GENERAL SCOPE AND USES OF
PHYSICAL/BIOLOGICAL ANTHROPOLOGY

Course name: Prehistoric Archaeology

Paper No. & Title: B.A./B.Sc. (Honours) 5th semester (Theory)

Topic No. & Title: 7/21 Lower Palaeolithic Cultures: Sohanian and Madrasian
Objective:

After studying this module the undergraduate students are able to:

* understand the two classification of Indian Lower Palaeolithic Culture based on its tool types.
* identify the Soanian and Madrasian tools.
* classify the typology and technology of the two different regions.
* explain why Pre-Acheulian stages are claimed.

Content & Script of the Programme

Introduction:

The Lower Palaeolithic culture in India is considered to have two distinct traditions, \textit{i.e.}, (a) the Sohanian, also known as the Soanian, represented by pebble tools or chopper-chopping tool tradition and (b) the Acheulian, also referred to as Madrasian, represented by biface or handaxe-cleaver tradition. The Soanian artefacts are found in the north of Indo-Gangetic plain whereas the Acheulian artefacts are found mostly in Peninsular India. It was H. de Terra and T.T.
Paterson (1939) and V.D. Krishnaswami (1953) who suggested the existence of two independent cultures within the Lower Palaeolithic period of the Indian subcontinent. Further it was thought that the Singrauli basin in Uttar Pradesh and Central Narmada basin in central India were the probable meeting places of these two cultures (Krishnaswami and Soundara Rajan 1951). Later on, based on new discoveries and typo-technological studies, it has been generally agreed that there is no sufficient evidence for interpreting these typo-technological variations in terms of distinct cultural groups (Jayaswal 1978). Interestingly, research at a number of sites show that Acheulian artefacts occur even in the localities of sub-Himalayan region where chopper-chopping tools are dominant (Mohapatra 1990) and at the same time, a few assemblages devoid of tool types of the handaxe-cleaver complex also occur in Peninsular India where Acheulian is dominant.

**Claims for Pre-Acheulian Stages**

There is no well substantiated evidence so far for the presence of a pre-Acheulian cultural phase anywhere in India. Although a few claims for the existence of Mode 1 industries have been made:
1. A.P. Khatri (1962) claimed to have discovered an industry exclusively made up of pebble tools in the lowermost red clay stratum on the Narmada at Mahadeo Piparia. He coined the term ‘Mahadevian’ for this pre-Acheulian industry and believed this industry to be the oldest in India comparable to the Oldowan of East Africa. The excavations undertaken subsequently by S.G. Supekar (1985) at Mahadeo Piparia conclusively proved that there was no stratigraphic basis for postulating the existence of a pebble tool substratum underlying the Acheulian handaxe-cleaver industries.

2. Similarly, there are other claims also for the presence of an Oldowan assemblage at Durkadi in the Narmada basin by J. Armand (1985) and a ‘pebble-tool’ horizon at Bhimbhetka rock shelter by V.S. Wakankar (1973), which were subsequently criticized by others and do not have much bearings on the presence of a pre-Acheulian industry in India.

3. However, at Riwat in Northern Pakistan, one of the most potential areas for investigating the early occupation in South Asia, the investigators of the British Archaeological Mission to Pakistan, R.W. Dennell and H.N. Rendell (1985) have claimed to find Lower Palaeolithic artefacts of Mode 1 technology and dated the site to around 1.9 million years BP or even earlier by palaeomagnetism and fission-track dating.
methods. This is the only well substantiated claim for the presence of a pre-Acheulian stage in the Indian subcontinent as it has been corroborated with absolute dates unlike the other claims mentioned above.

Here we shall discuss both the traditions of Soanian and Acheulian briefly with their salient features as well as their present status of research.

Fig. 1: Map of India showing lower Palaeolithic sites (after Misra 1989)
Soanian Culture:

As early as in the 1930s, H. de Terra and T.T. Paterson interpreted and labelled some of the lithic assemblages found in the Siwalik region as Soan or Soanian and subsequently, researchers like H.L. Movius (1948) considered the Soanian culture as a part of the chopper-chopping tool tradition of South East Asia. The name Soanian is derived from Sohan river and the terrace gravel and associated loess deposits of the Indus-Sohan in the Potwar region of Pakistan.

Recent discoveries however show that both Soanian and Acheulian sites occur in the sub-Himalayan tract in the Punjab, Himachal Pradesh and Uttar Pradesh and Siwalik Frontal range. G.C. Mohapatra (1990) who has discovered both Soanian and Acheulian sites in the Hoshiarpur-Chandigarh sector of the Siwalik hills has argued that the Acheulian and Soanian populations inhabited two distinct types of environment, the former occupying the flat plain surfaces of the Siwalik front range and the latter the *duns* or valleys of the Himalayan flanks in the hilly region. He has observed that Soanian tools are fashioned on water-worn cobbles and pebbles, while the Acheulian people utilized large flakes detached from boulders for preparing bifaces.
Soanian artefacts conventionally distinguished on the basis of typological and technological ground from the Acheulian artefacts. The Soanian artefacts primarily consisted of amorphous unifacial tools on cores and rarer bifacial pieces, whereas the Acheulian artefacts consisted of biface such as handaxes, cleavers and picks on cores and flakes and unifacial tool types on cores and retouched flakes. The Soanian artefacts are manufactured on quartzite pebbles, cobbles, and occasionally on boulders and the assemblages are generally comprised of varieties of choppers, discoids, scrapers, cores, and numerous flake types, all occurring in varying typo-technological frequencies at individual sites. Most of the sites bearing Soanian artefacts are surface sites, so, dating is limited to relative dating.

Fig. 2: Diverse Soanian tool types from Toka: a) uniface; b) hammerstone; c) unifacial and unimarginal chopper; d) secondary flake; e) single-platform core on
split cobble; f) core scrapers; g) nonconvergent unifacial discoid; h) pointed unifacial chopper; i) flake with cortical platform; and j) angular core fragment. (after Chauhan 2007)

The Soanian has been further classified into Early and Late Soanian. Early Soanian is a Mode 1 technology, although it may be late Pleistocene and Late Soanian is Mode 3 technology (Karir 1985). The Late Soanian is comparable to a Middle Palaeolithic industry, rich in pebble tools, and dated to between 50 and 20 ka. The Early Soanian is technologically related to the Lower Palaeolithic, but without handaxes or cleavers. The site of Toka studied by Parth R. Chauhan (2007) which has absence of Acheulian tool-types, associated biface-thinning flakes, and typical Upper Palaeolithic features reveals that the Toka assemblage probably represents late Lower to early Middle Palaeolithic technology. Stephen Lycett (2007) has also arrived on a similar conclusion on the prominent presence of the Levallois or a Mode 3 element through a comparative assessment of morphometric variables on some original cores of Soanian tradition collected by de Terra and Paterson. He further infers that at least some sites within the Soan valley contain a clear Mode 3 Levallois core component which is consistent with the hypothesis that the Soanian techno-complex is either late Acheulian or post-Acheulian in
terms of technology. Although Soanian material has frequently been seen as contemporary with or preceding the Acheulian in India and Pakistan, it has also been argued that the Soanian may actually post-date the Acheulian by Gaillard and Mishra (2001) and Chauhan (2003). Gaillard (2006) show that neither the Soanian nor any other chopper chopping tool industries contemporary to the Acheulian are found in the sub-Himalayan region of the Indian sub-continent. The Soanian, long considered as a component of the Lower Palaeolithic Mode 1 comes from later contexts than the Acheulian and dates to the Late Pleistocene. According to them, the different lower Palaeolithic technologies of south Asia do not fall into regional groupings but rather into chronological ones.

From the above discussion, we can see how the identity of the Soanian has been changing over time. On technological ground, Soanian artefacts have Middle Palaeolithic or Mode 3 elements and chronologically, it occurs in a later context than the Lower Palaeolithic Acheulian. Mishra (2006/07) pointed out that except for the Plio-Pleistocene sites of Riwat and Pabbi Hills in Pakistan, there is no well-defined Lower Palaeolithic Mode 1 occurrence in South Asia, in contrast to other parts of the world.
Acheulian Culture:

India is one of the areas of largest concentrations of Acheulian sites. This has been revealed by multiple surveys and excavations over the last half-century. British geologist Robert Bruce Foote, the father of Indian Prehistory first discovered a handaxe from Pallavaram near Madras (now Chennai) on 30th May, 1863. There are several best studied areas of Acheulian occurrences such as the Thar desert, the Son and Belan valley, the Bhimbhetka area or Raisen district of Madhya Pradesh near the Narmada valley, Maharashtra, and southern India. R.S. Pappu (2001) in his book *Acheulian Culture in Peninsular India: An Ecological Perspective* has discussed the salient features of Acheulian culture of India which are summarized briefly below:

(A) Distribution and Habitat Pattern

Long term research in different parts of the country shows that Acheulian artefacts are found distributed all over the country except certain pockets such as the Indo-Gangetic plains, probably due to the non availability of rocks necessary for preparing stone artefacts, or if any Acheulian sites existed there in the past, they got buried subsequently under the
thick alluvium, northeast India and along the west coast and the Western Ghats due to rugged terrain, heavy rainfall and thick vegetation. The sites occur in varied geographical landscape such as arid to semi-arid regions of western Rajasthan, forested and hilly regions of Vindhyan region and Chota Nagpur plateau, coastal regions of Orissa, Andhra Pradesh and Tamil Nadu, river terraces of Siwalik regions and plateau regions of the Deccan Upland, rock exposures in central India and Karnataka, and in rock shelters and caves, which altogether indicate the ecological adaptations of the Acheulian hominids.

Fig. 3: An example of open air prehistoric site
Fig. 4 and 5: Examples of excavation at open air prehistoric sites

Fig. 6 and 7: Bhimbetka rock shelters
R.S. Pappu has classified the Acheulian sites into five groups: alluvial, coastal, slope, surface all falling in open air sites and rock shelter and cave sites. The Acheulian population lived mostly close to the river banks, sea and lake shores and in the foothill areas for easy access and exploitation of perennial water, plant and animal foods, and raw materials for making stone tools etc.

Some of the best studied and well known excavated open air sites are:

- Chirki-Nevasa in Maharashtra (Gudrun Corvinus)
- Lalitpur in Uttar Pradesh (R. Singh)
- Hunsgi and Baichbal valley in Karnataka (K. Paddayya)
- Paisra in Bihar (P.C. Pant and Vidula Jayaswal)
- Raisen district in Madhya Pradesh (J. Jacobson)
- Anagawadi in Karnataka (R.S. Pappu and Sushama G. Deo)
- Morgaon in Maharashtra (Sheila Mishra)
- Bori in Maharashtra (V.S. Kale and R. Korisettar)
- Attirampakkam in Tamil Nadu (Shanti Pappu)
- Belan valley in Uttar Pradesh (G.R. Sharma)
- Son valley in Madhya Pradesh (G.R. Sharma and J.D. Clark)
- Didwana in Rajasthan (V.N. Misra, S.N. Rajaguru and Claire Gaillard)

The rock shelters and caves sites include:
- Adamgarh in Madhya Pradesh (R.V. Joshi)
- Bhimbetka in Madhya Pradesh (V.N. Misra)

Not much is known about the habitation structures or dwellings of the Acheulian period except the evidence of the construction of a wall of boulders for partitioning the interior space in one of the rock shelters of Bhimbetka (Misra 1985), an oval-shaped living floor surrounded by granite boulders on all sides, deliberately placed by man for constructing hut-like structures at Hunsgi (Paddayya 1982), stone alignments in habitation floors, postholes at Paisra (Pant and Jayaswal 1991) etc.
(B) Acheulian Stone Tool Typology and Technology

The Lower Paleolithic artefacts consist of handaxes, cleavers both having a variety of shapes and forms, choppers, scrapers, discoids, points, borers, polyhedrons, spheroids, etc. The handaxe is one of the standardized tool types which is tear-drop in shape and pointed at the tip with sharp edges on the lateral sides, whereas the cleaver is characterized by a broad cutting edge, usually at right angles to the long axis. The main techniques used in making these tools are block-on-block, stone hammer and soft hammer or cylinder hammer. The raw materials used for fashioning the Acheulian artifacts are quartzite, basalt, dolerite, granites, cherty limestone etc., depending on the availability.
Fig. 11: Acheulian artefacts from Chirki-Nevasa, trench VII. (1–3) Cleavers; (4–6) handaxes (after Gaillard et. al. 2009)

Fig. 12: Acheulian artifacts of the Hunsgi and Baichbal valleys. 1–3 Handaxes; 4 Knife; 5 Cleaver; 6 Polyhedron; 7 Pick; 8 Hammestone; 9 Anvil stone; 10 Chopper (after Paddayya 2007)
Fig. 13: Handaxes from Singi Talav at Didwana (after Gaillard 2006)

Fig. 14: Acheulian cleavers from Pilikarar (after Chauhan 2007)
(C) Geological, Paleontological and Palaeoanthropological Background

The quaternary formations associated with Acheulian industries include glacial, fluvio-glacial, fluvial, lacustrine, fluvio-lacustrine, aeolian, littoral and colluvial deposits which contain Paleolithic tool assemblages and also mammalian fossil remains. Studying these deposits helps us in understanding the depositional environment of the artifacts and paleo-ecological background besides the chrono-stratigraphic position of the artifact bearing horizons. The geo-archeological and paleo-environmental studies show that there were climatic fluctuations, sea-level changes and tectonic movements in the Indian subcontinent during the Quaternary period in terms of past environment particularly paleo-climate.
Fig. 15: Hathnora in the Narmada valley where a partial cranium of advanced *Homo erectus* or archaic *Homo sapiens* was discovered by Arun Sonakia.

Fig. 16: Hathnora partial cranium

Fig. 17 and 18: Animal fossils
Localities bearing fossilized bones of mammalian species have been discovered in the Karewas of Kashmir, the Siwalik formations in the sub-Himalayan region in Punjab and Himachal Pradesh, the alluvial deposits of Narmada and Mahanadi in Madhya Pradesh, Belan valley in Uttar Pradesh, Pravara, Godavari, Krishna, Ghod and Manjra valleys in Maharashtra and Hunsgi, Tungabhadra and Ghataprabha valley in Karnataka. The faunal remains associated with the Acheulian artifacts are of *Elephas namadicus*, *Stegodon ganesa*, *Stegodon insignis*, *Bos namadicus*, *Equus namadicus*, *Bubalus palaeindicus*, *Cervus duvauceli*, *Rhinoceros unicornis*, *Hippopotamus palaeindicus*, *Leptobos frazeri*, *Ursus namadicus*, *Sus* sp., *Trionyx* sp. and *Emys* sp. etc., (Badam 1979).

The partial cranium of advanced *Homo erectus* or archaic *Homo sapiens*, discovered by Arun Sonakia in 1982 and a hominid clavicle in 1997 by A.R. Sankhyan in the basal gravels of the Narmada alluvium at Hathnora near Hoshangabad in Madhya Pradesh (Sonakia 1984 and Sankhyan 1997) are the so far hominid fossil discoveries in India. Lower Paleolithic Acheulian artifacts are also found in the same deposit.
(D) Subsistence and Settlement Pattern

Although, there is no direct evidence for reconstructing the subsistence practices of the Lower Paleolithic people due to poor preservation (tropical climate and acidic soil conditions) of animal and plant remains at the excavated primary sites, hunting of animals and gathering of wild plant foods can be considered as the subsistence strategies of the early hominids. The discoveries of a large number of contemporary animal fossils near the Acheulian sites indicate that probably some of these animals were hunted by them besides fishing activities in the nearby perennial streams. Moreover, there is also no direct evidence to reconstruct the techniques and equipment used for hunting. The tools like handaxes, cleavers and scrapers were probably utilized for different activities. Ethnoarchaeological studies conducted in the Hunsgi valley by K. Paddayya, Bhimbetka area by V.N. Misra and Malti Nagar and among the tribal communities like Gonds, the Chenchus, and the Yerukalas by M.L.K. Murty have shown that wild plant foods like fruits, berries, tubers, roots, nuts, seeds, greens, etc. were possibly exploited by the early human. Site Catchment Analysis (Land Use Pattern) concerning the exploitation of plant, animal and mineral resources by
human groups in a particular territory, conducted at a number of Acheulian sites such as Chirki-Nevasa, Anagwadi, Khyad and Hunsgi has furnished the evidence for the range of movement of the Acheulian hunter-gatherers for resource exploitation within a radius of 10 km.

Study of the settlement pattern considering the location, distribution and densities of sites in terms of ecology indicate annual activity cycle of the Acheulian groups and nature of their seasonal settlement systems. K. Paddayya (1982) suggests that the Acheulian groups in the Hunsgi valley aggregated during dry season at spring-fed water sources and dispersed during wet season. The wet season dispersal with attendant reliance on plant foods and small fauna and dry season aggregation characterized by large game hunting were the governing principles of the Hunsgi valley settlement system. Study at the Kaladgi basin in North Karnataka by R.S. Pappu and S.G. Deo (1994) shows that the Acheulian sites in the Ghataprabha valley of the Kaladgi basin were influenced by morphometric parameters like relief, slope and drainage density, thereby indicating their role in the location of sites. There are several examples of studies on site formation process which provide a basis for interpreting the duration of human occupation, the continuity or intermittence of occupation,
intensity of occupation, rate of deposit formation, post-depositional alterations and the effects of erosion on the preservation of cultural remains such as by K. Paddayya, M.D. Petraglia, Richa Jhaldiyal in the Hunsgi valley, and Shanti Pappu in the Kortallayar basin etc.

(E) Origin, Chronology and Divisions

To understand the origin and chronology of the Acheulian culture, both relative dating based on paleontological and geomorphological evidence and as well as absolute dating with methods like Thorium-Uranium (Th/U), Potassium-Argon (K/Ar), and Thermo-Luminescence (TL) have been applied. There are number of Acheulian sites which are dated to the beginning of the Middle Pleistocene, such as Bori in western Maharashtra by Sheila Mishra, Jalalpur and Dina in the Siwalik sediments in Pakistan by Rendell and Dennell.

Sheila Mishra (1992) brought out the implications of Th/U dates for the Acheulian sites of Indian subcontinent and shows that all the sites dated are beyond 350,000 year BP, which is the limit of Th/U method. Moreover, the site of Bori with an early Acheulian assemblage has been dated by $^{39}$Ar/$^{40}$Ar method to $0.67 \pm 0.03$ Ma BP. The Acheulian sites of
Nevasa, Bori and Morgaon are dated with palaeomagnetism which suggest a pre-Brunhes age (> 0.78 Ma BP) (Mishra 2006/2007). K. Paddayya has studied the Hunsgi and Baichbal valleys of southern India and carried out detailed excavations at the site of Isampur dated to 1.2 million years by ESR dating method. Another site, Attirampakkam located in Kortallayar River basin, South India, studied by Shanti Pappu has been recently dated to 1.51 ± 0.07 million years by using a relatively new technique of cosmic – ray exposure dating in which the time elapsed since the burial of quartzite artifacts is estimated (Pappu 2011). Interestingly, the new date obtained at the site of Attirampakkam and Isampur has pushed back the antiquity of Acheulian culture in India to the early Pleistocene age which compares fairly well with the chronology of the Acheulian in other parts of the Old World.

In Peninsular India at most of the Lower Paleolithic sites, Acheulian artifacts occur in a mixed state. There is as yet no sound stratigraphic evidence to divide the Acheulian into various phases as have been recognized in Europe and Africa. V.N. Misra (1978) after comparing the Acheulian assemblages from Bhimbetka to other excavated Acheulian sites in India, suggested a two fold division of the Acheulian into Early and Late Acheulian. Typo-technological study and metrical analysis
of the Acheulian assemblages from various regions allow us to recognize these two developmental phases within the Acheulian. The former is characterized by inferior workmanship, as revealed by deep and irregular flake scars, thick bodies and asymmetrical forms. The Late Acheulian, on the other hand, includes finer types with smoother surfaces resulting from controlled flaking and symmetrical forms. According to V.N. Misra (1987) the Early Acheulian assemblages are generally “characterized by such core tools as handaxes, choppers, polyhedrons, and spheroids, a low number of cleavers and flake tools, the predominant use of the stone-hammer technique, and the absence of the Levallois technique” whereas, in contrast, the Late Acheulian assemblages are represented “by the low proportion of bifaces, the high ratio of cleavers to hand axes, the very high ratio of flake tools like scrapers, the extensive use of the soft-hammer technique, and the knowledge of the Levallois and discoid-core techniques”. According to Parth R. Chauhan (2004) the Early Acheulian bifaces in South Asia are often asymmetrical, large with thick butts or mid-sections and possess large and bold flake scars (albeit irregular), indicative of hard-hammer percussion. The Late Acheulian assemblages are generally smaller, thinner, and more refined, with a significant increase in the degree of retouching and controlled
bifacial thinning/flaking. Although the term ‘Middle Acheulian’ has been occasionally applied to ‘transitional’ assemblages (Jayaswal 1978), this term is not used frequently. According to R.S. Pappu (2002) the assemblages from Acheulian sites show differences in the proportions of choppers, handaxes, and cleavers, probably depending on the ecology, function, and raw material.

It is to be remembered that unless these two recognized groups occur in a stratigraphic succession, they do not imply any evolutionary stages. The representative examples of the Early Acheulian tradition are Singi Talav (Didwana) in Rajasthan, Khyad, Anagawadi and Hunsgi in Karnataka, Chirki-Nevasa in Maharashtra, Lalitpur in Uttar Pradesh and Mayurbhanj in Orissa whereas important examples of the Late Acheulian tradition are Gangapur in Maharashtra, Rallakallava basin in Andhra Pradesh, Attirampakkam and Vadadadurai in Tamil Nadu, Bhimbetka and Raisen complex in Madhya Pradesh and Paleru and Gunjana valleys in Andhra Pradesh.