

**ANIMAL REMAINS & BONE TOOLS FROM PANDU RAJAR DHIBI,
A PROTOHISTORIC SITE IN BURDWAN, WEST BENGAL.**

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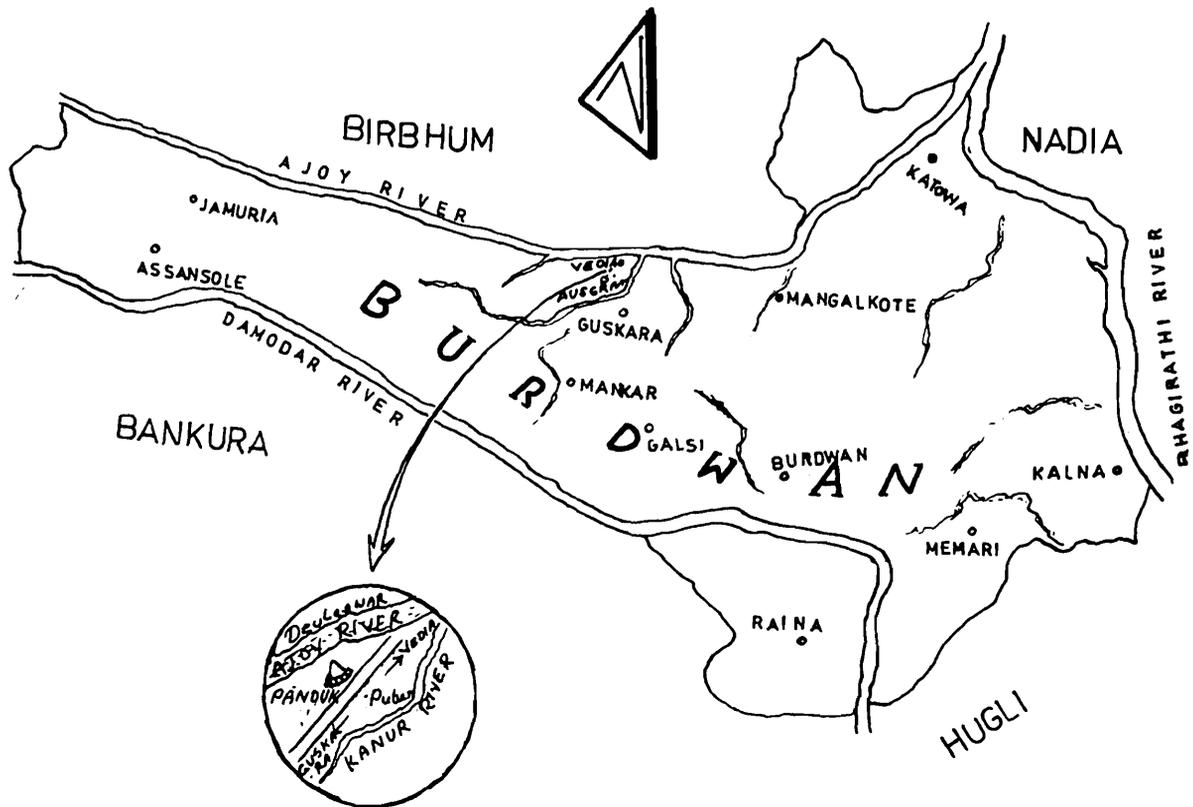
INTRODUCTION

We had the occasion to study the animal remains and bone tools unearthed in 1985, from Pandu Rajar Dhibi, the type site of Ajoy Valley Civilization in Burdwan. The site (see map) is situated about 10 km away from Bhedia on way to Bolepur from Calcutta. The place was originally known as 'Raja pontar danga' which meant the burial ground of the king. It was designated as Pandu Rajar Dhibi (the mound of King Pandu), by Late P. C. Dasgupta, ex-Director of State Archaeology Department, West Bengal in 1962. The colloquial Bengali terms 'danga' or 'dhibi' denote a mound or elevated land. The local people were accustomed to see this ancient mound from time immemorial. Late Dasgupta was the pioneer to explore and excavate the site about two decades ago. The excavation unveiled that a Protohistoric culture flourished in and around the Ajoy Valley several thousand years ago. The inhabitants of this site were Proto-Australoid or Veddaic race. They were characteristically long headed, broad-nosed and dark skinned race. Though this primitive society stuck to hunting, yet their economic life was based upon agriculture. It was learnt that cultivation of paddy was known to them.

The earlier excavations unearthed varied stone implements (microliths), potteries, copper implements and human burials. Analysis of all these relics revealed that from old stone age a protohistoric culture sprang up and flourished in and around the confluence of river Ajoy and its tributaries Kunoor and Kopai. This culture later on merged with the chalcolithic development dated 1012 ± 120 B.C., and achieved maritime contact with the Red Sea Coasts and Aegian World (Dasgupta 1965).

In a recent excavation in 1985, conducted by Shri Sudhin Dey, Superintendent under the direction of Dr. S. C. Mukherjee, Director of the State Archaeology Department, the present materials along with other important antiquities were collected. Comparatively, the bone tools and animal remains obtained earlier, were scanty, yet mention may be made to those of the arrow heads and awls and the remains tentatively identified as of Nilgai, Sambar, Pig and Cattle. Besides these, one copper fish hook, fish and Pea fowl figurines were discovered. In spite of the fragmentary nature of some samples, the present collection is quite rich and promising. The material belongs to two categories. The first or primary type are purely bony or skeletal remains derived from slaughtered food animals viz., Fish, turtle, fowl, pig, deer, goat etc. The second type are the fashioned out implements, comprising bone tools viz., points, scrapers, arrowheads etc.

Analysis of this Archaeo-zoological material reflects the food habit, level of industry achieved by those Protohistoric people and finally it throws light on the then environment and associated animal life.



Not to the scale

Map showing the location of Pandu Rajar Dhibi

I. THE SYSTEMATIC ACCOUNT OF THE REMAINS IDENTIFIED :

Phylum ARTHROPODA
 Class CRUSTACEA
 Order DACAPODA
 Family PATAMONIDAE

The Freshwater Crab

30.3.85; PRDB; trench No. 'B'; layer (1,2) - calcified tibia.

Phylum CHORDATA
 Class PISCES
 Order CYPRINIFORMES
 Family CYPRINIDAE

Catla catla (Hamilton)

10.3.85; PRDB; trench No. 'B'; layer (6); depth 1.09 meter - Opercular bone.

Undetermined carps

10.3.85; PRDB; trench No. 'B'; layer (7); depth 1.10 meter - A rib with broken distal end; 17.3.85; PRDB; trench No. 'B'; layer (7); depth 1.38 meter - Broken ribs; 21.3.85; PRDB; trench No. 'A'; layer (6) - Fish rib; 24.3.85; PRDB; trench No. 'B'; layer (7); locus B III + ..57 X 1.37 - 1.95 meter - Broken ribs; 27.3.85; PRDB; trench No. 'A'; Ash pit; depth 1.60 - Pectoral bone & ribs of large carps; 27.3.85; PRDB; trench No. 'A'; Ash pits (4) depth 2.22 meter; - girdle bones and ribs; 28.3.85; PRDB; trench No. 'B'; layer (6); locus B III + .30 X 2.70 - 1.22 meter - Ribs.

Order SILUROIDEA
Family BAGRIDAE

24.3.85; PRDB; trench No. 'A'; layer (5); locus A II + 0.44 X 2.55 - 1.13; depth 1.13 - Proatlas of *Rita* sp. 28.3.85; PRDB; trench No. 'B'; layer (5); depth 1.25 meter - Condylar portion of the right pectoral spine of *Mystus* sp.

Class REPTILIA
Order TESTUDINES
Family TRIONYCHIDAE

***Lissemys punctata punctata* (Bonnaterre)**

8.3.85; PRDB; trench No. 'B'; layer (6); locus BI + 0.25 X 1.92 - 1.31; depth 1.31 meter - piece of plastron; 8.3.85; PRDB; trench No. 'B'; layer (6); locus B II + 0.41 X 1.03 - 0.82; depth 0.82 - Piece of plastron; 21.3.85; PRDB; trench No. 'B'; layer (10); depth 1.90 meter - Piece of plastron, likely used as a sharp tool; 27.3.85; PRDB; trench No. 'A'; Ash pit; 1.60 meter - piece of carapace.

Order CROCODILIA
Family GAVIALIDAE

***Gavialis gangeticus* (Gmelin)**

PRDB; trench No. 'B'; layer (1) - Dorsal scute.

Class AVES
Order GALLIFORMES
Family PHASIANIDAE

***Gallus gallus murghi* Robinson & Kloss**

5.3.85; PRDB; trench No. 'A'; layer Ash pit; depth 1.07 meter - Distal condylar bone (with cut marks) of left tibia; 19.3.85; PRDB; trench No. 'A'; layer (8); depth 1.90 meter - Charred and broken oblique process of sternal bone; 21.3.85; PRDB; trench No. 'A'; layer

(6) - Broken coronoid bone; 27.3.85; PRDB; trench No. 'A'; layer (10) - Broken shaft bone; 29.3.85; PRDB; trench No. 'B'; layer (7) - Broken right scapula.

Class MAMMALIA
Order CARNIVORA
Family CANIDAE

Canis aurius indicus (Hodgson)

9.2.85; PRDB; trench No. 'A'; locus AI + 0.45 X 3.90 - 0.48 layer (3) - 5th metatarsal of left pes; 17.3.85; PRDB; trench No. 'A'; Locus III + 0.25 X 0.60 X - 1.50; layer (8); depth 1.50 meter - Upper left canine; 27.3.85; PRDB; trench No. 'A'; Ash pit; depth 1.60 meter - Occipital portion of skull with condyles.

Order ARTIODACTYLA
Family SUIDAE

Sus scrofa cristatus Wagner

13.2.85; PRDB; trench No. 'B' layer (3) - Piece of mandibular bone of left side with 3rd premolar; 20.2.85; PRDB; trench No. 'B'; layer (2A); Burning place -; 0.20 cm - Damaged body of mandible with broken incisors; 12.3.85; PRDB; trench No. 'B'; layer (7) - Broken zygomatic arch of right side; 16.3.85; PRDB; trench No. 'A'; locus A O + .47 X 2.54 - 1.29; layer (7) - Broken piece of maxilla of right side with 3rd & 4th premolars; 23.3.85; PRDB; trench No. 'B'; layer (10); depth 2.40 meter - Broken piece of zygomatic bone; 27.3.85; trench No. 'A'; layer (10) - Upper right 1st molar; 27.3.85; PRDB; trench No. 'B'; layer (10); depth 2.15 meter - Fragment of frontal bone with supra orbital foramen; 28.3.85; PRDB; trench No. 'B'; locus B III + .30 X 2.70 - 1.22 meter; layer (6) - Broken lower 3rd premolar; 4.4.85; PRDB; trench No. 'C'; locus C + D - M X 1.40 X 2.55 meter; layer (9); depth 2.55 meter - 4th metatarsal of left pes.

Family CERVIDAE

Axis porcinus Zimmermann

12.3.85; PRDB; trench No. 'B'; layer (7); depth 1.23 meter - Disc of thoracic vertebra; 12.3.85; PRDB; trench No. 'B'; layer (8) - Glenoid portion of scapula (charred); 19.3.85; PRDB; trench No. 'B'; layer (8) - Glenoid portion of scapula of right side; 8.4.85; PRDB; trench No. 'A'; locus 4.12 mt; layer after (11); mother soil; Ash pit - Two fragments of rib; 9.4.85; PRDB; trench No. 'C'; layer - 1 pit; depth 2.97 meter - 2nd upper right molar with a portion of maxilla.

Cervus duvauceli Cuvier

3.3.85; PRDB; trench No. 'A'; locus I + 0.40 X 0.38 - 0.41; - Distal fragment of right tibia; 17.3.85; PRDB; trench No. 'A'; locus III + 0.25 X 0.60 - 1.50; layer (8) - Charred piece of the ramus of mandible; 31.3.85; PRDB; trench No. 'A'; Ash pit material - Charred rib.

Family BOVIDAE

Bubalus bubalis (Linnaeus)

5.3.85; PRDB; trench No. 'B'; layer (5); - Damaged upper 3rd molar; 10.3.85; PRDB; trench No. 'B'; layer (6); - Fragment of a rib; 17.3.85; PRDB; trench No. 'B'; layer (8); depth 1.27 meter - Piece of a thoracic rib, 19.3.85; PRDB; trench No. 'A'; locus A III + 0.00 X 2.20 - 1.40; layer (6); Broken scapula; 24.3.85; PRDB; trench No. 'B'; locus IV + 0.43 X 1.33 - 1.65 mt; layer (7); depth 1.65 meter - Upper 1st molar; 4.4.85; PRDB; trench No. 'C'; locus C 0 + DM X 1.40 mt X 2.55 mt; layer (9); depth 2.55 meter - Bone point, polished, made out of the horncore.

Bos indicus Linnaeus

5.3.85; PRDB; trench No. 'A'; locus I + 0.45 X 0.65 X - 1.15; layer (5); depth 1.15 meter - Broken 3rd thoracic rib; 6.3.85; PRDB; trench No. 'B'; locus III X 1.30 - 0.68; layer (6); depth 0.68 meter - Broken thoracic rib; 8.3.85; PRDB; trench No. 'B'; locus BI + 0.25 X 1.92 - 1.31; layer (6); depth 1.31 meter - Upper left 2nd molar; 9.3.85; PRDB; trench No. 'B'; Peg IV 0.78 X 1.47 X 1.02; layer (6); - Upper left 3rd molar; 9.3.85; PRDB; trench No. 'B'; layer (6); 1 meter from surface - Proximal fragment of thoracic rib; 18.3.85; PRDB; trench No. 'A'; locus A III + 0.88 X 1.19 0 - 1.10; layer (8); depth 1.10 meter - Right upper 3rd molar; 21.3.85; PRDB; trench No. 'C'; locus I + 0.28 X 1.53 X 0.50; layer (3) - Shaft bone of left metatarsal; 22.3.85; PRDB; trench 'A'; locus A II + 0.63 X 1.66 - 1.70 mt; layer (9); - Upper right 2nd molar of sub-adult beast; 23.3.85; PRDB; trench No. 'B'; layer (10); depth II; 2.00 mt - Broken piece of lower 3rd molar; 31.3.85; PRDB; trench No. 'A'; Ash pit - Condylar fragment of left humerus; 31.3.85; PRDB; trench No. 'B'; layer (14); depth 3.25 mt - Distal end of metatarsal.

Capra hircus aegagrus Erxleben

1.4.85; PRDB; trench No. 'B'; layer (14); - Broken olecranon process of right ulna; 1.4.85; PRDB; trench No. 'C'; layer (8); - Broken shaft of right humerus.

Order RODENTIA

Family MURIDAE

Rattus sp.

10.3.85; PRDB; trench No. 'A'; depth Peg II - 0.65 mt - Lower incisor.

II. FOLLOWING BONE TOOLS HAVE BEEN IDENTIFIED FROM THE SITE :

21.3.85; PRDB; trench No. 'A'; I - 1.06; layer (6); depth 1.06; - Scraper and point made

from shaft bone; 18.3.85; PRDB; trench No. 'A'; locus A III + 0.43 X 1.73; layer (8); depth - 1.73 mt - Bone point for incision on pottery; 14.2.85; trench No. 'B'; layer (1); depth B - 0.03; - Bone point made from the tine of antler of Hog Deer; 28.3.85; PRDB; trench No. 'A'; layer (8); depth 1.80 mt - Bone points, probably made from shaft end of cattle tibia; 29.3.85; PRDB; trench No. 'A'; depth 2.12 mt - Bone point; 15.3.85; PRDB; trench No. 'B'; locus 0 + .50 X 1.34 - 1.06 mt - Polished fine point, made from the antler of Hog Deer; 1.4.85; PRDB; trench No. 'C'; layer (8); - Bone spear head (tanged); 27.3.85; PRDB; trench No. 'A'; A III + 0.74 X 1.39 - 1.45; layer (7); depth 1.45 mt - Bone point; 16.2.85; PRDB; trench No. 'A'; locus I - 1.64 - 0.72; layer (3a) - Bone point, made from the phalanx of jackal; 27.3.85; PRDB; trench No. 'B'; locus III + 0.13 X 0.35 - 1.90; layer (9) - polished bone point, hacked from bovine fibula; 5.3.85; PRDB; trench No. 'B'; locus II - 0.85; layer (4); depth 0.85 meter - Polished bone (burnt), used for etching purpose; 12.3.85; PRDB; trench No. 'A'; locus A III X 1.14 - 1.08; layer (5) - Bone implement, bead hacked from phalangeal bone with perforation; 12.3.85; PRDB; trench No. 'A'; layer (4); depth 0.95 cm - Piece of rib bone, used as a cutter; 14.3.85; PRDB; trench No. 'A'; layer (6) - fragment of scapula, used as a scraper; 17.3.85; PRDB; locus A III + 0.55 X 1.65 - 1.65 mt; layer (8) - Scraper hacked from a compact bone; 17.3.85; PRDB; trench No. 'B'; layer (7); depth 1.15 mt. - Bone tool for digging purpose - two pieces of compact bone, derived from the femoral bone of cattle; 20.3.85; PRDB; trench No. 'B'; locus B II + 0.00 X 0.00 - 1.60; layer (8); depth 1.60 metre - Bone scraper from parietal bone of cattle; 22.3.85; PRDB; trench No. 'A'; locus A I + 00 + 1.79 - 1.80; layer (8); depth 1.80 mt. - Spear head, hacked from femoral shaft; 25.3.85; PRDB; trench No. 'B'; peg IV, 0.72 X 1.42 - 1.77 mt; layer (8); depth 1.77 metre Double sided blade or scraper; 25.3.85; PRDB; trench No. 'B'; peg IV, 0.72 X 1.42 - 1.72 mt; layer (8); depth 1.77 mt; - Barbed harpoon, hacked from the lower jaw of buffalo; 27.3.85; PRDB; trench No. 'B'; locus III - 0 + 0.98 - 2.09 mt; layer (10); depth 2.09 mt. - Bone bead made from small mammalian vertebra.

Besides the above mentioned animal remains and bone tools, following inorganic objects have been identified. 13.3.85; PRDB; trench No. 'B'; layer (3); - a fragment of black unpolished ware; 6.3.85; PRDB; trench No. 'A'; locus A II + 0.39 X 1.40 - 1.00; layer (6); depth 1.00; - A piece of bluish black polished flint; 27.3.85; PRDB; trench No. 'B'; peg III 0 + 0.98 - 2.09 mt; layer (10); depth 2.09 mt. - 'Pea Iron Ore' - It generally forms in low lying and marshy area, enveloping some organic substance.

DISCUSSION

The study of the bone tools and animal remains unveils that the area was once much fertile and teeming with vegetation. The rivers were affluent and the soil had the capacity to retain the moisture to a greater degree. The area around the rivers was immensely rich in wild animals and birds. The bone remains from ashpit and hearths testify that animals like Barasingha, Hog deer, pig and Jungle fowls in nearby jungles provided the inhabitants with rich animal protein. The overall analysis of the collection throws some light on the following aspects of past life :

Food habit and use of fire : The ancient veddaic inhabitants were not pure vegetarians.

That they had a special addiction to animal diet is evident from the huge fish remains in association with the remains of turtle and fowl, which plentifully occurred from the ashpit and hearths. Besides these, a number of skeleton of slaughtered Hog deer and Barasingha also have been found. This testifies that the people in general, or specially the legendary royal family of 'Pandu Raja', specially prized the delicacy of venison for which they used to hunt the animals regularly from nearby jungles.

Among the domesticated animals, pigs, goats, humped cattle and buffalo are noteworthy. It is assumed that these animals might have contributed to their diet, as many of their remains bear cut marks and show charred condition. Some of the bones show signs of maceration and breakage along the shaft bones. The latter probably resulted from the extraction of marrow. The charred condition of the bones, occurrence of flint and the presence of hearths or ashpit indicate the use of fire as well as the system of broiling of flesh. The flint is a compact crypto crystalline silica, used by prehistoric men for the production of fire and fabrication of weapons. It is noteworthy that in more advance stage, the flints were shaped perfectly from a pressure exerted by an antler bone, and here we encounter that sample too.

Some of the economically important animal fauna :

Fish : Fishes which occur in the collection were all edible and mainly large size carps (Cyprinidae). From early time the prehistoric men adopted the practice of fishing. Even the Neanderthal men about 1,50,000 years ago used to spear the fish for a substantial diet (Demdeck, 1966). Fishes are easier to capture and broil than other animals and is the reason why early settlers used to select their dwelling site near the rivers abounding with fish. The remains of the carps in question are mostly ribs. It is noteworthy that carps were the most ancient and popular edible fish in India and China. Fattened carps were considered in post Aryan culture as a symbol of fertility and good omen. Remains of edible fishes were recovered also from Harappa, Mohenjodaro, Hastinapur and a few other sites. The remains from those sites were mainly vertebrae.

Turtle : The specimens of the Indian Flap Shelled Turtle, identified in the collection are mainly represented as plastron and carapace. The species was distributed widely in the Ganges, Indus and their tributaries. At present it is becoming rare. The flesh is edible and people in the country used to capture this animal from very ancient time along with other aquatic animals. Remains of this species were also recorded from Mohenjodaro, Harappa, Nagda, Hastinapur and Jaugada (Nath, 1961).

Fowl : The jungle fowls are supposed to be the ancestor of the native old fashioned multicoloured cock of India which differs of course by a more slender body (Zeuner, 1963). The bird abounds the woods of northern India. Remains of fowl (*Gallus* sp.) were also unearthed from Harappa, Rupar, Lothal, Brahmagiri and Jaugada. The remains of fowl from Harappa are supposed to be of domesticated stock. Fowl as a table bird, became popular in the north western India prior to 500 B.C. It reached Mesopotamia (Iraq and Iran) and Egypt from India as early as 1500 B.C.

Humped cattle : The humped cattle which is considered by the Hindus as a sacred animal is basically a beast of milch cum 'burden'. Rutimeyer (1862) considered the animal as the sole type of domestic cattle of Asia and Africa since unknown past. Remains of humped cattle were also unearthed from many ancient sites like Harappa, Mahenjodaro, Maski, Rugar, Rangpur and many other sites. From the measurement, the sample from Pandu Rajar Dhibi are assumed to be of adult animals with medium stature (runt).

Buffalo : The buffaloes have been used in the plains of eastern India from a pretty long time in threshing corn, for milk and as draught animals. These animals were definitely domesticated in India from the endemic wild species during early Agricultural Phase. The wild progenitors are still extant in the hot and humid forest in India. Remains of domesticated buffaloes have been recovered from Harappa, Mohenjodaro, Hastinapur, Maski, Rangpur, Rugar and Taxilla.

Goat : It appears that the present day breeds of goat in India are derived from an admixture of three different progenitors, viz., The Markhor, the Bezoar and the Jura. Among these, it is assumed that the main stock descended from the bezoar, which inhabited the Sind, Punjab, Persia, Asia Minor and Greek Islands at large. The remains from Pandu Rajar Dhibi on comparative study, appears to be of adult beast but with stunted growth. Remains of domestic goats were also recovered from Harappa, Rugar, Rangpur, Nevasa, Maski, Nagda and Jaugada.

Pig : The remains of pig in the collection belong to sub-adult and young specimens. Probably these animals were selected from the captive stock for consumption. The domesticated pig in India is derived from its wild ancestor *Sus scrofa cristatus*, which inhabit the riverine forests and grass jungles in India. Remains of domestic pig were also recorded from Mahenjodaro, Harappa, Rugar, Lothal, Nasik, Nagda, Ujjain and Jaugada .

Hog deer : Remains of hog deer is being reported for the second time from a prehistoric site in India. So long, it was in the record only from Mohenjodaro. Of course other deer species, namely Chital, Swamp deer, Sambar and Hangul were reported to occur from a number of old sites. The remains of Hog deer in the present collection were compared with the modern specimen and were found resembling in size and shape. It is to be mentioned that most of the fine bone points in the collection were hacked out from antlers of this deer. This species of deer occurs in Sind, Punjab, Kumaon, Nepal, West Bengal, Bangladesh and Assam. Out side India it is also found in Burma, Sri Lanka and Malayan Peninsula.

Animal keeping : Among the animal remains, it is already mentioned that domesticated pig, goat, cattle and buffalo have been identified. Pigs and buffaloes are animals which prefer to live in damp ground with ample water reserver, where as the goats and cattle prefer comparatively high and dry zones. Besides this, their food habit also differs. Therefore to raise these animals simultaneously, requires adequate knowledge in animal husbandry and it is assumed that the people had already achieved that much knowledge in animal domestication. The cattle and buffalo are basically milch animals. So, it is likely that they were kept for primarily for milk. But as the people were practising agriculture at the same time,

it is assumed that the animals were also deployed in ploughing or in allied jobs in agriculture.

Bone tools and sense of frugality : The sense of frugality in those people is reflected from the art of tool making (industry). Majority of the tools were hacked out from the waste bones or skeleton that were left after consuming the flesh. So, it is understood that the animals which served the people with milk, flesh or power, also provided the bone implements. The selection of particular bones, horn and antler for utilization in the manufacture of specified bone tools indicates the people's aptitude in bone tool industry and testifies their knowledge on osteology. That the calcareous tines of antlers or cornified horns are more resistant to wear and tear than ordinary bones were known to them and eventually these materials were selected for making finer points to be used in pottery work (engraving, designing and boring) which renders the tools liable to regular abrasion. A little inferior or coarse points were usually made from the compact bone walls in the shafts of long bones. The scrapers (blades) have been fashioned out from thin parietal, scapular and rib bones, though rarely, the strong and straight long bones were also hacked to scrapers. It appears that some of the tools were sharpened regularly and some were renewed for the second time on becoming blunt. In some cases the tools were sharpened by some metallic weapons that left very sharp cleavage on them. The dependence on the bones as a raw material for tools, suggests that metal were dearer to the people and from the point of durability the bones were convenient, easy to carve and easily available material.

Environ and Animal life : The identified animal remains were compared with the bones of recent specimens and were found to resemble them closely. The species are mainly from hot humid plains, teeming with vegetation. The occurrence of a few samples of 'Bog Iron Ore' testifies that some parts of the area were swampy or low-lying. Fishes belonging to the family Bagridae (Cat fishes) and Cyprinidae (Carps), along with the remains of Flap Shelled aquatic turtle testify by their huge remains that the area was inundated regularly by rains and the affluent rivers and contained large water bodies. The magnificent size of some of the carp remains, recalls that these fishes used to attain enormous growth (8-9 kg) under favourable water condition. The remains of jungle fowl, Hog deer, Swamp deer and jackal testify that scrub jungles and forested areas persisted along with grassy plains in the vicinity of the settlement. Majority of the animals disappeared from the site a long time ago with the shrinkage of the jungles. But the jackals and the jungle fowl survived in the zone till a few decades ago. The disinterred remains of jackals from the habitational area is interesting. Probably these animals on being lured by the captive animals or birds used to come close to the settlements and were entrapped and slaughtered. Capturing of jungle fowl for its flesh was a common practice among the tribals in the area till it was plentiful. It is assumed that the native domesticated fowl has descended from this stock of jungle fowl, through successive captive-breeding.

SUMMARY

It appears that prior to 3500 B.P. and before the advent of full-fledged metallurgy, the site in question at Ajoy Valley was inhabited by a group of protohistoric people, who led

a pastoral life based on agriculture. They knew the use of fire and used to roast and cook their food. For designing and carving the pottery, they depended largely on bone tools, which they fashioned from antlers and long bones. The people usually lived by hunting and fishing, besides nominal agriculture. There were jungles in outskirts which harboured a number of wild birds and mammals. The deer, fowls, large fishes and turtles provided the people with valuable protein diet.

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REFERENCES

- Dembeck, H. 1966. 'Animals and Man' William Clowes & Sons Ltd. London.
- Dasgupta, P. C. 1965. The Excavation at Pandu Rajar Dhibi. A Bulletin of the Directorate of Archaeology, West Bengal.
- Nath, B. 1961. Animals of Prehistoric India and their affinities with those of the Western Asiatic countries. *Rec. Indian Mus.* 59(4) : 335-367.
- Rutimeyer, L. 1862. Die Fauna der Pfahibauten der Schweiz-Neue Dent. *Schr. Schweiz. Ges naturw Zurich* 19, 248 pp. (General).
- Zeuner, F. F. 1963. A History of Domesticated Animals. Hutchinson of London.