Early prehistoric signatures of man in Bastar region, Central India

Bastar region (17°40′N–20°30′N, 80°20′E–82°15′E; Figure 1), the home of the most ancient tribes[1], can potentially enlighten us about the prehistory and migrations in South Asia. Although there is sufficient information available on the Mesolithic–Neolithic cultures of Bastar[2–7], little is known about its early Palaeolithic prehistory. Here report the analysis of a good collection of 143 Stone Age implements from the Lower Palaeolithic, as old as ~50,000 kya, up to the Mesolithic–Neolithic period, dated recently to just ~7000 years ago on charcoal and burnt seeds[8]. Our brief exploratory survey conducted during December 2008–January 2009 identified 13 potential sites in the Bastar and Dantewada districts, though a thorough study was extremely difficult under the prevailing social conditions.

Exclusive Palaeolithic cultural implements were discovered from six sites, namely Dandak Cave, Barsur, Chitrakot-I, Dantewada, Kailash Cave and Nalla and Michanar, whereas the other seven sites, namely Kutumsar Cave, Chitrakot-II, Erikpal, Kangoli, Metawara, Tirathgarh and Dondrapal yielded implements which indicate cultural continuity right from the Palaeolithic up to the Mesolithic period. A brief account of these sites and findings of the analysis are presented in Figures 2 and 3, and Tables 1 and 2.

The Kutumsar–Dandak Cave complex located in the western foothill spur of the Kanger Valley National Park in Bastar District (19°00′N, 82°00′E), geomorphologically seems an ideal habitat of prehistoric man and yielded the Mesolithic implements which could be ~7000 years old on the recent charcoal dates[8]. The area closer to this cave complex is presently inhabited by the Dhurva tribe, who practice agriculture supplemented by forest produce. The Dandak Cave, located just within the 5 km of the Kutumsar Cave, yielded a number of limestone handaxes, ficrons and scrapers of the Middle Palaeolithic typology, some of them found in stratified/*in situ* contexts.

The left bank of River Indravati in Chitrakot-I takes a horse-shoe-shaped course which yielded four heavily rolled quartzite Palaeolithic artefacts bearing marks of river transportation of the material from the right bank. At the latter a flat, rocky surface of the foothill is an ideal prehistoric habitat where we found tiny implements made of chert, chalcedony and quartz, and numerous cores and waste flakes on the surface which certainly indicated a microlithic factory site of the Mesolithic man.

Michanar is another site 15 km south of Chitrakot; its western escarpment presents an interesting topographical contrast with respect to the northern face. A 160 cm thick section of the Jori Nala tributary proved important from the archaeological lithostratigraphic point of view. It is comprised of the bottom boulder gravel bed, succeeded upward by layers of sandy-clay, yellowish loamy–clayey soil, quartz vein, loose kankar with small gravel, and reddish silty and sandy kankar soil. A number of Lower Palaeolithic flake and core handaxes, cleavers, and choppers made on sandstone were noticed lying in the stratified *in situ* contexts; some were on the eroded surface.

The Kailash Cave/Kailash Nala site is on a gravel bed of the palaeo-channel; its bedrock is schist overlain by loose gravel with clay, loamy clay with kankar, and yellowish-brown soil on the top, interspersed with kankar and rock chunks. It yielded two Middle Palaeolithic scrapers made of shale and chert found in the stratified and open contexts respectively.

At Barsur on the bed of Indravati, a mixed assemblage of the Lower, Middle and Upper Palaeolithic implements was discovered, which included handaxes, cleavers, choppers and scrapers of different types made on quartzite and chert. Another riverbed site on the Dankini – a tributary of the Indravati at Dantewada yielded limestone and quartzite implements of different kinds – cleavers, choppers, discoids and scrapers of the Lower and Middle Palaeolithic typology.

The Tirathgarh site is located on a rocky surface and yielded a number of quartzite, quartz and chert scrapers, arrowhead points of the Middle Palaeolithic to Mesolithic typology. The Dondrapal is an eroded laterite surface which yielded a number of Lower to Middle Palaeolithic spheroids and scrapers made of quartzite. Likewise, the Erikpal site is located on a slightly elevated and partly eroded reddish-yellow lateritic surface, which yielded a number of chert implements, notably scrapers of the Middle Palaeolithic to the Mesolithic cultural levels. Another site, Kangoli as a hilltop flat, yielded many Middle Palaeolithic scrapers and handaxes on shale and the microliths on chert. Lastly, the Metwada site on the hill slope along the eastern bank of the Indravati, 8 km north of village Asna, near Jagdalpur, yielded a number of scrapers, points and picks of

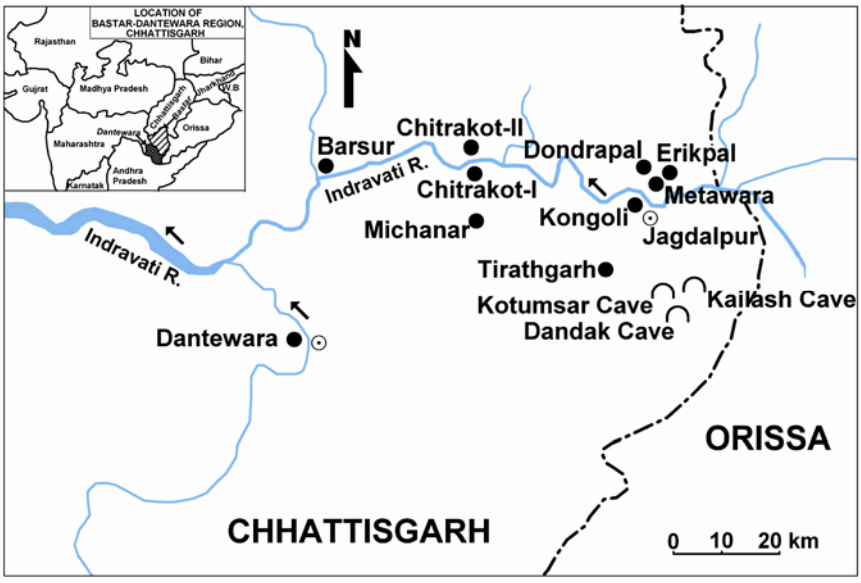

Figure 1. Map of Bastar region, Chhattisgarh, Central India showing the prehistoric sites discovered and explored.

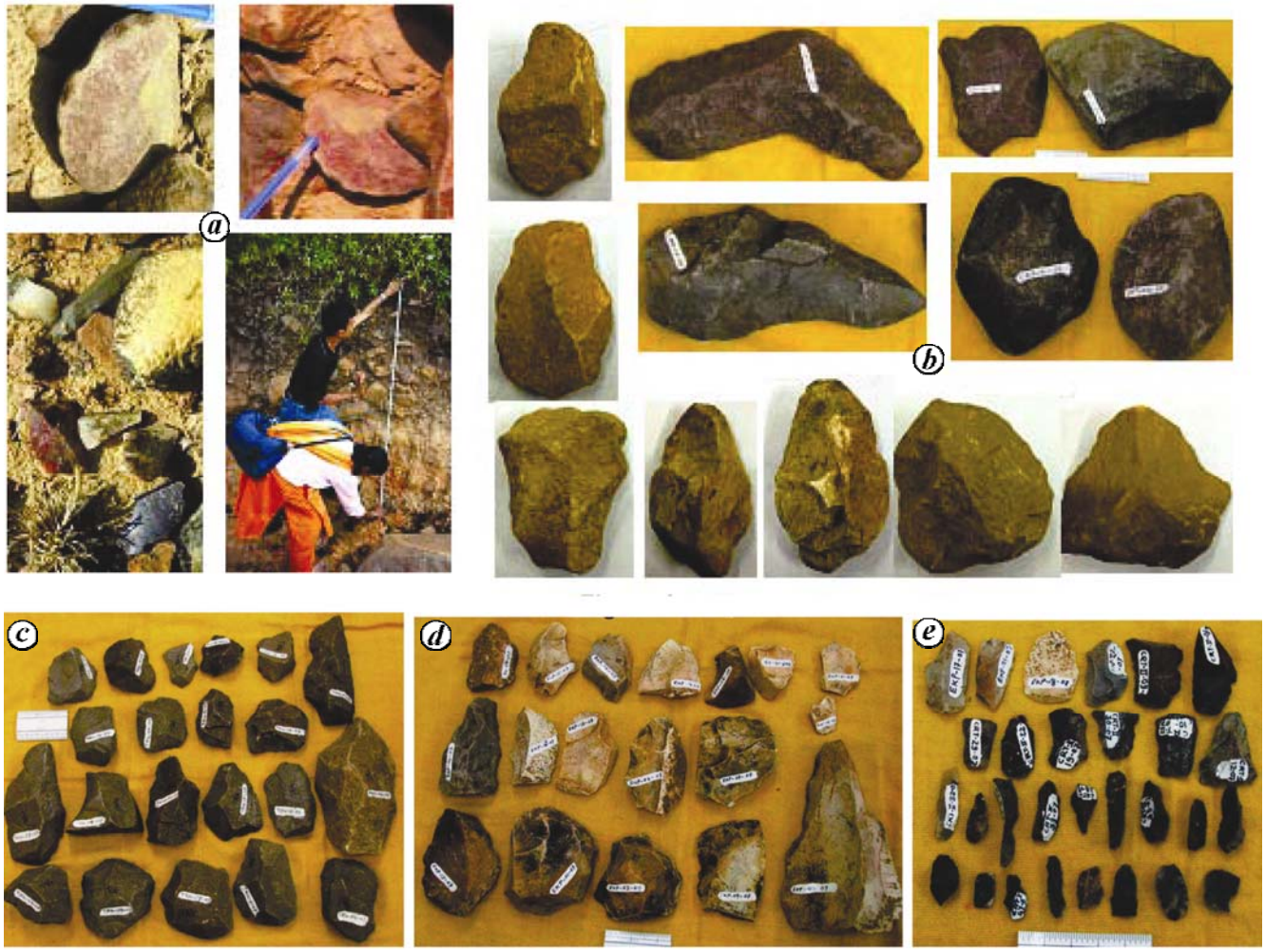

Figure 2. ***a***, Lithostratigraphy showing the implements *in situ* (arrows); ***b***, Lower and Middle Palaeolithic implements; ***c*** and ***d***, Middle Palaeolithic implements and ***e***, Mesolithic implements recovered.

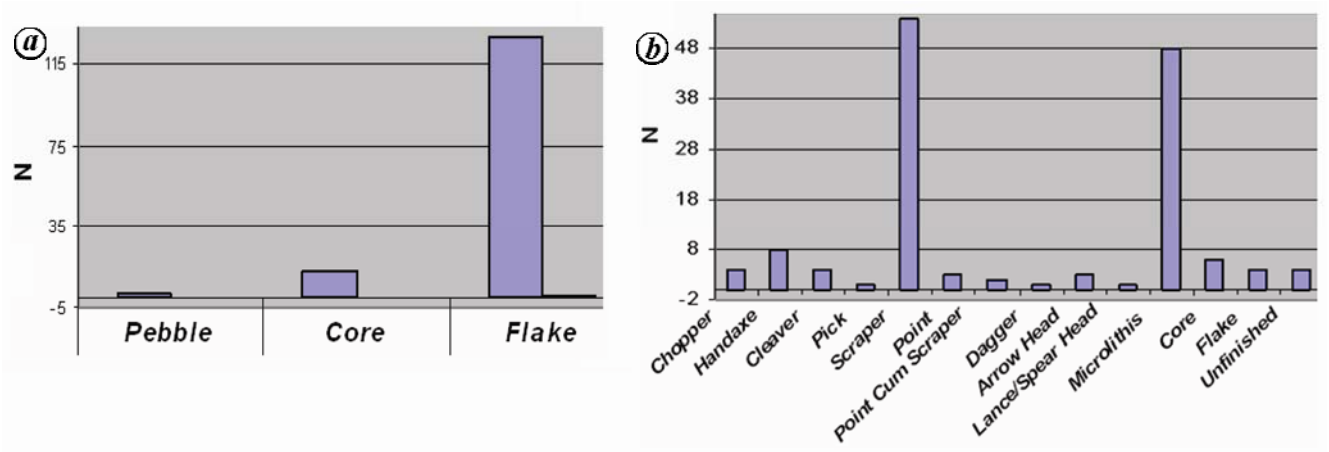

Figure 3. ***a***, Frequency of the major stone implement types recovered from Bastar. ***b***, Typological distribution of the stone implements in Bastar.

the Lower Palaeolithic to the Mesolithic industries made on shale, quartzite, chert and limestone.

In all 143 Stone Age implements were collected, classified into various standard types and their frequencies calculated as presented in Tables 1 and 2. A number of important inferences may be drawn from the present study. The collection represents almost all major types of Palaeolithic to the Mesolithic implements, namely handaxes, picks, ficrons, choppers, cleavers, discoids, spheroids, scrapers, spears or lance-heads, boomerang or curved dagger and arrow points. Quartzite

Table 1. Frequency distribution of the Stone Age implements based on the mother core used in various localities explored in the Bastar region

	Pebble		Core		Flake		
Site	*N*	Percentage	*N*	Percentage	*N*	Percentage	Total
Barsur	0	0	0	0	6	100	6
Chitrakot-1	1	25	0	0	3	75	4
Chitrakot-II	0	0	4	8.33	44	91.66	48
Dandak	0	0	1	25	3	75	4
Dantewada	0	0	2	50	2	50	4
Dondrapal	1	50	0	0	1	50	2
Erikpal	0	0	0	0	22	100	22
Kailash	0	0	0	0	2	100	2
Kongoli	0	0	1	16.66	5	83.35	6
Kutumsar	0	0	1	20	4	80	5
Metawada	0	0	–	–	8	100	8
Michanar	0	0	3	33.33	6	66.66	9
Tirathgarh	0	0	1	4.34	22	95.65	23
Total	2		13		128		143

Table 2. Typological distribution of the Stone Age implements in different localities explored in the Bastar region

Tool type	*N*	% Palaeoliths (*N* = 81)	% All (*N* = 143)
Chopper	4	3.24	2.79
Handaxe	8	6.48	5.59
Cleaver	4	3.24	2.79
Pick	1	0.81	0.69
Scraper	54	43.74	37.79
Point	3	2.43	37.79
Point-cum-scraper	2	1.62	1.39
Boomerang/dagger	1	0.81	0.69
Arrowhead	3	2.43	2.09
Lance/spearhead	1	0.81	0.69
Sub-total (Palaeolithic)	81	65.61	
Microliths	48		33.56
Core	6		4.19
Flake	4		2.79
Unfinished	4		2.79
Pebble tools	2		1.39
Core tools	13		9.09
Flake tools	128		89.51
Grand total	143		99.93

is found as the preferred Palaeolithic raw material, but other available materials like limestone, shale, quartz and chert were also used.

As a general observation, stone implements were found in abundance in sites near water and food sources, e.g. near Chitterkot waterfalls (74.4%), Tirathgarh (32.9%), Erikpal (31.5%), Michanar (12.9%) and Metawada (11.4%). All sites show a striking preponderance of the flake and blade industries of the Middle to Upper Palaeolithic and Mesolithic typology (89.5%), followed by core tools (9.1%) and a negligible frequency of the pebble tools (1.4%) of Lower Palaeolithic typology indicating Late Acheulian affinities.

Earlier scholars[2–8] believed that the Bastar caves were occupied by the Mesolithic–Neolithic men not earlier to ~7000 years ago, but the present findings of the artefacts confirm the presence of prehistoric man in Bastar region, occupying the caves as early as 50,000 years ago. This is in agreement with other places in Central India, e.g. the Vidhyan and Satpura caves and rock-shelters of Bhimbetka and Adamgarh occupied as early as ~40 kya, the Betadomba Lena in Sri Lanka ~30 kya, the Arago and Nice caves in southern France and the Choukoutian in China where the Lower Palaeolithic implements are >100 kya.

The Late Acheulian Lower Palaeolithic implements of Bastar are similar to those of the Central Narmada valley industries associated with the 'evolved' *Homo erectus*[9] or 'archaic' *Homo sapiens*[10–15]. It appears that prehistoric man penetrated into the Bastar region as a result of gradual southeastward expansion of the Narmada valley hominins[16] at the terminal phase of the Lower Palaeolithic and flourished in the region during the Middle to Upper Palaeolithic and continued up to the Mesolithic. This is further attested by the rich assemblages of the Upper Palaeolithic through Mesolithic and Neolithic recovered from the upper Indravati basin in Koraput District[17,18] which indicate a favourable route of prehistoric migrations across eastern/Central India. The Bastar region needs thorough palaeoanthropological and archaeological explorations and excavations.

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Petrographic signatures of marine inundation from the Barakar coal measures of Mahanadi–Ib Valley, Orissa, India

Onset of Gondwana sedimentation in peninsular India marks the end of a long phase of non-deposition since the late Proterozoic. The coal-bearing late Palaeozoic Gondwana successions are distributed in a number of isolated basins along the prominent lineaments demarcated by the present-day river valleys of the Indian peninsula, and are long believed to be a thick pile of continental sediments of fluvial origin[1,2]. Though marine Palaeozoic sequences are recorded from across the globe, e.g. South Africa (Karoo basin), South America (Paraná basin, Brazil), Australia (Hunter Valley Area, New South Wales), Madagascar, etc., little is known about the palaeo-sea conditions during the Permo-Carboneferous in peninsular India and is still an important issue in the Gondwana stratigraphy of India. Discovery of marine fossils from Umaria of Rewa basin by Sinor[3] and their description by Reed[4] added a new dimension to the idea about the depositional environment of these rock successions. Subsequently, marine influences in the Gondwana successions were reported from the Talchir Formation[5–8].

We report here some of the peculiar petrographic evidences from the Barakar coal measures which are uncommon in the Gondwana succession of India and are indicative of marine influence.

The samples were collected from the Lajkura seam of Samleswari Mines, Lakhanpur Coalfield (21°45′N, 83°40′E), Mahanadi–Ib Valley, Orissa. Geology of the area is shown in Figure 1 *a*. Stratigraphic succession is presented in Table 1. Petrographic studies were carried out following IS 9127/ISO 7404 standard, and proximate and ultimate analyses carried out following the procedure given in IS 1350 standard. The results are given in Table 2. Leica-make polarized light microscope was used to measure the per cent reflectance and for maceral analyses.

The coals studied are sub-bituminous type with reflectance values in the range 0.43–0.45%. The range of major group of macerals (on mineral matter basis) are vitrinite 31.4–43.8%, liptinite 12.2–17.8% and inertinite 21.4–25.5%. We report here from the studied coals two prominent features which are seldom found in Indian Gondwana coals, i.e. phlobaphinite and framboidal pyrites. Figure 2 *a* and *b* shows the development of plate-like phlobaphinite along with the vitrinite groundmass. Such plate-like phlobaphinites are reported especially in bark tissues, in particular cork. Characteristic cork tissues are well known from coals of marine origin. Phlobaphinites are chemically and structurally resistant and indicate a highly anoxic environment[10]. A few corpocollinites are observed in the studied samples (Figure 2 *c*). Corpocollinites share characters with the phlobaphinites and are indicative of a marine origin. Some typical funginites are also found (Figure 2 *e*). Sulphur content in the samples was >1% (Table 2); thus is rare in Indian Gondwana coals. Based on studies on the distribution of sulphur in modern peat-forming environments of southern Florida, Cohen *et al*.[11] established that marine to brackish peat contains more pyrite (and total sulphur) than the freshwater type.

Close association of framboidal pyrite and phlobaphinite in the samples further strengthens the idea of a marine influence. The earliest formed pyrites are usually preserved as framboids and are pre-compactional forms[12]. This precompactional pyrite is related to the influx of marine aqueous sulphate after deposition of the peat[13]. Figure 2 *d* shows the incipient developments of pyrite framboids on the organic substrate and illustrates the colonial mode of development of spherical pyrite framboids. Figure 2 *e* shows