

# **CRAFTING BONE – SKELETAL TECHNOLOGIES THROUGH TIME AND SPACE**

**Proceedings of the 2<sup>nd</sup> meeting of the (ICAZ) Worked Bone Research Group**

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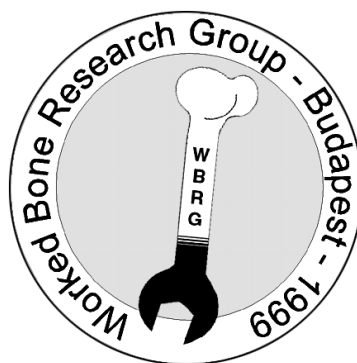
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**Worked Bone Research Group 2<sup>nd</sup> Meeting  
Budapest 31 August – 5 September 1999**

**BAR International Series**

2001

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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 Biró, Kordula Gostenčnik, Eszter Kovács, Christopher Morris, Sabine Deschler-Erb, Ans Nieuwenberg-Bron, Katalin Simán, Isabelle Sidéra, Mickie Zhilin

## CRAFTING BONE - SKELETAL TECHNOLOGIES THROUGH TIME AND SPACE

### Proceedings of the 2<sup>nd</sup> meeting of the (ICAZ) Worked Bone Research Group

Budapest, September 1999

#### 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 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.

## PRE- AND EARLY ROMAN BONE AND ANTLER MANUFACTURING IN KÄRNTEN, AUSTRIA

Kordula Gostenčnik

**Abstract:** This paper is based on bone and antler artefacts excavated in the Italian-Roman town on Magdalensberg in Kärnten; a close chronological frame between ca. 50 BC and 50 AD yielded interesting results as regards typological and chronological sequences of worked bone and antler. An almost exclusive predominance of Mediterranean types, local production of carved and turned objects from the very beginning of the town onwards and preference for elk-antler against bone rose the question, to what extent local traditions existed in the manufacturing of bone and antler, especially in pre-Roman Iron Age. In examining three more sites, namely Teurnia, Gurina and Rabenstein, an attempt is made towards the question, as to what extent the present state of research into the archaeology of the Iron Ages allows a definite assessment.

**Keywords:** Pre-Roman, early Roman, Austria, Magdalensberg, bone and antler tools

**Résumé:** Cet article étudie les outils en os et bois de cervidé découverts dans la ville romaine de Magdalensberg à Kärnten. Une occupation chronologiquement bien cernée entre 50 avant J.-C. et 50 de notre ère a fourni d'intéressants résultats concernant la typologie et l'évolution des outils en os et bois de cervidé. Une prédominance presque complète des types méditerranéens, l'existence d'une production locale d'objets découpés et tournés dès les premières phases d'occupation de la ville, ainsi que la préférence accordée au bois de cerf face à l'os, soulève la question de l'existence de traditions locales dans le travail de l'os et du bois de cerf plus précisément au cours de l'Âge du fer pré-romain. En examinant trois autres sites, respectivement Teurnia, Gurina et Rabenstein, nous essayons de voir s'il est possible, en l'état actuel des connaissances sur l'Âge du Fer, d'élaborer une estimation définitive.

**Mots-clés:** Age du Fer, époque romaine, Autriche, Magdalensberg, outils en os et bois de cervidé

**Zusammenfassung:** Die Ausgrabungen in der italisch-römischen Stadt auf dem Magdalensberg in Kärnten erbrachten hinsichtlich der typologischen und chronologischen Einordnung der bearbeiteten Knochen und Geweihe aufgrund eines engen chronologischen Rahmens von ca. 50 v. bis 50 n.Chr. interessante Aufschlüsse. Ein beinahe ausschließliches Vorherrschen des mediterranen Formenschatzes, die lokale Produktion geschnitzter und gedrehter Waren bereits zu Beginn der Siedlungstätigkeit und – gegenüber Knochen – eine Bevorzugung von Hirschgeweih als Rohmaterial werfen die Frage auf, inwiefern sich einheimische Traditionen der Beinverarbeitung speziell in der vorrömischen Eisenzeit nachweisen lassen. Anhand dreier weiterer Fundorte (Teurnia, Gurina und Rabenstein) wird versucht der Frage nachzugehen, ob der derzeitige Forschungsstand eine klare Beurteilung überhaupt zuläßt.

**Schlüsselworte:** Vorrömische Zeit, Frühhömische Zeit, Österreich, Magdalensberg, Knochen- und Geweihgeräte

The geographical area between southern Austria and north-eastern Italy, although rendered difficult to some degree by high mountains, was marked by early contacts between Celtic Kärnten and Republican Italy. Archaeological records as well as evidence from Greek and Latin written sources show an exchange of products between the Alpine region and markets in northern Italy which gradually expanded during the final period of the Iron Age. Commercial investments into trade with tribes in the south-eastern Alps mainly by merchants from Aquileia intensified especially from the mid 1<sup>st</sup> c. BC onwards, and resulted in a greatly increased influx of southern merchandise. A rare hint is by the tombstone inscription of a *mercator transalpinus* from Aquileia (Maselli-Scotti 1994). The same phenomenon in the history of Noricum is discussed in the partly outdated work by Alföldy (1974: passim).

Above all, metals and especially steel or *ferrum Noricum* was the chief material of interest in exchange, as the Celts in Noricum had developed a technology for steel-production

and, given the political background, there was a high demand for it in Italy from the period of the Civil Wars to the end of the Republic. Virunum, as the town at Magdalensberg (1058 m above sea level, ca. 580 m above the surrounding plains) was called, was founded by Italics, mainly people from Aquileia, as a mercantile centre. Along with this town, small trading bases were kept throughout the country, and they too began to flourish simultaneously by the mid 1<sup>st</sup> c. BC, decades before the Roman occupation of Noricum in 15 BC.

When working with Magdalensberg bone and antler objects, one question which immediately arose was whether or not those materials were much in use in periods before the increased presence of goods with a typological provenience from the Mediterranean. The native Celts themselves immediately acquired a taste for Mediterranean articles, for which there was great demand, clearly underscored by the Magdalensberg produce exchange.

Starting with Magdalensberg sequences of bone and antler small finds (Gostenčnik forthcoming; archaeozoological report: Hornberger 1970), this study is complemented by an analysis of material from three other sites, which have also produced a number of bone and antler objects worth working with, namely Gurina, Teurnia and Rabenstein (fig. 1). However, it soon became evident that Late Republican – Early Imperial artefacts prevail almost exclusively, whereas pre-Roman periods, above all LaTène C2/D1, are not much in evidence. LaTène D2 is suffused already by a southern life-style among those who could afford it, decades before the country was occupied by the Romans.

### ‘Old Virunum’ - Magdalensberg

The formation of an emporium by the mid 1<sup>st</sup> c. BC subsequently resulted in a rush on the one hand of immigrants from Italy, namely merchants and traders with their staff to run their businesses but also artisans and craftsmen, etc., and on the other hand by the presence of the native Celtic inhabitants. This is clearly elucidated by onomastic material on dozens of tombstone-inscriptions and a huge number of graffiti on walls and various finds as is shown in the summary on Magdalensberg (Piccottini 1989). After the Roman conquest of Noricum in 15 BC, the town became the administrative centre of the later province until the place was completely abandoned in the time of Claudius, mid AD 1<sup>st</sup> c., in favour of the newly established capital *municipium Claudium Virunum* in the plains of the Zollfeld, some 15 km to the south-west of the mountain (fig. 1). Luckily therefore, we are able to excavate a town that was in use for one century only, and was never again revived with the exception of some lime kilns in the Middle Ages. In dealing with bone and antler artefacts, the two succeeding towns provide us with interesting typological and chronological hints within clearly separated chronological frames. Thus, in addition to the material excavated on the mountain, further studies will have to concentrate on the later finds from the Zollfeld; the work here is in progress. Worked bones from our recent excavations have been listed in Zabehlicky-Scheffenegger and Gostenčnik (1999: 143-5).

“Old Virunum” at its lofty altitude was constructed according to Republican town-planning requirements, on natural and artificial terraces on the southern slopes of the mountain (fig. 2). Traces of bone and antler manufacturing can be observed from the very beginning, including the two technologies of turning and carving. For the simple reason that in later periods radical reconstructions were repeatedly begun and due to the precipitation and heavy erosion throughout the centuries, this early period from the mid 1<sup>st</sup> c. BC to ca. 25/20 BC only rarely comes to light while the number of finds among the few layers attributable to it is rather small. For all that, it is possible to demonstrate that *stili* (fig. 3; 7,1-4) were manufactured at this site from the very beginning. This is a special instrument for writing on wax-tablets. The preferred raw material for its manufacture by turning were bovine metapodials. Elk-antler (fig. 6,15-16) was an impor-

tant raw material for the production of discoid elements with large diametres of up to 12 cm, the latter being a Magdalensberg-peculiarity. The use of elk-antler at our site has already been discussed (Gostenčnik 1998). The six following periods until the mid AD 1<sup>st</sup> c., however, are quite rich in material. On the whole, examination of half finished objects and raw material have shown that there was a preference for elk-antler as opposed to bone. Horn manufacturing is evident by discarded horn cores (fig. 8,12-14). As long as early objects from Italy or the Hellenistic East are not published properly, the Magdalensberg finds are the most important collection of examples for the understanding of the typology and chronology of Late Republican – Early Imperial bone artefacts. Based on a selected number of items incorporating the main groups of objects, the overview to follow gives an impression of the spectrum prevalent in both the 1<sup>st</sup> c. BC and the AD 1<sup>st</sup> c. Production had already commenced in the very beginning, yet it is understood that imports from Italy should also be assumed; however, it is nearly impossible to differentiate provenience on individual pieces.

Among the approximately 1,079 items in bone and antler, the 316 writing utensils or *stili* form the biggest group (Gostenčnik forthcoming: pl. 1-14; see also fig. 3), illustrating the town's main function as a commercial and administrative centre with a intense demand for writing-equipment. Furthermore, this number increases by an additional ca. 200 *stili* in iron. Production based on demand therefore is the main reason why *stili* were manufactured locally from the earliest period. Examples include the specimen in fig. 7,1, a half finished *stilus* with the two small disks on both ends not yet removed and still unpolished. A typological or chronological development of those implements is not apparent, although it seems likely that the objects shown in fig. 1,24-35 were already very rare in AD 1<sup>st</sup> c. Our *stili* on the whole are lathe-turned; parallels are known from Italy as early as 3<sup>rd</sup> c. BC, but their production ends sometime during the 2<sup>nd</sup> half of the AD 1<sup>st</sup> c. *Stili* are easily distinguishable, as they very often display marks of chewing, with the imprints of human teeth clearly visible on their small olive-shaped heads.

The second largest group comprises 222 gaming counters of one distinctive design, namely turned bone-discs with bevelled edges and even surfaces; the majority of these objects have a central point on one side, 22 pieces have inscriptions or graffiti on them, usually names or numbers (fig. 4,1-15). In addition to the counters, 36 dice are extant, one made in ivory (fig. 4,18); 14 dice (fig. 4,16-17) was found in the debris of a burned shop along with thousands of pieces of broken pottery, melted glass, bronze or iron small finds, all dating to the end of Tiberius' reign after AD ca. 30. Counters were apparently produced locally (fig. 7,5-7), as was one roughly cut die in elk-antler (fig. 4,19).

Spoons on the whole are not particularly spectacular at all. Even so, our material contains one interesting exception which is worth pointing out. Besides two fragmented bigger spoons or *ligulae* (fig. 4,23) and 24 small spoons or *cochle-*

aria with a round, shallow bowl and straight handle (fig. 4,21-22), both common early Roman finds in terms of their total quantity, our site produced 23 spoons with an almond-shaped bowl and straight handle (fig. 4,24-25), an unusual number as they normally are very rare, never drawing level with the round bowls. However, if one bears in mind the early dating of Magdalensberg and the lack of comparable sites or published collections, the accumulation of spoons with almond-shaped bowls has to be considered as a chronological factor. A few closely dated pieces of both types of small spoons from our excavations come from a time range between the last decade BC to the mid 1<sup>st</sup> c. AD.

Toilette equipment such as ear scoops, pyxides or small caskets, is present on almost every site under Roman influence (fig. 4,26-28). The broken casket mount (fig. 4,29) has a scene carved on its top, showing a barbarian who is being captured by three legionaries.

Textile production has left implements in bone in archaeological materials for thousands of years, although among early Roman finds they are rarely made in bone or antler. A few distaffs, spindle whorls, weaving swords, bobbins (?) and one needle (fig. 5,1-13) in osseous materials are extant among a much bigger bulk of textile equipment from our site. A weaving sword (fig. 5,7) bears the owner's name P(h)ILARGI in genitive, a typical slave's name derived from Greek, meaning 'domineering' or 'tyrannical'. The significant thing about the name is that it is male, so, it seems that weaver's work was at least done by male slaves too and was not women's work exclusively. Imprints of warp threads on both sides of the sword show production of coarse and fine textiles, as numbers range up to 40 threads per centimetre.

For needles with three eyes, the evidence from graves indicates their use as hairpins. Needles and pins on the whole are not much in evidence on Magdalensberg, whereas they usually form the largest number of bone artefacts among Roman finds in later periods. For example, the total number of bone and antler artefacts studied from Augusta Raurica is 5902 pieces, out of which 2313 (i. e. 39.2%!) are needles and pins (Deschler-Erb 1998: 140-42 and 159-66). In the assemblage under discussion here, the total numbers are 14 pins and pin-heads of different shapes (including fragments), 19 more fragmented pin-shanks and 12 needles with three eyes (fig. 5,14-17). On the other hand, typical needles for sewing are numerous in metals with approximately 400 specimens in copper-alloys and iron.

Among locally produced iron-knives, one distinctive type with a wavy blade was provided solely with handles in elk-antlers, partly decorated with dot-and-ring motives (fig. 6,1-2). Roughly cut handles for different tools and implements too demonstrate a preference for antler as opposed to bone. Four handles with a waisted end (Greep 1982) among those in ivory (fig. 6,3) and a two-piece bone handle (fig. 6,4), were imported doubtlessly from the south as confirmed by use of ivory which additionally may only be encountered as part of a com-

posite knife handle and a die, yielding altogether a total of three objects in ivory discovered so far at Magdalensberg.

*Tesserae nummulariae* are indicators for the presence of a banking system, nothing unusual in a mercantile centre (fig. 5,20-21). The names written on those small bone tablets are the names of persons checking coins, confirming the quality and value especially of silver coins. Normally those tablets, dating exclusively to the 1<sup>st</sup> c. BC through the 1<sup>st</sup> c. AD, appear in Italy, especially in Rome, with more than 120 tesserae the highest figure on record. Magdalensberg, with 12 of those items, is the second largest collection known.

Discoid antler pendants (fig. 6,10-11) at least can be attributed to artefacts of non-Mediterranean origin; two such pendants – one with a phallus – and two unfinished pieces were found at Magdalensberg. Various amulets and pendants have been discussed, for example, by Gostenčnik (1999: passim) and Deschler-Erb (1998: 168-73). Perforated teeth (fig. 6,13-14) and bones similar to an equid's *os sesamoideum* (fig. 6,12) also fall into line with objects related to personal religious belief or superstition, though it is not possible to define the group of persons using them as 'natives' or 'Mediterraneans'.

Quite a number of artefacts were combined with other materials, especially wood, but also iron and copper alloys. Except for handles of various kinds in antler (fig. 6,5-7) and a few more composite objects especially in connection with antler, the import of foot rules (fig. 5,18-19), copper alloy or wooden caskets with hinged bone lids (fig. 4,28) or knives with handles with waisted ends (fig. 6,3-4) is hardly deniable, as their uniformity suggests production in specialised workshops. In the case of weapons, it seems more likely that sword-hilts (fig. 6,8-9) were repaired locally rather than that they were produced on a large scale locally, as we lack half-finished products or workshop waste for such objects within the local *fabrica armorum* working between approximately 20-10 BC.

The selection presented above shows clearly that by and large one does not have to reckon with a provenience from Laténoid traditions. Antler pendants, knife handles in antler, maybe use of antler on the whole and possibly ring-and-dot motive as a decorative element (except for eyes on dice) do not seem to have Mediterranean roots. Use of bone or antler at Iron Age settlements is rare, as is evident for instance by the results of excavations at Braunsberg in Lower Austria. Pieces identified by Erika Kanelutti include one parallel-epiped die (Urban 1995: fig. 61,43), and two cattle astragali (Urban 1995: figs. 255,3117 and 288,3779). But one should also consider that data for Late Republican - Early Imperial bone or antler artefacts from the northern Adriatic are not available yet; the foothills of the Alps might have been sources for antler, so that a general lack of the use of antler in bone-manufacturing workshops in the Mediterranean can not be attributed to this area without caution. Nevertheless, use of the lathe and a greatly increased utilization of both bone and antler as materi-



als for manufacture is based on increased southern influences; in the case of antler, experiments in addition to experience might have shown their workability.

Finally, it seems interesting also to provide a few numbers to elucidate the significance of bone and antler artefacts within the archaeological record. The so-called 'Südhang-Bauten' on Magdalensberg were especially abundant in terms of the numbers of finds. During excavations there, 19,247 sherds from various kinds of pottery were unearthed (Schindler-Kaudelka 1989: 73) as well as up to 1,400 pieces of glass. The same place yielded 86 bone and antler artefacts, with 223.8 pieces of pottery or 16.25 pieces of glass found for every bone or antler object being a fairly small number. Figures for iron, copper alloys and animal bones are not yet available. The average number of objects in these materials excavated during one season does not exceed 20 specimens.

### Teurnia – St. Peter in Holz

Settlement in Teurnia can be traced back to a period as early as the Urnfield period, through the Iron Ages (Glaser 1992: 13). Similarly to Magdalensberg, an increased import of southern wares around the mid 1<sup>st</sup> c. BC also indicates closer connections with northern Italy, although Late Republican - Early Imperial structures are few. Similarly to Virunum on Zollfeld, Teurnia became a Roman municipium in the AD mid 1<sup>st</sup> c. and was the capital of Noricum in Late Antiquity. Among the worked bone artefacts found there, one single bone pyxis similar to that shown in fig. 4,27 with a ring-and-dot motive was found in the early layers. The major part of the bone material comes from the AD 2<sup>nd</sup>/3<sup>rd</sup> c. and is not yet available for study.

### Gurina

This settlement is supposed to be the most important site in Iron Age Kärnten, beginning in the Neolithic and extending far into the Roman Imperial period and Late Antiquity (Jablonka forthcoming). Excavations at this site started anew only recently. A number of inscriptions and graffiti in the Venetic language of northern Italy, datable to the 2<sup>nd</sup> c. BC, are the most remarkable discoveries from that place, indicating close contacts between the two regions. The site was mainly excavated in the 19<sup>th</sup> c., without stratigraphical observations. A small amount of bone and antler artefacts and workshop waste including horn (fig. 9) was recovered at that time as well. Most prominent in this assemblage are the two discoid antler pendants with central perforations, one *stilus* with an inscription in Venetic, a 'bobbin', and two knife-handles in elk-antler, one with a ring-and-dot motive (fig. 9,1-4, 8-9). All these objects, however, fit well into the Magdalensberg sequences. Pendants with a central perforation were already in use during the LaTène period, but traces made by the tools used for production – the saw and drill – did not yield results as regards dating. The *stilus* is an exception, because it was carved and not turned on the lathe as all the Magdalensberg examples. Considering the inscription, a date in the 2<sup>nd</sup> c. BC and a provenience from northern Italy

seem very likely. The two knife-handles were in all probability produced locally and are perhaps datable within the Magdalensberg-horizon. The 'bobbin' is exceedingly rare. It has not been reported elsewhere with the exception of Augst (Deschler-Erb 1998: pl. 56,4539) and Magdalensberg.

### Rabenstein

The importance of this small site in south-eastern Kärnten lies above all in the Copper Age, but pottery indicates settlement on into the LaTène. Due to its steep slopes, the hill was badly damaged by heavy erosion, destroying both structures and stratigraphy. A decorated bone handle for a tattoo-needle and a bone point (fig. 10,1-2) as well as a few more antler artefacts, mostly handles except for a elk-antler sleeve ('Zwischenfutter'; fig. 10,5), may shed some light on the question of preferences in raw materials, even if these are scattered over more than two millennia. The description of the objects is provided in Vahlkampf (1995: 72-76). However, considering the approximately 80 stone tools which came to light there, the use of bone and antler artefacts in relation to them seems less important.

### Summary

Objects in bone and antler are rare in Kärnten before the mid 1<sup>st</sup> c. BC; pre-Roman sites hardly yield any results at all. Apart from a typology of Mediterranean origin, workshop waste and half finished objects from Magdalensberg indicate preference of antler compared to bone, which cannot be attributed to southern traditions alone. Sharp increases in the use of bone and antler artefacts as well as working of those materials on the lathe, however, clearly occur under the influence of an increased presence of immigrants from Italy. As far as a rough examination of artefacts from the AD 2<sup>nd</sup> and 3<sup>rd</sup> c. allows us to say, bone at any rate was preferred to antler later on in the sequence.

### Acknowledgements

My grateful thanks go to Dr. Anton Kern, Department of Prehistory, Museum of Natural History (Vienna), for permission to study the original objects from the excavations at the Iron Age site of Gurina, Kärnten.

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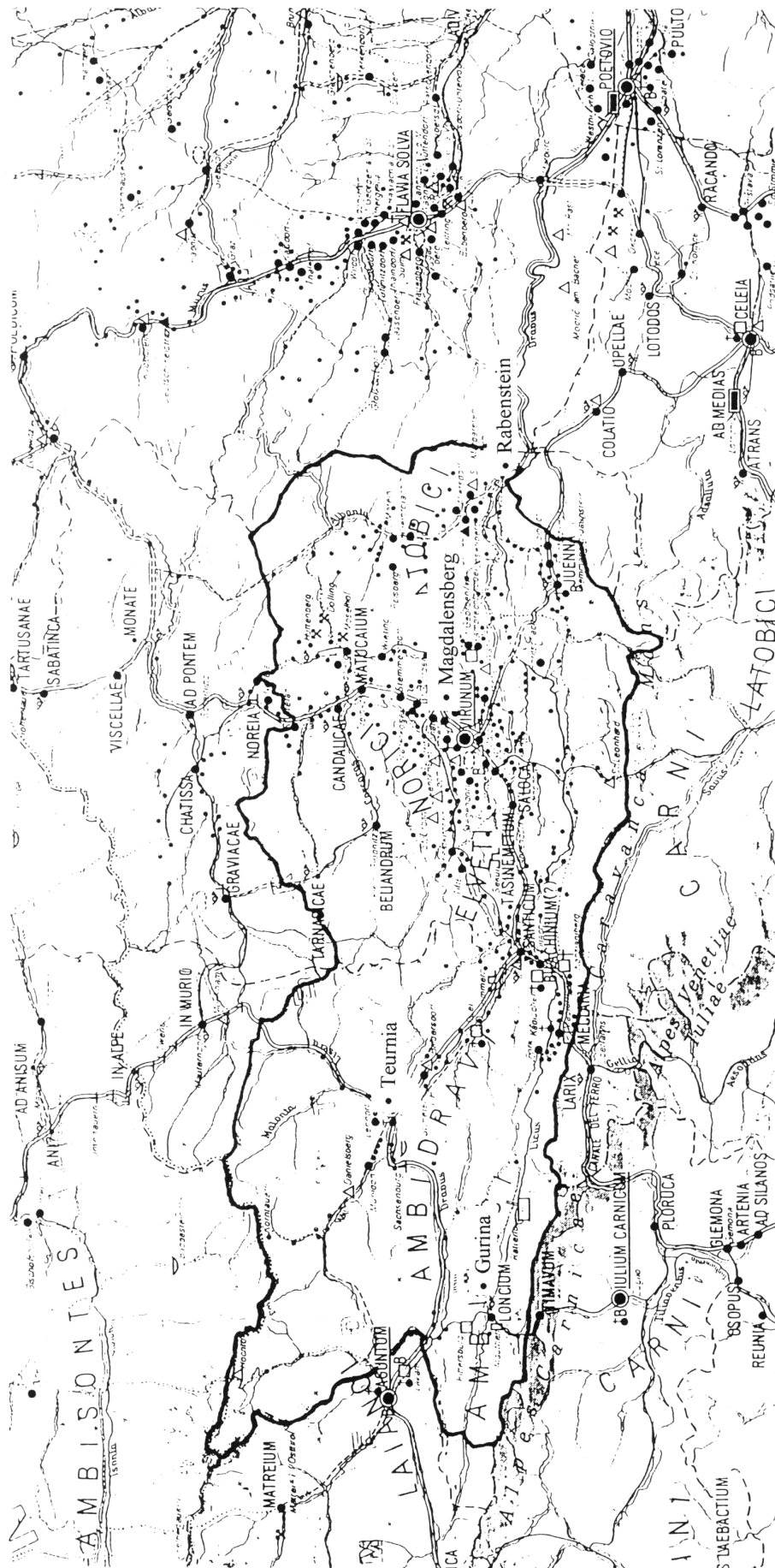


Fig. 1 Kärnten; distribution of sites, scale 1:1 125 000 (after G. Piccottini)

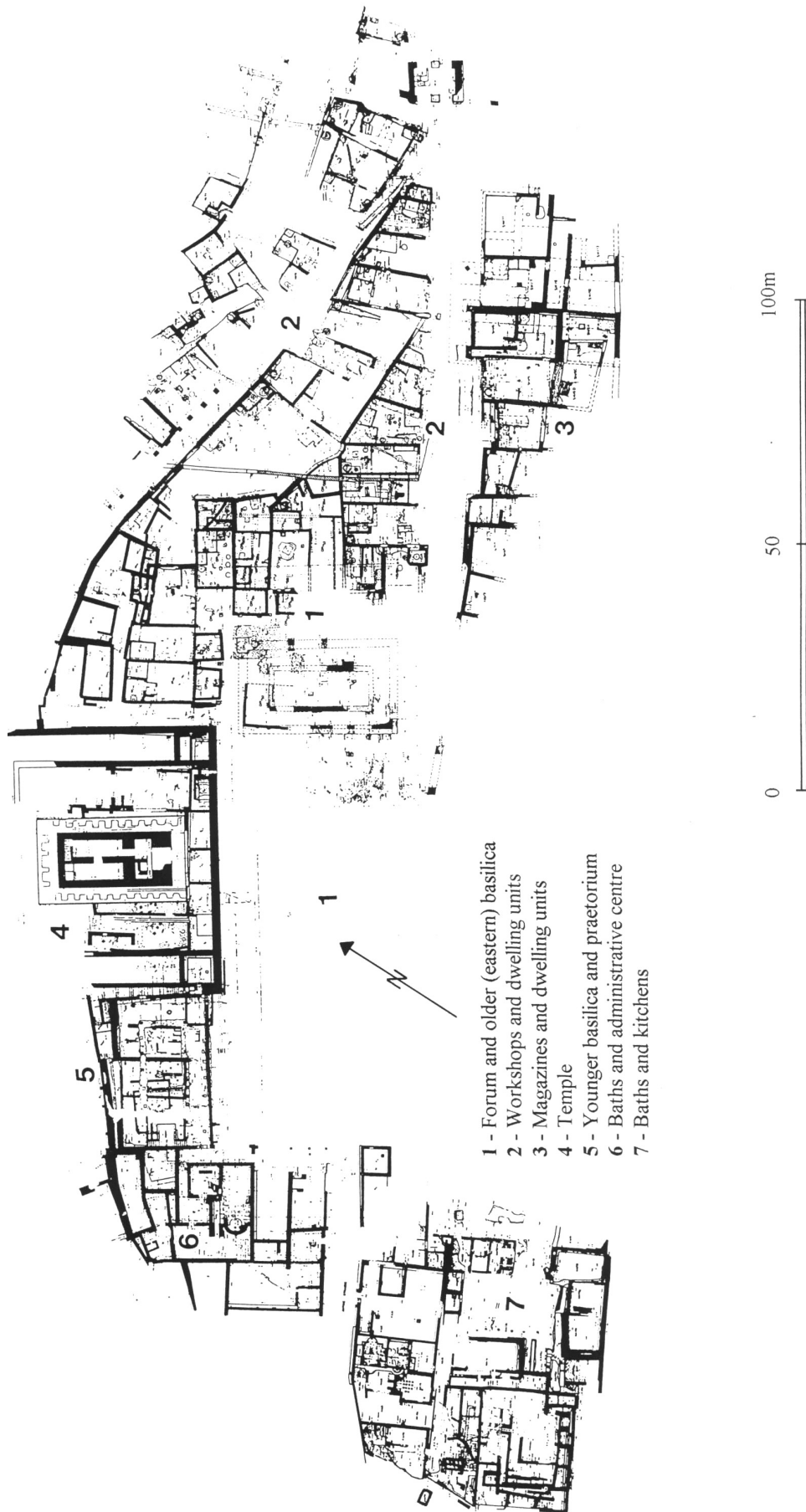


Fig. 2 Magdalensberg: general map; scale appr. 1:1 200 (after G. Piccottini)

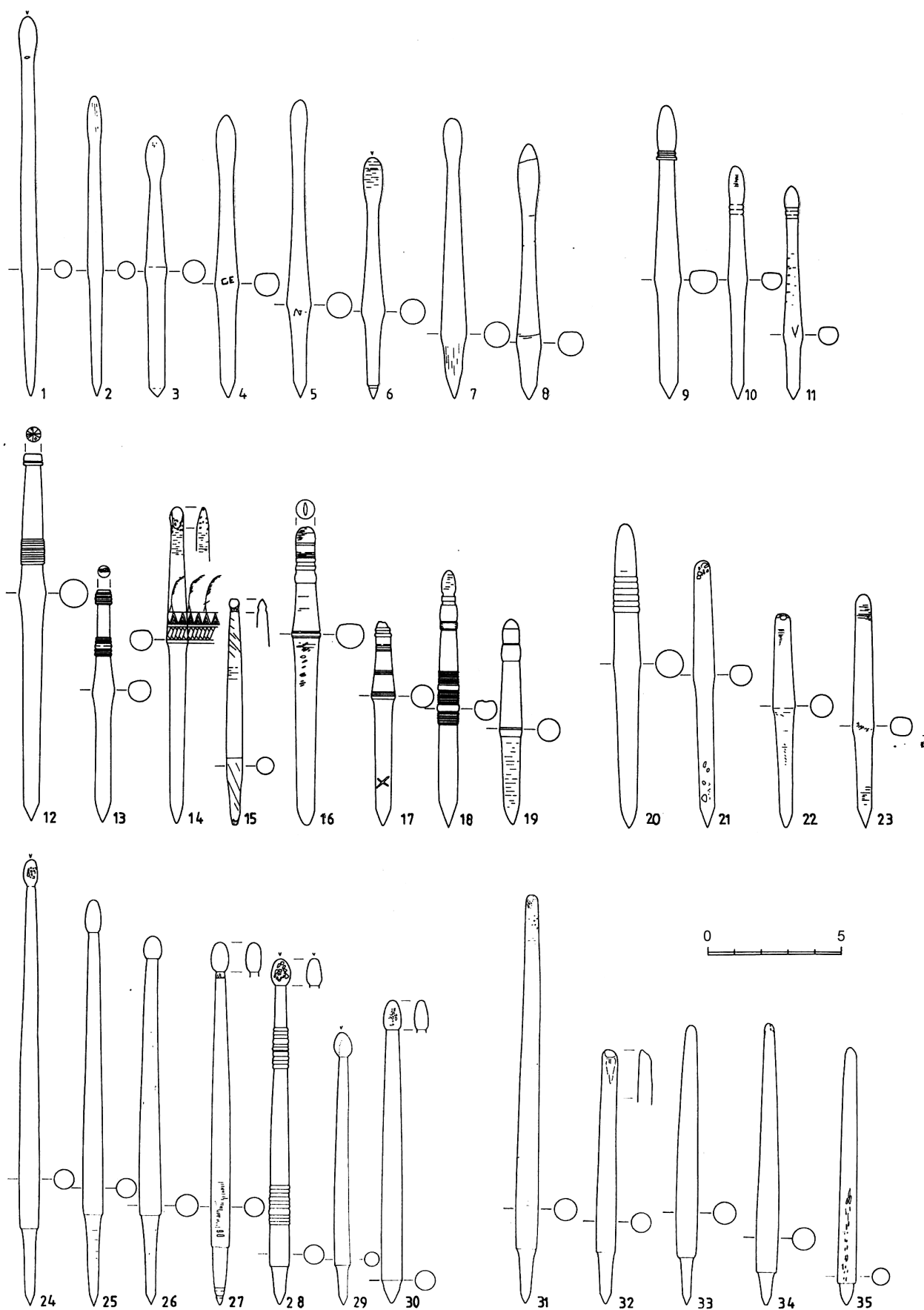


Fig. 3 Magdalensberg; 1-35. *stili*: bone (K. Gostenčnik)

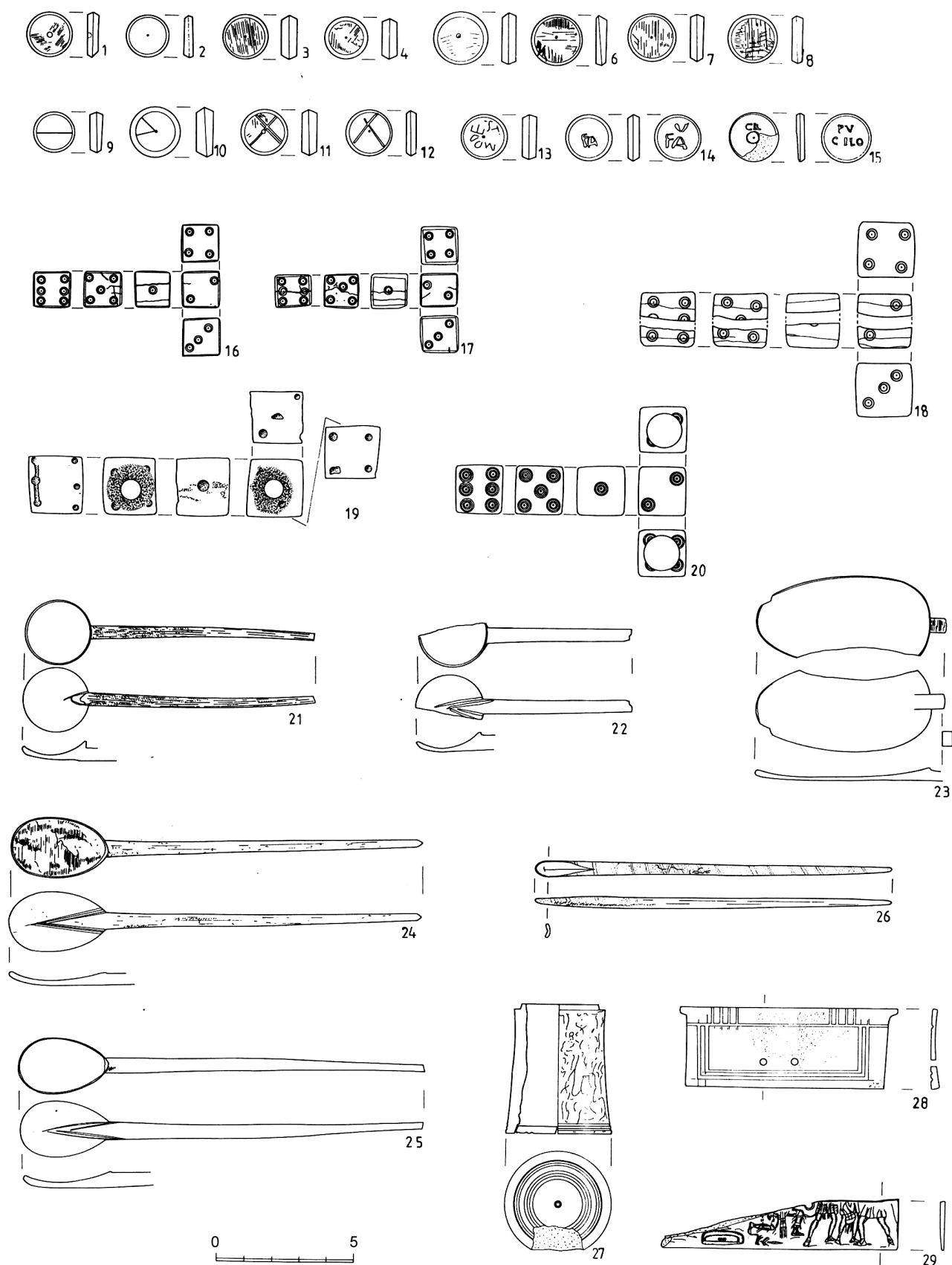


Fig. 4 Magdalensberg; 1-15. gaming counters, 16-20. dice, 21-25. spoons, 26. ear scoop, 27. pyxis, 28. hinged lid, 29. casket mount: 1-17., 20-29. bone, 18. ivory, 19. elk-antler (K. Gostenčnik)



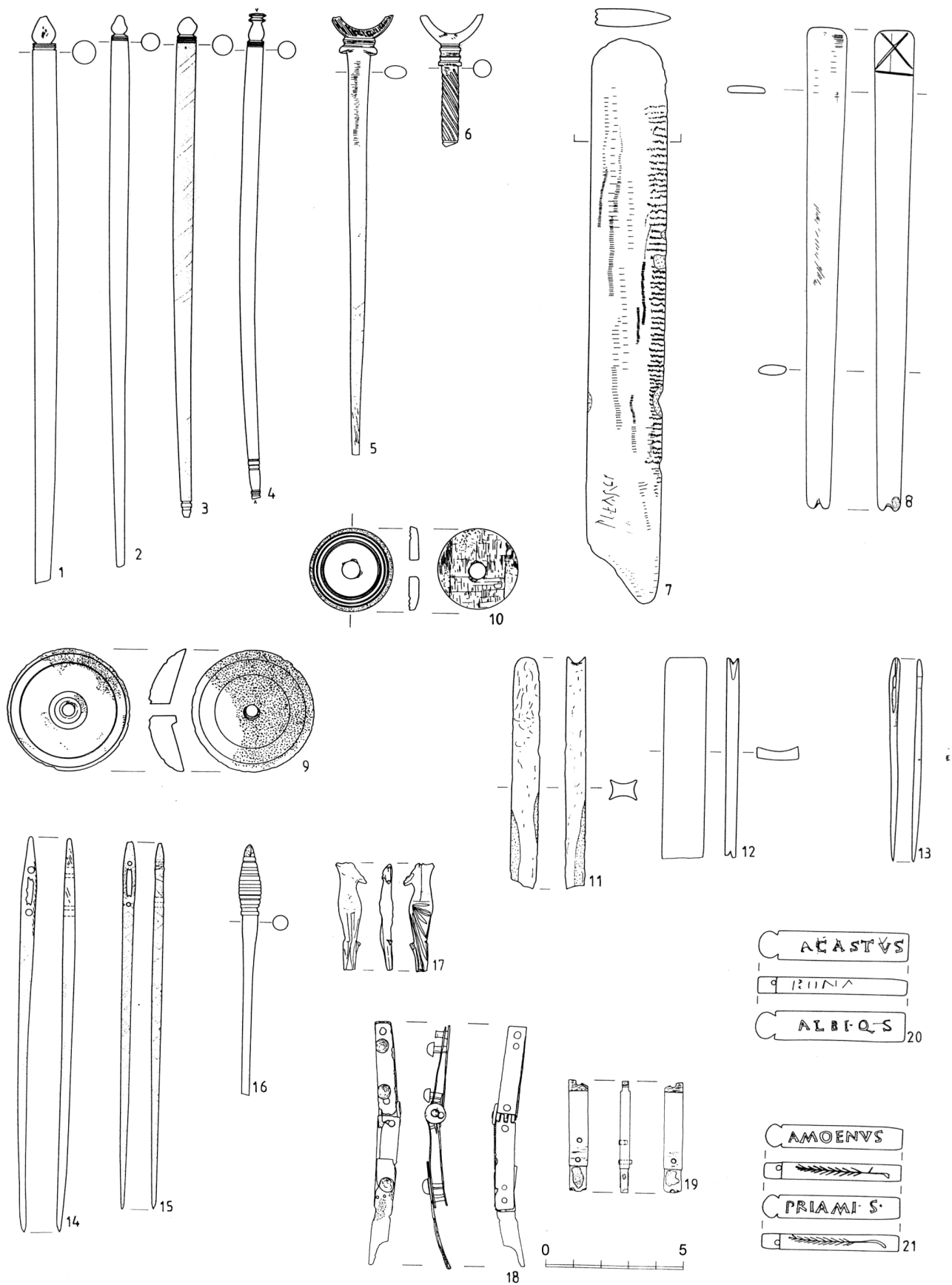


Fig. 5 Magdalensberg: 1-6. distaffs, 7. weaving sword, 8. weaving implement, 9-10. spindle whorls, 11-12. 'bobbins', 13. needle, 14-17. hairpins, 18-19. foot rules, 20-21. tesserae nummulariae: 1-8, 10-17, 20-21. bone, 9. elk-antler, 18-19. bone and copper alloy (K. Gostenčnik)

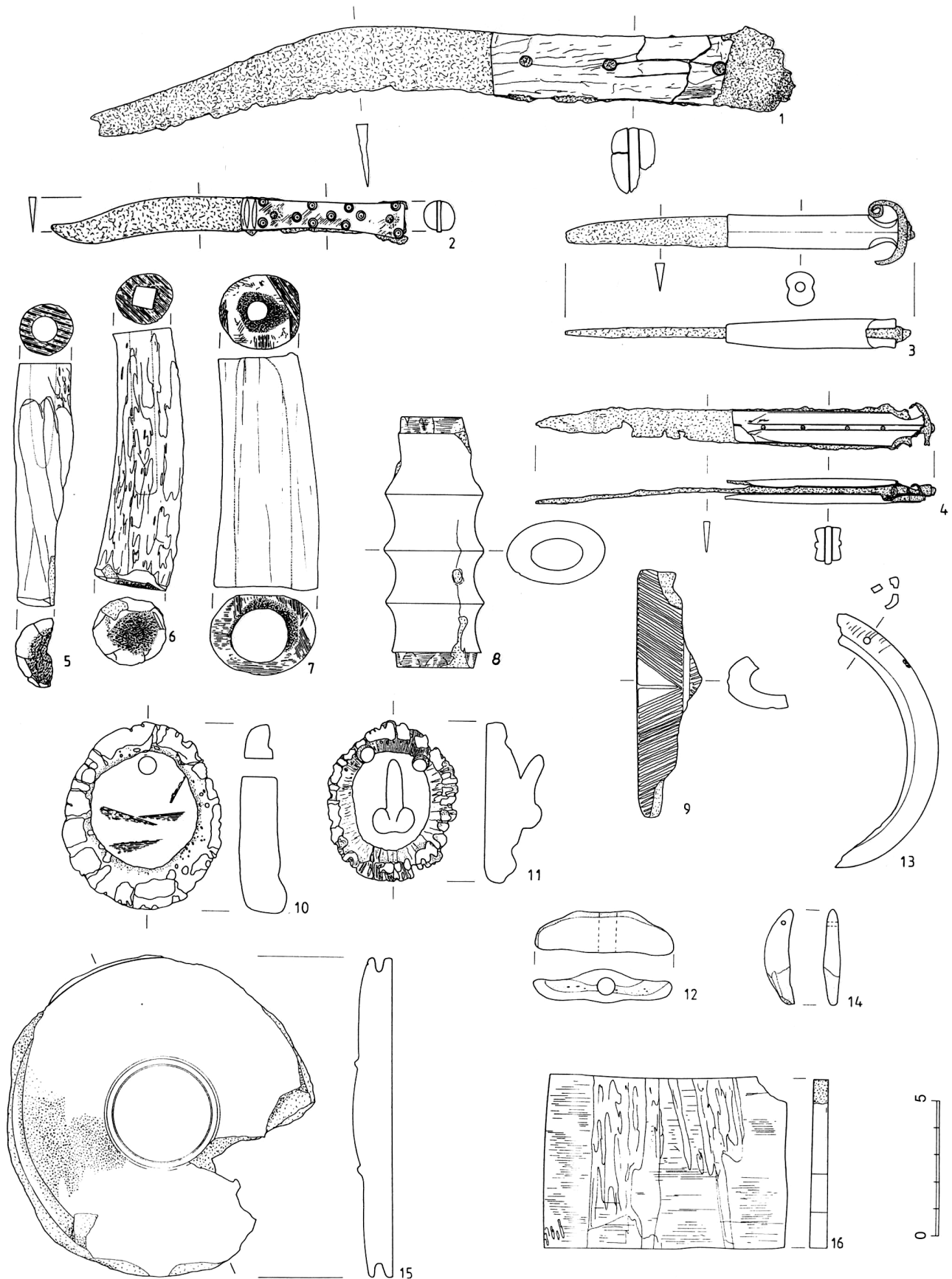


Fig. 6 Magdalensberg; 1-4. knives, 5-7. handles, 8-9. sword hilts, 10-14. pendants, 15. part of a wickerwork basket, 16. workshop waste: 1-2, 4-7, 10-11. elk-antler, 15-16. elk antler, 3. ivory, 4,8-9, 12 .bone, 13-14. teeth (K. Gostenčnik)

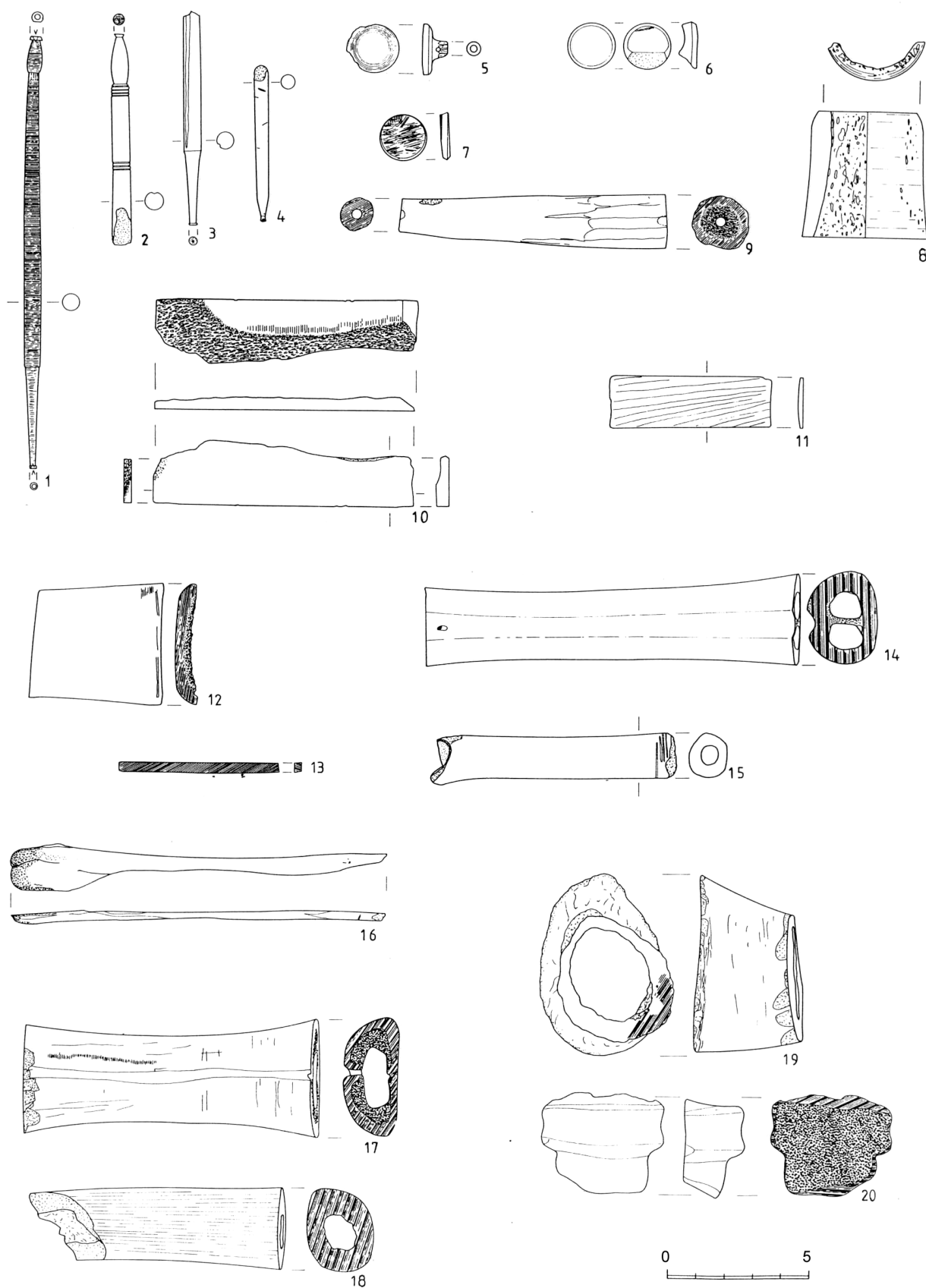


Fig. 7 Magdalensberg; half made specimens and workshop waste: 1-4. *stili*, 5-7. gaming counters, 8. pyxis, 9. handle, 10-11. casket mounts, 12-20. bone waste: 1-8, 10-20. bone, 9. elk-antler, 1-9. lathe-turned (K. Gostenčnik)

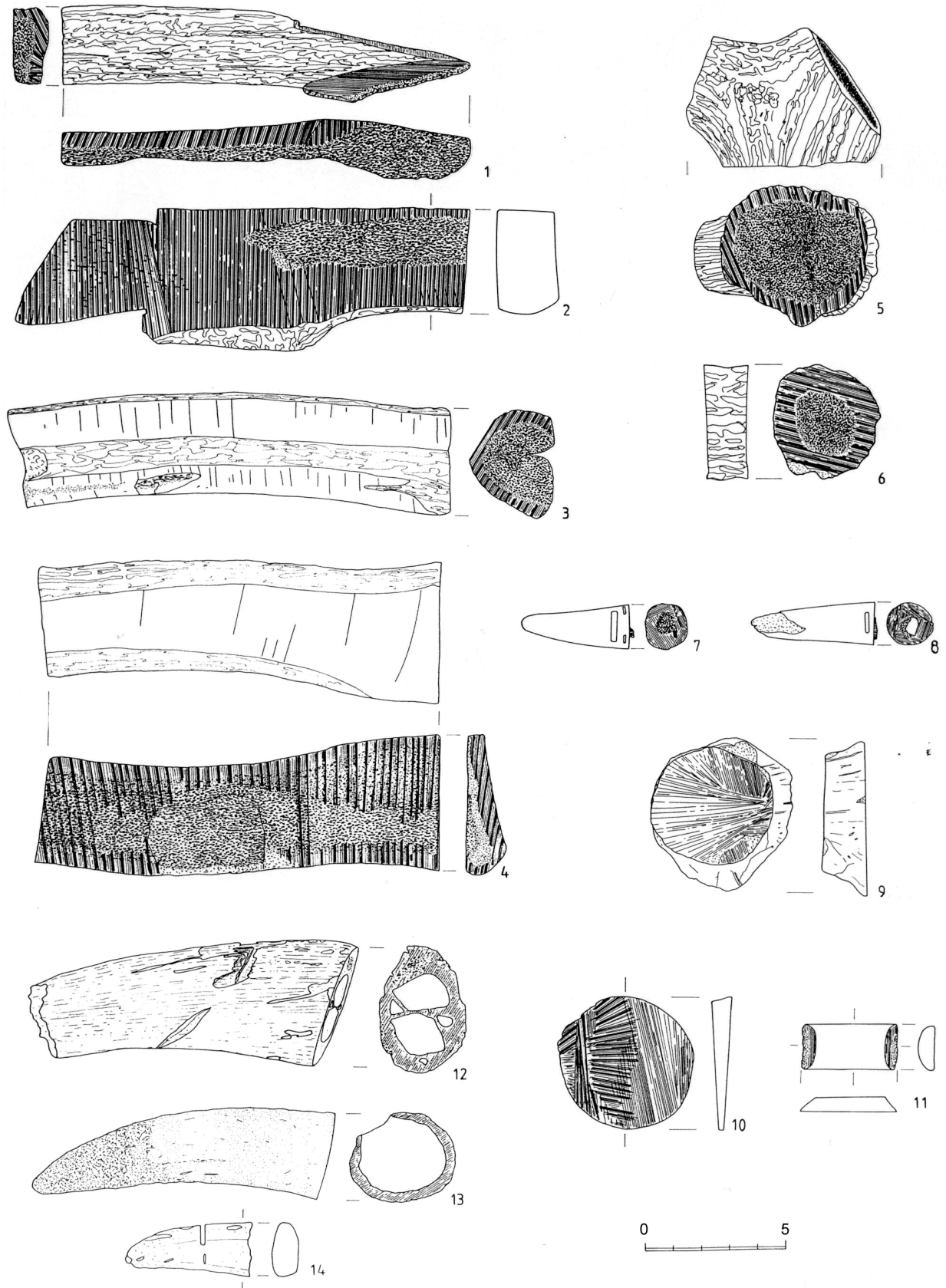


Fig. 8 Magdalensberg; workshop waste: 1-11. elk-antler, 12-14. horn (K. Gostenčnik)



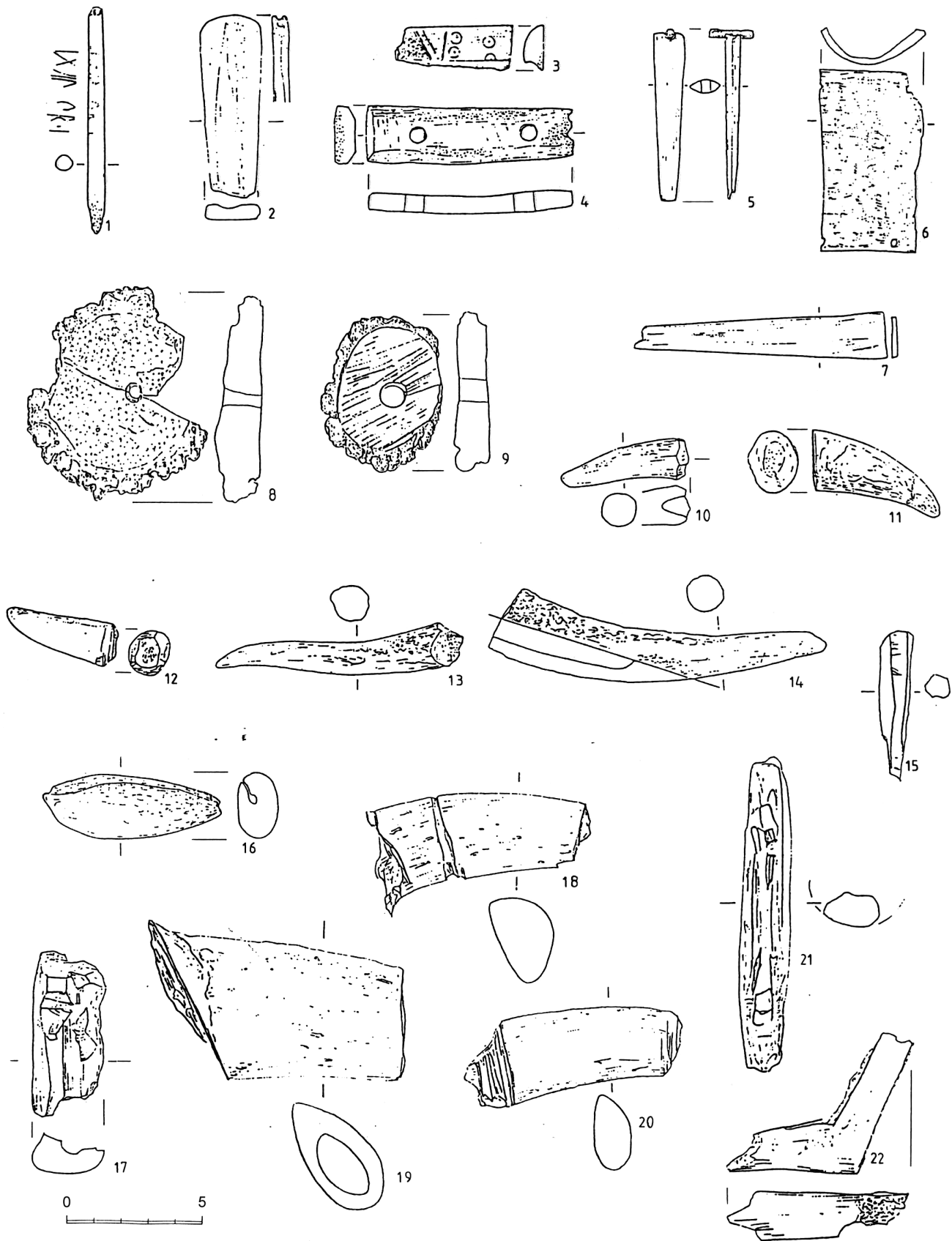


Fig. 9 Gurina; artefacts and workshop waste; 1. stilus, 2. 'bobbin', 3-4. knife handles, 5-7. bone artefacts, 8-9. pendants, 10-22. workshop waste; 1-7, 21-22. bone, 8-15. elk-antler, 16. tooth, 17-20. horn (after P. Jablonka)



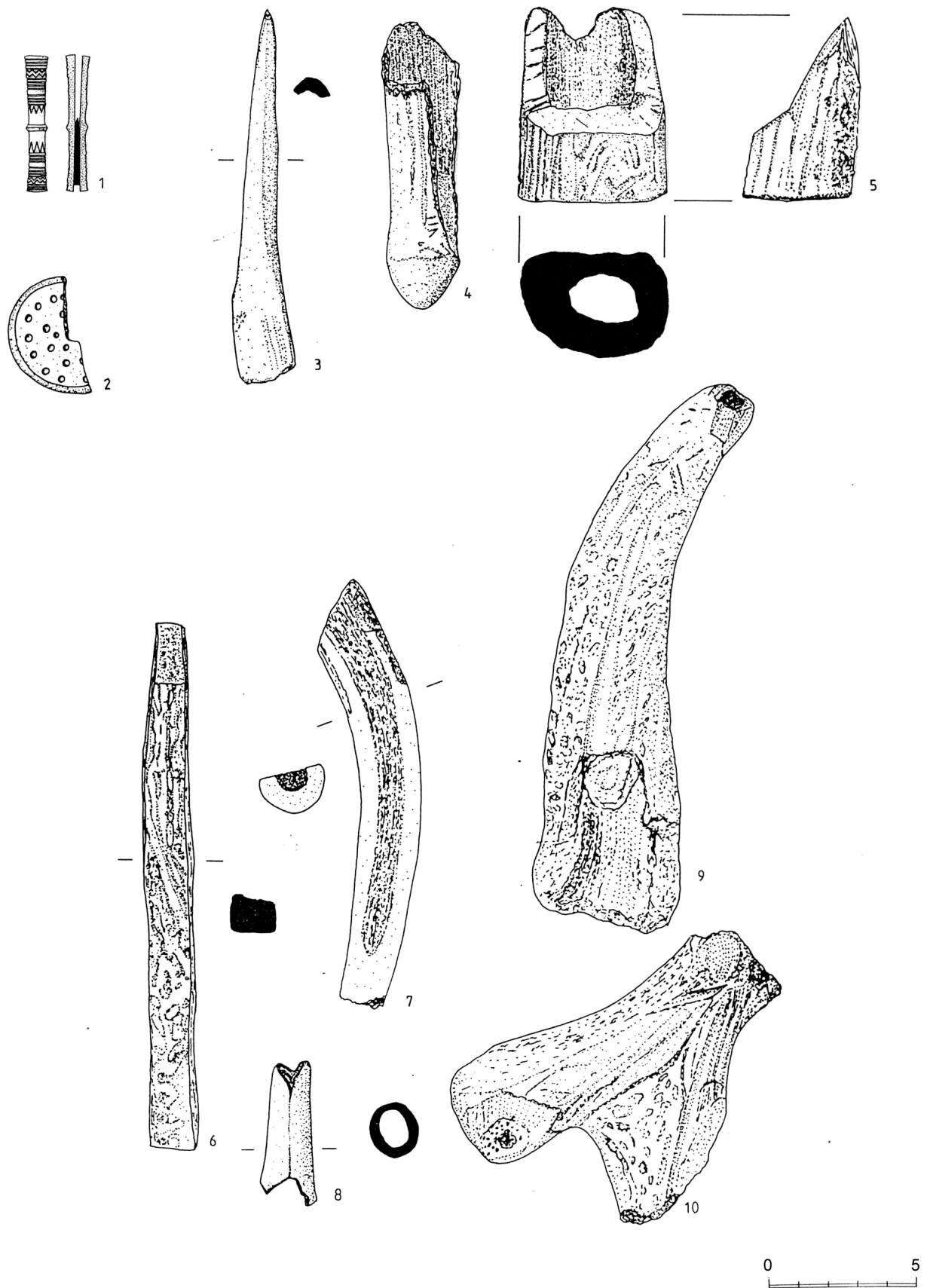


Fig. 10 Rabenstein; artefacts and workshop waste; 1. needle-fragment within handle, 2. disk, 3. point, 4, 7-9. handles, 5. 'Hirschgeweihzwischenfutter', 6. waste, 10. axe: 1. bone and copper alloy, 2-3. bone, 4-10. elk-antler (after G. Vahlkampf)