A Preliminary Report on the Discovery of Two Middle Palaeolithic Localities, District Ganjam, Odisha, Eastern India

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Abstract: *The coastal Odisha in general and Ganjam district in particular has been terra incognita as far as Palaeolithic investigations are concerned. Here we present interesting findings from our recent small-scale survey (2022) in this region. Our explorations led to the discovery of two Middle Palaeolithic localities. These localities have varied geomorphic contexts i.e. regolithic deposit overlying bedrock and channel gravel. The artefacts were made on locally available khondalite while granite was avoided. It is perhaps one of the rare instances where khondalite has been used for making Middle Palaeolithic artefacts. The assemblage comprises of a few bifaces, flake tools such as backed scrapers/knife and points, flakes and cores. Prepared cores, single and multi-platform cores and split cobbles are present in the assemblage. A majority of artefacts are medium sized (< 10 cm). Tentatively on the basis of geomorphic context and typo-technological attributes of artefacts it can be suggested that the hominins occupied this region since early/mid-Late Pleistocene.*

Keywords: Odisha, Acheulian Tools, Khondalite, Middle Palaeolithic, Regolith, Lithic Assemblages, Pleistocene Sediments

Introduction

Palaeolithic investigations in Odisha in Eastern India have largely been concentrated in the western and northern upland parts of the state having quartzite formations, while areas near the coast have remained somewhat unexplored (as reviewed previously by Joglekar *et al*. 2020). The western and northern upland regions of Odisha have rock

formations such as quartzite, sandstone and siliceous materials. These rocks have been considered as suitable raw materials for manufacturing stone artefacts particularly during the Palaeolithic phase, while geological formations in the coastal belt particularly in the Ganjam district is dominated by alluvial fills and rock formations rarely comprises of quartzite. Ganjam district has exposures of typical Archaean rocks associated with Eastern Ghat mobile belt, which consists of charnockite, khondalite, granite, granite gneiss and pegmatites. These rocks are capped by lateritic formations of the late Tertiary/Quaternary period (Sahu and Nandi 2016; Sahoo *et al.* 2018).

The main geomorphic units of the Ganjam district are structural hills, denudation hills, residual hills, inselbergs, linear ridge, intermontane valleys, buried pediplain, flood plain, coastal plain and sand dunes (Sahu and Nandi 2016). The granite is easily available in the landscape, while other rocks such as khondalite, charnockite, quartzite, sandstone, quartz are exposed in limited areas (see figures in Sahu and Nandi 2016; Datt 2017). Possibly, the geological formations of this region deterred archaeologists to carry out surveys as far as Palaeolithic cultures are concerned.

Recent surveys in the adjoining Khurda district have brought to light a few palaeolithic localities (Joglekar *et al*. 2020; Joglekar 2021; Joglekar *et al*. 2022). These findings with artefacts made on gneissic rock and quartz encouraged our group to carry out explorations in adjoining parts of southern Odisha. On this basis a small-scale survey was carried out in Ganjam district in March 2022. The principle aim of this exploration was to identify potential palaeolithic localities and understand the geomorphic contexts of the lithic artefacts. Earlier, a few palaeolithic and microlithic localities with artefacts made on quartzite, chert and jasper have been reported in neighbouring districts (Koraput and Bolangir) of Southern Odisha but details were lacking (Tripathi 1972). The Ganjam area is fairly unexplored as far as palaeolithic sites are concerned, thus presenting an opportunity to probe and ascertain the situation of palaeolithic record. The major issue with palaeolithic surveys in this region is extensive fine sediment cover, and limited exposures of suitable raw materials. Towards the south of Ganjam on the east coast in Vishakhapatnam district of Andhra Pradesh a few Acheulian and Middle Palaeolithic sites have been reported with tools made on quartz and quartzite (Prakash 1981; Reddy 1994; Rath *et al.* 1997). A number of palaeolithic sites in the Prakasam district were previously reported (Madhusudan Rao 1979). It shows that the Eastern Ghats and its surrounding areas in the northern parts of coastal Andhra Pradesh were occupied by the early hominins. These findings had given adequate hints towards possibility of presence of palaeolithic occupations in the coastal district of Ganjam in Odisha.

Middle Palaeolithic Localities and Assemblages

During our brief survey we could identify two Middle Palaeolithic localities with different geomorphic contexts (Figure 1). The artefacts were collected employing random sampling method from these localities for initial understanding of the nature of sites.

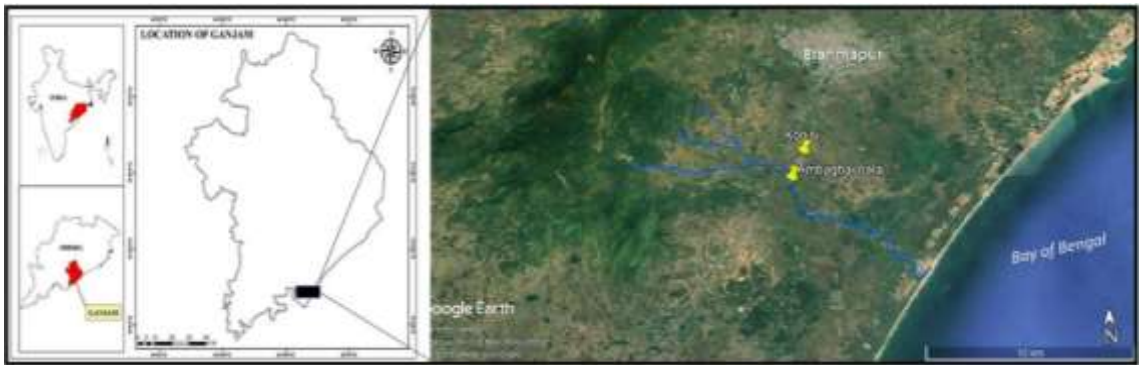

Figure 1: Study Area and Localities (Source Image: Google Earth)

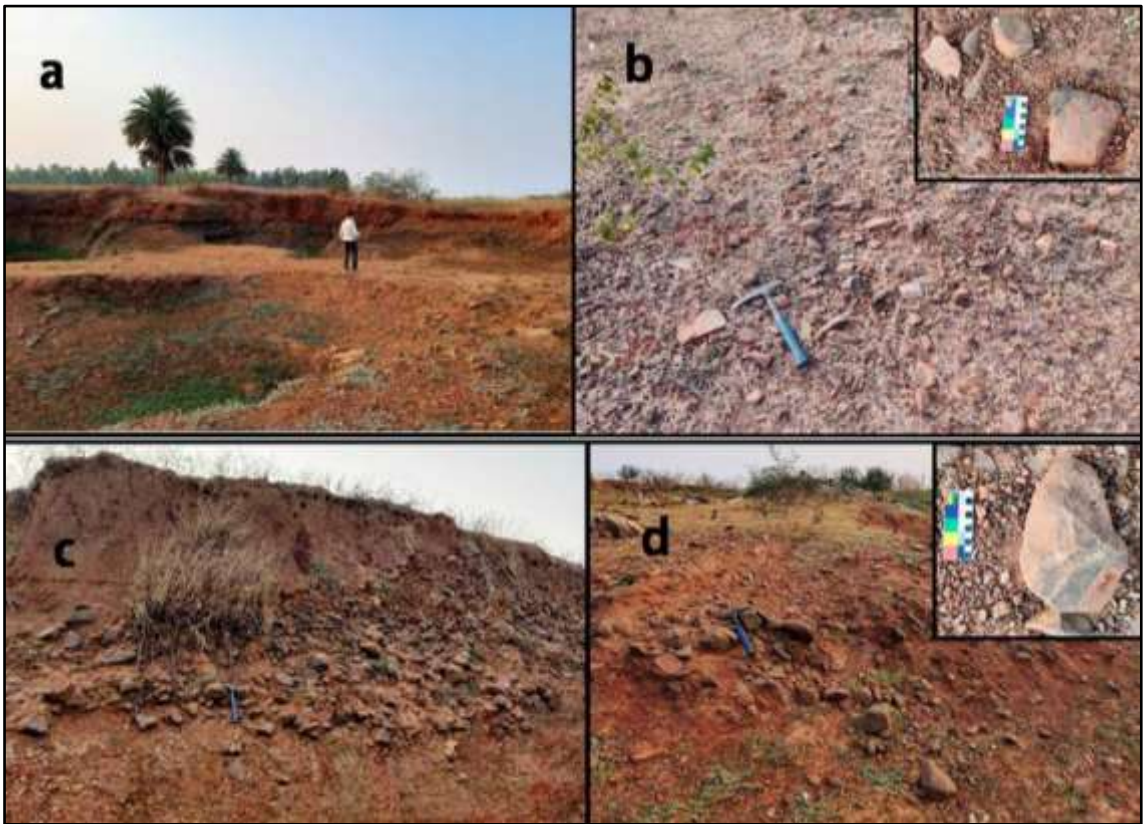

Figure 2: a) General view of the site at Konisi, b) surface scatter of artefacts, c) exposed weathered bedrock and regolithic cover capping the bedrock, d) exposed artefacts over regolith.

Konisi: This locality (19°14'36" N; 84°46'26" E; 28 m AMSL) is situated about 8 km south-southwest of Brahmapur city in Ganjam district of Odisha (Figure 2). This is low elevated (25-30 m AMSL) outcrop of khondalite covered by grasses and occasional trees. This outcrop is spread for about 0.18 km^2; at this locality while surveying a few artefacts could be seen on the surface. Further while probing the outcrop, a ditch of about 1200 m^2 was observed. The ditch is a result of recent digging for rock quarrying, and as a by-product making a pond. The satellite images of this locality over the years have shown that this ditch is a consequence of very fresh activity, thus exposing the

artefact-bearing regolithic deposit. Artefacts were found from the exposed coarse regolith in this ditch. Broadly the artefacts were collected from an area of about 0.3 km^2 at this locality, while higher concentration was seen near the ditch area, a result of recent digging. The artefact context is cobbly-pebbly regolithic deposit capping the weathered khondalite bedrock. The thickness of this regolithic deposit varies from 30-150 cm aligning to the uneven bedrock topography. The regolithic deposit is clast supported, and packed with matrix of ferruginous pellets. This artefact-bearing regolith is overlying the weathered ferruginous bedrock, while it is capped by a thin deposit (<20-30 cm) of finer regolithic yellowish-brownish sandy sediment. The artefacts which are exposed on the surface are fairly abraded; while those buried in the coarse regolith deposit are quite fresh. '*Regolith deposit is the layer of loose material derived from weathering of bedrock through breakdown and alteration by mechanical and chemical processes. This loose material is available for transport away from the site*…' (Nichols 2009:89-90). The artefacts on the surface get trampled due to movement of cattle and sheep herds, and also human activities such as outdoor sports. Yet on the basis of field observations, it is quite evident that the artefacts have not been displaced significantly from their original position of discard.

In this case the source of raw material for artefact production is the coarse regolith deposit. On the basis of the fairly high density of artefacts and various stages of production, good preservation condition and stratigraphic position of the artefacts it can be suggested that possibly there might have been multiple occupational phases within the Middle Palaeolithic. Excavations can confirm this proposition. A total of 82 artefacts were collected from this locality. These include a few tools (2 handaxes, 8 scraper/knife), large flakes/large cutting tools (11), pointed/ retouched flakes (9), flakes, flake fragments and debitages (31), and cores, split cobbles, worked nodules (21). The presence of cores, flakes, a few finished tools, debitage of various sizes indicates that the site is a manufacturing space. The artefacts at this locality are fairly well preserved and close to in-situ position, thus can be considered as evidence of primary occupation with knapping at the locality. The tools, a few large flakes with sharp edges, and pointed/retouched flakes might have been used for various purposes. Cores of various types such as single and double platform, core with centripetal flaking, discoid, and amorphous are present in the assemblage.

***Ambaghai Nala*:** This nala is a lower order stream originating from a hill range in the western-northwestern direction of Konisi; it flows for about 30 km in the eastern direction and joins the Bay of Bengal (Figure 3). The artefacts were collected from one locality (19°13'44" N; 84°46'1" E; 13 m AMSL) in this nala; it is situated about 10 km south-southwest of Brahmapur city in Ganjam district of Odisha. This locality has preserved moderately cemented cobbly-pebbly artefact-bearing gravel capping the gneissic bedrock. The thickness of this gravel varies between 1-2 m. This gravel is moderately cemented by ferruginous sandy matrix. This artefact-bearing gravel is capped by a 2-3 m yellowish brown silty-clay; it is further capped by brownish-black clay of about 1-2 m which is currently under cultivation. The semi-rolled and rolled

artefacts were collected mostly from loose channel gravel, while a few slightly fresh were collected from the moderately cemented cobbly-pebbly gravel.

The artefacts have ferruginous and manganese coating on their surfaces. This is a common phenomenon in fluvial conditions in this region. The nala bed is dry in patches (except monsoon and a few months after rains), from which the artefacts were collected, in the present study these were collected from an area of about 1000 m^2 within the channel bed near a bridge. These artefacts might have been eroded from the cemented gravel. A total of 23 artefacts were collected from this locality. These include a few tools (1 pointed tool, 5 scrapers), retouched flakes (2), flakes (14) and one hammer stone. These artefacts seem to be transported over a short distance by the ephemeral stream.

Figure 3: a) General view of the Ambaghai *nala*, b) exposed cobbly-pebbly cemented gravel on the bank of *nala*, c) a few artefacts collected from the gravel, d) artefact sampling from the channel gravel.

Broadly it has been observed that split cobble with further flake detachment, and prepared core technique has been employed for detachment of flakes. Centripetal

flaking and Levallois method was employed and planned flake removals and alternate flaking has been observed on the cores, single and multi-platform cores were also noticed. Although at present there is no evidence of use of granite yet it is quite possible that granite hammerstones might have been used, as granite harder than khondalite. Broadly it has been observed that the size of tools is between 4-9 cm. Looking at the assemblage it can be inferred that it was a conscious effort to detach pointed flakes from the cores. The dominance of medium-sized flake tools, prepared core reduction, and preference for pointed flakes, limited number of miniature bifaces and all the technological and morphological attributes of the artefacts indicate towards an early to middle phase of Middle Palaeolithic as per observations on the various Middle Palaeolithic phases in India (Pal 2001; Kumar *et al*. 2018) (Figures 4 and 5). The detailed analysis of lithic assemblages is in process and will be published in a separate communication.

Figure 4: Handaxes, Pointed tools, Scrapers/knife (scale 5 cm)

Provenance and Results of Thin Section

Khondalite suit of rocks, an Archaean meta-sedimentary rock sequence is commonly exposed in Eastern Ghats of India in association with charnockite. Typically, khondalites consists of schists or gneisses consisting sillimanite along with garnet, quartz and feldspars. Khondalite in hand specimen are brown to greyish brown in colour and are kaolinised due to weathering and can show strong foliation due to intense metamorphism. Samples of the raw material along with the artefacts from the localities were collected for provenance studies as general visual observation of the rock was insufficient for identification. Thin sections were prepared for these samples for the identification of the raw material used for making these artefacts. These thin sections were studied under Leica DM 702p polarising microscope. Thin sections show the mineral assemblage of sillimanite, garnet, biotite, quartz and orthoclase feldspar (Figure 6). Porphyroblasts of garnet along grains of quartz and feldspar show very typical mosaic/ granulose texture (Dash 1989; Sahu and Nandi 2016). The hominins preferred fine grained khondalite for making artefacts with a few exceptions of medium to coarse grained varieties which are available only in patches in the

landscape, while easily available granite rock has been avoided. At Konisi, khondalite bedrock is exposed at places, while it is covered by regolithic deposit which is blocky and cobbly in nature (see Figure 2). These locally available blocks and cobbles of khondalite were exploited by the hominins to detach primary flakes and further shape them into tools.

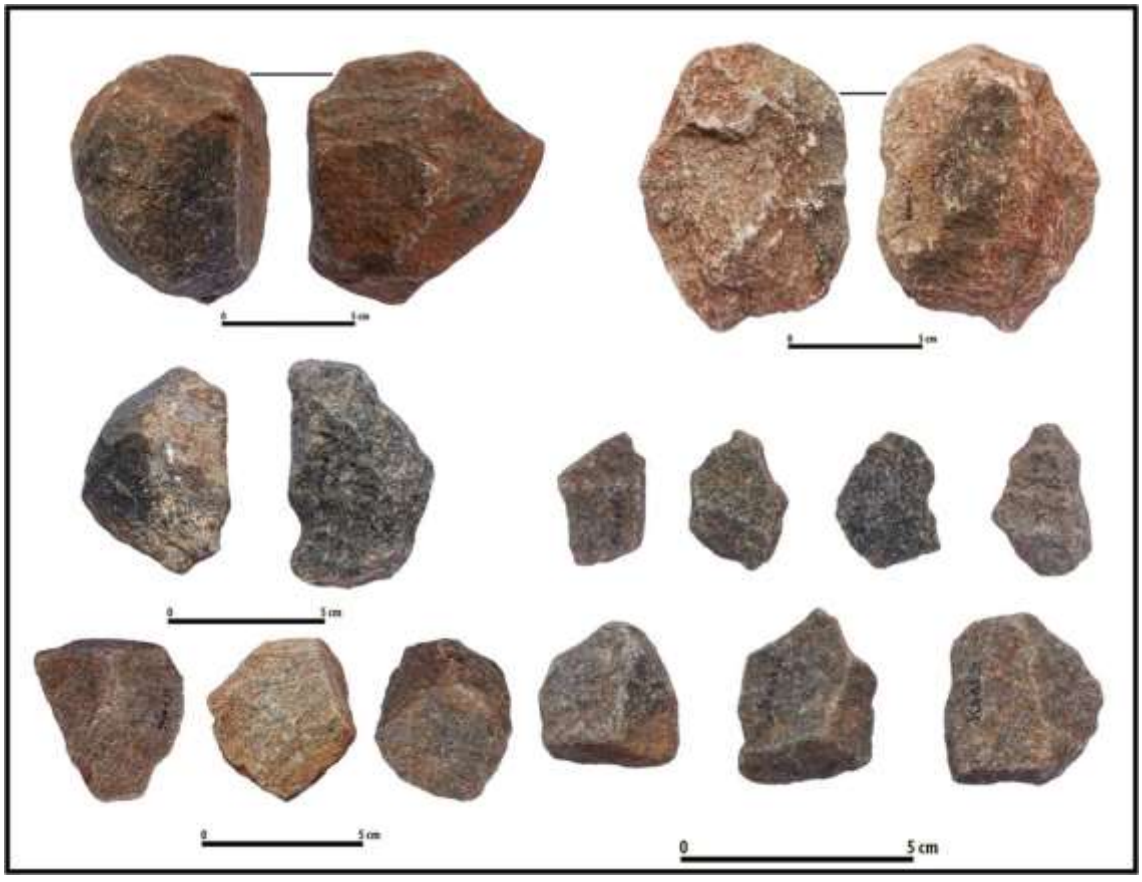

Figure 5: Cores and Flakes (scale 5 cm)

Significance and Discussion

Rarity of such finds in this region is largely due to geological reasons, such as infrequent availability of suitable raw materials; thick sedimentation in the plains by major and minor drainages, these factors led to limited surveys. The landscape was fairly different during the Pleistocene times when hominins made stone artefacts. The sediment cover was fairly thin and bedrock was exposed in more areas, thus it is highly possible that a number of palaeolithic localities might be buried under the sediments (similar observation was made previously in Khurda district- Joglekar *et al.* 2022). The result of our small-scale study has shown that hominins have exploited khondalite for making artefacts, while granite has been avoided. This shows that the early humans had preferential behavior, perhaps after experiencing the difference in the conchoidal fractures of granite and khondalite. This is one of the rare instances where we are reporting use of khondalite in the Middle Palaeolithic context. Further targeted surveys need to be carried out at khondalite, granitiferous gneiss and

quartzite outcrops. Such investigations will help to understand the hominin adaptation pattern during the Pleistocene in this understudied region on the eastern coast of India.

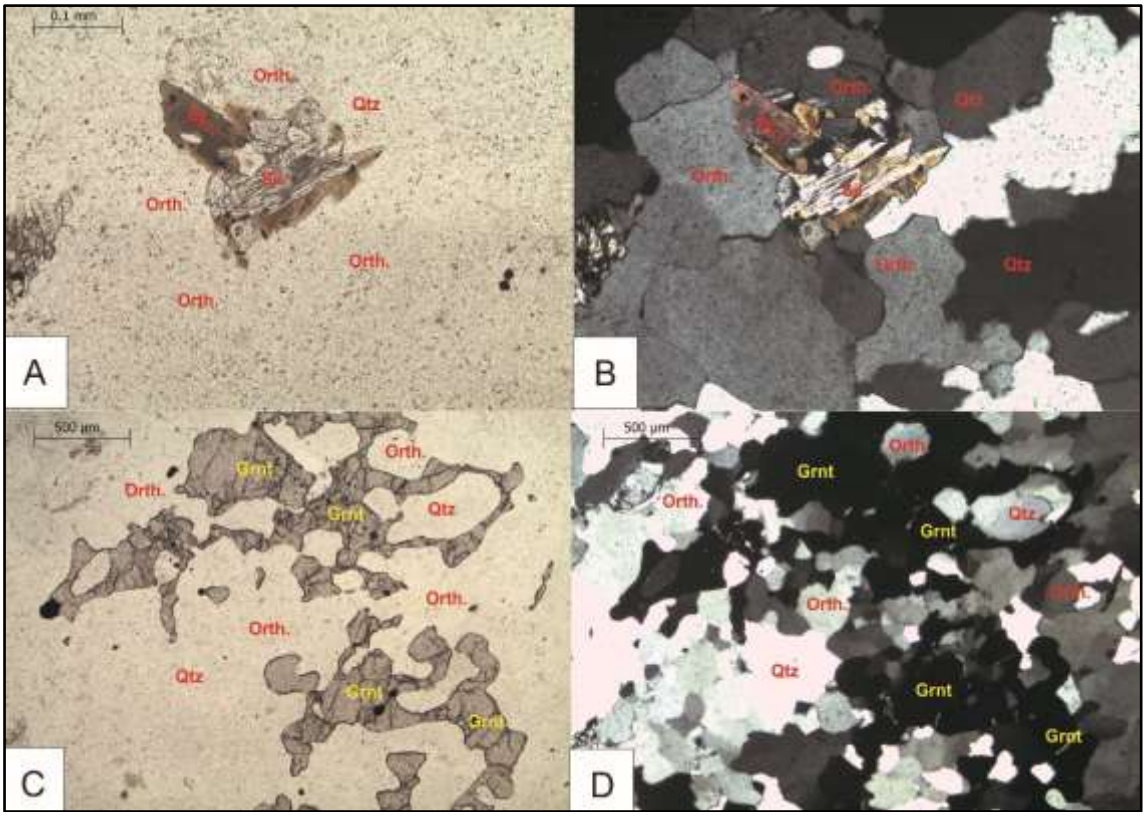

Figure 6: Microphotograph of khondalite: (a) Porphyroblasts of sillimanite and biotite are surrounded in matrix consisting of quartz and orthoclase in plane polarised light; (b) cross polarised light (Magnification 10X); (c) Reddish to pinkish garnet, quartz and feldspar showing mosaic structure in plane polarised light; (d) cross polarised light.

The first Palaeolithic stone tools in Odisha were reported from highland regions (Ball 1876). Later first ever excavation of Acheulian site at Kuliana, in the former Mayurbhanj state of Odisha, was carried out between 1939 and 1942 (Bose and Sen 1948). This led to further investigations in different parts of Odisha largely focusing on the upland areas by various scholars (as reviewed by-Mohanty 1992; Mohanty and Tripathy 1998; Basa 2000, 2005; Padhan 2006, 2013, 2018; Singh 2017; Rana 2017, 2019). Even the recent Palaeolithic studies in Odisha have largely concentrated in the upland region i.e. inland areas away from the coast (selected references: Behera *et al.* 2015; Thakur 2016; Padhan 2013, 2016, 2018; Behera and Thakur 2019; Rana 2016, 2017, 2019; Behera *et al.* 2020; Barik 2022; Behera and Barik 2022). The coastal Odisha remained fairly unstudied as far as the Palaeolithic cultures are concerned. The present small-scale effort is an initiative to address this issue.

Previously it was suggested that possibly migrations into this region were with the microlith manufacturing populations in the terminal phase of Late Pleistocene or Early Holocene (Padhan 2017). But, our recent surveys in Khurda and Ganjam districts have

opened up a new region for carrying out more such field-oriented Palaeolithic investigations. On the basis of results of these surveys, it can be proposed that hominins with Middle Palaeolithic tool kits occupied this landscape since late Middle/early Late Pleistocene. As of yet it is unclear if there was any preceding large flake Acheulian (LFA) techno-cultural phase in this region, further surveys are necessary to address this matter. The upland region has yielded evidence from Acheulian culture followed by Middle Palaeolithic and subsequent phases (selected references- Behera *et al.* 2015; Thakur 2016; Rana 2016, 2017, 2019; Padhan 2018; Behera and Thakur 2019); as of yet this region does not have a clear Acheulian phase.

It is now well established that the earliest evidence for Middle Palaeolithic occupation in India is as early as 385-172 ka (Kumar *et al*. 2018), while a number of other important Middle Palaeolithic sites such as Hanumanthunipadu and other sites in Paleru River Basin, Jwalapuram complex, Dhaba, 16R Dune, Kataoti, Sandhav belong to the i.e. pre-Youngest Toba Tephra (YTT) event (Petraglia *et al.* 2007; Haslam *et al.* 2012; Blinkhorn *et al.* 2013; Blinkhorn and Petraglia 2014, 2017; Blinkhorn*et al.* 2017; Blinkhorn *et al.* 2019; Blinkhorn 2020; Clarkson *et al.* 2020; Blinkhorn *et al.* 2021; Devara *et al.* 2022 and references used in these publications). All these assemblages broadly can be categorized in early to middle stages of Middle Palaeolithic techno-cultural phase. At this stage absolute chronology of the Middle Palaeolithic occupations in the present study region cannot be ascertained, yet cautiously it can be suggested that Middle Palaeolithic in this region might belong early to mid-Late Pleistocene (130-65 ka), if not earlier. Fairly comparable types of assemblages were recovered earlier from the Middle Palaeolithic yielding localities in the neighboring Khurda district (Joglekar *et al.* 2020; Joglekar *et al.* 2022).

The context of these localities i.e. Gangapahad and Asuradhipa in Khurda were ferruginized regolith deposit and channel gravels, similar context has been observed in the present study area. The geomorphic context and typo-technology of the artefacts tempts us to point towards such time frame. The present assemblages with occurrence of limited bifaces, backed scrapers/knife, points/pointed flakes, prepared cores, and negligent presence of laminar blade elements hint towards an early to middle phase of Middle Palaeolithic as mentioned earlier (Pal 2001; Kumar *et al.* 2018). The evidence of hafting is quite clear as tang/notch has been observed on proximal end of some of the artefacts with one backed side. The production of hafting-based tools is conspicuous from the Middle Palaeolithic phase in South Asia since the late Middle Pleistocene-early Late Pleistocene (for review see- Blinkhorn 2019); the present assemblage is fairly alike. Planned surveys in this and surrounding regions, systematic sampling, along with excavations at selected localities are necessary for further understanding the Palaeolithic cultural complexities of this part of Eastern India. Further multi-disciplinary studies are needed in this region to confirm the chronology.

Looking at the landscape and geological formations it can be suggested that this region might have been sparingly occupied by the Palaeolithic groups. This kind of gneissic

and granitic terrain with low relief is characterized by a tor-inselbergs landscape, limited availability of suitable raw material resources (fine grained with conchoidal fracture pattern), poor and shallow surface water resources, and low plant and animal food biomass. This type of area with extremely low density of sites has been classified as 'Isolated Area' for Palaeolithic settlements (Korisettar 2007). Yet identifying sites in such areas is crucial, as these can help us in understanding the hominin migrations and preferential behaviour in such terrain where suitable raw material is sparsely available. This preliminary study indicates that the presence of Middle Palaeolithic in such areas can be expected in future.

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