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**ROMAN BONE ARTIFACTS FROM *POROLISSUM*:
CONTRIBUTIONS TO THE KNOWLEDGE OF THE BONE INDUSTRY
FROM ROMAN DACIA**

Ph.D. thesis

Summary

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Table of Contents

Preface: the topic	4
I. Introduction	7
I.1. Methodology	7
I.2. The history of research into worked bone, antler and ivory artifacts:	11
<i>I.2.1. The history of research into worked bone, antler and ivory artifacts in the Roman Empire</i>	11
<i>I.2.2. The history of research into worked bone, antler and ivory artifacts in the Dacian provinces</i>	15
I.3. Ancient sources regarding bone, antler and ivory working	18
I.4. The raw materials	21
II. 'Bone' industries' in the Roman Empire	27
II.1. Workshops	27
II.2. Typical products and clientele	38
III. 'Bone industries' in the Dacian provinces	41
III.1. Workshops	41
III.2. Raw materials	51
III.3. Products	54
III.4. Clientele	57
IV. The analysis of bone, antler and ivory artifacts from <i>Porolissum</i>	61
IV. 1. Jewelry and artifacts connected to personal grooming	61
<i>IV.1.1. Hairpins</i>	61
<i>IV.1.2. Beads</i>	87
IV.2. Artifacts connected to cosmetics and personal care	91
IV.3. Furniture fittings	98
IV.4. Roundels	109
IV.5. Amulets, pendants	114
IV.6. Gaming pieces	126
IV.7. Instruments, tools	141
<i>IV.7.1. Spoons</i>	141
<i>IV.7.2. Keys</i>	147
<i>IV.7.3. Plug(?)</i>	149
<i>IV.7.4. 'Knot looseners'</i>	150
<i>IV.7.5. Labels (tesserae nummulariae)</i>	154
<i>IV. 7.6. Handles</i>	157
<i>IV.7.7. Instruments used for decorating pottery</i>	170
<i>IV.7.8. Instruments used for spinning and sewing</i>	176
<i>IV.7.9. Musical instruments</i>	196
<i>IV.7.10. Writing implements</i>	200
IV.8. Weaponry and military equipment	205
IV.9. Artifacts for dress	228
IV. 10. Half-finished objects and working debris	233
IV. 11. Artifacts of unknown function	239

V. Manufacturing techniques:	246
V.1. Manufacturing techniques used in the Roman Empire and in the Dacian provinces	246
V.2. Manufacturing techniques used for manufacturing of the bone artifacts from <i>Porolissum</i>	262
VI. The analysis of the bone, antler and ivory artifacts on the basis of the finding spot	276
VII. General considerations about the bone industry from <i>Porolissum</i>	299
VIII. Repertory of the bone, antler and ivory objects from <i>Porolissum</i>	310
IX. Conclusions	416
General bibliography	423
Plates	

Key words: bone, antler, ivory, bone industry, *Porolissum*, Roman Empire, serial production, functional categories, workshops, bone-working.

I. Introduction

The major goal of this thesis was to present a general picture concerning bone, antler and ivory working at *Porolissum*, while at the same time contributing to what is already known about Roman bone industry in the Dacian provinces. Through the analysis of the ‘bone’ artifacts (hereafter ‘bone’ is used to all artifacts made from osseous materials including bone, antler and ivory) from the perspectives of different criteria taken from the methodology of worked bone research, I tried to integrate the results within the general scheme of Roman bone industry. My approach of the subject, in contrast to other publications on bone artifacts from Romania, is totally new. The research presented here aimed to go beyond the traditional positivistic and purely descriptive model of analysis. The bone, antler and ivory artifacts were analyzed mainly from the perspective of the economic and cultural factors which determined their production. During the redaction of this thesis, I began my work from the hypothesis that bone and antler objects were the results of a standardized manufacturing process as in the case of artifacts manufactured in other raw materials. Thus, they are suitable objects for identifying at least some of the economic and cultural factors which determined the evolution of a settlement. Through this new approach in my research, I intended incorporate, a multi-lateral and a more elaborated methodology which could help me to draw more nuanced conclusions in future research.

“Industrial” production presumes the manufacture of objects on a large scale; a constant clientele with well-defined demands; well-organized raw material acquisition as well as the marketing of the finished products. The over 400 pieces of bone and antler artifacts analyzed in this thesis attests the existence of “industrial” production in *Porolissum* fitting the general pattern of Roman bone industries elsewhere. Although in contrast to the bone and antler products from other provinces the number of such objects in *Porolissum* is moderate, they represent the second largest bone material in the Dacian provinces after *Apulum*.

Given the lack of special analyses and publications regarding these types of artifacts, it is difficult to integrate the thesis results into the bone industry of the Dacian provinces in

general. The only monograph on a bone tool assemblage from a Roman settlement in the Dacian provinces, written by Daniela Ciugudean, presents the bone, antler and ivory objects from *Apulum*. Under these circumstances, the results of the present analysis do not necessarily reflect the historical reality but rather the current state of research.

Raw materials: The use of a particular type of raw material may be determined by the source of acquisition so much as by the cultural traditions similarly to some workshops in *Pannonia* or *Germania Superior (Augusta Raurica)*, where the large-scale use of red deer antler was explained by the influences of the Germanic population (*foederati*). In the matter of the raw material choice and acquisition in the manufacturing processes that went on in *Porolissum*, there is a certain discrepancy between the finished product and half-finished objects or debris. All the half-finished objects recovered from the auxiliary fort on Pomet hill, from the amphitheater or from the military fort on Citera hill represent different parts of the red-deer antler crown, while many of the finished products were manufactured from mammalian long bones. The concentration of working debris and half-finished objects in the military fort on Pomet hill indicates a certain kind of specialization in the production of artifacts made from antler which can be linked to the large-scale production of bow stiffeners in the vicinity of this archaeological feature. If the acquisition of antler was assured by gathering the shed red deer antler racks or whether they were procured through hunting remains an open question for the moment. However, the large number of bow stiffeners and half-finished products suggests that both procurement methods may have been used to acquire the antler. The frequent use of a certain raw material argues for the case that the carver had knowledge of raw material properties and deliberately exploited the special characteristics of the red deer antler (hardness, higher resistivity, flexibility) for the production of artifacts of good quality that were subject to sudden shocks during use such as bow-stiffeners. This kind of red deer antler exploitation in the military fort at Pomet hill fits perfectly into the general pattern of bone-working at other military forts in the Dacian provinces, where the most popular type of raw material used for artifact production was antler. Half-finished objects or working debris from skeletal long bones, similar to those from *Apulum* or *Ulpia Traiana Sarmizegetusa*, have not yet been identified in *Porolissum*. The large number of artifacts manufactured from long bones of large mammals such as cattle or equids suggest that both antler and long bones needed for production in the workshops of this settlement were acquired from household refuse.

II. 'Bone' industry in the Roman Empire

This chapter focuses on the identification of workshops from different provinces, offering at the same time a small catalogue of them. Because of size restriction on this chapter, however, not all publications on bone and antler objects have been taken into account, I concentrated instead on the pieces of information provided by the production from the attested workshops. From the perspective of the workshops, I also endeavored to identify the economic factors which contributed to the standardization in the bone-working.

III. 'Bone' industry in the Dacian provinces

In identifying the economic factors and the characteristics of bone industries in the Dacian provinces, I used the data provided by the local workshops as well as from the finished bone products recovered at various Roman sites. Just as in Chapter II, a repertory of settlements has been created where settlements and military forts with possible workshops specialized in bone and antler working has been included. For this chapter, I used the archaeological reports and monographs on the Roman military forts and urban settlements.

If the quantity of the bone artifacts is considered then it could be concluded that in the Dacian provinces, in contrast to other areas in the Roman Empire, the craft of bone and antler working is not so well represented. This conclusion can be explained, primarily I believe by the current state of research and by the lack of publications concerning the archaeological find material in general. Another explanation may also be the limited chronology of the province which did not permit the full development of this industry.

IV. The analysis of bone and antler artifacts from *Porolissum*

The spectrum of the worked 'bone' objects recovered from *Porolissum* is varied and reflects different typical characteristics of Roman daily life. All classes of artifacts could be found ranging from items connected to personal grooming, jewelry, gaming pieces, weaponry and military equipment, writing implements, musical instruments, artifacts used in to sewing and spinning or in pottery decoration, furniture fittings, and artifacts related to cosmetics. Just as in other Roman sites and settlements in the Dacian or other provinces, hairpins are the most numerous artifacts made of bone or antler in *Porolissum*. They have been recovered from almost every archaeological feature at this site. Gaming pieces represent the other wide-spread and very popular artifact category in *Porolissum*. The group comprising instruments and tools is the second largest category due to the large number of

sewing needles. The aforementioned three artifact groups are the most popular artifacts found in other provinces of the Empire as well which suggests that there was a constant demand for them and therefore their manufacture.

While the large number of hairpins could be explained by the quickly changing fashion trends concerning hairdo styles as well as their lower prices in contrast to hairpins made from metal, the great number of gaming pieces is connected to the immense popularity of table games in the Roman era. The large-scale production of sewing needles can also be explained by its lower cost of production. This may explain as well why they are found in larger numbers compared to metal sewing needles. Bone and antler artifacts connected to weaponry or to military equipment are also commonly found in *Porolissum* giving a special character to the local production. The large quantity of antler bow stiffeners and bone arrowheads come from a local workshop within the military fort. Their large-scale production was determined, probably, by the internal demands of the archery units stationed here, or even other troops from the military forts in the surrounding area.

From this point of view, the production of these objects resembles the bow stiffener-production from two other auxiliary forts at *Tibiscum* and *Micia* where the production line as well as the manufacturing techniques was identical. Eastern archery units were stationed at all the three forts. The similar way production sequences were organized in all three places was organization probably determined by the traditional fighting strategies of these military units. The production of a certain artifact type that is heavily influenced by tradition can be observed even better in the case of the bone arrowheads found here and which are unique finds so far in the Roman Empire, so far. The manufacturing process used in their production required a double effort and twice as much time compared to similar objects made from metal. This seeming lack of efficiency can be explained only by the importance of a certain, as yet unknown, tradition these particular archery units brought with themselves into the region.

V. Manufacturing techniques.

The manufacturing techniques used in the workshops from *Porolissum* represent the common and well-known methods used all around the Roman Empire. They were varied and depended on the composition and morphology of each raw material type as much as on the object to be produced. Regardless of the raw material, the manufacturing process was usually multi-stage: 1) selection and acquisition of the raw material 2) preparation of the raw material, including cleaning, drying, cutting into pieces; 3) the appropriate working processes

using instruments like knives, chisels, files, lathes and bow-drills 3) finishing the worked objects by grinding, polishing, coloring . The manufacturing techniques used in ‘bone’ manufacturing at this settlement reflect an organized production where the different manufacturing stages were standardized and predefined. This standardization is especially clear in the bow stiffener and arrow head-production in the military fort on Pomet hill, where a relatively precise *chaîne opératoire* could be identified. The use of bow-lathes for producing certain type of artifacts (i.e. counters, instruments used for decorating pottery, musical instruments, furniture fittings) also suggests there was a standardized, large-scale production similar to other workshops in the Roman provinces. Lathe-turning the instruments used for decorating pottery, otherwise an atypical bone product in Roman times, seems to be a local tradition and most probably it is linked to the large-scale pottery production at this settlement which required a set of more durable and more resistant tools.

VI. The analysis of the bone and antler artifacts based on find provenience

The majority of the bone and antler artifacts analyzed in this thesis was recovered from systematic excavations carried out at various topographic spots in Porolissum. A part of the find material came into the museum collections as stray finds. Some objects had been part of the private collections of Counts Wesselényi-Teleki. The overwhelming majority of the artifacts coming from systematic excavations were unearthed from two archaeological complexes. The complex that provided the most numerous bone and antler objects was the auxiliary military fort on Pomet hill, followed by the amphitheater of the settlement. The proportion of artifacts recovered from the systematic excavations carried out in various zones of the military *vicus* is surprisingly low. This situation may be explained by the more limited research that has been carried out on the military *vicus* which focused mainly on certain buildings. The ‘bone’ objects from the military fort not only represent the largest group of artifacts. Within this group, however, there are also a large variety of finished and unfinished objects. Almost all types of bone and antler objects attested in Porolissum encountered in this assemblage. From this point of view, the range of bone and antler products from the military fort on Pomet hill differs from the general tendencies observed at other forts in the Dacian provinces, where the spectrum is more limited (tools, weaponry, military equipment, gaming pieces) to objects needed by the military units stationed in the respective fortifications. This fact may suggest that the large-scale production in the fort on Pomet hill satisfied the demands of larger clientele so that only a part of the bone and antler objects were produced for the settlement alone.

Another possible explanation may be found in some particularities regarding the use of the bone objects at the camp that differed from their use at other forts with some of the objects being procured by the soldiers from the military settlement. This issue remains for the moment unresolved given the lack of evidence related to local production of the majority of the finished artifacts with the exception of weaponry. The bone and antler object categories from the amphitheatre are in agreement with the way this edifice was used. The large number of hairpins in a large variety of types, some articles related to weaponry and military equipment (scabbard slides, bow stiffeners) identified in this building reflect its role as the main meeting point for different inhabitants of the city and the military fort. The high proportion of sewing needles unearthed during excavation work at the amphitheatre, is, however, more difficult to explain. One cannot exclude the possibility that a workshop for garment repair functioned inside this building or that these artifacts actually had another function. The other bone and antler artifacts coming from the buildings in the military *vicus* (building OL 5, OL 6, and LM 1) comprise the typical inventories of Roman private houses with different types of hairpins, needles, counters etc.

VII. General considerations on the ‘bone’ industry at *Porolissum*

The majority of the bone and antler objects represent well-known and wide-spread types in the Roman Empire. However, there are some certain types that have so far been reported only from *Porolissum* and which could be considered local products. The same is the case for certain hairpin types found in the amphitheatre (types III.3, III.5.a-b, III.7, and IV) which reflects probably local tastes. The resemblance of bone hairpin types with those manufactured from bronze from the same building may indicate that certain types of bone pins imitated pin types made in other materials. Equally unique are the beads, the instruments used for decorating pottery, handles of type 1.a-c and 2, a plug, furniture fittings type 1 and 2, the type 1 cosmetic container and the drilled red deer antler tines (category 7 in the group of artifacts of unknown function). The dominance of particular types of sewing needles (type 1) also indicates their local production, reflecting at the same time a demand for a certain type of instrument.

There are some bone objects, otherwise typical in other areas in the Roman Empire that were attested only in *Porolissum* in the Dacian provinces. Their reduced number (usually a single example of each type) excludes the possibility of a local production. Thus, these objects were considered to be imported objects: the distaff ending in a depiction of *Venus* – artifact type distributed mainly in the region along the Lower Danube, *Pannonia* and in the

eastern provinces; the pocket knife handle with the depiction of *Eros* riding a dolphin, probably imported (or brought into the area by a private individual) from the Germanic provinces; the type 1 lathe-turned *stilus*, known in the western provinces; the lathe-turned lip plate of a flute, missing from other sites from the Dacian provinces or the scabbard chape from the amphitheater decorated with *pelta* motif, produced and distributed mainly along the Rhenan *limes*. These objects probably came to *Porolissum* with their owners, as parts of personal instruments or equipment. The distaff decorated with the figure of *Venus* as well as the pocket-knife handle with the depiction of *Eros* are at the same time, the only artifacts of any artistic quality in the find material analyzed here.

On the basis of the unfinished objects or working debris I identified three topographic spots where theoretically bone and antler manufacturing workshops could have functioned: 1) the auxiliary fort on Pomēt hill; 2) the auxiliary fort on Citera hill and 3) the amphitheater. Of these three spots only military fort on Pomēt hill clearly had find material indicating bone and antler workshop activity. The four unfinished antler objects from the amphitheater are too few in number to identify the presence of a workshop here with any certainty. These finds could have reached have gotten there from other spots as well as on the occasion of the leveling works in the amphitheater.

At the auxiliary fort on Citera hill, the reduced number of unfinished objects or debris or the lack of finished artifacts again present an obstacle to localizing a workshop area there. The heterogeneous distribution of working debris at the auxiliary fort on Pomēt hill also does not permit precise localization of such a bone workshop. The concentration of finished as well as unfinished objects and debris in the building of the *latus praetorii*, especially in building C4, or around water cistern B10 in the *praetentura sinistra* indicates that such workshop(s) many have operated in one of the buildings in the two topographic units at the military fort. This spatial distribution of the finished and unfinished objects inside the fort differs from the general pattern observed at other military establishments from the Roman provinces where the unfinished bone or antler objects or debris concentrate mainly in the barracks together with remains from other crafts (i.e. at the military fort of Buciumi or at Niederbieber). Surprisingly, no traces of bone or antler working has been found in those barracks considered workshops, such as barrack no. 1 at the big auxiliary fort at *Porolissum*.

On the basis of general observations made at other urban settlements in the Roman Empire, bone and antler manufacturing workshops functioned close to the places the products were sold in markets, in buildings in *insulae* (*Augusta Raurica*, *Ulpia Traiana Sarmizegetusa*, *Apulum*). In *Porolissum*, except for these three topographic areas, no other

bone working workshops could be identified, so that the aforementioned general pattern was not valid here. I am convinced that in other parts of the settlement, where I have not had the possibility to analyze the worked bone and antler artifacts, at least one workshop must surely have existed and whose existence will be hopefully confirmed sometime in the future. It is very difficult to identify the specific product made at particular workshops because the finished objects cannot be correlated with the unfinished objects or debris. It is more probable that the characteristic products of the workshops from the military fort on Pomet hill were objects connected to weaponry and, in particular, bow stiffeners and arrowheads. Local production of individual object types was confirmed by the discovery of their unfinished variants as well. There is no proof of local production for the other finished bone and antler product types from the fort; they could equally have been manufactured in workshops operating outside the fort.

Perspectives.

The results of this thesis attest the existence of an organized production at an “industrial” level for bone and antler objects which can be perfectly integrated into the economic life of this settlement as well as into the general scheme of industrial bone object production found elsewhere in the Roman Empire. With the help of these objects I endeavored to clarify the character and the position of this craft among the other Roman craft activities that took place in *Porolissum*. In the future however, these results can be connected and compared more precisely to the bone industry in the Dacian provinces in general only in the future when the increased research and publications on ‘bone’ artifact assemblages will enhance the scope of our knowledge. This thesis also presents a research model for studying this type of material which I will use in the future to examine other assemblages of bone and antler from the Dacian provinces. Collaboration with zooarchaeologists to identify other economic factors (not to mention locating artifacts still in the faunal material after excavation) was not discussed explicitly in this thesis. It will be important to establish a general pattern regarding raw material choices and use in future analyses.

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