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# A Study of Microlithic Culture in Ranj Stream with Special Reference to Bhubanpali

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Received: 19 July 2017; Revised: 12 September 2017; Accepted: 01 November 2017  
Heritage: Journal of Multidisciplinary Studies in Archaeology 5 (2017): 357-369

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**Abstract:** *Microlithic industries are very well represented in the river valley of Western Odisha. Mahanadi and its tributaries such as Jira, Danta, Tel and Ranj are also rich in prehistoric settlements. This paper is based on the surface exploration made by author in the year 2013-14 in the Ranj stream, a tributary of Jira river system in the Bargarh upland. A total of 15 sites have been discovered. All most all the sites are located on the cliff surface at both the banks of the river, and are found to be associated with the upper most brownish colored sandy deposit. Out of which only one site i.e. Bhubanpali, which is situated in the confluence of River of Ranj and River Jira has been taken into typo-technological as well as matrilineal analysis. The tools collected from this site gave a gradual development of stone tool technology. Occurrences of these cultural remains show that the Bhubanpali was a favourable area for prehistoric settlement.*

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**Keywords:** Microlith, Ranj, Assemblage, Blade, Core, Flake, Chert

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## Introduction

Sporadic finds of microliths and Neolithic implements were made in India before 1863, but it was in that year Robert Bruce Foote, a geologist in the Geological survey of India first identified a Paleolithic implement in India in a gravel pit at Pallavaram near Madras. Foote's subsequent geological career lay in the modern states of Tamilnadu, Karnataka, Andhra Pradesh and Gujarat (Misra, V.N. 1986:45-47). Discoveries were also made in other parts of India, and the wide distribution of palaeolithic and prehistoric implements in the country was amply clear by the beginning of the twentieth century. Odisha was also not lagging behind this discovery. For the first time Valentine Ball in the late 19th century initiated prehistoric research in Odisha in a systematic manner. He is credited with being the first prehistoric investigator in the state of Odisha (Mohapatra G.C. 1962: 26). He collected a few artefacts from Bhursapali in Kuchinda subdivision of the Sambalpur district, Kaliakata and Harichandanpur near Talcher in Angul district Odisha in 1875. Later on in between 1939 and 1942 N. K Bose and D. Sen of Calcutta University (1949) discovered and excavated a rich Lower palaeolithic industry at Kuliana in Mayurbhanj district of Orissa, which laid the foundation for subsequent systematic prehistoric investigations in the state (Mohanty,

P.K 1992:207-232.). However in recent decades, considerable research in experimental, ethno archeological, vertebrate taphonomy and geoarchaeological context has appreciably increased (Schiffer 1983:675-76).

The present paper is a part summary of the archaeological investigations carried out by the author in the year 2013-14 in the Ranj stream, a tributary of Jira river system. Only one site has been given emphasis in this paper because of its rich cultural antiquities. This site lies in the foot hill of Tulundi Reserve forest and confluence of River Jira and Ranj stream. The material remains of Bhubanpali was thoroughly studied in order to understand the archaeological potentialities of the area.



**Figure 1: General View of Site Bhubanpali**

### **Geography of Study Area**

The Bargarh district lies between 20° 43' to 21° 41' North latitude and 82° 39' to 83° 58' East longitude. Broadly speaking, except the eastern part, the rest of the area of this district forms an undulating upland varying in height from 146m to 228m above mean sea level, excluding hills and tablelands. The river Ranj is tributary of the Jira, which in turn is a tributary of Mahanadi, located in the Bargarh district of Odisha. The river Ranj originates from near the village Birhipali in the district Bargarh and after flowing for about more than 45 km in south-eastern direction it joins the right bank of the river Jira near the village Samlaipadar. The site Bhubanpali is only 4 km away from the Right bank of Ranj (Figure 1). The important seasonal streams joining Ranj River are the Bargarh Nala, Baunsenmura Nala, Barpali Jhor etc. The land between River Jira and Ranj has formed a very vast plain. This plain contains a good portion of the cultivated land of the district and its undulating character affords excellent scope for

irrigation due to reservoirs. The soil of this plain is a mixture of sand and gravel as well as of clay (Behera, P. K. 2006: 1-62). The soil covering the greater part of Odisha is apparently derived from underlying metamorphic rocks and the differences found in it are mainly due to the elimination and transportation effected by surface erosion (Mendaly, S and S. Hussain, 2015). The vegetation growth of this area stands in a variety of land forms ranging from low lands to chain of hills of various heights and valleys. The climate of this area is characterized by long warm summers and cold winters. The climate of this area support mostly dry-mixed-Deciduous type of forest, closely resembling that of the semi-arid and sub-tropical zone (Naik, J. 2002). The average annual precipitation in the district is 1527mm; about 90 percent of the annual rainfall is received in the monsoon season.

## **Methodology**

The study of prehistoric sites basically depends on the archeological remains, which are found scattered over a vast geographical area. The areas surveyed for understanding geoarchaeology includes lower and upper parts of River Ranj and most of its rivulets such as Bargarh Nala, Baunsenmura Nala, Barpali Jhor etc. Survey was successful as 15 new archaeological sites were discovered and recorded. Most of these sites were discovered on the bank of River Ranj, its tributaries and also along the hill slopes. Many Microlithic sites are found at the base of the hills spreading over the granitic outcrops or near the exposed cliff surfaces of the river and sometimes in piedmont areas (Behera, P.K.1992a.). The third season exploration was conducted in the month of October and November in 2013 in lower Ranj. About 6 sites were reported with the collection of microlithic artefacts. The cultural materials collected from different sites have been analyzed by applying recent methodologies and systematic sampling procedure has been followed for collecting samples from different sites. Inferential and descriptive statistical methods have also been adopted for deriving patterns and features. Rocky areas, waste land, bad land, hilly terrain, hill slopes and small hill tops were also surveyed to understand the pre-quaternary geology and provenance of the raw material sources used for tools as of class present in the alluvium. A series of attributes were recorded for each microlith to gain further understanding into the typological and technological details of each piece. These attributes include physical condition of artefacts, Breakage pattern, the preserved component of the tool, raw material type, maximum length, width, and thickness etc. Standard deviation and Average of all assemblage has been worked out. For the raw material analysis, quality and colour were recorded for each artifact. Raw material quality was assessed visually, with ordinal categories of very fine, fine, coarse, very coarse, and indeterminate quality.

## **Description of Site**

The site Bhubanpali is Located on the right bank of the river Ranj. The site is about one kilometer east of the village Govindpur and about 3 kilometer from the river bank. The exact site is situated about half a kilometer west of the village Bhubanpali near the foot

hill of Tulundi reserve forest (Figure 1). It has elevation of 166m above mean sea level. It lies between 21° 9' 41.0" N longitude and 83° 39'49.8" E latitude. The site is on the slope of the hill. Below the slope a natural pond has been formed. The eroded surface of this site has exposed a large chunk of area with artefactual scatters spreading over an area of about 60m x 60m. Weathering of quartz is also seen in many places. In respect of general topography, raw material and techno-typology, this industry closely resembles with other sites of lower Ranj. A total of 452 specimens were randomly collected measuring 15m x 15m from the eroded surface of uppermost brownish deposit. In this site also artefacts of the microlith component are made on agate, chalcedony and quartz. The assemblage composition of microlithic component is indicated in the following table (Table 1).

**Table1: Microlithic Assemblage of Bhubanpali**

Artefact Category	Total Nos.	Percentage	Unretouched Blank Nos.	Percentage	Retouched Blanks	Percentage	Percentage Utilised
Core	81	17.92	–	–	–	–	–
Flake	273	60.39	206	80.78	67	76.13	24.54
Blade	19	4.20	13	5.09	06	6.81	31.57
Bladelet	43	9.51	29	11.37	14	15.90	32.55
A-Distal	1	0.22	1	0.37	–	–	–
B-Medial	3	0.66	2	0.78	1	1.13	–
C-Proximal	4	0.88	4	1.56	–	–	–
Total	424	93.78	–	–	–	–	–
Debris	28	5.08	–	–	–	–	–
Grand Total	452	98.86	255	99.95	88	99.97	–

The macro assemblage composition of Bhubanpali (Table 1) shows that only flakes predominate the blank group (60.39%). However, the core group is dominated by Blade-Bladelet cores. Blade and Bladelet comprise 4.20% and 9.51% respectively. Although bladelets form only 6.62% in the assemblage, it has maximally been utilized in the production of tools (32.55%). Among the retouched Blades 31.57% have been utilised. In Bladelet category percentage of utilization is highest of all. The proportion of debris is low. Although percentage of flake is higher, Utilised tools on flake blank are only 24.54%. This suggests that the large majority of the flakes might have been detached during the process of core rejuvenation and preparation methods. In Fragments category the medial part has only 1 tool where as there is lacking of tools in distal and proximal part. In view of the above the predominance of flake elements in the assemblage it remains basically a bladelet oriented industry. Representatives of Microlithic components of each category of Bhubanpali is shown in (Figure 2).



Figure 2: Microlithic Components of Bhubanpali

### Raw Material Classification

Large occurrences of quartzite river pebbles, cobbles and boulders are abundantly found in the Bargarh upland. Basically five types of raw material have been observed in the explored area. Such as Chert, Quartz, Chalcedony, Agate and quartzite. Quartz has very large crystals which produce sharp edges after breaking. It is the most

dominating material found all across the river valley. There are two types of quartz common in this area such as crystal quartz and milky quartz. There are three different forms of chert nodules which have been utilised in the study area; the river pebble, hill slope nodules and outcrop chunks (Tripathi, K. C. 1980). But in this site hill slope nodules are the source of raw material. The site Bhubanpali is rich in material antiquities. A Total of 452 specimens were collected from eroded surface. After processing the artefacts, analysis and classification was made. While analyzing the raw materials quality and colour were recorded for each artifact. Raw material quality was assessed visually, with ordinal categories of very fine, fine, coarse, very coarse etc. Different artefacts classified on the basis of colour yielded the following categories of raw material type (Table2).

**Table 2: Raw Materials of Bhubanpali**

Raw Material Type	Artifact Category				Total in Numbers	Percentage
	Core	Flake	Blade	Bladelet		
Brown chert	2	-	-	1	3	0.92
Green chert	12	2	2	5	21	6.42
Black chert	6	8	2	1	17	5.25
Grey chert	9	9	-	-	18	5.50
Banded Reddish chert	4	12	-	3	19	5.81
Agate	9	7	-	5	21	6.42
Chalcedony	1	32	-	-	33	10.12
Blueish Greyish chert	2	9	-	-	11	3.36
Reddish off white chert	-	5	-	-	5	1.53
Cherty Agate	13	43	-	-	56	17.10
Milky quartz	25	49	4	10	88	26.90
Crystal quartz	9	4	4	-	17	5.26
Yellowish Grey Agate	-	17	-	1	18	5.53

Although quartz forms a predominant raw material, the site has exceptional evidence of the dominant use of Cherty Agate (17.10% of the assemblage) for the production of microliths (Table 2). Chert appears the second preferred material at (32.67%), followed by the use chalcedony (10.12%) and agate (6.42%). There was minimal use of crystal quartz (5.26%) and as raw material at the site. Cherts of various coloured have been identified during classification such as Brown chert, Green chert, Black chert, Grey chert, Banded Reddish chert, Blueish Greyish chert, Reddish off white chert. Among the Chert type Green chert (6.42%) and Black chert (5.25%) dominated other variety. Also, the use of Milky quartz was at 26.90%. Grey chert and Banded Reddish chert, has also been preferred for lithic production.

### **Tool Typology of the Site**

After classification, tools were sorted from each category of artefacts. A good number of finished tools have been reported from this site. The cultural assemblage (Figure 3)

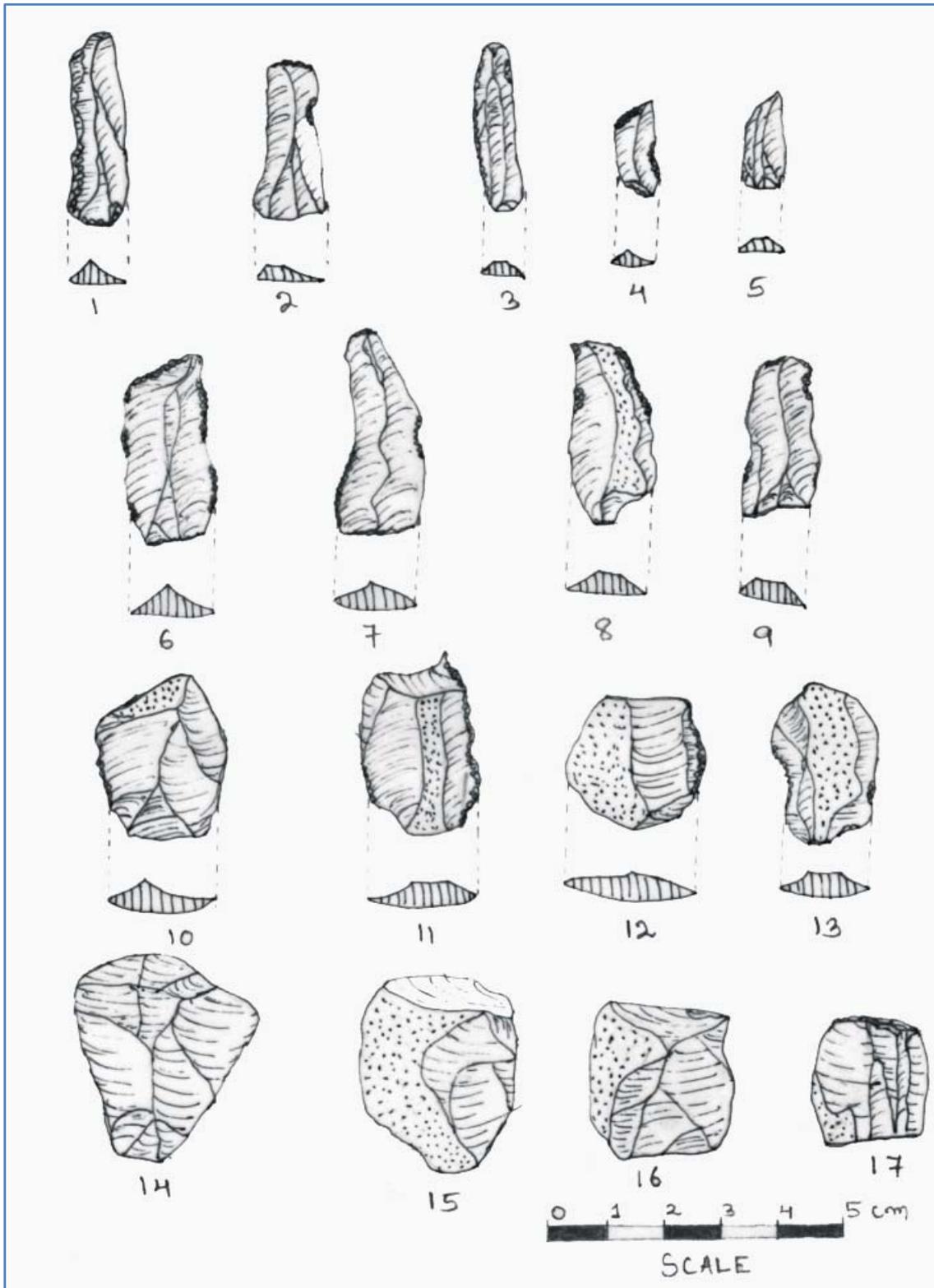
of this site contains 452 artefacts. Among these, a total of 87 finished tools have been noticed. Scrappers of different variety have dominated the tool type, which includes 18 side scrappers (20.68%), 3 Transverse scrappers (3.44%), 4 Double side scrappers (4.59%), 12 Denticulate tools (13.78%), have been found. There are only 4 notches. Second position is occupied by marginally retouched (10.34%), and partially retouched tools (13.79%). Presence of a good number of burins (3.42%), and Convex backed point (2.29%), is the main characteristics of this site. 1 Offset Burin and 1 Offset Dihedral Burin has also been reported. Besides, Only 2 geometric tool like 1 Trapeze and 1 Lunate is present at this site. The following table shows the types of various tools of Bhubanpali (Table 3).

**Table 3: Tool Typology of Bhubanpali**

Sl. No.	Tool Type	Blank Forms			Total	Percentage
		Flake	Blade	Bladelet		
1	Side scrapper	17	1	-	18	20.68
2	Transverse scrapper	3	-	-	3	3.44
3	Double side scrapper	4	-	-	4	4.59
4	Notch	4	-	-	4	4.59
5	Denticulate	6	-	1	7	8.04
6	Denticulated top	4	-	-	5	5.74
7	Awl	1	-	-	1	1.14
8	Marginally retouched	7	1	1	9	10.34
9	Partially Retouched	10	2	-	12	13.79
10	Retouched top	5	-	1	6	6.89
11	Unilaterally retouched	3	-	6	9	10.34
12	Convex backed point	-	1	1	2	2.29
13	Partially Retouched backed point	1	-	2	3	3.44
14	Trapeze	-	-	1	1	1.14
15	Offset Burin	-	1	-	1	1.14
16	Offset Burin at butt	1	-	-	1	1.14
17	Offset Dihedral Burin	1	-	-	1	1.14
18	Lunate	-	-	1	1	1.14
<b>Total</b>		<b>67</b>	<b>6</b>	<b>14</b>	<b>87</b>	<b>-</b>

### Metric Analysis of Assemblages

The complete tools of this site were taken into metric analysis (Table 4). Length, Breadth, and thickness of all tools have been worked out. Maximum, Minimum and Average length of core have been measured to understand their tool manufacturing technology. Besides, Standard deviation and Co-efficient of variation of all tools has been taken. The Table shows that, the cores have a length range of 11-44 mm, breadth dimension is 10 - 52 mm and thickness is 7 - 42mm. Average length of core is 24.18mm.



**Figure 3: Drawing of Assemblage from Bhubanpali** (1,2-Partially Retouched Points, 3-Baked Bladelet, 4-Trapeze, 5- Baked Point, 6 –OffsetBurin, 7-9-Partially Retouched Blade, 8-Convex Baked Point, 10-Double Side Scraper,11-Awl, 12-Marginally Retouched Side, 13-Denticulate, 14-17 – Core).

and thickness is 13.42mm. In addition to this the range of length, breadth and thickness of flake components fall in between 7-53mm,7-37mm and 3-19 mm respectively. The Average thickness of a flake is 7.02mm. Simultaneously the average length, breadth and thickness of the blade are 33.33mm, 15.77mm and 7.66mm respectively. The Bladelets have an average length of 22.00mm. It's breadth is 9.55mm and thickness is 4.88mm. Looking at their mean size it may be said that while the blades are generally short, the bladelet of this assemblage are narrow elongated in shape. Most of the Bladelets are also thin in comparison to flakes and blades.

**Table 4: Metrics of Retouched Artefacts**

LENGTH ( in mm)	Core	Flake	Blade	Bladelet
MAXIMUM	41	53	49	31
MINIMUM	11	7	24	13
AVERAGE	24.18	22.64	33.33	22.00
STDEV	6.59	6.69	7.72	4.25
COEFF. OF VARIATION	27.26	29.57	23.18	19.34
WIDTH ( in mm)				
MAXIMUM	52	37	23	13
MINIMUM	10	7	13	4
AVERAGE	20.66	19.22	15.77	9.55
STDEV	6.18	5.34	3.70	2.38
COEFF. OF VARIATION	29.91	27.82	23.45	24.92
THICKNESS ( in mm)				
MAXIMUM	42	19	12	8
MINIMUM	7	3	5	2
AVERAGE	13.42	7.02	7.66	4.88
STDEV	5.44	2.63	2.44	1.64
COEFF. OF VARIATION	40.55	37.55	31.94	33.56
SAMPLES	66	135	09	18

## Discussion on Tool Technology

The technique of microlithic production is a very specialized one. The manufacture of each tool requires special care and precision. Slight changes in the method of retouch completely changes the character of tools and transfer it into a specialized type of tools. The microlithic technology of the Prehistoric people of Ranj stream is characterized by

different kinds of cores such as Multiple platform cores, Single platform cores, Cores in opposed platform on same surface, cores in opposed platform on opposite side, Discoidal core and Levallois core etc. Bidirectional and bipolar blades cores are also present. Blade cores having up to four striking platforms seem to have been utilized in this site. In most of the cases, the core striking platform is prepared but in exceptional cases some blades and bladelets also detached with non-prepared cortical platforms that utilised the advantageous natural shape of the raw material (Padhan T. 2007). Cores of Ranj River stream are generally made on three types of raw material nodules: one is the river nodules, the hill slope pebbles and the other one is chunks quarried from the outcrop or veins. However most of the cores of Bhubanpali are hill slope pebbles as this site is situated near the foot hill of Tulundi Reserve forest. In the case of quartz nodules, it has been observed that most of the time the quartz chunks are utilised as cores. The flake cores (57.61%) are large in number. The numbers of flake-blade cores are 21 in numbers (20.24 %) out of the core assemblage. As many as 8 blade cores have been noticed and Bladelet core consists of only 11 in number of the core assemblage. Some core has shown the removal of Blade and Bladelet from the same platform. In comparison to cores of having opposed platform on same surface, core of platform on opposite side is maximum in use.

The microliths of Bhubanpali are mostly fresh and constitutes 74.39%. Occasionally the artefacts made on quartz and quartzite appears to be weathered and rolled; Hard hammer technique is the mostly preferred technique for flaking. The use of hard hammer stone is also supported by the steep fracture. The use of soft hammer is observed on only a few bifacial artefacts. Flake component has various type of tool such as scrapper, notch, denticulate, burin etc. All the scrapers in these assemblages are retouched flakes. These scrapers have straight, concave and convex working edges with steep retouch and ventral retouch. Raw material analysis of scrapers shows that chert was the preferred raw material for making scrapers. Notched are found on variety of tools types but in Ranj valley it was confined to only on blades, scrapers and points. Quartz was the most preferred raw material as it was utilized in many sites. Black chert and Green chert is also abundantly used in this site. Chalcedony has been used as preferred raw material for flake manufacturing. After looking at the blade length it clearly shows that the Microlithic people had some standard choice for blade length size. In this site there is an almost standard breadth made both on chert and quartz. But in the case of blade- width there is an almost homogeneity except few sites. Chalcedony blades (Figure 4) are appeared to be found narrow by breadth. The chert blades have the widest range followed by quartz. Presence of Backed artifacts in the Ranjmicrolithic assemblages is a common feature. The Bladelets(Figure 5) were broken in certain sizes to achieve the desirable length and morphology of backed bladelet tools. Crescent backed bladelets are popularly known as lunate. The crescent belong to the backed bladelets groups. They are symmetrical along the shorter axis and exhibit blunting or steep retouch. Only 1 Trapeze and 1 Lunate are available in this site. Thus Bhubanpali is lacking geometric tools in its assemblages. There are different types of backing, or retouching on the lateral side of the bladelets. There are two types of

backings observed: backed from the ventral side and from dorsal to ventral side in two of the either ways unifacial or with alternating techniques. The bladelets were broken in a certain sizes to achieve the desirable length and morphology of backed bladelet tools. Sometimes two or three successive scar removals were observed in different direction to get the backing edge.



**Figure 4: Blades from Bhubanpali**



**Figure 5: Bladelets from Bhubanpali**

## Discussion and Conclusion

The development of stone tool technology has a long history of evolution from the large flake tools to the tiny blade composite tools of microlithic period. With the selection of finer quality raw materials and variety of improved hard or soft hammers and invasion of indirect percussion and pressure techniques brought a drastic change in stone tool technology (Bar-Yosef, O. 1991: 235). These microliths appeared to be more successful in hunting than the large tools of the preceding periods. The use of microlithic tools were very effective because of their light weight, durability, multiple, razor sharp cutting edges and pointed tip were more penetrative and caused deadly injuries to the game (Behera .P.K., P. Panda and N. Thakur. 1996). Cores having higher numbers of platforms have shown that such specimens are more intensively reduced and also produce a lot of core rejuvenation flakes. This may also be interpreted as the lack of good raw material in nearby areas; therefore all the cores were intensively worked to produce more blades out of them. Some of the blade cores have sharp edges at their base and could have also served as core scrapers (Tripathi, K. C. 1980).

Typical flake cores are very common in this site. Even the number of flake-blade cores is more as compared to the blade cores. It appears that the microlithic people of Ranj Stream were more careful about removing blades from the cores. Keeping in mind the

occurrence of a different variety of tools at a site may provide greater variety of utility in exploiting greater range of plant and animal food activities in the hunting gathering process. This technological innovation marked the increased in number of sites and population during this period. It is worth to note here that besides stone tools also the prehistoric people must have adopted a number of techniques for food collection, process and their manipulation. The continuing presence of blades, microblades and backed tools for a longer duration in the late Pleistocene to mid Holocene suggests that such tool types played a big role in the late Palaeolithic technology for successful hunting- gathering and food collecting technology.

## Acknowledgement

I owe a great debt of gratitude to my guide and supervisor Dr. P.K. Behera, (Head) P.G. Dept. of History, Sambalpur University for his ungrudging help and wise suggestions in preparing this paper.

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