



Middle Palaeoliths in a Microlithic Landscape: Analyzing Tool Assemblage on Rocky Outcrops in the Upper Baitarani Valley, Keonjhar District, Odisha

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Abstract: This study presents the results of an exploration of the Upper Baitarani valley in Keonjhar district, Odisha, with particular reference to the semi-elevated and elevated granitic rock outcrops in the Musakhari localities of the Patana block. Notably, the entire Musakhari region and surrounding areas show numerous microlithic sites, with no evidence of earlier cultural materials; however, only the Musakhari locality-II site shows Middle Palaeolithic, late/Upper Palaeolithic, and microlithic tool assemblages. The most interesting aspect of the lithic assemblage recovered from the Musakhari-II site is the predominance of Levallois elements, including prepared and discoidal cores, flakes, points, scrapers of various types, and a very small number of parallel-sided and elongated blades and bladelets. The lithic assemblage also includes a microlithic tool assemblage comprising cores, flakes, and numerous finished tools. The artefacts recovered from the site are made from quartzite, dolerite, and silicified cryptocrystalline rocks, which were imported from the nearest hills and riverbeds as large blocks, pebbles, and cobbles. The raw materials were most probably imported from the Baitarani river valley, about 10 kilometres north of the Musakhari site, and were also available on the Sita River, a tributary of the Baitarani, situated nearly 3 kilometres from the site. The assemblage recovered from the site is predominantly flake-based, and the flakes are made exclusively from locally available rock sources. In terms of raw material use for tool production and other aspects, the studied assemblage markedly differs from sites with large-flake tools widely distributed in other parts of Odisha, where artefacts are predominantly made from medium- to fine-grained quartzite. However, in the upper Baitarani valley, dolerite is utilised alongside quartzite, which is abundantly available in the northern highlands and within extensive dolerite dykes. This highlights the variability of lithic assemblages in the region.

Keywords: Rock-Outcrop, Levallois, Prepared Core, Flakes, Crypto-crystalline, Discoidal Cores, Middle Palaeolithic and Microliths, Holocene, etc.

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Introduction

The study of prehistoric stone tool industries offers insight into the technological, behavioural, and demographic development of early human populations. In South Asia, the archaeological record is particularly rich and complex, with evidence for both Middle Palaeolithic and microlithic (Late Palaeolithic/Mesolithic) industries often found in overlapping or adjacent contexts. Traditionally, the Middle Palaeolithic is associated with flake-based technologies—most notably the Levallois and discoidal core reduction methods—while microlithic industries are characterised by the production of small, retouched blades, bladelets, and geometric microliths, frequently used as components of composite tools. The presence of Middle Palaeolithic artefacts in regions long considered dominated by microlithic assemblages challenges linear models of technological progression and raises critical questions about the nature of human occupation, technological transitions, and the behavioural flexibility of prehistoric populations (Akhilesh, 2018). The chronological framework for the Middle Palaeolithic and microlithic industries in South Asia has been significantly refined in recent decades, primarily through advances in luminescence dating (OSL, TL), radiocarbon dating, and tephrochronology (notably the Toba ash marker at ~74 ka). The Middle Palaeolithic in India is now recognised to have emerged as early as 385 ± 64 thousand years ago (ka) at sites such as Attirampakkam, and to have continued until at least 40 ka, possibly later in some regions (Akhilesh, 2018). Microlithic industries, on the other hand, appear in the archaeological record from around 45–42 ka (e.g., Mehtakheri, Patne, Mahadebbera, Kana and Jwalapuram), with some evidence for even earlier occurrences in Sri Lanka and Eastern India (Mishra *et al.*, 2013; Basak *et al.*, 2014; Basak *et al.*, 2023; Clarkson *et al.*, 2009). The habitation history of Odisha extends back to prehistoric times. Situated on the northern fringes of the Eastern Ghats and the extension of the Chhotanagpur plateau, Odisha is characterized by its diverse landscape, which includes hills, forests, rivers, and plains. This geomorphological setting creates an ideal environment for prehistoric human habitation. Keonjhar, in particular, is located at the convergence of the Gondwana Formation, the Chhotanagpur Plateau, and the Eastern Ghats, offering a favourable climate and topography that support the development of residential and cultural environments for its inhabitants. Consequently, one observes a long, continuous history of the people of Keonjhar.

Prehistoric colonisation across various regions of India has been the focus of extensive scholarly research. Processual archaeological methods, such as debitage analysis, radiometric dating (e.g., beryllium dating) for tools, and other analytical techniques, have been employed to map prehistoric human settlements. Recently, numerous archaeological surveys and excavations have pushed back the dating of the Palaeolithic period in Odisha to an earlier age. However, the tribal forested highlands and plateaus of Keonjhar district in Odisha haven't received attention from archaeologists, except for the limited exploration by G. C. Mohapatra, Pradeep Mohanty, Rajendra Dehuri, and Bashanta Mohanta (Mohapatra, 1962; Mohanty, 1989; Dehuri, 2013; Mohanta, 2002). The present work aims to map the prehistoric stresses of the Upper Baitarani River Valley. Extensive fieldwork over four seasons has led to the discovery of tool assemblages spanning from the Lower Palaeolithic Period to the Neolithic period. The abundance of pebble deposits, diverse plant and animal species, and stone tools near the riverbanks indicates long-term human colonization in this area from the Middle Pleistocene onward. During our field survey in the Musakhari area, a large number of Middle Palaeolithic and Upper Palaeolithic artefacts were found in a semi-primary context, and Microlithic tools were scattered on the semi-elevated granitic rock outcrops in the Musakhari Locality-II region. The most interesting aspect of the lithic assemblage recovered from this site is the predominance of Levallois and Non-Levallois elements, including cores, flakes, and finished tools made from medium- to fine-grained

Quartzite and Dolerite. Notably, the lithic assemblage is predominantly a flake-tool industry; blades and bladelets are present in smaller numbers, and all tools are produced from locally available rock sources. The flakes are exclusively made from locally available rock sources. However, in the upper Baitarani valley, dolerite is utilised alongside quartzite, which is abundantly available in the northern highlands and within extensive dolerite dykes. This highlights the variability of Middle Palaeolithic assemblages in the region. For the production of microliths, cryptocrystalline siliceous rocks were used, which are readily available on riverbeds and in nearby hills as large or small blocks, pebbles, and cobbles.

Prehistoric Research in the Study Area

The archaeological potential of the study area was earlier reported by G.C. Mohapatra (1962), who noted that, stratigraphically, Middle Stone Age tools occurred in a layer of fine gravel above a layer of clay or red silt. These red silts distinctly separate the fine gravel from the coarse gravel, yielding the tools of the early Stone Age. Scraper, borer, burin and scraper-borer were the regular tool types, and utilised flakes, nodules, cores and blades occurred in suitable proportions. These tools were manufactured on fine-grained quartzite, chert, jasper, opal, or occasionally on chalcedony. Mitra and Ghosh (1958-59) also reported some Neolithic artefacts in the Danguaposi, Ghatagaon, Jagannathpur and Kunar area of Keonjhar district (IAR, 1958-59: 37-38). They collected a huge number of Neolithic tools in different localities. Among the stone artefacts apart from the polished stone Celts, many shoulder Celts, adzes, axes, bar Celts and chisels are recovered in these areas. A small-scale exploration was conducted by Chakrabarti and Chattopadhyay (Chakrabarti & Chattopadhyay, 1988) in the context of the Mayurbhanja and Keonjhar districts. The exploration work resulted in the recovery of a few microlithic tools and polished stone celts in this region. P. Mohanty's (Mohanty 1989, 1991 1992, 1993, 1998, 2000) intensive field investigations in the context of Keonjhar district in Northern part of Odisha, which is generally seen as an extension of the Chotanagapur region, for seven seasons, brought to light a large number of microlithic sites were associated with granitic outcrops while a few were found to be located in the foothills lying close to streams of Baitarani River. B. Mohanta (Mohanta, 2002), during his field investigations in the Mayurbhanj and Keonjhar districts, reported a large number of Neolithic polished stone celts, axes, adzes and many other materials associated with the Neolithic cultural period. R. Dehuri (Dehuri, 2013). During his field exploration in and around the Kakharua river valley of north-central Odisha, especially in the Keonjhar and Angul districts of Odisha, he also reported a large number of prehistoric sites in this region. Most of these sites were associated and located in the granitic outcrops, while a few were found in the foothills lying close to streams.

Geology and Geomorphology of the Study Area

The Baitarani River, a prominent river in Odisha, originates in the Guptaganga hills near Gonasika village in the Kendujhar district. It flows for 360 kilometres, joining the Brahmani at the Dhamra mouth near Chandabali, before draining into the Bay of Bengal (Senapati, 1986). The Upper Baitarani valley spans latitudes of 20°35' to 22°15' N and longitudes of 85°10' to 87°03' E. The present study area covers the north-eastern to south-eastern parts of Keonjhar district, comprising localities in and around Musakhari village in the Patana block. Geographically, the area is an extension of the Chhota-Nagpur region and is drained by the Baitarani River and its numerous tributaries, including the Kalinjari, Kukurkutia, Sita, and other small Nullahs. The average annual precipitation is 900 mm. The vegetation is tropical deciduous, and the climate is characterised by hot summers, high humidity, and

well-distributed rainfall. Geologically, Keonjhar district is rich in rock types and mineral resources. The geological formations in the district are highly diverse and consist mainly of Precambrian rocks. The Baitarani River Basin contains Quaternary and Recent unconsolidated alluvium (Figure 1). Geomorphologically, the district is dominated by dense forests and extensive hilly terrain. The landscape is characterised by undulating topography, featuring numerous fertile valleys and a variety of soils ranging from rich loam to the gravelly detritus of the hill slopes. Keonjhar district encompasses valleys, lowlands, and mountainous highlands, with a prevailing north-south slope (Figure 2). The Baitarani River and its catchment areas must have formed an equally important region in the past due to its strategic location, geography, and suitable geology for the rise of ancient settlements. The dendritic drainage pattern of the Baitarani River basin is characterised by a diverse, picturesque landscape of hills, rock shelters, and a chain of hillocks, which fosters a rich cultural heritage. Raw materials such as quartzite, limestone, quartz, chert, chalcedony, dolerite, dolomite, and others are readily available as river pebbles and cobbles, and on adjoining hill slopes as blocks and slabs. These must have provided sufficient raw materials for prehistoric settlers in the Baitarani River valley throughout the Pleistocene.

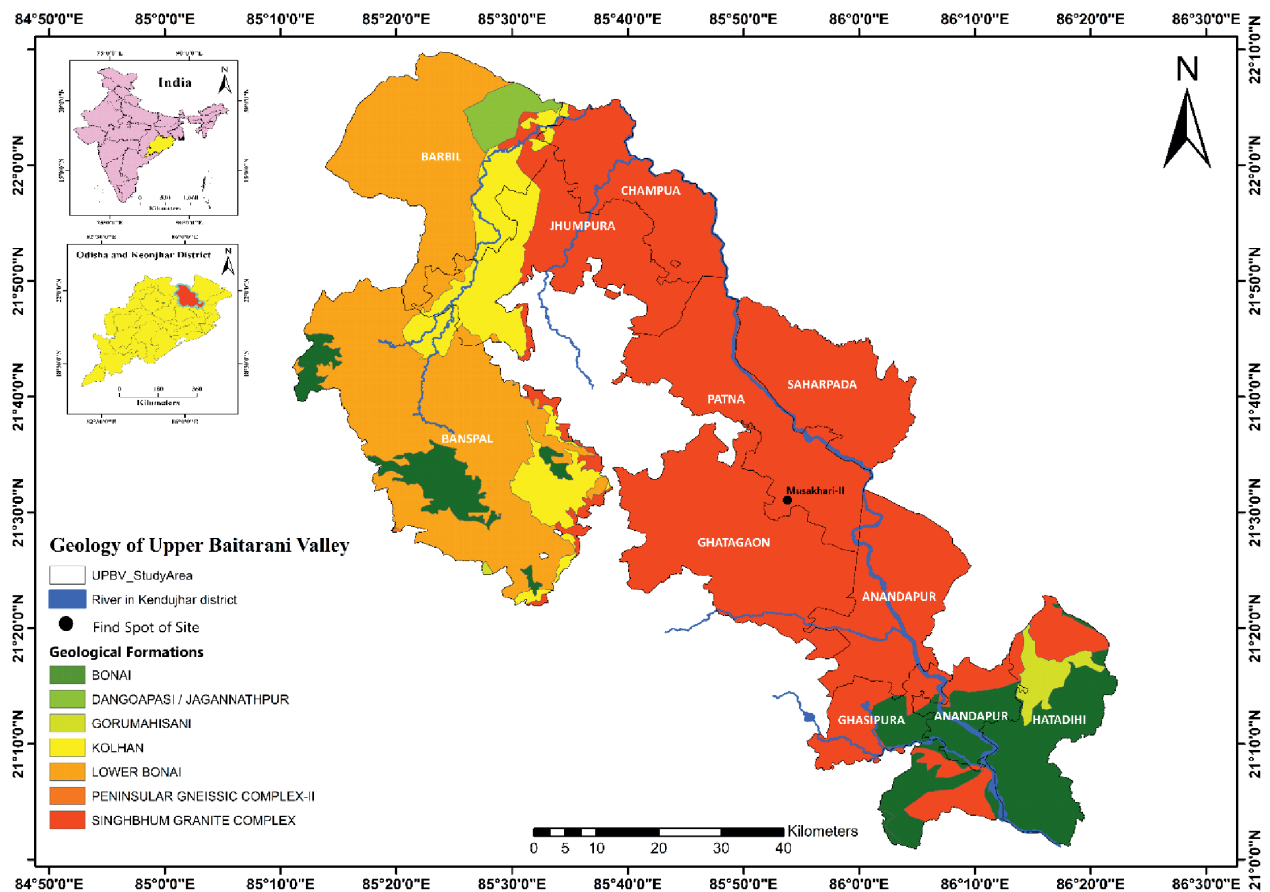


Fig. 1: Location of the upper Baitarani valley and its associated Geological formations.

Table 1: Distribution of Prehistoric Sites in the Sita & Kukurkuta Rivers

Sl No.	Site Name	Block	Context	Cultural Materials	River System	Latitude / Longitude
1	Dehuripasi (DHP)	Ghatagaon	River bank	Microlithic	Kukurkuta River	21°27'24"N 85°52'59"E
2	Panupasi (PNP)	Ghatagaon	River bank	Microlithic	Kukurkuta River	21°29'28"N 85°53'23"E

Sl No.	Site Name	Block	Context	Cultural Materials	River System	Latitude / Longitude
3	Kaspada-I (KPD-I)	Ghatagaon	Foothill	Neolithic & Microlithic	Sita River	21°30'54"N 85°51'03" E
4	Kaspada-II (KPD-II)	Ghatagaon	Granite Rock Outcrop	Microlithic	Sita River	21°31'15"N 85°51'41" E
5	Dhinkikot (DKT)	Ghatagaon	Granite Rock Outcrop	Upper Palaeolithic & Microlithic	Sita River	21°50'55"N 85°82'79"E
6	Musakhari-I (MKR-I)	Patana	Granite Rock Outcrop	Upper Palaeolithic & Microlithic	Kasia Nala	21°33'19"N 85°53'35"E
7	Musakhari-II (MKR-II)	Patana	Granite Rock Outcrop	Lower, Middle Palaeolithic, Upper Palaeolithic & Microlithic	Kasia Nala	21°34'23"N 85°52'38" E
8	Kumudabadi-I (KMBD-I)	Patana	Granite Rock Outcrop	Microlithic	Perennial Stream	21°33'02"N 85°55'40"E
9	Kumudabadi-II (KMBD-II)	Patana	Granite Rock Outcrop	Microlithic	Perennial Stream	21°32'57"N 85°55'42"E
10	Kumudabadi-III (KMDB-III)	Patana	Granite Rock Outcrop	Microlithic	Perennial Stream	21°33'02"N 85°55'46"E
11	Dangidhar (DGR)	Patana	Granite Rock Outcrop	Microlithic	Kasia Nala	21°.56'65" N 85°.86'94" E
12	Pichilabeda-II (PBD-II)	Patana	Erosional Surface	Microlithic	Perennial Stream	21°32'50"N 85°58'03"E

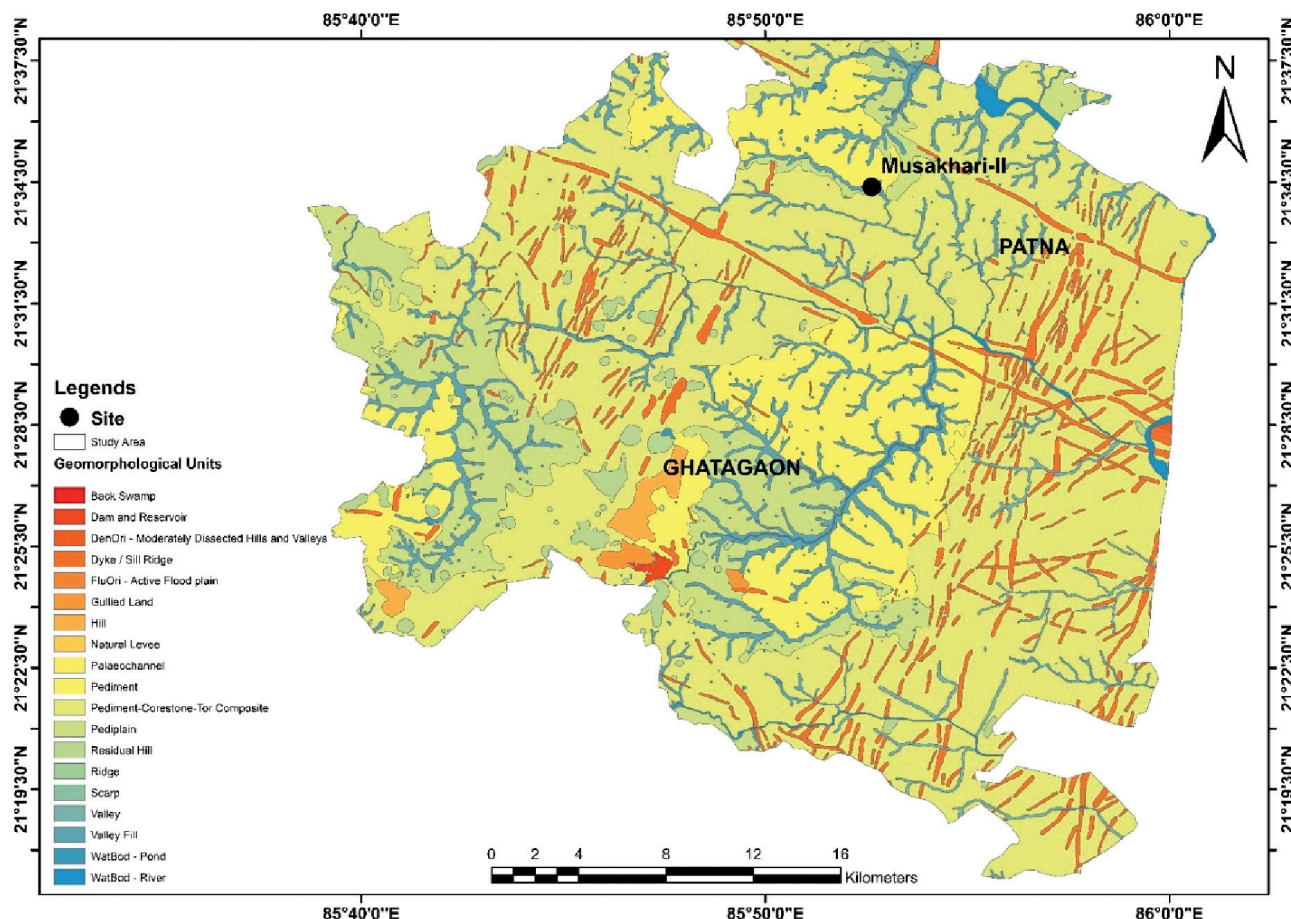


Fig. 2: Geomorphological Map of the study area.

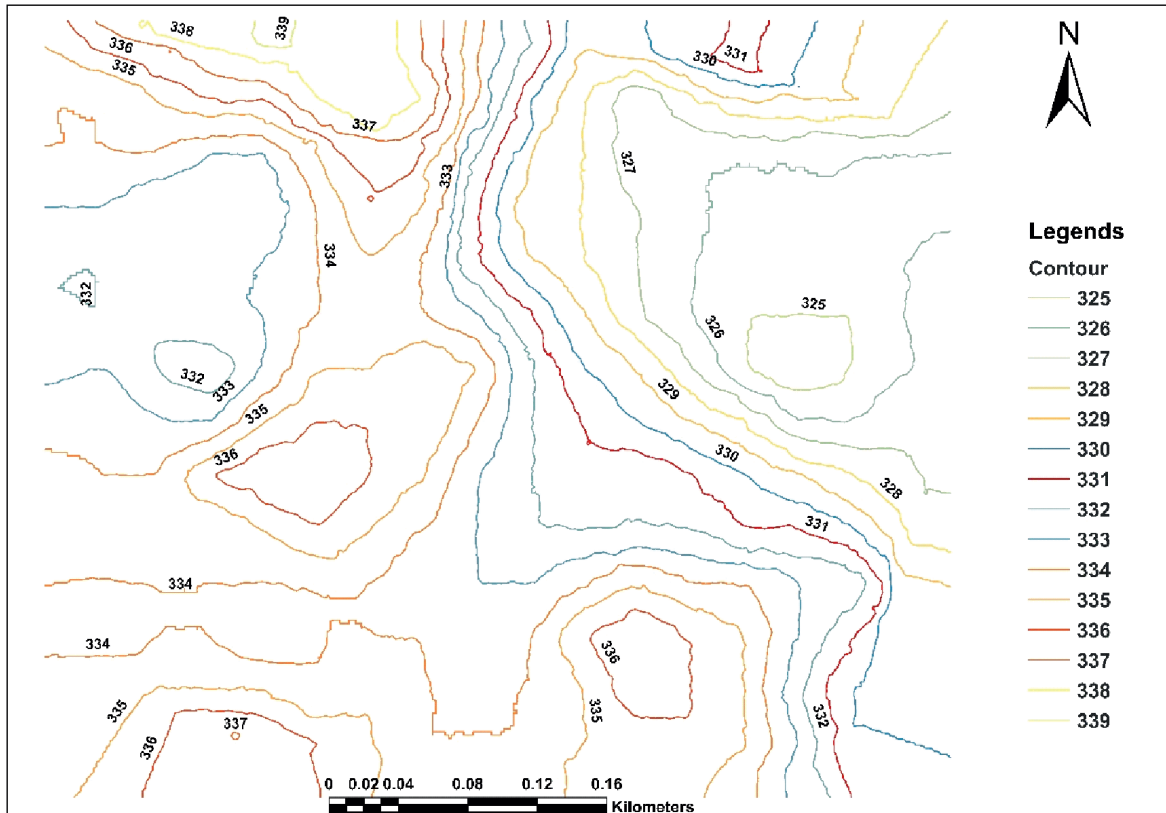


Fig. 3: Contour map of the Musakhari-II site.

Field Survey & Distribution of Sites

During our field investigations in the Ghatagaon and Patana blocks of Keonjhar districts, a total of *twelve* prehistoric sites were reported (Table 1). All these sites were located on the banks of the Sita and Kukurkuta rivers and along their numerous nullahs in the Upper Baitarani Valley. The recovered sites were found in three geomorphological contexts: 1. sites on the river banks, 2. sites on the foothill, and 3. sites on the granitic rock outcrops. Notably, the entire Musakhari region and surrounding areas show numerous microlithic sites, with no evidence of earlier cultural materials; however, only the Musakhari locality-II site shows Middle Palaeolithic, late/Upper Palaeolithic, and microlithic tool assemblages (Figure 4). The most interesting aspect of the lithic assemblage recovered from the region is the predominance of Levallois elements, including prepared and discoidal cores, flakes, points, scrapers of various types, and a very small number of parallel-sided and elongated blades and bladelets. The lithic assemblage is also associated with a microlithic tool assemblage comprising cores, flakes, and a large number of finished tools. In addition, a limited number of ground and polished tools were found in this region. The artefacts recovered from the site are made from quartzite, dolerite, and silicified cryptocrystalline rocks, which were imported from the nearest hills and riverbeds as large blocks, pebbles, and cobbles. The lithic assemblage recovered from these sites is predominantly flake-based, and flakes are exclusively made from locally available rock sources. In this paper, only the Musakhari-II site is used for the study due to its unique findings.

The Nature and Assemblage Composition of the Musakhari-II Site

The Musakhari, Locality-II site is situated on a granitic rock outcrop, approximately 5 kilometres from the left side of NH-220, between Dhinkikot market and Patana road. It is positioned on the left

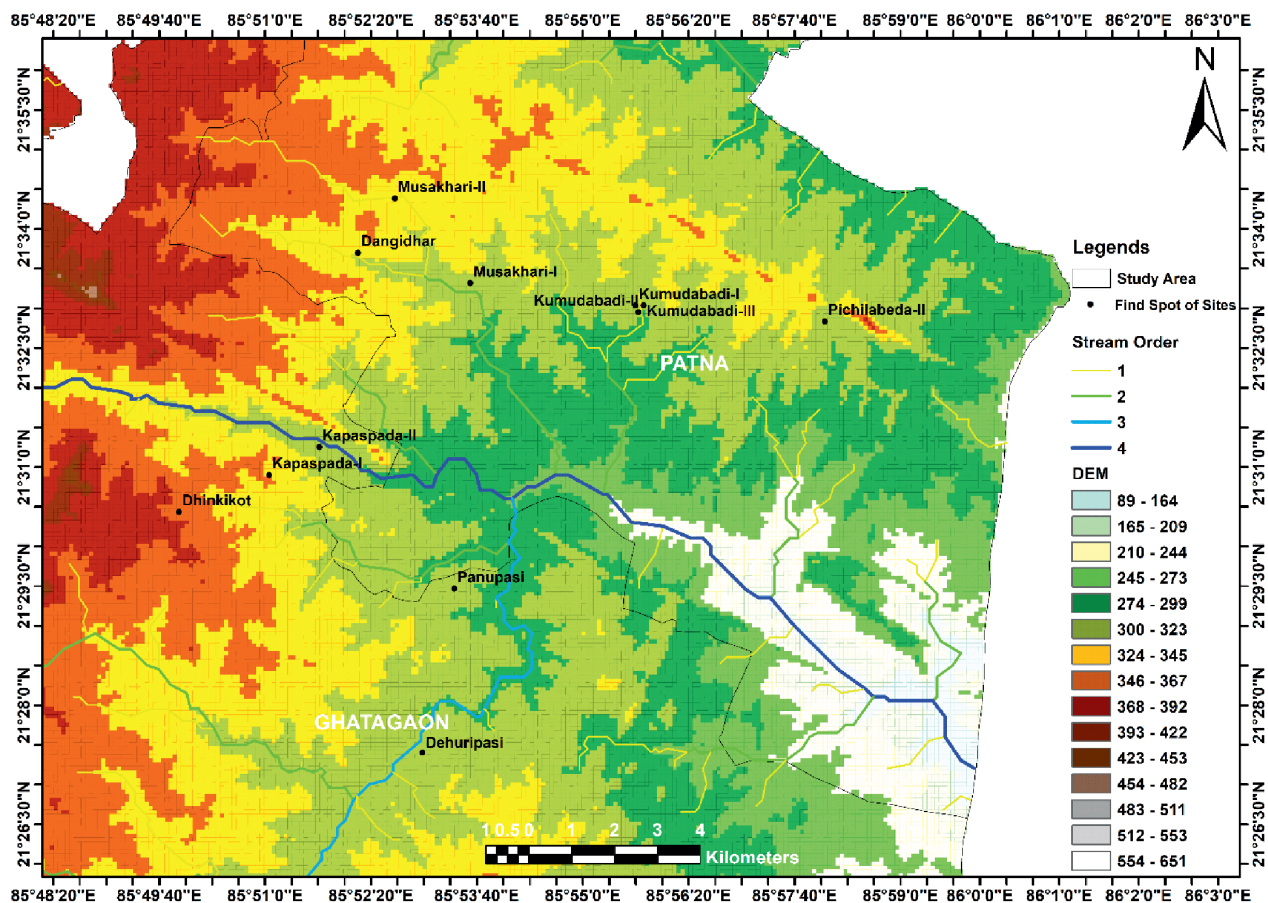


Fig. 4: Site distribution map of the Musakhari area

bank of a small perennial streamlet, known locally as Kasia Nullah, and is surrounded by two other streamlets that converge with Kasia Nullah to the east of the site. The site is located on the eroded surface of a high, elevated, rocky knob near the Nullah bank. The Musakhari region has evidence of microlithic tools recovered from various localities around the area (Figure 4). The site is situated at an elevation of 339 meters above mean sea level and encompasses an area of approximately 230 square meters (Figure 3). The erosional surface of the rock outcrop exhibits artefactual scatter, with some parts of the site showing signs of partial destruction due to extensive soil quarrying and modern anthropogenic activities (Figure 5). In this context, the microliths are discovered in conjunction with a limited number of core tools and significant retouched flake tools adjacent to the erosional surface of the granite rock outcrop (Figure 6). The exposed surface on the rock outcrop is yellowish-brownish-coloured sandy, silty clay deposits mixed with quartz, dolerite, chert and calcrete nodules on which the stone artefacts were found. Artefacts were randomly collected from the surface of a small portion of the site measuring 15m x 15m, which yielded 186 artefacts.

Lithic assemblage composition

The site designated for artefact collection yielded a total of 186 artefacts, as presented in Table 2. This collection comprises cores at various stages of reduction (11.83%), debitage (20.43%), shaped tools (56.45%), and manufacturing waste products (11.29%). Among the overall tool assemblage, microliths (n=141; 78.80%) and large flake tools (n=45; 24.19%) of the Palaeolithic period were recovered from the Musakhari-II site. The overall assemblage composition clearly indicates that flakes not only



Fig. 5: General view and artefact scatter of the Musakhari-II site.



Fig. 6: Close-up view of a Levallois core on the surface of the Musakhari-II site.

dominate the debitage class but also that the majority of the shaped tool category has been made from them. The artefacts collected from both the slopes and the tops of the rock outcrops are uniformly thin, patinated, and moderately abraded, and often bear encrustation on their surfaces, indicating their depositional context. Despite the slope of the granitic rock outcrop and recent anthropogenic activities, the majority of the artefacts recovered are in good physical condition.

Table 2: Lithic Assemblage composition of the Musakhari-II site

Artefact Category	Numbers	Percentage
Core	22	11.83
Flake/Debitage	38	20.43
Shaped Tools	105	56.45
Chips & Chunks	21	11.29
Total	186	100.00

Raw Materials

The raw materials for the tool components collection comprise a variety of materials, including different types of quartz, quartzite, dolerite, dolomite and chert. A large number of Microlithic tools made through different crypto-crystalline rocks were collected from the site. These included various types of charts such as black chert, grey chert, green chert, white chert, banded black chert, banded grey chert, red chert, and banded red chert. Black chert, constituting 54.8% of the raw materials, emerged as the predominant type used at the site. Additionally, fine, milky, and banded varieties of quartz were utilized in the production of Microlithic tools. A minimal amount of jasper, accounting for 0.5%, was also employed in the tool manufacturing process (Figure 7).

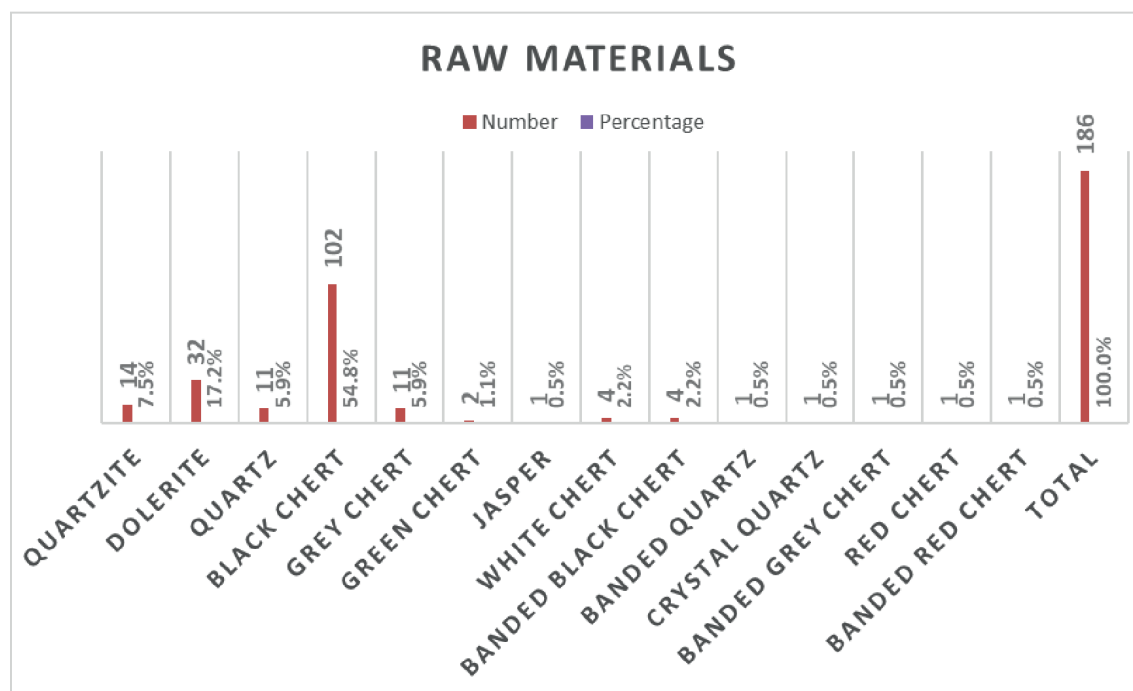


Fig. 7: Number and percentage of raw materials in the recovered tools from the Musakhari-II site.

Analysis of Lithic Assemblage

Core: To understand the blank-removal techniques adopted at the site, the available cores and debitage were subjected to morphometric analysis with respect to their blank forms, scar patterns, and the

techniques employed for blank removal (Figures 8 & 9). Based on the typo-technological aspects, six types of cores can be identified: Levallois Core, Flake-Blade Core, Flake-Bladelet Core, Blade-Bladelet Core, Blade Core, and Bladelet Core. Various types of original blank forms of the cores from which flakes were removed are identified, with the use of angular pebbles, cobbles and primary flake types of blanks being prominent (Table 3). In the Levallois cores, the back surface is mostly flat, with the remnant of the original blank form and marks of prepared platforms around it, while the dorsal surface retains the typical convexity with centripetal negative scars. The striking platform types of the majority of cores are found to be plain, cortical, prepared, and dihedral.

Table 3: Core types and different blank forms within the overall lithic assemblage

Core Type	Blank Form					Total	
	Angular Pebble	Angular Cobble	Flake	Chunk	Indeterminate	N	%
Levallois Core		1				1	4.55
Flake-Blade Core	2	1	1			4	18.18
Flake-Bladelet Core	1	1	1			3	13.64
Blade-Bladelet Core	2	1	1	1		5	22.73
Blade Core	2	1	2	1		6	27.27
Bladelet Core	2				1	3	13.64
Total No.	9	5	5	2	1	22	100



Fig. 8: Discoidal cores found from the Musakhari-II site.



Fig. 9: Microlithic cores from the Musakhari-II site.

Debitage: In thedebitage category, a large number of unmodified blanks, including Levallois flakes, cortical flakes, non-cortical flakes, bladedebitage, and bladeletdebitage, were recovered from the Musakhari-II Site (Figures 10 & 11). With the flake blanks, a number of chips and chunks were also recovered from the site, which were produced during core reduction. During flake removal, three main flaking patterns were observed in thedebitage category: unidirectional, bidirectional, and perpendicular (Table 4). A unidirectional flaking pattern is observed on most flakes, and a bidirectional pattern is also common. Like the flaking pattern, the striking platform types were also studied; they included plain, faceted, dihedral, prepared, cortical, and thinned. Among them, the plain, cortical and prepared types of striking platforms are more numerous within the overall tool assemblage (Table 5). In addition, the flake termination pattern is studied; among these, the step, hinged, and punctiform types are prominent. The breakage pattern in the proximal, distal and lateral ends of the tools was analysed.

Table 4: Debitage types and their flaking patterns

Debitage Type	Flaking Pattern			Total	
	Uni-directional	Bi-directional	Perpendicular	N	%
Levallois Flake		1		1	1.69
Cortical Flakes	6	5	1	12	20.34
Non-Cortical Flakes	4	3	1	8	13.56
Bladedebitage	8	2		10	16.95
Bladeletdebitage	6	1		7	11.86
Chips & Chunks	17	4		21	35.59
Total No.	41	16	2	59	100.00
Percentage	69.49	27.12	3.39		

Table 5: Debitage types and their striking platforms

Debitage Type	Striking Platform						Total	
	Plain	Faceted	Dihedral	Prepared	Cortical	Thinned	N	%
Levallois Flake				1			1	2.63
Cortical Flakes	5	2			8		15	39.47
Non-Cortical Flakes	4	1	1	3		1	10	26.32
Blade debitage		1	2	1		4	8	21.05
Bladelet debitage	2		1		1		4	10.53
Total No.	11	4	4	5	9	5	38	100.00
Percentage	28.95	10.53	10.53	13.16	23.68	13.16		



Fig. 10: Middle Palaeolithic Flakes found from Musakhari-II Site.



Fig. 11: Microlithic Flakes recovered from the Musakhari-II site.

Shaped Tools: In the macro assemblage composition of Musakhari-II, the distribution of tools within the n-186 assemblage, of which 105 are shaped tools (Table 6), is as follows: flake 20.43%, core 11.29%, blade 3.23%, bladelets 6.99%, burin 2.15%, borer 5.38%, backed blade 1.08%, microblade 11.83%, cleaver 0.54%, side scraper 1.61%, Levallois point 3.76%, concave scraper 1.61%, double-sided scraper 2.69%, scraper cum borer 1.08%, notch 2.69%, end scraper 1.61%, Levallois core 0.54%, micro scraper 9.14%, and point cum borer 0.54%. Compared with cores, flake tools are the dominant type in the site’s overall tool assemblage. In addition, chips and chunks (10.75%) are present in small quantities. The core group comprises mainly flake, blade, and bladelet cores. Apart from these, heavy-duty tools, primarily consisting of one cleaver, single- and double-sided scrapers, round scrapers, and end scrapers, were recovered from the site across the Lower, Middle, and Upper Palaeolithic periods (Figures 12 to 17). Levallois cores and points of the Middle Palaeolithic period were recovered from the site. A few large-sized, parallel-sided, and elongated blades and scrapers of different varieties, made on dolerites and quartzites of the Upper Palaeolithic period, were recovered from the site.

Table 6: Number and Percentage of Shaped tools from Musakhari-II site.

<i>Tool Types</i>	<i>Number</i>	<i>%</i>
Blade	6	5.71
Burin	4	3.81
Bladelets	13	12.38
Borer	10	9.52
Backed Blade	2	1.90
Micro blade	22	20.95
Single Sided-Scraper	3	2.86
Cleaver	1	0.95
Borer-cum-Awl	1	0.95
Levallois Point	7	6.67
Concave Scraper	3	2.86

<i>Tool Types</i>	<i>Number</i>	<i>%</i>
Double-sided scraper	5	4.76
Scraper-cum_borer	2	1.90
Notch	5	4.76
End Scraper	3	2.86
Micro Scraper	17	16.19
Point cum Borer	1	0.95
Total No.	105	100.00



Fig. 12: Cleaver and double-Sided Scraper from Musakhari-II.



Fig. 13: Borers, Burin and Notch tools from Musakhari-II Site.



Fig. 14: Levallois points, single-sided scrapers and double-sided scrapers recovered from the Musakhari-II site.



Fig. 15: Partially retouched parallel-sided elongated blades from the Musakhari-II site.



Fig. 16: Microlithic blades, bladelets, points and backed blades recovered from the Musakhari-II site.



Fig. 17: Microlithic Scrapers, Points, Borers and Burins from the Musakhari-II Site.

Discussion and Conclusion

The Palaeolithic assemblage of the Musakhari locality-II site in the upper Baitarani Valley exhibits several unique features distinct from the other sites within the river valley and also those of other river valleys in Odisha, including the absence of small to medium-sized handaxes, as well as picks, polyhedrons, but the presence of only one cleaver and a well-organised blade core technology. However, it shares a unique characteristic in the northern highlands of Keonjhar district, in general, and in the Baitarani river basin in particular. The region also shares some material cultural similarities with other areas, such as the Jira Valley and Bargarh uplands in Western Odisha, the Singhbhum region in Jharkhand, and Mayurbhanj in northern Odisha, especially in the Subarnarekha and Budhabalanga river valleys. The lithic assemblages exhibit a widespread utilization of both preferential and recurrent Levallois techniques, discoids, and a prevalence of scrapers, notched tools, and denticulates, which are commonly encountered in the majority of the Middle Palaeolithic industries within the Indian sub-continent. The remarkable presence of chopper-chopping tools is evident in numerous Indian Middle Palaeolithic sites, including those in the Soan valley (Late Sohan-A), the Dang-Deokhuri valleys in Nepal, the Budha Pushkar area in Rajasthan, several sites in southern Uttar Pradesh, Patpara-II in the Son valley, Adamgarh in central India, Jamalpur in Bihar, Kortallayar basin in Tamilnadu, Ramayogi Agraharam in Andhra Pradesh, Giddalur area in Kurnool district of Andhra Pradesh and Sagileru basin in the Cuddapah district in Andhra Pradesh (Petraglia *et al.* 2007; Corvinus 1994; Allchin 1972; Pant 1982; Blumenschine *et. al.* 1983; Joshi *et. al.* 1978; Jayaswal 1978; Pappu, 1996; Rath 1997; Rami Reddy 1978; Reddy and Sudarsen, 1978). Notably, despite the prevalence of pebbles and cobbles of varying sizes in the channel beds of both major and minor rivers and their tributaries within the region, the Middle Palaeolithic industries of the Upper Baitarani Valley do not exhibit chopper-chopping tools. The presence of a few large blades of the late/upper Palaeolithic type, made from quartzite and dolerite, along with the large number of microlithic tools made from silicious rocks found at the sites of Musakhari-II, indicates advancement in stone tool production in this region. In the Indian context, some scholars have attempted to categorise the Middle Palaeolithic industries into three developmental stages: an early phase characterized by the continuity of Acheulian elements, a middle phase dominated by prepared core and discoidal core technology, and a late phase marked by increasing use of blade technology (Pal 2002: 71). The interpretation of the Middle Palaeolithic and its assignment to a specific phase in the archaeological record seems theoretically sound, although it lacks support from stratigraphic sequences and mainly depends on techno-typological variations. The lithic assemblage characterised by the dominance of prepared core and discoidal core technology, along with a smaller number of blade tools and the presence of microlithic tools at some sites from the upper Baitarani Valley, suggests a probable affiliation with the middle to late phase of the Middle Palaeolithic period, based on techno-typological aspects (Pal 2002: 79). However, establishing a specific chronological position is currently not possible. Nevertheless, our study unequivocally illustrates variations in the utilization of raw materials and the composition of assemblages in the upper Baitarani Valley; primarily, they used locally available stones, such as dolerite and quartzite, for tool manufacture in the region. Because dolerite is locally available in the form of dyke of hockey stick shape.

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References

- Akhilesh, K., Pappu, S., Rajapara, H. M., Gunnell, Y., Shukla, A. D., & Singhvi, A. K. (2018). Early Middle Palaeolithic culture in India around 385–172 ka, reframes Out of Africa models. *Nature*, 554 (7690): 97–101.
- Allchin, B., Hegde, K.T.M. & Goudie, A. (1972). Prehistory and Environmental change in western India: A Note on Budha Puskar, Rajasthan, *Man* 7(4), pp. 541–64.
- Basak, B., Dasgupta, S. & Paul, A.K. (2023). Late Pleistocene microlithic industries in the Ayodhya Hills, Purulia, West Bengal: insights from geoarchaeological exploration. *Geological Society London Special Publications*, 515(1).
- Basak, B., Srivastava, P., Dasgupta, S., Kumar, A., & Rajaguru, S. N. (2014). Earliest dates and implications of Microlithic industries of Late Pleistocene from Mahadebbera and Kana, Purulia district, West Bengal. *Current Science*, 1167–1171.
- Blumenschine, R. J., Steven, A. & Clark, J. D. (1983). Excavation and Analysis of Middle Palaeolithic Artefact from Patpara, Madhya Pradesh, in *Palaeoenvironment and Prehistory in the Middle Son Valley* (G. R. Sharma and J. D. Clark Eds.), pp. 39–100. Allahabad: Abinash Prakashan.
- Chakrabarti, D.K. & Chattopadhyay, R.K. (1988). A note on the Lithic Industries in Mayurbhanj and Keonjhar, Orissa, *Man and Environment* XII: 203–208.
- Clarkson, C., Petraglia, M., Korisettar, R., Haslam, M., Boivin, N., Crowther, A., & Koshy, J. (2009). The oldest and longest enduring microlithic sequence in India: 35 000 years of modern human occupation and change at the Jwalapuram Locality 9 rock shelter. *Antiquity*, 83(320), 326–348.
- Corvinus, G. (1994). Prehistoric Occupation Sites in the Dang-Deokhuri Valleys of western Nepal, *Man and Environment*, XIX (1–2): 73–89.
- Dehuri, R. (2013). *Archaeology of Kakharua Valley, North-Central Orissa*. Ph.D. Dissertation, Bhubaneswar: Utkal University.
- Indian Archaeology- A Review, 1958-59. New Delhi: *Archaeological Survey of India*.
- Jayaswal, V. (1978). *Palaeohistory of India: A Study of the Prepared Core Technique*, Agam Kala Prakashan, Delhi: 158–161.
- Joshi, R. V., Badam, G. L. & Pandey, R. P. (1978). Fresh data on the Quaternary fossils and Stone Age culture from central Narmada Valley, India, *Asian Perspectives*, 21: 164–181.
- Mishra, S., Chouhan, N. & Singhvi, A. (2013). Continuity of Microblade Technology In the Indian Subcontinent Since 45 ka: Implications for the Dispersal of Modern Humans, *PLoSOne* 8 (7): 1–14.
- Mohanta, B. K. (2002). *Neolithic and Post-Neolithic Cultures of Northern Orissa (With Special Reference to Mayurbhanj and Keonjhar Districts)*. Ph. D. Dissertation, Bhubaneswar: Utkal University.
- Mohanty, P. K. (1989). *Mesolithic Settlement System of Keonjhar District Orissa*. Unpublished Ph.D. Dissertation, Poona: University of Poona.
- Mohanty, P. K. & Tripathy, B. (1998). The Prehistoric, Proto-historic and the Early Historic Cultures of Orissa, *Paragdhara*.8: 69–99.
- Mohanty, P.K. (1992). Stone Age Research in Orissa: An Overview, *Man in India* 72: 207- 232.
- Mohanty, P.K. (2000). Mesolithic Culture and Ethnography of Keonjhar District, Orissa, in *Archaeology of Orissa*, Vol. I (K.K. Basa and P. Mohanty Eds.), pp. 114–152. New Delhi: Pratibha Prakashan.
- Mohanty, P.K. & Mishra, B. (2005). From Stone Age to the Early Historic: Recent Archaeological Discoveries in Kalahandi District, Orissa, in *River Valley Cultures of India* (K.K. Chakravarty and G.L. Badam Eds.), pp. 97–124. Bhopal. Indira Gandhi Rashtriya Manav Sangrahalaya.

- Mohanty, P.K. (1993). Mesolithic Hunter-Gatherers of Keonjhar District, Orissa, in *Asian Perspectives* 32: 85–104.
- Mohapatra, G.C. (1962). *The Stone Age Culture of Orissa*. Poona: Deccan College.
- Pal, J.N. (2002). The Middle Palaeolithic Culture of South Asia', in *Indian Archaeology in Retrospect- Archaeology and Interactive Disciplines* (S. Settar and R. Korisettar Eds.), Vol. 1, pp. 67–83, New Delhi: Manoharlal and Indian Council of Historical Research.
- Pant, P. C. (1982). *Prehistoric Uttar Pradesh*, Agamkala Prakashan, Delhi.
- Pappu, S. (1996). Reinvestigation of the Prehistoric Archaeological Record in the Kortallayar Basin, Tamil Nadu, *Man and Environment*, XXI (1): 1–23.
- Petraglia, M., Korisettar, R., Boivin, N., Clarkson, C., Ditchfield, P., Jones, S., Koshy, J., Lahr, M., Oppenheimer, C., Pyle, D. & Roberts, R. (2007). Middle Palaeolithic Assemblages from the Indian Subcontinent before and after the Toba Super-Eruption. *Science*, 317: 114–116.
- Rami Reddy, V. (1978). A Note on Two Middle Palaeolithic Assemblages from Prakasham District, Andhra Pradesh. *Man and Environment* II: 81–88.
- Rath, A., Reddy, K. T. & Vijayapraksh, P. (1997). A Middle Palaeolithic Assemblage from Ramayogi Agraharam in the Red sediments on the Visakhapatnam Coast', *Man and Environment*, XXII (1): 31–8.
- Reddy, K. T. & Sudarsen, V. (1978). Prehistoric investigations in the Sagileru basin. *Man and Environment* II: 32–40.
- Senapati, N. (1986). *Orissa District Gazetteers: Keonjhar*. Cuttack: Orissa Government Press.