

Worked osseous assemblage from Iron Age site of Indor Khera, Upper Ganga Plains (India)

Assemblage osseux travaillé provenant du site de l'âge du Fer d'Indor Khera, plaines supérieures du Gange (Inde)

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Abstract: Indor Khera, an Iron Age archaeological site in the Upper Gangetic Plain, was investigated by archaeologists through systematic exploration and excavation between 2004 and 2010. Archaeological materials recovered from the site indicate its continuous occupation from *circa* 12th century BCE to the 13th/14th century CE, divided into three cultural phases (I - *c.* 1200–200 BCE; II - *c.* 200 BCE–500 CE; III - *c.* 500–1200/1300 CE). Overall, 120 osseous objects, mostly made of bone, horn, and ivory, were recovered from different excavation seasons. They were found mainly from a horizontally excavated area in the northwestern sector of the site during the 2008–2009 and 2009–2010 seasons and belong to Phase II. Based on the discovery of artefacts and materials other than osseous, the area was identified as an industrial-scale pottery-production locality consisting of several households. This fascinating discovery from the locality raise the question: were these osseous objects manufactured by the potter's family members or supplied to them from somewhere else?

Keywords: Osseous object, Indor Khera, Iron-Age, Ganga plain, pottery.

Résumé : Indor Khera, un site archéologique de l'âge du Fer dans la plaine du Haut-Gange, a été étudié par des archéologues lors d'explorations et de fouilles systématiques entre 2004 et 2010. Les vestiges archéologiques récupérés sur le site indiquent une occupation continue du ^{xii}^e siècle avant J.-C. environ au ^{xiii}^e-^{xiv}^e siècle après J.-C., divisée en trois phases culturelles (I. vers 1200-200 avant J.-C. ; II. vers 200 avant J.-C.-500 après J.-C. ; III. vers 500-1200/1300 après J.-C.). Au total, 120 objets osseux, principalement en os, en corne et en ivoire, ont été récupérés lors des différentes campagnes de fouilles. Ils ont été trouvés principalement dans une zone fouillée horizontalement dans le secteur nord-ouest du site pendant les campagnes 2008-2009 et 2009-2010, et appartiennent à la phase II. La découverte d'artefacts et de matériaux autres qu'osseux a permis d'identifier la zone comme une localité de production de poterie industrielle, composée de plusieurs foyers. Cette découverte soulève la question suivante : ces objets osseux ont-ils été fabriqués par la famille du potier ou leur ont-ils été fournis par une autre source ?

Mots-clés : objet osseux, Indor Khera, âge du Fer, plaine du Gange, poterie.

INTRODUCTION

The discovery of osseous artefacts from the Iron Age (1300 BCE–600 CE; Uesugi, 2018) culture sites is a common feature of alluvial plains of north India, which have been mainly formed by the Indus and Ganges River

systems. At many places, they have been found in hundreds (Gaur, 1983; Vinayak, 2016a and 2021; Salahuddin and Alam, 2000). Their commonality and numbers from Iron Age sites of this region suggest their substantial role in contemporary societies. Despite this, their study lagged far behind that of other common materials recovered from archaeological deposits, such as pottery, stone, brick,

metal, etc. So far, they have been systematically studied in a few places in the region, and perhaps in the entire Indian subcontinent, and have rarely been considered for reconstructing local histories. Archaeologists paid little attention to the artefacts of these materials. This lack of interest has been highlighted by the present author in the last decade through his writings (Vinayak 2016a, 2016b, 2021 and 2023), but it still prevails. Another important assemblage of worked osseous material from this region and age is presented in this paper in an effort to bring more attention to their studies, enhance the dataset, and explore how such an assemblage can be fitted into a larger framework so that the past can be reconstructed at the local

and regional scales. This assemblage originated from the excavation of an archaeological mound located at the present-day village of Indor Khera, Bulandshahr, Uttar Pradesh, India ($28^{\circ}14'57''$ N, $78^{\circ}12'48''$ E; fig. 1). The excavation was performed by a team consisting of local villagers and students of different educational institutes, led by J. Menon and S. Verma. The excavation spread over several seasons in different areas of the mound and resulted in the discovery of 120 osseous artefacts and manufacturing waste. They were found mainly from a horizontally excavated area in the north-western sector of the site during the 200–2009 and 2009–2010 seasons and belong to Period II (fig. 2a). Based on the discov-

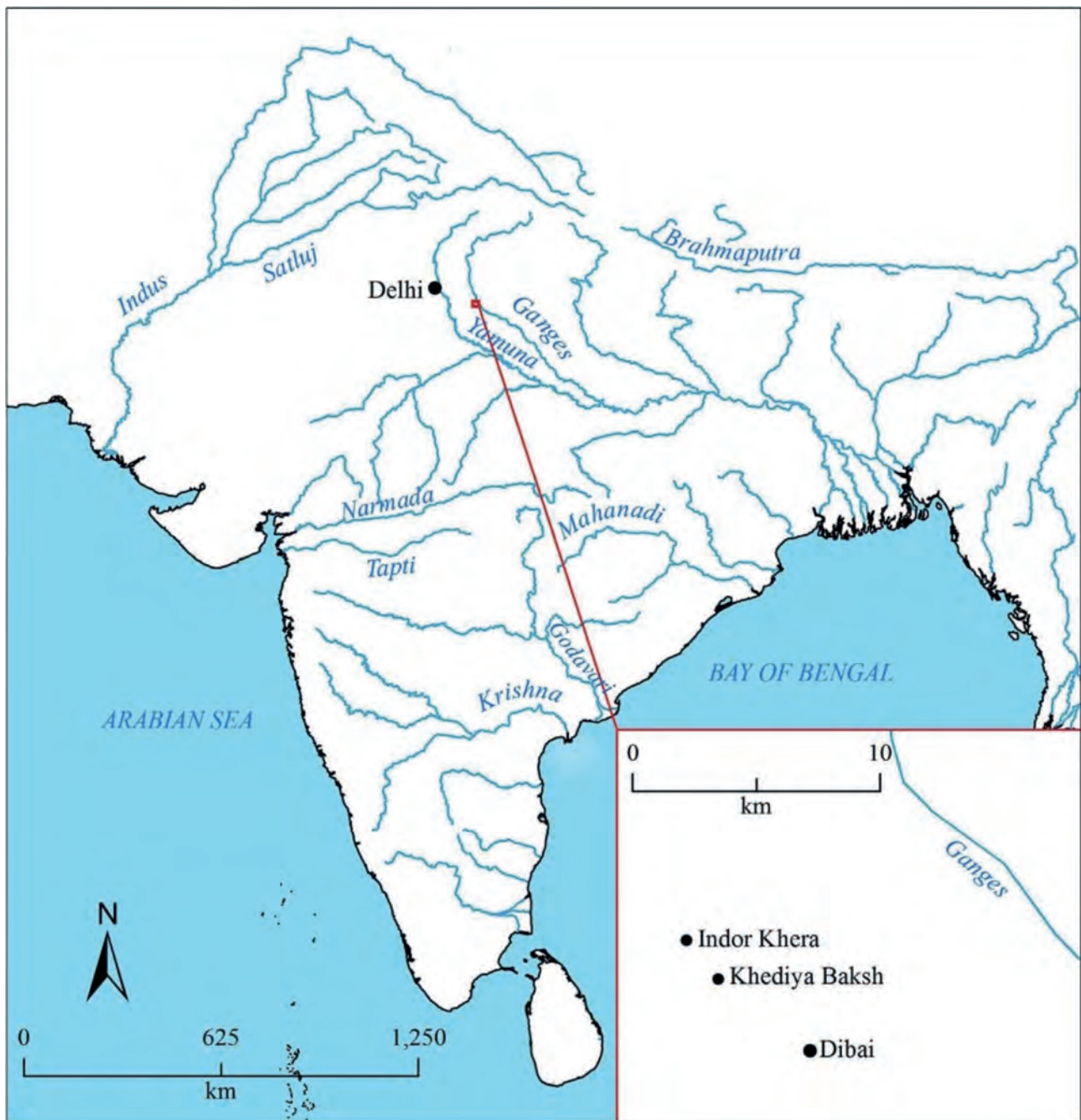


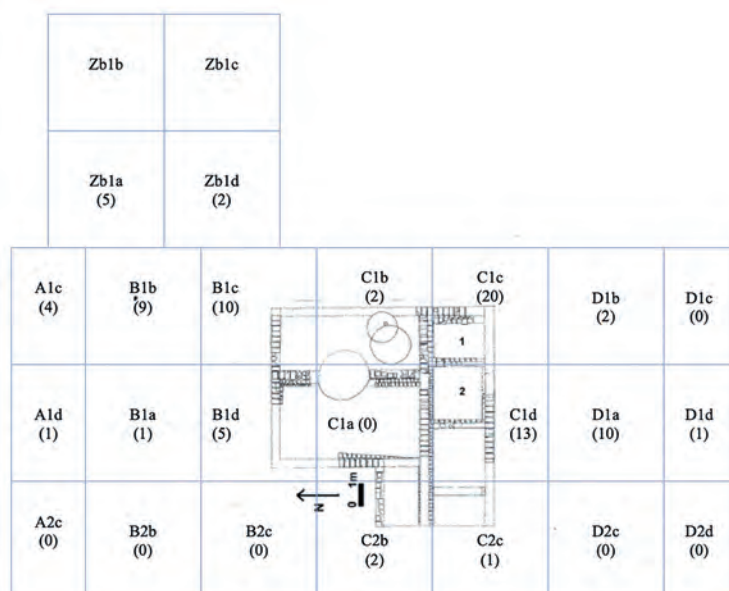
Fig. 1 – Location of Indor Khera in India (after Menon and Varma 2017).

Fig. 1 – Localisation d'Indor Khera en Inde (d'après Menon et Varma, 2017).

ery of artefacts and materials other than osseous, the area was identified as an industrial-scale pottery-production locality consisting of several households. This fascinating discovery from this locality raises the question: were these osseous objects manufactured by the potter's family members or supplied to them from somewhere else? An attempt is made in this paper to answer this question.

1. SITE AND CHRONOLOGY

Geographically, the site of Indor Khera is located on the right bank of a small river locally known as Chhoya, and it is one of the tributaries of Kali Nadi that merges with the Ganga River near the city of Kanauj



a



c



b



d

Fig. 2 – (a) Horizontally excavated area, including trench plan with their name (e.g. C1c; B1d) and number of bone artefacts recovered from each trench mentioned in the brackets, and a two-room house; **(b)** Types of osseous objects; **(c)** Incomplete objects; **(d)** Three artefacts discovered in trench C1c from locus 76.

Fig. 2 – (a) Zone de fouille horizontale, incluant le plan de tranchée indiquant la taille et le nombre d'objets osseux récupérés dans chaque tranchée, ainsi qu'une maison de deux pièces ; **(b)** types d'objets osseux ; **(c)** objets incomplets ; **(d)** trois objets découverts dans la tranchée C1c du locus 76.

(fig. 1). It flows about 200 m north-east of Indore Kheda. As per modern jurisdiction boundaries, the site falls in the Debai tehsil of the Bulandshahr district in Uttar Pradesh, India, and is located about 1 km north-west of the Aligarh-Anupshahr state highway. The main mound (12 ha) is surrounded by a number of small mounds (which range from 0.1 to 0.6 ha), situated on its western and northern sides approximately 200–700 meters away from the main mound (Menon et al., 2005 and 2008). It was first investigated by A. C. L. Carlleyle in 1874–1875 (Menon et al., 2005 and 2008). More recently, it remained under investigation between 2004 and 2010 by a team of experts steered by J. Menon and S. Varma. This investigation was started with a systematic survey of the site in a 2×2 km area. This survey formed the base for preliminary soundings, and three trenches were dug. This way, chronology and cultural sequences were recognised, and they formed the base of horizontal excavation in the north-western part of the site. Based on these excavations, the cultural deposit at this site is broadly divided into the following three chronological brackets (table 1):

No brick structures were found in Period I. They first appeared in the early phase of Period II and were made from whole bricks instead of brickbats. However, structures made from brickbats begin to emerge in the later phase of Period II and continue into Period III. The horizontally excavated area in the north-western region of the site is the primary concern of this paper, as it yielded 100 osseous artefacts and debris—83% of the total. Of these 100 bone artefacts and debris, 92 were found in Period II. The high concentration of these artefacts in Period II comes with impressive structures, features, and antiquities like terracotta dabbers, stone potter wheel sockets, terracotta human and animal figurines, terracotta spindle whorl, metal coins, and so on. Based on these findings, Period II is identified as one of the phases of the Second Urbanisation of the Indian subcontinent (Uesugi, 2018), which reached its peak between the 2nd century BCE and the 3rd century CE (Chakravarti, 2016; Singh, 2009) and is well reflected at this site. This period has been given different names by different scholars of this region, i.e. the Upper Gangetic Plain, depending on their sources and discipline (table 1). Since this paper mainly concentrates on archaeological remains, Period II of this site has been considered one of the phases of the

Iron Age. The following section briefly explains how this Age has been understood in this region.

2. THE IRON AGE IN THE UPPER GANGA PLAIN

When and where the Iron Age began in India remains an issue of debate (Tripathi, 2001; Tewari, 2003; Sahu, 2006; Uesugi, 2018; Vinayak, 2021). With each isolated discovery of iron technology, scholars claim the start of the Iron Age from their own site or regions and represent it as older than ever. But should these isolated findings be considered for the start of the Iron Age? Does the mere advent of any technology lead to its large-scale use? The scale of use for any technology is an important factor in naming a period after it. For instance, the Greeks invented the first steam-powered device, the “Aeolipile,” in the 1st century CE and used it to surprise the people; however, it was only in the 18th century that steam power became popular and marked the beginning of the Industrial Age/revolution. So, isolated discoveries of iron technology from isolated sites should not be used as markers for the beginning of the Iron Age in South Asia. In this context, I agree with S. A. Vaidya (2014) that the Iron Age in India is marked by the beginning of the use of iron technology, subsequent production, and its widespread cultural use across the subcontinent.

Relying upon the above explanation, most scholars date the Early Iron Age in the Upper Ganga Plain to the 11th to 6th centuries BCE. On the basis of archaeological data, chronology and the first signs of ironworking, V. Tripathi (2001) and A. Uesugi (2018) divided the early ironworking of the Indian subcontinent into seven and four different regions, respectively. A. Uesugi (2018) places the Upper Ganga Plains into the North Indian Iron Age and divides it into six cultural and chronological phases. The last three phases (IV, V and VI) of his classification are contemporary to the Period II at the Indor Kheda, and they have been associated with Late NBPW, Red Ware Phase I (Kushan) and Red Ware Phase II (Gupta) cultures, respectively. These cultures are also represented at some other important sites of this region, like Jakhera, Atranjikheda, Ahhichhatra, and Hastinapur (Gaur, 1983; Lal, 1984 and 1986; Sharma, 2007).

Period	Time	Archaeological Cultures	Literary Traditions	Political
I	c. 1200-200 BCE	Painted Grey Ware (PGW), Northern Black Polished Ware (NBPW), Iron Age	Early Vedic, Later Vedic, Post-Vedic	Jan, Janapada, Mahajanapada, Early states, Mauryan
II	c. 200 BCE-500 CE	Early Historic, Iron Age, Redware Phase I & II	Dharmasastra, Purana	Post-Mauryan, Kushan, Gupta
III	c. 500-1200/1300 CE	Early Medieval	Regional traditions	Pushyabhutis, Gurjara-Pratiharas, Rajputs

Table 1 – Chronology and cultural deposit at Indor Kheda.

Tabl. 1 – Chronologie et dépôt culturel d'Indor Kheda.

3. A DISCOVERY OF A POTTERY PRODUCTION LOCALITY

We now return to the excavated deposit of Period II at Indor Kheda. Structurally, it comprises mud-brick platforms, rooms with a brick-paved area, firing facilities with reddish deposits, rammed brickbats, large houses, and circular platforms (Menon and Varma, 2010b; Varma and Menon, 2011). Also, from the evidence of pottery production found in the houses of this area, it can easily be identified as a locality engaged in the specialised production of pottery on an industrial scale, and it is the focus of this section.

Raw material: Clay, an essential ingredient of pottery and terracotta production, was found in the form of lumps, rolls, coils, pellets, and perhaps used to produce pots, appliques and figurines. Interesting to note that several terracotta lumps that might have been accidentally fired were also discovered. Sand, which is commonly used for tempering in ceramic production, was recovered in heaps from various rooms (Menon and Varma, 2010a and 2010b).

Tools: Terracotta stamps were used for decorating the surfaces of leather-hard clay vessels. Numerous terracotta anvils recovered indicate the clear knowledge of the paddle and anvil method. Several flattened (and sometimes worked) stones were also unearthed with small round depressions on one or both sides. Excavators called them “socket stones” and used to place the axis of wooden wheels for making pottery. The availability of terracotta plaques suggests the knowledge of the technique of moulding (Menon and Varma, 2010b).

Firing facilities: Two types of firing facilities were detected, and both were used on a permanent basis. Lower levels had a Brickbat-packed platform with over-vitrified brickbats and ash. The upper levels had distinctive circular platforms made of white material and ash, ranging from 1 to 2 m in diameter (Menon and Varma, 2010b).

4. OSSEOUS ASSEMBLAGE FROM PERIOD II

4.1. Typology

Osseous objects recovered from horizontal excavation areas have been broadly classified into six categories based on their morphology (fig. 2b). Bipoints are most common and found in different shapes and sizes (table 2). Sharply pointed tips, circular in cross-section and made on the longitudinal shaft, served as working edges. The nature of their morphology and micro-wear patterns at pointed ends suggests that they functioned as utilitarian tools rather than works of art (artefacts). The next popular osseous artefact in number is the tanged point. Typologically, they resemble bipoints except for their ends, that developed small Tangs due to their widespread use. Antimony rods are next in line in terms of popularity. They are straight and thin in the middle section with a circular cross-section end to end. Their ends are mainly bud-shaped and are slightly wider than the middle part. Bangles are rectangular in cross-section. Parallel grooves decorate the outer surface of a bangle. Awls are pointed at one end, and the other is used to hold them in the hand. Numbers on rectangular dice are marked on each side with the help of concentric circles. Apart from these artefacts, a number of artefacts were also found in an unidentified and unfinished state, and placing them into a category is a difficult task.

4.2. Raw material

Different osseous raw materials used for various objects found from Period II are presented in table 3. The most dominant material is bone, followed by ivory and antler. Bone was used to manufacture most utilitarian objects, 68 (82.5%) represented by bipoints, tanged bipoints and awls. One possible reason for this trend may be the easy availability of bones, as they were recovered in a good amount from the excavated area. Moreover, the shape and texture

	Typology		
Period	I	II	III
Bipoint	3	42	1
Tanged Bipoint	-	21	-
Awl	-	2	-
Bangle	-	3	-
Antimony Rod	-	4	-
Dice	-	1	1
Miscellaneous	-	5	1
Unfinished	-	9 (7 Bipoint, 1 Socketed object, 1 unidentified)	-
Raw Material	-	5	2
Total	3 (3%)	92 (92%)	5 (5%)

Table 2 – Typology of osseous objects.

Tabl. 2 – Typologie des objets osseux.

Raw Material	Bone	Ivory	Antler	Horn	Not recognised
Bipoint	42	-	-	-	1
Tanged Bipoint	21	-	-	-	-
Awl	3	-	-	-	-
Bangle	-	3	-	-	-
Antimony Rod	3	1	-	-	-
Dice	-	1	-	-	-
Miscellaneous	2	-	1	-	1
Unfinished	7	1	-	-	-
Raw Material	2	-	2	1	-
Total	80 (86.9%)	6 (6.5%)	3 (3.2)	1 (1.08%)	2 (2.1%)

Table 3 – Osseous raw material.
Tabl. 3 – *Matière première osseuse.*

of bone do not allow carving similar to ivory. Further, most available items were stripped of their raw materials during manufacturing processes to such a degree that their natural form is challenging to recognise. As a result, it is difficult to recognise raw material to the level of animal species or humans and their age with the naked eye.

4.3. Manufacturing

Based on the types of artefacts and structures found in the excavated area, J. Menon and S. Verma (2010b) have identified the houses in this area with pottery production as their primary occupation. The discovery of osseous raw materials, manufacturing waste and incomplete objects (fig. 2c) from these houses strongly indicates that these were produced there. However, the post-abandonment factor could not be ruled out completely. Once the area was abandoned, it may have been used as a dumping ground, and all the osseous materials were likely deposited there in a secondary context. But the information from trench C1c is very important. Some osseous objects of C1c (finished or unfinished) were found from locus 9 to 14 in the 2008–2009 season. The following season, 2009–2010, also yielded three different objects from locus 76 in the same trench at the same spot, and they belonged to three distinct categories: one is an unfinished object, the second is antimony, and the third is a Tanged point (fig. 2d). The presence of incomplete and complete objects in the same location suggests that they were produced in the same area.

The analysis of osseous objects from Period II indicates that utilitarian objects were produced in the potter's locality, while artistic objects were produced somewhere else, as they needed specialised skills to produce, and potters might not possess them. Further, if osseous objects were made in the potter's locality at Indor Khera, then what raw materials were used, and how were they obtained? As it has already been explained earlier, it is difficult to determine the raw material at the species level due to extensive modification of objects, so limited information is available in this regard. Almost all utilitarian

objects were produced from bones, and possibly they were derived from both wild and domesticated animals or humans. The scale of finishing touch presented over them suggests their ad-hoc nature in manufacturing and extraction of raw material from carcasses in the secondary stage of butchering. This may not always be the case. Two animal skeletons were found beneath two white-red firing platforms in trenches ZB1d and C1c, indicating that some ritual practices were involved. In such cases, bone could have been obtained even in the primary slaughter phase. Bones left over from potters' or other people's meals were the best source of raw material, as they were readily available, but scavenging could also be another option. Thus, it is clear from these details that the potters could have procured bones from multiple channels.

The state (fresh or dry) in which the bone or horn was used for carving is unknown. It is also difficult to trace the pre-treatment stage (like boiling or soaking) of the raw material from the present condition of the objects and debris. The manufacturing wear observed on osseous objects of Period II clearly shows the use of metal tools, but the type of metal is unknown. It is evident from the excavation of various archaeological sites of the Upper Ganga Plain that the utilisation of iron increased during this phase of the Iron Age. The good quantity of iron objects and their fragments recovered from the excavated area strengthens the possibility that iron was used in making osseous artefacts.

Detailed examination revealed that their primary cutting must have been done through direct or indirect percussion techniques, as signs of other techniques, like saw or groove marks, are not noticed on the incomplete objects and debris. Two types of flaking marks have been observed on various incomplete objects. The marks of the first category are rough in texture and short in length, while the second category are smooth and long. This suggests that two types of tools or techniques may have been used for creating them. These marks could also indicate a two-step process followed during flaking, first to create a rough shape and second to give the final shape. Such flaking marks were replicated on experimental specimens

using long-bladed tools (cleaver and long-bladed knife) for short ones and chisels for long ones (Vinayak, 2016b). The analysis of micro-wear patterns of pointed ends indicates their shaping, sharpening and resharpening by grinding their surface on abrasive surfaces like sandstone manually, using either side-by-side or back-and-forth motions. These patterns also rule out the use of mechanical tools such as grinding wheels or lathes.

This may be the standard procedure for producing bipoints and tanged bipoints, but some objects do show individual disparities. An awl made from long cannon bone (probably from metacarpal or metatarsal) was found in a common space in trench ZB1a and ZB1b, which displays a different production trend. It is 143 mm long, the longest osseous item found from the site. It is difficult to cut such a long piece of bone to create its blank using direct or indirect percussion techniques. It might have been cut by either sawing or grooving. It was likely shaped by scraping and whittling, as flaking could easily break it. The wear of the manufacturing polish suggests that it was polished on some rotating means. Like the awl, the four antimony rods were also made from straight, long bones. Their shapes (thin in the middle and thick and rounded at the ends) suggest that primary cutting was done by sawing or grooving. Thereafter, these were also shaped by scraping and whittling and then polished through some turning means. The awl and antimony rod production process suggests that they required higher skill than the bipoint production.

No incomplete ivory objects have been found from the horizontally excavated area; in all probability, they were not manufactured here. Two miscellaneous antler objects are reported from Period II. One of these has a circular socket at its lower end, and evidence of flaking suggests it was an incomplete object. After the socket was made, it was cut from below with a saw, as is evident from the saw marks. The other one has similar flaking marks, but instead of a socket, a rectangular “U” shaped cut was made at its bottom end with a saw to mount it to something.

4.4. Spatial Distribution and Manufacturing Context

The number of objects recovered from the deposits of Period II varies in different trenches (table 3). Five trenches (B1b, B1c, C1c, C1d, and D1a) contain 62 (67%) objects. Of these 62 objects, 49 (bipoints and tanged bipoints) are recognised as utilitarian objects. Based on the distribution pattern, two clusters could easily be recognised. One is centred around B1b and B1c and yielded 33 (35.8%) objects from four trenches, while the other is concentrated in C1c, C1d and D1a and contained 43 (46.7%) objects.

It is difficult to indicate the exact context of each bone, ivory, antler and horn object found from Indor Khera. However, as a case study, I will take up the C1c trench for a more detailed discussion. J. Menon and S. Verma (2010b) interpreted the structures from trench C1c as part of a house belonging to Period II within the C1 (10×10 m)

square. This house had two rooms in the C1c trench. They were rectangular (1.9×2.1 m and 2.1×2.3 m) and exhibited several construction phases (Menon and Verma, 2015). Only four objects were recovered from Room one, and the author identified their precise location and context when excavating during 2009–2010. Three of them have been found from locus 76 from the same spot along with cowries, slag, shell, black slipped ware sherds, fine grey ware sherds, red ware sherds, copper pieces, burnt seeds, and sand patches on the southern side of the room. Locus 79 directly dug under the locus 76 (locus 77 and 78 were assign to the walls) and just two to five cm below floor number eight was exposed with broken terracotta round worked sherd, worked brick object, slag, fine grey ware sherds, red ware sherds terracotta lump, burnt seeds, two black and green micro glass beads, blue squarer glass bead, arecanut shape terracotta bead, shell, cowries, round copper coin and square copper piece. The sandy section of Site 76 extended further, and beneath it was found a circular fire pit, coated with a white substance (could be lime). It means that bone objects found from locus 76 were directly linked to the floor eight. The fourth object was found in locus number 100 of this room in the season 2009–2010. It is a broken and burnt unidentified object.

Room two of the C1 square house has yielded a bone Bipoint from locus nine, along with slag, an terracotta bead shaped like a areca nut, burnt seeds, glass bangle pieces, shell, grey ware shreds, a broken miniature pot, an iron piece, worked shreds, a terracotta wheel, cowries, black slipped ware sherds, red ware sherds, a terracotta lump and an upside-down pot. The locus 11 and 12 were dug in an area located outside room two (the majority of this area falls in trench D1b). From here 11 complete and incomplete artifacts (four Bipoints, four Tanged Bipoints, 1 miscellaneous object and two incomplete objects with bone pieces) along with human and animal terracotta figurines, cowries, iron pieces, miniature terracotta pot, glass beads, red sand stone burnt seeds, shell, grey ware sherds, shell bangle, black slipped ware sherd, red ware sherds, slag, mother of pearl and clay object. According to the trench supervisor, a bone fragment was found with remains of coarse pottery from the south-eastern corner of this trench. Further, locus 13, 14, and 18 covered the area within and outside room two. A total of four objects (three Bipoints and one Tanged Bipoint) have been reported from these loci with cowries, red sandstone, animal figurines, iron pieces, grey ware sherds, red ware sherds, spout, terracotta unidentified object, beads, seeds, designed terracotta miniature vessel, terracotta wheels, copper piece, mother of pearls, glazed objects, round terracotta work sherds.

CONCLUSION

The spatial distribution and findings of bone objects in different stages in different contexts from the two rooms and an area outside them suggest that these locations were used to produce bone objects with other

activities. This implies that the potter's family members were involved in osseous object production, as the two-room house is identified for pottery production. It means with industrial-scale pottery production, they were also engaged in allied activities, which was very common for the households of this time. As simple techniques and tools were used except for several objects, Potter's family members may not need special skills to produce them. However, information about the specific family members involved in their production is unknown, i.e. whether they were male or female, young or old. The physical and mental labour required to produce osseous objects at different stages discussed in this paper suggests that they could have been produced by both men and women, as well as young and old members. In the end, it can be said that most of the bone objects were made in the potters' homes and were not supplied from outside, but why they were produced here and what purpose they served is still unknown to us. It isn't easy to paint a good picture of this area without finding answers to these questions, and it will be carried out in the future course of research.

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