Chapter I

GEOGRAPHICAL AND GEOLOGICAL INTRODUCTION

Eastern India¹ comprises the provinces of Assam, East Pakistan, West Bengal, Bihar and Orissa. But these administrative provinces do not make a geographic homogeneity, nor are they in any way separated from the rest of India by physical or cultural barriers. They cannot even be said to show that bond of kinship which the term South India implies, as opposed to North India. The only geographic feature common to all these provinces is the fact that they share the monsoon climate and the heaviest rainfall in the sub-continent. On this point alone a wider link may be established with the monsoon countries of South-East Asia. As the Bay of Bengal washes the shores of most of these countries, it might be held to strengthen this link but not before the problem of the monsoon was understood and overcome by the people.²

Eastern India is an integral part of the Indo-Pakistan sub-continent, and hence shares equally the cultural heritage that developed in the great sub-continent. The Himalayan Range of the north defines the northern limit of this area, while the numerous forest-clad hills of the Assam-Burma border almost shut off communication with the trans-border regions, though a precarious passage could be forced through difficult passes. The western boundary is ill-defined. The Ganges links up Bengal and Bihar with northern India. The thickly forested uplands of Chota Nagpur continue this physical aspect right into the Vindhyas and Satpuras. The River Mahanadi, again, connects the rice-growing areas of Orissa and the Chattisgarh plains. The southern boundary is well marked by the Orissan hills that penetrate right into the sea below the Chilka Lake, and thus separate the Oriya-speaking people of Orissa from the Telagus of the Ganjam district.

¹ India has been used here in a wider sense, denoting Indo-Pakistan sub-continent.
² Sylvain Levi (P. C. Bagchi, 1929, Pp. 125-26) has likened the Bay of Bengal to the Mediterranean of Europe, but the geographical conditions obtaining in the Bay of Bengal are altogether different from those of the Mediterranean Sea, which is not dominated by marked seasonal changes.
The physiographical aspect of Eastern India is dominated by the basins of the Ganges in Bihar, the Brahmaputra in Assam and their joint deltaic formation in Bengal, while the rice-growing nucleus of Orissa is formed by the deltaic alluvium of the Brahmani, Baitarni and Mahanadi rivers. The northern river basins and the Bengal delta make one uninterrupted stretch of land, in geological terms, a homogeneous formation brought about by the deposition of alluvium by the hypothetical Indo-Brahm River. This alluvial flat is separated from deltaic Orissa by the gneissose plateau of Chota Nagpur, a thickly forested area cut up by numerous hill ranges enclosing small river valleys—a wild area that has always presented difficulties from the point of view of communication between north and south India parallel with the eastern coast. This is the northeasternmost extension of the Peninsular block. O. H. K. Spate (1954, P. 585) aptly remarks, "geographically speaking it is terra incognita, rocky, jungly, isolated, backward, and almost empty." There is another such detached block of the Peninsula lying between the Brahmaputra valley and the Bengal delta. It has been called the Shillong or Assam Plateau, and is divided into the Garo, Khasi and Jaintia Hills with the Mikir and Rengma Hills as further and even more dissected outliers (See map no. 8). Around it are wrapped the Tertiary ranges of the mountain wall. Towards the east the Shillong Plateau is linked with the Barail and so with the Assam-Burma Ranges by a saddle, which sinks below 300 feet and is used by the Assam Bengal railway (See map no. 1).

The thickly inhabited parts of Eastern India are naturally the river basins and the deltas. It is the fertility of their soil that has attracted throughout the known

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Chota Nagpur is used here as defined by L. S. S. O’Malley (1917, P. 24), "The term, Chota Nagpur Plateau, is used to designate the elevated country extending from the Gangetic valley to the hilly table-land of the Central Provinces and approaching close to the Bay of Bengal on the south-east. It is not intended to imply that it forms a table-land like the steep-walled precipice behind Cape Town with its long and lofty horizontal top. The word plateau is, in fact, a technical expression for an area of which the lowest levels are at a considerable height above the sea. The plateau as thus defined extends far beyond Chota Nagpur itself, stretching into the inner highlands of Orissa on the south-east, and through the Santal Parganas, as far as the bank of the Ganges on the north-east."
period of history horde after horde of invaders and settlers. In the settlement of this region the northern river basins and the Bengal delta hold the first position as they are directly connected with the plains of northern India. Beginning from the first recorded tradition of the Vedic Aryan settlement in Videha (north Bihar) by the Vedic hero Videgha Mathava after crossing the River Sadanira (*Satapatha Brahmana, I.4.1.10-18*), this northern Gangetic plain has throughout history served as a highway for invaders, merchants and pilgrims alike. It is needless to repeat the well-known routes so fully recorded in the travel accounts of the Chinese pilgrims, Fa hien and Yuan Chwang (see Motichandra, 1953, for details). Orissa has always remained outside this northern movement of peoples. It comes into limelight for the first time with the missionary activities of the Buddhists and the Jainas. It is from the late evidence of the Hathigumpha inscription of Kharavela that Orissa is said to have come for the first time within the political orbit of a northern ruler, the Nanda king of Magadha⁴ (4th century B.C.). The rice-growing area of Orissa was, no doubt, a great attraction, but to reach that region was not easy. The route,⁵ if at all it can be called a route, lay through the south-western districts of Bengal, and the choice lay between the barren hilly ranges of the west and the alluvial delta, cut up by numerous broad rivers difficult of passage. It is clear that this passage could be forced through only by indefatigable conquerors, like Asoka, Samudra Gupta or Harshavardhana. The region seems to have attracted only homeless fugitive wanderers, such as the uprooted Rajputs in the early mediaeval period and the Pathans, true Afghans, who fled from Bengal into Orissa under the pressure of settled Mughal Government. As the result of its isolation, Orissa has always remained backward, but at the same time has developed a cultural pattern of its own. Its link with northern India is stronger than with the South, the Chilka Lake remaining the linguistic boundary.

In contrast with the river basins and their deltas, the uplands of Chota Nagpur and the Shillong Plateau are naturally very sparsely populated. They are the homeland of aboriginal tribes, living a precarious life in various stages of food-collecting or simple food-producing. They have always been left to their own

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¹ On this evidence the historians have supposed that the Nandas ruled over Orissa.

² The straight route shown in Motichandra's map (1953) is hardly corroborated by history.
fate and way of life by the great empire-builders, such as Asoka and Samudra Gupta, though briefly mentioned in their inscriptions. These regions are not absolutely barren lands. As will be described shortly, numerous hill terraces and small river valleys lie between the hill ranges, which have been taken advantage of by these hill peoples, who have practised a form of agriculture, known in Assam as *jhuma* and in Chota Nagpur as *daya*. These forest-clad plateaus, which lie athwart the pattern of the main river basins and deltas, may be taken as refuge areas for those lesser peoples who were driven out from the alluvial regions, a fact to which later history bears ample evidence. But there is no evidence to show that these hill tribes were refugees from the great plains. The recorded tradition of the Vedic Aryan does not indicate any great opposition in the northern Gangetic valley such as they met in the country of the *Sapta Saindhavas*. Strangely enough, the archaeological finds of the stone artifacts are also confined to the south of the River Ganges. It must also be mentioned that it is in this southern hilly zone that the raw material for working stone tools is most plentifully found. It is in the same zone that important deposits of metal ores of iron and copper are also found. Probably it was the availability of metals that aided the rise of the Magadha (South Bihar) power and ultimately led to the foundation of the first great empire in India. Magadha maintained this position till the rise of the Rajputs and the advent of the Muslims, when the Gangetic political arena was linked westward beyond the Indus and the capital transferred from Pataliputra (Patna) to Kanauj or Delhi.

Besides the two broad divisions of the river basins and deltas on the one hand, and the hilly uplands and plateaus on the other, Eastern India can be divided into seven natural divisions:

1. The Middle Ganges Valley.
2. The Bengal Delta.
3. The Brahmaputra Valley.
4. The Orissan Coastal Plan.
5. The Sub-mountain Region of the Himalaya.
1. The Middle Ganges Valley

This consists of the eastern portion of the Gangetic valley lying between the lower spurs of the Himalayas on the north and the Chota Nagpur Plateau on the south. It is an alluvial plain watered and drained by the Ganges and its tributaries, the Gandak, Son, Gogra and Kosi. Throughout almost its whole extent, the general aspect is that of an unbroken level, diversified by clusters of villages, mango orchards, clumps of bamboos, and groves of palm trees. In geological terms, the great plain is an area of alluvial deposit older than that of the delta and the greater portion of the area is composed of **bhangar** land, through which the rivers cut their **kbadar** valleys at depths from 50 to 200 feet below the general level. R. D. Oldham explains this distinction as follows: "The older alluvium (**bhangar**) is usually composed of massive clay beds of a rather pale, reddish brown colour, very often yellowish when recently exposed to the air, with more or less **kankar** disseminated throughout. In places, and especially in Bengal and Bihar, pisolithic concretions of hydrated iron peroxide, from the size of a mustard seed to that of a pea, are disseminated through the clay; occasionally these nodules attain larger dimensions, some being found, near Dinajpur of the size of pigeons' eggs. In places **kankar** forms compact beds of earthy limestone. Sand, gravels and conglomerates occur, but are, as a rule, subordinate, except on the edges of the valley, the quantity of the sand in the clay decreasing gradually as the distance from the hills increases. Pebbles are scarce at a greater distance than from 20 to 30 miles from the hills bordering the plain. Beds of sandstone, sufficiently compact for building, have occasionally been found, but are of rare occurrence. On the whole, there is no great difference between the alluvial formation of the Indo-Gangetic plain and those of the Narbada and Tapti, except that the latter are rather darker in colour, and perhaps less sandy.

"The newer alluvial (**kbadar**) deposits consist of coarse gravels near the hills, and especially at the base of the Himalayas, sandy clay and sand along the course of the rivers, and fine silt consolidating into clay in the delta in the flatter parts of the river plain. In the Ganges delta beds of impure peat commonly occur. Fresh water shells are of more frequent occurrence in the newer forms of alluvium than in the older, the species being those now living in
the rivers and marshes of the country." (R. D. Oldham, 1893, Pp. 431-32).

The whole Middle Ganges Valley may be divided into two sub-divisions: 1(a) North Bihar, and 1(b) South Bihar.

1(a) North Bihar lies in the main highway of the northern invaders. It is an absolutely flat country, drained by numerous tributaries of the Ganges, originating in the Great Himalaya, which have flooded the plains with recent alluvium. Culturally it is a compact area with language, tradition and history formed round the historical names Videha, Tirhut (Tira-bhukti) and Mithila. The terminology is derived from the northern agricultural system based on the cultivation of irrigated kbadar land.

1(b) South Bihar is sharply separated from North Bihar by the line of the Ganges. The change is definite, both naturally and culturally. Here the alluvial filling is shallow, a mere veneer, from below which the Peninsular edge emerges, showing groups of small, craggy hills (up to 1600 feet) like islands of bare rock or scrub. The only noteworthy tributary of the Ganges is the River Son, along which the alluvial strip expands to some 85 miles in width. In the east the Rajmahal hills abut almost directly on to the Ganges, thus closing the path-way along the southern bank of the great river. Historically South Bihar is the Magadha of ancient fame. Culturally its product was the Magadhi language preserved in the Asokan inscriptions and even now surviving as Magahi. The economic life is, again, based on agriculture, dependent on the utilisation of the available alluvial soil with the help of seasonal rains.

2. The Bengal Delta

R. D. Oldham (1893, P. 440) defines the delta as follows: "The limits of the delta, or the places where the rivers first bifurcate and commence to give off disturbances, are between Rajmahal and Murshidabad on the Ganges, and on the Brahmaputra opposite the south-west corner of the Garo Hills. But for a considerable distance above the actual delta the rivers flow through a broad plain of low ground, a large area of which is liable to flooding, and consequently to the deposition of silt. The delta is, in fact, the natural continuation of the kbadar, or alluvial flat in the upper portion of the river's course, and this kbadar becomes broader before it expands into the delta."
The plains of Bengal, though characteristically flat, have been unequally aggraded, with the result that some lie above flood-level, and others remain below water table. They can be broadly grouped into three classes:—(i) the older deltaic and flood plains lying north of the Ganges-Padma-Meghna axis, (ii) the younger deltaic and flood plains lying south of the axis, and (iii) the erosional and flood plains lying west of the Bhagirathi-Hughly river. The surface of the older delta have been partially preserved in the Barind, Madhupur and Lalmai uplands (the geology is fully explained by E. Vredenburg, 1908, Pp. 50-51). The younger delta is in many respects typical. It is a combination of the flood and deltaic plains, extremely low-lying with a web of distributary channels, especially in the south. If the sea were to rise 25 feet, its greater part including the city of Calcutta would be submerged. (S. P. Chatterji, 1949, P. 8)

Floods are both a boon and a curse in Bengal. They are common events in the province and the people have become used to them. Their little bamboo huts, erected on islands (chars) in the river or on the river banks, are easily dismantled and transported in boats to other islands which have just risen from the floods. The earliest written record discovered in Bengal refers to this danger of floods (Mahasthan Brahmi inscription, Epigraphia Indica, Vol. XXI, Pp. 83 ff.). This fear is all the more aggravated by the ever shifting river courses (see J. Rennell, Pp. 1-18). Nature is not constant here. The beds change according to the floods of the river, and with them alter the riparian cities, the surrounding fields and the very landscape. It is in the history of these rivers that a chronicle of the past civilisations can be built up and in their silts and beds can be seen buried the oldest material culture of Bengal.

This factor of change in the course of the river serves as an important background to the archaeological history of Bengal, a point well stressed by Dr. R. C. Majumdar (1940, Pp. 341-364). The present river system divides Bengal into five main parts:

(a) North-West Bengal, lying between the Ganges and the Jamuna,¹ the western channel of the Brahmaputra. In this tract the main rivers bypass the old alluvium of Barind (the ancient Varendra), though drainage rivers cut

¹ This Jamuna should not be confused with the great tributary of the Ganges in U.P., which also bears the same name.
through this high land and flow into the Chalan Bil. The rivers all run in a south-east direction.

(b) North-East Bengal, extending east of the river Jamuna. This is the great triangular sector, at the head of which stands Dacca, the capital of East Pakistan. Here the rivers, again, are confined by the raised reddish upland of the Madhupur tract, and many of them converge in the low-land to the north-east of this tract, then combined waters being drained by the Meghna.

(c) South Bengal, including the Sundarbans, lies between the Bhagirathi and the Padma (the western and eastern channels of the Ganges). In this region the rivers flow south to the sea. The changes in the river beds here have been fully explained by T. Oldham (1870, Pp. 47-48).

(d) South-West Bengal, lying west of the River Bhagirathi. Here is to be found a large area of older alluvium, the surface of which is undulating, the result of denudation. This tract is continuous with the alluvial area of the east coast, and probably owes its comparative elevation to the deposits from the Mor, Ajai and Damodar rivers, which originate in the Chota Nagpur Plateau, flowing in east and south-east direction. Geologically this is the most important part of Bengal. Kanangopal Bagchi (1944, P. 18) rightly says, “the greater part of the districts of Bankura, Burdwan, Birbhum and the western half of Midnapur is a continuation of the Chota Nagpur Plateau to the east, and the present surface of the region has been derived mainly by a process of degradation of the table-land.” There is a high level laterite, resting on the old rocks at whose expense it has been formed, and a low level laterite, which is merely a detrital form. The former is found as a cap on the summit of low hills. The latter forms a broken band or mantle stretching from near the Bay of Bengal in Orissa and Midnapur to Rajmahal, generally occupying the eastern fringe of the gneissic table-land. Wherever seen in this area, it is detrital and contains pebbles of quartz, felspar and other rocks, the source of which is indicated by the way in which they increase the nearer we get to the gneiss rocks to the west. The true laterite occurs in massive beds, from which slabs are excavated for building.

The south-eastern part of Birbhum district is an alluvial plain with a soil composed of dark clay or sand and clay. Proceeding towards the west, the patches of reddish clay and gravel are seen, while the ground gradually rises and becomes
irregular and broken (Figs. 1-2). Here calcareous nodules, called *ghutin*, are found mixed with clay, coarse sand, or ferruginous gravel. Proceeding further westward, the ground becomes more elevated and is broken into irregular ridges, the coloured clay giving place to a reddish brown gravel and bedded laterite. In some places this rock is found on the surface, extending laterally for several hundred feet in one block. It is then of a darker colour. After cutting through this rock a bed of clay is met with, below which gneiss is found at various depths. Granitic veins traverse the district in many places, occasionally outcropping at the surface, the dip being at various angles and the strike from east to west. (O'Malley, 1910, P. 7). The lateritic deposits continue in the district of Burdwan, except in the Asansol sub-division, where Gondwana rocks are exposed. They are rich in coal-bearing seams. (J. C. K. Peterson, 1910, Pp. 11-12). One important lateritic outcrop in this district is near Durgapur on the left bank of the River Damodar. In the districts of Bankura and Midnapur the western area shows metamorphic or gneissic rocks only in irregular patches along the western edge, which are the projecting headlands of the western gneissic table-land (T. Oldham, 1859, P. 254). In the town of Bankura itself, and to the west of it, gneiss is abundantly seen, showing uniformly as great rounded bosses, which break through the more recent deposits of lateritic or gravelly character. South of Bankura, veins of epidotic granite may be traced cutting through the gneissic rocks. The most easterly point at which the gneiss crops out from beneath the lateritic flats in Midnapur district is near the village of Sildah, about 30 miles west from Midnapur town. The lateritic deposits occur in hard, massive beds or blocks and also in lateritic gravels. These gravels pass by almost imperceptible gradations into solid laterite on the one hand and on the other into a coarse sandy clay. (O'Malley, 1908 a, Pp. 8-11, and 1911, Pp. 10-13)

(c) South-East Bengal, extending east of the River Meghna. Here the rivers rise from the eastern Tertiary Hills of Tippera and Chittagong, and flow in a west or south-west direction. There are three important river valleys in this region, which cut through the Tertiary ranges. The Surma valley, incorporating the district of Sylhet, separates the Tipperah Hills from a fringe of the Tertiary rocks bordering the southern edge of the Shillong Plateau. The Gomati River, rising in the Tippera Hills, encircles the lateritic deposit of the Lalmai-Mainamati
Hill on three sides. This deposit is made up of slightly micaceous, yellow-coloured sandstone and ferruginous concretions which, when decomposed, colour the top of the Hill brick-red. The sandstone is not very compact and appears to be in horizontal beds. There are, also, horizontal intercalations of clay, only a few inches thick and occasional bands of argillaceous nodules. The most striking feature here is the abundant occurrence of fossil wood. These fossils are completely silicified and lie in horizontal beds. The fragments apparently lie parallel to one another and may well have been transported by a strong current (J. A. S. B., 1908, P. 350). The fossil wood examined so far is supposed to be of the genus GlotornyIon (the two species of Glota, G. Tavoyana and G. Travan-corica, also show similarity with our specimens from Lalmai). Some have linked the Lalmai fossils with the fossil wood of Burma. (Science & Culture, Vol. VII, Pp. 370 & 573-74). The third valley is that of the Karnaphuli river in Chittagong district, which cuts through the Chittagong Hill Tract. This Hill Tract consists of a substratum of Tertiary rocks, covered over by alluvial deposits. The hills are capped with laterite, and near Sitakund, 24 miles north of Chittagong, huge boulders of laterite occur in the overlying deposit of the alluvial soil. (O’Malley, 1908 b, Pp. 9-10)

These sub-divisions of Bengal have kept, throughout the centuries, their distinctive features in spite of the changes in the courses of rivers. Today, the main rivers are the Padma, Jamuna and Meghna, the Jamuna meeting the Padma near Goalando, and the Padma joining the Meghna near Chandpur. But about hundred and fifty years ago the Jamuna was a negligible channel and the main water flowed through the course of the Brahmaputra east of the Madhupur Tract. The river Tista (Tri-srotA) joined the Ganges through triple channels, the Purnabhava, Atrai and Karatoya, all of which were then important rivers. (See J. Fergusson, 1863, Pp. 321-354). About 200 years ago, the Padma did not join the Meghna and went straight to the sea¹. In the early Mughal period (16th and 17th centuries A.D.) the Padma flowed, or more correctly, branched into its more important distributary, the Dhaleswari.² Earlier still the main channel seems to

¹ See Rennell’s Sheet.

² R. C. Majumdar (1940, P. 364), who bases his conclusion on the evidence of Mirza Nathan’s Babaristan-i-Ghaidi, a contemporary work written locally,
have been the Buriganga (Vridhha Ganga), on the northern bank of which Dacca now stands. But, Sonargaon was the most important river port in the 14th and 15th centuries, as attested by Ibn Battutah and the Chinese visitor Mahuan. Not only did sea-going vessels set out from Sonargoan (H. A. R. Gibb, 1929, P. 271), but it was also connected with the then capital, Pandua or Gaur, by the river Padma (P. C. Bagchi, 1945, Pp. 96-134). In the pre-Muslim period the course of the Padma is obscure, though, relying on Ptolemy’s Geography, Dr. N. K. Bhattasali (1940, Pp. 233-39) has tried to throw some light on this problem.

The vagaries of the rivers have, however, not altered the deep-rooted sentiments and the social ties of the people living in the different sub-divisions of Bengal. The two most predominant social entities are the Varendris of North West Bengal and the Radhis of the South West. Both have a general contempt for Bengala, i.e. the people of Vanga (South Bengal). The region east of the Meghna is the land of Samatata and Harikela (For details see R. C. Majumdar, 1943, chapter I). The triangular high tract of Madhupur is the least known region in Bengal. So far research into the historical records have failed to produce any definite evidence of its past traditions. However, it is not unreasonable to suggest that its past is rooted in the history of the old capital towns, Vikrampur and Suvarnagrama, and in the lost language of the Dhakkiya Prakrit.

3. The Brahmaputra Valley

R. D. Oldham (1893, P. 439) points out, “The Assam Valley is a gigantic kbadar, or strath, the greater portion being liable to flooding and consequently not in a habitable state. There are, however, higher tracts here and there, sometimes mere mounds, and sometimes small plains (sic), which may be considered as representing the extensive bhanger of the Gangetic plain. Along the foot of the hills are gravel deposits, but they do not appear to be very extensive.” The southern boundary of the valley is marked by the detached Mikir and Rengma hills, and the Shillong Plateau, while on the north between the Himalayan foothills and the river the flat plain is cut up by numerous tributaries of the Brahmaputra.
This plain directly opens into the *dvāra* of northern Bengal, comprising the districts of Rangpur and Jalpaiguri and the former State of Cooch Behar. Both these regions have a common history under the name of Kamarupa-Kamata. This valley is under the direct political and cultural influence of northern India. Indeed the culture here has a greater link with the north Indian system than with the tribal life of the neighbouring southern hills.

4. The Orissan Coastal Plain

Three rivers, Baitarni, Brahmani and Mahanadi, combine to form the great alluvial plain of Orissa, stretching along the seaboard from the Chilka Lake to the Subarnarekha river. It consists of three distinct zones:

(i) A marshy woodland strip along the coast from three to thirty miles in breadth, narrowing at the Chilka Lake. This marshy strip resembles the Bengal Sundarbans as regards its swamps, dense jungle, and noxious atmosphere; but it lacks the dramatic forest scenery of the Gangetic delta. This strip is intersected by innumerable streams and semi-tidal creeks, whose sluggish waters deposit their silt and form morasses and quicksands. A hundred years ago cultivation did not begin till the limits of this dismal region were passed (W. W. Hunter, 1877, Vol. XVIII, Pp. 20-21). In the district of Balasore it is written off as "the Salt Tract". Towards the beach it rises into sandy dunes, from 50 to 80 feet high, sloping inland, and covered with a vegetation of low scrub jungle.

(ii) An intermediate arable tract of rice land in the older part of the delta stretches inland for about 40 miles. This occupies the country between the marshy sea-coast strip and the inland hills. It is intersected by several large rivers which emerge from the western mountains, and throw out a network of branches in every direction. As a whole, it is a region of rich rice fields, dotted with magnificent banyan trees, and thickets of bamboos.

(iii) Hunter’s "Sub-montain Tract" consists of a country dotted over with

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1 *Dvāra* is apparently a Sanskrit word, meaning gateway, here referring to the valley of the Tista through which runs the route to Tibet from Bengal. The antiquity of its use in this technical sense is not known. In Central Asia ‘dara’ is a common appellation for a river valley opening highways.

2 The term, however, over dramatises the actual elevation of the western hills.
detached peaks and small ridges, which become more sparse and scattered to the east, being there separated from each other by plains of deep alluvium. Further to the west, the uplands are generally surrounded by laterite, which rises to a considerable height above the alluvium.

The geological feature of the western hills and the undulating alluvial plain is much the same as is found in the districts of Bankura and Midnapur. The more northern portion of the flats of Orissa province, i.e. the part extending from the Subarnarekha river to the Burhabalanga, belongs geographically to the Midnapur and Hugli region of Bengal. From Balasore, however, for about 20 miles to the south-west is a district of older alluvium. This is found throughout the northern parts of Orissa, but is not seen to the south of the Brahmani river.

The Orissan Nilgiri Hills, which touch the banks of the Burhabalanga river, consist of granitic rock. Near Jagjuri trap dykes appear, and also gneiss. In the gneiss are found bands of chloritic rock, serpentine in texture. Still further to the south-west and near the Splandi river, quartz schist appears. Gneiss is again seen along the Brahmani river, while the hills along the Mahanadi near Katak are of unidentified sandstone. Detached hills of gneiss, separated by laterite and alluvium, continue right up to the Chilka Lake. Laterite covers a very large area in the central and southern divisions of Orissa south of the Brahmani up to the Chilka Lake, and forms a raised terrace-like plain surrounding nearly all the hills, except a few isolated in the alluvium. It is also important to note that blown sand occurs along all parts of this coast which face the south-east. In some cases, these dunes cover a considerable tract, as near Puri, where they are two or three miles across. In the opinion of W. T. Blanford, each range of these dunes marks an old sea coast. (T. Oldham, 1859 b, P. 276)

5. The Sub-montain Region of the Himalaya

The district of Darjeeling is the only region within our scope containing a small portion of the Himalayas. The mountains rise from the plains in a succession of bold spurs and ridges separated by deep valleys. On one of the ridges the hill station of Darjeeling is perched. This ridge is cut through by the Tista valley which extends into north Bengal, and thus opens up the great highway
from Bengal to Tibet through Darjeeling. The country at the base of the Himalayas is known as the Tarai, a marshy belt of land, notorious for its unhealthiness. In Bengal this part is known as the dvars. Culturally this is the meeting ground of trans-Himalayan intrusions and the neighbouring Indian provinces, distinct in language, tradition and culture.

6. The Chota Nagpur Plateau

This is a rugged region of great inequalities, consisting of a succession of plateaus, hills and valleys, drained by several large rivers, including the Damodar, Barakar, Subarnarekha, Brahmani, Baitarni and Mahanadi. The confused geography of this region has been summed up by O. H. K. Spate, who is here quoted in length: "Beyond the Behar tributary of the Son, however, we have firmer lines: a great rectangle of some 40,000 square miles, mainly Archaean gneiss forming rolling peneplains, bisected longitudinally by the fault-trough of the Damodar with its Lower Gondwana coal. Most of this area lies in the Chota Nagpur division of Behar, which extends beyond it into the Jamshedpur Gap. "The Hazaribagh peneplain N of Damodar lies at about 1300 feet. Across it, and slightly diagonal to its E/W extension, runs the Hazaribagh 'Range', really a higher plateau (c. 2000 feet) with some monadnocks rising 2800 feet. The plateau on the whole is rather open, and there is a fair amount of cultivation. On the N it falls abruptly, but with many irregular spurs and outliers covered with open jungle, into the Gangetic Plain; to the S E the descent is more gradual and the upper Ajai and Damodar-Jamunia valleys provide routes across the plateaus giving Calcutta direct access to the Middle Ganges Plain. In the N E the Rajmahal Hills, highly dissected plateaus of basalts of Gondwana age, rise steeply from the alluvium in the great bend of the Ganges. Considering the terrain they are well cultivated and densely peopled; the Santals occupy the broader valleys, keeping large herds of buffaloes in the smaller side-valleys, while on the higher ground the Paharias ('Hillmen') cultivate remarkably steep slopes. ... South of it (Damodar Basin) lie the Ranchi peneplains. In the E is the country of the pats: little plateaus, largely basalt, with intricately fretted and extremely steep sides, the relics of a peneplain at about 3600 feet. Some of their flat tops are cultivated, but soils are lateritic and their jungle-
covered walls make many of them practically inaccessible. The main peneplains are at about 2500, 2000 (the most extensive) and 1000 feet, the last bordering the Subarnarekha; open, broadly rolling country, with mature valleys (Sankh, S. Koel) bordered, however, by low gullied terraces, fantastic cones and domes of gneiss ‘looking as if they had been excluded from the earth as gigantic bubbles that had become solid instead of bursting.’ E of the Subarnarekha the plateau sinks gradually into the deltaic alluvium, and is generally veneered with laterite.” (O. H. K. Spate, *1954, Pp. 585-586)

The valleys of the Damodar and Ajai have been utilised to make the most important route between Calcutta and the Middle Ganges valley, by cutting across the great Ganges bend. This route seems to have been utilised in the past by intrepid invaders, like Bakht-yar Khalji. (See *Tabaqat-i-Nasiri*, Pp. 146-57). Another important route lies through the Jamshedpur Gap along the valley of the river Sanjai, only 850 feet high, between the hills of Orissa and the spurs of Chota Nagpur. It is through this gap that a railway runs between Calcutta and Bombay via Nagpur. In the early eighteenth century A.D. the well-known raid of the Mahrattas into Bengal followed this route.

7. The Shillong Plateau and the Tertiary Ranges of the East

The Shillong Plateau (See map no. 1), which forms an elevated tract between the Brahmaputra valley on the north and the Eastern Bengal Plains on the south, is bordered along the southern edge by a fringe of Tertiary rocks (M. S. Krishnan, 1943, Pp. 6-7). Here the Archæans are represented by gneiss, schists and granites. The gneissic complex is apparently overlain by the Shillong series, which is regarded as younger (M. S. Krishnan, 1943, P. 129). This series “is a widely developed formation, consisting of a thick series of quartzites, slates and schists, with masses of granitic intrusion and basic interbedded traps.” (D. N. Wadia, 1953, P. 104). This Shillong series is for the greater part of its extent overlain by horizontally bedded Cretaceous sand-stones.

In the Naga Hills the lowest Eocene beds are the *Disang shales*—a great thickness of very well-bedded dark-grey shales with well-cemented sandstones. Towards the interior of the hills, separating Assam from Burma, the shales become hardened and slaty, and are associated with quartz veins and serpentine. (D. N. Wadia, 1953, P. 338)
The Naga Hills are distinct from the Shillong Plateau and form a link with the Assam-Burma Ranges, which sweep in a long curve from the far north-eastern corner of Assam to Cape Negrais on the south-west coast of Burma. Different parts of this hill belt bear different names. The Patkoi Hills lie to the north, then follow the Naga Hills which enclose the Manipur Plateau, and southwards the Lushai Hills, Chittagong Hills and Chin Hills consisting of a succession of long parallel ranges separated by deep valleys. Still farther south the hill belt gradually narrows, forming the Arakan Yomas. The parallel arrangement of the long unbroken ridges is responsible for the inaccessibility of most of the region and the difficulty of communication between one valley and another. On the other side of the Irrawaddy stretches the Indo-Malayan mountain system, a geomorphological unit since the close of the Mesozoic, which includes the Yunnan massif, the Shan Plateau, the hills of Siam and the Annamite Cordillera, a long range giving off from the plateau of ‘Haut Laos’ towards the south-east and separating Annam from Laos.

Routes across the Assam-Burma Ranges were for the most part mere trails until the last war. The Hukawng Valley route, and the Tuzu Gap route a little to the south, lie in the northern part of Burma. An easy route leads through Manipur, whilst the An and Taungup passes link Central Burma and Arakan.

The distribution of the tribes in these hills is determined by geological and geographical factors. L. A. Waddell writes: “The relatively low rounded gneissic and limestone hills to the west of the Dhansiri River and Barail Range, and occupied by the Garo, Khasi, Jaintia, Mikir and Kachari, are more open to India, whilst the widely different geological formation to the east, belongs to the rugged Burmese mountain system and is chiefly peopled by the savage tribes broadly classed as Naga. The wilder tribes inhabit especially the labyrinthine glens and ridges of the upper valleys, whilst the more civilised tribes are mostly restricted to the bottom of the tropical central valley fringing the great river which connects them with the plains of India. The steep ridges and deep ravines in this area are exceptionally numerous and act as dividing barriers, partitioning off sharply the different tribes and clans and tribelets, and have clearly contributed to the formation of the latter.” (L. A. Waddell, 1900, p. 8)
CHAPTER II

PALAEOLITHIC INDUSTRY IN EASTERN INDIA

No fossil remains of Pleistocene Man have so far been found in Eastern India, nor indeed in the sub-continent of India and Pakistan. W. Theobald once recorded the find of a human cranium, “supposed to have come from a conglomerate bone bed” of the Narbada (Theobald, 1881, p. 122). It was preserved and then lost in the museum of the Asiatic Society of Bengal. H. De Terra observes, “Theobald listed it as Homo Sapiens; hence it seems more likely that it was collected from younger deposits, perhaps from the cotton soil, in which we found late palaeolithic tools.” (De Terra & Paterson, 1939, p. 313). In the Attirampakkam terrace near Madras R. Bruce Foote discovered a bone (now at Oxford) of a human skeleton seemingly washed out of the implementiferous conglomerate and associated with a large number of handaxes. This bone was examined by Professors Busk and Dawkins and recognised as possibly a human tibia although from which both the articulations were lost (Krishnasvami, 1947, p. 34). This lack of human remains stands in great contrast to the abundance of Siwalik fauna in which fossil primates predominate (P. Mitra, 1927, pp. 110-115). The migration of this Indian Siwalik fauna has been noted by Von Keonigswald (1939, pp. 28-53; See also De Terra, 1943, pp. 459-61) as far down as Java, an island lately regained from the ocean, and it is in this latter country that number of fossil homonids have been recovered (De Terra, 1943, pp. 437-51). The earliest skull, Homo Modjokertensis, has been dated to the first interglacial period (De Terra, 1943, p. 455; Zeuner, 1952, p. 280).

However, the presence of Pleistocene Man in India is known from the chipped stone tools left behind by him and discovered in many localities. The study of these tools and their geological association is still in its infancy in the Sub-continent. Though various types of palaeolithic implements have been found here, yet their exact relationship and the environmental background under which they were manufactured, are questions that remain to be answered.¹ The other

¹ Prof. F. E. Zeuner (1950) has given us for the first time the environmental background of the Gujarat industries.
important point that remains to be tackled is the nature of the raw material available, on which really depends the forms of the tools as well as the techniques employed for tool manufacture. This dependence of the form and the technique on the raw material has been ably shown by Prof. C. Van Riet Lowe (1945, pp. 56-59) on the evidence from South African material. In India quartzite was mainly used for tool manufacture. In what way it was available and what difference it made in the forms of the tools, are questions that remain to be answered. It is an established fact that there is fundamental technological difference between the working of quartzite and flint. K. P. Oakley (1952, p. 20) points out, "The commonly used white vein-quartz, consisting of crystals matted together breaks irregularly, and is a most difficult stone to work."

In Eastern India palaeolithic tools have so far been found only in the Chota Nagpur Plateau (See p. 2 for its extent) (Map no. 2). V. Ball was the pioneer in this region as R. Bruce Foote was in South India. Ball observes, "I examined on the Theria (Jheria) coalfield, various heaps and spreads of pebbles derived from the conglomerates which are so characteristic of the Lower Damoodah series of rocks. These pebbles consist of gneiss, quartzite and sometimes even granite; a large portion of them are jointed, or perhaps to speak more correctly, cracked, the planes of easy fracture being inclined at a small angle to the major axis." (Ball, 1865, pp. 127-28). In association with these pebbles he discovered a handaxe (pl. 1, no. 7), made from a pebble of greenish quartzite, which was lying on the surface of the ground near the village Kunkune, 11 miles southwest of Govindpur on the Grand Trunk Road. In the same paper Ball noted the discovery by G. T. Hughes of a similar type of "pebble tool" made from micaceous quartzite on the Bokharo coal-field in Hazaribagh district. In 1867 Ball (1867, p. 143) reported the discovery of a third specimen, made of quartzite. It was found on the surface at an elevation of about 700 feet, near the village of Gopinathpur 11 miles S.S.W. of Beharinath Hill in Bankura district (pl. 1, no. 6). A fourth (pl. 1, no. 4) was found by Ball (1874, p. 96) in the Raniganj coal-field in Burdwan district on a laterite strewn surface. Four more specimens were reported by him (1876, Pp. 122-23) from Orissa. Pl. 1, no. 5 is of granular quartz

1 For the controversy see M. C. Burkitt, 1936 a and b; Van Riet Lowe, 1936; and T. P. O'Brien, 1936,
from Dhenkenal. "It was found together with the debris from a laterite conglomerate; and from the fragments of ferruginous matrix still attached to its surface there can, I think, be little doubt that it was at one time imbedded in the laterite." Pl. i, no. 3 is of vitreous quartzite obtained near Bursapali to the north of the village of Kudderbuga in Sambalpur district. Pl. i, no. 1 is also of vitreous quartzite obtained in the bed of a stream near the village of Kalikota, Ungul. Pl. i, no. 2 is of vein-quartz found on the surface near Harichandpur in Talchir. On these tools V. Ball remarks, "On comparison with a series of Madras implements, the resemblance to some of the forms is very striking, and the conclusion that a connexion existed between the peoples who manufactured these implements, respectively, seems a legitimate one to draw. Not only is there a resemblance in form, but also in material, and in some instances at least, in the case of the Bengal specimens, they were picked up at localities far remote from the nearest possible source of origin, thus necessitating some human means of transport." (Ball, 1879, p. 394). Recently in the districts of Manbhum and Singbhum stray palaeolithic finds have been made (Science & Culture, Calcutta, 1951, Vol. 17, p. 164). D. Sen (1954, p. 123) also reports a similar find in Monghyr district.

The most important palaeolithic discovery so far made was in Mayurbhanj state. A number of sites have been located in the valley of the river Burhabalanga in and around the village of Kuliana. At some of these sites trial excavations were carried out and large number of tools collected by the Anthropological Department of Calcutta University. (N. K. Bose & D. Sen, 1948). So far geological context of the Mayurbhanj palaeolithic industry has not been definitely established.

However, recently some sections at the Burhabalanga River have been examined with a view to throwing light on this problem. Three sections have been given by N. K. Bose & others (1951).

Section no. 1 (See fig. 1 on p. 20) is within half a mile upstream of Churgunia Ghat near the confluence of Burhabalanga with a small nullah. Of the six beds distinguished, the lowest is said to be of yellow white clay of unknown depth. The next bed is described as "compact laterite" having "a typical ferruginous lateritic appearance with characteristic vermicular structure," mottled in colour being red, yellow and dark brown in patches. Then follow "boulder conglo-
SECTION AT THE BURHABALANGA RIVER

(AFTER BOSE, SEN & RAY)

FIGURE 1
merates”, separated into Upper and Lower beds by a thin layer of sandy clay containing “gravels of various sizes”. The matrix of the conglomerates “shows some concentration of ferruginous material”. The uppermost bed is called “Top soil” said to have been formed “by a thick deposit of alluvium”. One core tool was dug out from the “Upper Boulder Conglomerate”. Section no. 2 (See figure 1 on p. 20) is located further down stream. Here the yellow clay bed and a portion of the “compact laterite” are said to lie under water. This section agrees with no. 1, except that the “Lower Boulder” is said to have “a peletty lateritic structure, in which pebbles are embedded”. Here in the “Lower Boulder” bed a “pebble tool” was found and in the Upper a “crude hand-axe”, both showing “signs of rolling”. Section no. 3 was located between sections 1 and 2 and is said to be “nearly identical with the previous two in character.”

These sections may be compared with another from the same locality (See figure 2 on p. 21), given by Prof. F. E. Zeuner (1953, fig. 5). Here the underlying rock is limestone, over which lies “bluish-white clayey silt”. Then follows “mottled clay” equivalent to the “compact laterite” of Bose and others. Next is shown only one bed of “cemented gravel”, i.e., the “Boulder Conglomerate” beds of Bose and others have been integrated into one, the thin sandy layer being possibly considered as insufficient to demarcate the bed into two divisions. Prof. Zeuner divides the “Top Soil” of Bose and others into two beds.
Bose and others have called the “Top Soil” “Old Alluvium” as they point out “even present day high floods do not reach the top of this bed”. But it seems that the term is derived from the older geological maps in which these beds have been described as “older alluvium and laterite” (J. A. Dunn, 1933, p. 286). Dunn, (ibid, p. 287) argues for a “late Tertiary” age of the “series of gravels and grits” on his supposition that they are similar “to the Durgapur beds of the Raniganj coalfield, in which certain fossil wood fragments, recently determined as Tertiary (probably Miocene) in age, have been found.” Bose and others (1951, p. 5) have further suggested that the lower greyish clay bed may be of “post-Lower Miocene in age” as they observe it “is of the same appearance as the ‘thinly stratified greyish white or very pale clays’ found above the Ostrea beds at Mahula near Baripada by P. N. Bose (Rec. Geological Surv. India, Vol. XXXI, p. 168) which is of Miocene age.” These geological observations are based on insufficient data. They remain to be verified and proved by further field work.

A general geological picture of this region has been given in chapter I. Against that background these sections, along with one (See figure 4 on p. 33) given in chapter III, should be examined. On correlating them it is observed that below the top soil has been found a deposit of microliths and neoliths, which are definitely known to be post-pleistocene on the evidence of the associated skull and teeth of a modern wild horse or ass. In the gravel bed of the Burhabalanga River have been found palaeolithic tools. So far no human remains have been found in the lower beds.

On the typology of the palaeolithic tools “collected from the boulder conglomerate section near Kamarpal” and “recovered in situ from the Upper and Lower Boulder Conglomerates”, Bose and others (1951, pp. 6-7) observe, “Most of the specimens are rolled and weathered and show a yellowish brown stain. The workmanship is generally crude and primary. The series includes both core and pebble tools and flake tools. The flake tools, however, are very few. The former comprise handaxes of early Abbevillian type and show crude form and workmanship. Most of them are of irregular outline, and flake scars being large and ill-defined. Often the butt is pebbly and much of the cortex remains unworked. Among these, a few crude peariform(sic) and oval or ovaloid handaxes can be roughly distinguished.
"The flake tools which comprise a few large and small specimens show poor and primary workmanship, sometimes with a little cortex remaining. The striking platform is plain and unfacetted. Little secondary work of retouch is present. The working edges are rather irregular. Some crude scrapers and knives of irregular outline can be distinguished. The flakes recall Cromerian and pre-Soan types. A few of the flakes may, of course, be waste products from the manufacture of pebble and core tools.

"The handaxes and related tools on core described above resemble to some
extent tools found from the boulder conglomerate at Vadamadurai near Madras”. It is on this typological comparison that D. Sen (1954, p. 144) has tentatively ascribed these tools to Lower Middle Pleistocene.

A greater number of tools (totalling 663) were, however, obtained in actual excavations at and near Kuliana (Bose & Sen, 1948). The sections observed in their excavations are diagrammatically shown here (figure 3). These sections have not been correlated so far with those observed at the river bank. Bose and Sen (1948, p. 13) point out, “The boulder beds by the river bank could not again be satisfactorily equated with that found in Quarry C, south of Kuliana.” The tools were found only in the secondary laterite. Typologically these tools, as Bose and others (1951, p. 7) remark, are more advanced than those found in the “boulder conglomerate”. They point out, “The general sequence of the tools found in the secondary laterite of Kuliana starts from crude handaxes and choppers and ends in finer bifaces and a few flake tools. But the tentative sequence in the sections on the Burhabalanga, established by a few in situ tools, is from crude pebble tools to handaxes of crude type... At present we can suggest that the lower portion of the secondary laterite in Kuliana containing crude choppers and handaxes corresponds roughly to the lower portion of the Upper Boulder Conglomerate bed at Kamarpal containing the same facies of tools.” It may, however, be pointed out that the basis on which the tools found in the sand bed of the secondary laterite, have been chronologically separated, is not at all clear.

In the classification of the implements Bose and Sen have followed a principle “based largely upon the imagined function of the tools”. These are:

A. Cutting or Hacking by means of heavy blows.
B. Scraping.
C. Piercing.
D. Doubtful Use.

Such a principle is in this context hardly creditable, as the function of the tool is often anything but certain. In the typological description they have divided the tools under three categories: Pebble tools, core tools and flake tools. These three categories have been followed in the description given here. They have also made numerous groups and sub-groups of typological variations. We have
omitted all these ramifications. The main type followed here are (1) chopper, (2) chopping tool, (3) scraper, (4) handaxe, (5) cleaver, and (6) flake tool.

The percentage of the various categories, given by them, is as follows:

- Pebble tools 12.21%
- Core tools 81.29%
- Flake tools 6.48%

A selection of the tools is given below under our main types.

A. Pebble Tools

Type no. 1: Chopper:

pl. 2, no. 8:—Fine-grained quartzite, moderate ferruginous incrustation. Not rolled. $8 \times 7 \times 4.1$ cm. This has a jagged margin formed by the irregularly disposed scars on the flat ventral (lower) surface, while the dorsal (upper) face is formed by the original rolled pebble surface, except for one shallow primary scar. It is a pebble chopper in the sense, defined by Movius (1948, p. 350), and is paralleled with the early types of the Soan culture (De Terra & Paterson, 1939, pl. XXXIV), as well as with the Kafuan tools of Uganda (O'Brien, 1939, fig. 6).

pl. 2, no. 10:—Greyish quartzite, no ferruginous incrustations, but slight stain. Not rolled. $10.2 \times 8.5 \times 4.2$ cm. It is roughly oval pebble with flat natural ventral surface. Four free strokes applied on this face and directed upwards have produced irregularly convex working edge at one side, the edge being scalloped. This is also a chopper, and can be compared with the rounded pebble types of the Soan culture (De Terra & Paterson, 1939, pl. XXVX). Compare also Sankalia (1946, pl. V, nos. 9-11).

Type no. 2: Chopping Tool:

pl. 2, no. 9:—Fine-grained quartzite with no ferruginous incrustation or stain. $13.2 \times 11 \times 6$ cm. This has been flaked at one margin only by a few alternate strokes to produce a slightly convex extensive cutting edge, which is jagged. Opposite lies the thick pebble butt. It is a chopping tool according to

1 The terminology of Movius (1948, p. 350ff), though defective, has been followed in the following description,
the terminology of Movius, and has parallels in the Soan culture as well as in Oldowan pebble tools (Leaky, 1951, figs. 1-5).

Type no. 3: *Scraper:*

pl. 2, no. 13:—Quartzite, stained dark brown, but no ferruginous incrustation. Not rolled. $14.2 \times 12.2 \times 7.1$ cm. It is sub-triangular in form. The original pebble surface extends from anterior tip across right half of dorsal face to all over butt. Left margin is jagged while right is straight. This tool is classed by Bose and Sen as a knife with the left jagged margin serving as a working edge and the right one as the base for the finger. It differs from the side-chopper in possessing the latter characteristic and in not having a holder at the butt end. In this particular tool the lateral margins converge anteriorly though they do not meet at a well-defined point. This gives it the appearance of a crude handaxe. It might as well have been a scraper.

Type no. 4: *Handaxe:*

pl. 2, no. 14:—Quartzite, stained brown, no ferruginous incrustation. Not rolled. $13.3 \times 6.4 \times 5.3$ cm. This longish pebble has been worked into a crude handaxe. It has a long pebble butt with mid-rib (or spine) extending from the butt to almost anterior extremity on the dorsal face, while the ventral face is trimmed flat. The cross section is acutely triangular. This has a resemblance with the "pointed rostrocarinate-like digging tools" of the Singrauli basin (Krishnasvami & Saundararajan, 1951, nos. 3 and 4 in fig. 3 and pl. XVI).

pl. 2, no. 15:—Quartzite, stained brown with slight ferruginous incrustation. Not rolled. $15.1 \times 9.5 \times 6.3$ cm. This tool is a further development of the former variety. The upper face has pebble surface in the posterior portion while the other shows a low mid-rib as a result of two flakes which slope down laterally. The lower face is very irregularly flaked. The margins converge anteriorly to meet at a blunt point. The butt end is of a rounded outline. It is stated that secondary flaking in the form of small scars at the lateral margins is present. Compare Burkitt & Cammiade, 1930, pl. III; Sankalia, 1945, pls. IV-V, fig. 6.

pl. 2, no. 16:—Quartzite with no ferruginous incrustation. Not rolled. $14 \times 7.9 \times 5.1$ cm. This is another irregular type of biface made from a longish pebble. The upper face shows the pebble surface more than half its length,
while the lower face has an irregular mid-rib. The anterior is obtusely pointed. Left margin is alternately flaked, while the right is flaked only for a short length in the anterior portion. Compare Burkitt and Cammidae, 1930, pl. III.

pl. 2, no. 17:—Quartzite, stained brown but with no ferruginous incrustation. Not rolled. $11.2 \times 7.8 \times 4.2$ cm. An oval pebble has been utilised to form this handaxe. One face is entirely a convex pebble surface. The other is slightly convex, flaked all over.

pl. 2, no. 18:—Quartzite with slight ferruginous incrustation. Not rolled. $22 \times 11.9 \times 6.9$ cm. Another oval pebble of large size was selected to produce this handaxe. Here the original cortex is preserved at the butt end. The lower face has been entirely flaked, while the upper is convex with numerous flake scars shallow and extensive, except at the anterior tip, where they are shallow and small. The anterior is broad and convex. Compare Burkitt and Cammidae, 1930, pl. II, no. 10.

pl. 2, no. 19:—Fine-grained quartzite, moderate ferruginous stain and incrustation. Not rolled. $10.6 \times 6.6 \times 3.3$ cm. This is the finest type of handaxe of a truncated amygdaloidal shape made from a pebble. The pebble was first split and then the upper face was carefully dressed. Flake scars are generally shallow, regularly disposed on one lateral margin, irregularly disposed on the other. Stepped flaking and dressing prove the use of wood technique. The form resembles no. 46, fig. 5 of the Singrauli basin (Krishnasvami & Saundararajan, 1951), and also with no. 10, pl. VIII of Sankalia (1946).

Type no. 5: Cleaver:

pl. 2, no. 12:—Quartzite with no ferruginous incrustation. Not rolled. $9 \times 6.9 \times 6.1$ cm. This is a type of longish pebble tool. In this case the anterior edge is formed by alternate flaking. Consequently the edge is scalloped. It is stated that "heavy vertical blows have caused strong stepped platforms on both sides of the jagged edge," and hence it is surmised that it was "used as a chopper for dealing heavy vertical blows." But it has been included by Bose and Sen under the category of cleavers.

pl. 2, no. 11:—Quartzite with slight ferruginous incrustation. Not rolled. $17.3 \times 11.3 \times 5.8$ cm. This is also made from a longish pebble with its anterior
at right angles to the long axis, the working edge being formed by the intersection of two surfaces; the dorsal face is formed of the original crust, only the margins being coarsely trimmed, and the ventral face is mostly one major flake scar. It is a cleaver made on pebble and has several parallels in South India. (Krishnasvami, 1938, p. 72).

B. Core Tools

Type no. 4: Handaxe:

pl. 3, no. 20:—Medium-grained quartzite with moderate ferruginous incrustation. Not rolled. 12.61×8.7×5 cm. This is the crudest example resembling an ovate handaxe. It is flaked all over, the two ends have been left thick and the margins are convex and sinuous.

pl. 3, no. 21:—Quartzite, brown stain which is light or dark in patches, no ferruginous incrustations. 13.5×8.9×4.5 cm. An oval core is flaked to a flat ventral surface and a highly convex dorsal face, the latter showing a flat patch in the middle and a mid-rib ending in an anterior point. The posterior has also a rib. Flake surfaces are shallow, confined to the neighbourhood of the margins. Step-flaking is present on the anterior half of right margin. Compare Burkitt and Cammiade, 1930, fig. 1 no. 3. It is described as a rostro-carinate type.

pl. 3, no. 22:—Quartzite, schistose, without ferruginous incrustation. Not rolled. 19.4×11.8×5.9 cm. It is a large amygdaloidal form with thick butt unworked on the upper face. Original crust of rolled boulder extends on this face from butt to near anterior end. Lower face is slightly concave towards the anterior end. Lateral margins are straight when viewed from above. They end in a somewhat rounded butt. Secondary flaking is present at the anterior end.

pl. 3, no. 23:—Quartzite-schist, flaggy variety. Stained brown with heavy ferruginous incrustation. Not rolled. 19.4×10.4×6 cm. This is a highly modified form of the previous example. In this case the anterior end is pointed and the butt is straight. Owing to its flaggy nature many of the larger fractures lie roughly parallel to one another. At both lateral margins there are numerous small secondary trimmings, most of which are free. The form compares well with no. 12, pl. XXI of Sankalia, 1946.
pl. 3, no. 24:—Quartzite, stained dirty brown. Not rolled. 12.7 × 8.6 × 3.6 cm. This a still finer specimen of the previous form, with its pointed anterior end broken off. No cortex is visible. The lateral margins are unequally sharp, the left one is comparatively thinner and sharper, with numerous small step-flaking along its length. The right margin also shows some secondary retouch. The form is comparable with no. 48, fig. 5 (Krishnasvami & Saundrarajan, 1951) and nos. 16 and 17, pl. XXI of Sankalia (1946).

pl. 3, no. 25:—Vein-quartz. Not rolled. 13.9 × 9 × 4.3 cm. It is a rounded variety of the amygdaloid form with the pointed end at the anterior. Primary strokes are very close. Both faces are of medium convexity. Secondary flaking is numerous along the margin, many being of a stepped character. It resembles no. 51, fig. 5 (Krishnasvami & Saundrarajan, 1951) and no. 7, p., XXI, nos. 9-10, pl. XI of Sankalia (1946).

pl. 3, no. 26:—Quartzite, stained red with moderate ferruginous incrustation. Not rolled. 17.7 × 11.8 × 7.3 cm. This handaxe is pear-shaped. Posterior portion is worked little, anterior comparatively thinner. Low mid-rib on dorsal face. Lateral margins are straight when viewed from above, sinuous when viewed in profile. No secondary flaking.

pl. 3, no. 27:—Flaggy variety of quartzite, slight ferruginous incrustation. Not rolled. 9.8 × 7.2 × 2 cm. It is an oval form of handaxe flaked all over. Large portions of both faces are flat as a result of fracture along joint planes. The margins show secondary flaking all over, some of the flake scars being of stepped character. It resembles no. 56, fig. 6 (Krishnasvami & Saundrarajan, 1951), and no. 2, pl. XXI of Sankalia (1946).

pl. 3, no. 28:—Grey flaggy quartzite, no ferruginous stain, but some incrustation. 18.3 × 10 × 4.9 cm. It is an elliptical biface with its lower end thin and broken at the extremity. Lateral margins are convex and they meet at a slightly rounded points. Secondary flaking is numerous along left margin and anterior.

Type no. 5: Cleaver:

pl. 3, no. 29:—Quartzite, stained brown, with ferruginous incrustation. 17.4 × 8.5 × 4.4 cm. It is a cleaver with its cutting edge formed by the intersection of two extensive flake scars. The lateral margins are roughly parallel, though
slightly convex, and converge to meet the pointed butt end. Secondary flaking is present at the two lateral margins. The cross-section is a trapezoid. It can be compared with no. 5 fig. 8 (Krishnasvami, 1947).

pl. 3, no. 30:—Quartzite with some ferruginous incrustation. Not rolled. 18.7×15.5×5.6 cm. This is a variant of the previous example with a U-shaped butt end, and the lateral margins diverging towards the working edge and thus producing a broad and sharp edge. No secondary flaking. Compare Krishnasvami (1938a) p. 72.

pl. 3, no. 31:—Fine-grained quartzite with some ferruginous incrustation. Not rolled. 17×10.4×4.5 cm. It is a guillotine type of cleaver with rhomboidal section and pebble butt, and has a straight cutting edge, obliquely inclined to the long axis. It has many parallels in South India. R. B. Foote (1916), pl. 1, no. 2204; Krishnasvami (1938a) p. 72.

C. Flake Tools

The flake tools have been made from the chips of quartzite boulders, and they differ from the former two classes in so far as these show striking platforms either natural, unifacetted or multifacetted, and also a complete flake scar either on one or both faces and a prominent bulb of percussion. The technique is mostly clactonian and the angle of flaking is obtuse, though the preparation of the platforms speaks of crude resemblance to the levallois.

pl. 4, no. 32:—Quartzite, with slight ferruginous incrustation. Not rolled. 13.4×8.9×5.1 cm. This is classed by Bose and Sen as a chopper, but could better be described as a scraper. It is made from a large thick flake. Plain platform makes an angle of 112° with ventral face, which has a prominent bulb of percussion. The working edge is produced by a few free and also resolved flaking directed from the ventral towards the dorsal face. The opposite margin retains the cortex.

pl. 4, no. 33:—Fine-grained quartzite without ferruginous incrustation. Not rolled. 13×8.8×4.2 cm. It has also been classed as a chopper by Bose and Sen. It shows prepared unifacetted platform, the flaking angle being 128°, and hence the bulb of percussion is comparatively diffuse. One lateral margin is thick and
the other sharp. The working edge shows a few step fractures probably as a result of secondary flaking.

pl. 4, no. 34:—Quartzite with some ferruginous incrustation. Not rolled. 13.9 x 8.2 x 5.1 cm. An oval core is struck from the parent boulder after preparation of the platform, the flaking angle being 114°. Secondary flaking is seen on the lateral margin. The sides are more or less parallel and sharp. Compare Sankalia (1946), no. 15, pl. V.

pl. 4, no. 35:—Quartzite with some ferruginous incrustation. 13.4 x 9.2 x 4.6 cm. This is described as a handaxe of amygdaloidal shape. The ventral face is one flat flake surface with a bulb of percussion and a flaking angle of 114°. The dorsal face is flaked on its left half while the right half retains the cortex.

pl. 4, no. 36:—Finegrained quartzite with some ferruginous incrustation on the dorsal face only. Not rolled. 12.4 x 8.9 x 3.9 cm. This is described as an ovate type of handaxe. The dorsal face is convex, having a slight patch of the cortex in the middle. The margins, which are convex, show both free and resolved flaking. It resembles no. 75, fig. 7 (Krishnasvami & Saundararajan, 1951).

pl. 4, no. 37:—Quartzite, stained brown, with no ferruginous incrustation. Not rolled. 10.1 x 7 x 3 cm. This is a cleaver with working edge at right angle to the long axis, the edge being formed by the intersection of two large surfaces. The cortex is present at the butt end. It is trapezoidal in section. The bulb of percussion is very prominent on the ventral face. The flaking angle is 100°. Compare Krishnasvami (1947), no. 9, fig. 8.

pl. 4, no. 38:—Quartzite, grey, with ferruginous patches. Not rolled. 11.3 x 9.5 x 4.7 cm. It is a side-scaper of rectangular shape, the working edge being formed by the intersection of a flake scar with the original crust surface on the other face. There is no secondary retouch. The opposite margin as well as the anterior are thick.

pl. 4, no. 39:—Vein-quartz, with ferruginous stain, but no incrustation. Not rolled. 9.6 x 6.6 x 3.6 cm. It bears some resemblance to a handaxe, but has an obtusely pointed anterior end. The flaking angle is 124°. One surface is convex with flake scars spreading fanwise as a result of subsequent flaking. The anterior point is produced by secondary trimming.
pl. 4, no. 40:—Quartzite with some ferruginous incrustation. Not rolled. 12.5 × 10.4 × 4.9 cm. It appears to be an ovate biface in form, and has been produced by a crude levallois technique. The dorsal face shows two flake scars, while the ventral is convex with a bulb of percussion. The platform is bifaceted and the angle is 135°. The margins are sharp. These flakes bear a general resemblance with the flakes of the Godavari industry. (Sankalia, 1952, figs. 12-19).

As has already been pointed out, the Kuliana industry shows varying traditions of stone working. The typological description, given above, makes it clear that the artifacts are a mixture of crude forms with well-made tools. It appears to be solely on this account that Bose and Sen have tried to make a chronological distinction between cruder and better forms. But there is no other evidence available to support this distinction. A calculation on the percentage basis may throw further light on this question, if and when comparable material is available.

Many similarities pointed out between the Kuliana tools and those of the Singrauli basin in Mirzapur district, of Gujrat and of South India, fairly well relate this industry with the Peninsular complex. Though a few chopper-chopping tools of the so-called Soan Industry have been found here, as also in Gujrat and Madras, these make only a minor feature in the local stone tradition. The evidence seems to make it clear that the assemblages of Eastern India are definitely related to those of the Peninsula.
CHAPTER III

MICROLITHIC INDUSTRY IN EASTERN INDIA

Captain Beeching (1868, p. 177) was the first person to report the discovery of chert flakes near Chaibasa and Chakradharpur in Singbhum district, Bihar. (See also Coggin Brown, 1917, p. 129, no. 51.) Later V. Ball (1870, p. 268) visited the locality and reported that he had “obtained what I believe to be strong evidence of the human origin of the flakes. Those at Chukerdharpur must have been transported at least three miles as the nearest source of the material, of which they are made, is situated at that distance. It is difficult to believe from the nature of the case, that the transporting force can have been other than human.” (See also V. Ball, 1879, p. 394.) In 1887 W. H. P. Driver discovered another important site near Ranchi. J. Wood-Mason paid a visit to this site and collected numerous flakes, cores, and other neolithic tools (Wood-Mason, 1888, pp. 387-96). The whole material has been listed by Coggin Brown (1917, pp. 122-130). The third important site was brought to light near Durgapur on the bank of the river Damodar by N. G. Majumdar in 1937 (An. Rep. A. S. I., 1937-38, Revealing India’s Past, p. 116). E. F. O. Murray was the next person to collect flakes and cores in the Dhalbhum Pargana of Singbhum district while he was making a survey of ancient copper mining in this area (Murray, 1940, pp. 79-104). His small collection from Hartopa near Jamshedpur is in the British Museum. Recently another site has been discovered near Bongara in Manbhum district (G. S. Ray, 1954, pp. 16-19). P. O. Bodding, also, mentions the find of “chips and flakes” of flint, chert etc. in the Dumka sub-division of Santal Parganas (Bodding, 1904, p. 28). The discovery of microliths in Bankura district, West Bengal, has also been reported (Chakladar, 1952, p. 130). Recently the archaeological department of the Government of India carried out excavations at the microlithic site near Birbhanpur (formerly reported as Durgapur, Times, London, 15th March, 1954) in Burdwan district (A. Ghosh, 1954, p. 6).

All these microlithic sites are situated south of the river Ganges in Chota Nagpur Plateau, or its extensions into West Bengal (See map no. 2), a region well
known to be inhabited predominantly by aboriginal tribes. Referring to the
find of the microliths in this region, Col. Gordon remarks, “In southern Bihar
the majority of the microlithic sites are associated with the copper belt which
starts 5 miles north of Chakradharpur and runs through Kharsawan and
Saraikela and across Dhalbhum through the Rakha mines to Ghatsila on the
Subarnarekha.............copper slag heaps and microliths are in close prox-
imity, and the presence of microlithic sites from Chakradharpur to Ghatsila,
including Talsa, Banabassa and Rakha mines, coincides so closely with the
copper seam that it is difficult to suppose they were not associated.” Again he
adds, “In fact once away from the copper seam no microliths are to be seen.”
(Gordon, 1950, p. 83). This remark of Col. Gordon needs modification in
view of the find of microliths in Ranchi, Manbhum, Burdwan and Bankura
districts where no copper deposits have so far been reported. It must be pointed
out that in this region of Chota Nagpur palaeolithic tools have also been found.
Moreover in some of these microlithic sites neolithic artifacts, including coarse
red or dark black pottery have been collected; but as all these are surface finds,
nothing definite can be said about the relationship of the microlithic industry
with the neolithic culture. Mr. Murray found cores, flakes and also neolithic
tools in the neighbourhood of ancient copper mines, sometimes in deep pits
(e.g., at Porojarna Hill, Murray, 1940, p. 83). This fact suggests that the stone
tools were in use at least among some section of the local people when these
copper mines were being worked. This association may give us at least one
chronological fix; but how far back the artifacts go and with what environ-
mental conditions they were associated, are questions that cannot be answered
in the present state of our knowledge.

There are, however, some reports of field observations available, which may
throw some light on the problem if the material is re-examined actually on the
sites. The first is that of C. W. Anderson (1917, pp. 349-62) who surveyed “the
valley of the Sanjai and tributary streams from a point about two miles west of
Lotapahar station on the Bengal-Nagpur Railway, north-eastwards to Sini, a
distance of about 30 miles as the crow flies.” This whole valley, according to
Anderson, is in the process of denudation. With each monsoon more and more
soil is washed towards the river beds, leaving isolated plateaus or table-lands
with more or less precipitous sides separated by rain gullies. The top level of these plateaus were found to be substantially the same as the plain level of the soil near Chakradharpur, suggesting that the soil nearabout is stable. It is "from stiff and undisturbed clay at or near these plateaux" that some tools were excavated indicating that they were deposited before the accumulation of the top soil, which is sometimes reddish and sometimes dark-coloured. Several sections observed by Anderson showed two main layers of gravel bed: one is a bed of 9 to 10 feet thickness at depths varying from 12 to 23 feet from the surface overlying whitish clay or schist, the second is a compact layer of 10 feet thickness of large water-worn pebbles at a height of about 10 feet above the level of the present bed of the river Sanjai. Anderson writes, "The level at which the stone implements were found coincides in the main with that of the last deposit of the

**Typical Section Near Bijai River**

![Diagram](image)

**Fig. 4.**

gravel. They are later than the gravel, for they are not in the least water-worn in the ordinary sense of the word; but with a few exceptions to be noted later, they were evidently deposited earlier than 18 feet of soil which covered that gravel." At this level well finished chert flakes were dug out from a clearly
marked line round the exposed sides of the plateaus. In the same level were found a skull and teeth of a modern wild horse or ass. The few exceptions refer to some “celts” and quantities of broken chert of inferior workmanship, which were found at 7'6" from plateau level. A typical section near Bijai River, a tributary of Sanjai, is given here (Fig. 4).

These observations of Anderson are important in so far as they indicate that different climatic and environmental conditions obtained in this region when these microliths were deposited. The 18 feet of soil overlying the microliths does not, however, provide a definite chronology unless the whole geographical and geological factors are properly re-assessed on the site.

The Bongara site is situated about three miles east of the Nimdih railway station, on a branch line of the Eastern Railway, connecting Tatanagar with Adra near Purulia. G. S. Ray observes, “The actual site is a valley formed between a hill range of about 2000 feet and a few hillocks which are about 1000 feet in altitude. The valley is a narrow one, more than a mile in length, and gradually slopes towards the hillocks, and may be said to form roughly three different levels.” (G. S. Ray, 1954, p. 17). The microliths were picked up as surface finds more or less from a restricted portion of the second level. They were associated with a fair number of cores from which flakes have been removed. Hence it is regarded as a factory site. A detailed study of the different levels in this valley should throw further light on the environmental conditions of the deposit.

Mr. B. B. Lal’s (Ancient India, no. 14, 1958, pp. 8-9) observation of the Damodar Terraces near Birbhanpur has revealed two definite levels—the first, “the youngest terrace (Tn), on which a part of Birbhanpur village is situated and which can be seen in the form of a flat plain to the west of that village, has a level between 220 and 226 ft.;” the second, “the next higher terrace, viz., Tn-1, has a level of 269 ft. near Trench BBP-2. Towards the north-west, in the Sal-jungle, it rises to a maximum of 278 ft., while eastwards it slopes down to even lower than 250 ft. On the north, across the railway line, the level is somewhat higher than what it is near Trench BBP-2, but as one moves towards the river on the south, the level slowly but certainly goes down and, at a distance of about a hundred yards north of Birbhanpur, it suddenly falls from about 250 ft. to 230 ft., thus bringing the terrace to an end.” Here the microliths have been found
only in the upper terrace. This is quite in keeping with the observations made by G. S. Ray at the Bongara site and by C. W. Anderson in the valley of the Sanjai River. Everywhere the tools have been found away from the recent alluvium and deposited in the older terrace or "plateau". This corroboration of the geological features, as observed by several field workers, is very significant in so far as it definitely suggests the antiquity of the materials discovered, but it is hard to be certain about a definite chronology, nor is it possible at this stage of our knowledge to distinguish between the period of the microlithic tools from that of the neolithic in this region.

The main material used for the microlithic industry is chert. C. W. Anderson writes, "The quality of chert varies considerably. It is often of grey or brown material cutting in straight smooth line and more rarely approximates to the true flint with its characteristic conchoidal fracture. The place of the chert is sometimes taken by agate or chalcedony obtainable from the cavities of the surrounding rocks." (C. W. Anderson, 1917, p. 353). In Ranchi the chief materials used were chert and chalcedony. J. Wood-Mason (1888, p. 395) adds, "There occur in abundance at Ranchi, in the soil with the implements, not only unworked quartz crystals, quartz of various kinds, chert, jasper and other stones, suitable for the manufacture of tools and weapons, and evidently collected for that purpose, as has already been stated, but also lumps of red earthy haematite, some of which have not been used, but some, on the other hand, have been rubbed down to a smooth surface on a flat stone or scraped in the production of the red pigment." The Bongara implements are mostly made of "flint of glassy variety" (sic.). The Durgapur specimens of N. G. Majumdar "have been chipped out of hard rocks of various beautiful colours, such as agate, chert, jasper, chalcedony, flint etc." (Chakladar, 1952, p. 153). The Durgapur specimens are "of various geometric patterns—triangular, crescent, rhomboidal, or trapezoid, while some have one end more or less elongated to a fine point." (Ibid)

Similar geometric types of microliths were found by T. N. Ramchandran in his excavation of the site at Nadiha in West Bengal (B. B. Lal, 1958, p. 16). But Lal's own excavation at Birbhanpur and exploration of the sites at Dijuri, Malandighi and Gopalpur produced different results. Lal observes that the microlithic industry in all these sites is identical. Summing up the evidence, he says: "The
surface collection from Birbhanpur included a large number of blades, lunates, points, borers, burins, and scrapers, but only one example of trapeze and a doubtful example of triangle. In the excavated trenches, however, no triangle or trapeze was encountered, although all the other types were found. While one should not set aside the single specimen of trapeze and the doubtful example of triangle, even though found on the surface, one cannot, at the same time, say with any degree of certainty that these two types did form regular constituents of the Birbhanpur microlithic industry. Thus pending a further investigation of the issue, all that may he said for the present is that the industry seems to be essentially non-geometric. Another noteworthy feature of this industry is the absence of any associated pottery.... Still another noteworthy point about the industry is the absence of the 'crested ridge'—a feature so typical of the microlithic industries of the chalcolithic period.” (B. B. Lal, 1958, p. 35).

From these evidences B. B. Lal, though with caution, characterises the Birbhanpur industry as pre-pottery and pre-chalcolithic, and argues to correlate it with the similar industries from Langhnaj, Sangankallu (Phase I), Jalahalli, Khandivli and other sites in the Western Deccan. But while the chalcolithic culture is well defined there in relation to the microlithic, in this region of Bihar and Bengal we have so far found no definite evidence of a chalcolithic culture. The microlithic industry, as presented by Lal, is not altogether new in this region. As the analysis of the older finds in the next paragraph will show, the local microlithic industry has proved to be of this nature. The triangles and trapezes have been noted only at Durgapur and Nadiha—sites not far from Birbhanpur. Nothing definite can be said about the relation of these two types of microliths with the main industry. However, before we characterise this industry as pre-pottery and pre-chalcolithic, it is necessary to seek a better definition of this industry by further excavation and exploration in this region.

At Bongara 69 flakes and 24 cores were found. Out of these 37 are classified as being “micro-blades” with sharp edges: flakes which do not show any secondary retouch; one blade with secondary retouch on the two edges; 12 blades with blunted back. The remaining flakes are irregular points or scrapers. From Ranchi 57 microliths are listed in Coggin Brown's Catalogue (1917): 4 scrapers, 10 points, 13 lunates, 15 irregular flakes, 11 fluted cores
and 4 "rock-crystals". From Singhbum district no statistical figures are known as the collections have been made by several persons. A selection of micro-liths is described below:

Pl. 5, nos. 41-48:—Anderson's collection. Singhbum district. They are cores from which many flakes have been removed. Some of them, like nos. 46 and 48, have one end pointed. The stones are well chosen: chert, agate, or chalcedony.

Pl. 5, no. 49:—Murray collection in the British Museum. Hartopa in Dhalbhum. Greenish dolerite with black bands. It has a thick butt with the other end, now broken, probably pointed. Several flakes have been removed from the upper face and only one from the bottom.

Pl. 5, no. 50:—Murray collection in the British Museum. Hartopa in Dhalbhum. Black slate. The flake shows a median ridge or spine.

Pl. 5, nos. 51 and 52:—Murray collection in the British Museum. Hartopa in Dhalbhum. No 51 of quartz and no. 52 of black slate. Both show flaked points with a median ridge or spine.

Pl. 5, no. 54:—Wood-Mason's collection from Ranchi. Chert core, measuring $37 \times 27 \times 17.8 \text{ mm.}$, from which rectangular flakes have been struck. Cores of quartz crystals and rock crystals also occur here.

Pl. 5, nos. 53 and 55-58:—Wood-Mason's collection from Ranchi. No. 53 of chalcedony measuring $38 \times 16 \times 8.5 \text{ mm}$. No. 55 of black chert, measuring $34 \times 10 \times 4.2 \text{ mm}$. No. 56 of black chert measuring $21.4 \times 16 \times 7.7 \text{ mm}$. No. 57 of black chert measuring $20.4 \times 12.2 \times 4 \text{ mm}$. No. 58 of chert deeply weathered, measuring $43 \times 24.5 \times 10.8 \text{ mm}$. They are all worked points. Nos. 57 and 58 show notches.

Pl. 5, nos. 59-62:—Bongara in Manbhum district. They are also sharp-edged flakes with one flake removed from the underside and two or three from the upper.

Pl. 5, no. 63:—Bongara in Manbhum district. It shows retouch on both sides.

Pl. 5, nos. 64-65:—Bongara in Manbhum district. Both of them have blunted back.

Pl. 5, no. 66:—Anderson's collection. Singhbum district. It shows retouch on both sides.
Pl. 5, no. 67:—Anderson’s collection. Singhbum district. It is described as a graver or “burin”.

Pl. 5, no. 68:—Murray collection in the British Museum. Hartopa in Dhalbhum. It is a blunted backed knife.

Pl. 5, nos. 69 and 70:—Anderson’s collection. Singhbum district. They are knives with slightly concave edge.

Pl. 5, no. 71:—Anderson’s collection. Singhbum district. It is a burin.

Pl. 5, no. 72:—Anderson’s collection. Singhbum district. Leaf-shaped flake.

Pl. 5, no. 73:—Wood-Mason’s collection from Ranchi. Leaf-shaped flake.

Pl. 5, no. 74:—Bongara in Manbhum district. It is a lunate with its arc blunted.

Pl. 5, no. 75:—Wood-Mason’s collection from Ranchi. It is a lunate with its arc blunted.

Pl. 5, nos. 76 and 77:—Murray collection in the British Museum. Hartopa in Dhalbhum. No. 76 of black slate, a flake with original cortex on one side and edge curved. No. 77 of translucent quartz, triangular in section.

So far microliths have not been found in northern Bihar (i.e., north of the river Ganges), Orissa, East Bengal and Assam. In the mainland of South East Asia only in Burma a few flakes and scrapers were found by the American Expedition and in Malaya microliths have been reported only from one place. These appear to have no connection at all with the Eastern Indian microliths. Typologically, however, the latter fall in the same series as those of the Singrauli Basin in Mirzapur district (Krishnasvami & Saundararajan, 1951, pp. 40-65) and those found by Carlleyle in the Kaimur Hills (V. A. Smith, 1906, pp. 185-95), as well as those referred to by B. B. Lal as “non-geometric”.