (N6), Grayish orange (10YR 7/4), Dark reddish brown (10R 3/4) or Very dusky red (10R 2/2), Grayish black (N2), Dusky green (5G 3/2), and multiple patination on some artefacts due to their embedded nature within the conglomerates (colours recorded using Munsell Rock color charts 2009).

A few points have been highlighted after the study of lithic assemblages, these will be summarized here.

1. Locally available raw material in the form of cobbles, blocks, boulders has been exploited for flake detachments

2. Hard core stones were used as hammers

3. Large/Giant cores ranging from about 20-40 cm were observed but were not collected; were certainly exploited as evident through presence of large flakes

4. Victoria West and cobble opening flake are the most commonly observed

core reduction techniques

5. Discoid/radial flaking and Levallois core reduction method is absent

6. Side flakes was the most preferred blank type followed by corner flake, and end flake for cleavers/cleaver-flakes

7. A variety of cleavers/cleaver-flakes is the most common artefact, followed by LCTs

8. Minimal secondary flaking on the cleaver-flakes

9. Cleaver/cleaver-flakes have a pointed, rounded or squarish butt end; parallel, splayed convergent or divergent bit end

10. Pointed tools like handaxe and picks are rare

11. Choppers and chopping tools are totally absent

12. A high number (65%) of artefacts are heavily abraded, about (30%) moderately and about (5%) are slightly abraded as a reflection of artefacts collected from three categories of sites as mentioned earlier

13. The assemblages from the study area are contrasting to the assemblage from Yedurwadi which comprises of a few finished tools and is dominated by small flakes which are a product of biface preparation

Variability in the assemblages from sub-humid region (present study area) and semi-arid region (Yedurwadi) could be a result of raw-material availability, food availability, and adaptation pattern to local environment. The present assemblage is truly large flake dominated but with a few bifacial tools. Although this is a random collection, yet it suggests the Acheulian character of the assemblage with presence of such high number of cleavers/cleaver flakes on large flakes. It also has to be noted that majority of the artefacts were collected from the channel gravel context, hence it is highly possible that the artefacts were made over thousands of years, but certainly all belong to Large Flake Acheulian tradition, no artefacts could be classified as Middle or Late Palaeolithic.

Menavali and Atit assemblages have yielded most variety of artefacts. At these two sites, artefacts have been preserved in conglomerates and cobbly-rubble; these have not been completely fluvially eroded thus preserving the artefacts in a lesser disturbed context. While at other localities the artefacts are often found in fairly transported context, thus only larger artefacts could be recovered.

After considering all the factors i.e. metrical analysis, typology, technology,

context and preservation condition of the assemblages, it can be suggested that the Acheulian artefacts might be of different phases, some of these might be of early stages while some might be of evolved stage. Although the stratigraphical development could not be confirmed yet it can be suggested that the thinner artefacts and splayed cleaver-flakes could be of an evolved Acheulian stage. Further studies could throw more light on these aspects.

Importance and Discussion

The Deccan trap region especially semi-arid areas had yielded fairly convincing Acheulian record (for detailed review – Deo and Joglekar 2021). Yet there were certain areas such as Marathawada, North and South Maharashtra, present study area which had provided scanty evidence of Acheulian culture. This led prehistorians to believe that the early hominins only occupied the Deccan region sparingly (particularly semi-arid regions and areas having dolerite dyke intrusions were occupied) as compared to Kaladgi formation area (Pappu and Deo 1994), and Hunsgi and Baichbal valley area (Paddayya 2007) which was fairly densely occupied.

The recent study in the Krishna basin within Satara district has suggested that the area within the Deccan trap which lacks dolerite dyke intrusions in the vicinity was also occupied by the early hominins. Earlier Morgaon and Yedurwadi were the only significant sites which had similar geological situation, but environmentally both are in semi-arid condition (Mishra et al. 2009; Kale et al 1986b; Joglekar et al. 2011). The present study area falls under sub-humid environmental conditions, suggesting that such areas might have also been occupied by the early hominins; further studies in such heavy precipitation areas are required to confirm this hypothesis. The terra incognita areas such as the present study area need to be systematically surveyed. Further studies including excavations might give a better picture of the early hominin behavioral pattern and adaptation in sub-humid environment and rocky terrain. The latest study has turned this area into terra potentia as far as Acheulian culture is concerned.

The findings of this research could be termed as a culmination of continuous efforts since 1950s, though earlier efforts yielded only a few find spots, yet they provided some clues for early hominin occupations. The present study has for the first time identified fairly rich Acheulian complex in sub-humid and rocky terrain in the Krishna basin, and placed this area on the global map of Acheulian occupation complexes. The assemblage from the study area is a rare collection dominated by unifacial cleaver-flakes. The typo-technology of the artefacts and geomorphic contexts suggests that the Acheulian culture flourished in this region certainly in the Middle Pleistocene if not Early Pleistocene. As mentioned earlier, this area had not given any evidence of Early and Middle Pleistocene archaeological remains

or sediments. The present study has convincingly established possibly Middle Pleistocene hominin activity as well as presence of patches of relict sediments (as observed at Acheulian localities). Although no absolute date is available at this stage, but this presents an opportunity for scientists of different fields such as geo-chemistry, mineralogical analysis, palynological studies, etc to carry out micro-level studies.

Globally it has been observed that the oldest stone artefacts i.e. Lomekwian, Oldowan or Acheulian were made using igneous rocks. Thus, suggesting that the early hominins exploited all types of stones which were locally available. These studies elsewhere in old world indicate that the Deccan Trap region in peninsular India needs to be re-investigated as this area has tremendous potential for understanding the Acheulian culture. The present study is a testament for it and presents distinctive opportunity to pursue further studies in this challenging and interesting region.

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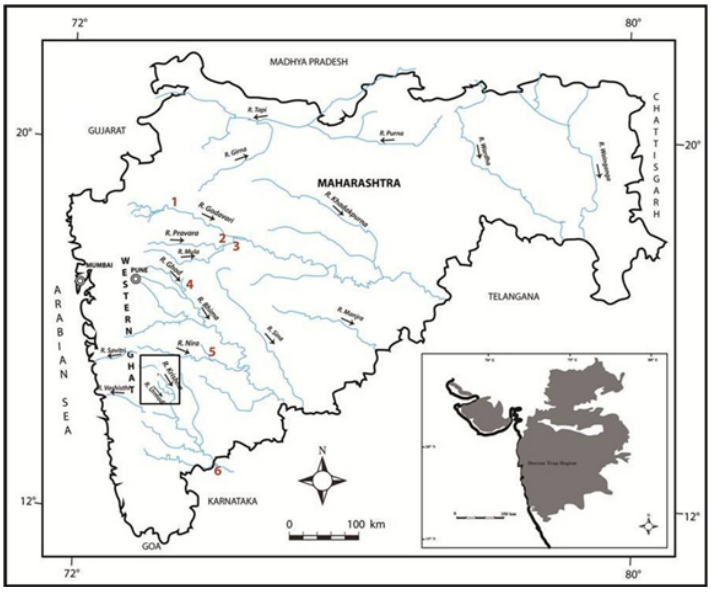

Fig.1 Location of Acheulian sites in the Deccan Upland: 1- Gangapur, 2- Nevasa, 3- Chirki-on-Pravara, 4- Bori, 5- Morgaon, 6- Yedurwadi, and rectangular black outline marked area showing the present study area

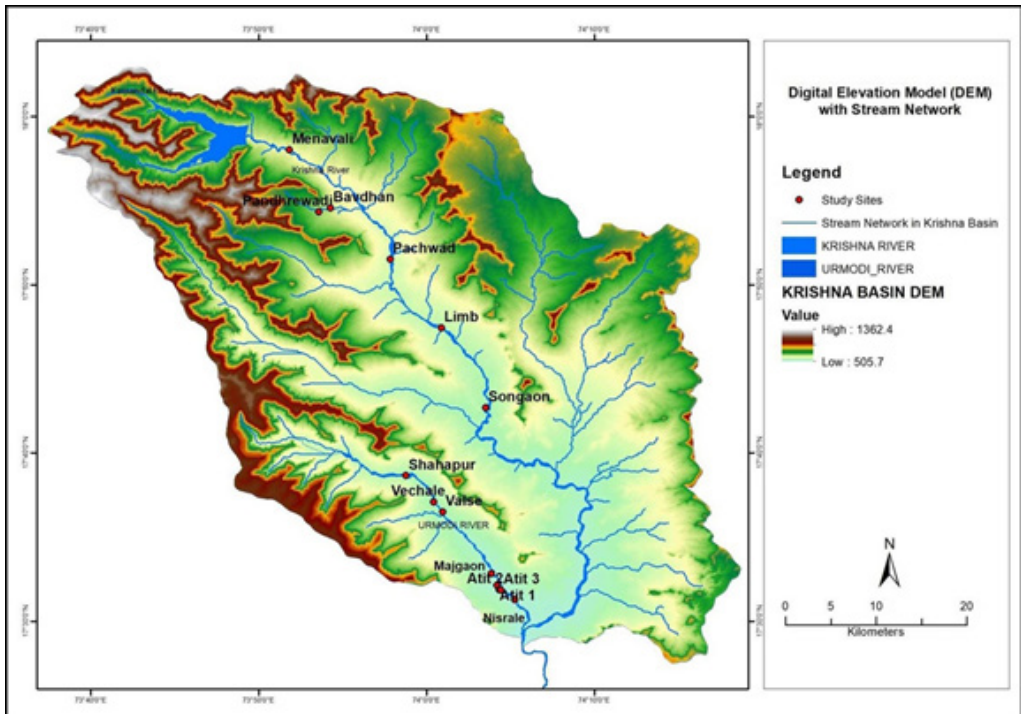

Fig. 2 Digital Elevation Model of the study area and location of the Acheulian sites

Fig.3 Loose channel gravel commonly observed at all the sites (inset: Acheulian artefact)

Fig.4 Breccio-Conglomerate observed at Atit 1 (inset: Acheulian artefact)

Fig.5 Cobbly-rubble observed at Atit 2 (inset: Acheulian artefact)

Fig.6 View of the artefact-bearing weathered gravel capping the bedrock at Nisre

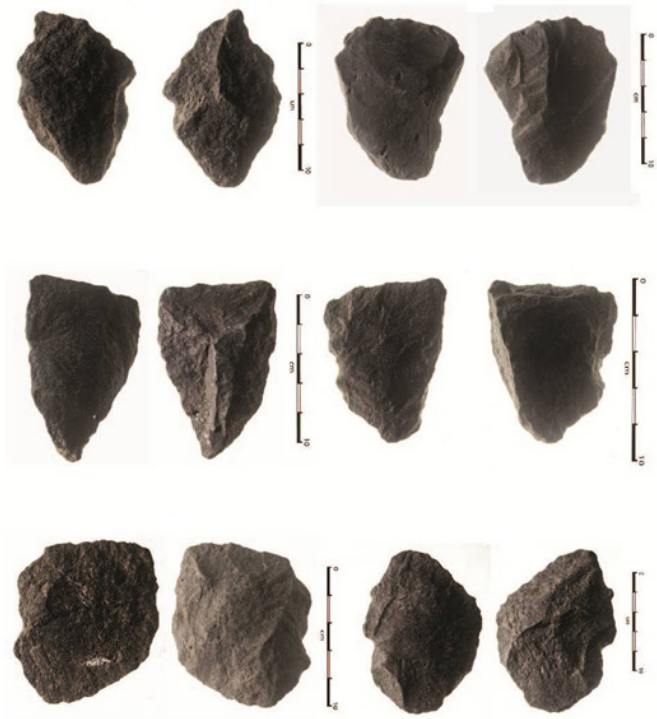

Fig.7 Representative cleavers/cleaver-flakes (all scales 10 cm)

Fig.8 Representative LCTs (all scales 10 cm)

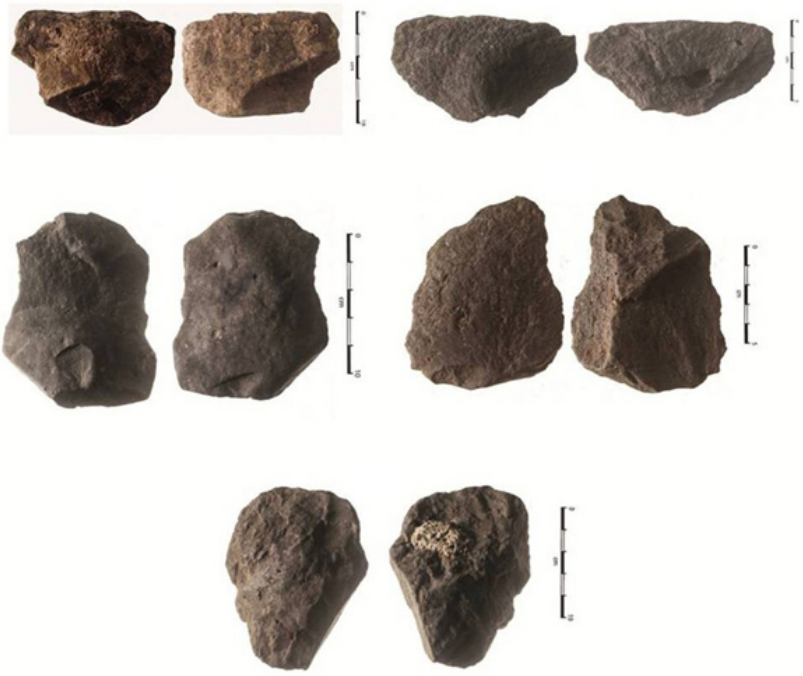

Fig.9 Representative Flakes (note the difference in scale sizes)

Fig.10 Representative cores/flake cores (note the difference in scale sizes)