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PREHISTORIC SITES FROM THE UPPER REACHES OF NARMADA, CENTRAL INDIA: STONE TOOL RECYCLING AND HISTORICAL CONTINUITY

Abstract

The prehistoric archaeology of Mandla is of considerable significance to our understandings on the question of historical continuity of stone tool tradition / technology, in India. During the latter half of the last century, a series of ethno-archaeological investigations have well established the historical continuity of the archaic Stone Age technology among the contemporary tribes in Australia, Central America and in the highlands of Papua New Guinea. But, this is for the first time that we have found some evidence for a similar experience in this sub-continent. This article discusses the details of the field survey report, i.e. methods, sites, industry / tool assemblages etc., of the Mandla prehistoric sites for the first time. This will contextualize the issues emerging from the Mandla findings in more detail material context giving potentiality for further archaeological investigation.

Keywords: *Microliths; Open Air Site; Stone Tool Recycling; Porcelain in Prehistory; Contemporary-Prehistory; Ethno-Archaeology; India*

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Introduction

Contemporary hunting-gathering adaptation in South East Asia is now understood to be very complex to any broad generalized engagement (Morrison and Junker 2002). The Mandla microlithic sites with evidence of prehistoric activities continued from Late Pleistocene/ early Holocene to historical period (Roy 2003, 2008, 2009, 2012) suggests for a more complex adaptation problem in earlier time. So far stratigraphic evidence for the upper limit of microlithic tradition in the Indian subcontinent is concerned – De Terra recorded a microlithic industry of proto-Neolithic phase homologous to the Mesolithic culture in association with the third cycle of Narmada sedimentation (Krishnaswamy 1947:36-37). Recent studies further pushed the upper limit of

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the microlith use in this sub-continent to the range of 35,000 to 45,000 years before present (see Clarkson *et al.* 2009; Mishra *et al.* 2013). Regarding the lower limit, several studies have reported continuity of this tradition until fairly late historical period (Cammiade 1924; Cooper and Bowdler 1998; Fairservis 1971; Gordon 1950; Malik 1959, 1966; Todd 1932, 1950). Nevertheless, this issue has never been exclusively treated in Indian prehistoric discourse so far.

The Mandla discovery has brought in fresh inputs to our knowledge on prehistoric archaeology in Indian sub-continent, particularly on the question of historical continuity of prehistoric tradition/technology. It is very interesting to note that when some parts of India were at the height of Indus Valley Civilization, other parts remained staggeringly at early Stone Age economy suggesting for a greater cultural diversity scenario in the past. The possible continuity of the microlithic tradition until modern time and the use of recycled stone tools successively for a considerable long time is now being reported for the first time in Indian prehistory (Roy 2008, 2009, 2011, 2012, 2015). The continuity of stone tool tradition (at least as technology) until late 19th or early 20th century is evident from the use of datable electrical porcelain insulators (EPI). The use of recycled stone tools down the timeline by successive groups of people, as evident from multiple patinations, further substantiates this view. These have profound significance in understanding the historical and contemporary uses of stone tool technology in this region quite in parallel to studies conducted elsewhere, e.g. Australia, Central America, and Papua New Guinea. These further have the potentials for starting a fresh debate on the conventional practice of archaeological interpretation, as the same speaks for a more complex techno-economic adaptation and evolution in regional perspective. While some of these issues have already been discussed elsewhere (Roy 2009, 2012), here for the first time the details of material facts of Mandla prehistoric archaeological sites are presented.

The Mandla prehistoric materials, as presented here, would invite fresh attention on the need for reconsidering archaeological approach and interest on open-air sites that are found far more numerously in this sub-continent. The stratified and well preserved prehistoric sites of great antiquity have always invited popular attention from both the archaeologists and the general public, whereas, the apparently disturbed open-air sites without any dating clues have usually been neglected. The stratified subsurface deposits, however, are no longer treated as fossilized archaeological records, as it is now understood that most often such sites actually were as disturbed as the surface findings, at least for a brief period of time before undergoing stratification (Dunnell and Dancy 1983 cited in Cooper and Nugent 2009: 223). The open-air sites, particularly from recent past, in fact, can contribute in understanding the higher resolution picture, i.e. the picture in short time perspective, of prehistoric culture (see "Time Perspectivism" in Bailey 2007). The open-air

sites continued historically also may have ethno-archaeological significance to understand prehistory in contemporary living and functional ecological perspectives (Roy 2012). Mandla's typical landscape, the distribution of sites, the issue of continuity of prehistoric tradition/ technology, the ethnology of the region, etc. suggest a huge potential for further investigation contributing to our knowledge on prehistoric archaeology of the region and beyond.

Sites & Methods[1]

During 2001-2002, followed by a chance find of a few microliths in the village Kachnari[2], a total of 17 sites bearing microliths have been discovered in Mandla (Latitude 22^0 12' and 23^0 22' North and Longitude 79^0 57' and 81^0 45' East) of Madhya Pradesh (Roy 2003, 2008, 2009). Of these 17 sites, 13 are all along the Narmada main course looping around the present day Mandla township (Fig.1). Literally, the whole of the district bears testimony of Stone Age culture, as astray pieces of stone artifacts are often found quite effortlessly. The details of the geographic, administrative and cultural location of the sites and tool assemblages are presented in Table 1.

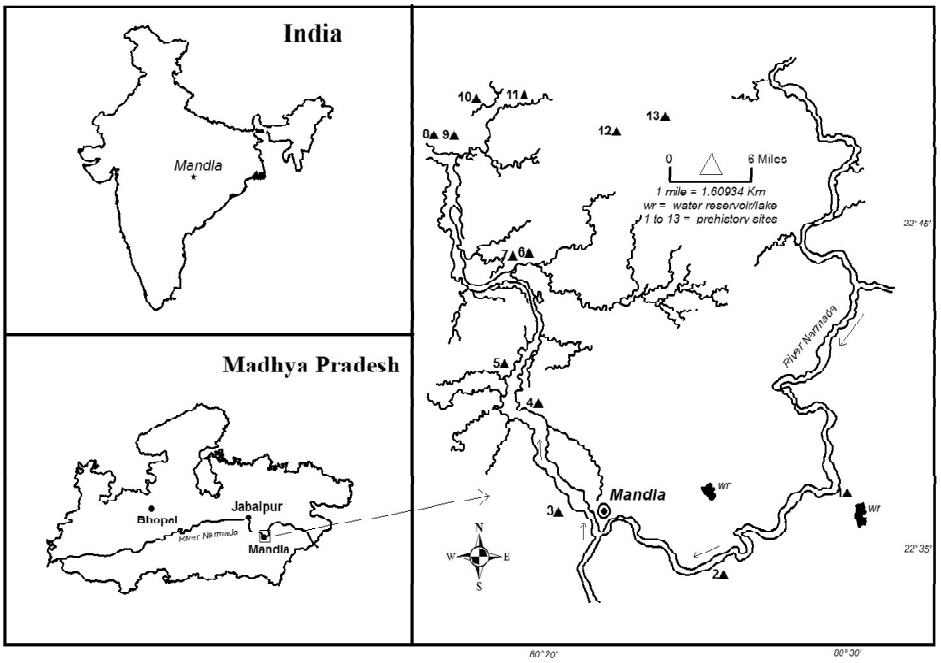


Fig.1. Mandla prehistoric sites. (Left/Top) Political map of India showing the location of Mandla. (Left/Bottom) Madhya Pradesh: A State within Indian Union showing the location of Mandla, the State capital Bhopal and the important town of Jabalpur and the major course of the river Narmada. (Right) The course of Narmada around Mandla showing the prehistoric sites, 1 to 13. For actual name of the sites, see Sl.No. 1 to 13 in Table-1.

Table 1: Mandla Prehistoric Sites (*Geographical, Administrative & Cultural Location and Tool Assemblages*)

Sl. No.	Name of the Site	Geographical Location	Approach Road	Site Description	Tool Assemblages
1	Ramnagar (CDB*: Bichia)	80^0 (30' 48.86") East and 22^0 (36' 28.46") North	30 kilometer from Mandla town on the Mandla-Ghugri (CDB headquarters) road	**Secondary site, river bed deposition:** The river Narmada has deposited several chipped stones along with natural pebbles and rocks on either side, but mostly on the Ramnagar side, just behind the 17th Century Ramnagar Fort (belonged to the Garha-Mandla Ruling Dynasty). Many of these deposits exhibit heavy abrasion by water force, as these were carried down along the long course of the river. Artifacts were collected at random. No comprehensive survey was made.	**Large tools:** Scrapers, flakes, points, cores, etc.
2	Ghughra (CDB: Mandla)	80^0 26' (28.50" to 43.31") East and 22^0 34' (09.62" to 14.39") North	18 kilometer from Mandla town on the Mandla-Ghugri (CDB headquarters) road	**Sporadic distribution of prehistoric artifacts:** Microlithic remains are found sporadically within a radius of 150 meter red *barrah* land (i.e. lateritic red soil variably mixed up with sand and stone pebbles of different size) located on the South bank of the river Narmada bordering the village Madhpuri on the North-East. The vast track of land surrounding this *barrah* patch is intensively plowed fertile black cotton soil devoid of any traces of archaeological remains. Ghughra site being very close to a modern village settlement inhabited by Hindu Castes population is heavily disturbed by recent human activities. It is quite understandable that the micros users once inhabited the entire region, as any prehistoric habitation cannot confined within such a small patch of land. The intensive cultivation practices down the generations most possibly have destroyed any trace of archaeological remains in the region, except the *barrah* patch that left untouched from such activities till date. Artifacts were collected at random. No comprehensive survey was made.	**Microliths:** Micro-blades and flakes, cores, scrapers, etc.

3	Manadei (CDB: Mandla)	80° 19' (19.29" to 54.61") East and 22° 39' (12.02" to 44.67") North	6 kilometer from Maharajpur / Mandla town	**Primary open-air site:** The present day inhabited village Manadei is situated on the West bank of the river Narmada adjacent to the Mandla township on the South East, and is surrounded by the village Mohgaon on the South, Khapakalan on the West and North. The microlithic site is located at about 6 kilometer from Maharajpur/ Mandla on either sides of the Mandla-Bhainsadah road. This is a large site extending over a kilometer stretch. The stone users occupied the site successively over a long period of time. Stone tools apparently were recycled by the successive occupants. The fresh flaking marks (or working edge) on already used stone tools are a clear proof for it. The people using microliths evidently occupied places closer to the river suggesting that they were more dependent on river ecology, might be for fishing, than those who used the large tools. Artifacts were collected through simple random sampling.	**Large tools & Microliths:** (i) A rich deposit of Upper Paleolithic tool types such as blade-cores, parallel-sided blades, scrapers of different type, points, etc. (ii) Microliths are in the form of micro-blades and flakes, cores, scrapers, etc. iii) The large tools (are heavily patinated while micros are fairly fresh.(iv) Microliths are often found to be manufactured from recycled materials of earlier large tools.
4	Gonjhi Ryt. (CDB: Mandla)	80° 21' 25.62" East and 22° 36' 45.89" North	3 kilometer from the district headquarters town of Mandla	**Sporadic distribution of prehistoric artifacts:** The site is right on the eastern bank of the river Narmada. The village Gonjhi Ryt. has only *usofractory* right over the area. Microliths are collected from a number of spots all along the river bank extending for over a kilometer stretch along the highway connecting Jabalpur. None of the locations yielded any concentrated deposition of the Stone Age remains. Occasional finds of microliths suggest that the Stone Age people once inhabited the whole region now where the Mandla township is located. Artifacts were collected at random.	**Microliths:** Micro-blades and flakes, cores, scrapers, etc.
5	Bhaisadah (CDB: Mandla)	80° (18' 48.82" to 53.58") East and 22° (40' 26.81 " to 45.51") North	16 kilometer from Maharajpur/ Mandla	**Primary open-air site:** Predominantly a microlithic site of huge size starching over a kilometer area. The extent of distribution of stone tool *debitage* indicates that the area was a major work station cum settlement that was occupied for a prolong period of time. Artifacts were collected through	**Microliths:** Micro-blades and flakes, cores, scrapers, etc.

				simple random sampling.	
6	Babaiha (Rat) (CDB: Mandla)	80^0 19' (11.94" to 31.50") East and 22^0 44' (13.19" to 13.21") North	18 kilometer from Mandla	**Primary open-air site:** The site is on the Mandla-Jabalpur road right at the border of Mandla and Narayanganj Tahsils that jurisdictionally lay just outside the Babaiha village territory on the northwestern border. The people of Babaiha (Gond tribe), however, claim the forest to be theirs and have informal control over it. The sites stretches over ½ kilometer on the left side of the current Mandla-Jabalpur road going towards Jabalpur overlooking the river Narmada on the right side. The site being right in the forest, it remained relatively undisturbed. The Stone Age artifacts are found in several concentrated clusters. Artifacts were collected through comprehensive random sampling representing all the artifacts clusters. The site found to be fairly undisturbed, despite being open.	**Microliths & Pottery:**(i) Fluted-core, parallel-sided blank blades, a few lunates and backed blades. (ii) Some microliths are found to be made on recycled earlier tools.(iii) Red and black pottery wares (potshards). Withering patterns suggest their greater antiquity. (iv) Modern fireplaces and potshards. These potshards are quite fresh and are exactly the same as are used nowadays.
7	Gadhar (CDB: Mandla)	80^0 19' (07.44" to 12.40") East and 22^0 44' (19.74" to 20.77") North	20 kilometer from Mandla	**Primary open-air site:** The site is 20 kilometer from Mandla on the Mandla-Jabalpur road, adjacent to the Babaiha forest site, but on the other side of the current Mandla-Jabalpur road (built about 28 years back). The Gadhar villagers have *usofactory* control over this part of the forest. The microliths are found sparsely scattered over an area of 1 kilometer stretch all along the foothill region. This has yielded the most important dating clue to the microlithic industry in the district. The EPI of late 19th or early 20th Century dating were used in micros knapping authenticating for the first time the historical continuity of the microlithic tradition in India until such a recent date. Although because of the present day village jurisdiction this site recorded to be a separate site from Babaiha (Rat) (CDB: Mandla), but from prehistoric settlement	**Microliths & Pottery:** (i) Fluted-core, parallel-sided blank blades, a few lunates and backed blades. (ii) Microliths on EPI material.(iii) Red pottery (potshards).

				point of view they would be appropriately considered as one. Artifacts were collected at random. The EPI pieces were collected in absolute number.	
8	Kunmha (CDB: Narayanganj)	80^0 17' 08.70" East and 22^0 47' 53.48" North	37 kilometer from Mandla	**Open-air quarry site:** The site is 37 kilometer from Mandla on the Mandla-Jabalpur road. Only a very few microliths are found amidst huge rock nodules scattered over a vast area of more than a kilometer stretch. This looks to be a major quarry site having heaps of *detritus* (un-worked or natural rocks) scattered over a large area. Artifacts were collected at random. No comprehensive survey was made.	**Microliths:**(i) Fluted-core, parallel-sided blank blades, etc.(ii) This site has yielded one of the finished pieces of arrow/projectile head made on a flake.(iii) Some of the tools are found to be made on recycled stone tools of earlier time.
9	Chiri (CDB:Narayanganj)	80^0 16' (35.11" to 44.77") East and 22^0 48' (13.29" to 22.71") North	35 kilometer from the town of Mandla	**Highly disturbed open-air site:** The site is 35 kilometer from the town of Mandla on the right side of the Mandla -Jabalpur road going towards Jabalpur. This is predominantly a microlithic site stretching about ½ kilometer area all through the flat land extending right from the base region of a low mound branched out from the adjacent chain of low hills up to the present day metal road. On the other side of the metal road, the region is undulating and descends down to the river Narmada. Adjacent to this site there are several spots containing unused rocks seemed to be gathered by the Stone Age men while quarrying the site. The whole of the Chiri site has been highly disturbed by recent plowing activities, as the local villagers (mostly Gond tribe) recently have started cultivating millets over there. Artifacts were collected through simple random sampling.	**Microliths:**(i) Blank-blades (parallel sided), fluted cores (different types), lunates, backed blades, etc. (ii) Most of the remains are in the form of unused *debitage*. (iii) The only evidence, so far, about the bottle glass being used in micros knapping in Mandla is found.(iv) Some of the micros are found to be manufactured on recycled earlier large tools.
10	Partala (CDB: Narayanganj)	80^0 (17' 41.54" to 19' 07.94") East and 22^0 49' (22.54" to 28") North	36 kilometer (of which 5 kilometer is kacha road) from Mandla	**Sporadic distribution of prehistoric artifacts (primary and secondary depositions):** The village Partala is 36 kilometer (of which 5 kilometer is kacha road) from Mandla on the Mandla-Jabalpur road at 80^0 (17' 41.54" to 19' 07.94") East and 22^0 49' (22.54" to 28") North. It is a forested village	**Large tools & Microliths:** (i) Microliths as well as specimen of large tools are found sporadically

				located right in the middle of forests and surrounded by the village Amdra on the North, Dungariya-Chatra and Chatra on the East, Bamhani (Partala) and Barbaspur (Bamhani) on the South, and Kumha and DeoriKhairi on the West. The village Partala is inhabited by Gond, Baiga and Hindu Castes population. There are at least three distinct clusters or sites having fairly undisturbed Stone Age deposits. Microliths have been found in two separate concentrations in a less disturbed forested part on the northwestern border of the village at 80^0 17' 41.23" East and 22^0 49' 26.44" North and at 80^0 17' 47.33" East and 22^0 49' 23.22" North, and another concentration has been found right at the middle of the forest road towards Barbaspur (Bamhani) village at 80^0 17' 49.98" East and 22^0 48' 59.13" North. Artifacts were collected at random (from sporadically scattered locations) as well as by simple random sampling (from concentrated clusters). No comprehensive survey was made.	across the village, but mostly on the less disturbed borderline zones between forest and agricultural field. (ii) One chopper -chopping tool recovered from the stream bed passed across the village.
11	Amdra (CDB: Narayanganj)	80^0 19' 24.19" East and 22^0 49' 37.37" North	5 kilometer from Partala	**Open-air quarry site:** The site is 5 kilometer from Partala (via forest road) towards North. Microliths are found along with unused rocks. Artifacts were collected at random. No comprehensive survey was made.	**Microliths:**Micro-blades and flakes, cores, scrapers, etc.
12	Sajpani forest village (CDB: Narayanganj)	80^0 24' (18.19" to 18.21") East and 22^0 48' (48.01" to 51.07") North	35 kilometer from Mandla	**Sporadic distribution of prehistoric artifacts:** The site is 35 kilometer from Mandla via Phulsagar on the Mandla-Niwash road right at a juncture from where a forest road bifurcated towards the village Dobhi-Tarbani. The village settlement is one the right side of the road coming down from Phulsagar (Mandla). Microlithic remains are found on the other side of the road scattered on an exposed rock surface. Artifacts were collected at random. No comprehensive survey was made.	**Microliths:**Micro-blades and flakes, cores, scrapers, etc.
13	Tarbani-Dobhi (CDB: Narayanganj)	80^0 22' 54.43" East and 22^0 48' 24.02" North	5 kilometer inside the forest on the North West of Sajpani forest village site	**Sporadic distribution of prehistoric artifacts:** The site is 5 kilometer inside the forest on the North West of Sajpani forest village site. No concentrated deposit has been found. Microliths are found sporadically throughout the current village settlement. Artifacts were collected at random. No comprehensive survey	**Microliths**:Micro-blades and flakes, cores, scrapers, etc.

				was made.	
14	Dongar Mandla (CDB: Ghugri)	80^0 (36' 35" to 37') East and 22^0 (38' to 38' 20") North	44 kilometer from Mandla	**Sporadic distribution of prehistoric artifacts:** The site is 44 kilometer from Mandla on the Mandla-Ghugri (CDB headquarters) road. Artifacts were collected at random. No comprehensive survey was made.	**Microliths**:Micro-blades and flakes, cores, scrapers, etc.
15	Gullu-Khoh (CDB: Ghugri)	80^0 36' 43.66" East and 22^0 38' 22.15"	43 kilometer from Mandla on the Mandla-Ghugri (CDB headquarters) road.	**Highly disturbed primary open-air site:** The village Gullu -Khoh is flanked by thick forests on the North West, and surrounded by the village Katangi on the North East, Dongar Mandla on the East, Ramhepur on the South East, and Dalka Gupangi on the South. Prehistoric remains are found within a radius of about 100 meter at 80^0 36' 43.66" East and 22^0 38' 22.15" North. Plowing activities has disturbed most part of the site. Artifacts were collected through simple random sampling.	**Large tools & Microliths:** (i) Microliths: fluted-core, parallel-sided blankblades, etc.(ii) Heavy Stone Age tools in the form of points and scrapers of different types. (iii) Atypical typology includes a cleaver like tool, one perforated stone piece (typology not clear), and a peculiar three sided point like tool having all the three edges retouched.(iv) At least a couple of tools bear clear indications for being made on recycled materials.
16	Kachnari (CDB: Ghugri)	80^0 49' 47.99" East and 22^0 46' 49" North	15 kilometer from Chabri	**Sporadic distribution of prehistoric artifacts:** The village Kachnari is 15 kilometer from Chabri (on the Mandla-Dindori road). It shares boundary with the newly curved out Dindori District on the East. It is surrounded by the village Kusmi on North, Urwahi on West, Bhainswahi on South West and Siganpuri on the South. Microliths are found right at the middle of the current settlement and the cultivated red *barrah* land all around at 80^0 49' 47.99" East	**Microliths:**Micro-blades and flakes, cores, scrapers, etc.

				and 22⁰ 46' 49" North. This is the site from where a few pieces of flakes were picked up by chance, which later on confirmed to be microliths leading to the discovery of Mandla prehistoric sites. Artifacts were collected at random. No comprehensive survey was made.	
17	Kui Mal (CDB: Narayanganj)	80⁰ 20' 40.34" East and 22⁰ 48' 40.42" North	15 kilometer from Partala	**Open-air quarry site:** The site is 15 kilometer from Partala. Microliths are found in the heaps of natural rocks and pebbles. Artifacts were collected at random. No comprehensive survey was made.	**Microliths**:Micro-blades and flakes, cores, scrapers, etc.

*CDB = Community Development Block (a sub-district administrative jurisdiction).

Mandla lies in between the Maikal Ranges of the Satpura Mountain and the foot of the Kaimur Range of the Vindhyan Mountain. Geologically the area is mostly covered by Deccan traps of Upper Cretaceous to Palaeogene period[3 & 4]. Laterite of Pleistocene/recent origin often covers the undulating plateau with mounds of the region. Narmada alluvium (silty clay mixed with *kankars*), black cotton soil (originated from decomposed Deccan traps), and red lateritic soil are the three major generic types found in the district. The various specific soil sub-types are formed by a combination of these three main types along with *kankars* and pebbles in different combination and proportion. The Stone Age artifacts are found usually either exposed or partially embedded in shallow deposits of red soil or mixed red and black soil overlying hardened Laterite or Deccan Traps. The sites are primary open-air type distributed all along the river Narmada and its tributaries. Secondary riverine deposits of Stone Age artifacts are found at Ramnagar (CDB: Bichia). There are several possibilities to find out more such sites in the district. The riverine deposits indicate possibilities for secondary stratified deposits as well.

Since a large number of open-air sites left unnoticed till date, it seems that the region was never surveyed earlier. Several prehistoric sites (Chauhan and Patnaik 2008; Gordon 1950; Joshi *et al.* 1978; Khatri 1961; Misra and Bellwood 1985; Zeuner1952) as well as prehistoric human remains (Athreya 2010; Kennedy *et al.* 1991; Patnaik *et al.* 2009; Sankhyan 2005; Sankhyan *et al.* 2012) have been discovered from the middle and lower reaches of Narmada, but nothing from the upper Narmada region until this present findings. The only exception is that during 1960's A.K. Ghosh and D. Sen had reported some prehistoric tools pre-ceding to the Mesolithic period in a stratified context on the river Banjar, a tributary of Narmada (cited in Murty 1979:305). However, no further study was ever conducted on this reference. The survey of Mandla prehistoric sites was conducted with reference to the motor-able roads

mostly passing all along the main course of Narmada and its tributaries. The area in the Chiri-Kui-Dobah-Babaiha pocket of the Narainanganj local administrative division called Community Development Block (CDB) in between 22^0 47' to 51' North and 80^0 15' to 25' East was scanned quite extensively by conducting foot-march through forest tracks. Of the total of eight administrative CDBs constituting the present day district of Mandla at the time of conducting the field investigation, Niwas on the North and Bicchiya on the East that may have further archaeological potentials having identical topographic and ecological conditions, and Nainpur on the South of the district, however, left unexplored.

Location map (notional) showing up to the village level boundary of Census of India (*District Census Hand Book, Mandla, 1981*) and the Survey of India Topographical-Sheets have been used to plot the geographical location of all the sites. Notional maps showing important landmarks have been prepared. Field information so collected, Census of India Maps, and the digital information available in "Google Earth Watch (GEW at: http://www.google.com/earth/download)" helped in finalizing the site maps. Today, GEW is a free and easily accessible GIS technology throughout the world and is becoming increasingly popular in conducting field-based research. Recently, O'Reilly and Glen (2015) availed this successfully to spot new moated sites of the Iron Age in the Mun River Valley in Thailand. Clarkson and Bellas (2014) demonstrated the usefulness of GIS technology for locating the possible prehistoric lithic source zone. GEW facilities could be used for further aerial prospecting of the Mandla region, as the area bearing prehistoric remains is of specific characteristics clearly identifiable in GEW pictures, and also for prospective further evidence of Mandla prehistory in terms of raw material distribution, transportation and procurement activities.

The present investigation has been designed to study the lithic remains of both *in-situ* and *ex-situ* contexts. With reference to some of the important sites (i.e. Babaiha, Gadhar, Manadei, Chiri, Partala) several days were spent on field observation, inspecting each and every point, scrutinizing artifacts one after another, so that the bare material remains of the archaeological past could be contextualized to the current environmental context. The method of field collection of artifacts ranges from "details representative sampling" to "simple random sampling" to "comprehensive" as well as "random collection" depending upon the nature of the site (particularly to what extent the site has already been disturbed by recent human activities and artifact distribution) and the scope/ limitation of the investigation.

A very systematic investigation was made in case of the relatively undisturbed part (part-A) of the Babaiha forest site, where Stone Age remains were found in twenty two distinct clusters (Fig.2). These clusters seemed to have directly resulted from knapping activities and left not to be much disturbed over the years. Of the three divisions of the site, the topography of this part is

relatively flat. The site was meticulously plotted showing all the clusters of artifacts. Chipped stone artifacts were collected from a few sample grids 1x1 meter of surface collection from some of the representative clusters. The part-B of the site, which is a low laying pocket, is having sedimentary deposits of black cotton soil possibly brought there from the adjacent uplands. The part-C of the site is undulating and has been disturbed by recent earth digging activities (earth was removed for road construction purposes). Although artifacts were found scattered throughout the area, but were concentrated on the northern slope of a gentle mound (the southern slope is a steep decline of several meters down to the river) located right at the southeastern corner of the site where the Mandla-Jabalpur road crosses the river.

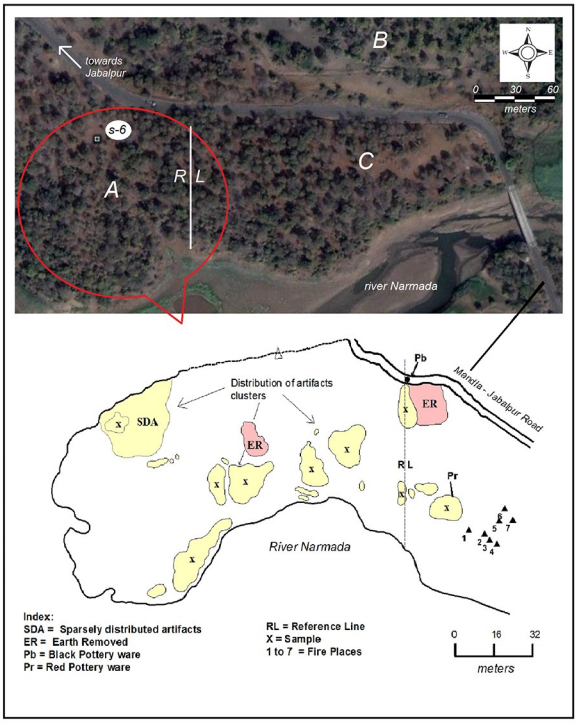


Fig.2. Babaiha site. (Top) Arial view (credited: *Google Earth Watch*). (Bottom) Spatial distribution of artefacts clusters.

Systematic investigation of all sites could not be possible by an individual effort, more particularly by a freelance archaeologist. From relatively undisturbed sites (i.e. Manadei, Gullu Kho, and Bhaisadah) and undisturbed part within a site (Partala forest site) the artifacts were collected as a sample from 1x1 meter surface collection squares from the representative clusters. But, from the sites heavily disturbed by recent human activities (i.e. Chiri, Ghugra, and Partala village area) the materials were collected without any sampling reference (Fig.3). In such cases, the specimens were collected rather

on a salvation drive. In some cases, I did pick up some very uncharacteristic specimens quite subjectively, particularly when they were found outside any site context. The positive note on salvation recovery of artifacts in this manner cannot altogether be ignored. At Gadhar, the microlithic remains were found sparsely scattered all along the foothill range of nearly a kilometer extent. Collection of artifacts from this site was limited to a few stone artifacts, potshards, and the prized collection of the porcelain chips. The porcelain pieces bearing undisputed signs of microlithic operation were found concentrate within a radius of 1½ meter. A good number of porcelain pieces were recovered from the cavity of a tree trunk. The villagers who occasionally visit the area for fodder and fuel-wood collection might have gathered them over there. Some of the Mandla sites were visited only once (i.e. Amdra, Dobhi, Kachnari, Kui, Kumha, Sajpani), other than collecting a few specimens from areas where the artifacts were left exposed and got disturbed by the local people, these sites virtually left unexplored by and large.

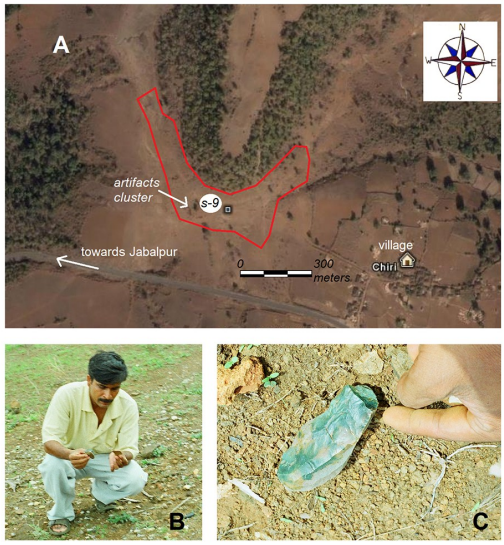


Fig.3. Chiri site. (Top) Arial view (credited: *Google Earth Watch*). (Bottom/ Left)Author inspecting the site(2001). (Bottom/Right) Close view of the site showing an exposed stone tool.

Artifacts

1. Lithic

Lunates, penknives, backed-blades, points, etc. are the common microlithic tool types found in Mandla. The retouched blades are mostly flat retouched struck ventrally, while struck dorsally are rare, but not totally absent. The backed blades (including penknives) having blunting retouch (i.e. backing) on one edge and flat retouch (i.e. sharpening) on the other were found from several sites (e.g. Babaiha,

Bainshada, Chiri, etc.). Lunate is the only geometric form found in Mandla. If we ignore a few pieces of the truncated micro-blades (of square or rectangle shape), which are doubtful to be the true functional geometric types (particularly in absence of any retouch works), except lunate, any other geometric form is conspicuously missing. The lunate size varies from 2.3 x 0.7 centimeter to as big as 6 x 2 centimeter (reconstructed from a broken piece of about 3 x 2 centimeter size recovered from Manadei). In most cases, the chord is a plain un-retouched type. The largest of the lunates is having the chord serrated by alternating removal of a series of notches, each of which was produced by removal of several tiny flakes. There is a total of three notches present alternately on either side of about half of the specimen's size recovered. The dorsal-ventral features of the specimen are not very clear. The size of the specimen gives a picture that it could be comfortably hafted into a sickle or a serrated knife (Fig.4). A few pieces of very fine needle size points were recovered from a roadside drainage section on right side of the metal road at about 11 kilometers from Ramnagar on the way to Ghugri. These needle-points are noteworthy, as in case of one of them, of just 21x3.5x1 millimeter in size, microscopic blunting retouch, struck from the ventral side on one edge and flat retouch struck from the dorsal side on the other, are found. These are very fine microlithic working at any rate. The specimen is either broken or deliberately truncated obliquely at the proximal end. Although such a needle could be an effective projectile head to hunt small games (e.g. birds), the precision of the specimen suggests that this might have been prepared for some specific function, possibly as a hide-piercing tool (e.g. awl/needle) for some fine sewing works [Fig. 13(8)].

Fig.4. Microliths. (1) Lunates. (2) Blades. The scale bar = 2 centimetre (0.6 inch).

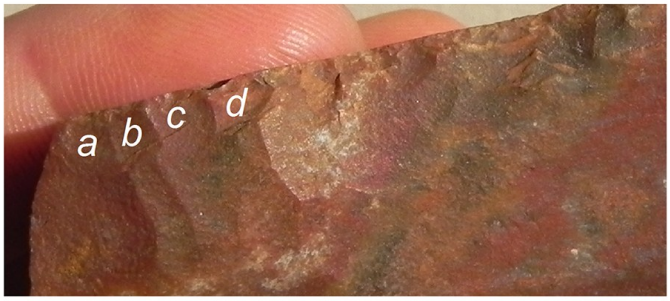
Un-retouched or blank bladelets found in large number both in quartz and chert. These are not always the blanks or unfinished tools as such, particularly for the presence of microscopic flake-scars as use-damage found in many cases. Gordon (1950:69) observed that unless a flake shows signs of working, usually it is not a true artifact but just a flake (a waste product on a workshop site). However, the un-worked flakes often show the signs of use. According to Cooper (1997:49-50): "It is quite possible that simple un-retouched blades served as the heads of projectiles and also as barbs. On the other hand, these sharp-edged parallel-sided flakes may have been multipurpose tools…Their functions probably varied in different environmental and socio-economic milieus." Cores are the remains of knapping activities for flake removal. The wide range of cores suggests a well-developed flake knapping technology. The micro-blade cores found in Mandla are range from very small to medium and large size, and from irregular and exhausted cores to regular conical and cylindrical blade cores having either plain platform or faceted platform types. Double platform tabular/ cylindrical blade cores having blade flakes removed from both sides were found from Manadei and Chiri. Conical microblade cores of different size (length minimum half a centimeter to maximum 4 centimeters), having both faceted platform and plain butt, are recovered from Babaiha, Manadei, Chiri, Gadhar, and Partala. Irregular and multiple platform cores were also found from a number of sites.

Sites like Babaiha, Bhainsadah, and Chiri are found to be pure microlithic type yielding no large tools at all. On the other hand, Partala, Gullu-Kho, and Manadei have yielded both large tools and microliths. Stone tools on medium and large flakes and blades like the different type of scrapers (e.g. end-, nose-, side-, thumb-nail-, keeled-, etc.), notches, denticulates and serrated blades/flakes, points, different type of burins (e.g. dihedral, single), borers, etc. were found along with micros from almost all the sites (Fig.5 to 7). The working edges often found bearing fine secondary retouch and/or use damages. Scrapers having alternating retouch (direct and then inverse) or direct retouch or both are found. Most of the scrapers, however, are of direct retouch type. The scrapers and burins of different type and size are usually found in association of microlithic assemblage. To work out a wooden piece into an effective shaft, a scraper probably would be the right tool, whereas a burin would be more effective in making the right kind of groove on it.

Fig.5. Scrapers. (1—4) Snub-nosed scrapers. (5—7) Small Convex "thumb-nail" scraper. (8) Projectile head. (9) Scraper on core. (10) Close view of (9). (11) Concave scrapers. (12) Side scraper on blade.The scale bar = 1 centimetre (0.3 inch).

Fig.6. Large flake and core tools. (1) Side scraper-cum-point (a. lateral view, b. ventral view). (2&3) Cores. (4) Unifacial chopper on pebble. (5) Large core with elongated narrow flake scares. (6) Concave scraper with denticulate scrapping edge. (7) A point. The scale bar = 2.5 centimetre (0.75 inch).

(1)



(2)

Fig.7. (1) Heavy duty side scraper, a fresh specimen.(2) Close up view of the working edge, showing parallel flake scares—a, b, c & d). The scale bar = 2.5 centimetre (0.75 inch).

Large tools are of both unifacial and bifacial types having the working edge made either by primary or by both primary and secondary flaking. Both soft and hard hammer percussion were used for retouching/sharpening a tool, while occasionally parallel flaking method (i.e. pressure flaking) was used for the purpose (Fig.7). The evidence of indirect percussion by using hard punch is also found. Miss-hit marks from hard metallic punch percussion are convincingly present in some tools (Fig.8). In Manadei, large core tools and typologically the Middle Paleolithic flake and blade tools literally outnumbered the microlithic remains. Many of the large tools recovered from Manadei are thickly patinated, which denotes their greater antiquity. The microliths found in the same site and under similar exposed condition are relatively fresh. Presence of crude large tools of the chopper-chopping category in microlithic assemblage is an important observation. A unifacial chopper and a large leaf-shaped flake bearing prominent bulb of percussion were recovered from Partala streamside. Several large blades and blade cores, points and different type of scrapers were found in Manadei, and also in other sites (Fig.9). A cleaver along with a few other large tools was found at Gullu-Kho.

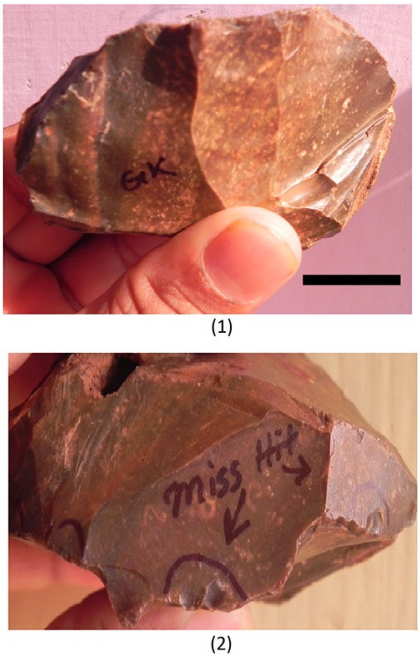


Fig. 8. (1) Core. (2) Striking platform bearing several pair of miss-hits. The stone tool maker apparently had hit at least twice at every possible fracture plane to knock out a working flake before the core was abandoned. The scale bar = 2.5 centimetre (0.75 inch).

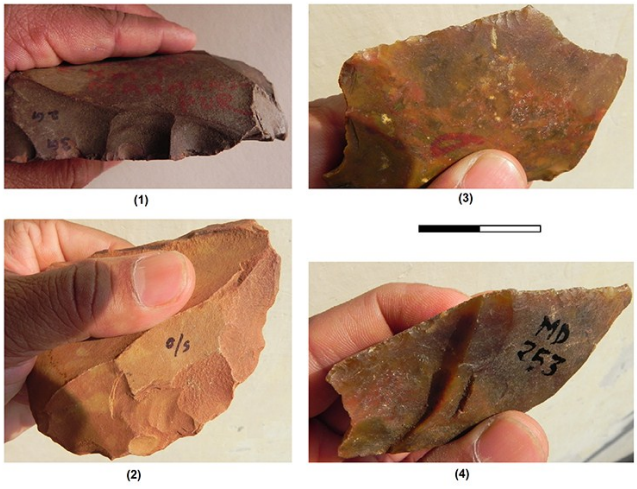


Fig.9. (1) A unifacial chopper made on pebble. (2) & (4) Large flake tools with fine working edge prepared by regular micro-trimmings. (3) Large Concave scraper with crude working edge. The one unit of the scale bar = 2.5 centimetre (0.75 inch).

A stone with a hole was recovered from Gullu-Kho. It is measuring 6.3 x 2.7 x 1 centimeter (Fig.10: 1).The typical features are its polished surface and a hole in the middle. The hole was drilled from both sides to meet at the center resulting typical hour-glass pattern. The object is broken at one end rendering it more difficult to identify its actual functional type. This is the only perforated object found in Mandla. Another stone piece bears a gouge or a half-way-through-hole recovered from the same site (Fig.10: 2). It looks that the hole was made either from several imperfect attempts of drilling or from a kind of drilling technique in which the initial hole was made by multiple attempts. The only other polished specimen found is from Manadei, which is again not identifiable with any known Stone Age typology (Fig.10:3). The drilling technique used in Mandla industry apparently was of the very high standard. The fluted drill bit on core is a proof of that. The diagonal groove brings it functionally very close to the helical fluted modern drill bit (Fig.11). An effective drill bit is most likely to be made on core so that it can endure the force of drilling, a point on which a borer should characteristically differ. The traditional distinction of a core from that of a flake is now debated in Stone Tool Technology (McPherron 2007). A flake thoroughly worked by removing secondary flakes from all sides into the desired tool is same as a core tool. The range of different borers and drills found in the industry speaks that the techniques of boring and drilling were extensively used. The paucity of evidence in the form of finished perforated objects, however, could be explained that these techniques perhaps were employed more extensively on perishable materials (e.g. wood, bone, etc.) than on stone.

Fig.10. Perforated and grinded stone implements. (1) Polished & perforated unidentified stone object (6.3 x 2.7 x 1 centimetre). (2) Stone piece bearing sign of perforating attempt (3 x 2.6 x 1.7 centimetre). (3) One side polished unidentified object (12 x 6 x 2.4 centimetre).

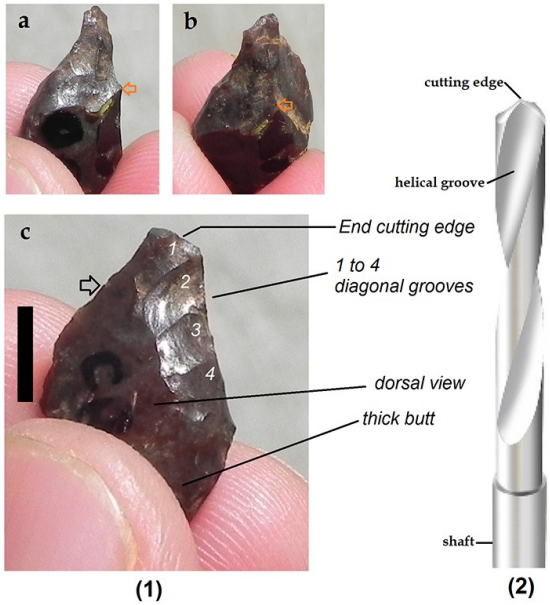


Fig.11. Micro-Drill. (1) Micro-drill head with four diagonal grooves (1, 2, 3, & 4). (2) Modern metallic twist drill-bit with helical groove. In 1861 Stephen A. Morse of Massachusetts invented twist drill—the name acquired from the original process of making by twisting the shaft having lineal flutes into helical flutes. Today most twisted drills are made by grinding flutes into solid rounds. Helical fluted drills automatically remove chips produced as a result of drilling operation through the helical flutes resulting more efficient and uninterrupted drilling operation (Marlow 2010, Chapter 5).The scale bar = 1 centimetre (0.3 inch).

Three sided long flake having all the three edges worked is an uncharacteristic Stone Age typology found in Mandla industry. The different edges either were worked out at different time finally resulting in the present form or it could be homologous to the modern triangular file, a specialized tool used in trimming and sharpening of the working edge (teeth) of a tool. Functionally this could be used effectively to widen a hole in any soft timber or vegetative material (e.g. in making a gourd/ bamboo appliances). This function is convincing from another three-sided worked specimen having clear shine on the distal end of the working edge that possibly acquired from rotating/ turning effects of its user in making a hole or gouge on some vegetative materials. Other atypical typology includes a triangle piece on a core having all the three edges trimmed.

2. Non-lithic

Apart from the usual stone, volcanic glass/obsidian, fossil-wood, and most importantly the modern industrial materials such as electrical porcelain insulator (EPI) and bottle glass were used in Mandla industry. A large number of microliths on EPI and a solitary one on bottle glass are significant as they confirm continuity of the Stone Age tradition until modern time, the arrival of electricity. Knapping of

modern materials, such as glass, has been reported from among many contemporary tribes still living with primitive technology in different remote parts of the world (Conte and Romero 2008; Seitsonen 2004), and among the native Indians, particularly in New World, all through the contact period of historical time (Joseph *et al.* 2004: 191-192; Silliman 2003; Sampson 2009). The use of historic ceramics including the porcelain in making projectile points and other utility flakes has been reported from San Diego County sites in California (Sampson 2009:58-59). Bottle glass in micros knapping has occasionally been reported from Indian prehistoric sites as well (Cooper and Bowdler 1998; Malik 1959, 1966; Todd 1932). However, such evidences were never exclusively discussed in prehistoric context.

In Mandla, some 900 pieces (mostly *debitage*) of chipped EPI (Fig.12 to 16) were recovered from the Gadhar forest site along with microliths on stone. At least ten to twelve different EPI types were used (Roy 2008). A broad classification of this collection is provided in Table 2. As much as 98 percent of the total EPI chips are of the non-tool category; of which 25 percent are blades, 4 percent cores (or core-likes), 65 percent flakes, and the remaining 6 percent broken pieces without any sign of works. Thus, just 2 percent of the total EPI chips, as recovered, are true artifacts. Most of the EPI pieces are not any way identifiable as tools or at least it is difficult to prove them to be so, particularly in absence of any retouching or finishing works. Most of them are, however, confirmed to have resulted from some kind of systematic knapping exercise of microlithic workmanship (Roy 2009). The typical dorsal features (flake struck from preceding flake scar resulting in a concave dorsal surface with sharp arêtes and convex ventral surface, negative and positive bulb of percussion on opposite faces, etc.) are found even in just a few centimeter long tinny blades or flakes [Fig.14 (5-6)]. Secondary re-touches, although are not so clearly distinguishable, are found in a few cases of EPI artifacts.. A concavo-convex scraper made on EPI bears relatively clear retouched edge.

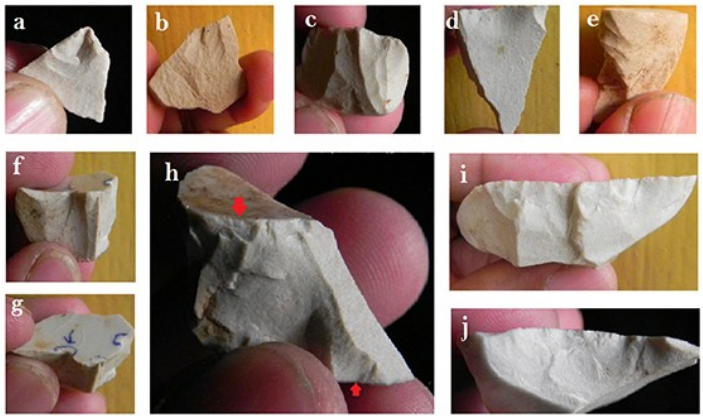


Fig.12. EPI cores and flakes. (a)Flake with flake-scare and sharp impact from hard punch hit.(b)Flake with two tinny flake-scares from pressure flaking impact.(c)Micro-blade core with parallel sided long narrow flake-scares.(d)&(e)Plain flakes.(f)&(g)Micro-blade core bearing flake-scare with sharp impact of hard punch.(h)Micro-blade core with several miss-hit on the platform edge.(i)&(j)Large flake with edge trimmed/worked, which may be accidently produced by successive miss-hits. Scale: Thumb indicator (breadth) = 2.5 centimetre.

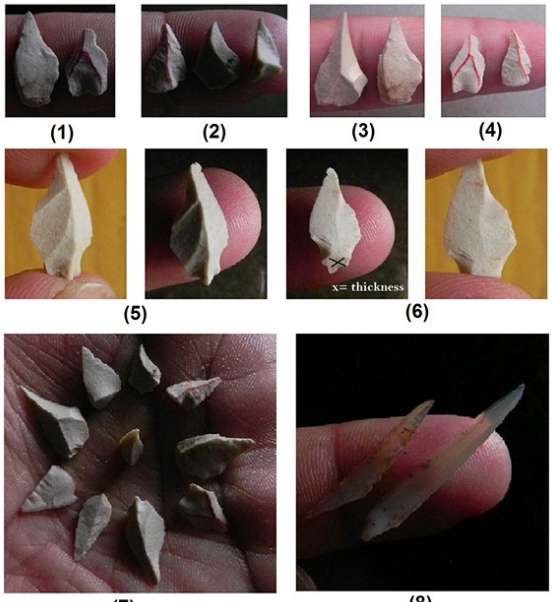


Fig.13. EPI projectile heads. (1—4) Small projectile heads.(5—6)Arrow head (bifacial), worked from both dorsal and ventral sides.(7)Different projectile heads, i.e. points and arrow head.(8)Needle points on stone bearing microscopic flat retouch on one edge. Finger indicator (breadth) = 2 centimetre.

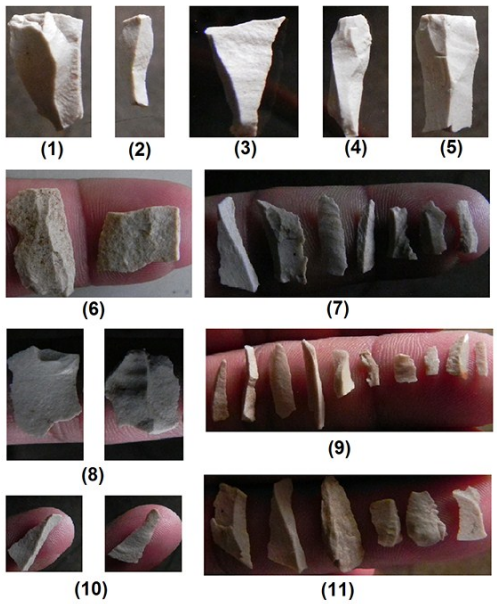


Fig.14. EPI blades bearing clear dorsal features, i.e. flake-scares from previous removal. Finger indicator (breadth) = 2 centimetre.

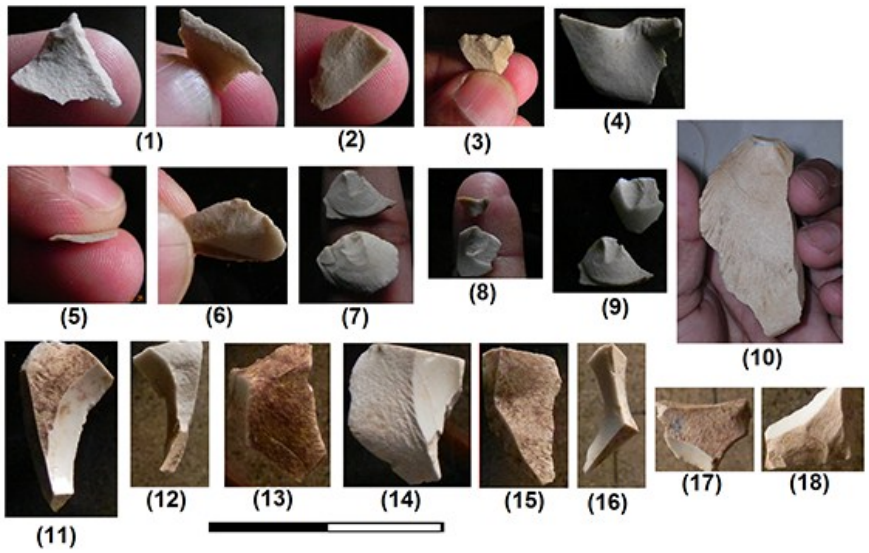


Fig. 15. EPI flakes. (11-18) These long flakes bearing thin glazed edge indicate meticulous slicing action executed to produce them. The one unit of the scale bar for 11—18 = 2.6 centimetre (0.75 inch); for rest of the figures (except 4) thumb-breadth (2.5 centimetre) or finger-breadth (2 centimetre) is the scale indicator.

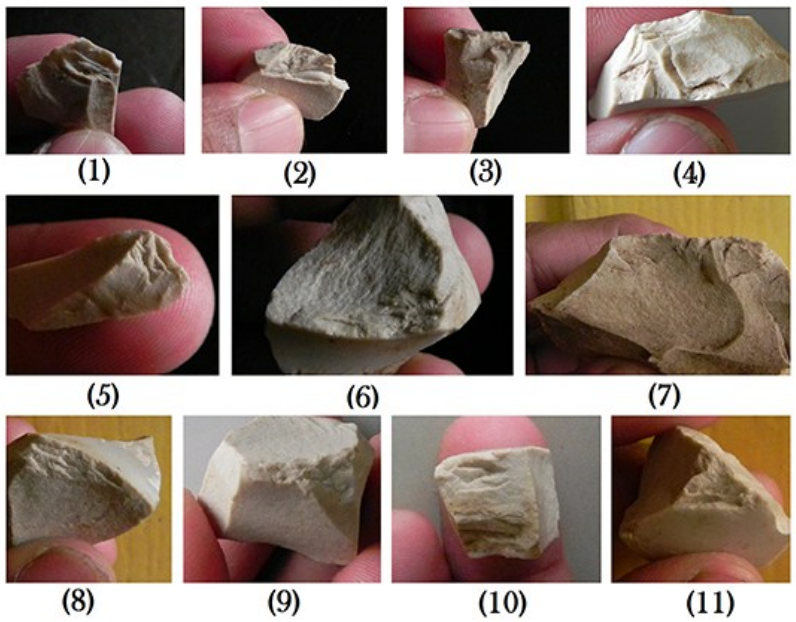


Fig.16. EPI flakes. (1—11) Flakes and cores bearing multiple step and hinge flaking and miss-hit scares. Thumb indicator (breadth) = 2.5 centimetre.

Table-2: Details of the EPI artefacts recovered from surface, Gadhar Forest Site

Sl. No.	Artefacts Type	No of Specimens	Percentage to total
	A: NON-TOOLS CATEGORY:		
1	Blades having distinctive dorsal features and PFA* traits.	128	15.01
2	Very small micro blades/chips (*debitage*) resulted from retouching works—pressure flaking/trimming.	66	7.74
3	Irregular distal blade fragments (irregular because the two edges are not as parallel as otherwise found in a true blade).	4	0.47
4	Irregular blade fragments (distal and proximal ends missing).	8	0.94
5	Irregular blades (point of percussion is clear; In two cases the distal base end is having the outer glaze coat of the raw material. This speaks that the small blade size was determined by the available size of the raw material, rather than by technology/ manufacturing process).	5	0.59
6	Regular proximal blade fragment (this is nearly a complete blade, except marginal breakage on the distal end. One of the fine bladelets on this raw material; Edges are near parallel; Point of percussion is clear; The mid-dorsal ridge runs parallel to the fracturing plane of the specimen. Dorsal side bears 5 flake scares; The ventral side is the primary flaking surface).	1	0.12
7	Cores and core-likes.	32	3.75
8	Large flakes with prominent bulb of percussion, the dorsal side is with the original porcelain glaze, the outer coat of the raw material.	1	0.12
9	Flakes (useable) having PFA traits.	7	0.82
10	Flakes (*debitage*) having sign of stone tool working, PFA traits.	153	19.94
11	Flakes (*debitage*) having sign of hinge fracture.	104	12.19
12	Flakes/chips (*debitaze*/very small) resulted from trimming/ retouching works.	167	19.58
13	Flakes (*debitaze*/medium size) having PFA traits.	106	12.43
14	Broken pieces having identifiable marks, structure or trademarks.	29	3.40
15	Broken pieces without any sign of stone tool working.	24	2.81
	B: TOOLS CATEGORY:		
16	Single tanged projectile point/ arrow-head (This is one of the few pieces that were identified as tools on EPI. This is a miniature projectile point/ arrow-head; bearing 5 flake scares on one side, and 2 on the other; The mid-dorsal ridge passes parallel to the fracturing plan.	1	0.12
17	Projectile points (The primary dorsal ridge is present except in one case; More than two flake scares were counted on the dorsal side).	10	1.17

18	Blade with a notch (This is one of the few bladelets on EPI having true characteristics of a blade; A flake scare on the dorsal side having ridges running parallel; The notch is distally placed on the right edge, if viewed from the dorsal side; Being so tinny it is not very convincing whether the notch was made intentionally or just it was an accidental removal).	1	0.12
19	Concavo-convex scraper (The specimen bear irregular scraper retouch).	1	0.12
20	Nose scraper (Fine elongated regular retouch possibly by pressure flaking; This is the only example where the application of pressure flaking is convincing).	1	0.12
21	Convex scraper (The scraping or working edge is not that clear from use damage).	2	0.23
22	Side scraper (Fine regular retouch on one edge; Dorsi-ventral orientation is not clear in one case, while in another the outer glaze coat of the EPI material remained as the dorsal side; In latter case retouching was struck from the opposite side of the glaze surface).	2	0.23

* PFA (Point of Force Application) Traits includes, bulb/impact of percussion, flake scare, rides of previous removal, striking platform, percussion ripple, etc.

Some of the EPI cores bear elongated narrow flack scars. These are evidently resulted from the application of pressure flaking technique. Many of the EPI pieces bear sharp impact, i.e. point of force application, from indirect percussion in which a pointed hard punch, a deer antler or an iron punch, might have been used[5] [Fig.12 (f & g)]. Miss-hits, multiple step- and hinge-fracture scars are found in several EPI pieces (Fig.16). In many cases, the preparation of platform (plain butt) and the flaking plane are comparable with typical microlithic types on stone. The prepared striking platform is evident in many cases for which the outer coat of the porcelain glaze was removed. It is also evident that the striking platform was prepared by roughening the surface by partial removal of the glaze. In one case the outer coat of the porcelain glaze was chipped off from two corners of a lump, which could be the beginning strokes in the process. Typologically, some of the finished chips are micro projectile points. Among them, a small bifacially (having flakes removed from both dorsal and ventral sides) and bilaterally (having flakes removed from the right and left sides/corners of either dorsal or ventral or both sides) flaked arrowhead/projectile point on core is found. The tiny size defies it to be functionally effective, but the detailed plan of working certifies meticulous execution of the microlithic technique on porcelain material. It was prepared by removing flakes from both sides (at least 4 on one and 2 on the other) and also from the butt end; one each from either side, removed possibly to produce the tanged and barb projections of the specimen [Fig.13 (5-6)]. A few EPI cores found roughly of conical shape bearing long and narrow parallel flake scars created by

possible pressure flaking [Fig.12 (c)]. The typical fluted core of microlithic industry, however, is still missing. This may be because of the natural limitation of the EPI material instead of any skill or technical imperfection on part of their makers. Thus, the knapping technique employed on EPI material is quite comparable with prehistoric microlithic technique. This could be a good proxy to establish the historical continuity of the tradition, even merely as technology.

3. Ceramics

The pottery is a key identifiable element used to distinguish the chronology of microlithic culture. Association of microliths and pottery is a common occurrence, as microliths use in most places assumed to lead to the pottery using microliths and then to the Neolithic and Chalcolithic phase of cultural development (Krishnaswami 1953:74). The microlithic tradition in neighboring Bastar region has been reported to be a tradition without pottery use and thus attesting it to be of greater antiquity (Cooper 1997:18). In Mandla, potshards were recovered, rather sporadically, along with microliths from a number of sites (e.g. Babaiha, Gadhar, Partala, etc.). Proportionately their number is quite insignificant to the total frequency of stone tools found in Mandla. The only definitive fact is that the pottery shards are quite old with heavy attritions/withering. To draw any significant conclusion on such ceramic remains, which have been found in open sites, however, requires further scrutiny.

All pottery types so far discovered in association with stone tools are wheel turned red and black wares devoid of any engraving or painting works. Some of the potsherds found at Gadhar forest site are very thick in making, coarse texture and ill-burnt. The black and red earthenware are commonly used in the region. The Baigas and the Gonds do still exclusively use earthenware for cooking, apart from their usual transportation and storing of water. Any true association of the potshard found in Mandla along with stone tools could not be ascertained conclusively in the absence of any stratified findings. Such confirmation is essential, particularly when both the red and black wares are still being used by the local tribes. Until then, the Mandla microlithic tradition would be safely called a tradition without pottery.

Raw Materials

1. Type

The raw materials used in Mandla industry are ranged from the Stone Age preference of microcrystalline rocks to the occasionally used volcanic glass (not yet petrologically confirmed) and fossil-wood and to the modern materials

like the bottle glass and electric porcelain insulator. Of the microcrystalline rocks of chalcedony group, the chert, chalcedony, and quartz were mainly used. Semiprecious chalcedony like the yellow and red jasper was also used. Petrified wood is quite common in the region[6], what that the stone tool users did not quite ignore. In Mandla tool assemblage, a flake is confirmed to be made on petrified wood. The evidence of bottle glass use is not conclusive. Only one such piece was recovered that bears some probable pressure flaking marks.

Extensive use of quartz in the microlithic industry was reported from Mirzapur, which said to be a characteristic difference with Central Indian microlithic tradition where the chert and chalcedony were largely used (Krishnaswami and Soundararajan 1951:40). Equal choice of quartz and chert in microlith manufacturing in Teri industry considered to be a distinguishing feature (Zeuner and Allchin 1956:19). In Mandla the chert and chalcedony were extensively used for making both the microliths and the large tools. In large tool production occasionally other materials (e.g. quartzite) were used. Quartz was also used in microliths making. The majority of the retouched microlith blades from Mandla are on chert, while the quartz blades are mostly un-retouched blanks. This observation is quite opposite to what was observed in neighboring Bastar, where most of the retouched blades were reported to be on quartz material (Cooper 1997).

The use of discarded EPIs in microlith manufacturing is noteworthy. From morphological studies (particularly the neck groove), at least half a dozen EPI types have been confirmed in the remains, which perhaps were quarried from as many different sources (Roy 2009). Three different trademarks (black ink under-glaze in two cases and dull red/ brown ink under-glaze in one case) are identified attesting the manufacturers' signatures (Fig.17 & 18). Of the two bearing blank ink under-glaze marks, one is a monogram of '*AP*' and the other one 'BEPC…' (the last alphabet 'C' in BEPC… may be 'D', which is not clearly seen, as the piece is broken at that point). In case of the dull red under-glaze mark, "JP" is written. The trademark in the form of monogram consisting of the Latin letters 'A' and 'P' can be of Russian origin belonging to the Popov Porcelain Factory of the period 1806-1872. 'JP' is a trademark of the France Company Belleville (now Fontainebleu) established in 1790 by Jacob Petit. The first letter 'j' is small and 'P' is capital and along with two dots, one below the letter 'j' and the other one after 'P', which are accommodated on the same plan by reducing the size of 'j' compare to 'P'. The red ink under-glaze mark 'JP' found printed on the EPI pieces is, however, without any dots and also that here both the letters are in capital styles. (see http://www.oldandsold.com/pottery).

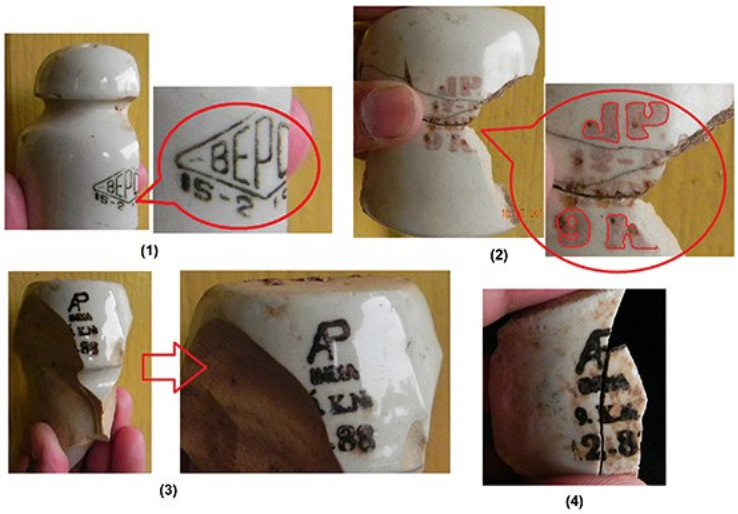


Fig.17.**Three different maker's signature (factory marks) recovered from the remains of the EPI pieces used in microliths making in Mandla. Thumb indicator (breadth) = 2.5 centimetr**

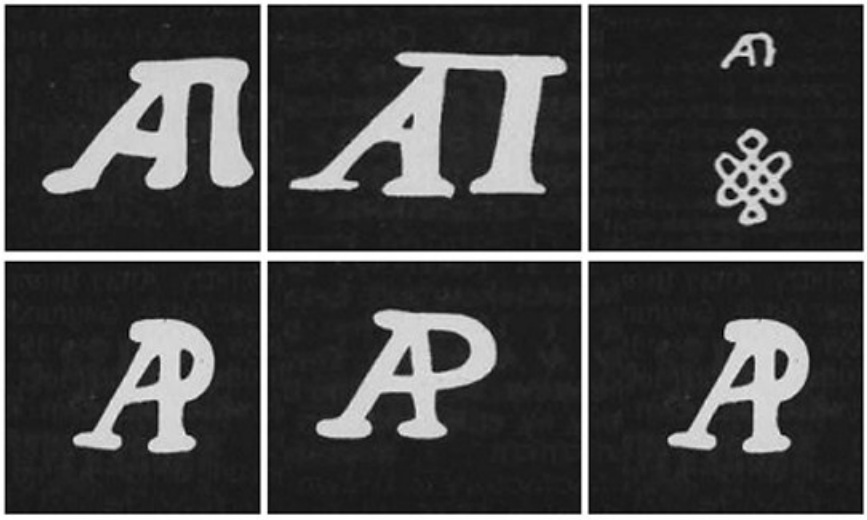


Fig. 18. **Popov porcelain factory (Russia) marks belonging to the period of late 19th century to early 20th century. The early trademarks were in the form of monograms consisting of the Latin letters <<AP>>, which is one of the three trademarks found in EPI pieces used in Mandla prehistory. Throughout the operation period, the Popov factory reported to use the mark <<AI>> stamped under glaze and impressed in the paste. A rare brand was an impression in the paste reading <<nonoBbI>> pertaining probably to the period (1850-1860's). (Credited: Journal *Sovfarfor*. See at:http://en.art.sovfarfor.com/popovs-factory/79-popov-porcelain-marks.html).**

Artifacts once classified as "too recent", such as porcelain insulators, are now considered significant in historic archaeological interpretations (Myers 2010). The Mandla EPI pieces are confirmed microlithic activities in modern time. Never the less, their significance in attesting the historical continuity of the Mandla prehistoric tradition will continue to be debated, at least until some clear evidence from well-stratified sites are found. Until then, we may consider these as the most concrete datable evidence to tag antiquity of the final extended phase of the microlithic tradition in this sub-continent.

2. Quarrying

Procurement of raw materials demands several strategic efforts to maximize profit in any industrial organization. In Stone Age industry, although the raw materials were freely available in nature, their procurement was not an effortless process. A systematic study of quarrying sites recently has drawn keen archaeological attention. In Mandla, the rock materials used in manufacturing stone tools apparently were extracted from the neighboring areas. The stone types that were used in prehistoric tool making are abundantly found in the district. The landscape in many pockets of the district possibly had greatly been altered by quarrying and tool making activities. Quarrying of suitable quartz or flint nodules or any other microcrystalline rocks requires a substantial amount of planning and physical effort to extract and transport the materials to the place of actual work. The extent of remodeling of the district's landscape resulted from possible quarrying activities silently speaks volumes on efforts that the prehistoric men once invested.

The huge quantity of discarded natural rock nodules and chips found scattered at various places in the district, often substantially altering the local landscape of considerable large area, mutely describes the past land use and raw material procurement activities. Raw material transported to the actual manufacturing site away from the quarrying often undergoes pre-processing to reduce the burden of carrying large and heavy rocks resulting accumulation of early-stage reduction at or close to quarrying site (Clarkson and Bellas 2014: 324). In some of the Mandla sites, the evidence of quarrying activity was found quite adjacent to the stone tool making place or activity area. In other cases, the same was found at a distant place suggesting that suitable rocks were quarried and transported from elsewhere to the actual place of work. The occasional presence of one or two used stone (i.e. having signs of human work) in the heaps of unused natural rocks, such as the non-utilitarian components (e.g. rock cortex), virtually confirms prehistoric quarrying. Several of such possible quarrying sites were found on either side of the road extending about 90 kilometers from Jabalpur to Mandla. From a few meters distance, these sites remain indistinctive from any true site of microliths. They, being more numerous in number, huge in size (often stretching more than a kilometer), and being distributed all throughout the district, are often effortlessly spotted, what at first glance always appeared to be an exciting discovery of a new site.

When there were so much of stone material resources available in the region, a genuine question arises that why the stone tool makers required shifting their choice to recycling practice and also to the modern industrial materials, such as EPI and bottle glass? Is it because of the scarcity of raw materials that the people were forced to search for alternatives? Scavenging and recycling of the easily available materials are always economically rewarding, while regarding shifting of choice to modern industrial materials, the experimental tendency of human beings to try out with newer materials may not be altogether denied. The recycling activities in Mandla prehistory have been discussed separately in details. Regarding procurement of the EPI types of late 19th or early 20th century makings, it is assumed that these could be transported either from Jabalpur or from Nagpur, as both the towns got electrified prior to 1955 (Datta 1961; Jagathpathi 1961; Mackie 1951; Pandya 1971). The town of Jabalpur, being closer to Mandla, could be more likely a possibility. Any possibility of transporting this material from elsewhere, however, cannot be ruled out, particularly when one of the EPI types is a confirmed late 19th century dating, i.e. a date earlier than Nagpur and Jabalpur electrification[7].

3. Recycling

In today's industrial world, recycling is a useful strategy for procurement of cheap raw materials. Our prehistoric ancestors were not unaware of this. Tool recycling activities in Stone Age is now well established, and that such practices rather were common playing a significant role in prehistoric assemblage formation (Amick 2007; Vaquero 2011; Vaquero *et al.* 2012). Recently *Quaternary International* has devoted an entire issue (volume 361; 1-342: 2015) on this topic. Any evidence of recycling in prehistoric culture could be confirmed only on the basis of identifiable double or multiple patinations along with signs of successive human works, barring any prehistoric recycling activities would ever remain unidentified in archaeological records. Recently several proxies of recycling such as use-ware analysis, knapping techniques (e.g. bipolar methods), choice of raw material in terms of core or flake use, spatial distribution pattern, etc. are suggested in analyzing prehistoric recycling behavior (Barkai *et al.* 2015:1-3).

In Mandla, both primary recycling (i.e. reuse of a tool after it was discarded with or without doing any rejuvenation work, say sharpening the working edge) and secondary recycling (i.e. using a discarded tool as raw material to knap fresh tools out of it) are evident. The microlith makers had extensively used the recycled large tools of earlier period to the extent that in some sites (e.g. Manadei) almost every alternate piece seem to be made on the recycled material (Roy 2011, 2015). The patinated dorsal features (flake scars) from previous uses along with comparatively fresh flaking marks on the same specimen confirmed secondary recycling. The recycled stone tools often were repeatedly used down the timeline. The flake scars of multiple patinations clearly demonstrate such successive uses. The evidence of recycling is found from a number of Mandla

sites (e.g. Babaiha, Chiri, Gullu-Khoh, Kunmha, Manadei, etc.). The stone tools identified having confirmed recycling evidence from different Mandla sites is presented in Table 3. A large majority of which was recovered from Manadei. In almost half of these cases, more than two patinated surfaces are found indicating that at least two successive occasions a tool was reused after it was originally discarded. The percentage distribution of the different tool types made on recycled materials is presented in Fig.19.

Table-3: Stone tools identified having confirmed recycling evidences from Mandla sites

Sl No	Site	Number of identifiable differential patinations	Frequency			Tool typology*
			Older patinated surfaces are clearly of human works	Older patinated surfaces are not clearly of human works	Total	
1	Babaiha (Rat) (CDB: Mandla)	2	-	2	2	Unidentified / discarded flake = (1); Fluted core = (1)
	- do -	3	-	1	1	Blade core (1)
2	Chiri (CDB: Narayanganj)	3	1	-	1	Unidentified/ discarded flake – (1)
	- do -	2	-	3	3	Fluted core – (2), Irregular core – (1)
3	Gullu-Khoh (CDB: Ghugri)	3	1	-	1	Blade core = (1)
4	Kunmha (CDB: Narayanganj)	2	-	1	1	Unidentified/ discarded flake = (1)
5	Manadei (CDB: Mandla)	2	-	3	3	Unidentified/discarded flake – (1); Fluted core = (1); Side scraper = (1)
	- do -	2	2	-	2	Side scraper = (2)
	- do -	3	-	2	2	Bifacial cutter/ chopper – (1); Side scraper = (1)
	do	3	6		6	Bifacial cutter/ chopper = (1); Core = (1); Side cum notch scraper = (1); Unidentified / discarded flake = (2); Fluted core = (1)

* Numeric figure within parenthesis stands for total number of item.

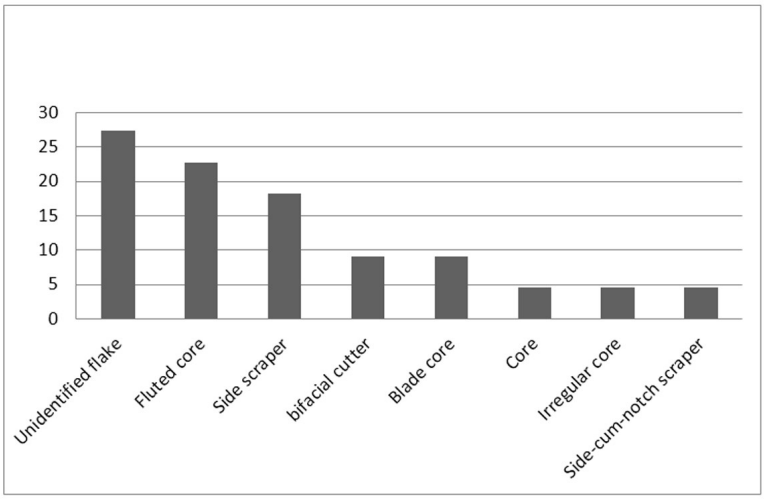


Fig.19. Distribution of tool types (*in %*) made on recycled earlier stone tools.

The extensive scavenging and reuse of stone tools suggest that the stone tool users preferred recycling of the easily available discarded tools than going for fresh mining. Any increase in recycling and tool rejuvenation activities during Stone Age can be attributed to scarcity in chipped stone resources (Galup 2007:42). The bipolar reduction technique considered to be the last possible effort to produce usable flakes, whereas any intensive recycling held to be an effective rational way of dealing with a tool replacement problem (Goodyear 1976, 1993 cited in Low 1997: 19). But, the recycling behavior not necessarily always suggest for the scarcity of raw materials. In Mandla, the abundant presence of large natural nodules of chert does not quite substantiate any material scarcity situation. The economy of using recycled materials could be a possible reason instead. Fresh mining always requires more physical and strategic effort. The stone tool users who had the choice of comfortably using the discarded large tools as raw material, in fact, would prefer them than going for fresh mining (Amick 2007:227). Thus, the general assumption that the stone tool users were compelled to switch on to recycled materials or to any other alternate materials (e.g. bottle glass, EPI, etc.) in the event of depleting conventional material resources may not be always true.

The archaeological units are now considered to be palimpsests subjected to complex temporal dynamics irrespective of well-stratified or open-air sites (Bailey 2015). Recycling is appearing as one of such dynamics having both archaeological advantages and disadvantages. Disadvantages are that the archaeological data may be unidentifiable ambiguous jumble created through repeated recycling activities over a longer timescale resulting low-resolution palimpsests formation that they are of no significance to draw any comprehensible archaeological information. On the contrary, the advantages are that the evidence of recycling can contribute to dissect the palimpsests to provide a higher resolution snapshot picture of human behavior (Barkai *et al.* 2015:1-3). Small flake production and lithic recycling during the Paleolithic period are now become quite evident (Agam *et al.* 2015). The Stone Age economy of using the easily available large tool remains as raw materials, particularly in subsequent small tool using cultures of more recent timescale (e.g. flake tool cultures of Middle Palaeolithic and the microliths of Mesolithic period and beyond), has significant general implication in understanding/ interpreting prehistoric culture and behavior (Roy 2015).

Discussion

The encountering experiences of the Native American Indians who were then still living in Stone Age technology with those of the colonial settlers are now well documented (Cobb 2003; Kardulias 2009; Sampson 2009; Silliman 2003). In Indian subcontinent, this is for the first time that some evidence for similar historical continuity of archaic tradition (even merely as tool technology) is found. Here the technological continuity is evident from the continued use

of the much elaborate method of microliths flaking until recently – a practice that most unlikely to be reinvented again in history. The question of cultural continuity, i.e. whether the same people who once lived in Mesolithic time had been continuing with Stone Age tradition, however, is still an open question to be debated. Nevertheless, the technological continuity may not remain completely unchanged. The use of stone tool technology beyond the stereotype production of Stone Age typology suggests contemporary adaptation and development of the same. The three-sided worked a modern file like implement and the helically grooved drill bit made on stone are possible imitations of modern tool types by the contemporary stone tool users. This suggests for some close interactions of contemporary foragers with technologically advanced people. The introduction of metallic punch in microlithic knapping during the Metal Age resulted in production of the long ribbon-shaped blades (average length 6-10 centimeters), as reported from a host of Chalcolithic Harappan sites in India (Allchin 1977; Harris 2011:111; Kenoyer1984; Wheeler 1947:125). Such blades are missing in Mandla, but the evidence of using metallic punch is quite convincing.

Assigning any broad typological characteristic to the Mandla prehistoric industry could be difficult and misleading. This is because the prehistoric cultural remains of Mandla were accumulated from different cultural periods, and that the open-air sites were subjected to disturbance by subsequent human activities, such as recycling and reuses of earlier tools, and of late by modern agricultural activities of the newest inhabitants of the region. Elsewhere, it has been observed that in the absence of distinguishable deposits any presentation of tool frequency on the basis of arbitrary layers/chronology is rendered quite meaningless (Cooper 1997:19). Although the exposed sites are more likely to be extensively mixed up for being impregnated by successive occupancy of cultural groups over a much longer period of time, it is now understood that both sealed and exposed sites could be equally disturbed (see Dunnell and Dancy 1983 cited in Cooper and Nugent 2009: 223). Thus, separation of successive prehistoric industries often could be a challenge in archaeological interpretation even in case of well-stratified sites. In Indian sub-continent, the large majority of prehistoric sites are of open-air types. In absence of any datable materials, the Typo-Technological study of tools is commonly attempted in temporal chronological interpretation. Such practices alone without being substantiated by other comparable evidence could be quite misleading. Patination study may corroborate the typological distinction of stone tools, which, however, may not be that reliable, as variable patinations (i.e. patination of different thickness and type/chemical composition) could be formed even to the contemporary deposits under a variety of climatic conditions. The multiple patinations and tool recycling evidence, instead, may provide the more reliable information. Despite all limitations, the Mandla microlithic industry could be described as predominantly a non-geometric or a limited geometric type that experienced a possible uninterrupted connection/continuation from the earlier

large tool using tradition, and it possibly survived (at least in some form) up to the modern period. The successive occupancy of the sites possibly from early large tool users to the later micros users is clearly evident from recycling activities. The general description of tool typology as presented here provides a broad picture of prehistoric progression in the region.

The most numerous prehistoric sites found in Indian sub-continent are the open-air microlithic type. The evidence of such a large number of sites has been attributed to the marked growth in Mesolithic human population during that period (Misra 1965, 1985, 1986, 1989, 2001, 2004). The Mesolithic people expand their horizon, as has been argued, as they colonized *hitherto* virgin territories like the Indo-Gangetic plain, the West Coast and the peninsula South of Kaveri River (Misra 2001). Sudden climatic change and the appearance of completely different kind of flora and fauna caused the emergence of microlithic adaptation in Post-Pleistocene time. The population increase phenomenon during this period is also established on the basis of the available genetic (mitochondrial DNA studies), paleo-environmental and archaeological data (Petraglia *et al.* 2009). Nevertheless, as a general understanding, the population expansion theory to explain the increased number of Mesolithic sites apparently looks to suffer a setback, as in such case the subsequent Neolithic sites should have been even more numerous. But, such an explanation still holds merit assuming that the Neolithic remains suffered possible damage from subsequent cultural advances (as the fertile lands where Neolithic thrived also happened to be the cradle-lands for subsequent historic civilization), whereas the pre-Neolithic sites of hunting-gathering subsistence in inaccessible areas remained undisturbed. The continuity of microlithic tradition for a considerable long time, all through the Mesolithic Age up to the recent history, also may cause to increase their number. First, obviously, because of the increasingly faster growth of human population in Post-Pleistocene climate, and second because of the longer continuation of the microlithic tradition than what is otherwise commonly understood. Evidence emerged here suggest a further possible reason that the subsequent small tool users might have had exhaustively reused the early large tool remains, leaving no evidence of latter's ever existence discernible. If it happened so in the past, as an extensive practice, then the same must have far greater implication in interpreting prehistory. The Mandla evidence of the extensive practice of stone tool recycling invites necessary revisiting to other prehistoric sites on this question.

The two key issues are emerging:

First: The Mandla example not only invites further investigation of the region but also likely to raise some potential questions on our general archaeological understandings inviting fresh debate in general, but more specifically involving the most numerous open-air sites of early and late Holocene period. This may not be an isolated case of historical continuity of

stone tool tradition/technology in Indian sub-continent, and that the recycling evidence in prehistoric assemblage may not be actually so lacking. The evidence of recycling probably remained inadvertently unattended in archaeological interpretations so far in India, so as in other parts of the world (Amick 2014: 66-68). The relatively coarse temporal resolution and palimpsest nature of much of the archaeological record, one of the three basic elements of Geoff Bailey's "Time Perspectivism" (Bailey 2007), could completely erase any evidence of recycling that happened in the distant past over a larger timescale. But, the higher resolution data of any comparatively recent age and of any relatively smaller timescale may unfurl the intrinsic details of prehistoric activities. In this context, the recycling activities have significant interpretative implications to capture the higher resolution picture of prehistoric activities, especially of the late Stone Age tradition that experienced rapid diversification and transformation in relatively short timescale perspective. This requires reappraisal of prehistoric data in general, but particularly of this period, exploring further what *hitherto* might have been ignored.

Second: The Mandla example has the potential to invite detail ethno-archaeological investigation. The contemporary stone tool using experience from Papua New Guinea raises question on the conventional practice of archaeological interpretations of stone tools (see Hardy 2009; Sillitoe and Hardy 2003). The significance of modern ethnographic study on stone tool uses among contemporary communities who are still living with them is now convincing. Such communities outside the pockets of Australia, Central America, and Papua New Guinea are now impossible to find (Sillitoe and Hardy 2003:555). The historical continuity of some kind of stone tool tradition even merely as technology in Mandla promises interesting ethno-archaeological research. The Baigas (a primitive tribe speaking Austro-Asiatic dialect), the earliest inhabitants of the region, are sharing space with Gonds (a Dravidian speaking tribe) for a considerable time. Although several important ethnographic studies on the aboriginal communities of the region are available, any focused ethno-archaeological study is virtually lacking. Such studies may certainly offer fresh ethnographic insight into our understandings of prehistory not only in Mandla regional context but also in broader India *per se* greater Asian perspective.

Notes

1. Field investigation on livelihood and economic activities of the people in Mandla was conducted during 2001-2002 for the *Madhya Pradesh-Livelihood Options Project* conducted by the *Overseas Development Institute (UK)*. Methodologically, the study was an intensive "village study". For this purpose, two villages (Partala and Ghugri) were selected in the district Mandla for an intensive year-long investigation. These experiences go in a long way in shaping the core understandings of the ethnological present of the region.

2. My journey to the Mandla Stone Age Archaeology begins all of a sudden on the 24th day of May 2001, as I accidentally found a few pieces of glittering quartz on the paddy field of the village Kachnari in Ghugri CDB located at about 15 kilometers

from Chabi on the Mandla-Dindori road. I had no hunch about the precious finds until I rediscovered them to be microlithic remains almost a month after when I gave a second careful thought at the collection recollecting from my old classroom memories of prehistoric training in anthropology. I had very little practical experience on microliths in the Department of Anthropology, Gauhati University. Microliths are not yet found from anywhere in North East Indian region. Confirmation of the discovery led to vigorous searching for similar findings elsewhere leading to the discovery of more than a dozen open and exposed sites during the period till October 2002. Most of the sites as discovered are along the Mandla-Jabalpur main road. A more systematic survey possibly would lead to many more findings in the district.

3. See: *Geological and Mineral Map of Madhya Pradesh* at http://www.portal.gsi.gov.in/gsiDoc/pub/MP30_GM_MadhyaPradesh.pdf

4. See: *District at a Glance: Mandla District, Madhya Pradesh*, Report by Ministry of Water Resource, Central Ground Water Board, North Central Region, Bhopal (2013) at: http://www.cgwb.gov.in/District_Profile/MP/Mandla.pdf

5. Gill Pollard <gill@gillpollard.com> 250 Sunnybrook Lane, Boones Mill, VA, 24065, had made stone and glass arrow points using hammer stone and deer antlers. According to him porcelain material can be very strong and sharp if it can be worked. He experimented with chipping flakes from porcelain insulator using deer antler and successfully produced sharp edge arrow points (*internet communication*) (see at: http://www.insulators.info/clubs/bric/aug03.htm).

6. The *National Fossils Park* in Dindori district of Madhya Pradesh in India has got the collection of fossil plants recovered from several villages in the districts of Dindori and Mandla. The *Birbal Sahni Institute of Palaeobotany*, Lucknow, has conducted some research on the plant fossils of Mandla. The standing petrified trunks of trees in the villages of Ghuguwa and Umaria have been identified as Gymnosperms and Angiosperms (see at: http://en.wikipedia.org).

7. The history of electricity goes back to the latter part of 19th century. The first thermal power station in India was constructed in Calcutta (now Kolkata) in 1899. The supply of electricity, however, remained confined to remunerative metropolitan urban and industrial areas till the middle forties of 20th century (Datta 1961:2). In the then province of Madhya Pradesh, the first license for electric supply was granted in 1905 to Messrs. Crompton and Company Ltd. This to follow other electric supply companies to sprang up in important towns, mostly in the district headquarters in the province. However, there was no apparent large-scale electrification until 1937-38. By 1951 several important towns of the province, viz. Nagpur, Jabalpur, Chanda, Chandni, Raipur etc. become electrified. The district Mandla still remained out of the electrification ambit (Mackie 1951:359-362). The Mandla Municipality area got electrified exactly on the 15th August of 1955. Till 1961 electricity in the district was solely confined within the Municipality area (Jagathpathi 1961: xxi-i). In the 3rd Plan (i.e. during 1960-65) some important steps for spreading electricity were taken at national level, particularly with regard to rural electrifications. By the end of 1971, as many as 70 towns and villages got electrified in the backward district of Mandla (Pandya 1971).

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