



# Written in Bones

**Studies on technological  
and social contexts  
of past faunal skeletal remains**

edited by  
Justyna Baron  
Bernadeta Kufel-Diakowska

Uniwersytet Wrocławski  
Instytut Archeologii

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*Editors*

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*Cover*

Justyna Baron

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53-505 Wrocław, ul. Lelewela 4

# The remains of a late medieval workshop in Inowrocław (Kuyavia, Poland): horncores, antlers and bones

Worked animal bone constitutes one type of archaeological relic—alongside pottery, postconsumption animal bones, toothed saw blades, and lathe discs—recovered from site 19 in Inowrocław (Kuyavia Lake District, central Poland).

Site 19 is a piece of land belonging to a convent which contains some wooden buildings. The Franciscan nuns made the land available to the townspeople in the Late Middle Ages. Around the wooden buildings were found numerous signs of workshop activity, in the form of worked fragments of horncore, antler, and bone (n=347). Worked elements are classified into three categories, depending on whether they belong to the primary, secondary, or tertiary stage of the manufacturing process. Craft materials, semi-finished products, unfinished products, and finished products are all present. Products were prepared on-site, from the preliminary processing of material to the final stage of production, as exemplified by the diverse elements of facings and combs present. In most cases (about 60%), the elements of all three groups are waste. The analysed bone material represents the remnants of a late medieval workshop. The profile of the workshop indicates that mostly horncores (which dominate in the material) and antlers were worked on. The elements are derived mainly from goats, cattle, and red deer.

Most of the approximately 350 worked horncores, antlers, and bone fragments came from domestic mammals (60%, n=218), with about 30% (n=96) coming from wild mammals and 10% from fish (n=1), mammals (n=32).

**Key words:** zooarchaeology, worked bone, workshop, Late Middle Ages, Kuyavia, Poland

## Introduction and purpose of study

Inowrocław is located in the Kuyavia Lake District, central Poland (Fig. 1). Archaeological research in this locality has identified a number of sites, and of particular interest is that known as site 19. This is located on Klasztorny Square, an area which between the 13th and 19th centuries belonged to a Franciscan convent.

Under the direction of Marcin Wozniak, excavations at this site discovered the architectural remains of the Franciscan convent, a medieval church, and, to the west of these (on land owned by the convent, but which may have been made available to the townspeople in the Late Middle Ages; Wozniak, pers. com.), a range of wooden buildings. Numerous

indications of workshop activity were identified in the area around the wooden buildings; the evidence comes primarily in the form of worked fragments and waste of horncore, antler, and bone.

Systematic overview of the material will be presented in separate paper.

The main purpose of this paper is to answer the question of whether they were produced in the analyzed site and what was the profile of the workshop. This paper also describes differences in the production of objects made from antlers and objects made from long bones, and also attempts to identify the technological process employed and to reconstruct the tools used.

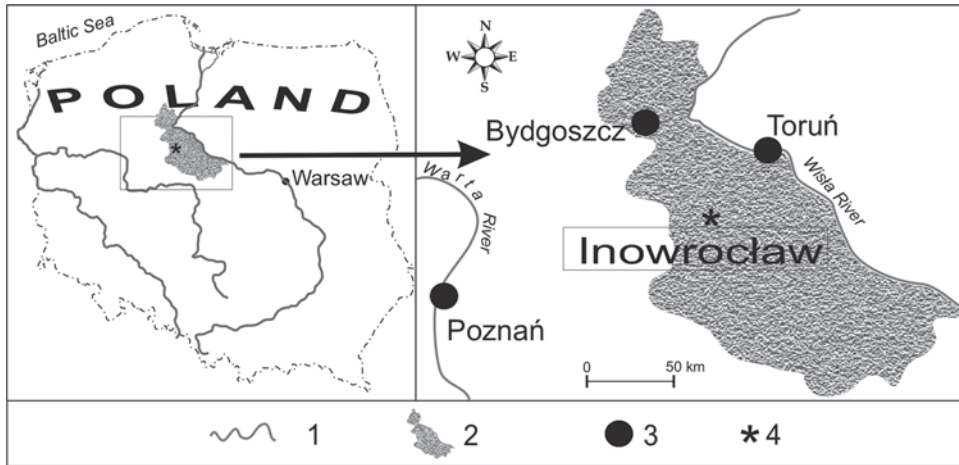


Fig. 1. Map of Poland showing location of site. 1 – main rivers, 2 – range of Kuyavia Lake District, 3 – main cities, 4 – Inowrocław site

## Material

Alongside pottery and artefacts such as saw blades and the discs from lathes, animal bone constitutes a significant component of the finds assemblage. In total, about 7,800 animal bones were recovered, though this includes material relating to the consumption of food, as well as that which clearly evidences manufacturing. This paper is concerned with the latter group.

There are approximately 350 fragments of worked horncore, antler, and bone, and most of this material comes from domestic mammals (60%,  $n=218$ ). Wild mammals account for 30% ( $n=96$ ). The elements are derived mainly from goats (*Capra hircus*) ( $n=88$ ), cattle (*Bos taurus*) ( $n=84$ ), and red deer (*Cervus elaphus*) ( $n=69$ ) (each constituting about 20% of the remains) (Fig. 2). Bones from other animals ( $n=73$ )

– such as sheep (*Ovis aries*), horse (*Equus caballus*), moose (*Alces alces*), pig (*Sus domestica*), roe deer (*Capreolus capreolus*), bear (*Ursus sp.*), and aurochs (*Bos primigenius*) – occurred in smaller proportions.

Anatomically, the elements consist primarily of horncores ( $n=125$ ), antlers ( $n=90$ ), metatarsals ( $n=56$ ), and metacarpals ( $n=22$ ). Other elements ( $n=54$ ) – such as scapulae, ribs, phalanges, radii, tibiae, femora, teeth, skull bones, and mandibles – are found with frequencies between 0.3% and 3% (Fig. 3).

Taphonomic evidence indicates that food remains were also used in craft: there are cuts and chops marks on the surfaces of certain elements (17% of the total material). The left horncore of an aurochs (in which

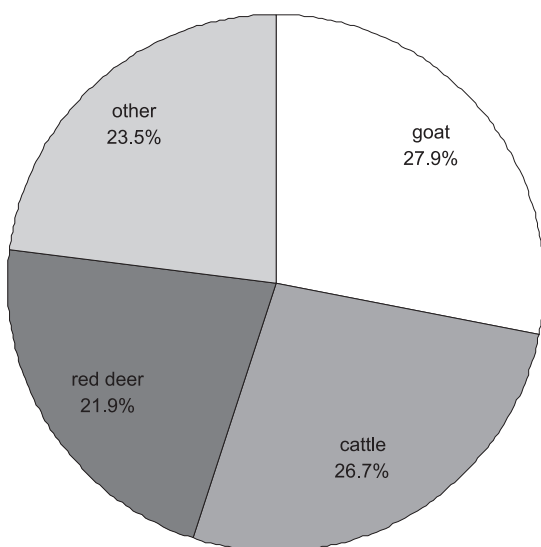


Fig. 2. Taxonomic distribution of bones by NISP ( $n=314$ )

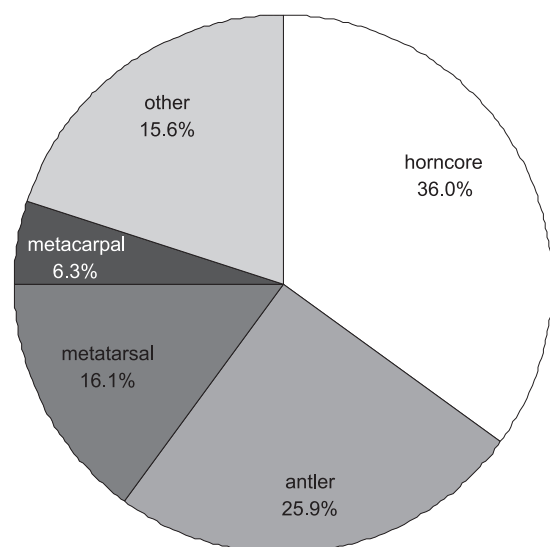


Fig. 3. Anatomical distribution of bones by NISP ( $n=347$ )



Fig. 4. Horncore of an aurochs with marks of skinning (a) and chopping (b).  
Photo K. Pawłowska



Fig. 5. Preworked material for crafting. Metatarsal of cattle.  
Photo K. Pawłowska



Fig. 6. Semi-finished product of knuckle bone.  
Photo K. Pawłowska



Fig. 7. Pottery comb.  
Photo K. Pawłowska



Fig. 8. Textile comb.  
Photo K. Pawłowska



Fig. 9. Toggle button for clothing.  
Photo K. Pawłowska

a fragment of the frontal bone is retained) provides a nice example of an element bearing visible indications of anthropogenic intervention. The horncore features two types of anthropogenic mark: chopmarks, and cuts related to skinning (Fig. 4a and 4b).

## Stages of the manufacturing process

The majority of bone-, antler-, and horn-working debris is easily characterised according to a tripartite classification in which waste may relate to the primary, secondary, or tertiary phases of the manufacturing process (a distinction developed from chaîne opératoire analysis of lithics, and applied by Niall Sharples in his analysis of antler waste from Bornais, South Uist; see also Ashby 2005). These phases can be described as follows:

- The primary stage is represented in the archaeological record by large pieces of bone or antler in which gross morphology is still clear, but which bear visible marks of chopping, cutting, or sawing. This

Spatial analysis of the worked-bone findspots failed to reveal concentrations of any one category of find (*e.g.* raw materials, semi-manufactures, complete products, or waste) as the spatial organization of the workshop on this site.

waste represents the preliminary processing of unworked material into smaller, workable pieces.

- The secondary stage may be recognized by the presence of half-worked or discarded blanks. Antler may be stripped of all porous core material, while longbones may be split longitudinally into segments. At this stage, preworked pieces begin their transformation into finished artefacts or components (*e.g.* the connecting plates or billets of composite combs).

- The tertiary stage of manufacture includes the final phases of production, such as the cutting of comb teeth, decoration, and riveting together of components. The elements are finished by trimming and smoothing.

## Results

The remains from the Inowrocław site may be sorted into the following groups, corresponding to the three stages of manufacture outlined above:

a) those bone, horn, or antler elements that represent raw materials intended for use in craft, but which were subsequently unworked (though some examples may have been preworked) (Fig. 5);

b) the semi-manufactures and unfinished products produced using the above materials (such as the knuckle bone in figure 6 and textile combs – Fig. 8). Debris was found from first and second groups.

Some products in studied material may be readily assigned to one of the following classes of objects, as categorized by Lasota-Moskalewska (1997) with modifications:

- Decorative objects (*e.g.* beads)
- Tools (*e.g.* pottery combs – Fig. 7)
- Domestic equipment (*e.g.* handles and bipartite ‘facings’ to cover knife handle
- Items associated with dress/ appearance (*e.g.* combs, toggles or buttons for clothing – Fig. 9)
- Items connected with entertainment (*e.g.* whistles? pipes?)

The analysed elements in material, in most cases (about 60%) are waste (for example: goat and sheep horncores with their ends cut off; branching segments and coronets from red deer antlers; proximal and distal ends of cattle metacarpals and metatarsals;

defective facings and clothing toggles; unfinished or discarded pieces of textile combs) (Fig. 10).

Of the remains of raw materials suitable for working (bone, antler, and horn) horn is the most well represented (in the form of horncores). It is interesting that in the finds material there are neither products made from horn (such as combs), nor any evidence that this material was used for making glue, despite the fact that two ways are recorded for separating the

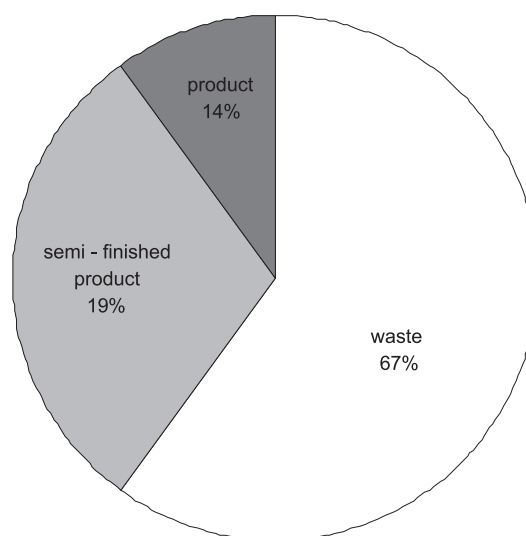


Fig. 10. Typological distribution of modified animal bones by NISP (n=342)



Fig. 11. Cattle horncore with marks of separating the sheath by extraction (central part).

Photo K. Pawłowska



Fig. 12. Cattle horncore with marks of separating the sheath by cutting off the ends.

Photo K. Pawłowska



Fig. 13. Fragment of facing (left side) and waste of facing (right side, four pieces).

Photo K. Pawłowska



sheath from the horncore – by extraction (Fig. 11) and by cutting off the ends (Fig. 12). It is associated with very rare cases the preserve of horn on the archaeological sites. Only a few tertiary-phase items (those regarded as finished) can be recognised; these are clothing toggles, a comb, and perforated phalanges).

There is evidence to suggest that all stages of manufacture – from preliminary processing of material to the final stages of production – took place on-site. This is particularly clear in the material related to the production of ‘facings’, for which primary, secondary, and tertiary stages of manufacture are evidenced (Fig. 13: a-b). According to Jastrzębski (1999), the production of facings from scapulae begins with the trimming of the spinous process. This is followed by tracing and incising, using knives, chisels, and compasses. The use of compasses is indicated by semicircular marks left on waste from the Inowrocław site. However, the character of edges of semicircular marks suggests that the bone fragment was first incised and then snapped off. The procedure was thus similar to that evidenced in the second half of the 13th century and in the 14th century in the market in Wrocław (Jastrzębski 1999).

Examination of the material from Inowrocław also allowed the identification of several stages of comb manufacture (the process undertaken in medieval Poland is well understood; see Cnotliwy 1973). Once again, elements belonging to primary, secondary, and tertiary phased were recovered. The primary stage is represented in the form of pre-worked raw material (cut lengths of antler), while there is diverse evidence for the secondary stage of manufacture: pieces of antler preworked with groove and splinter technique; antler plates for which the porous core material has been removed; and semi-finished products such as composite comb plates formed from hard outer layer of antler (*substantia compacta*) (Fig. 14). In the tertiary stage, there are some final products – the riveted comb elements (Fig. 15).

The degree of preservation and processing of the material allows differences to be inferred in the production of objects made from antlers and objects made from long bones.

Horn cores which display the marks of different methods of separating the sheath have been described above. The base and tip of horn cores are preserved in various lengths. The horn core was cut from the skull using a thick saw, what left cut marks



Fig. 14. Semi-finished product of comb.  
Photo K. Pawłowska

2 mm wide (cattle) or 1.6 mm wide (goats). Some of them have been preserved together with the frontal bone, on which marks from breaking off the horn core were found.

In most cases, there are marks on the surfaces of long bones and antlers, which allow identification of the technological process and reconstruction of the tools used.

Shafts of cattle metacarpal and metatarsal bones, as well as of horse radii, were used as raw material in the production process. Both ends were cut off, and then the bone shaft was cut along the long axis. The ends are waste material and were cut off completely or partially and then broken off. Subsequently, the shaft was divided into smaller fragments by cutting. The next step of bone-working consisted of cutting the bone, polishing and making holes. In other cases, only one of the bone ends (proximal or distal) was cut off, and the shaft surface was unilaterally or bilaterally planed. Elements with a cut-off proximal end whose shaft has been planed to a polygonal form were also found (dimensions of the sides of the polygon: 10 mm / 6.4 mm / 7.4 mm / 4.8 mm / 11.5 mm / 6 mm / 8.5 mm / 6.8 mm). Bones were cut with a saw, as evidenced by the marks of width 1.8 mm, parallel to the surface intersection. A plane was used to smooth the bones.

The bones were either well or poorly softened during working, which can be determined in each case based on the absence or presence of notches on surfaces.

The technique of working pig metacarpals and metatarsals consisted of planing the proximal end using a knife, and making a hole in the shaft using a thick drill of diameter 4.3-6.7 mm.

In assessing the usefulness of particular parts of the antler for manufacturing the relevant objects, the craftspeople chose the main beam and pedicle. Other parts of antlers (the branching segments and coronets) were discarded as wastes.

The pedicles of the antlers were cut off with a thick saw, a process which left wide marks (width



Fig. 15. Final products- the comb.  
Photo K. Pawłowska

1.7 mm). The dimensions correspond with marks described in Gdańsk (0.1-0.2 cm) (Cnotliwy 1973). The process of pedicle-working consisted of planing with a knife, smoothing and drilling holes. This process is consistent with the technique described by Cnotliwy (1958) – using antler handles for placing a knife's tang.

The basic raw material for the craftsman was a cervid main beam. From this part of the antler, blocks were cut. A thick saw was used, which left cut marks of width 1.7 mm. The dimension corresponds to that found in Gdańsk (0.1-0.2 cm) (Cnotliwy 1973). In a further stage, the blocks were divided into quarter-beam segments for the production of combs. Long antler plates (up to 21 cm) were obtained by incising grooves in antlers with a knife. This precise and efficient technique – known from the castle in Dobra Nowogardzka (13<sup>th</sup>-14<sup>th</sup> centuries) according to Cnotliwy (1973) – was used to soften the raw material. Such plates were used for making comb facings. Further processing of these antler-shaped pieces consisted of removing the porous core material, planing and trimming, smoothing, making holes and ornaments.



## Conclusions

The analysed bone material, saw blades, and lathe discs that were found at site 19 in Inowrocław represent the remains of a late medieval workshop. The profile of the workshop indicates that the chief raw materials to be worked were horn (derived primarily from goats and cattle) and antler (from red deer). While hornworking or antlerworking are identified in many assemblages from different site, both of them from one archaeological site are relatively rare.

The characteristics of the analysed material – in particular the large quantity of waste material, unfinished products, and damaged products – allow it to be broadly characterised as waste. It is possible that some of the material may represent imperfect artistry on the part of the person who worked the ma-

terial. Explain the presence of several finished objects poses an open-ended question. Excavation of urban sites in Inowrocław (late medieval) has produced evidence for all aspects of crafts, from gathering and processing of raw materials to produce of semi-finished products and the finished products. Combs were the most complex product in the last category. A wide range of crafts contained the bone-working, hornworking and antlerworking which are rare. Mainly antlerworking and boneworking (Hilczzerówna 1961; Cnotliwy 1956, 1958; Rębkowski 1996, 1997) developed in medieval (since the middle of the 10th century) Poland which was related to urban development and increase exchanges in the local market (Cnotliwy 1956).

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