CHAPTER II

LOWER PALAEOLITHIC SITES

Lower Palaeolithic culture of "Malnad Region" - forming the south-western part of Karnataka comprising the present districts of Shimoga, Chikmagalur and Hassan - is less known when compared to the others parts of Karnataka particularly north Karnataka. Pre-historic cultural relics in "Malnad" were first noticed in 1886 by Robert Bruce Foote when he picked up two pebble tools from a 'shingle bed' at Nyamti in district Shimoga during his geological studies of the region. He further reported the occurrence of 'Palaeoliths' at three sites, viz., Kadur, Langadahalli and Nadaghatta in Chikmagalur district (Bruce Foote, 1901).

The first Palaeolith in India was picked up by Bruce Foote in 1863 from the laterite bed at Pallavaram in Tamilnadu. Since then numerous Lower Palaeolithic sites have been brought to light by various foreign and indigenous scholars by extensive field work. Except for few pockets, practically almost in every part of the country, the Lower Palaeolithic artefacts have been noticed, particularly in the river valleys. Some of the important studies carried out in the river valleys such as Sohan (Deterra & Patterson, 1939), Sabarmatī basin ((Zeuner, 1950), Singrauli basin (Krishnaswamy, Soundararajan, 1951), Beas and Banganga (Lal, 1956), Kortalayar valley (Krishnaswamy, 1938), Guler (Joshi, 1968), Krishna valley (Soundararajan, 1961-62), Narmada valley (Wainright, 1964), Son valley (Nisar Ahmed, 1966), Pravara basin (Corvinus, 1970) and Luni valley (Mishra, 1977) have revealed detailed information about the occurrence of Lower Palaeolithic cultural remains in stratigraphical context along with the probable climatic conditions. It is interesting to note that few dwelling sites of the period such as at Bhimbetka (Madhya Pradesh), Chirki-Nevasa (Maharashtra) and Hunsgi (Karnataka) have been subjected to excavations to understand settlement pattern. Occurrence of fossils of Elephas nomadicus (Sohan valley), Bos Babalus and Cervus (Narmada and Godavari valley), Bos Nomadicus, Sus, Elephas, etc. (Belan valley), along with Lower Palaeolithic tool bearing deposits is noteworthy.
Although the existence of the Lower Palaeolithic sites were first noticed in southern districts of Karnataka, it is only in northern Karnataka that systematic Pleistocene studies were undertaken to understand the Lower Palaeolithic culture in its proper stratigraphical context. Particular mention may be made of the work done in the Malaprabha basin (Joshi, 1955), Upper Krishna valley (Pappu, 1974) and Shorapur doab (Paddayya, 1968). Detailed study of artefacts in the first two valleys have brought to light two distinct cultural horizons represented by the Lower Palaeolithic and the Middle Palaeolithic industries ascribable to the aggradational phases noticed by them. Pre-historic investigations carried out in the Shorapur doab region has brought to light a prolific acheulian industry, the tool kit of which comprises of hand axes, discoids, knives and cleavers. Use of limestone for manufacturing tools in the doab sites is interesting (Paddayya, 1968). Explorations in the right bank of the river Tungabhadra at Nittur near Tekkalakota in district Bellary, revealed pebble tools along with fossilized animal bones of Bos Nomadicus. A few Middle Palaeolithic tools were also found from the gravel bed. This mixed industry is one of its kind found in the Lower Tungabhadra (Ansari, 1970). Few decades back, a similar industry comprising Lower and Middle Palaeolithic artefacts was reported further upstream of Nittur at Hampasagara in the same river valley (Seshadri, 1956). Besides, a large number of Palaeolithic sites have been reported from Gulbarga, Bijapur, Dharwar and Belgaum districts (IAR 1955 to 1979) in northern Karnataka.

Hitherto, pre-historic investigation in southern Karnataka has been sporadic. So far, no systematic study of the Palaeolithic industries and their main features have been attempted, in the absence of which, it is difficult to assess the pre-historic potentiality of the southern Karnataka.
LOWER PALAEOLITHIC SITES : THE UPPER TUNGABHADRA VALLEY

A stretch of 60 Kms of the Upper Tungabhadra, i.e., from Kudli where the Tunga and Bhadra meet, to Konantale, the last village in Shimoga district along the Upper Tungabhadra, has been intensively surveyed. Lower Palaeolithic tools could be collected in six of the localities from Hadonahalli to Sudur (the latter located on the bank of the river Kumudvati, a tributary to the Upper Tungabhadra in this stretch. The distance between these two localities is approximately 45 Kms as crow flys).

Flora: The stretch of plain of the Tungabhadra proper is generally Maidan area having trees of smaller growth and thorny species comprising Dindiga (Anogeissus latifolia, Wall), Ippe (Rassia longifolia, Macbride), Bevu (Azadirachta indica, A.Juss), Alale (Terminalia chebula, Retz), Nelli (Emblica officinalis, Gaertn), Srgandha (Santum album, Linn), Honge (Pongamia pinnata, Pirre), Biji lali (Acacia leucopholea), etc. The middle part of the Kumudvati, a tributary of the Upper Tungabhadra where the site Sudur is located, is comparatively with moderate to thick forest area comprising Saguvani (Tectona grandis, Linn.f), Beete (Dalbergia latifolia, Roxb), Honne (Pterocarpus marsupium, Roxb), Jambe (Xylia dolabriformis, benth), Kanagal (Dallenia indica, Linn), etc.

Fauna: The fauna of the region met with in mammal group include wild Boar, wild Pig, Porcupine, Loin tailed Macaque, Jackal, wild Dog, etc. Birds found in the region include Teal, Duck, wild Geese, King Fisher, Jungle Crow, Parrot, Peacock, Heron and Stork. Varieties of reptiles such as Snake, Tortoise are met with. Fish fauna group consists of Carp, Scorpion fish, cat fish, Masshur, Murrel fidler, Eel and other varieties.

Environment: The environmental conditions seem to have been very favourable to human living, and would not have been very much different in the Middle and Upper Pliostocene periods. For, recent
investigations in Hunsgi valley (Paddayya, 1985) have indicated no
striking change in the environmental condition from the pre-historic
times to the present day. Probably, weather would have been more cold
and rain fall also more, consequently the present Maidan would have
been more green with atleast moderate forest. On the whole, the
conditions, it would appear, in the pre-historic time, was favourable
for human living. The rain fall in this region varies from 600 m to
1000 m.

Stratigraphy: The Upper Tungabhadra

This important river in the northern most limits of the region
under study is formed by the confluence of the Tunga and the Bhadra at
Kudli about 25 Kms north-east of Shimoga town. Due to twin
composition of the rivers, the Upper Tungabhadra attains big
proportion in its width and flows in a broad valley exhibiting mature
phase. From Kudli, it runs for a distance of 60 Kms in Shimoga
district. Thereafter, it enters Dharwar district in Konantale. The
present investigation to understand the stratigraphy of deposits is
restricted to its flow in Shimoga district only.

In its 60 Kms run in Shimoga district, the river has exposed a few
cliff sections at various localities and the same were examined for
fixing a tentative stratigraphy of deposits. The sequence of deposits
observed in five localities are discussed below.

From its source at Kudli upto Konantale in five localities
yielding Lower Palaeolithic tools, viz., Nagasamudra, Hadonahalli,
Vaderpura, Govinkovī and Chikbasur, cliff sections both on the left
and right sides are composed of bed rock at the bottom (gneiss)
overlain by pebbly gravel almost loose in nature varying in thickness
from 50 cms to 90 cms. Above this gravel rests silt deposit, brown to
reddish in colour, varying in thickness from 4 m to 7 m. In some
places, silt is found mixed with patches of kankar (for example at
Govinkovī).
Lower Palaeolithic and Middle Palaeolithic artefacts occur in the loose pebbly gravel. None of the specimens are found in the gravel section. It is interesting to note that the Middle Palaeolithic, Upper Palaeolithic, Mesolithic and Neolithic sites are also found in the vicinity of the Lower Palaeolithic sites indicating continuous occupation of the area by prehistoric people. The exposed pebble beds vary in measurements. The largest pebble bed site measures 500 m north-south x 100 m east-west and the smallest measures 60 m north-south x 15 m east-west.

In the remaining stretch, i.e., from Kudli to Nagasamudra, from Mangote upto Vadera pura and from Nimbegondi upto Govinkovi, from Hottapura to Chikbasur and from Benakanahalli upto Honnalı and further upto Konantale (where the river enters the district Dharwar), the cliff sections of the river are exclusively composed of reddish sandy silt varying in height from 3 to 8 m. In some places gneiss outcrops are seen protruding from the river bed or they are seen lining the river section. Patches of kankar mixed with silt is seen in few points. In many places, cliff sections are steep and where they are sloppy, grass has grown over the surface. Small deciduous forested hillocks are located near Chillur, Benakanahalli and Haraganahalli in this stretch of the Upper Tungabhadra. From the above survey of the cliff sections wherever present, the general stratigraphy of the river section may be reconstructed as follows; from top to bottom.

(a) Red to brownish silt mixed with thin, fine sand ranging from two metres to six metres in thickness.

(b) Pebbly gravel (not continuously present).

(c) Bed rock (gneiss).

During the survey in the vicinity of Hadonahalli village about 1 Km from the present river bank, at a higher level, a small patch of pebbly gravel is noticed at a depth of 40-60 cms below the surface in a
trench dug by the Public Works Department of the Government of Karnataka. This probably suggests the existence of an earlier terrace in the valley. It is pertinent to recall the observations of Seshadri who accompanied Zeuner in his expedition in 1950 for investigating the pleistocene deposits in the Lower Tungabhadra valley at Hampasagara, north of Hospet in district Bellary (Karnataka), which falls in the Maidan tract of the valley. He opines "The section extending to the higher level shows loose gravel on rock, covered by kankarised gravel and about 10' of kankarised silt. This carries a soil section with a Grey A - horizon (2') and a Brown B - horizon (7')" (Seshadri, 1956). These observations seem to confirm more or less the observations made by me in the upper part of the Tungabhadra described above.

No tools as such are found in the section proper in the pit at the upper level. However, the pebbles of the river bed and of the layer in the pit are one and the same. It is, therefore, reasonable to associate these two with this layer although the period of their use can not be exactly determined in the present stage of our knowledge.

Rock material: Geologically, the area falls into gneissic complex. In the river bed, large patches of quartzite pebbles are also noticed. Majority of tools, essentially made on core using the brown coloured quartzite pebbles with saccharoidal texture containing inclusions of magnetite, are available in abundance in the exposed loose gravel beds, probably derived from the quartzite formations of the Dharwars surrounding the gneiss. Few unfinished tools and flakes are also found in the loose pebbly gravel indicating that the pre-historic men used these gravel beds as factory sites. Small percentage of tools are found made on quartz also. However, most of the tool repertoire from Nyamti are made on brownish epidote quartzite having thin layers of magnetite.
Pebble group: This group is characterised by small proportion of artefacts noticed in three sites, namely, Chikbasur, Sudur and Nyamti in the Upper Tungabhadra valley proper and in the Kumudvati and Hirehalla, its tributaries respectively have yielded pebble tools totalling five in number of which, three are rolled and the rest are fresh. All the artefacts are made on the riverborne quartzite pebbles of brown colour. The bifacial chopper from Nyamti made on an end portion of a pebble has brownish core and the exterior has white surface due to weathering. No patination is seen on the tools. Rolled artefacts have blunt cutting edge while it is very sharp and distinctly visible on the three chopping tools from Chikbasur and deep flaking with prominent scars in the unifacial chopper from Nyamti, all indicative of the use of stone hammer technique.

Chopper chopping artefacts of the Upper Tungabhadra: As is well known, the term chopper chopping was coined by Movius (1948). The five pebble tools in the collection are divided into two usual groups:

(a) Unifacial chopper
(b) Bifacial chopper
Table No. 2

**Typological classification of Chopper chopping tools from the Upper Tungabhadra and its tributaries**

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Site</th>
<th>River/Stream</th>
<th>Tool type</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sudur</td>
<td>Kumudvati</td>
<td>Unifacial</td>
<td>2</td>
<td>60%</td>
</tr>
<tr>
<td>2</td>
<td>Nyamti</td>
<td>Harehalla</td>
<td>Unifacial</td>
<td>1</td>
<td>40%</td>
</tr>
<tr>
<td>3</td>
<td>Chikbasur</td>
<td>Upper Tungabhadra</td>
<td>Bifacial</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Table No. 3

**Metrical analysis of Chopper chopping specimens in the Upper Tungabhadra valley**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Site</th>
<th>Tool type</th>
<th>Measurement in cms</th>
<th>Shape of cutting edge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Length</td>
<td>Breadth</td>
</tr>
<tr>
<td>1</td>
<td>Chikbasur</td>
<td>Bifacial chopper</td>
<td>10.1</td>
<td>8.7</td>
</tr>
<tr>
<td>2</td>
<td>-do-</td>
<td>-do-</td>
<td>9.6</td>
<td>8.3</td>
</tr>
<tr>
<td>3</td>
<td>Sudur</td>
<td>Unifacial chopper</td>
<td>8.5</td>
<td>7.5</td>
</tr>
<tr>
<td>4</td>
<td>-do-</td>
<td>-do-</td>
<td>13.1</td>
<td>10.7</td>
</tr>
<tr>
<td>5</td>
<td>Nyamti</td>
<td>-do-</td>
<td>10.2</td>
<td>8.0</td>
</tr>
</tbody>
</table>

Unifacial chopper has convex working edge and thick round bottom. Flakes have been removed at $80^\circ$ angle. At the left lateral end, flaking is not uniform probably due to inferior quality of stone used. Bifacial choppers having convex working edge are made on flat pebbles with thin round bottom. While one is in mint condition, other one is slightly rolled. Table No. 3 shows that the chopping made on thick pebbles are common in the tributaries than in the main river valley.
where thin pebbles are preferred. This is a tentative observation. More work in this field is wanting.

**Summary:** Though the specimens picked up are small in number, they indicate the presence of both the types noticed in other adjacent regions. The unifacial choppers are thick and heavy. This sectioned pebbles are used for bifacial choppers. All the five tools are made on river borne pebbles and exhibit controlled workmanship. Prominent flake ridges on the artefacts is an interesting feature. Alternate flaking adopted to attain zigzag working edge exhibits the use of stone hammer technique. 60% of the specimens found rolled seems due to "in-situ" rolling of pebbles in the gravel bed. the remaining 40% of the specimens are fresh and indicate that they are derived from the nearby gravel bed which is undergoing constant erosion.

Pebble tools account for only 14.28% of the total collection of Lower Palaeoliths. Hence, detailed metrical analysis has not been done. Also the occurrence of pebble tool is very negligible. It substantiates the existence of the mixed pebble and hand axe industries noticed elsewhere in the Peninsular India in the northern Karnataka, Andhra and Maharashtra sites.

**Core and flake group:** Compared with the number of pebble - choppers discussed above, the percentage of tools made on cores and flakes such as hand axes, discoids and scrapers are more in the Lower Palaeolithic sites of the Upper Tungabhadra valley and her tributaries (Table No. 4).
### Table No. 4
Distribution of various types of Hand Axes in the Upper Tungabhadra valley

<table>
<thead>
<tr>
<th>Site</th>
<th>River valley/ Tributary</th>
<th>Triangular</th>
<th>Oval</th>
<th>Cordiform</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) ON CORE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) Hadonahalli</td>
<td>Upper Tungabhadra</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>8.33</td>
</tr>
<tr>
<td>2) Vaderpura</td>
<td>-do-</td>
<td></td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>8.33</td>
</tr>
<tr>
<td>3) Nagasamudra</td>
<td>-do-</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>50.00</td>
</tr>
<tr>
<td>4) Nyamti Hirehalla</td>
<td>H</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>3</td>
<td>25.00</td>
</tr>
<tr>
<td>5) Sudur Kumudvati</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>8.33</td>
</tr>
<tr>
<td>6) Nyamti Hirehalla</td>
<td>-</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>9</td>
<td>99.99</td>
</tr>
<tr>
<td></td>
<td></td>
<td>33.33%</td>
<td>41.66%</td>
<td>23%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) ON FLAKE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) Hadonahalli</td>
<td>Upper Tungabhadra</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>11.11</td>
</tr>
<tr>
<td>2) Vaderpura</td>
<td>-do-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>11.11</td>
</tr>
<tr>
<td>3) Nagasamudra</td>
<td>-do-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>33.33</td>
</tr>
<tr>
<td>4) Chikbasur</td>
<td>-do-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>11.11</td>
</tr>
<tr>
<td>5) Sudur Kumudvati</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>3</td>
<td>9</td>
<td>99.99</td>
</tr>
<tr>
<td>6) Nyamti</td>
<td>Hirehalla</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>66.66%</td>
<td>33.33%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The above table shows preference of core (57.15%) over flake (42.85%) for manufacturing hand axes.
As already mentioned, in 1886, Bruce Foote noticed a few Palaeoliths from four sites in the Shimoga and Chikmagalur districts. Subsequently, few Palaeolithic tools were reported from Kibbanahalli in Tumkur district (Sampath Iyengar, 1924). Seshadri (1956) has made a detailed study of this collection comprising Lower Palaeolithic and Middle Palaeolithic artefacts. Further, he also reported the occurrence of Palaeoliths at Karadigudda in Hassan district.

Explorations conducted in the river valleys in the Malnad region has yielded twentytwo new Lower Palaeolithic sites, besides the previously known, viz., Nyamti, Nidaghatta, Langadhalli and Kadur (Bruce Foote, 1901), all located in the tributaries of the river Tungabhadra. The newly found sites situated in the main river bed include Nagasamudra, Hadonahalli, Chikbasur, Vaderpura in the Upper Tungabhadra; Barandur, Dodgopenahalli, Sidhlipura, Balehonnur, Kagganahalla in the Bhadra; Honnapura, Pilangere, Hariharapura in the Tunga; Benkal, Kattebelguli in the Hemavati and Rudrapatna and Konanur in the Upper Kaveri valley. Other new sites located in the region include Sudur, Agrahara, Lekya in the Kumudvati and the Veda systems in the Tungabhadra basin. Shankaraghatta and Khandya are situated near the streams feeding the river Bhadra. Tool types and their type-technological aspects have been described from each of the river valley and their tributaries. Comparative study of industries found within the region under reference and with the sites in the neighbouring region has also been attempted. Raw materials used and techniques adopted to manufacture tools have been highlighted at appropriate places. Discussion is arranged in the following order, (a) Upper Tungabhadra valley, (b) Tunga valley, (c) Bhadra valley, (d) Hemavati valley and (e) Kaveri valley. Sites in the interiors have been put under sub-systems of the respective valleys.
As is evident, there are in all twenty-one hand axes in the collection belonging to different categories of types constituting 60% of the total collection. Based on the physical features, they are divided into two groups, namely,

a) Hand axes made on cores
b) Hand axes made on flakes

**Hand axes on cores:** Irregular blocks of desired size or the pebbles available in plenty in the pebble beds or large flakes detached from pebbles are normally used to manufacture hand axes. It is one of the earliest tool types. It is worked on both the faces and hence called bifacial. Sometimes, only one side is flaked on the cortex, called unifacial. Its working end is always thin, pointed and its bottom or butt end is thick. Ovate also falls into bifacial category but invariably they have thin working edge all round. Hand axe assemblage could be divided into two groups judging by the flaking on them.

**Pebble and butted axes:** Of the 21 hand axes, two are pebble butted (9.5%) and the remaining 19 (90.5%) specimens are fully flaked. Pebble butted hand axes are made on elongated pebbles. These have thick butt and the tip is thin and triangular in shape. One specimen exhibits shallow flaking of lateral margins up to the middle having zigzag working edge. These are symmetrical with biconvex cross sections. Both stone hammer and cylindrical hammer techniques seem to have been employed.

**Fully flaked axes:** Majority of the hand axes on core are fully flaked constituting 57.2% of the collection. However, only a few hand axes (16.6%) are fresh. These with regular working end and step flake scars suggest the employment of both the stone hammer and cylindrical hammer techniques. The remaining axes are found in semi-rolled condition making it rather difficult to ascertain the exact techniques employed for flaking. Of the 12 hand axes (partly and fully worked)
majority are oval shaped (5 Nos.) followed by triangular shaped ones (4 Nos.) and cordiforms (3 Nos.) (Table 4). Most of the specimens are thick at the centre, have prominent mid rib and usually are bi-convex in section. Concave margins in a few axes may indicate that these were hafted, a feature noticed elsewhere in the Upper Krishna valley (Pappu, 1974).

Table No. 5

<table>
<thead>
<tr>
<th>No.</th>
<th>Site</th>
<th>Maximum length</th>
<th>Maximum breadth</th>
<th>Maximum thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nyamthi</td>
<td>200 mm</td>
<td>110 mm</td>
<td>83 mm</td>
</tr>
<tr>
<td>2</td>
<td>&quot;</td>
<td>130 mm</td>
<td>80 mm</td>
<td>52 mm</td>
</tr>
<tr>
<td>3</td>
<td>&quot;</td>
<td>125 mm</td>
<td>70 mm</td>
<td>70 mm</td>
</tr>
<tr>
<td>4</td>
<td>Nagasamudra</td>
<td>170 mm</td>
<td>120 mm</td>
<td>88 mm</td>
</tr>
<tr>
<td>5</td>
<td>&quot;</td>
<td>145 mm</td>
<td>110 mm</td>
<td>77 mm</td>
</tr>
<tr>
<td>6</td>
<td>&quot;</td>
<td>110 mm</td>
<td>80 mm</td>
<td>60 mm</td>
</tr>
<tr>
<td>7</td>
<td>&quot;</td>
<td>150 mm</td>
<td>90 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>8</td>
<td>&quot;</td>
<td>95 mm</td>
<td>80 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>9</td>
<td>&quot;</td>
<td>115 mm</td>
<td>100 mm</td>
<td>70 mm</td>
</tr>
<tr>
<td>10</td>
<td>Hadonahalli</td>
<td>135 mm</td>
<td>100 mm</td>
<td>70 mm</td>
</tr>
<tr>
<td>11</td>
<td>Vaderpura</td>
<td>150 mm</td>
<td>130 mm</td>
<td>55 mm</td>
</tr>
<tr>
<td>12</td>
<td>Sudur</td>
<td>105 mm</td>
<td>75 mm</td>
<td>49 mm</td>
</tr>
</tbody>
</table>

The maximum length of hand axes on core, as can be seen from the table, measures 200 mm while the smallest hand axe measures 95 mm. Of the 12 specimens, two fall within the range of 200 mm to 170 mm accounting for 16.66% of the total. The remaining tools (9 Nos.) range between 150 mm to 95 mm (83.34%). Likewise, the maximum breadth of the hand axe in this group measures 130 mm and minimum 70 mm. Two groups are identified (1) those which fall between 130 mm to 100 mm
thickness of tools also varies. The maximum thickness is 88 mm and the minimum is 49 mm. While 7 specimens fall between 88 mm to 60 mm (58.40%), the remaining 5 specimens fall between 50 mm and 49 mm (41.60%). Variation in the dimensions also indicate various types of hand axes. Frequency in length seems to suggest preference of Pebbles measuring 100 mm and above. Thickness is fairly even in all the specimens.

**Hand axes on flakes:** There are in all 9 hand axes made on flakes obtained from the large pebbles in the river bed. Two hand axes are made on side flakes and the remaining specimens are classified under indeterminate group as the platforms are not clearly visible. All the 9 specimens fall under the category of unifacial hand axes. These have deep flake scars ranging from 3 to 8 in number found on dorsal surface. A few specimens are marginally retouched and have prominent mid rib. One specimen has pebble cortex. Deliberate removal of flakes vertically at the laterite ends to obtain what looks like a pointed tip is noteworthy. Few have symmetrical margins. Specimens having twisted or zigzag profile probably indicate their unfinished character. While 20% of the assemblage is fresh, 80% is found in rolled or semi-rolled condition rendering it difficult to analyze the angles adopted to remove flakes etc. Shapes of hand axes are given in the table below:

<table>
<thead>
<tr>
<th>No.</th>
<th>Site</th>
<th>River valley</th>
<th>Triangular</th>
<th>Oval</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Nagasamdrad</td>
<td>Upper Tungabhadra</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>2.</td>
<td>Hadonahalli</td>
<td>-do-</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>3.</td>
<td>Vaderpura</td>
<td>-do-</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>4.</td>
<td>Chikbasur</td>
<td>-do-</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>5.</td>
<td>Sudur</td>
<td>Kumudvat1</td>
<td>-</td>
<td>3</td>
</tr>
</tbody>
</table>

---

...84
Hand axes from Nagasamudra are triangular in cross section and the remaining bi-convex in cross section. Step flake scars in some are perhaps due to the cleavage of the rock rather than deliberate working. Side flakes have one face each produced by fracture. Prominent ridges on the upper surface, deep flake scars and limited secondary retouch work tend to suggest the use of stone hammer technique. Limited secondary retouching may indicate use of cylinder hammer technique also.

<table>
<thead>
<tr>
<th>Site</th>
<th>Length in mm</th>
<th>Breadth in mm</th>
<th>Thickness in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Nagasamudra</td>
<td>1) 125</td>
<td>100</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>2) 125</td>
<td>100</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>3) 160</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>b) Chikbasur</td>
<td>4) 100</td>
<td>80</td>
<td>40</td>
</tr>
<tr>
<td>c) Vaderpura</td>
<td>5) 115</td>
<td>70</td>
<td>35</td>
</tr>
<tr>
<td>d) Hadonahalli</td>
<td>6) 120</td>
<td>90</td>
<td>50</td>
</tr>
<tr>
<td>e) Sudur</td>
<td>7) 105</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>8) 130</td>
<td>95</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>9) 140</td>
<td>110</td>
<td>40</td>
</tr>
</tbody>
</table>

As seen from the above table, variation in length is noticeable. Maximum is 160 mm. Smallest hand axe measures 100 mm. This difference however does not indicate any typical feature. Tools ranging between 120 mm-100 mm constitute the bulk with 44.4%. Tools between 130 mm-125 mm form 33.3% while those fall between 160 mm-140 mm form 22.2% of the total collection. Breadthwise, there seems to be little conformity with the general pattern as 55.5% of the tools fall between 95 mm to 70 mm while the rest between 110 mm to 100 mm form 44.4% of the collection. Thickness varies considerably. The minimum
is 20 mm while the maximum is 70 mm. By and large, flake tools show consistency and definite pattern compared to hand axes on core.

**Discoids:** Discoids constitute 5.72% of the entire collection. These are circular artefacts made on core or flake usually bifacially worked. Flaking is employed around to obtain circular shape. Thick at the centre and exhibit shallow flake scars. Prominent protrusion at the centre is a common feature. Two specimens are made on quartzite pebble and the other on a flake, all brown in colour. In the Upper Tungabhadra river proper, this type is not located. Both the specimens are from its tributaries. Disc from Sudur is slightly rolled. Its periphery around is zigzag. The specimen from Nyaml is fresh. Thin flakes have been removed around. Working on the ventral surface clearly indicates the employment of levallois technique. Sudur specimen exhibits use of stone hammer as well as cylindrical hammer techniques. The exact use of this tool is not known.

**Scrapers:** This is one of the important types which commonly occur in the Palaeolithic cultures. There are in all seven scrapers collected from four sites, constituting 20% of the entire collection. These are divisible into three sub-types, namely, side scrapers, double sided scrapers and end scrapers.

<table>
<thead>
<tr>
<th>Type</th>
<th>Nagarasamudra</th>
<th>Sudur</th>
<th>Nyaml</th>
<th>Vaderpura</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Side scrapers</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>28.57</td>
</tr>
<tr>
<td>2. End scrapers</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>28.57</td>
</tr>
<tr>
<td>3. Double sided scrapers</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>3</td>
<td>42.85</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>99.99</td>
</tr>
</tbody>
</table>

...
Two end scrapers are made on core and remaining five are made on thick flake. Depending on the workmanship noticed on the lateral sides they have been classified under the above mentioned categories.

**Side scrapers:** In this group, one side of the tool is worked lengthwise by retouching. Both core and flake are used. In the double side scraper category, retouching is done on both the borders to obtain working edge.

The assemblage comprises of three side scrapers and two double sided scrapers. Faceted platform is visible on four tools. Bulb of percussion is prominent in the rectangular double sided scraper. One of the side scrapers having beak shaped tip is noteworthy. The double sided scraper with tang suggests use of hafting. All the scrapers are made on thick flakes. Flake scars are prominent in four scrapers while the fifth one from Vaderpura is heavily rolled. Four tools exhibit triangular section. One has bi-convex section. Workmanship noticed on the tools with thin elongated flake scars and secondary retouch work on the edges indicate the use of cylindrical hammer technique.

**End scrapers:** In this category, extreme ends are retouched to obtain working or scraping edges. Thin blades, flakes or cores are used. In the present case, cores have been used.

Both are fresh. In one artefact, flakes have been removed from both the dorsal and ventral sides while in the other, thin flakes are removed from the dorsal surface only. Ventral surface is flat, working edges are wavy. One has triangular section, the other has plain convex section.
<table>
<thead>
<tr>
<th>Site</th>
<th>Tool No.</th>
<th>Length in mm</th>
<th>Breadth in mm</th>
<th>Thickness in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nagasamdu</td>
<td>1</td>
<td>100</td>
<td>80</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>85</td>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>80</td>
<td>65</td>
<td>40</td>
</tr>
<tr>
<td>2. Vaderpura</td>
<td>4</td>
<td>85</td>
<td>65</td>
<td>25</td>
</tr>
<tr>
<td>3. Sudur</td>
<td>5</td>
<td>85</td>
<td>65</td>
<td>30</td>
</tr>
<tr>
<td>4. Nyanti</td>
<td>6</td>
<td>90</td>
<td>80</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>110</td>
<td>60</td>
<td>30</td>
</tr>
</tbody>
</table>

From the above table, it can be seen that there is a similarity between different types of scrapers. Variation in length, breadth and thickness is meagre. However, those which fall between 90-80 mm in length, 65 mm - 60 mm in breadth and 25 mm - 30 mm in thickness are more frequent than others. This group accounts for almost 70% of the collection.

General observations: Detailed work undertaken in the Upper Tungabhadra between Konantale and Kudli and in the tributaries further west of the main river has been rewarding, for, a number of sites yielding Lower Palaeoliths have been located. These are situated in different geo-setting, viz. (a) Sites in the 'Maidan' belt with semi-arid ecological conditions (b) In the Semi-Malnad and in the thick forested 'Malnad' belt, whether the same ecological situations prevailed in the past, particularly during the pre-historic times requires thorough interdisciplinary study.
The tool kit noticed in the region are surface finds comprising of choppers, hand axes, discs, scrapers, borers and points. The raw material used in preparing artefacts is essentially quartzite of different shades and colours, available in plenty in the form of river borne pebbles in these sites. Few are made on quartz also. From a close examination of the flaking system and massiveness of artefacts (hand axe group), it is apparent that abbevillian technique has been employed in preparing hand axes noticed at both Nagasamudra and Vaderpura. Other artefacts in the Upper Tungabhadra exhibit acheulian features of different stages. A significant feature is the tools rarely show any extensive retouch. However, the best example of the employment of advanced acheulian technique with extensive retouch is found in the artefacts picked up from Nyamti. Interestingly in none of the sites artefacts are found in clusters. A few artefacts particularly discoids represent levallois technique. Another feature of this culture in the region is the absence of cleaver group. This needs to be examined in detail.

**Lower Palaeolithic sites in the tributaries of the Upper Tungabhadra(north-east and south-west Malnad region)**

The Lower Palaeolithic artefacts noticed in the tributaries of the Tungabhadra and near the lakes in the above region have been described separately as they indicate a slightly developed stage of the culture. River systems, stratigraphy, tool descriptions, etc. have been dealt in detail, besides analysing their metrical characters.

A portion of the eastern belt of the Maidan is drained by Vedavati formed by a series of streams flowing down the eastern slopes of hillocks in Chikmagalur and Kadur taluks of Chikmagalur district. Hence, stratigraphy of important streams are discussed below.
The Kudida (Agrahara): This is one of the important streams feeding the Vedavati, a tributary of the Tungabhadra. It flows in the eastern limits of Chikmagalur district. A small cliff section examined at Agrahara revealed a 0.80 m thick loose pebbly gravel over-imposed by a layer of brownish sandy silt measuring 0.50 cm in thickness. From the surface of loose pebbly gravel, few Palaeoliths made on flake were obtained. The slopy pebble bed measures 30 m north-south x 6 m east-west. The base of the gravel is not exposed.

The Hulihalla: About 20 Km south of Sakrepatna at Nidaghatta, another cliff section on the right bank of a nullah locally known as Hulihalla, was examined. It rises at the Nidaghattagudda about 3 Km north of the village and after flowing in different directions, it joins the Vedavati river. It is active only during the monsoon and remains dry most of the year. The cliff section exposed on the right bank revealed the following stratigraphy. Over the rock rests 30-40 cms thick brownish clay overlain by 60 cm thick gravel which is over-imposed by brownish clay measuring 0.70 m to 1 m height. Above this rests small strip of pellet gravel of 5 to 10 cm thick overlain by 60-80 cm thick reddish silt. From the loose pebble bed in the stream bed, pebble tools, hand axes and other flake tools were obtained. Pebbles are strewn in the nearby fields also. This is one of the four sites where Bruce Foote collected Palaeoliths in 1886 from laterite debris.

**Lower Palaeolithic sites in the Vedavati, District Chikmagalur**

Lower Palaeolithic sites in the north-eastern and south-western part of the eastern Maidan belt of the central Malnad region (mostly in the eastern plains with typical maidan features) comprising the present Chikmagalur district (formerly known as Kadur district) were brought to light as early as in 1886 when Bruce Foote picked up hand axes, discs and ovates from as many as three sites, viz., Lingadahalli,
Nidaghatta and Kadur. Specimens collected by him were few and far between to understand the nature of industry and its typo-technological aspects. Fresh investigations conducted in the region revealed a few new sites. These are situated in two different locations viz. (a) sites in the stream beds & (b) lake side sites. Sites of the first group noticed in Sakrepatna and Chikmagalur talukas of the region are near the stream beds in the upper reaches of the Vedavati, one of the important tributaries of the Tungabhadra. The factory site at Nidaghatta is the most important in this group comprising choppers, hand axes, discs, scrapers, etc. The lake side site of the second group is noticed at Gedlahalli in Kadur taluk in Chikmagalur district. This again is a factory site situated 6 Km south-east of Kadur town about 1.5 Km of a lake locally called 'Tanalikere'. Tool repertoire include hand axes, choppers, scrapers, points, blades and discs distinctly different from other sites in the region under study.

The Lower Palaeolithic assemblages noticed in these sites in the region can be divided into two distinct categories on the basis of typo-technological features.

I. Pebble tool group represented by unifacial and bifacial choppers; and

II. Flake group represented by hand axes, scrapers, discoids, solitary cleaver, points, borers and blades.

The following table illustrates the typological distribution of tools in the various sites of the region.
Table No. 10

Typological distribution of artefacts in Vedavati valley

<table>
<thead>
<tr>
<th>Tools</th>
<th>Sites</th>
<th>Nidaghatta</th>
<th>Agrahara</th>
<th>Lakya</th>
<th>Gedlahalli</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pebble tool</td>
<td></td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>5%</td>
</tr>
<tr>
<td>Hand axe</td>
<td></td>
<td>7</td>
<td>3</td>
<td>-</td>
<td>11</td>
<td>21</td>
<td>35%</td>
</tr>
<tr>
<td>Scraper</td>
<td></td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>17</td>
<td>28%</td>
</tr>
<tr>
<td>Discoid</td>
<td></td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>4</td>
<td>6</td>
<td>10%</td>
</tr>
<tr>
<td>Point</td>
<td></td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>9%</td>
</tr>
<tr>
<td>Borer</td>
<td></td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>4</td>
<td>7%</td>
</tr>
<tr>
<td>Blade</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Cleaver</td>
<td></td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>24</td>
<td>5</td>
<td>2</td>
<td>28</td>
<td>59</td>
<td>100%</td>
</tr>
<tr>
<td>Percentage</td>
<td></td>
<td>40%</td>
<td>8%</td>
<td>5%</td>
<td>47%</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

I. Pebble tool group: All the three specimens were picked up from the dried up bed of a stream at Nidaghatta. These are made on quartzite pebbles of light brown and dark brown colours. One of the specimens displays distinct zigzag working edge recalling the features of early acheulian technique. Flake scars are deep and have prominent ridges. However, in one of the specimens, step flaking has been deliberately employed to straighten the working edge indicating soft hammer technique. Two are made on split pebbles while the third one is made on a large pebble. These constitute 5% of the total collection. All the three specimens are fresh indicating 'in-situ' condition. They fall into the following categories.

a) Unifacial choppers (2%): The specimen made on a split pebble has convex working edge. Five deep flakes have been detached to obtain a zigzag working edge. Cortex is retained on both the surfaces.
(b) **Bifacial choppers** (3%). These are fashioned on a split pebble and a large pebble respectively. Cutting edge is wavy obtained by alternate flaking. Step flaking to straighten the edge is noteworthy. Number of flake scars vary from 3 - 6 on each surface.

**Table No. 11**

<table>
<thead>
<tr>
<th>SI. No.</th>
<th>Tool type</th>
<th>Cutting edge</th>
<th>Measurement in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unifacial chopper</td>
<td>Convex</td>
<td>130 90 60</td>
</tr>
<tr>
<td>2</td>
<td>Bifacial chopper</td>
<td>Convex</td>
<td>115 85 75</td>
</tr>
<tr>
<td>3</td>
<td>Bifacial chopper</td>
<td>Convex</td>
<td>140 105 80</td>
</tr>
</tbody>
</table>

**Summary:** Although small in percentage, occurrence of pebble tools in the region is noteworthy. Fresh nature of the pebble tools probably indicate their recent exposure and their manufacture in the stream bed. Deep flake scars and prominent ridges suggest early acheulian character of the assemblage. All the specimens have convex working edge and the metrical characters are inter-related indicating preference in selecting pebbles of a definite size. Quartzite is the chief rock-material while quartz has also been used for fashioning Lower Palaeoliths in the region but to a lesser extent.

**II. Flake tool group:** As already mentioned, Lower Palaeolithic sites in the eastern belt of central Malnad region is characterised by predominance of flake tools. Most of these are made on quartzite, a small group is of quartz and dyke is also used to fashion tools. There are in all 57 specimens constituting 95% of the total collection. Typological classification of this group is as follows.
Table No. 12

Typology of Flake tools

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Tool type</th>
<th>Total No.</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hand axe</td>
<td>21</td>
<td>37%</td>
</tr>
<tr>
<td>2</td>
<td>Scraper</td>
<td>17</td>
<td>30%</td>
</tr>
<tr>
<td>3</td>
<td>Borer</td>
<td>4</td>
<td>7%</td>
</tr>
<tr>
<td>4</td>
<td>Point</td>
<td>5</td>
<td>9%</td>
</tr>
<tr>
<td>5</td>
<td>Discoid</td>
<td>6</td>
<td>11%</td>
</tr>
<tr>
<td>6</td>
<td>Cleaver</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>7</td>
<td>Blades</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>56</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Hand axes are fashioned on thick flakes obtained from Pebble as well as natural blocks, as for example at Gedlahalli. The 21 specimens (35%) picked up from loose gravel beds in the streams as well as from sections at Gedlahalli are of varying dimensions and shapes. In few specimens noticed in the stream beds pebble cortex has been retained partially on one side and in some, cortex is retained fully on the ventral side suggesting both unifacial and bifacial working of the specimens. Some have deep flake scars with ridges. Step flaking is employed near the margin in four specimens to attain straight outline. Couple of them have prominent mid-rib on the dorsal. Flake scars vary from 3-15 on one or both the surfaces. Pointed tip is another noteworthy feature. Beak like projection in some specimens are comparable to similar types, noticed from the Upper Krishna basin (Pappu, 1974). Faceted platforms are also visible in a few specimens. Attempt to produce tang for hafting is noteworthy. In the collection, unifacially flaked axes account for 18.18% while bifacially flaked axes account for 81.18%. Comparatively, Handaxe collection from the Gedlahalli site exhibit uniformity both in size as well as technique adopted to fashion them. Size varies from medium to small.
Unlike the stream bed sites where plenty of pebbles are available, the tool repertoire is essentially made on quartzite lumps and irregular blocks strewn all over the site. Straight natural portion of the block or flake is retained and the remaining portion is minutely trimmed to the required shape. Most of these exhibit prepared core technique. Stone hammer technique to detach flakes may also have been used. Thin and pointed tips of triangular hand axe is a noteworthy feature. Steps noticed on both the surfaces are probably due to natural cleavage of the rock which is slightly inferior to the rock material used in the stream bed sites. A few specimens also exhibit single platforms along the lateral margins. All these typo-technological features tend to show a developed stage of late Acheulean transforming slowly into the next stage of culture viz. Middle Palaeolithic. Interestingly, all the hand axes are bifacially worked.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Hand axe types</th>
<th>Nos.</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cordiform</td>
<td>3</td>
<td>14%</td>
</tr>
<tr>
<td>2</td>
<td>Triangular</td>
<td>8</td>
<td>38%</td>
</tr>
<tr>
<td>3</td>
<td>Sub-triangulars</td>
<td>4</td>
<td>19%</td>
</tr>
<tr>
<td>4</td>
<td>Oval</td>
<td>6</td>
<td>29%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>21</td>
<td>100%</td>
</tr>
</tbody>
</table>

The above table indicates the dominance of the triangular shape followed by oval shape. These features are probably due to the use of rectangular flakes as is evident from the working noticed in the flake axes.
Table No. 14

Frequency of cross sections - Hand axes

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Cross section</th>
<th>No. of specimens</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Triangular</td>
<td>3</td>
<td>14%</td>
</tr>
<tr>
<td>2</td>
<td>Plano-convex</td>
<td>7</td>
<td>33%</td>
</tr>
<tr>
<td>3</td>
<td>Bi-convex</td>
<td>11</td>
<td>53%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>21</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table No. 15

Different rock material used: Hand axes

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>No. of specimens</th>
<th>Rock material</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14</td>
<td>Quartzite</td>
<td>66.66%</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>Quartz</td>
<td>28.57%</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Dyke</td>
<td>5.76%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>99.99%</td>
</tr>
</tbody>
</table>

Obviously hand axes of quartzite of brown and light brown colour are dominant. Use of dyke as raw material is a noteworthy feature.

Table No. 16

Metric analysis of Hand axe group

(a) Length

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Range in mm</th>
<th>No. of specimens</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>80 to 90</td>
<td>2</td>
<td>9.52%</td>
</tr>
<tr>
<td>2</td>
<td>90 to 100</td>
<td>8</td>
<td>38.10%</td>
</tr>
<tr>
<td>3</td>
<td>100 to 110</td>
<td>7</td>
<td>33.33%</td>
</tr>
<tr>
<td>4</td>
<td>110 to 120</td>
<td>2</td>
<td>9.52%</td>
</tr>
<tr>
<td>5</td>
<td>120 to 130</td>
<td>2</td>
<td>9.52%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>21</td>
<td>99.99%</td>
</tr>
</tbody>
</table>
The above analysis indicates the dominance of hand axes of 90 mm – 100 mm range closely followed by 100 mm – 110 mm range group. The maximum and minimum length being 130 mm and 90 mm respectively.

(b) Breadth

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Range in mm</th>
<th>No. of specimens</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60 to 70</td>
<td>4</td>
<td>19.05%</td>
</tr>
<tr>
<td>2</td>
<td>70 to 80</td>
<td>8</td>
<td>38.09%</td>
</tr>
<tr>
<td>3</td>
<td>80 to 90</td>
<td>4</td>
<td>19.05</td>
</tr>
<tr>
<td>4</td>
<td>90 to 100</td>
<td>3</td>
<td>14.28</td>
</tr>
<tr>
<td>5</td>
<td>100 to 110</td>
<td>2</td>
<td>9.52</td>
</tr>
</tbody>
</table>

The maximum and minimum breadth are 100 mm and 60 mm respectively. Obviously the second group of 70 mm to 80 mm dominate.

(c) Thickness

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Range in mm</th>
<th>No. of specimens</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20 to 30</td>
<td>4</td>
<td>19.04%</td>
</tr>
<tr>
<td>2</td>
<td>30 to 40</td>
<td>4</td>
<td>19.04%</td>
</tr>
<tr>
<td>3</td>
<td>40 to 50</td>
<td>6</td>
<td>28.58%</td>
</tr>
<tr>
<td>4</td>
<td>50 to 60</td>
<td>6</td>
<td>28.58%</td>
</tr>
<tr>
<td>5</td>
<td>60 to 70</td>
<td>1</td>
<td>4.76%</td>
</tr>
</tbody>
</table>

Two groups ranging between 40 mm to 60 mm dominate accounting for 57.15% of the entire group followed by 20 mm to 40 mm group accounting for 38.10%.
The metrical analysis of hand axes do not indicate preference for a particular type or size. This is obvious because tools are fashioned as per the requirement and depends more on the shape of the flake or the core as the case may be.

2. **Scrapers:** This is another major group in the assemblage constituting 28% of the total collection. These represent different sub types viz. (a) Side scraper (b) End scraper and (c) Round scraper. Most of the specimens are made on thick medium sized flakes. Step flaking in a few is a noticeable feature. Zigzag working edge indicates alternate flaking. Specimens with cortex and occurrence of levallois flake are other noteworthy features. Besides, prepared platform is also observed. Generally, these artefacts are rectangular in shape. However, few triangular specimens are also noticed. Brownish quartzite and pinkish-white quartz are the rock material used. These are classified into sub types on the basis of retouch observed along the working margins. Scrapers with bi-convex cross section account for 60% and the remaining 40% of the artefacts have triangular cross section.

(a) **Side scraper:** These are made on thick flakes and account for 35.29% of the total collection. In a few specimens shallow step flaking with numerous ridges is noteworthy. Working edges are retouched on both the dorsal and ventral sides of scrapers from Gedlahalli. While the working edge of scrapers from other sites are thin and straight attained by removing small flakes near the margin on side, broad flake scars and straight margins are also noticed. Some have prominent bulb of percussion. These are mostly rectangular in shape and thick at the centre. Some are made on levallois flake.

(b) **End scraper:** These are made on both thin and thick flakes and account for 35.29% of the collection. The working edge along the far end is retouched in a few specimens. Gedlahalli specimens are small.
and almost uniform in size. By and large, artefacts are thick at the centre and exhibit prominent mid ridge. Step flaking and prominent bulb of percussion are other noteworthy features.

(c) Round scraper: All the five artefacts are round in shape. These are made on medium sized flakes including a Levalloisian flake. The working margins are retouched from both the sides in some and in others either the dorsal or ventral side margins are retouched. Wavy cutting indicates alternate flakings.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Length</th>
<th>Breadth</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60 mm</td>
<td>53 mm</td>
<td>36 mm</td>
</tr>
<tr>
<td>2</td>
<td>66 mm</td>
<td>61 mm</td>
<td>20 mm</td>
</tr>
<tr>
<td>3</td>
<td>70 mm</td>
<td>60 mm</td>
<td>40 mm</td>
</tr>
<tr>
<td>4</td>
<td>70 mm</td>
<td>65 mm</td>
<td>40 mm</td>
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<tr>
<td>5</td>
<td>70 mm</td>
<td>55 mm</td>
<td>25 mm</td>
</tr>
<tr>
<td>6</td>
<td>70 mm</td>
<td>75 mm</td>
<td>25 mm</td>
</tr>
<tr>
<td>7</td>
<td>72 mm</td>
<td>64 mm</td>
<td>55 mm</td>
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<tr>
<td>8</td>
<td>80 mm</td>
<td>60 mm</td>
<td>25 mm</td>
</tr>
<tr>
<td>9</td>
<td>81 mm</td>
<td>67 mm</td>
<td>35 mm</td>
</tr>
<tr>
<td>10</td>
<td>85 mm</td>
<td>35 mm</td>
<td>15 mm</td>
</tr>
<tr>
<td>11</td>
<td>85 mm</td>
<td>60 mm</td>
<td>55 mm</td>
</tr>
<tr>
<td>12</td>
<td>89 mm</td>
<td>61 mm</td>
<td>28 mm</td>
</tr>
<tr>
<td>13</td>
<td>94 mm</td>
<td>73 mm</td>
<td>22 mm</td>
</tr>
<tr>
<td>14</td>
<td>96 mm</td>
<td>65 mm</td>
<td>40 mm</td>
</tr>
<tr>
<td>15</td>
<td>110 mm</td>
<td>65 mm</td>
<td>30 mm</td>
</tr>
<tr>
<td>16</td>
<td>115 mm</td>
<td>95 mm</td>
<td>40 mm</td>
</tr>
<tr>
<td>17</td>
<td>140 mm</td>
<td>70 mm</td>
<td>40 mm</td>
</tr>
</tbody>
</table>
The above analysis shows the longest of the tools measures 140 mm and the shortest one measures 60 mm. Lengthwise two groups are identified, (a) Tools ranging between 70–85 mm and (b) those ranging between 110–140 mm. The former is dominating with 64.44%.

The narrowest tool of this group measures 35 mm while the broadest measures 95 mm. However, the dominating group is that of the tools measuring between 55 mm to 75 mm accounting for 77.77% of the scraper collection. Thickness of scrapers vary between 15 mm and 55 mm. Two groups ranging between 15–25 mm and 30–40 mm account for 44.44% of the scraper collection.

No uniformity appears to exist between length, breadth and thickness. No set pattern is observed in distribution of sizes.

(d) Borer: There are four specimens in the assemblage and account for 7% of the collection. Two specimens are made on elongated flakes. Specimen from Gedlahalli is made on a thick flake. Pointed tip, backed side, prominent mid ridge obtained by removal of flakes at steep angles are some of the noticeable features. Deep notch along the margin to produce borer point is noteworthy. These are bifacially worked and one artefact has positive bulb of percussion. This type is not noticed in other regions of Malnad. Both quartz and quartzite have been used for fashioning tools. The maximum and minimum length, breadth and thickness measure 120 mm x 70 mm x 25 mm and 71 mm x 50 mm x 25 mm respectively.

(e) Discoid: These account for 10% of the total collection. Circular in shape, most of the specimens are made employing prepared core technique. Best examples are collected from Gedlahalli. Some have zigzag edge allround due to alternate flaking and others have symmetrical margin. Prepared platform and thick mid ridge are other noteworthy points. Core as well as flakes have been preferred. These
are bifacially worked and thick at the centre. Both quartz and quartzite are used as the rock material. The maximum length, breadth and thickness are 95 mm, 79 mm and 33 mm respectively.

(f) **Point**: These account for 9% of the total collection and are made on small to medium size flakes. Removal of long flakes at steep angle on the dorsal side in all the three specimens noticed at Nidaghatta resulting in prominent and almost straight mid-ridge is a noteworthy feature. In one specimen, tip is obtained by producing a notch near the top of right lateral side. Step flaking and working of bulb of percussion are other interesting features.

<table>
<thead>
<tr>
<th>Table No. 18</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Metrical analysis</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Length</th>
<th>Breadth</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>90 mm</td>
<td>50 mm</td>
<td>20 mm</td>
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<tr>
<td>2</td>
<td>88 mm</td>
<td>51 mm</td>
<td>22 mm</td>
</tr>
<tr>
<td>3</td>
<td>77 mm</td>
<td>46 mm</td>
<td>21 mm</td>
</tr>
<tr>
<td>4</td>
<td>75 mm</td>
<td>40 mm</td>
<td>20 mm</td>
</tr>
<tr>
<td>5</td>
<td>60 mm</td>
<td>40 mm</td>
<td>15 mm</td>
</tr>
</tbody>
</table>

The average length, breadth and thickness of points measure 78 mm, 45.5 mm and 19.6 mm respectively.

(g) **Cleaver** (2%): It is made on an indeterminate shaped flake of brownish Quartzite. It has bi-convex cross section and thin convex working edge. Left lateral side is straight while the right lateral side is slightly wavy due to alternate flaking. Step flaking on both the surfaces and measures 9 mm in length, 51 cm in breadth and 7 mm in thickness.
General observations: Lower Palaeolithic sites noticed in the eastern Maidan belt of central Malnad region are distinctly different from the other sites noticed in the northern Malnad along the main course of the Upper Tungabhadra both in terms of their locations as well as characteristics of tool types. While the artefacts in the main valley sites are large in size and fairly rolled (reasons for rolling has already been mentioned) the tool repertoire of the central Malnad region are fresh and few and in mint condition indicating their "in situ" condition. Quartzite is the chief rock material. Use of quartz of pinkish white variety and close grained dyke are also noteworthy.

Another characteristic feature of the Lower Palaeolithic assemblage of the Malnad region is the occurrence of scraper and points predominantly in a few sites particularly in the eastern belt of the central Malnad region characterised by typical topographical features. Other noteworthy types such as blades and even borers also occur particularly in sites where Late Acheulian phase is distinctly present. These elements seem to be the forerunner of the early stages of the Middle Palaeolithic culture when compared with the findings from Anagawadi (Pappu, 1974).

In the light of the above observations of the Lower Palaeolithic sites in the whole of Malnad (particularly the eastern belt), the one noticed at Gedlahalli deserves special mention, for, it is only in this site the tools have been found away from the river valley, in the vicinity of a lake, at the foot of a granite hill. A careful examination also revealed a dried up bed of a seasonal nullah leading to nearby lake situated about 1.5 Km north-west of the hillock. The surroundings of the site is covered with grass, shrubs and thorny bushes amidst low outcrops of granite, all indicative of the semi-arid ecological features. The very location seems to suggest the assemblage being primary site in the vicinity of a lake, only one of its kind so far noticed in Karnataka.
The tools noticed here are made on quartzite/quartz of inferior quality. What is noteworthy is that comparatively medium to small size thick fragments and occasionally flakes had been conveniently worked to the minimum to get the desired tool type. The method of flaking evidently indicates the employment of levalloisian technique liberally. The tool assemblage comprises of miniature hand axes of cordiform and triangular shapes, discoids, chopper, scrapers and points belonging to both core and flake tool groups.

Occurrence of site in the vicinity of lake is noteworthy since such sites have not been reported from other regions in Karnataka. Of course, Seshadri (1956), while commenting on the Palaeolithic tools from Kibbanahalli, opines that the tools in the area where now there is no nullah or river nearby, suggests the existence of a nullah at least in the past. Recently, Gururaja Rao and Shiva Rudrappa (1989) in the course of re-examination of this site, have postulated the possibility of existence of a lake. But now, actually there is no tank or lake nearby in the past. The discovery of Gedlahalli site evidently supports their view. Thus, there appear to be two Palaeolithic sites nearby lakes in Karnataka evident from the one in Chikmagalur area and other almost opposite to it near the eastern border of the State.

As already mentioned above, Songaon sites in the basins of Lake Victoria in Africa have yielded miniature hand axes, prepared cores and scrapers. Interestingly, similar types of tools are found in large number at Gedlahalli exhibiting levalloisian technique predominantly is noteworthy.

The lake side dwellers of Karnataka were essentially of Late Acheulian phase transforming into the Middle Palaeolithic. This is further corroborated by the Kibbanahalli evidence. Outside Karnataka, lake side site is reported from Andhra Pradesh at Guruvarajupalli at Remigunta (Murthy, 1981) where Middle Palaeolithic occupation is noticed on granitic surfaces.
Thus, the Lower Palaeolithic assemblage of the central Malnad noticed in the Maidan belt for a separate group by itself. Small percentage of pebble tools, appearance of large number of medium to small sized tools including miniature hand axes, more number of scraper groups, points, emergence of blade elements and preference of prepared core technique particularly at Gedlahalli are indicative of a transitional stage from the Late Acheulian to the early stages of Middle Palaeolithic culture. However, this tentative observation deserves further careful investigations on an inter-disciplinary basis.

LOWER PALAEOLITHIC SITES: THE TUNGA VALLEY

The Tunga: The river Tunga rises at a desolate spot known as Gangamula in the gloomy wilderness of the western ghats in Chikmagalur district. A stretch of 176 Kms of the river from its source till its confluence near Kudli was surveyed. Of this, about 15-20 Kms stretch between Mandagadde and Gajanur is submerged in the back waters of barrage built across the river. Extensive investigations carried out in the remaining portion of the valley revealed a few Lower Palaeolithic sites viz. Pilangere, Honnapura and Hariharapura. Besides, few doubtful specimens were also collected from the pebble bed at Sringeri. However, these have not been included in the present study.

Flora: The surroundings of the upper reaches of the Tunga from Gangamula and the lower reaches upto the Gajanur barrage are covered with southern tropical wet evergreen forests, semi-evergreen forests and southern moist-deciduous forests. Beyond Gajanur along the river course, southern tropical dry-deciduous forests and southern tropical thorn forests are seen. The species of the above forest groups include Hebbalasu (Artocarpus hirsutus, Lam), Ponne, Siruponne (Colophyllum elatum, Bedd), Gobbalanerlu, Nilimara (Bischofila javanica, Blume), Halmaddi (Litsea floribunda, Goonb), Bilimatti (Terminalia peniculata), Alalekayimara (Terminalia chebula, Retz), Saguvanu; Tadi (Tectona grandis, LF).
Fauna: The fauna is rich and varied. Cat, civet, mongoose, dog, bear, monkey, elephant, bison, antelope, rodent, wild boar of the mammal group; duck, eagle, hawk, kite, the jungle crow, tree pie, parakeet, patridge, pigeon, sparrow, wood pecker of the bird group; various types of snake, crocodile and lizard of the reptile group; frog, carp, cat fish, eel of the amphibian and fish group; are well represented in this region.

Stratigraphy: Intensive survey in this river valley revealed three Lower Palaeolithic sites at Hariharapura, Honnapura and Pilangere and two Middle Palaeolithic sites at Harakere and Hoisanahalli. Details of examination of the nearby cliff section in these sites are given below. Bed rock is overlain by gravel (cemented in two localities and loose in the remaining sites) varying in thickness from 60 cm to 1 m. Over this rests sandy silt section brown or whitish in colour varying in height from 3 m to 10 m. The two cemented pebble beds at Hariharapura and Honnapura measure 20 m x 20 m. No artefact could be picked up from these beds. However, loose beds in the vicinity yield artefacts.

Similar sections in the upper reaches is noticed in localities such as Umblikere, Horabailu, Nemmar, Sringeri, Kavadi, Madagimana but devoid of pre-historic artefacts. The sections are composed of 0.60 m to 1 m thick gravel (of loose pebbles varying in dimension) over which rests sandy silt of 1 m to 5 m height. Sections are slopy and thick forest borders the sections. From Madagimana up to Mandagadde, the sections are of whitish sandy silt of 4-5 m height covered with patches of thick forest. From Gajanur up to Kudli where the river joins the Bhadra, cliff sections exhibit uniform feature. Over the bed rock is seen reddish silt deposit varying in height from 3 m to 10 m. In this stretch of the river, few loose pebble beds noticed at Harakere, Pilangere and Hoisanahalli are composed of quazite pebbles of varying dimension coated with a thin layer of brownish patina. The
largest pebble beds are noticed at Hariharapura and Honnapura measuring on an average 250 m north-south x 50 m east-west. Occurrence of oyster shell near the cemented gravel at Hariharapura is noteworthy (vide appendix no. ). Couple of Mesolithic sites and Neolithic habitation sites also occur near the Lower Palaeolithic sites, a feature already observed in the Upper Tungabhadra valley indicating continuation of human habitation.

From the above survey, the following stratigraphy is reconstructed (from top to bottom).

a) White or red silt (mixed with fine sand)
   1 m to 10 m in height,

b) Loose pebbly gravel (cemented gravel in two localities).

c) Bed rock (schist-gneiss).

Environment: Environmental condition of the Lower Palaeolithic sites in the region are varied. All sites are found in the river bed under two different geographical limits. Occurrence of a solitary site amidst thick forest indicate that the Palaeolithic man occasionally ventured to live in rugged terrains of the region because most of the sites occur in the lower reaches characterised by less rain fall, shallow waters in the river and semi-deciduous forests. This is a common feature in the region under study.

Rock material: Quartzite is the most favoured rock material. It is brownish and close grained. Thin layer of blackish patina on them is noteworthy.

The Lower Palaeoliths: The Lower Palaeolithic artefacts retrieved from the loose pebbly gravel at Honnapura and Pilangere have been discussed below. A lone hand axe from Hariharapura site has not been included in the analysis.
Table No. 19

Typological distribution of Artefacts

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Tool Type</th>
<th>Honnapura</th>
<th>Pilangere</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chopper</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Hand axe</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Discoid</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Cleaver</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Scraper</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
</tbody>
</table>

On typo-technological basis, these are further divided into the following three groups.

Table No. 20

Core and Flake groups

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Group</th>
<th>Tool Type</th>
<th>No.</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pebble tool</td>
<td>Chopper</td>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td>2</td>
<td>Core tool</td>
<td>Hand axe</td>
<td>4</td>
<td>40%</td>
</tr>
<tr>
<td>3</td>
<td>Flake tool</td>
<td>Hand axe</td>
<td>5</td>
<td>50%</td>
</tr>
</tbody>
</table>

Pebble tool group: Unifacial chopper accounts for 10% of the total collection. The lone specimen having a thin coat of blackish patina is flaked from one direction. Numerous shallow step flake scars indicate advanced technique. The specimen having convex cutting edge is fashioned on a roundish quartzite pebble measuring 70 cm x 25 cm x 8 cm.
Core tool group: Two types of tools belong to this category: (1) Hand axes and (2) Discoids.

Hand axe (40%): As already noticed, these, fashioned on quartzite pebbles, are bifacially worked. Mid rib is prominent in one while the other one is flat on both the sides. Tip is pointed and both have wavy periphery attained by alternate flaking. Artefacts are rolled and have biconvex cross section indicating Acheulian characters.

Discoid (20%): One each from the two sites were picked. Both are made on pebbles of medium size. Bifacially worked, having four to six flake scars and the zigzag outline suggests the use of alternate flaking. The artefacts are in semi-rolled condition. Shape is almost sub-triangular, thick at the centre.

Flake tool group: This category comprising three tool types, viz. (a) Hand axe, (b) Cleaver and (c) Scrapers, constitute 50% of the total collection. All the five specimens made on flakes detached from large pebbles were picked up from the loose pebbly gravel bed.

(a) Hand axe: These are fashioned on slightly thicker flakes, constituting 30% of the total collection. Two are of medium size and the third one is comparatively big. These are bifacially worked and exhibit 4 - 6 shallow flake scars. Mid rib is prominent. Two specimens exhibit pointed tip. One is beak like. The tip is achieved by removing a flake at steep angle near the top. Two specimens exhibit faceted platform. Bulb of percussion is prominent. Outline is wavy in two specimens while the third one is fairly straight. Artefacts devoid of secondary retouch indicate the early Acheulian character. Two are triangular and the third one is oval in shape. Stone hammer technique seems to have been employed for fashioning these artefacts made on quartzite.
(b) Cleaver: The solitary cleaver made on a side flake has two faceted platforms. It is roughly 'U' shaped. Profile on both the sides is straight. Working on the surface is limited. Butt end has been achieved by removing two large flakes at steep angle on either side. No retouching. Biconvex section at the middle. Blackish patina is noteworthy. Stone hammer technique seems to have been employed to fashion the tool made on Quartzite.

(c) Scraper: The lone scraper almost triangular in shape is made on a primary flake. Its left lateral side is curved so as to form a beak like tip, a rare feature found in this region. The working end is thin. 3-4 flake scars are distinctly visible on the dorsal side. Its maximum length is 130 mm.

Table No. 21

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Length</th>
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<th>Thickness</th>
</tr>
</thead>
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<td>1</td>
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</tr>
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<td>100 mm</td>
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</tr>
<tr>
<td>4</td>
<td>110 mm</td>
<td>77 mm</td>
<td>45 mm</td>
</tr>
<tr>
<td>5</td>
<td>140 mm</td>
<td>95 mm</td>
<td>30 mm</td>
</tr>
</tbody>
</table>

As can be seen from the above analysis, artefacts ranging between 100 mm - 110 mm account for 60% maximum being 140 mm. Breadthwise also, specimens ranging between 70 - 80 mm dominate with 80%, maximum breadth being 95 mm. Thicknesswise, 60% of the specimens ranging between 40 mm - 45 mm dominate.
As the percentage of artefacts are very meagre, it is difficult to ascertain the standard pattern adopted for manufacturing hand axes in the Tunga valley. Further work in this field may throw more light on this aspect.

**General observations:** Lower Palaeolithic industry of the Tunga valley is represented by all the known tool types of this culture. The number of artefacts, though limited, suggest the presence of pre-historic people in the region. The artefacts picked up from the loose pebbly gravel bed exhibit an admixture of pebble tool and hand axe-cleaver groups. Pebble tool group is represented by only unifacial chopper. Majority of the hand axes made on flake have pointed tip. Hand axe with beaked projection or tip is a noteworthy feature common to the sites in the region under study. Occurrence of cleaver is important as this type is not found in the adjacent Upper Tungabhadra and Bhadra valleys. Discoids and scrapers also occur. From the point of view of flaking technique employed for fashioning the tools, the entire assemblage can be associated with middle Acheulian stage. Quartzite is the most favoured rock material.

In the absence of evidences supporting the location of factory sites in the vicinity of gravel beds or in the surrounding area away from the river bed, it may be presumably concluded that the exposed pebble beds were used for fashioning tools as and when required.

**LOWER PALAEOLITHIC SITES : THE BHADRA VALLEY**

**The Bhadra:** The river Bhadra rises in the western ghats at Gangamula and changes its direction frequently. It forms the main water shed of the central and eastern limits of Chikmagalur and Shimoga districts respectively. Investigations in 155 Kms stretch of the river revealed Palaeolithic sites at Kagganahalla, Balehonnur, Khandya,
Shankaraghatta, Sompura, Sidhilipura, Dodgopenahalli, Barandur; Mesolithic sites at Bommanakatte, Kagikodumagge, Dasara Kallahalli and a Neolithic site at Mattighatta. Cliff sections of the river were also examined at regular points to ascertain the stratigraphy. About 50 Kms stretch of the river could not be surveyed as it is submerged in the back waters of the dam built across the river at Lakkavalli.

Flora: The upper reaches of the Bhadra river is covered with evergreen forests. Nilimara (Bischofia javanica Bl.), Kaidhupa (canarium strictum Roxb.), N Burm (Mesua nagassarium) are some of the important species. The region in the middle course of the river accommodates wet deciduous and semi-evergreen forests. Bilimatti (Terminalia peniculata), Nauladi (Vitex altissima L.F.), Haldina (Cordifolia Roxb) are some of the useful trees. In the lower reaches from Lakkavalli down upto Kudli, the region falls under dry deciduous and thorn scrub belt. Alale (Terminalia chebula Retz.), Tare (Terminalia bellerica, Roxb.), Saguvam (Tectona grandis, Linn.F.) are some of the common trees in the region. In the Lakkavalli region, extensive bamboo brakes is also seen. Deciduous trees are replaced by thorny trees and shrubs as the area becomes drier in the lower course of the river.

Fauna: On account of varied forest belt, the fauna of the region is very rich. Tiger, leopard of the cat family, civet, mongoose, hyena, members of the dog family, bear, otter, bat, elephant, bison, deer family, rodent, boar, Indian pangolin of the mammal group; heron, stork, duck, teal, eagle, hawk, kite, owl, tree pie, jungle crow, tít, parakeet, pigeon, patridge, sparrow, wild dove, cuckoo, bulbul of the bird group; snake, lizard, crocodile of the reptile group; varieties of frog of the amphibian group; carp, cat fish, murrel, eel of the fish group and other domestic animals are well represented in this region.
Stratigraphy: As already mentioned above, except for about 50 km stretch of the river submerged in the back waters of the Lakkavalli dam; the remaining stretch from its source upto Hebbe and the area between Lakkavalli and Kudli where it merges with the Tunga; cliff sections revealing the following stratigraphy were examined.

In the Palaeolithic sites at Kagganahalla, Balehonnur, Sompura, Sidhlipura, Dodgopenahalli and Barandur, the cliff sections composed of loose pebbly gravel of 60 cms to 1 m thickness, probably resting on bed rock, overimposed by a thick deposit of silt of white or brown to reddish in colour varying in height from 2 m to 10 m were noticed. Similar stratigraphy in the upper course is observed in the sections at Ambatirtha, Kalasa, Bannur, etc but devoid of pre-historic tools. The largest pebble bed in the region at Bannur measures 100 m north-south x 20 m east-west. In the upstream where the river traverses through typical Maland belt, the river sections are covered by thick forest and in the Maidan area, deciduous Savana like features are noticeable.

Environment: Palaeolithic sites in the region under study occur in two distinctly different geographic situations. Pebble tools of Acheulean character retrieved from Kagganahalla, pebble bed in the upper reaches situated amidst the thick forested area and rugged terrain of western ghats with heavy rain fall may indicate that Palaeolithic people also preferred to live under tuff conditions. But this seems to be a solitary case since most of the sites in the region are located in the lower reaches where the shallow river and Savana type vegetation offered congenial condition for living. In the adjacent river valleys also, sites are found in similar geographical conditions.

The Lower Palaeoliths: Explorations conducted in the Bhadra Basin, from its origin till its confluence with the Tunga at Kudli, revealed as many as seven sites having Lower Palaeolithic appendage distributed at various points. A solitary site situated at a higher level about 2 Km away from the river bed has also been included along with the above mentioned seven sites for discussions in the following pages (Table 22).
Table No. 22

Typological distribution and frequency of Lower Palaeolithic tools in the Bhadra valley

<table>
<thead>
<tr>
<th>Sites</th>
<th>Barandur</th>
<th>Dodgopenahalli</th>
<th>Sidhlipura</th>
<th>Sompura</th>
<th>Shankaraghatta</th>
<th>Balehomur</th>
<th>Khandya</th>
<th>Kagganahalla</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool types</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unifacial Chopper</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Bifacial Chopper</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Hand axe on core</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Hand axe on flake</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Scraper on core</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Scraper on flake</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Discoid</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total percentage</td>
<td>23%</td>
<td>19%</td>
<td>23%</td>
<td>7%</td>
<td>7%</td>
<td>7%</td>
<td>7%</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

As usual, the Lower Palaeolithic assemblage in the Bhadra valley is also characterised by pebble, core and flake tools. The pebble group includes unifacially and bifacially worked choppers. These were picked up from four sites, namely, (1) Kagganahalla, (2) Sidhlipura, (3) Dodgopenahalli and (4) Barandur.

Pebble tools constitute 14.81% of the total collection. The four artefacts of this group comprises of two unifacial choppers having flake scars on one side made on trap quartzite and two bifacial choppers with working on both the sides both made on quartzite.
Specimens from Kagganahalla, Dodgopenahalli and Barandur are fresh and have clear flake scars, exhibiting *in situ* condition. The fourth specimen from Sidhipura is slightly rolled probably due to movement within the pebble bed particularly during heavy floods.

### Table No. 23

**Site-wise occurrence of Pebble tools in the Bhadra valley**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Site</th>
<th>Tool type</th>
<th>Rock material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Barandur</td>
<td>Unifacial chopper</td>
<td>Quartzite(Brownish)</td>
</tr>
<tr>
<td>2</td>
<td>Dodgopenahalli</td>
<td>Bifacial chopper</td>
<td>-do-</td>
</tr>
<tr>
<td>3</td>
<td>Sidhipura</td>
<td>-do-</td>
<td>-do-</td>
</tr>
<tr>
<td>4</td>
<td>Kagganahalla</td>
<td>Unifacial chopper</td>
<td>Trap</td>
</tr>
</tbody>
</table>

Shallow flaking confined to both the ends are directed from base upwards, resulting in scar dipping at steeper angles varying from 60° to 80°. Cortex is retained. Symmetrical convex working edge and biconvex cross section are seen. Semi-fresh; one artefact has a pointed tip.

### Table No. 24

**Metrical analysis of Pebble tools**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Length</th>
<th>Breadth</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>115 mm</td>
<td>89 mm</td>
<td>40 mm</td>
</tr>
<tr>
<td>2</td>
<td>105 mm</td>
<td>90 mm</td>
<td>45 mm</td>
</tr>
<tr>
<td>3</td>
<td>95 mm</td>
<td>85 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>4</td>
<td>100 mm</td>
<td>95 mm</td>
<td>50 mm</td>
</tr>
</tbody>
</table>

All the artefacts are proportionate to one another in measurement indicating uniformity in size.
Core and flake industries: Tool types of this group in the Bhadra valley comprises of hand axes, scrapers (with sub-types) and discoids. No cleaver could be picked up from the sites.

Hand axes constitute the major portion of the assemblage with 48.15% of the total collection. Of these, 61.46% are made on core and 38.46% are made on flake. The common shapes met with are as follows:

Table No. 25

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Shape</th>
<th>Total No.</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Triangular</td>
<td>4</td>
<td>31%</td>
</tr>
<tr>
<td>2</td>
<td>Oval</td>
<td>4</td>
<td>31%</td>
</tr>
<tr>
<td>3</td>
<td>Pear shaped</td>
<td>3</td>
<td>23%</td>
</tr>
<tr>
<td>4</td>
<td>Almond</td>
<td>2</td>
<td>15%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>13</td>
<td>100%</td>
</tr>
</tbody>
</table>

Hand axe on core: In this group, eight hand axes are made on pebbles of medium size. Of these, four exhibit cortex partially or fully on one side and the remaining four are fully flaked. Though semi-rolled, flake scars on them detached at steep angle of 60° to 80° are still clearly visible. Deep flaking and zigzag working edge in artefacts from Sompura exhibit abbevelian features. However, remaining types from sites such as Dodgopenahalli and Shankaraghatta have symmetrical edge. Thin pointed tip in them is noteworthy. Hand axe from Barandur has prominent negative bulb of percussion. The specimens of different forms are thick at the middle.

Hand axe on flake: Hand axes of this category 18.51% of the total collection) are made on large flakes detached from pebbles. These are bifacially worked and are in semi-rolled condition. Triangular and
pear shaped Hand axes are commonly met with. Hand axes are characterised by shallow flake scars, symmetrical working edge and step flaking. Deliberate notch near the tip on the right ventral side is a noteworthy feature. Two artefacts have faceted platforms. Couple of artefacts are retouched marginally. All the artefacts have pointed tip. In fact, one Hand axe with beaked point resembles similar specimens reported from Kibbanahalli (Seshadri, 1956) and from Upper Krishna basin (Pappu, 1974). Notches near the lateral ends may also indicate hafting. Artefacts found in streams are more refined indicating late Acheulean characters. Hand axes with biconvex cross section are more preferred followed by triangular sectioned axes as is evident from the following table.

Table No. 26
Cross sections of Hand axes: Bhadra valley

<table>
<thead>
<tr>
<th>SI No.</th>
<th>Cross section</th>
<th>Nos.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plano-convex</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Bi-convex</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Triangular</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Trapezoidal</td>
<td>1</td>
</tr>
</tbody>
</table>
Table No. 27
Metrical analysis of Hand axe group

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Maximum Length</th>
<th>Maximum Breadth</th>
<th>Maximum Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>85 mm</td>
<td>55 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>2</td>
<td>90 mm</td>
<td>70 mm</td>
<td>25 mm</td>
</tr>
<tr>
<td>3</td>
<td>95 mm</td>
<td>70 mm</td>
<td>60 mm</td>
</tr>
<tr>
<td>4</td>
<td>105 mm</td>
<td>70 mm</td>
<td>45 mm</td>
</tr>
<tr>
<td>5</td>
<td>110 mm</td>
<td>75 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>6</td>
<td>110 mm</td>
<td>90 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>7</td>
<td>110 mm</td>
<td>90 mm</td>
<td>40 mm</td>
</tr>
<tr>
<td>8</td>
<td>115 mm</td>
<td>60 mm</td>
<td>30 mm</td>
</tr>
<tr>
<td>9</td>
<td>115 mm</td>
<td>80 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>10</td>
<td>120 mm</td>
<td>90 mm</td>
<td>35 mm</td>
</tr>
<tr>
<td>11</td>
<td>126 mm</td>
<td>95 mm</td>
<td>45 mm</td>
</tr>
<tr>
<td>12</td>
<td>145 mm</td>
<td>80 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>13</td>
<td>152 mm</td>
<td>80 mm</td>
<td>30 mm</td>
</tr>
</tbody>
</table>

Variation range is too great as it is evident from the above analysis. The smallest one measures 85 mm in length while the longest one measures 152 mm in length. In fact, the smallest hand axe is the most uncommon in the collection. Specimens ranging between 105 mm to 115 mm (6 Nos.) account for 46.15% of the total collection; followed by tools ranging between 120 mm to 152 mm (37.69%) numbering four. Remaining three specimens fall within the range of 85 mm to 95 mm accounting for 23.76% of the total collection.

Breadthwise, the narrowest is 55 mm and the broadest is 95 mm. However, tools ranging between 95-90 and 75-70 account for 4 Nos. each (37.69%) and the remaining five specimens fall in 80 mm (23.75%) and 55-60 mm (15.38%) ranges.
Variations ranging between 25 mm to 60 mm in the thickness is also noteworthy.

Technique: Stone hammer is the most common technique employed for fashioning tools. Secondary retouching of the working edge in some of the tools also indicate the use of cylindrical hammer technique. Specimen from Sompura exhibiting deep flake scars and the zigzag working end are devoid of secondary retouch work and indicate abbevelian feature. Artefacts from Shankaraghatta, though small in length, have all the characteristic features of advanced acheulian technique. The whole assemblage of the Bhadra valley on the basis of typo-technology can be attributed to abbevillio-acheulian to late acheulian.

Discoid: The solitary discoid made on quartzite flake is bifacially worked. Outline is zigzag exhibiting alternate flaking and thick at the centre. Semi-rolled.

Scraper: The scrapers retrieved from four sites are divided into two categories.

(a) Scrapers made on core (9.21%)
(b) Scrapers made on flakes (88.88%)

The lone specimen of the first category made on a thick quartzite flake is rather crude. 3 to 4 flake scars are seen on both the surfaces. Zigzag left margin indicates alternate flaking. Tip is pointed.

Scrapers made on flakes account for 88.88% of the total collection. The following sub-types on the basis of working are noticeable.
Table No. 28

Classification of scrapers

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Tool type</th>
<th>Total No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Side scraper</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Side scraper cum point</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Double sided scraper</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Double sided scraper cum point</td>
<td>1</td>
</tr>
</tbody>
</table>

Among the eight scrapers, six are bifacially worked and the remaining are worked on one side. None of the artefacts exhibits retouching of margins. Faceted platform is observed in a couple of scrapers. Occurrence of levalloisian flakes with prominent bulb of percussion is noteworthy. Double sided scrapers have thick mid-rib. Few scrapers having pointed tip is another important feature. Triangular, oval and rectangular are the common shapes met with. 77.77% of the scrapers have triangular cross section and 22.22% have bi-convex section. Scrapers made on quartzite are fashioned using stone hammer and levalloisian techniques.

Table No. 29

Metrical analysis of scraper group

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Length</th>
<th>Breadth</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>80 mm</td>
<td>40 mm</td>
<td>25 mm</td>
</tr>
<tr>
<td>2</td>
<td>81 mm</td>
<td>70 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>3</td>
<td>85 mm</td>
<td>65 mm</td>
<td>30 mm</td>
</tr>
<tr>
<td>4</td>
<td>95 mm</td>
<td>65 mm</td>
<td>28 mm</td>
</tr>
<tr>
<td>5</td>
<td>100 mm</td>
<td>55 mm</td>
<td>40 mm</td>
</tr>
<tr>
<td>6</td>
<td>100 mm</td>
<td>70 mm</td>
<td>20 mm</td>
</tr>
<tr>
<td>7</td>
<td>100 mm</td>
<td>80 mm</td>
<td>30 mm</td>
</tr>
<tr>
<td>8</td>
<td>115 mm</td>
<td>80 mm</td>
<td>30 mm</td>
</tr>
<tr>
<td>9</td>
<td>115 mm</td>
<td>80 mm</td>
<td>55 mm</td>
</tr>
</tbody>
</table>
It is evident from the above table that lengthwise, specimens ranging between 100 mm - 115 mm (55.55%) dominate followed by those ranging between 80 mm - 95 mm (44.44%) Breadthwise, artefacts ranging between 65 mm - 75 mm with 55.55% dominate followed by 40 mm - 55 mm range. Thicknesswise, scrapers ranging between 30 mm - 40 mm (44.44%) are the dominant group. The minimum and maximum thickness is 20 mm and 55 mm respectively.

General observations: Intensive survey of the Bhadra valley has revealed moderate number of Lower Palaeolithic sites. As already mentioned above, the river Bhadra travels both in the Malnad and Maidan belts of the region. Interestingly, sites are located in different geographical settings in the valley. The percentage of artefacts in these sites is limited. However, all important types such as pebble choppers, hand axes, scrapers occur. Absence of cleaver in the group is noteworthy. Majority of the artefacts are made on river borne quartzite pebble, available in plenty in the river bed. However, pebble tools made on volcanic trap noticed at Kagganahalli in the Upper Bhadra valley deserve attention for, this is the only site in southern Karnataka where use of volcanic rock is reported. Although artefacts (hand axes) from Sompura exhibit abbevelian feature both in type as well as technology, other tool repertoire reported from different sites show the employment of advanced acheulian technique. Occurrence of levalloisian flakes is also noteworthy. Hand axes having pointed tips as well as notches in the lateral margins probably for hafting deserve attention.

Thus, it is clear from the above features that the site noticed in this valley are similar to adjacent valleys both in their geographical distribution pattern as well as in typo-technological aspects of the culture.
LOWER PALAEOLITHIC SITES: THE HEMAVATI VALLEY

The Hemavati: Hemavati, also called Yennehole, is one of the major tributaries of the river Kaveri. It rises at Devanasi hills (1090 m MSL) in the western ghats in Mudigere taluk of Chikmagalur district and flows to a distance of 200 Kms before joining Kaveri near Krishnarajasagara. Intensive archaeological survey conducted in about 110 Kms stretch in two districts of Chikmagalur and Hassan revealed Lower Palaeolithic, Middle Palaeolithic, Mesolithic and Megalithic sites. About 50 Kms stretch between Gorur and Sakleshpura, submerged in the back waters of Gorur dam across the Hemavati could not be included in the survey.

Flora: The region in the upper reaches of the river accommodates tropical evergreen forests. Hebbalasu (Artocarpus hirsu Lam.), Dhuma (Dipterocarpus indicus Bedd), Balpale (Lophopetalum wightianum Arn), Halmaddi (Litsea floribunda Gamb) are some of the common trees. The middle course of the region has semi-evergreen and wet deciduous forests with Aduva (Celtis tetrandra Roxb), Miarole; Neraladimara (vitex altissima L.F.) and other types of trees. In the eastern limits of the river course, the region has dry deciduous and thorn scrub forests. Saguvam; Jadi (Tectona grandis L.F.), Shantimara (Terminalia billerica [Gaertn.] Roxb.), Gandha; Srigandha (Santalum album 2.), Honne (Pterocarpus marsupium Roxb) are some of the trees commonly met with in the region. Besides, the region is infested with interested aquatic flora also.

Fauna: The fauna of the region is rich and varied on account of the three forest types, namely, tropical semi-evergreen, tropical moist and sub-tropical wet forests. The mammal group is well represented by ciret, mongoose, dog, bear, deer, otter, antelope, etc. The bird group is represented by about two hundred and fifty species. These include birds of prey, migratory nature and perching birds. Other bird types include parrot, king fisher, hornbill, wood pecker, etc. Among the reptile group, there are as many as thirtyfive species of snakes.
Stratigraphy: In the upper reaches, almost near the source, occurrence of a Lower Palaeolithic site is noteworthy. In the lower reaches, Lower Palaeolithic artefact could be picked up only at Kattebelguli which incidentally is also a prolific Middle Palaeolithic site. Down stream from Kattebelguli, two Middle Palaeolithic sites at Kattehosalli and Cholenahalli and two Mesolithic sites at Mudalahippe and Maranayakanahalli occur right on the river bank, a feature uncommon in other valleys of the region under study.

Two distinct stratigraphy is observed in these sites. At Kattebelguli, bed rock (Holenarasipur Gneiss?) is overlain by cemented pebble bed of 0.90 cm height over which rests a 25 cm thick brownish clay which in turn is superimposed by a loose kankarised gravel bed of 0.70 m height. Above this gravel is 2 m thick sandy brownish silt. Though similar stratigraphy is noticed at Kattehosalli about 3 Kms down stream from Kattebelguli, the thickness of deposits vary considerably. The stratigraphy of the sections in the second group of sites at Holenarsipur, Cholenahalli, Mudalahippe and Maranayakanahalli are almost uniform. Over the bed rock is loose pebbly ravel of 60 cm to 90 cm thickness on which rests 40 cm to 80 cm thick sand deposit which in turn is overlain by 2 - 4 m thick brownish silt. However, the above stratigraphy is conspicuously absent in Bankal and Ramagattu where over the bed rock is 60 cm to 90 cm thick pebbly gravel which is covered by a 1 m to 2 m thick brownish Silt. In the upper reaches, most part of the river section is composed of 2 - 5 m thick whitish sandy silt. Cemented pebble bed is also observed at Nagaratti (in Hassan district limits) where the river enters the adjacent Mysore district.

From the above survey, the following two different stratigraphy is reconstructed (from top to bottom).
Environmental conditions seem to be almost similar to the conditions prevailed in the other valleys of the region under study. Occurrence of a lone Acheulian site in the thick forest known for heavy rain fall is noteworthy. The lower reaches of the valley characterised by semi-deciduous forests and shallow water seem to have favoured Palaeolithic and Mesolithic men since majority of the sites found are of these cultures.

Rock material: Lower Palaeoliths retrieved from Bankal pebble bed are made on quartz of brownish colour containing grains of white mica. This rock is probably derived from the quartz veins of schist belt in the region. A lone hand axe from Kattebelguli is made on quartz of brownish colour, a rare feature found in this valley.

The Lower Palaeoliths

As already mentioned above, the two Lower Palaeolithic sites noticed in the valley together yielded only 6 artefacts. The collection include choppers and hand axes. Typological distribution of the tools are given below in the table.

<table>
<thead>
<tr>
<th>Site</th>
<th>Chopper</th>
<th>Hand axe</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Bankal</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>b) Kattebelguli</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Typological distribution of artefacts
The assemblage may be divided into two groups as follows:

Table No. 31

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Artefact</th>
<th>Tool type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Core tools</td>
<td>Chopper 2</td>
<td>66.66%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hand axe 2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Flake tools</td>
<td>Hand axe 2</td>
<td>33.33%</td>
</tr>
</tbody>
</table>

Core tools: There are two types of artefacts, viz. (1) choppers and (2) hand axes.

Chopper: These are made on quartz pebbles of brown colour. Five to six step flake scars are found on both the dorsal and ventral sides besides the uneven butt and deep flake scars. Zigzag convex cutting edge with a tendency to have a pointed tip. Butt portion is uneven and both specimens exhibit deep flake scar. The semi-rolled condition is probably due to movement within the pebble bed.

Hand axe: Two hand axes in the assemblage are made on core. They account for 50% of core tool collection. Both the specimens are fashioned on quartz pebbles of pinkish white colour. Step flaking on both the surfaces; straight prominent mid-ridge, thick at the centre. One is cordiform and the other one is sub-triangular. The former has zigzag working edge due to alternate flaking while the latter exhibits secondary retouch near the periphery to obtain straight working edge. Cross section is biconvex; thin roundish tip is observed in one hand axe while the other has cleaver like thin cutting edge near the tip. Stone hammer technique, it seems, employed to fashion these artefacts found in semi-rolled condition.
Flake tools: This category is represented by two artefacts: (a) Ovate and (b) Double pointed oval shaped hand axe. Both the specimens are made on flakes detached from the thick sectioned flakes from quartz pebbles of brown and white colour respectively. These account for 33.33% of the total collection. Double pointed hand axe exhibit as many as three striking platforms indicating that it is made on a side flake. Mid ridge is semi-curved, periphery is wavy due to alternate flaking. Ovate hand axe exhibits large shallow flake scars and its under-surface is not worked at all. Periphery is made almost straight by retouching. Calcarious material is sticking to the specimen and the fresh condition suggests its 'in situ' deposition in the cemented bed. Both the artefacts indicate the employment of stone hammer and cylindrical hammer techniques.

Table No. 32

Metrical analysis of Hand axe group

Since the collection is very meagre, actual measurements have been given below:

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Maximum length</th>
<th>Maximum breadth</th>
<th>Maximum thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100 mm</td>
<td>100 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>2</td>
<td>125 mm</td>
<td>105 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>3</td>
<td>150 mm</td>
<td>80 mm</td>
<td>30 mm</td>
</tr>
<tr>
<td>4</td>
<td>165 mm</td>
<td>132 mm</td>
<td>50 mm</td>
</tr>
</tbody>
</table>

As can be seen from the measurements of the four specimens, there is no inter-relationship between length, breadth and thickness. Dimensions also indicate that the specimens are of medium size. The average length, breadth and thickness being 131.77 mm, 104 mm and 47.50 mm respectively.
General observations: Investigations in the Hemavati basin has thrown light on the pre-historic potentiality of the region. Lower Palaeolithic phase in the Hemavati valley is now known by the presence of chopper - hand axe industry. Location of the Lower Palaeolithic site almost near the origin of the river in the thick forest area is particularly noteworthy. All the specimens are from the gravel bed. In the chopper group, unifacial chopper is absent while in the flake tool group, except the hand axes, other tool types of the Lower Palaeolithic phase such as cleaver, scraper, discoid, etc. are not traced. However, their occurrence can not be ruled out.

All specimens exhibit step flaking. Some specimens exhibit alternate flaking while some are retouched along the periphery thereby indicating Acheulian character of the assemblage. Stone hammer and cylindrical hammer techniques have been employed liberally to fashion the tools.

Although specimens available in the collection are very meagre, they exhibit close similarity to the assemblages noticed elsewhere in the adjacent valleys of the same region. The double pointed hand axe is a rare type in the entire region. However, such types are reported from the Malaprabha basin in northern Karnataka (Joshi, 1956).

Detailed description of select tool types is given at the end of the chapter.

LOWER PALAEOLITHIC SITES: THE KAVERI VALLEY

The Kaveri: This principal river forms the southern most drainage system of the region under study. Rising in the western ghat in Coorg district, it flows in its eastward course beyond the borders of Coorg into Hassan district where it traverses for a distance of 30 Kms before entering the adjacent Mysore district. Investigations in this stretch of the river in Hassan district revealed Palaeolithic and Megalithic
sites scattered between Kaduvina Hosalli upto Keralapura.

Geologically, the region under study is of granitic complex although major portion of Hassan district is covered by schist.

**Flora:** The region subjected to investigation is covered by dry deciduous and thorny scrub forests. 'Alalekayamara, Hardekayamara (Terminalia chebula retz), Shantimara (Terminalia bellirica (Gaertn Roxb), Saguvani; Tadi (Tectona Grandis L.F), Bandre (Dodonaea viscosa Jocq) are some of the species of trees in the region. Besides, a rich aquatic flora and soft wood species are also found in the region. Rain fall in the region varies between 300 mm to 600 mm.

**Fauna:** Hyena, mongoose, cat, bear, deer, fox, jackal, bat and rodent of the mammal group; prey, eagle, hawk, buzzard, kite and vulture, pigeon, dove, patridge, fowl, bulbu, babbler, shrike of the bird group; snakes of various species of reptile group are well represented in the region under study.

**Stratigraphy:** Examination of sections in sites yielding Lower Palaeolithic sites at Konanur and Rudrapatna revealed the following sequence. Over the bed rock(?) is 60 - 90 cm thick loose pebbly gravel which is overlain by a thick deposit of brownish clayey silt varying in height from 1 m to 3 m. Similar sections devoid of lithic tools are seen at Kattepura, Basavanaballi and near Ramanathapura where cemented gravel bed of 60 cm to 90 cm is overlain by a thick brownish clayey silt deposit of 1 to 2 m height. In other sites, cliff sections are exclusively composed of brownish silt rising in height from 2 m to 4 m. The largest pebble bed in the entire stretch of 30 Km is noticed at Rudrapatna measuring about 100 m north-south x 300 m east-west.

The following sequence is reconstructed from top to bottom:

(a) Brownish silt  
(b) Loose pebbly gravel (cemented gravel in some localities but devoid of lithic artefacts)  
(c) Bed rock(?)
Environment: The environmental conditions does not seem to have been much different from the conditions that prevailed in the adjacent valleys in the region, viz. Hemavati, Bhadra, etc.

Rock material: Geologically the region under study falls within the Gneiss complex. Quartzite and jasper are the two types of rock material used for fashioning tools. Occurrence of tools of jasper is a rare feature observed in the region. It is brown in colour and contains micro-crystalline quartz. A unifacial chopper and a side scraper are made on this rock. Hand axes and other types of tools prepared on quartzite is also noteworthy.

The Lower Palaeoliths

Intensive survey of small stretch of 30 Km of Upper Kaveri basin in the Hassan district revealed two Lower Palaeolithic sites and a few Megalithic sites. Locations and other features of these sites have been described in the preceding chapter.

The Lower Palaeolithic tools belong to two groups, viz. (1) Core tools and (2) Flake tools as illustrated below.

Table No. 33

Typological distribution of Lower Palaeolithic tool types in the Upper Kaveri valley

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Tool type</th>
<th>Konanur</th>
<th>Rudrapatna</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chopper</td>
<td>-</td>
<td>1</td>
<td>Loose Pebby gravel bed</td>
</tr>
<tr>
<td>2</td>
<td>Hand axe</td>
<td>1</td>
<td>2</td>
<td>-do-</td>
</tr>
<tr>
<td>3</td>
<td>Discoid</td>
<td>1</td>
<td>-</td>
<td>-do-</td>
</tr>
<tr>
<td>4</td>
<td>Side Scraper</td>
<td>-</td>
<td>1</td>
<td>-do-</td>
</tr>
<tr>
<td>5</td>
<td>End Scraper</td>
<td>-</td>
<td>2</td>
<td>-do-</td>
</tr>
</tbody>
</table>

2 + 6 = 8
Table No. 34

**Distribution pattern of core and flake tools**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Tool type</th>
<th>Core</th>
<th>Flake</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chopper</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>2</td>
<td>Hand axe</td>
<td>-</td>
<td>3</td>
<td>3</td>
<td>37.5</td>
</tr>
<tr>
<td>3</td>
<td>Discoid</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>4</td>
<td>Side scraper</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>5</td>
<td>End scraper</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>25.0</td>
</tr>
</tbody>
</table>

As is evident from the above chart, flake tools account for 62.5% followed by core tools accounting for 37.5% of the total collection.

(1) Core tool group comprises of bifacial chopper, discoid and one end scraper.

**Chopper:** The lone chopper is made on a jasper pebble of medium size. The working end is achieved by alternate flaking, cortex portion is thick and roundish.

**Discoid:** It is worked bifacially on a medium size pebble. It is circular in shape. Working end is achieved by alternate flaking. Thick at the centre and fresh.

**End scraper:** End scraper is made on an irregular lump. Though rolled, thin and long flake scars are seen all over. Zigzag working end obtained by alternate flaking.
Table No. 34(a)

Metrical analysis of Core tool group

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Tool type</th>
<th>Maximum Length</th>
<th>Maximum Breadth</th>
<th>Maximum Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chopper</td>
<td>85 mm</td>
<td>70 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>2</td>
<td>Discoid</td>
<td>80 mm</td>
<td>75 mm</td>
<td>60 mm</td>
</tr>
<tr>
<td>3</td>
<td>End Scraper</td>
<td>85 mm</td>
<td>70 mm</td>
<td>50 mm</td>
</tr>
</tbody>
</table>

To understand the metrical character of these groups, further work in the region may be necessary.

(2) Flake tool group of the Upper Kaveri constitutes 62.5% of the total collection and comprises of two categories, namely (a) Hand axes and (b) Scrapers.

Hand axes made on thick flakes obtained from pebbles are of three forms viz. oval, pear and triangular. These are picked up from the loose pebble bed at Konamur and Rudrapatna. Two hand axes are bifacially worked and the third one is worked on the dorsal side. Flake scars vary in number from 5 to 8 on surface. Steps on these artefacts are due to the cleavage in the rock. Marginal retouch is limited. They are thick at the middle with prominent mid rib. Biconvex in cross section and have almost symmetrical periphery. A deliberate notch near the top on the right lateral side of the triangular hand axe appearing like a beak shaped projection is a noteworthy typological feature. Tip is retouched in the other two Hand axes.
Table No. 36(b)

**Metrical analysis of Hand axes**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Tool type</th>
<th>Maximum Length</th>
<th>Maximum Breadth</th>
<th>Maximum Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Oval shaped Hand axe</td>
<td>115 mm</td>
<td>85 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>2</td>
<td>Pear snaped Hand axe</td>
<td>130 mm</td>
<td>75 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>3</td>
<td>Triangular Hand axe</td>
<td>145 mm</td>
<td>105 mm</td>
<td>45 mm</td>
</tr>
</tbody>
</table>

As is evident, variation in length and breadth is noticeable while the thickness of the artefacts seem to be almost uniform. The average length, breadth and thickness measure 130 cms, 89 cms and 49 cms respectively.

**Scraper:** One is a side scraper and the other is an end scraper. Both are slightly rolled. Side scraper is fashioned on a thick Levalloisian flake. Flakes at steep angle have been detached from the left lateral side, has zigzag working end and faceted platform. It is rather thick at the centre and the mid rib is prominent.

End scraper made on a small flake has shallow bladish flake scars. Secondary retouch near the working end on the dorsal and ventral sides is noteworthy. It is almost circular in shape. Pebble cortex is retained on the ventral side.

Table No. 36(c)

**Maximum measurement of Scrapers**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Tool type</th>
<th>Length</th>
<th>Breadth</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Side Scraper</td>
<td>120 mm</td>
<td>90 mm</td>
<td>30 mm</td>
</tr>
<tr>
<td>2</td>
<td>End Scraper</td>
<td>75 mm</td>
<td>65 mm</td>
<td>25 mm</td>
</tr>
</tbody>
</table>
Technique: Shallow flake scars on the flake tools and the flaking marks on the solitary bifacial chopper indicate the use of stone hammer technique. Secondary retouch done on the oval shaped hand axe and end scrapers suggests employing of cylinder hammer technique. Couple of flakes exhibit the use of levalloisian technique also.

General observations: As already noticed, cleaver is absent in the tool repertoire of this valley also. Tools are bifacially worked. Hand axes constitute the major group (37.5%) followed by scrapers. Flakes show evidence of faceted platform. By and large, the flake assemblage exhibit improved skill of stone tool manufacture. Stone hammer and cylindrical hammer techniques used to detach flakes and for retouching respectively suggest that Upper Kaveri assemblage essentially belongs to the acheulian industry.
LOWER PALAEOOLITHIC TOOL TYPES

Figure I • Unifacial choppers

(1)
River valley: Bhadra Site: Barandur
Rock material: Quartzite Tool type: Unifacial chopper
Description: Medium sized, convex edge, oval in shape having flat base; pointed tip attained by removing shallow flakes on either side of the convex edge at the centre. Deep flake scars: Semi-circular butt. Measures 11.5 x 8.9 x 4 cm.
Comparable to: No. 8 of Fig. No. 13 of Anagawadi (Pappu, 1974).

(2)
River valley: Bhadra Site: Kagganahalla
Rock material: Volcanic trap Tool type: Unifacial chopper
Description: Made on almond shaped brownish pebble; convex working edge. Shallow flake scars inclined towards the edge. Flat butt. Semi-rolled. Measures 10 x 9.5 x 5 cm.
Comparable to: No. 9, Fig. 13, Upper Krishna (Pappu, 1974)
River valley : Tunga
Site: Pilangere
Rock material: Quartzite
Tool type: Unifacial chopper
Description: Made on a round bottomed pebble. Shallow flaking towards the working end on the dorsal side. Few steps are noticeable. Convex working end. Black patina on the cortex. Semi-rolled. Measures 8.5 x 10 x 4 cm.
Comparable to: No. 1, Fig. 20, Veddulacheruvu (Vidula Jayaswal, 1982).

River valley : Upper Tungabhadra
Site: Nyamti
Rock material: Quartzite
Tool type: Unifacial chopper
Description: It is made on a pebble with round bottom. Whitish cortex. Three deep and bold flakes removed on the dorsal side. Ventral side has uneven surface. Convex working edge. Inferior quality of the material resulting in uneven flaking and multiple fractures. Measures 9 cm x 7 cm x 5.5 cm.
Comparable to: No. 17, Fig. 32, Nagarjunakonda (Subramanyam, 1975).

Figure II: Bifacial choppers

River valley : Bhadra
Site: Dodgopenahalli
Rock material: Quartzite
Tool type: Bifacial chopper
Description: Medium sized, oval in shape and has convex edge. Broad shallow flake scars on both the sides. Dorsal side has protruded cortex and the ventral side is flat. Semi-circular, butt end. Measures 10.5 cm x 9 cm x 4.5 cm.
Comparable to: No. 14, Fig. No. 31, Nagarjunakonda (Subramanyam, 1975).
(6)
River valley: Upper Tungabhadra Site: Chikbasur
Rock material: Quartzite Tool type: Bifacial chopper
Description: Triangular shaped; protruded dorsal side. Flat ventral side. Zigzag working edge attained by removing three bold flakes on the dorsal side and two thin flakes from the ventral side. Narrow butt end. Measures 8 cm x 8.5 cm x 3.3 cm.
Comparable to: No. 2, Fig. 13, Anagawadi (Pappu, 1974).

(7)
River valley: Upper Tungabhadra Site: Sidhlipura
Rock material: Quartzite Tool type: Bifacial chopper
Description: Made on a thick ovalish pebble. Convex working margin with a pointed tip. Shallow flake scars on the dorsal and ventral sides. Round bottom, semi-rolled. Measures 10 cm x 8.9 cm x 5.3 cm.
Comparable to: No. 1, Fig. 21, Vadamadurai (Vidula Jayaswal, 1982).

(8)
River valley: Vedavati Site: Nidaghatta
Rock material: Quartzite Tool type: Bifacial chopper
Description: Medium sized, made on broken pebble; convex working edge, deep flake scars with patch of pebble cortex retained on both the sides. Uneven bottom due to deep flaking. Measures 11.5 x 8.5 x 7.5 cm
Comparable to: No. 25, Fig. 35, Nagarjunakonda (Subramanyam, 1975)
(9)
River valley: Hemavati
Site: Bankal
Rock material: Quartzite
Tool type: Bifacial chopper
Description: Made on a block; shallow step flake scars on both the sides. Zigzag convex edge achieved by alternate flaking. Thick at the centre, prominent ridge on one side. Thick uneven butt due to deep flaking. Semi-rolled. Measures 8.5 cm x 10 cm x 5 cm.
Comparable to: No. 13, Fig. 31, Nagarjunakonda (Subramanyam, 1975)

(10)
River valley: Vedavati
Site: Nidaghatta
Rock material: Quartzite
Tool type: Bifacial chopper
Description: Large sized; oval shaped; convex working edge achieved by removing deep flakes on both the sides. Thick at the centre. Patch of pebble cortex retained near the butt. Fresh.
Measures 14 cm x 10.5 cm x 8 cm.
Comparable to: No. 2, Fig. 37, Malaprabha (Joshi, 1955).

Figure III: Hand axes on core

(11)
River valley: Upper Tungabhadra
Site: Nyamti
Rock material: Quartzite
Tool type: Hand axe
Description: Medium sized, unfinished, made on oval shaped pebble. Shallow flaking on left half and upper portion on the dorsal side and half portion on the ventral side. Cortex retained in the remaining portions on both the sides. Tip retouched on the dorsal side. Fresh.
Measures 13 cm x 8 cm x 5.2 cm.
Comparable to: No. 22, Fig. 5, Giddalur (III) Soundararajan, 1952).
River valley: Upper Tungabhadra  Site: Nyamti
Rock material: Quartzite  Tool type: Hand axe
Description: Triangular shaped, having sharp pointed retouched tip, flaked upper and lower half; cortexed up to the butt. Protruded dorsal side and depressed ventral side. Fresh. Measures 12.5 cm x 7 cm x 7 cm.
Comparable to: KD 378 of Malaprabha (Joshi, 1955)

River valley: Upper Tungabhadra  Site: Nyamti
Rock material: Quartzite  Tool type: Hand axe
Description: Large sized and oval shaped. Both dorsal and ventral sides exhibit controlled step flaking. Prominent mid rib on the dorsal side. Round and thin tip. Symmetrical periphery. Thick at the centre and near the butt end. Fresh. Measures 20 cm x 11 cm x 8.36 cm.
Comparable to: No. 3, Plate VIII, Upper Krishna basin (Pappu, 1974).

River valley: Upper Tungabhadra  Site: Nagasamudra
Rock material: Quartzite  Tool type: Hand axe
Description: Roughly triangular shaped and heavy. Deep flaking of both the surfaces exhibits Abbivellian technique. Protruded dorsal side, zigzag working edge and the other margin is almost straight. Large flake removed near the butt seems to be a local feature. Rolled. Measures 17 cm x 12 cm x 8.8 cm.
Rare type.
(15)
River valley: Upper Tungabhadra  Site: Hadonahalli
Rock material: Quartzite  Tool type: Hand axe
Description: Cordiform type. Shallow flaking on both the dorsal and
ventral sides. Prominent mid rib on both the sides. Rounded tip.
Deliberate notches below the tip probably for hafting the tool. Zigzag
lateral sides. Rounded and broad thick butt. Rolled. Measures
13.5 cm x 10 cm x 7 cm.
Comparable to: (Roughly) No. 50, Fig. 8, Talapalle (Soundararajan, 1952)

(16)
River valley: Upper Tungabhadra  Site: Nagasamudra
Rock material: Quartzite  Tool type: Hand axe
Description: Roughly triangular shaped; medium sized. Shallow flake
scars on both the sides. Small patch of cortex retained on the dorsal
side. Zigzag working edge due to alternate flaking. Notch near the
tip obtained by shallow flaking. Flaked butt. Heavily rolled.
Measures 9.5 cm x 8 cm x 5 cm.
Comparable to: No. 8 of Plate No. VIII, Lingadahalli (Seshadri, 1956).

(17)
River valley: Upper Tungabhadra  Site: Nagasamudra
Rock material: Quartzite  Tool type: Hand axe
Description: Oval shaped; made on brownish pebble. Uneven dorsal side.
Alternate flaking to obtain zigzag working end on one side. Tip almost
round and thin. Shallow flake scars near the butt. Rolled. Measures
15 cm x 9 cm x 5 cm.
Comparable to: No. 10 of Plate VIII, Lingadahalli (Seshadri, 1956)
(18)
River valley: Upper Tungabhadra Site: Nagasamudra
Rock material: Quartzite Tool type: Hand axe
Description: Oval shaped; cordiform type, small in size. Shallow flaking on the ventral side. Flakes removed alternatively from lateral margin. Flaked and thick butt. Rounded tip. Heavily rolled. Measures 11 cm x 8 cm x 8 cm.
Comparable to: MNI 59 of Malaprabha (Joshi, 1955).

(19)
River valley: Kumudvati Site: Sudur
Rock material: Quartzite Tool type: Hand axe
Description: Oval shaped, made on brownish pebble. Shallow flaking on the dorsal side; prominent mid ridge. Patch of pebble cortex on the ventral side. Symmetrical edges. Thick at the centre. Heavily rolled. Measures 10.5 cm x 7.5 cm x 4.9 cm.
Comparable to: No. 29, Fig. 23, Nagarjunakonda (Subramanyam, 1975).

(20)
River valley: Bhadra Site: Dodgopenahalli
Rock material: Quartzite Tool type: Hand axe
Description: Pear-shaped; made on brownish pebble. Deep flake scars distinctly visible on both the sides. Prominent mid ridge. Working edge slightly zigzag. Tip attained by removing small flakes at the top. Deliberate notches on the lateral sides for hafting? Slightly rolled. Measures 14.5 cm x 8 cm x 5 cm.
Comparable to: No. 5, Fig. No. 16, Upper Krishna basin (Pappu, 1974).
(21)
River valley: Bhadra    Site: Sompura
Rock material: Quartzite   Tool type: Hand axe
Comparable to: No.4, Fig. 14, Upper Krishna basin (Pappu, 1975).

(22)
River valley: Tunga    Site: Pilangere
Rock material: Quartzite   Tool type: Hand axe
Description: Triangular shaped. Made on a brownish pebble. Shallow flaking on both the surfaces. Prominent protrusion near the butt on the dorsal side. Ventral side has prominent rib. Zigzag periphery due to alternate flaking. Beaked tip due to notch in the right side margin. Worked butt end. Rolled. Measures 10.5 cm x 7 cm x 5 cm.
Comparable to: No. 6, Fig. 2, Giddalur I (Soundararajan, 1952).

(23)
River valley: Hemavati    Site: Bankal
Rock material: Quartz   Tool type: Hand axe
Description: Sub-triangular shaped, made on a thick white pinkish core. Shallow flake scars on the dorsal side. A flake removed at 40° angle on the ventral side to achieve a thin working edge near the round tip. Deep flake scar near the butt on the ventral side; thick at the centre. Retouched straight periphery; bi-convex section. Uneven butt. Semi-rolled. Measures 10 cm x 10 cm x 5 cm.
Comparable to: No. 1, fig. 21, Nagarjunakonda (Subramanyam, 1975).
(24)
River valley: Hemavati  Site: Bankal
Rock material: Quartz  Tool type: Hand axe
Description: Cordiform hand axe made on a light pinkish pebble. Shallow flaking of the dorsal side. Prominent mid-ridge, deep flake removed near the top on the ventral side to achieve a thin round tip. Zigzag periphery; bi-convex cross section, uneven butt end. Semi rolled. Measures 12.5 cm x 10.5 cm x 6 cm.
Comparable to: No. 4, Fig. 21, Malaprabha basin (Joshi, 1955)
No. 29, Fig. 23, Nagarjunakonda (Subramanyam, 1975)

(25)
River valley: Upper Tungabhadra  Site: Hadonahalli
Rock material: Quartzite  Tool type: Hand axe
Description: Irregular triangular shaped; made on a thick end flake, zigzag left lateral margin. Thick right lateral margin due to removal of flake at 90° angle. Shallow flake scars on both the sides. Prominent mid rib on the dorsal side. Uneven butt end. Semi rolled. Measures 12 cm x 9 cm x 5 cm.
Comparable to: No. 21, Fig. 5, Giddalur (Soundararajan, 1952)

(26)
River valley: Upper Tungabhadra  Site: Chikbasur
Rock material: Quartzite  Tool type: Hand axe
Description: Made on a thick end flake almost transverse in shape. Shallow flake scars on the dorsal surface. Retouched left margin on the ventral surface near the tip. Semi rolled. Measures 10 cm x 8 cm x 4 cm.
Comparable to: No. 9, Plate IX, Talya (Seshadri, 1956).
(27)
River valley: Kumudvati Site: Sudur
Rock material: Quartzite Tool type: Hand axe
Description: Roughly oval shaped having double point made on a thick brownish flake. Prominent mid ridge. Shallow step flake scars on the dorsal side. Point attained by removing a deep flake from the lateral sides at both the ends. Cortexed ventral side. Wavy working edge around. Thick at the centre. Semi rolled. Measures 13 cm x 9.5 cm x 4.5 cm.
Comparable to: No. 1, Fig. 19, Malaprabha basin (Joshi, 1955)
No. 5, Fig. 14, Upper Krishna basin (Pappu, 1974)

(28)
River valley: Upper Tungabhadra Site: Nagasamudra
Rock material: Quartzite Tool type: Hand axe
Description: Sub-triangular shaped; made on a thick flake. Shallow flake scars visible on the dorsal side. Thin flake scars on the ventral side and pebble cortex. Prominent mid rib. Zigzag working end on one side. Pointed tip. Angular flake, slopes towards the butt end to obtain thick grip. Heavily rolled. Measures 12.5 cm x 10 cm x 5.5 cm.
Comparable to: No. 21, Fig. 5, Giddalur (Soundararajan, 1952)

(29)
River valley: Upper Tungabhadra Site: Nagasamudra
Rock material: Quartzite Tool type: Hand axe
Description: Made on a thick flake; triangular in shape. Shallow flake scars on the dorsal surface. Ventral surface is uneven and plain. Zigzag mid rib. Retouched working edges. Pointed tip. Striking platform retained near the butt. Positive bulb of percussion flake. Fresh. Measures 16 cm x 10 cm x 5 cm.
Comparable to: No. 22, Fig. 5, Giddalur (Soundararajan, 1952)
(30)
River valley: Vedavati  Site: Nidaghatta
Rock material: Quartzite  Tool type: Hand axe
Description: Cordiform type made on a brownish flake. Shallow elongated flake scars on the dorsal side. Prominent mid rib. A broad thin flake removed at steep angle on the ventral side to attain thin working edge. Thick and broad butt, uniform working edge. Semi rolled. Measures 9 cm x 10 cm x 5 cm.
Comparable to: No. 4, Fig. 21, Malaprabha basin (Joshi, 1955)

(31)
River valley: Vedavati  Site: Nidaghatta
Rock material: Dolerite  Tool type: Hand axe
Description: Oval shaped, made on a greyish flake. Thin step flake scar on the dorsal side. Pebble cortex on the ventral side. Prominent mid ridge. A deep flake removed obliquely on the right lateral margin to achieve beaked point. Thick at the centre. Semi rolled. Measures 11 cm x 9 cm x 5 cm.
Comparable to: No. 2, Fig. 21, Nagarjunakonda (Subramanyam, 1975)

(32)
River valley: Vedavati  Site: Nidaghatta
Rock material: Quartzite  Tool type: Hand axe
Description: Triangular shaped, made on a brownish thick flake. Shallow step flake scars on both the surfaces except a patch of cortex on the ventral side. Original steep surface on the left lateral margin retained deliberately to achieve pointed tip. Pointed at both the ends. Wavy periphery. Semi rolled. Measures 13 cm x 7.5 cm x 5 cm.
Comparable to: No.7, Pl. VII, Attirampakkam (Krishnaswamy, 1949).
(33)
River valley : Vedavati Site: Agrahara
Rock material: Quartzite Tool type: Hand axe
Description: Triangular shaped, made on a whitish flake. Shallow flake scars on both the surfaces. Ridge prominent on the dorsal side and thick at the centre. Beaked point attained by removing a deep flake near the far end. Retouched - wavy periphery arround. Slightly pointed butt. Semi rolled. Measures 9 cm x 6.5 cm x 2.5 cm.
Comparable to: No. 6, Fig. 2, Giddalur I (Soundararajan, 1952).

(34)
River valley : Vedavati Site: Agrahara
Rock material: Quartzite Tool type: Hand axe
Description: Triangular shaped, made on a pinkish flake. Broad shallow step flake scars on both the sides. Step partly due to cleavage of rock. Broken tip. Zigzag working edge arround. Flat striking platform. Semi rolled. Measures 10 cm x 8 cm x 2.5 cm.
Comparable to: No. 8, Pl. VIII, Lingadahalli (Seshadri, 1956).

(35)
River valley : Vedavati Site: Lakya
Rock material: Milky quartz Tool type: Hand axe
Description: Oval shaped, made on a flake. Both the surfaces fully worked with step flake scars. Step probably due to cleavage of the rock. Mid ridge almost straight and prominent. Thin wavy periphery. Deep flaking at the bottom. Broken tang. Fresh. Measures 10 m x 7 m x 4.5 m.
Comparable to: No. 23, Fig. No. 23, Nagarajunakonda (Subramanyam, 1975)
(36)
River valley: Bhadra        Site: Barandur
Rock material: Quartzite    Tool type: Hand axe
Description: Pear shaped; made on a brownish flake. Step flaking on
the ventral side. Dorsal side smooth due to rolling. Zigzag mid rib
on the ventral side. Pointed at both the ends. Near the top, lateral
sides have deliberate notches probably for hafting. Slightly rolled.
Measures 15.2 cm x 8 cm x 3 cm.
Comparable to: No. 5, Fig. No. 16, Anagawadi, Upper Krishna Basin
(Pappu, 1974)

(37)
River valley: Bhadra        Site: Barandur
Rock material: Quartzite    Tool type: Hand axe
Description: Made on a thin brownish flake. Patches of cortex on both
the sides. Dorsal side has shallow step flaking scars. Ventral side
has deep flake scars. Almost straight margins. A deep notch near the
top on the ventral side restricts the width of the tip. Slightly
rolled. Measures 11.5 cm x 6 cm x 3 cm.
Comparable to: No. 6, Pl. VI, Kibbanahalli (Seshadri, 1956)
No. 19, Fig. No. 22, Nagarjunakonda (Subramanyam, 1975).

(38)
River valley: Bhadra        Site: Shankaraghatta
Rock material: Quartzite    Tool type: Hand axe
Description: Oval shaped miniature hand axe made on brownish flake.
Shallow step flake scars on both the sides. Flake scars inclined
towards zigzag edge. Thick at the centre. Semi rolled. Measures 8.5
cm x 5.5 cm x 5 cm.
Comparable to: No. 13, Fig. 7 (Krishnaswamy, 1947).
(39)

River valley: Tunga Site: Honnapura
Rock material: Quartzite Tool type: Hand axe
Description: Oval shaped; made on a thick brownish flake. Both the dorsal and ventral surfaces exhibit numerous cleavage due to inferior rock material. Mid rib on dorsal side is distinctly visible. Steep flake scar on the ventral side near the tip. Thin lateral margins. Rolled. Measures 14 cm x 9.5 cm x 3 cm.
Rare type.

(40)

River valley: Tunga Site: Pilangere
Rock material: Quartzite Tool type: Hand axe
Description: Roughly triangular shaped; made on a thick brownish flake. Deep flake scars on the dorsal side. Ventral side has thin and shallow flake scars. Right lateral margin and the butt are rounded by removing thin flakes. Left lateral margin is distinctly zigzag. Borer like point obtained by removing a vertical flake near the upper part of right lateral side. Rolled. Measures 10 cm x 8 cm x 4.5 cm.
Rare type.

(41)

River valley: Tunga Site: Pilangere
Rock material: Quartzite Tool type: Hand axe
Description: Roughly triangular, made on a brownish flake. Steep flaking on dorsal side, converging at the centre. Ventral side plain and shallow at the centre. Symmetrical lateral margins. Butt obtained by removing a flake at 60° angle. Measures 14 cm x 9.5 cm x 3 cm.
Comparable to: No. 12, Pl. VIII, Attirampakkam (Seshadri, 1956)
(42)
River valley: Tunga Site: Hariharapura
Rock material: Quartzite Tool type: Hand axe
Description: Roughly oval shaped. Made on a thick brownish flake. Shallow flaking of both the dorsal and ventral surfaces. Retouched zigzag margins. Thick at the bottom. Rounded butt. Rolled. Measures 15.6 cm x 8.5 cm x 4.6 cm.
Comparable to: CMG 797, Malaaprabha (Joshi, 1955).

(43)
River valley: Hemavati Site: Bankal
Rock material: Quartzite Tool type: Hand axe
Description: Roughly oval shaped, made on a thick flake. Broad thin flakes removed at 40° angle on the dorsal side resulting in prominent mid ridge. Two thin flakes at 30° angle removed on the ventral side to achieve thin zigzag working edge. Pointed at both the ends. Bi-convex cross section. Semi rolled. Measures 15 cm x 8 cm x 3 cm.
Comparable to: No. 2, Fig. 19, Malaprabha basin (Joshi, 1955).

(44)
River valley: Hemavati Site: Kattebelguli
Rock material: Quartzite Tool type: Hand axe
Description: Ovate made on a brownish flake. The dorsal surface well flaked and a small patch of cortex near the butt. Plain ventral side. Thick at the centre. Bi-convex cross section. Fresh. Measures 16.5 cm x 13.2 cm x 5 cm.
Comparable to: No. 44, Fig. 33, Nagarjunakonda (Subramanyam, 1975).
River valley: Upper Kaveri
Site: Rudrapatna
Rock material: Quartzite
Tool type: Hand axe

Description: Triangular shaped, made on brownish flake. Thin broad flake scars on the dorsal side; prominent mid ridge. Ventral side unworked. Thin symmetrical margin. A deep notch on the right lateral side to obtain curved or beak shaped pointed tip. Semi rolled. Measures 14.5 cm x 10.5 cm x 4.5 cm.
(46)
River valley: Upper Kaveri        Site: Rudrapatna
Rock material: Quartzite        Tool type: Hand axe
Description: Pear shaped, made on brownish flake. Shallow flake scars and prominent mid ridge on both the sides. Thick at the centre. Rounded tip. Wavy periphery. Semi rolled. Measures 13 cm x 7.5 cm x 5 cm.
Comparable to: No. 50, Fig. 8, Tallapalle (Soundararajan, 1952).

(47)
River valley: Upper Kaveri        Site: Konanur
Rock material: Quartzite        Tool type: Hand axe
Description: Oval shaped; made on a thick pinkish flake. Bifacially flaked. Two shallow flake scars and prominent mid ridge on the dorsal side. Thin pointed tip attained by removing a flake at 45° angle on the ventral side. Cleavage of rock seems to be responsible for step flake scars. Wavy thin working edge. Measures 11.5 cm x 8.5 cm x 5 cm.
Comparable to: No. 37, Fig. No. 24, Nagarjunakonda (Subramanyam, 1975).

(48)
River valley: Vedavati        Site: Gedlahalli
Rock material: Quartzite        Tool type: Hand axe
Description: Triangular shaped, made on a thin brownish flake. Shallow flaking of the dorsal surface. Plain ventral surface and natural cutting from middle above retained to obtain pointed working tip. Retouched side margin on the ventral side as well as of bottom on the dorsal side. Thick near the left lateral margin. Fresh. Measures 11.6 cm x 9.10 cm x 3.01 cm.
Comparable: Roughly to No. 9, Fig. 21, Nagarjunakonda (Subramanyam, 1975)
River valley: Vedavati  
Site: Gedlahalli  
Rock material: Quartzite  
Tool type: Hand axe

Description: Triangular shaped, made on a thick brownish flake. Shallow flaking of the dorsal side at steep angle forming prominent mid rib. Shallow flake scars on the ventral side and platform near the bottom. Retouched margins on both the surfaces. Pointed tip. Fresh. Measures 9.7 cm x 8 cm x 4 cm.

(50)

River valley: Vedavati  
Site: Gedlahalli  
Rock material: Quartz  
Tool type: Hand axe

Description: Cordiform type made on a thick bluish flake. Shallow stepped flake scars on both the ventral and dorsal surfaces. Thick at the centre. Minute secondary retouched margins. Thin round tip. Flat platform at the bottom along the left margin. Fresh. Measures 8.7 cm x 7.1 cm x 4 cm.

Comparable to: No. 9, Fig. 3, Giddalur I (Soundararajan, 1952).

Figure V: Discoids

(51)

River valley: Upper Tungabhadra  
Site: Vaderpura  
Rock material: Quartzite  
Tool type: Discoid

Description: Made on core. Shallow flake scars converging at the middle of dorsal side and patch of pebble cortex. Shallow flaking on ventral side. Zigzag working edge. Thick at the centre. Rolled Measures 10.5 cm x 9 cm x 6 cm.

Comparable to: No. 8, Pl. 8, Lingadahalli (Seshadri, 1956)
River valley: Tunga  
Site: Honnapur  
Rock material: Quartzite  
Tool type: Discoid  

Description: Made on a brownish pebble. Bifacially flaked, shallow flake scars. Zigzag periphery due to alternate flaking. Rolled. Measures 9.5 cm x 7.5 cm x 4 cm.

Comparable to: Specimens from Kibbanahalli (Seshadri, 1956)

River valley: Vedavati  
Site: Agrahara  
Rock material: Milky quartz  
Tool type: Discoid  

Description: Made on a thick flake; step flake scars on both the sides. Prominent ridge on the dorsal side. Flat striking platforms at both the ends. Thin wavy periphery around. Thick at the centre. Semi-rolled. Measures 8 cm x 7.5 cm x 4 cm.

Comparable to: No. 9, Fig. 20, Upper Krishna (Pappu, 1974).

River valley: Upper Kaveri  
Site: Konanur  
Rock material: Quartzite  
Tool type: Discoid  

Description: Made on core, pinkish in colour. Bifacial flaking. Step flake scars probably due to cleavage of rock. Thick at the centre. Wavy edge around. Fresh. Measures 8 cm x 7.5 cm x 6 cm.

Comparable to: Pl. No. 9, Lingadahalli (Seshadri, 1956).
(55)  
River valley: Vedavati          Site: Gedlahalli  
Rock material: Quartzite        Tool type: Discoid  
Description: Round in shape, made on a thick whitish brown flake.  
Prepared core technique clearly visible on the dorsal surface. Shallow  
flaking on the ventral surface. Thick at the centre. Wavy working  
edge. Fresh. Measures 7.8 cm x 7.8 cm x 3.5 cm.  
Comparable to: No. 1, Pl. No. XI, Nidaghatta (Seshadri, 1956).

(56)  
River valley: Vedavati          Site: Gedlahalli  
Rock material: Quartzite        Tool type: Discoid  
Description: Round in shape made on a thick whitish brown prepared  
core. Shallow flaking of the ventral surface. A small patch of cortex  
retained on the dorsal side. Zigzag margin. Fresh. Measures 8.6 cm x  
7.5 cm x 4.8 cm.  
Comparable to: No. 4, Pl. No. X, Nidaghatta (Seshadri, 1956)

Figure VI: Cleaver and Scraper

(57)  
River valley: Tunga             Site: Hornapura  
Rock material: Quartzite        Tool type: Cleaver  
Description: Medium sized 'U' shaped; made on a brownish flake.  
Lateral margins almost straight. Depression near the butt on the  
dorsal side. Positive bulb on the ventral side. Retouched, thin  
curved working end. Thick butt. Rolled. Measures 12.5 cm x 8 cm x  
2.5 cm.  
Comparable to: No. 5, Fig. 19, Upper Krishna basin (Pappu, 1974)
River valley : Vedavati  
Site: Agrahara
Rock material: Quartzite  
Tool type: Cleaver
Description: Small in size; 'U' shaped on the thin brownish flake. Lateral margins almost straight and converge towards butt. Wavy cutting edge. Shallow flakes inclining towards the margins. Thick at the centre. Fresh. Measures 8.8 cm x 5.2 cm x 3.2 cm.
Rare type.

River valley : Upper Tungabhadra  
Site: Nagasamudra
Rock material: Quartzite  
Tool type: Side scraper
Description: Made on a thick brownish flake. Dorsal side fully flaked. Two shallow flake scars and cortexed ventral side. Convex right lateral margin. Straight left margin. Rolled. Measures 11 cm x 8 cm x 4 cm.
Comparable to: No. 1, Pl. III, Upper Krishna basin (Pappu, 1974).

River valley : Bhadra  
Site: Sidhlipura
Rock material: Quartzite  
Tool type: Side scraper
Description: Made on a Levalloisian flake of brownish colour. Shallow flakes converging at the middle on dorsal side. Deep flake scar and prominent bulb of percussion on the ventral side. Single working edge. Semi rolled. Measures 8 cm x 4 cm x 2.5 cm.
Rare type.
(61)
River valley: Upper Kaveri Site: Rudrapatna
Rock material: Quartzite Tool type: Side scraper
Description: Made on flake of brown colour. Shallow step flake scars on the dorsal side. Wavy mid ridge. Convex working edge. Thick at the centre. Thin broad flake scars on the ventral side. Semi rolled. Measures 12 cm x 9 cm x 3 cm.
Comparable to: No. 29, Fig. 35, Nagarjunakonda (Subramanyam, 1975).

(62)
River valley: Vedavati Site: Gedlahalli
Rock material: Quartzite Tool type: Side scraper
Description: Scraper made on a thick brownish flake roughly rectangular in shape. Shallow flake scar running steeply from left to right margin on the dorsal side. Prominent positive bulb of percussion on the ventral side. Straight left margin. Right margin and bottom edge retouched from both the sides. Fresh. Measures 9 cm x 6.1 cm x 2.5 cm.
Rare type.

(63)
River valley: Tunga Site: Honnapura
Rock material: Quartzite Tool type: Scraper
Description: Triangular beak type scraper made on thick brown flake. Shallow flaking on the dorsal side. Uneven ventral surface. The thin left lateral margin is curved at 70° angle. Uneven and thick right lateral margin. Retouched working edge. Flat curved tip. Broad at the base. Rolled. Measures 12.5 cm x 7 cm x 1.5 cm.
Rare type.
(64)
River valley: Bhadra Site: Sidhlipura
Rock material: Quartzite Tool type: Double sided scraper
Description: Made on medium sized brown flake. Prominent mid ridge. Heavily rolled. Pointed tip. Measures 8.5 cm x 6.5 cm x 3 cm.
Rare type.

\ Figure VII : Scrapers

(65)
River valley: Vedavati Site: Nidaghatta
Rock material: Quartzite Tool type: Round scraper
Description: Made on Levalloisian flake of pinkish colour. Deep flake scar at the centre on the dorsal side. Step flaking on the ventral side. Shallow flaking on the periphery to obtain wavy working edge around. Semi rolled. Measures 8 cm x 6 cm x 2.5 cm
Comparable to: No. 1, Fig. 2, Nittur (Ansari, 1980).

(66)
River valley: Vedavati Site: Gedlahalli
Rock material: Quartzite Tool type: Rectangular scraper
Description: It is made on a thin brownish flake, shallow flaking on both the surfaces. Thin retouched margin around. Fresh. Measures 6 cm x 6 cm x 2 cm.
Rare type.

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(67)
River valley: Vedavati Site: Gedlahalli
Rock material: Quartzite Tool type: End scraper

Description: It is made on a thick brownish flake. Shallow flake scars on the dorsal side from bottom towards the working end. Depressed ventral surface. Thick at the centre and bottom. Working edge at the far end, retouched from both the surfaces. Fresh. Measures 6.3 cm x 6.3 cm x 4.2 cm.

Rare type.

(68)
River valley: Vedavati Site: Nidaghatta
Rock material: Quartzite Tool type: Rectangular scraper

Description: Made on thick brownish flake. Shallow step flaking on the dorsal side. Shallow flaking on the ventral side. Working edge retouched on one of the lateral sides. Semi rolled. Measures 14 cm x 7 cm x 4 cm.

Comparable to: No. 5, Fig. 37, Malaprabha basin (Joshi, 1956).

(69)
River valley: Upper Kaveri Site: Rudrapatna
Rock material: Jasper Tool type: End scraper

Description: Made on a core. Shallow flaking of the dorsal surface. Pebble cortex retained on the ventral side. Working edge characterised by numerous steps. Semi rolled. Measures 7.5 cm x 6.5 cm x 2.5 cm.

Rare type.
(70)
River valley: Upper Kaveri Site: Rudrapatna
Rock material: Jasper Tool type: End scraper
Description: Made on thick core of blackish-brown colour. Shallow elongated flake scars on the dorsal side. Uneven ventral side. Retouched working edge. Semi rolled. Measures 8.5 cm x 7 cm x 5 cm.
Rare type.

Figure VIII: Point group

(71)
River valley: Bhadra Site: Barandur
Rock material: Quartzite Tool type: Scraper cum point
Description: Made on an oval shaped flake of brown colour. Shallow flaking on the dorsal side. Cortexed ventral surface. Prominent ridge. Pointed tip. Heavily rolled. Measures 9.5 cm x 6.5 cm x 2.5 cm.
Rare type.

(72)
River valley: Vedavati Site: Nidaghatta
Rock material: Quartzite Tool type: Pointed flake (or borer)
Description: Triangular leaf shaped; made on brownish flake. Shallow flake scars and prominent mid ridge on the dorsal side. Unworked ventral surface. Pointed tip. Edge retouched. Semi rolled. Measures 11.5 cm x 5.5 cm x 2.5 cm.
Comparable to: Specimens from Attirampakkam (Ancient India, 1948) as well as from Upper Siwalik hills (Sharma, 1979).
(73)
River valley: Vedavati  
Site: Nidaghatta
Rock material: Quartzite  
Tool type: Borer
Description: Made on thin brownish flake. Step flaking on the dorsal side. Prominent bulb of percussion on the ventral side. Elongated borer tip achieved by removing deep flakes from the lateral margins. Prepared platform. Broken tip. Broad zigzag base. Fresh. Measures 7.5 cm x 7 cm x 2.5 cm.
Comparable to: Nos. 1 & 2, Pl. VII, Kibbanahalli (Seshadri, 1956).

(74)
River valley: Vedavati  
Site: Gedlahalli
Rock material: Quartzite  
Tool type: Borer
Description: It is made on a thick brownish flake. Most of the original surface of the rock retained including a portion of the right lateral margin from middle above. Deep notch near the far end on the left lateral margin to obtain working point. Bottom retouched from both the sides. Fresh. Measures 8.5 cm x 6.8 cm x 2.5 cm.
Comparable to: No. 2, Pl. VII, Nidaghatta (Seshadri, 1956).

(75)
River valley: Bhadra  
Site: Barandur
Rock material: Quartzite  
Tool type: Borer
Description: Triangular shaped, made on brownish Levalloisian flake. Shallow broad flaking of the dorsal side. Depressed ventral side. Pointed tip attained by removing two large flakes on either side of the dorsal surface. Prominent ridge; thick at the centre. Semi rolled. Measures 11.5 cm x 7.5 cm x 4 cm.
Comparable to: No. 2, Pl. VII, Kibbanahalli (Seshadri, 1956).
(76)
River valley : Vedavati                Site: Nidaghatta
Rock material: Quartz               Tool type: Point
Description: Triangular shaped; made on thick whitish flake. Shallow flaking on both the surfaces. Deep flake removed near the top on the right lateral side to obtain point. Semi rolled. Measures 9 cm x 5 cm x 2 cm.
Rare type.

(77)
River valley : Vedavati                Site: Lakya
Rock material: Milky quartz        Tool type: Point
Description: Triangular shaped, made on thick whitish flake. Dorsal side fully flaked; mid ridge. Shallow flaking on the ventral side. Flat striking platform. Broken tip. Fresh. Measures 7.5 cm x 4 cm x 2 cm.
Rare type.

(78)
River valley : Vedavati                Site: Gedlahalli
Rock material: Quartzite            Tool type: Point
Description: It is made on a thick brownish flake. Shallow flake scars on the dorsal side. Plain ventral surface. Straight right margin. Convex left margin and a deep notch at the far end to obtain a beak like tip. Fresh. Measures 7.3 cm x 4.8 cm x 2.5 cm.
Rare type.
River valley: Vedavatı  Site: Gedlahalli
Rock material: Quartzite  Tool type: Blade

Description: It is made on a long thick brownish rectangular flake. Shallow flake scars on both the surfaces sloping from the middle towards the margin. Zigzag mid rib. Concave right lateral margin. Slight retouch on left lateral margin as well as far end. Fresh. Measures 9.4 cm x 4.5 cm x 2.8 cm.

Rare type.
LOWER PALAEOLITHIC TOOL TYPES

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Note: Serial numbers of tools mentioned in the description are common to the drawings as well as plates.
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LONGITUDINAL PROFILE OF THE RIVER BHADRA AND GENERAL SECTION AT 1 PREHISTORIC SITES - o o d g o p e n a h a l u • BARANOUR • BHADRAVATI KILOMETERS

LONGITUDINAL PROFILE OF THE RIVER BHADRA AND GENERAL SECTION AT 1

PREHISTORIC SITES •

SILT
LOOSE FERREY GRAVEL
MB ROCK

KILMETERS

METERS

620
600
580
560
540
520
500
480
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
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