

BONE, ANTLER, TOOTH AND IVORY: RAW MATERIALS FOR ROMAN ARTIFACTS

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Summary

Two results from the analysis of bone antler and ivory artifacts from the Roman town of Augusta Raurica/Augst (Switzerland) are presented. The first one concerns the frequency of the different animal hard tissues used by Roman craftsmen in the production of artifacts. The craftsmen apparently liked to work with equine bones, although most of the artifacts were made out of cattle bones. The second finding concerns a certain type of Roman artifact: hinges. A comparison of the thickness of the bones used in hinges with that of waste bones from Augusta Raurica indicates that the hinges were not produced locally.

Résumé

Os, bois, dent et ivoire : matières premières pour l'industrie et l'artisanat romain.

L'exposé présente deux résultats de l'analyse portant sur l'industrie osseuse de la ville romaine d'Augusta Raurica/Augst (Suisse). Le premier concerne la fréquence des différentes matières premières animales travaillées par les artisans romains. Bien que la plupart des objets soit constituée d'os de bœuf, les artisans préféraient travailler les os d'équidés. Le deuxième résultat concerne un certain type d'objet : les charnières. La comparaison de l'épaisseur des compacta utilisées pour les charnières avec celle des os non travaillés trouvés à Augst montre que les charnières ne sont pas des produits locaux.

Zusammenfassung

Knochen, Geweih und Elfenbein: Rohmaterialien römischer Handwerker.

Es werden zwei Ergebnisse der Untersuchungen von Knochen-, Geweih- und Elfenbeinartefakten aus der römischen Stadt Augusta Raurica/Augst (Schweiz) vorgestellt. Das erste Resultat bezieht sich auf die Häufigkeit verschiedener tierischer Rohmaterialien, welche die römischen Handwerker verwendeten. Obwohl die meisten Artefakte aus Rinderknochen hergestellt worden sind, scheinen die römischen Handwerker Pferdeknöchel bevorzugt verarbeitet zu haben. Das zweite Resultat bezieht sich auf einen bestimmten Artefakttyp: Die Scharniere. Ein Vergleich der Kompaktdicke von Knochenscharnieren und solchen der Speiseabfälle läßt vermuten, daß die Knochenscharniere nicht vor Ort hergestellt worden sind.

Key Words

Roman, Artifact, Bone, Antler, Tooth, Ivory, Raw material.

Mots clés

Époque romaine, Industrie, Os, Bois, Dent, Ivoire, Matière première.

Schlüsselworte

Romerzeit, Artefakte, Knochen, Geweih, Zahn, Elfenbein, Rohmaterial.

Artifacts of bone, antler, tooth and ivory may be described as the stepchildren of provincial Roman research. On the one hand, they are often systematically covered by archaeologists only in terms of typology, while the choice of raw material is discussed at most only in a few isolated cases. On the other hand, archaeozoologists are themselves little concerned with the archaeological types and can thus

draw no conclusions which lead further than a determination of raw material.

The Roman colonial town of Augusta Raurica, close to Basel, is an ideal site for a more extensive study of bone, antler, tooth and ivory artifacts which does justice to both areas of research⁽¹⁾. Two million animal bones have been found here in excavations over several decades and stored

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⁽¹⁾A Ph.D. thesis entitled "Roman artifacts of bone, antler, tooth and ivory from August Raurica" is at present in progress under the guidance of PD Dr. J. Schibler at the Archaeozoological Section of the Seminar für Ur- und Frühgeschichte at the University of Basel.

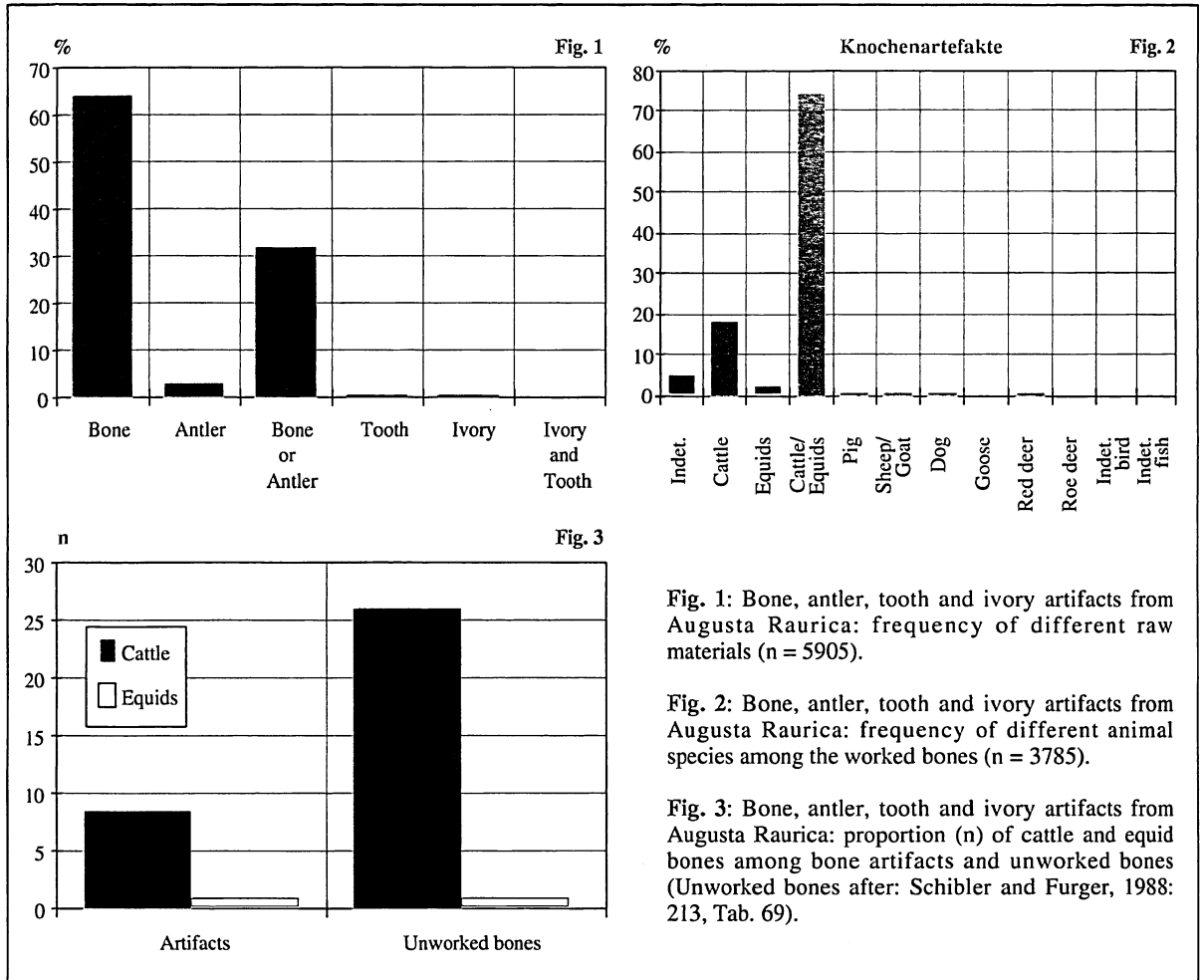


Fig. 1: Bone, antler, tooth and ivory artifacts from Augusta Raurica: frequency of different raw materials (n = 5905).

Fig. 2: Bone, antler, tooth and ivory artifacts from Augusta Raurica: frequency of different animal species among the worked bones (n = 3785).

Fig. 3: Bone, antler, tooth and ivory artifacts from Augusta Raurica: proportion (n) of cattle and equid bones among bone artifacts and unworked bones (Unworked bones after: Schibler and Furger, 1988: 213, Tab. 69).

separately according to find complex. Approximately one tenth of this material has so far been analysed and published (Schibler and Furger, 1988; Deschler-Erb, 1991; Deschler-Erb, 1992). In addition, until 1990 almost 6000 artifacts of bone, antler, tooth and ivory were found. The Roman Museum at Augst is thus in possession of one of the largest collections of such artifacts from the northwestern provinces, larger for example than Köln, Mainz or Lyon. From the wealth of results which such a study allows, two are presented here which are of interest especially from the archaeozoological point of view.

The first finding concerns the frequency of particular raw materials. Figure 1 indicates that by far the greatest proportion of these artifacts, around 65%, are made out of bone. Only 3.2% could be identified as antler. Despite microscopic and radiological examination, bone and antler could not be distinguished as the raw material in approximately a third of the objects. This is, amongst other factors,

due to the relatively poor preservation of these artifacts at Augst which becomes obvious only at the microstructural level. Tooth and ivory artifacts are numerically insignificant. Ivory is a luxury material which was not worked in the northern provinces. Its frequency can serve as a measure of the wealth and importance of a Roman settlement. Accordingly, the standard of living in Augusta Raurica can be judged to be average.

Of the bone artifacts (fig. 2), by far the greatest portion are made from the bones of domestic cattle and equids. However the animal type cannot be exactly determined for the majority of large artifacts. Nevertheless, for those which can be determined, cattle bones are clearly more common than equid bones. Other domestic animals, pigs, sheep, goats, dogs and geese, as well as red deer, roe deer and fish are of practically no importance in the manufacture of artifacts. The compact bones of these animals are too thin for most Roman artifact types.

Figure 3 indicates that the ratio of equid to cattle bones used is 1:8, whereas the same ratio in food refuse is only 1:26. There are approximately three times more equid bones among the worked bones than among the food refuse. The presumption is, therefore, that craftsmen working in bone deliberately chose to collect horse bones from the slaughterers. This may be connected with the fact that the metapodial bones of the horse family, which are mostly used, on the one hand grow more regularly and on the other do not have the suture that cattle metapodial bones have and along which artifacts can easily break in manufacture. Interestingly, von den Driesch and Boessneck (1982) were likewise able to establish from the Late Roman workshop in Pergamon that bones from equids were markedly more

frequent in the waste from the workshop than in food refuse. It can therefore be maintained that craftsmen in bone from various areas of the Roman Empire preferred the same raw materials. This is related to the fact that the typology and technology of such Roman artifacts was to a large extent the same throughout the Empire.

The second result to be presented here concerns hinges. Hinges were manufactured from diaphyses of tubular bones - mostly metapodials - of cattle. From these, the joints were sawn off and the bone was turned to form a perfect round so that the original surface of the bone often disappeared. A band of maximum 10 mm of the original bone surface remained occasionally in the case of the metatarsals and more frequently in that of metacarpals. One or two holes were drilled into the wall of the compact bone and wooden dowels inserted. The complete hinge consisted of several such elements with the dowels fixed alternately to the door and the sides of the cupboard or chest. This allowed the door to be opened and shut (fig. 4).

During cataloguing of the bone artifacts the thickness of the compact bones of these objects seemed surprising. The compact bones from food refuse at Augst seemed much thinner. A metrical comparison was undertaken to confirm this visual impression.

For this purpose the thickness of the compact bone of already published animal bones from the excavation of the north-west corner of the theatre at Augst was measured (Deschler-Erb, 1992). This way, new measurements were obtained which are not usually taken. The measurements were always taken at the same part of the bone: with both metatarsals and metacarpals the measurement was taken in a dorsal position at the broadest point of the compact bone in the middle of the diaphysis (fig. 5 a). Since this kind of measurement requires a clean break of the bone, only 20 items could be measured. Statistical tests, however, confirmed the relevance of the results.

When measuring the thickness of the compact bones of hinges, the fact that they were turned needs to be taken into account. This means that a considerable part of the compact bone was removed by the Roman craftsman. Because of this, as mentioned above, the original outline as well as the surface of the bone are generally no more recognizable. Figure 5b shows the amount of raw material which had to be removed in order to make the deepest *sulcus* disappear from the finished hinge. For the metrical comparison with the unworked cattle metatarsals from Augst, we postulated an average of 5 mm of removed compact bone material and added this to the existing thickness of the compact bone. Metatarsals especially have such deep dorsal sulci that in most cases a greater amount of the compact bone material

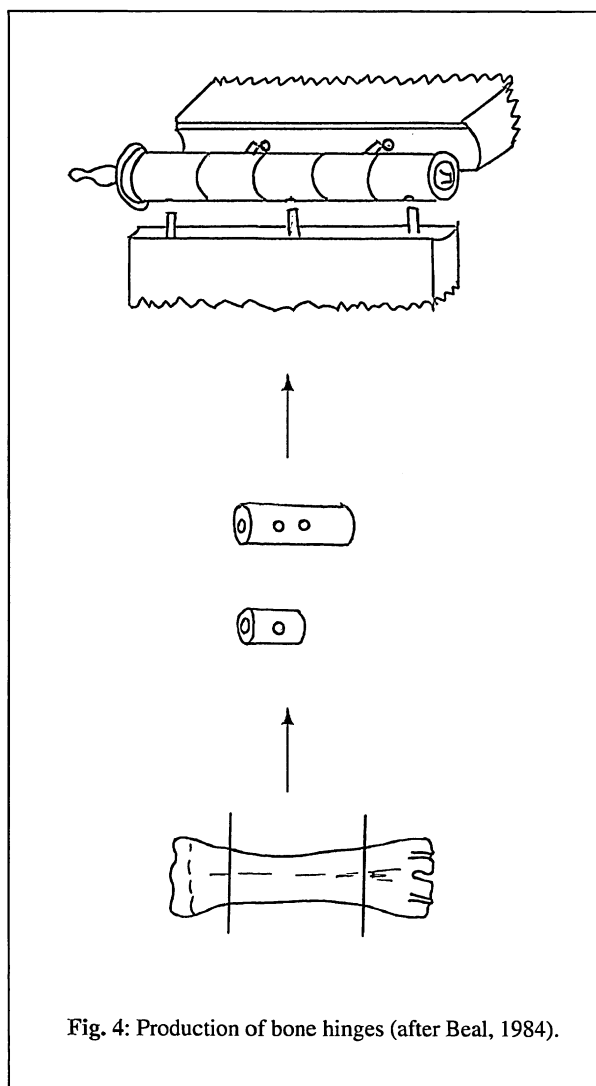
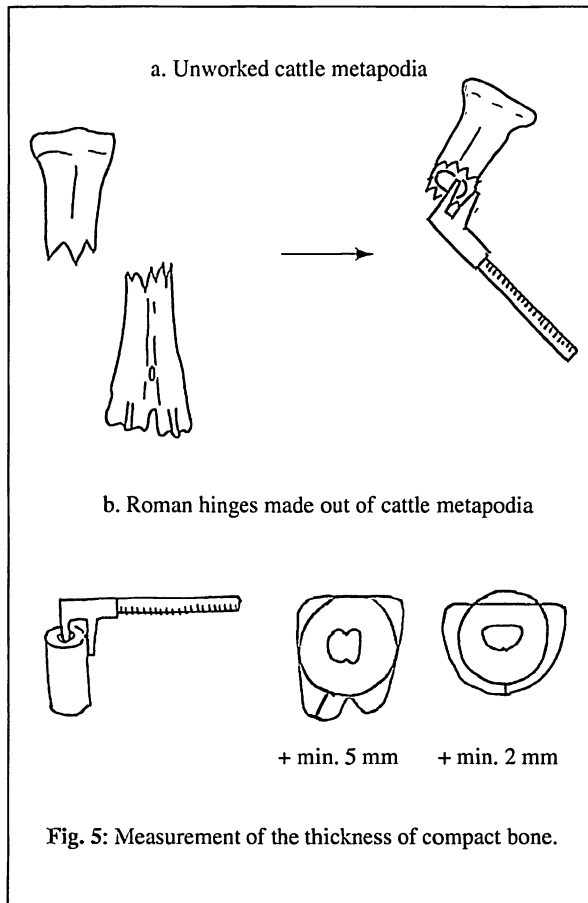


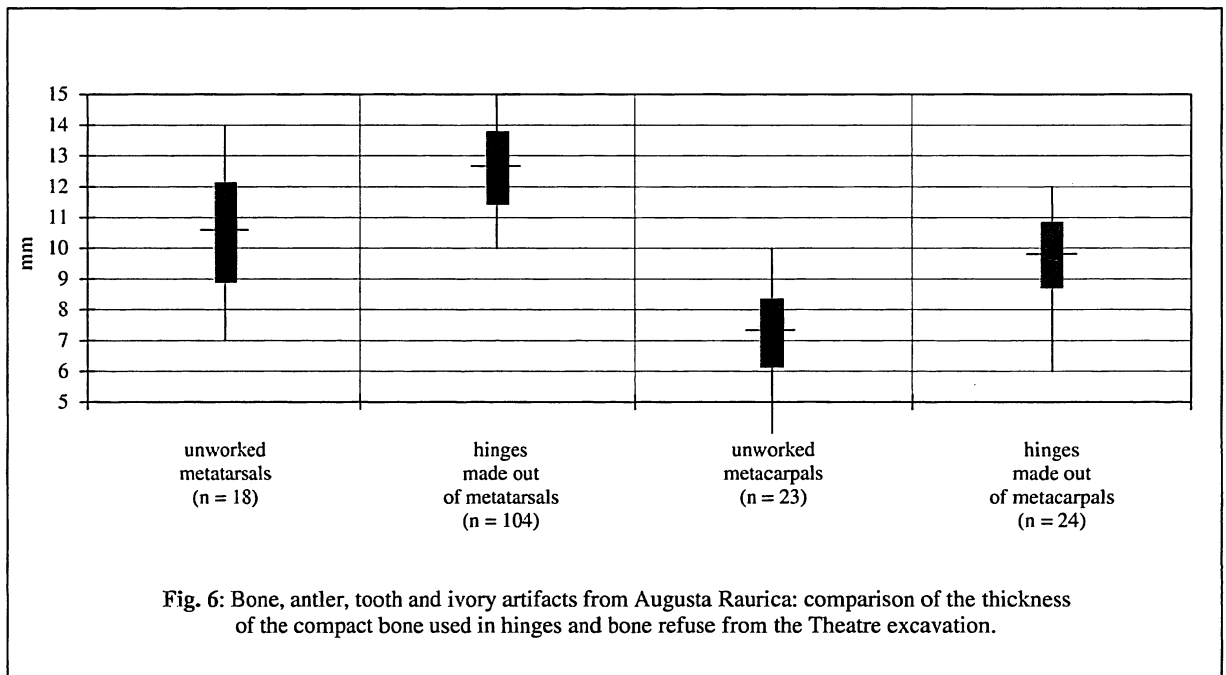
Fig. 4: Production of bone hinges (after Beal, 1984).



was probably removed. In addition, some hinges were heavily turned and thus one may well suppose that more than 5 mm of compact bone material has been removed. These particular hinges lower the average and therefore the original thickness of metatarsals was probably even greater. Metacarpal bones in hinges sometimes still show parts of the flat volar side. Because of this we added to the measurements on the dorsal side a minimal amount of 2 mm for removed material. With these minimal additions the initial visual impression is confirmed (fig. 6): the average thickness of the compact bone of unworked metatarsals and metacarpals is at least 2 mm less than that of the compact bone in hinges with the minimal additions to measurements taken into account.

This leads to the conclusion that the bone hinges found at Augst were not manufactured from cattle bones from Augst. Or the other way around: bones from Augst were not suited for the manufacture of hinges⁽²⁾. This is also con-

(2) The latest investigations have shown that most of the hinges found in Augst date from the first century AD. Although metrical examinations of the bone material from Augst have not yet taken place on a large scale, first results suggest that cattle at Augst gradually became bigger from the end of the first century AD (cf. Deschler-Erb, 1992: 399 ff.). This means that during the main period of hinge production, large cattle bones were not yet available locally.



firmed by the fact that practically no waste or partially finished hinges have been found at Augst to indicate local manufacture. The hinges found at Augst were therefore imported either integrated in complete cupboards or chests or as single parts for the use of local joiners. The hinges must have been manufactured in an area where a more intensive rearing of cattle produced larger bones than at Augst. With a lack of comparative data from elsewhere, possible areas of origin to date might include Italy.

To sum up, it can be said that Roman manufacturers of bone objects primarily used bones of cattle and equids.

Equid bones were a much valued raw material deliberately obtained from slaughterers, as also shown in the case of a workshop at Pergamon. A certain type of Roman bone artifact could only be manufactured from the bones of Roman high quality cattle. From these results it can be concluded that Roman manufacturers of bone objects throughout the Roman empire shared a profound knowledge of different bone materials. If the locally available material did not suit their requirements, production of certain types of artifacts was abandoned in favour of import.

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