Animal Remains from the Pre-NBPW (With Iron) Contexts at Raipura, Sonbhadra District, Uttar Pradesh

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Abstract: *Raipura (24° 40′ 40″ N; 82° 58′ 20″ E), excavated by the Department of A.I.H.C. and Archaeology, Banaras Hindu University in 2010-2011 is situated in Robertsganj tehsil, District Sonbhadra, Uttar Pradesh. Archaeological deposit was divided into three cultural periods: Period I (Pre-NBPW without metal), Period II (Pre-NBP with Iron), and Period III (NBPW). Animal remains were collected from all three periods. These were studied using the standard method of faunal analysis developed at the Archaeozoology Laboratory, Deccan College. This article is based on animal remains recovered from Period II. A total of 889 skeletal fragments were examined. The faunal material revealed presence of five domestic species (cattle, buffalo, sheep, goat and horse). The wild animal species were the nilgai, four-horned antelope, blackbuck, sambar, spotted deer, wild pig, elephant, hare, common teal, and freshwater fish.*

Keywords: Bone Artefacts, Bone Objects, Bone Tools, Tool Morphology, Microscopic Analysis, Pre-NBPW, Raipura

Introduction

The protohistoric settlement of Raipura (24° 40′ 40″ N; 82° 58′ 20″ E) is situated in tehsil Robertsganj, District Sonbhadra, Uttar Pradesh, at a distance of 100 km from Varanasi and at a distance of 16 km west of Robertsganj (Figures 1 and 2). It was excavated under the Indian National Science Academy (INSA) sponsored project entitled 'An Ethno-technological Study of Iron Working around Sonbhadra Region' in season 2010-11 by the Banaras Hindu University (Tripathi and Upadhyaya 2013; Tripathi 2014).

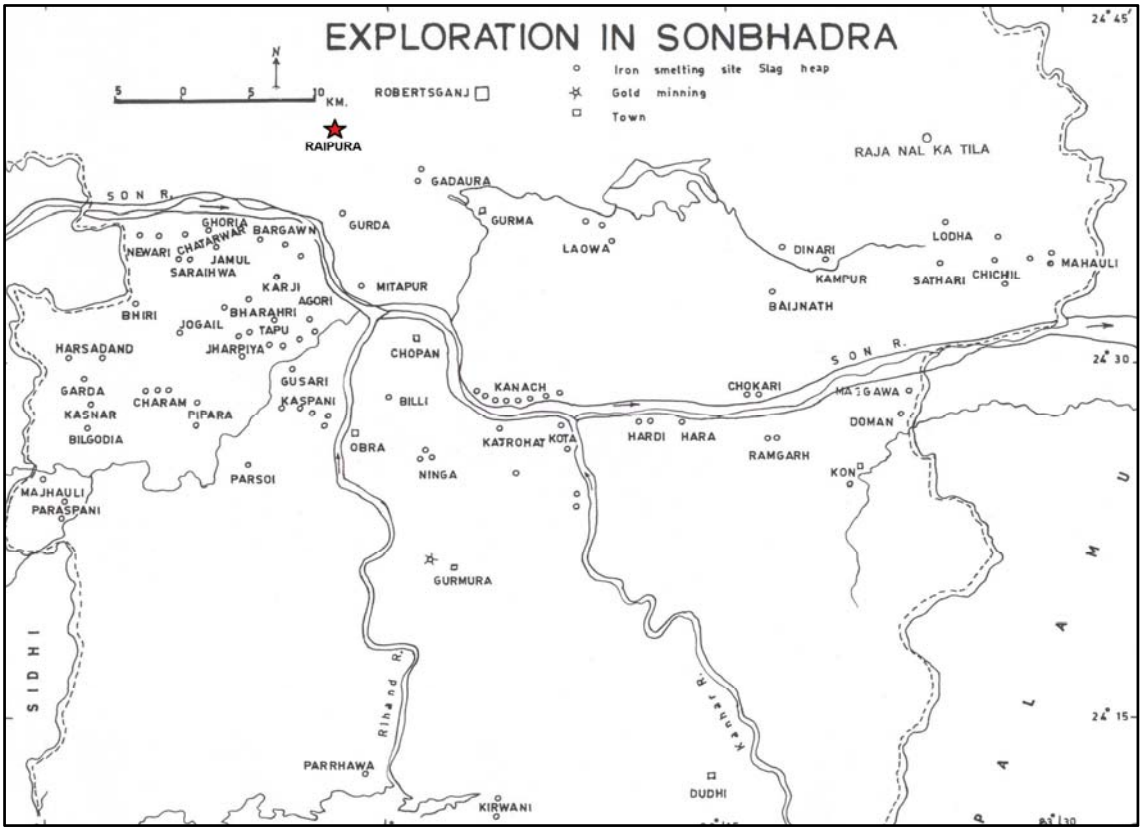

Figure 1: Map showing location of Raipura, Mirzapur District, Uttar Pradesh

Figure 2: Excavation in progress at Raipura

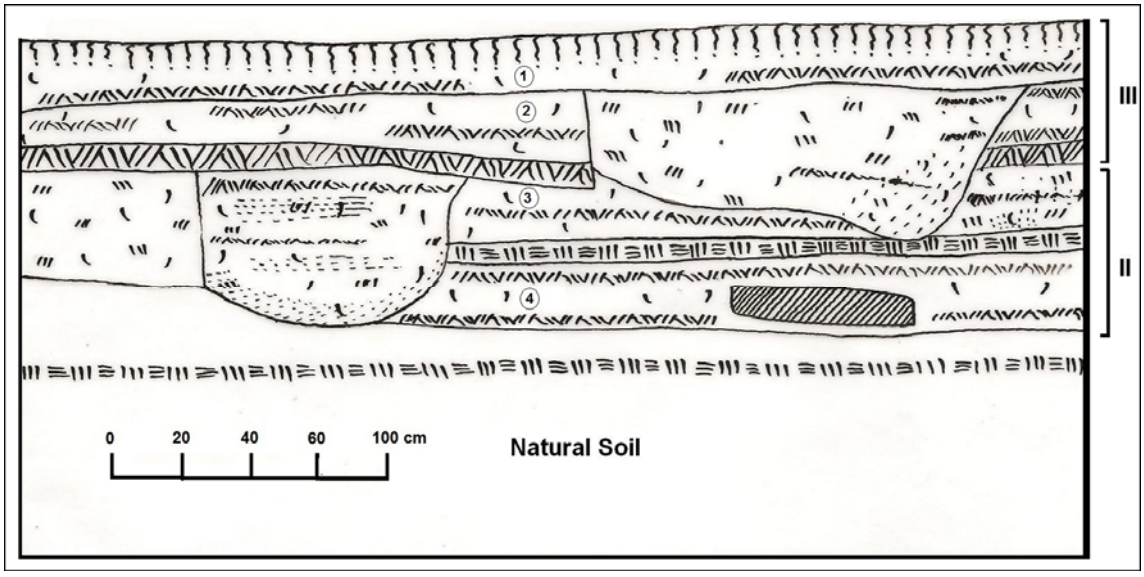

Figure 3: Section of Trench YI-11

Figure 4: Pottery of Period II (Red Ware and Black-and-Red Ware)

The mound lies about 700 m south-east of present-day village of Rajpura and is surrounded on three sides by a stream flowing down the hills. The mound extends over an area of approximately 400 x 350 m. The stream has cut the mound into two parts. The northern part was labelled by us as Mound 1. The southern part which is approximately four times larger than Mound 1 was labelled as Mound 2. Excavations were conducted on both the mounds. A total of ten trenches of 5 x 5 m were dug on Mound 1 whereas a single trench of 3 x 3 m was opened on Mound 2. Based on ceramic

assemblage, archaeological deposit has been divided into three cultural periods: Period I (Pre-NBPW without metal), Period II (Pre-NBP with Iron), and Period III (NBPW). The results of analysis of the faunal material from Period I (n=437) have been published. The faunal material revealed presence of six domestic species (cattle, buffalo, sheep, goat, horse and dog). The wild animal species were the nilgai, four-horned antelope, sambar, wild pig, wolf, and jungle cat (Joglekar *et al*. 2016). This article is based on animal remains recovered from only Period II contexts.

Period II - Cultural Background

The thickness of the cultural deposit of Period II (Pre-NBPW with iron) was 85 cm (Figures 3 - 4). Iron was introduced during this period at Raipura. Black Slipped Ware, Red Ware, Black-and-Red Ware and Black Ware are the main ceramics of this period. The small finds of this period comprised a number of iron objects, bone points, bone arrowheads, pottery discs, terracotta beads, semi-precious stone beads and microliths. Except an indeterminate copper object evidence of copper is missing. Like Period I, inhabitants of this period also lived in wattle-and-daub houses. A few floors and hearths have been found in different tranches. An iron smelting furnace was the most interesting feature of this period; recovered from Layer (4) of Trench YI-11. The trench yielded a number of iron objects along with iron slag pieces as well as fragments of burnt tuyeres. On the basis of cultural remains which are of an early variety and radiocarbon dates this period may be dated from c. 1700 BCE to 800/700 BCE.

Methodology

The work of faunal analysis was carried out at Banaras Hindu University in 2011. Only a few fragments were taken to the Archaeozoology Laboratory at Deccan College for confirmation. After the analysis was over select bones were returned to their respective packets. Entire faunal material recovered from Period I was examined, i.e. no sampling strategy was used in this case.

A standard protocol of the laboratory analysis, data storage and faunal quantification developed at the Archaeozoology Laboratory, Deccan College was used. As per internationally accepted norms of faunal analysis each bone fragment was examined to study the effects of both pre- and post-depositional factors on the skeletal elements. Bone modification signatures that were searched include intentional fractures (Sadek-Kooros 1975) as well as accidental breakage of bones both in the past and after their recovery during the excavation process. The bones that were complete and measurable were measured using the standard system developed by A. von den Driesch (1976) and utilised world over. The results of bone identification, measurements and comments on the signatures of bone modifications were recorded in the computerized coded format used at the Deccan College. DCPARZ –computer software developed at the Archaeozoology laboratory by the author in late 1980s was used for analysis. On the basis of size, unidentified fragments were grouped into 3 categories i.e., UF- S (small; up to 1 cm), UF-M (medium; between 1 cm to 5 cm) and UF-L (large; larger than 5 cm).

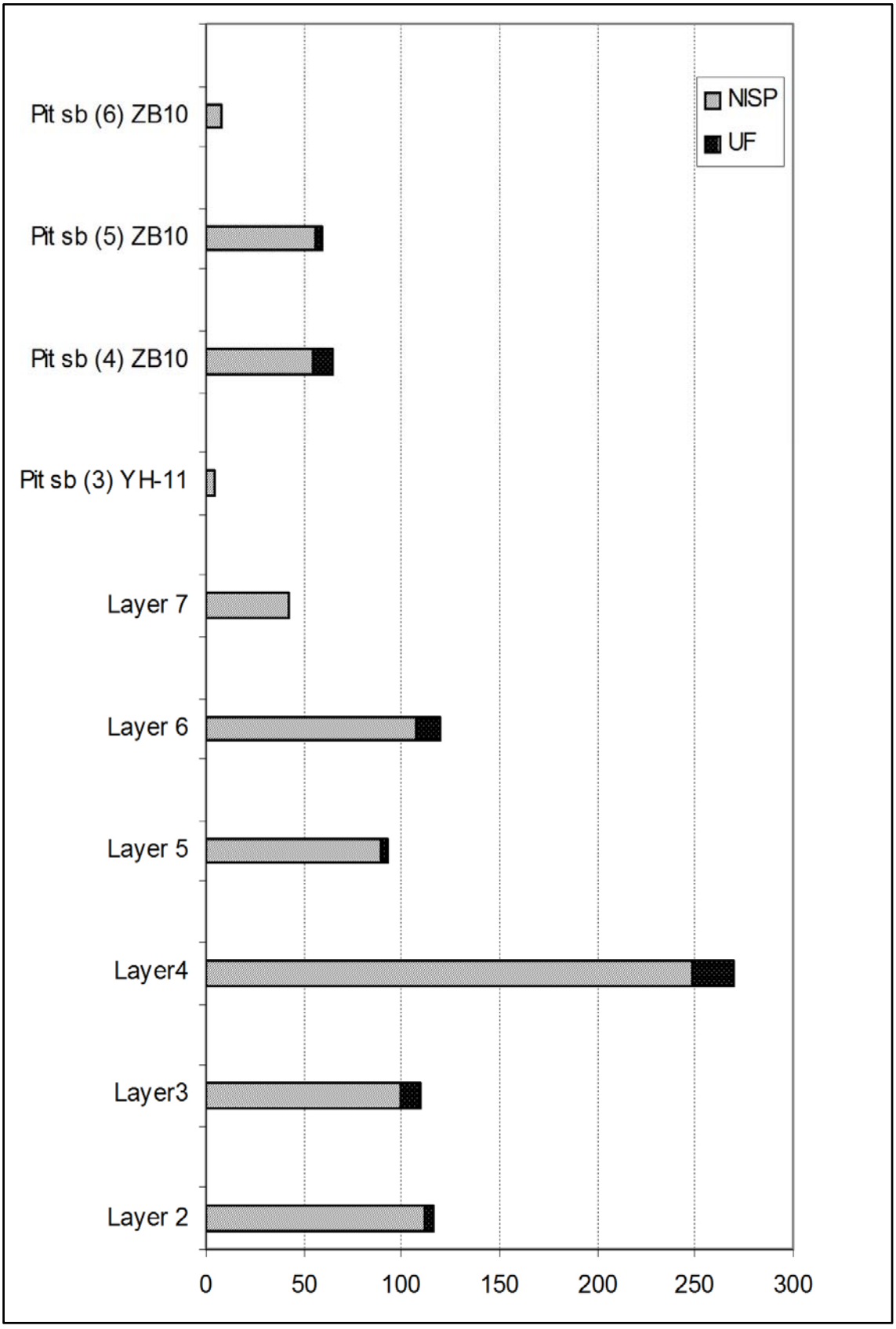

Figure 5: Raipura Period II: Summary of Identification

Nature of Faunal Material

The faunal material studied and reported in this article came from trenches ZH10, ZB10, XJ5, YH11 and YI11. There were four pits from where material has been studied. A total of 889 skeletal fragments were examined of which 823 fragments have been identified with an identification level as high as 92.57% (Table 1; Figure 5). The level of identification was high since most fragments were in well-preserved condition. In general the edges of most of the skeletal elements were not much abraded or rolled due to post-depositional physical factors. Also, the amount of unidentified splinters was found to be small (Table 1).

Table 1: Summary of Identification: Raipura Period II

Layer/Unit	NISP	Unidentified				Total fragments
		Large	Medium	Small	Total	
2	112	0	4	0	4	116
3	100	2	4	4	10	110
4	248	5	12	5	22	270
5	89	3	1	0	4	93
6	108	2	7	3	12	120
7	42	0	0	1	1	43
Pit 1: Pit sb (3) YH-11	5	0	0	0	0	5
Pit 2: Pit sb (4) ZB10	55	3	5	2	10	65
Pit 3: Pit sb (5) ZB10	56	0	3	0	3	59
Pit 4: Pit sb (6) ZB10	8	0	0	0	0	8
Total	823	15	36	15	66	889

Bone Modifications

Nearly one-fifth of the identifiable material showed bone modifications due to actions of both human and non-human agencies (Table 2). The evidence of action of non-human agencies was visible in the form of 6 gnawed bone fragments recovered from layer 4. These fragments were gnawed by dogs. Similar carnivore bone modification activities were also observed in case of faunal material of Period I (Pre-NBPW without metal) at Raipura (Joglekar *et al*. 2016). In addition three fragments of large bovid showed puncture marks made by a carnivore canine (perhaps a dog). These were a long bone shaft fragment of (layer 3), a metacarpal (layer 6) and humerus (layer 7).

Evidence of post-depositional trampling was observed from two contexts. Surfaces of a mandible (XJ5, layer 3) and distal end of a humerus (ZB10, layer 4), both of cattle were partly pushed due to mechanical pressure when these bones were in fresh condition.

The case of later intrusion was seen in faunal material of layer 6. A complete femur of a young rat was found from trench ZH10 that was of later period. Marks of charring were seen in case of 94 fragments (11.42%) of which only one fragment (cattle ulna) was over-fired and vitrified. Cutting and charring marks were seen on 20 fragments.

Figure 6: Bone Tools from Period II

Figure 7: Bone Tools from Period II

Figure 8: Modified bones and a bone object resembling a small container

Marks of repeated strikes for removal of flesh (parallel butchering marks) were found in case of four fragments (thoracic vertebra, rib and humerus of cattle and an ulna of buffalo), all from layer 4. An interesting case of a rib of cattle (ZB10, layer 4) showed that a sharp instrument/blade was used to strike on the dorsal side, and the blade had gone halfway through the rib.

Period II assemblage showed presence of 7 tools besides those already separated during excavation (Figure 6-7). Also a few fragments showed sharp cut marks that indicated modification, either to make tools or some kind of bone object (Figure 8). The tools stored along with other faunal material were made using long bone fragments of cattle/buffalo such as radius, humerus and tibia. However, the arrowheads and points were made using antlers, either of spotted deer or Sambar.

Table 2: Bone modifications recorded from Period II contexts at Raipura

Layer/Unit	2	3	4	5	6	7	Pit sb 4	Pit sb 5	Pit sb 6	Total	%
Slightly charred	3	2	37	13	5	2	8	5	0	75	9.11
Completely charred	0	0	8	0	0	0	5	5	0	18	2.19
Charred and vitrified	0	0	1	0	0	0	0	0	0	1	0.12
Butchering marks	0	0	4	0	0	0	0	0	0	4	0.49
Cut marks	2	2	48	11	3	0	3	1	0	70	8.51
Bone tools	0	0	2	0	1	0	3	1	0	7	0.85
Carnivore marks	0	0	3	0	1	1	0	0	0	3	0.36
Gnawing marks	0	0	6	0	0	0	0	0	0	6	0.73
Later intrusions	0	0	0	0	1	0	0	0	0	1	0.12
Total	5	5	106	24	11	3	19	12	0	185	22.5
% with base value of NISP= 823											

Pit Material

Pit sealed by layer 6 (Trench ZB 10) contained only eight fragments and all were identifiable. There were ribs and a first phalanx of cattle/buffalo, an astragalus and third phalanx of cattle, second phalanx of buffalo, and a first phalanx of four-horned antelope. No other evidence of four-horned antelope is available from any other context.

Pit sealed by layer 5 (Trench ZB 10) yielded 56 identifiable and 3 medium-sized unidentified fragments. Except 5 fragments of sheep/goat all others were of cattle/buffalo and mostly in eroded condition. It seems that most of these have undergone post-depositional displacements or breakage.

Table 3: Raipura Period II: Number of Identified Specimens

Trench	XJ5	XJ5, YI11	ZH10 ZB10	ZH10, ZB10	ZH10	ZH10	Pit sb 3	Pit sb 4	Pit sb 5	Pit sb 6	Total	%
Layer	2	3	4	5	6	7						
Bos indicus	22	40	79	26	23	10	0	12	14	2	228	27.7
Bos/Bubalus	80	54	133	46	74	28	2	38	37	4	496	60.3
Bubalus bubalis	0	0	10	2	0	0	1	2	0	1	16	1.94
Capra hircus	0	0	1	1	0	0	0	0	2	0	4	0.49
Capra/Ovis	8	2	5	8	2	1	0	0	3	0	29	3.52
Equus caballus	0	0	2	0	1	0	2	0	0	0	5	0.61
Boselaphus tragocamelus	0	0	7	2	0	0	0	0	0	0	9	1.09
Axis axis	1	0	2	1	2	0	0	1	0	0	7	0.85
Cervus unicolor	0	0	4	1	0	0	0	0	0	0	5	0.61
Tetracerus quadricornis	0	0	0	0	0	0	0	0	0	1	1	0.12
Antilope cervicapra	0	3	2	1	0	0	0	0	0	0	6	0.73
Sus scrofa	1	1	3	0	0	0	0	0	0	0	5	0.61
Rattus rattus	0	0	0	0	1	0	0	0	0	0	1	0.12
Elaphus maximus	0	0	0	0	0	3	0	0	0	0	3	0.36
Lepus nigricollis	0	0	0	1	0	0	0	0	0	0	1	0.12
Medium-sized bird	0	0	0	0	1	0	0	0	0	0	1	0.12
Anas crecca	0	0	0	0	0	0	0	1	0	0	1	0.12
Wallago attu	0	0	0	0	4	0	0	0	0	0	4	0.49
Labeo rohita	0	0	0	0	0	0	0	1	0	0	1	0.12
Total	**112**	**100**	**248**	**89**	**108**	**42**	**5**	**55**	**56**	**8**	**823**	**100**

Pit sealed by layer 4 (Trench ZB 10) contained 55 identifiable fragments and 10 fragments that could not be identified. The majority of fragments were from cattle and buffalo. It is interesting that two second phalanges of buffalo recovered from this pit came from two different animals of the same size. A good number of fragments showed charring (13) and cutting marks (3). Three tools were recovered from this pit whose edges were abraded, perhaps due to prolonged use. A metacarpal fragment of common teal (*Anas crecca*) was found from this pit. Common teal is a regular winter visitor in north India that migrates from the temperate regions of Eurasia. This species was exclusively represented in this pit. A single vertebral fragment of rohu fish (*Labeo rohita*) has been found from this pit. Pit sealed by layer (3) in trench YH11 yielded only five identifiable fragments (Table 3). There were two skeletal elements of cattle/buffalo (a rib and a thoracic vertebra), a femur head fragment of more than 40 month old

buffalo and two isolated mandibular molars of an adult domestic horse. These molars were worn and their edges were in abraded condition.

Figure 9: Bones of Cattle

Figure 10: Bones of Cattle

Figure 11: Cattle astragali and an astragalus of buffalo

Material from Layers 2-7

Layers 2 to 7 yielded a total of 752 fragments of which 699 (92.95%) were identifiable (Table 3). Most of the fragments were well-preserved and large in size. Of the 699 identified fragments a large proportion belonged to cattle and buffalo (627, 89.70%). All skeletal elements (appendicular as well as axial) of cattle were found (Figures 9-11). Cut marks were visible mostly on scapulae, vertebrae, and proximal and distal ends of long bones of both cattle and buffalo (Figure 12). The relative proportion of the buffalo was much less than cattle since only 12 skeletal elements of the buffalo were positively identified (Figure 11, astragalus). The cattle in general were of large size as indicated by presence of scapula, lumbar vertebra (layer 5), and femur and patella (layer 6). Also two skeletal elements - tibia (Pit sb layer 4) and pelvis (Pit sb layer 5) of cattle indicated massive animals, perhaps exceeding 300 kg, like modern Red Sindhi, Kankrej and Gir cattle breed. Age profile of cattle could be estimated from layer 4 in which animals of all ages ranging from 7-10 months to 96-108 months were found. Very old animals perhaps were large working bulls.

The proportion of sheep/goat skeletal elements was small (4% of NISP) as compared to cattle. Although a few sheep were indentified from Period I, Period II material did not show presence of sheep. It seems that all the skeletal elements identified were of the goats (Figure 13). Horse bones were found from layer 6 and layer 4 (Table 3). These were a right side maxilla of an adult (ZH10, layer 6), and acetabulum portion of pelvic bone and a rib of same individual (ZB10, layer 4). It is interesting that the ilium of the

pelvic bone showed an oblique (anterior-posterior) cut on the dorsal side. It is difficult to interpret this evidence of cut mark on a single bone, but such cut marks have been observed at Raja Nal Ka Tila, District Sonbhadra, Uttar Pradesh. At Raja Nal Ka Tila a couple of horse bones recovered from period II, c. 1300-700 BCE (Joglekar 2010-2012) did show marks of charring and cutting.

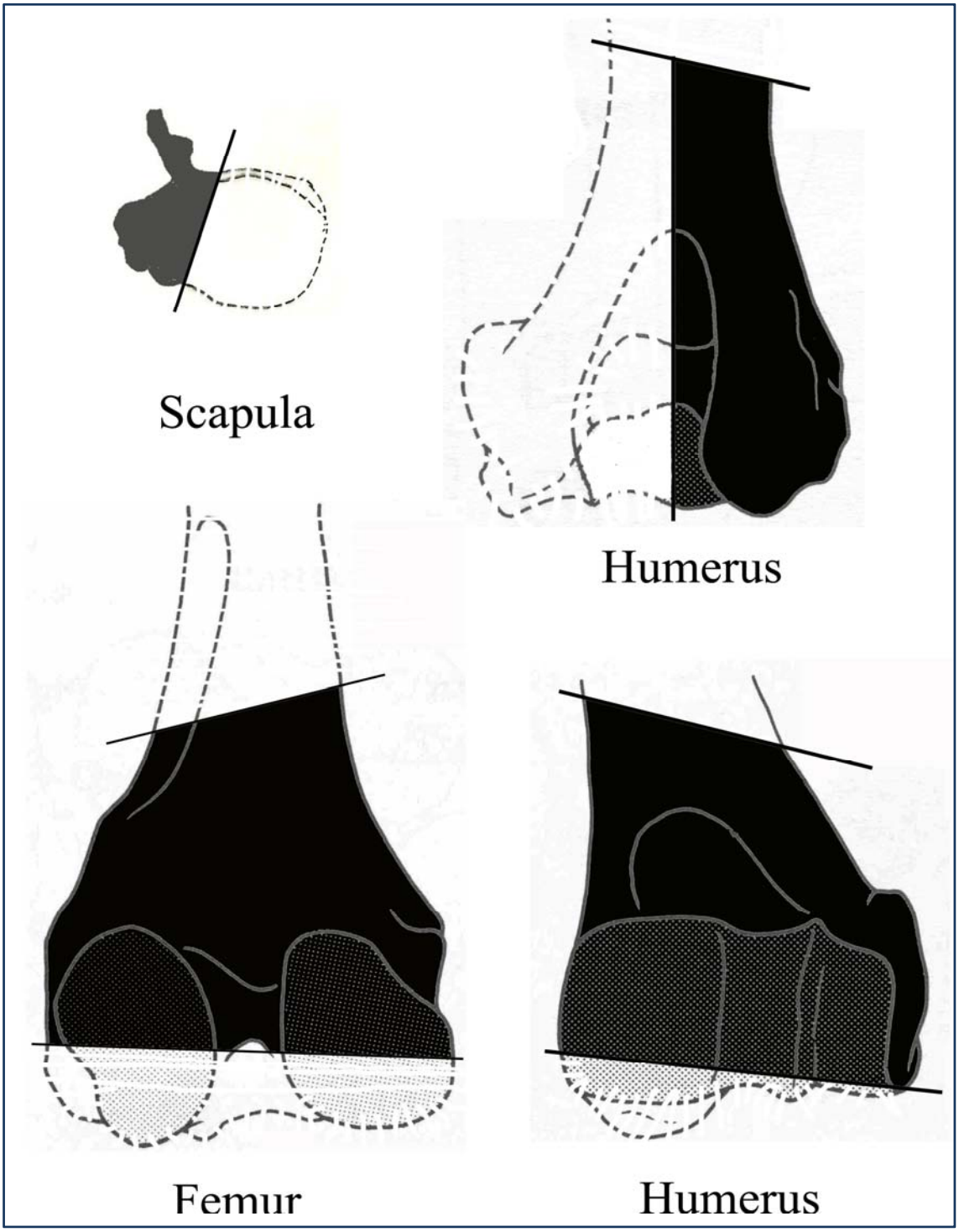

Figure 12: Pattern of cutting observed on cattle bones

Figure 13: Bones of Goat

The faunal assemblage mainly contained remains of domestic species (Table 3). From Period II contexts 787 fragments out of total 833 identifiable ones were of domestic animals. Thus merely a small proportion of wild animals (4.37%) were found from Period II contexts. This is similar to what has been observed for Period I.

Figure 14: Fish Dentary bone recovered from layer 6

Among the wild mammals the nilgai remains were found only from layer 4 (two maxillary molars, a mandible, two scapula fragments, an astragalus and a third phalanx) and layer 5 (first phalanx and third phalanx). All these belonged to three adults, one from layer 5 and two from layer 2. Blackbucks were hunted at Raipura. Their remains were found from layer 5 to 3. Many of these showed marks of charring and cutting. The MNI values were 1 (Layer 5), 2 (Layer 4) and 3 (Layer 3).

The spotted deer were found from many layers. Layer 6 had remains of two animals (both female) – a calcaneum and a tibia, Layer 5 yielded only one proximal end of tibia of right side. Layer 4 contained two skeletal elements (tibia and ilium) of a single buck of a large body size. Like the nilgai, Sambar deer were hunted only for a small duration of occupation (layer 4 and layer 5). Almost all the skeletal elements of the Sambar showed marks related to consumption. The MNI for layer 5 and 4 were three and one, respectively.

Wild pig bones were found only from top three layers (4 to 2). The skeletal elements identified were mandibles, cranial fragments and metapodia. All these belonged to young pigs (one individual each in each layer).

An interesting find from this period was presence of elephant skeletal element other than ivory. Ivory and finished ivory products have been found at many sites, but at Raipura three fragments of a scapula were recovered from layer 7 (Trench ZH10). These were of the same animal, broken after deposition. There were no marks of any other nature on this scapula (glenoid cavity portion).

Fish remains in the form of vertebrae, spine and a dentary bone (Figure 14) were recovered only from one context – trench ZH10, layer 6. These belonged to freshwater species of *Wallago* attu, a catfish of family Siluridae.

Metrical Analysis

The bone measurements form an important part of information regarding the animals in past. Particularly these are useful for obtaining estimates of sizes of the domestic animals that can be compared among sites of the same cultural period (Joglekar 2011). It was possible to record measurements in case of a few bones (Tables 4-16). All the measurements were recorded in mm using a digital calliper with a least count of 0.01 mm.

It was possible to estimate the height of the cattle at the withers using the medial length of the astragalus as per the formula given by Zalkin (1970). Cattle height estimates based on astragali from various contexts (n=9) showed that the height varied between 93.62 and 121.37 cm (112.49 ± 8.63). This analysis indicated that cattle variety was not different than that reared during Period I (Joglekar *et al*. 2016). Cattle reared during Period II were also of medium-built cattle variety known from other Ganga Valley and Vindhyan sites such as Jhusi, Agiabir, Raja Nal-ka-Tila and Malhar (Joglekar 2007-08, 2010-11, 2010-12). However, as judged on qualitative basis, a few individuals were of massive built- those kept for breeding purpose or performing heavy-duty labour works.

Concluding Remarks

As it has been concluded from analysis of faunal material of Period I (Pre-NBPW without metal) contexts (Joglekar *et al*. 2016), the animal-based subsistence of the inhabitants was primarily based on rearing of domestic animals, cattle, buffalo and sheep/goat in particular. Evidence of young, sub-adult and old cattle indicated that animal husbandry based on cattle continued from its fully developed state during this period (Pre-NBPW with iron) were present. A few very old animals indicate their use as labour and/or milk, however, secure age profiles based on MNI could not be prepared for each layer. As it has been observed in case of Period I, for the inhabitants of Raipura during Period II hunting/fishing was only supplementary in nature, as their main subsistence came from domestic animals.

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