

CRAFTING BONE – SKELETAL TECHNOLOGIES THROUGH TIME AND SPACE

Proceedings of the 2nd meeting of the (ICAZ) Worked Bone Research Group

Editors

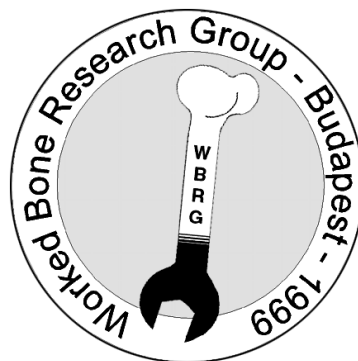
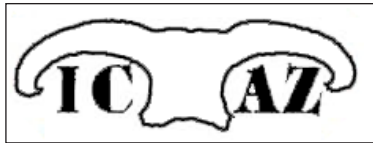
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Participants in the WBRG 1999 Budapest conference (left to right): Ülle Tamla, Elisabeth Brynja, Tina Tuohy, Liina Maldre, Karlheinz Steppan, Heidi Luik, Gitte Jensen, John Chapman, Alice Choyke, Janet Griffiths, Andreas Northe, Noëlle Provenzano, Jörg Schibler, Nerissa Russell, Colleen Batey, Lyuba Smirnova, László Daróczy-Szabó, Daniella Ciugudean, Mária Bíró, Kordula Gostenčnik, Eszter Kovács, Christopher Morris, Sabine Deschler-Erb, Ans Nieuwenberg-Bron, Katalin Simán, Isabelle Sidéra, Mickle Zhilin

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Introduction

Archaeologists and Archeozoologists, both study worked osseous materials (bone, antler and tooth, including ivory, in short all referred to as “bone”). Such reports, however, are often buried at the very back of faunal analyses appended to site reports. Furthermore, the two groups of specialists have had little chance to interact, even within Europe since they tend to attend different conferences and write for different fora.

At the root of this problem lay the arbitrary, largely institutional division between pre- and proto-historians, often imposed on bone manufacturing experts by nothing but formalism in research tradition. The most exemplary series of studies in this field is entitled: “*Industrie de l’os neolithique et de l’age de metaux*” (Bone industry from the Neolithic and Metal Ages). Another classic, a book, is sub-titled “The Technology of Skeletal Materials since the Roman Period”. In very early prehistoric assemblages, attention is often focused on the question of whether a particular piece of bone was worked or not. In later assemblages, it is the intensity of manufacturing that often renders objects zoologically non-identifiable, so that important aspects of raw material procurement, including long distance trade, remain intangible.

The history of raw material use, however, is continuous and many of the constraints and possibilities inherent in skeletal materials are the same whether one is dealing with Paleolithic or Medieval artifacts. Indubitably, the organization of manufacture, the function and value of bone artifacts (as well as some technological innovations such as the regular use of metal tools or lathes), differ substantially between simple and complex societies through time. On the other hand, fundamental questions of tensile characteristics, procurement strategies, style and certain technological requirements are not only similar diachronically, but also open up new vistas when apparently unrelated periods are compared. The function of these objects as social markers, for example, remains remarkably constant through time, even if details vary. The papers in this volume reflect these conceptual similarities and differences as did the papers delivered at the conference itself.

The first meeting of what was to become the Worked Bone Research Group (WBRG) was organized by Dr. Ian Riddler in the **British Museum, London, in January 1997**. The commitment and enthusiasm of that first workshop has greatly inspired subsequent efforts in recruiting a wide range of bone specialists, capable of contributing to discussions concerning bone manufacturing.

In keeping with the aims of the Worked Bone Research Group, since 2000 an official working group of the International Council for Archaeozoology (ICAZ), an effort was made to present these papers on the basis of what *connects* them rather than segregating them by archaeological period or region. Contributions mostly include articles based on papers delivered in September 1999 at the second Worked Bone Research Group meeting in Budapest, organized by the editors with the unfailing support of the Aquincum Museum (Budapest) and its staff. Several people who were unable to be present at this conference were also asked to contribute papers. Finally, five of the studies in this volume, originally delivered at a symposium on bone tools organized by Dr. Kitty Emery and Dr. Tom Wake, entitled “*Technology of Skeletal Materials: Considerations of Production, Method and Scale*”, at the 64th Annual Meeting of the Society for American Archaeology (Chicago 1999), were added thereby expanding the academic spectrum both in terms of research tradition and geographic scope.

There are a total of 36 papers in this volume. Research was carried out on materials from Central and North America to various regions of Europe and Southwest Asia. The authors represent scientific traditions from Estonia, Hungary, Romania, and Russia, European countries in which, until recently, ideas developed in relative isolation. Other European countries represented include Austria, Denmark, France, Germany, Great Britain, Greece, and Switzerland. Last but not least, the North American scholarly approach is also represented here.

Schools of thought may be said to be exemplified by what used to be Soviet research, well known for pioneering works on taphonomy, experimentation and traceology. Bone manufacturing was first brought to the attention of Western scholars by the publication in 1964 of the translation of S. A. Semenov’s *Prehistoric Technology*, published originally in 1957. Scholars in France have also carried out decades of co-ordinated work on operational chains in the manufacturing process from the selection

of raw materials to finished products, with special emphasis on prehistoric modified bone. An entire working group, “Unspecialized Bone Industries/Bone Modification”, is directed by Marylene Patou-Mathis. This working group itself is part of a larger research program on bone industry “*La Commission de Nomenclature sur l’Industrie de l’Os Préhistorique*” headed by Mme. H. Camps-Fabrer. Several specialists such as Jörg Schibler in Switzerland, have created laboratories where ground laying work has been carried out for years on worked osseous materials, especially from Swiss Neolithic Lake Dwellings and Roman Period sites. Language barriers have often prevented these important bodies of work from being as widely disseminated as they deserve. Arthur MacGregor in England, writing in English, has had a decisive influence on specialists working on more recent Roman and Medieval worked bone assemblages in Europe.

The work of all of these groups as well as certain individual scholars is well known within limited circles. Otherwise, however, the overwhelming experience of most researchers on worked bone have been feelings of isolation and alienation from most archaeological or archaeozoological work related, most importantly, to the absence of an international forum where their often specialized work can be presented and problems discussed.

In spite of the fact that there have been many practical obstacles to information flow between specialists in this field, there are really remarkable similarities of approach which should ultimately lead to the development of more compatible paradigms in research. Agreement on methodologies will have a positive feedback on communications, helping the field to grow and develop properly.

It seems that, at last, archaeologists and archaeozoologists and other specialists are talking to each other and sharing methodological points of view. One striking example of this can be seen in the the emphasis on raw materials studied in parallel to types found in the majority of papers in this volume. Previously studies often concentrated on typo-chronological questions, ignoring the questions of raw material morphology and availability. The series published by the *Centre National de la Recherche Scientifique*, edited by Mme. Henriette Camps-Fabrer in France is largely to be credited for beginning this new trend. It contains many papers concentrating on understanding manufacturing sequences and, indeed, from Europe to North America there are papers which explicitly deal with manufacturing sequences in individual assemblages.

There is also a consistent emphasis on experiment and manufacturing techniques present in much of the work in this volume. The related but fraught question of function continues to tantalize and frustrate most specialists. A number of articles attempt to apply techniques of hard science, such as scanning electron microscopy or light microscopy, together with experiment to get objective, “processual” answers to this important group of questions. Other researchers rely deductively on analogy, archaeological context, gross morphology, and textual sources as they try understanding how these objects were used.

When editing the volume, we tried to concentrate on the underlying main concepts represented by each paper rather than grouping them diachronically or by geographical region. As a result, contributions follow a line from the theoretical through the problems of raw material selection, manufacturing techniques, experimental work, technical function and socio-cultural interpretations. Obviously many of these papers deal with several of these aspects simultaneously. Finally, analyses of assemblages are grouped to show the current state of general application of these principles as illustrated in papers in the rest of the volume. Reports on bone tool types will ultimately benefit from more unified typologies and also provide researchers with comparative databases from regions beyond their own.

Finally, a word on the organization of papers in this volume. Although the editors have tried to group these papers by what they see as the main theoretical and methodological thrust of the authors it should be understood that most papers, to a greater or lesser extent, overlap between these artificial sub-titles. Happily, almost all these works include considerations of raw material exploitation, manufacturing and functional analyses and all make some attempt to consider the social context from which these artifacts emerged. It is exactly this cross-cutting of boundaries which allows us to hope that the study of worked osseous materials is well on the way to developing into a discipline in its own right.

In addition to the generous support given by our sponsors and technical editors for this volume, organizing the conference would not have been possible without the active help of numerous colleagues. Special thanks are due to Paula Zsidy, Director of the Aquincum Museum, Katalin Simán, archaeologist and two students from the Institute of Archaeological Sciences (ELTE, Budapest): László Daróczi-Szabó and András Markó. The Hotel Wien, Budapest and its efficient manager provided a comfortable setting for our discussions at a reasonable price. Last but not least, help with abstract translations by Cornelia Becker, Noelle Provenzano as well as Marjan Mashkour and Turit Wilroy should also be acknowledged here.

UTILIZATION OF RARE BONE MATERIALS IN MEDIEVAL NOVGOROD

Lyuba Smirnova

Abstract: Marine mammal bones and walrus ivory belong to rare and rather exotic materials utilised by artisans of Medieval Novgorod. Over three hundred walrus ivory artefacts from the deposits of Novgorod form a relatively small group compared with thousands of antler and bone items. However, it is the largest concentration of finds uncovered from a single medieval town in Europe. Distribution patterns of walrus ivory objects demonstrate that they did not filter through to the general populace. Supplies of rare types of raw material would have been restricted in availability, disposal being channelled through the noble households.

Keywords: Medieval Novgorod, walrus ivory, trade, nobility

Résumé: Les os de mammifères marins et l'ivoire de morse constituent des matières premières rares et plutôt exotiques parmi celles utilisées par les artisans de Novgorod au Moyen Age. Plus de trois cents artefacts en ivoire de morse proviennent des niveaux de Novgorod. Ils forment un groupe relativement réduit en comparaison des milliers d'outils sur os et bois de cervidé également mis au jour. Cependant ces trois cents objets constituent la plus importante concentration de ce type jamais découverte dans une ville médiévale en Europe. La répartition spatiale des objets en ivoire de morse montrent que ceux-ci ne se sont pas répandus dans l'ensemble de la population. L'approvisionnement en matières premières rares n'aurait concerné qu'un public restreint, suivant des circuits de distribution limités aux familles nobles.

Mots-clés : Novgorod, Moyen Age, ivoire de morse, commerce, noblesse

Zusammenfassung: Knochen von Meeressäugtieren und Walrobelfenbein gehören zu den seltenen und recht exotischen Materialien, die von den Handwerkern im mittelalterlichen Novgorod verarbeitet wurden. Gegenüber den Tausenden von Geweih- und Knochenobjekten bilden die mehr als dreihundert Artefakte aus Walrobelfenbein eine vergleichsweise kleine Fundgruppe. Dennoch ist dies die größte Ansammlung von derartigen Objekten aus einer einzigen mittelalterlichen Stadt in ganz Europa. Die Verteilungsmuster der Gegenstände aus Walrobelfenbein veranschaulichen, daß sie nicht dem der breiten Masse entsprechen. Solche seltenen Rohmaterialien unterlagen einer eingeschränkten Beschaffung und ihre Veräußerung geschah vermutlich nur in den Haushalten der Vornehmen.

Schlüsselworte: Mittelalterliches Novgorod, Walrobelfenbein, Handel, Nobilität

Marine mammal bones and walrus ivory belong to rare and rather exotic materials utilised by artisans of Medieval Novgorod, Russia. Owing to colonisation by the Novgorodians of more northerly latitudes in the 11th-12th centuries and constant northern intercourse thereafter, the supplies of large cetaceans' bones and ivory became less restricted and promoted utilisation on a more systematic basis than anywhere else.

Over three hundred walrus ivory artefacts from the deposits of Novgorod form a relatively small group compared with thousands of antler and bone items. However, it is the largest concentration of finds uncovered from a single medieval town in Europe. Together with a few dozen objects made out of walrus cranial bone and whale bone, they form a statisti-

cally representative group of products in rare materials. Not only do the presence of walrus ivory waste fragments confirm local production of these objects (Smirnova 1997), most objects are stylistically very similar to typical Novgorod style items in other materials (fig. 1)

The problem of identification of bone materials has been in the focus of archaeological studies over the last 15 years. In 1985 Arthur MacGregor published his fundamental book 'Bone, Antler, Ivory and Horn. The Technology of Skeletal Materials Since the Roman Period', which is the most systematic and comprehensive exercise of its kind yet undertaken. In this book, for the first time, the principal materials (bone, antler, ivory and horn) were reviewed in terms of their structure, morphology and availability and their mechanical prop-

erties were compared, and quantified in objective scientific terms (MacGregor 1985). The book had a great impact. It drew the attention of British archaeologists to skeletal materials. Since the late 1980s Britain has become the centre of studies into the nature and identification of various skeletal materials. Dr Terry O'Connor (University of York), Sonia O'Connor (York Archaeological Trust) and Prof. John D. Currey (University of York) have made considerable contributions to the understanding of the nature of skeletal materials. Still, the identification of skeletal materials is one of the most problematic points of archaeological research. Well-preserved, the Novgorod material is extremely productive in this kind of evidence. Ivory objects retain practically no morphological characteristics of the tusks, so for correct identification we need to know the structure and texture of each type of ivory.

The term ivory is applicable to dentine, which forms the body of specially developed teeth of some mammals. Dentine is a specific form of bone and has a characteristic prismatic structure (O'Connor 1987). Teeth grow by the deposition of layer upon layer of dentine around the inside of a conical pulp cavity and this layering produces the 'cone-within-cone' structure into which degraded ivories tend to crack (O'Connor 1987, Fig. 2.1). Ivories are distinguished from other bone materials by their extreme hardness and remarkable polishing properties. The identification of ivory objects to species could be problematic, but finds from Novgorod are so well preserved that all specific features are acutely revealed.

Elephant ivory objects are extremely rare in Novgorod and occur only in the late deposits. So far, the earliest object is a knife handle found in the late 14th century layers on Troitsky site. Three flat one-piece elephant ivory combs come from the late 15th-17th century context and two more were found on the banks of the River Volkhov. Apparently, elephant ivory objects were imported items in the town. Russian medieval written sources give no reference to the existence of elephant ivory. In the later sources dated to the 16th-17th centuries elephant and mammoth ivory is referred to as '*kost slonovaya, mamontovaya* or *ingrovaya (yedinorogovaya)*' (elephant, mammoth or unicorn bone; Old Russian Dictionary. 11th-17th-centuries 1979, 242; Old Russian Dictionary. 11th-17th-centuries 1980, 374). In the 16th-18th centuries the elephant ivory trade was in the hands of the English. In 1553 Richard Chansler arrived at the mouth of the Northern Dvina River and established lasting trade relationships. The Moscow-English Company bought in Russian resin, wax, hemp, flax, fat and walrus ivory and brought here Indian and other colonial goods including elephant ivory (Zubakin 1931, 27).

All elephant ivory pieces which have surviving transverse surfaces clearly display a characteristic pattern, often called 'machine turning'. With regards to mammoth ivory the picture is even more impressive with the system of intersecting tubules looking like an 'exaggerated copy of that of an elephant'. A knife handle from mammoth ivory, found on Nerevsky site, is a unique object in the Novgorod collection

(fig. 8, 4).

Walrus ivory artefacts have been recorded in the cultural deposits throughout the stratigraphic sequence with the earliest items being found in the late 10th and early 11th century contexts. Walrus ivory is particularly distinctive: the central cavity of a young animal's tusk contains dental pulp, while later it is filled with amorphous secondary dentine resembling marble. Luckily, a great majority of walrus ivory objects retain at least partially areas of translucent and crystalline secondary dentine, which makes them highly recognisable (fig. 3). Primary dentine from the upper canines of the walrus is visibly coarser than elephant ivory and shows none of the specific features (O'Connor 1987). But it is their lack of features as well as the structureless and homogeneous surface of the material that enhance the splendour of polished primary dentine from walrus tusks. Normally walrus ivory objects are in excellent condition and the colour of archaeological walrus ivory varies from warm tints of brown to yellow-creamish. Its texture is best revealed when polished.

Artisans who used walrus ivory benefited from the versatility of their medium, for it confined a manufacturer only a little in his choice of forms. As a denser, harder material, which could easily crack, it dictated certain limitations in ornamentation. Articles of 'fish tooth' from Novgorod would rarely be covered with incised decoration. The main decorative 'technique' was polishing, highlighting the wonderful texture of the material (fig. 4).

Dozens of artefacts are made out of marine mammal bones. Whale and walrus bones must have been regarded as a rather exotic material in the bulk of skeletal bones, but supplies of this material until the rise of arctic-based industry in the 17th century were always too restricted to promote large scale utilisation on a systematic basis. Whale bone is not as good as normal bone, since it is vascular and thus relatively light. More or less compact material occurs in whale mandibles, which provide quite suitable material for manufacturing a variety of objects. Whale bone artefacts, which in Novgorod are found nearly exclusively as simple knife handles, have a very distinctive streaked surface (fig. 5, 4-6; 6).

Unlike whale bone, walrus cranial bone is extremely heavy. It has a highly characteristic stony dotted appearance, rather unusual when polished (fig. 1, 3; 5, 1-3). A large area of compact material in walrus skull was suitable to be used for various items, from rings and buttons to knife handles and bludgeons. We can only speculate what reasons the Novgorodians had to transport walrus skulls along with tusks from such a distance. It might have been a sheer desire of wealthy and powerful people to possess exotic rarities.

In 1991, a large fragment of a vessel made out of a walrus skull was found in the Zagorodsky End of Novgorod (Mikhailo-Archangelsky site) in the late 13th century context (fig. 7). This object is a unique find as recorded from archaeological sites. Walrus skulls are known from settlements of

the Viking Age both near hunting camps (Western Greenland) and far from them (Bergen, Trondheim, Oslo, Sigtuna, Uppsala, Lund, Schleswig, Dublin; Roesdahl, 1995, 15-16). As for objects made out of whole walrus skulls, there was no archaeological evidence for them before the Novgorod find. On the other hand, a vessel made out of walrus skull was mentioned in one of the Icelandic sagas. The *Kroka-Refs* saga written down in the 14th century refers to events of the 11th century. A Greenland *höfðing* called Gunnar who sought the patronage of the Norwegian king Harald Hardraade visited the king with three very unusual gifts. One of them was a tamed polar bear, another was an ivory board game. The third present appeared to be a vessel made out of walrus skull with carved decoration gilded here and there, the teeth being intact (quoted from Roesdahl 1995, 15). It has to be remembered, in the meantime, that Harald Hardraade or Severe, as he is often referred to, was one of the richest people of his time, if not the richest. He made his fortune while in military service for the Byzantine Emperor Michael Catalact and his wife, the Empress Zoe. Not least owing to this fortune, which was said to be the largest that had been ever seen in the hands of one person in Northern Europe, Harald was able to marry Elizabeth, Yaroslav the Wise's daughter and eventually become king of Norway (Snorri Sturluson 1980, 402-464). The episode in *Kroka-Refs* saga refers to the period when Harald Hardraade was the king of Norway (1050s-1060s). To please the king who already had plenty of precious objects in his possession, it would have been necessary to bring something extremely rare or unusual. So the owner of the vessel in Novgorod must have been a man of wealth. It is not that the object must be the one mentioned in the saga, but it confirms the evidence from the written source, which is not always reliable.

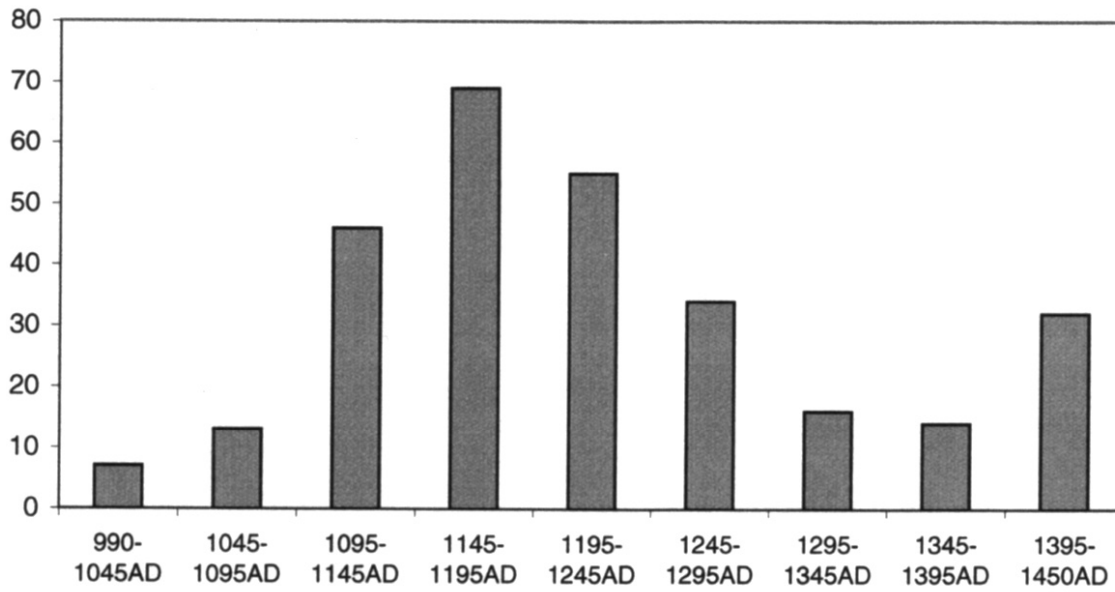
Among rare finds associated with walruses, there are also 3 fragments of worked walrus penis bone from large properties in the Lyudin and Nerevsky Ends.

Chronological distribution of artefacts in the materials associated with animals of the Far North may reflect the dynamics of economic activities, trade and cultural exchange across the vast area of the north of Eastern Europe. The colonisation of the north in the 11th-13th centuries was an important part of expansion of the East Slavs over the woodlands of Eastern Europe, which led to a growth in the area controlled by the Novgorod Republic, the Rostov-Suzdal Principality and, later on the Moscow Rus. First contacts with the lower northern Dvina region while more easterly lands (Biarmland) were established by people from Staraya Ladoga in the early 11th century (Nasonov 1951, 104). After Novgorod took over Ladoga around the 1040s-1060s, the demand for extension of tributary lands inspired Novgorod's expansion to the north and north-east. We know little about the first stages of the Novgorod colonisation of the area to the north and north-east from the watershed of Lake Onega and the Rivers Onega, Vodla and Sukhona, which was called Zavolochye. The geographical name 'Zavolochye' was first mentioned in a chronicle in the year 1078 in the story about the murder of Prince

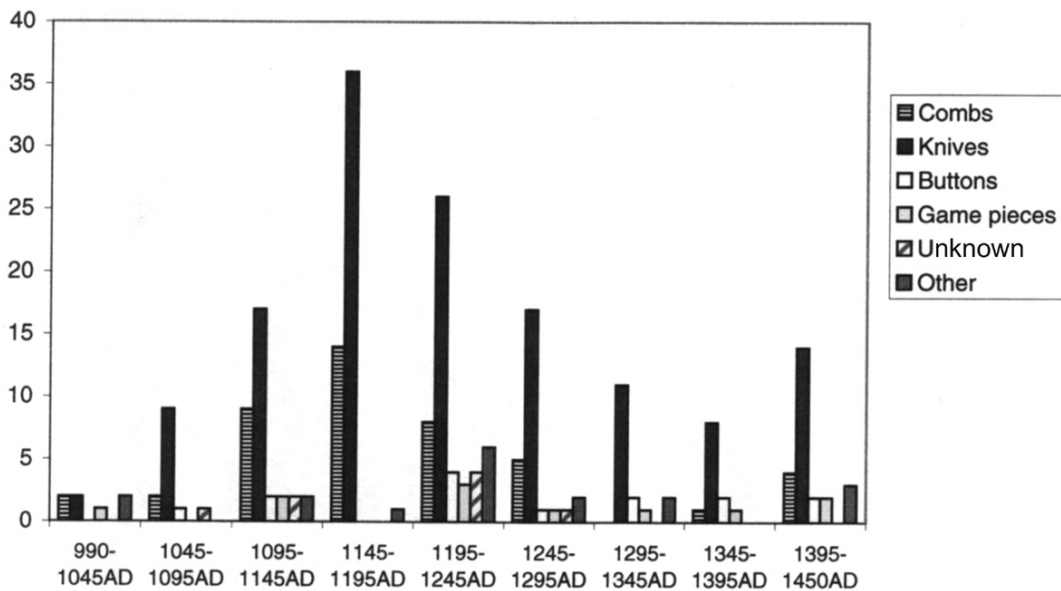
Svyatoslav. The prince, expelled by the Novgorodians, met his death in Zavolochye (NPL 1950, 18, 21; PSRL 1908, T. II, column 190; PSRL 1926, T. 1, column 199). It seems very likely that in the course of the last quarter of the 11th century the first properties belonging to Novgorod boyars (local noble families) were founded in Zavolochye. The properties were in the form of fishing and hunting territories. Archaeological evidence, however, is sparse and the earliest documentary evidence, dated to 1137, is Prince Svyatoslav's Charter with the list of parishes and dwelling sites along the lower Dvina River, which paid tribute to Novgorod.

No settlements of the 11th century which provide archaeological evidence for the presence of the Novgorodians are known in Zavolochye. On the other hand, artefacts typical of the material culture of the centre of Eastern Europe and East Baltic area have been found throughout a vast area from the Kola peninsula in the west to the mouth of the Pechora River and Trans-Urals in the east. They begin to appear as early as the late 10th – early 11th centuries but become more numerous by the late 11th century (Makarov 1997, 15). A similar pattern in the chronological distribution of earliest artefacts in exotic bone materials from the North has been revealed in cultural deposits of Novgorod (tab. 1). One can see the increasing numbers of finds from the late 11th century reaching a peak from about the mid 12th to mid 13th centuries. It is noteworthy that two concentrations of walrus ivory waste fragments come from the 12th century contexts on a boyar property 'D' in Nerevsky End and a wealthy Northern property on the Trade side of the town belonging to one of the prince's tax collectors (Smirnova 1998, 96-99). Later on a decline in the use of objects made from walrus ivory and other rare materials occurred, but the situation changes again from the late 14th century. We can only regret that the uppermost water-logged layers in Novgorod are dated only up to the mid 15th century. Drainage systems installed in the town in the 17th century dried water-logged layers from the 16th and the later 15th centuries. In 1478 Prince Ivan III put an end to Novgorod's independence from Moscow and a hundred years later prince Ivan the Terrible deprived the town of its remaining privileges. Water-logged deposits of Novgorod cover, therefore, nearly the whole period of the town's independence, but the dramatic decades of the 1460s-1470s are not represented in the deposits with anaerobic preservation conditions for organic materials.

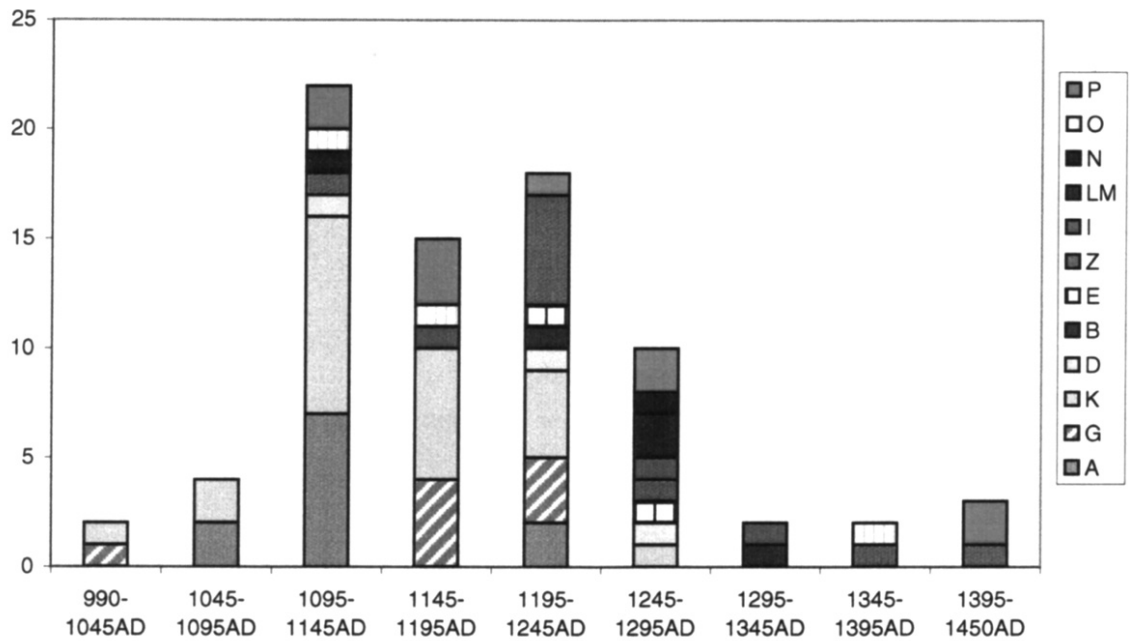
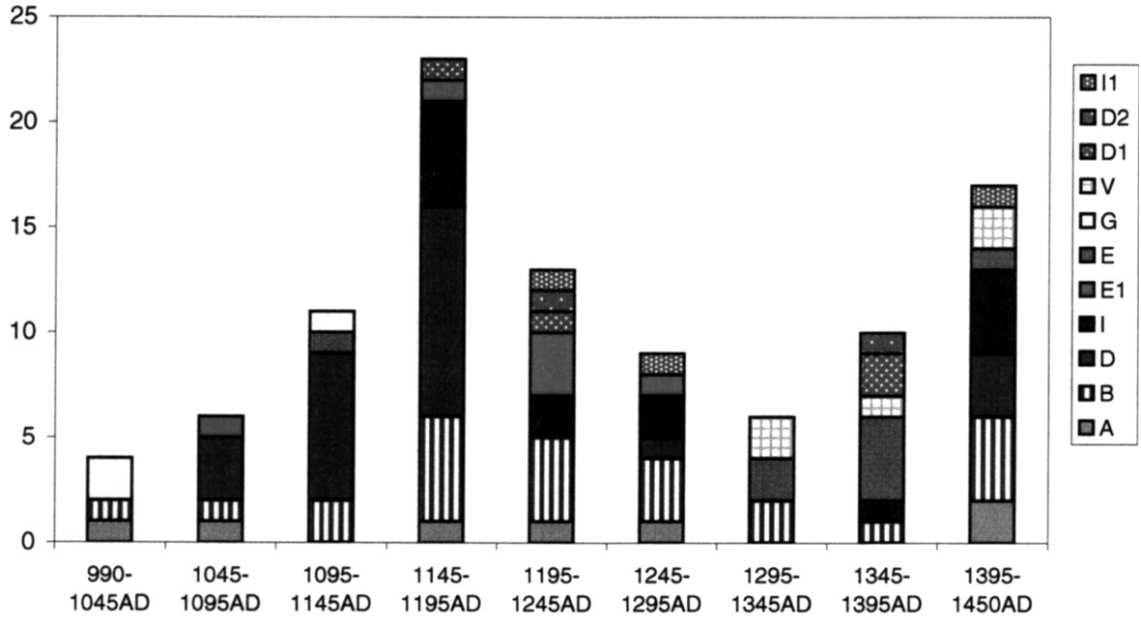
It is also interesting to see the range of products in the imported bone materials from different periods. As the objects in walrus cranial bone are very few and whale bone was used exclusively for knife-handles, only the assemblage of walrus ivory objects could provide the required evidence (tab. 2). Knife-handles were apparently the most common products at all times. Walrus ivory handles are notable for their refined forms (fig. 6, 3; 8, 1-3, 5; 10, 1). Slender proportions and the skilfully revealed charm of ivory texture make each handle extremely beautiful and unique. Additional details such as silver washers or tiny metal loops for fastening to the belt complete the image of an expensive and exclusive article.



Tab. 1 Chronological distribution of artefacts in walrus ivory and marine mammal bone



Tab-2 Chronological distribution of major categories of walrus ivory objects



Tab. 3 Spatial distribution of walrus ivory items on the properties of Medieval Novgorod

Double-sided one-piece combs were the second most common category of objects produced out of walrus ivory. Occasionally tooth-plates for double-sided composite combs were made out of this material (Smirnova 1996, 70-80). It seems that remains from knife-handle and comb production were utilised for minor objects such as buttons and toggles (fig. 1, 2-5), dice and gaming pieces (fig. 9, 3, 5), amulets (fig. 9, 1), seals (fig. 10, 3) and other objects. Whip-handles in the form of a bird's head were very popular in Novgorod in the late 11th – early 13th centuries. They were made in wood and skeletal materials (fig. 1). Walrus ivory whip-handles were definitely the most expensive and beautiful (fig. 9, 4; 10, 2). The curves of main categories of products in ivory (tab. 2) correspond to the curve of all artefacts in marine mammals' bone materials (tab. 1). The range of products attained its greatest diversity in the 13th century.

The two peaks in the graph of chronological distribution of imported northern bone materials could be used as an index of the intensive economic activities of the Novgorod Republic in the remote lands of the North. Indeed, in the course of the 12th and early 13th centuries Novgorod intensified its activities in the area. Troops of 'danniks' (tax collectors) consisting of certain people from each End of the town were sent to Zavolochye and also further to the north and north-east. In the early 12th century Novgorod imposed taxes on the Pechora River and Perm regions. In the early 13th century, the Tre area in the Cola peninsula fell into tributary dependence on Novgorod. In Zavolochye Novgorod interests clashed with those of the Rostov-Suzdal Principality, which also demanded tribute from certain areas. Campaigns against Rostov-Suzdal people in Zavolochye were undertaken in 1135, 1149 and 1169 (Nasonov 1951, 107-116). Colonisation of the northern lands provided Novgorod with access to the wilderness resources of the most remote regions.

In the late 14th century Novgorod was confronted by Moscow claims for the northern Dvina lands. By the end of the 14th century Moscow took over Rostov and Beloozero and raised the question of Novgorod's illegal annexations of volosts (districts) in the Dvina region. Increasing Moscow activity in the area was the result of the growing power of the Principality. The clash of economical interests of Moscow and Novgorod in Zavolochye caused serious conflicts between the two in the first half of the 15th century. To a certain extent these conflicts cost Novgorod its independence, for they were among the *casus belli* for the military campaigns against Novgorod in the 1470s (Yanin 1982, 200-211). Intensive political and economic activities in the northern lands of the Novgorod Republic in the 15th century resulted in the increasing flow of walrus ivory into the town, reflected in the second peak on the graph.

Spatial distribution of walrus ivory items can be seen more clearly on the properties of the Nerevsky and Lyudin Ends investigated within the Nerevsky and Troitsky sites (tab. 3). It is rather obvious that, first, they occur nearly always on wealthy boyar properties situated from the earliest times next

to street crossings and, second, that certain boyar families were more deeply involved in the 'northern tax enterprise' than others. Properties adjoining the cross roads were owned by related noble families and they formed so-called boyar *patronimia*, groups of properties belonging to big boyar clans. Thus, dwellers of properties B, G and A at the cross roads of Velikaya and Kholopya streets in the Nerevsky End were primarily involved in tax collecting in the north. Boyars from property B belonging to the clan known later by the name of Ontsfirovichs, seem to retain close contacts with the northern lands up to the 15th century, which is also confirmed by birch-bark documents referring to the tax collection in the north (Yanin 1981; Artsikhovskiy 1954; Artsikhovskiy and Borkovskiy 1958). Another cluster of properties owned by the families of the same clan is situated around the crossing of Velikaya and Kuzmodemyanskaya streets (properties D, E, I and K). Walrus ivory objects were found frequently on these properties and a remarkable concentration of walrus ivory waste occurred on the property D in the layers of the 12th century. It is noteworthy that outside the Novgorod Republic walrus ivory debris has been found only in the 11th century deposits at Sigtuna (within the area of the king's court), and in 12th-13th century layers at Trondheim and Roskilde (both at the archbishop's court; Roesdahl 1995, 19-20).

In the Lyudin End the largest concentration of walrus ivory objects have been revealed on the properties G, A and K adjoining the crossing of Proboinaya (Broad) and Chernitsina streets. The data from the birch-bark documents and stratigraphic evidence indicate that these properties were in the hands of the boyar clan of the Nesdiniches-Miroshkiniches. In the 12th – early 13th centuries Novgorod *posadniks* (elective head of the republic) belonged to the clan. An enormous concentration of wooden cylinders, which served as seals or locks of the sacks with tribute, has been revealed in the 11th – 12th century deposits on property K. The largest collection in Novgorod of valuable and exquisite walrus ivory items derives from the 12th – early 13th century complex in property K. By the decision of the *veche* (Novgorod parliament) the Miroshkiniches' urban properties were confiscated and handed over to the priests of St. Sophia's Cathedral (Khoroshev & Sorrokin 1992, 125-6). The dramatic events of 1209 and the following shift in the ownership of once hereditary properties caused noticeable changes in the distribution of walrus objects on the properties investigated in the Lyudin End. A sharp decrease of walrus ivory objects in the area indicates that the dwellers of the properties no longer belonged to the social elite of the town.

Distribution patterns of walrus ivory objects demonstrate that they did not filter through to the general populace. The quantities involved were always small and would have been inadequate in volume to support a viable industry.

Supplies of rare types of raw material would have been restricted in availability, disposal being channelled through the noble households.

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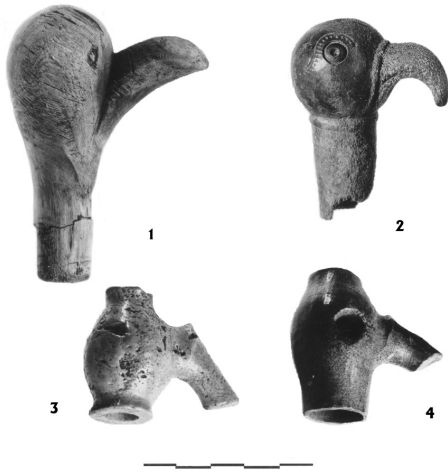


Fig. 1 Whip-handles. Late 11th -12th c. 1 - wood, 2, 4 - elk antler, 3 - walrus cranial bone.

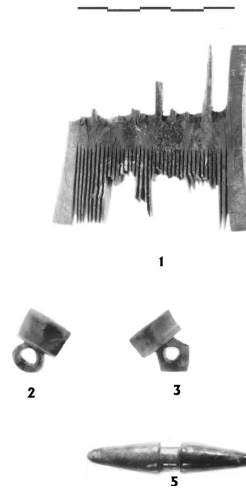


Fig. 2 Comb (mid. 14th c.), buttons and toggle (13th c.) - walrus ivory



Fig. 3 Gaming pieces (11th c.) - walrus ivory

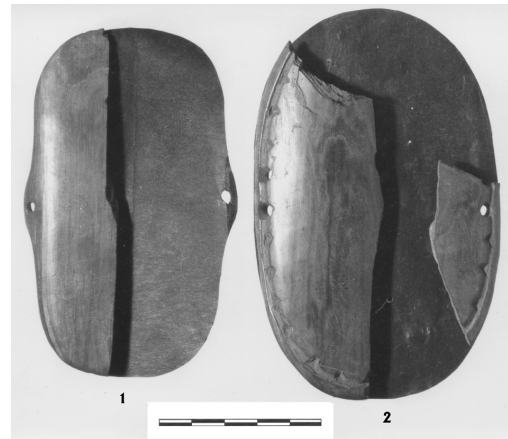


Fig. 4 Bracers (Late 12th - 13th c.) - walrus ivory

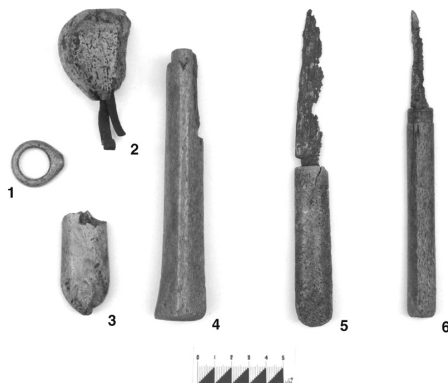


Fig. 5 Objects made of bones of marine mammals from 11th (1), 12th (4, 6), 13th (2), early 14th (5), late 14th – early 15th (3) century deposits: 1-3 - walrus cranial bone, 4-6 - whale bone



Fig. 6 Knife handles made of whale bone. Late 12th – early 13th c. (3), 14th c. (1, 2)



Fig. 7 Two views of a vessel made out of a walrus skull. Late 13th c.

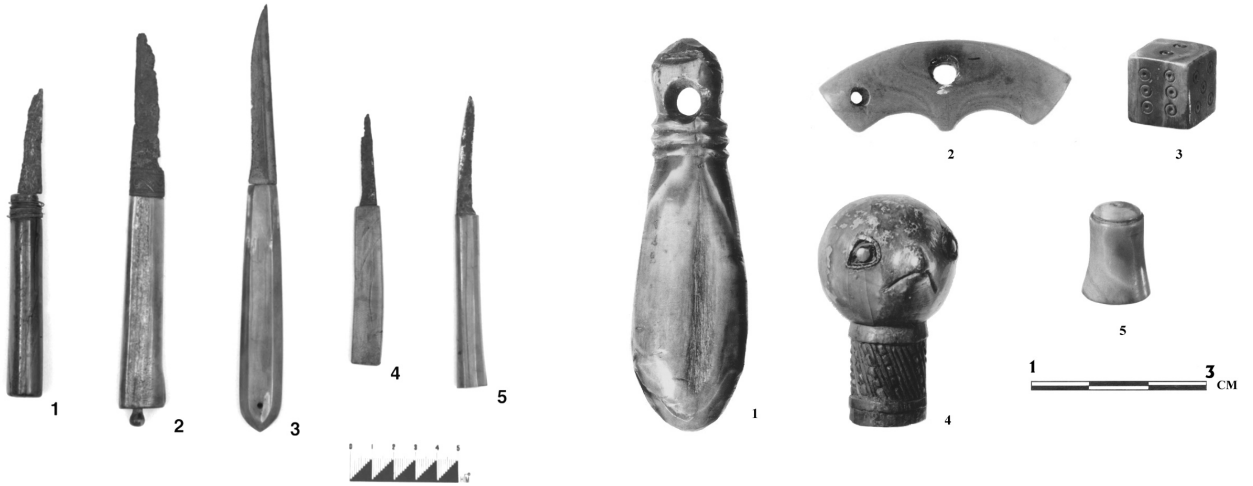


Fig. 8 Knives with walrus (1-3, 5) and mammoth (4) ivory handles. 11th (1, 4), 12th (3-5), late 13th – early 14th c. (2)

Fig. 9 Walrus ivory objects. 13th – early 13th c.

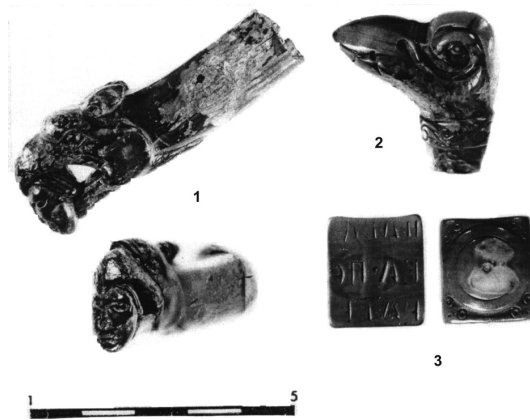


Fig. 10 Walrus ivory objects. Late 12th-early 13th (1-2), 15th c. (3)