

# **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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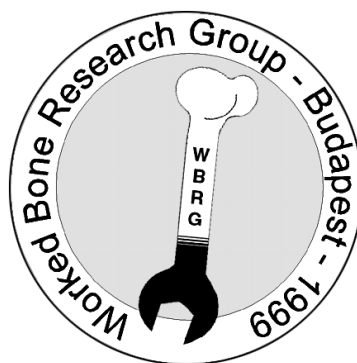
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Participants in the WBRG 1999 Budapest conference (left to right): Ülle Tamla, Elisabeth Brynja, Tina Tuohy, Liina Maldre, Karlheinz Steppan, Heidi Luik, Gitte Jensen, John Chapman, Alice Choyke, Janet Griffiths, Andreas Northe, Noëlle Provenzano, 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 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.



## DOMESTIC AND FUNERARY BONE, ANTLER AND TOOTH OBJECTS IN THE NEOLITHIC OF WESTERN EUROPE: A COMPARISON

Isabelle Sidéra

**Abstract:** Following more than ten years of research on west European Neolithic bone, antler and tooth artefacts, from all the contexts in which these objects are found, including settlements, enclosures, mines and graves, some results of the comparison between settlements and burials are given. Three aspects of funerary material are discussed. Through a presentation of ordinary, everyday objects and more exceptional grave-goods, the aim is to show the quite specific values which they convey and to underline the information that one can hope to obtain from this approach, thus broadening our knowledge of the Neolithic.

**Keywords:** West European Neolithic, settlement materials, funerary materials

**Résumé:** A la suite de dix années de recherches sur les industries en os, bois de cervidé et dents, en considérant tous les contextes qui ont livré ces objets, comprenant habitats, enceintes, mines et sépultures, nous donnerons quelques résultats issus de la comparaison entre les sites d'habitat et les sites funéraires. Trois aspects relatifs au mobilier funéraire sont abordés. A travers la présentation d'objets quotidiens et d'objets funéraires plus exceptionnels, notre but est de montrer la valeur spécifique de chaque type de mobilier et de souligner les informations que l'on peut espérer obtenir de cette approche, pour ainsi élargir notre connaissance du Néolithique.

**Mots-clés :** Néolithique d'Europe Occidentale, mobilier provenant des habitats, mobilier funéraire.

**Zusammenfassung:** Nach mehr als zehn Jahren intensiver Forschungsarbeit an Knochen-, Geweih- und Zahnartefakten aus neolithischen Fundplätzen in Westeuropa, die aus ganz unterschiedlichen Fundkontexten wie z.B. Siedlungen, Anlagen, Bergwerke oder Gräber kommen, sollen hier einige Ergebnisse aus dem Vergleich zwischen Siedlungen und Bestattungen dargelegt werden. Drei Aspekte aus Bestattungsbefunden werden diskutiert. Durch eine Gegenüberstellung gewöhnlicher Alltagsgegenstände und eher herausragender Grabbeigaben wird die spezielle Bedeutung einer solchen Analyse für die Erweiterung unserer Kenntnisse zum Neolithikum betont.

**Schlüsselworte:** Westeuropäisches Neolithikum, Siedlungsfunde, Grabfunde

The research I have undertaken for over ten years on bone, antler and tooth ornaments and tools from the 6<sup>th</sup> to the 3<sup>rd</sup> millennium BC in western Europe has focused special attention on all the types of contexts in which these artefacts occur<sup>1</sup>. Thus, the material from settlements, mines, burials and specialized workshops has been studied in turn (Sidéra 1989, 1991, 1992, 1993, 1995, and 1997, 499). Only by bringing together the objects from these different contexts can we understand the variety within a bone industry in a given culture, obtain the complete panorama of production in this culture and reconstruct the position held by these objects in terms of the society. Once all this evidence has been surveyed, the comparison of cultures and contexts can only be more rewarding.

However, making the most complete list possible of artifacts in these materials also helps us, above all, to grasp the cultural, economic and social facts involved in their manufacture and use. It is of course this line of research that I have pursued, using methods such as technology and use-wear as well as comparing fauna from food refuse with those selected for making tools, in order to broaden our knowledge of the Neolithic.

As will be outlined below, with grave-goods from the late 6<sup>th</sup> and 5<sup>th</sup> millennia in western Europe, the artifacts, raw materials and production techniques all greatly differ according to context and show the range of fields of implication for these objects. In order to illustrate this variety and at the same time lend meaning to it, I will discuss three aspects: the value placed on wild animals, extraordinary objects in graves and differences between domestic and funerary contexts in terms of the speed of diffusion of technical innovations.

As a result of a number of excavations of graves and cemeteries (for example, Trebur [Hessen, Germany: Spatz 1997, 157]; Schwetzingen [Baden-Württemberg, Germany: Behrends 1997, 17]; Bucy-le-Long "la Fosselle" [Aisne, France: Collectif 1996]; Aiterhofen-Ödmühle [Bavaria, Germany: Nieszery 1995]), there has recently been a spectacular increase in funerary data, opening up new paths of research. This new evidence means that the subject can now be approached through bone artifacts.

Research into the use of animals concentrated initially on domestic species, naturally associated with the Neolithic. Little attention was paid to the role of wild animals, relatively infrequent (under 20% and more often under 10%). The last

decade, which has seen the development of archaeozoological studies, as well as research on bone artifacts, has also seen the question of wild animals and their complex relations with man discussed and restored to its just value. The function of wild animals has drawn particular attention because they represent more than simple remains of food consumption. In particular, burial data from the 5<sup>th</sup> millennium indicate that wild animals were an especially important source of raw material for making the artifacts that were placed in graves. A number of original interpretations have been suggested, which take into account the cultural or economic function of hunting, as well as its symbolic, religious or prestige dimension (Audoin-Rouzeau & Desse 1993; S  n  part 1993, 293; Tresset 1993, 247; Vigne 1993, 201; Hachem 1995, 197; Jeunesse et al. 1997, 81.), or even its use as a social code to distinguish individuals within cemeteries (Sid  ra 1994, 15 and 1997, 499).

By combining the new data with the evidence already available, the phenomena which are relevant to the analysis can be identified, emerging at the end of the Linear Pottery culture and at the end of the first stage of the European Neolithic, around 5000 BC. This dynamic period saw the beginning of a new symbolic system which was to last several millennia and take on vast proportions later on during the Neolithic. Finally, it must be stressed that the bone artifacts especially well reflect the new symbolic trends that we are now going to describe.

### 1. Valorisation of the wild in burials at the end of the 6<sup>th</sup> millennium

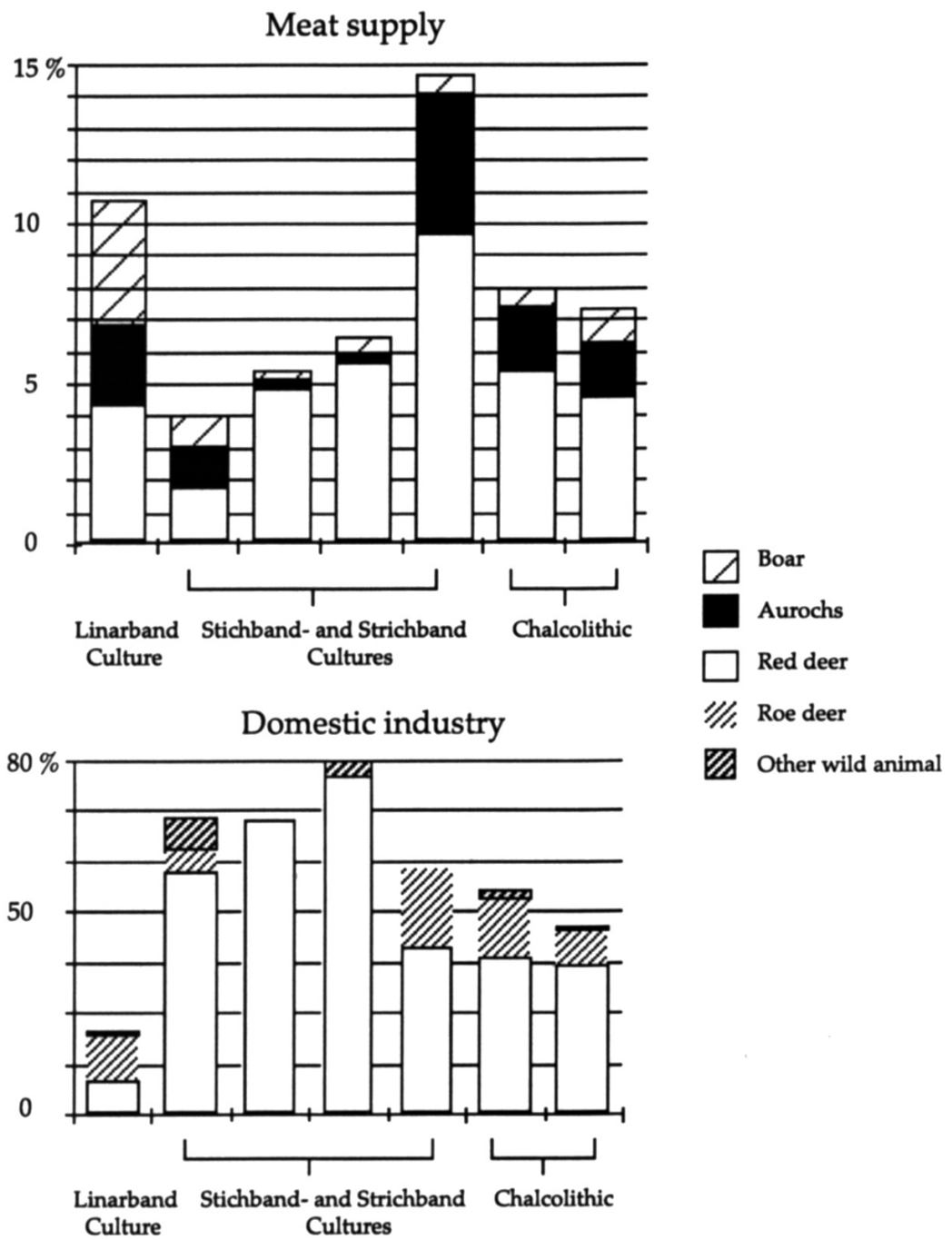
First of all, the evidence from settlements of the western Linear Pottery culture (Rhine and Paris basins) shows a coherent pattern of use of domestic animals for meat consumption and making tools. In this culture, around 5100 BC, craftspeople mainly used the animals that were eaten: cattle, followed by sheep. Hunting was not an important subsistence activity (11% on average<sup>2</sup>), and the rate of use of wild animal bones to produce domestic tools is low but stable (tab. 1). A few of these are artefacts made from tooth and antler, but most are made from bone (fig. 1).

From the end of the Linear Pottery onwards, a new phenomenon appears, and this contradicts previous rules. While the average amount of hunting of wild animals significantly decreases (Sid  ra 1994, 16 ; Hachem 1999, 325), their bones are more frequently used for making objects. Furthermore, red deer are particularly valued, both for hunting and as raw material for artifacts. They become one of the most hunted preys (Tresset 1993, 247; Hachem 1999, 335). Their bones are used more frequently, partly replacing those of cattle and sheep, for making the most common tools (tab. 1 & fig. 2). This double phenomenon begins right at the end of the Linear Pottery and develops above all in the succeeding cultures. Thus in the cultural episode which immediately follows, Villeneuve-Saint-Germain in the Paris basin and Grossgartach in the Rhineland, as well as red deer bones,

shed antlers, rather than antlers removed from hunted animals, play an increasingly important role in the domestic industry (fig. 2). The use of raw materials from living as opposed to slaughtered animals, signifies a new trend within the Neolithic. It reflects changing mentalities and technical processes associated with new objectives in the use of animals (Sid  ra 1990, 264).

The increasing importance of wild animals is clearest in the graves from the very end of the Linear Pottery and from the Hinkelstein culture, its equivalent on the Rhine. They contain abundant and diversified material, including debitage products, tools and ornaments, evoking or representing hunting through the choice of raw materials. In these graves, arrowheads are common and objects made from red deer bone or teeth are very frequently encountered. This material mainly includes beads and pendants made from red deer canines or from more or less realistic imitations in shell or limestone, forming necklaces or dress ornaments (fig. 3.5). One ornament can be made up of several hundred of these items. For example, a woman buried at Trebur (Hessen, Germany) has a necklace of genuine canines from 115 red deer (Spatz 1997, 157). Another female burial, at Bucy-le-Long "la Fosselle" (Aisne, France), contains a headband decorated with genuine canines from 27 red deer, as well as some imitations in limestone (Collectif 1997). Red deer are not the only species represented by these objects. There are also whole or reworked canines of bear and wild boar (fig. 3.4). The wild bestiary is the most complete in the late Neolithic (Cerny culture) and in the Chalcolithic (Michelsberg and Chass  en, Seine-Oise-Marne cultures). In addition to red deer bone and antler, bear and wild boar teeth, there are now bird of prey claws, beaver teeth and hedgehog mandibles.

The significance of hunting expressed through the use of raw materials from hunted animals, at a time when there is an actual decrease in hunting activity, is of course a complex matter which cannot be rapidly explained. While the background of this double phenomenon is probably related to the development of social structures within the Neolithic, itself involving a change in ideology, a thorough overview of society is required, beyond the scope of this article. We can nevertheless add that probable burials of hunters (or warriors ?), characterized by appropriate equipment (loaded quivers, sometimes a war-hammer, side-scrapers for shaping bows and arrows), appear two or three hundred years after the first signs of these new social trends which are more or less closely related to hunting (Sid  ra 1997, 499). Furthermore, these graves containing a large number of varied objects, a mark of esteem for the person buried, lend meaning to all the burials with objects made from hunted animals. These attributes probably act as a code relating to the person's status, especially since the variety of material is not random and bone artifact assemblages are always structured according to more or less invariable rules (Sid  ra 1997).



Tab. 1 Wild animal exploitation



## 2. Extraordinary grave-goods in the Neolithic

Although the artifacts just discussed certainly express very meaningful symbolic values, they remain quite ordinary. The beads that made up various kinds of ornaments worn while the person was alive generally show wear, and few beads, broken or simply lost, are found in settlement refuse (fig. 3.6). In the graves of the Neolithic, certain types of object are much rarer and occur exclusively in funerary contexts. These objects possess other meanings and symbolize complementary aspects of the social structure previously mentioned.

Different types of figurines made from cattle or sheep metapodia, radii or phalanges are completely new in the Linear Pottery culture. These miniatures show clear anthropomorphic attributes. Mother-of-pearl discs or incisions represent the eyes, mouth or nose (fig. 3.1 & 2). These items are associated with both adults and children.

The same applies to the large, long and pointed objects with wear showing that they were used as tools or weapons which occur in certain 5<sup>th</sup> millennium graves, exclusively in the Cerny culture (fig. 3.7 to 9). One of these objects can perhaps be interpreted as having small arms. The bulges on another clearly correspond to hips. All have a bifid ending probably representing legs. The examples made from long bones are perforated in the middle of the central, flat part. Two objects are made from shoulder blades and the scapular spine is perforated at an angle. On the best preserved examples, these perforations show a gloss which quite probably results from hafting, the position of which changed through time. Thus the instrument would have had a haft of indeterminate length that would have given the user a better hold. Given the nature of the macroscopic traces of wear on the points, very similar to wear on ordinary awls (*poinçons*), these instruments were certainly hand held rather than thrown, if they were weapons. Located next to the head in male burials, they were possibly unhafted before being placed in the graves. With these objects, which I propose to call hafted anthropomorphic perforating objects, it is interesting to note how the material and symbolic functions are associated. The combs carved in the cortical mass of a bone or an antler, form another rare type of object found only in funerary contexts. These artifacts, which occur in the Bavarian and Austrian Linear Pottery culture, are finely made and thus contrast with the domestic industry. The teeth of the combs are skilfully shaped, their edges cleverly notched and the known examples are decorated with incisions and round impressions (fig. 3.3). A whole set of materials that can be qualified as extraordinary, as opposed to the everyday production commonly used in settlements, thus occurs in graves, favouring universes which are, like ornament and dress, distinct from the purely material and everyday function exercised by the tools. The anthropomorphic figurines, tools or weapons had precise material functions and at the same time identified specific persons and social statuses within a cemetery. The fact that they are rare indicates the exceptional nature of the bearers of these objects.

## 3. Differential speed of diffusion of technical innovations in domestic and funerary contexts

Together with these extraordinary objects, common domestic types are used more frequently as grave-goods. Certain types appear in a precise chronological phase or stage and are worth commenting upon. For example, bone scrapers, awls and rings are the most common objects in both settlements and graves. Their use as grave-goods and their varied types reveal geographical, cultural and chronological variation that I will not discuss further here, as I would like to draw attention to a more original aspect of this material.

The graves contain artifacts of an ordinary, standard kind which display the same typology of shape and techniques as the material from contemporary settlements. Awls on small ruminant distal metapodia sawn in half are frequent in Linear Pottery graves and frequent in contemporary settlements, for example in Bavaria and Austria (Nieszery 1995; Lenneis et al. 1995). The situation is quite different, however with technical innovations that appear in settlements at a precise, well dated chronological stage, yet only reach the funerary domain much later.

Thus, the specific type of perforating tool made by abrasion of metapodia of small ruminants (*poinçons a la paire*: Poplin 1977, 85; fig. 4.3 to 5) is absent from the whole Linear Pottery sequence in Alsace. Further west, in the Marne, at a stage slightly later than the earliest settlement of Alsace, this type is still missing (Sidéra 1993). In the Aisne and the north-east Paris basin, it is still absent in the following stage, corresponding to the first Neolithic settlement here (Ilett & Plateaux 1995, 116). The type first appears associated with houses dated to the second settlement phase (Constantin & Ilett 1997, 281). The technique gradually becomes more frequent in the subsequent settlement phases. It becomes well attested in the final stage of Linear Pottery in the Aisne, Seine-et-Marne and Yonne and even more so in the succeeding Villeneuve-Saint-Germain stage. It disappears with the end of this culture. Awls made with this technique only appear in graves at the time of their maximum frequency in settlements, that is to say at the beginning of Villeneuve-Saint-Germain culture (Sidéra 1997, 499). This type of awl never occurs in burials which are dated to the Linear Pottery culture. Thus a century has passed between the appearance of this type of awl in settlements and their use as a funerary symbol. This means that technical innovations are integrated at a different rate between settlements and graves, as if the transfer of domestic objects to the funerary domain involved tried and tested objects, or only happened when they became very common in everyday life.

The case of the awl made by abrasion and the time-lag between the appearance of the technique in the settlement and the graves is not unique, since this also applies to a new technique of cutting metapodia of large ruminants to make awls and *outils tranchants*: sawing in quarter. This new technique first appears in settlements of the final stage of the Paris

basin Linear Pottery and then becomes more frequent in the immediately succeeding cultural episode, the Villeneuve-Saint-Germain. This cutting technique scarcely appears in graves before the Cerny culture. The first examples to occur in graves are probably in the Loire and Yonne, and date to about 200 years after the first appearance of this cutting technique in settlements.

Can a rule be made from the difference in the timing of the appearance of technical innovations between settlements and graves, and could this apply to all types of grave-goods? In other words, were the only objects available for the graves objects that were already obsolete, and thus representative of earlier chronological phases? If the speed of diffusion of technical innovations, different between settlements and graves, is a rule which applies not only to bone artifacts but also to certain other types of grave-goods, this implies that, to date a grave, one has to rely on finds duly proven to be representative of a chronological phase or stage. In that case, perhaps unexpected elements could be used to date a grave, rather than the classic material generally employed for this purpose.

These two examples are enlightening, and question the reliability of using grave-goods to date burials precisely. This is particularly clear with the bone industry because technical innovations appear here in a context with detailed chronology, notably due to analyses of ceramics from settlements (Ilett & Constantin 1993, 94; Constantin & Ilett 1997, 281).

## Conclusion

I have tried in this article to show differences in objects and inventories between settlements and graves, in order to demonstrate the necessity and the interest of research that takes into account all the types of context in which the modified animal material is found, if possible with the available evidence. The comparison is rewarding and a source of progress in the understanding of the remains with which we are confronted.

Translation: Mikael James Ilett

## Notes

<sup>1</sup> This research is based on more than 5000 objects from almost eighty sites. The observations on over two-thirds of this material are unpublished.

<sup>2</sup> The average given here should be taken as indicating a trend. The frequency of hunted animals can vary from 0.5 to 25%, and exceptionally even more, depending on the site (Hachem 1999, 325).

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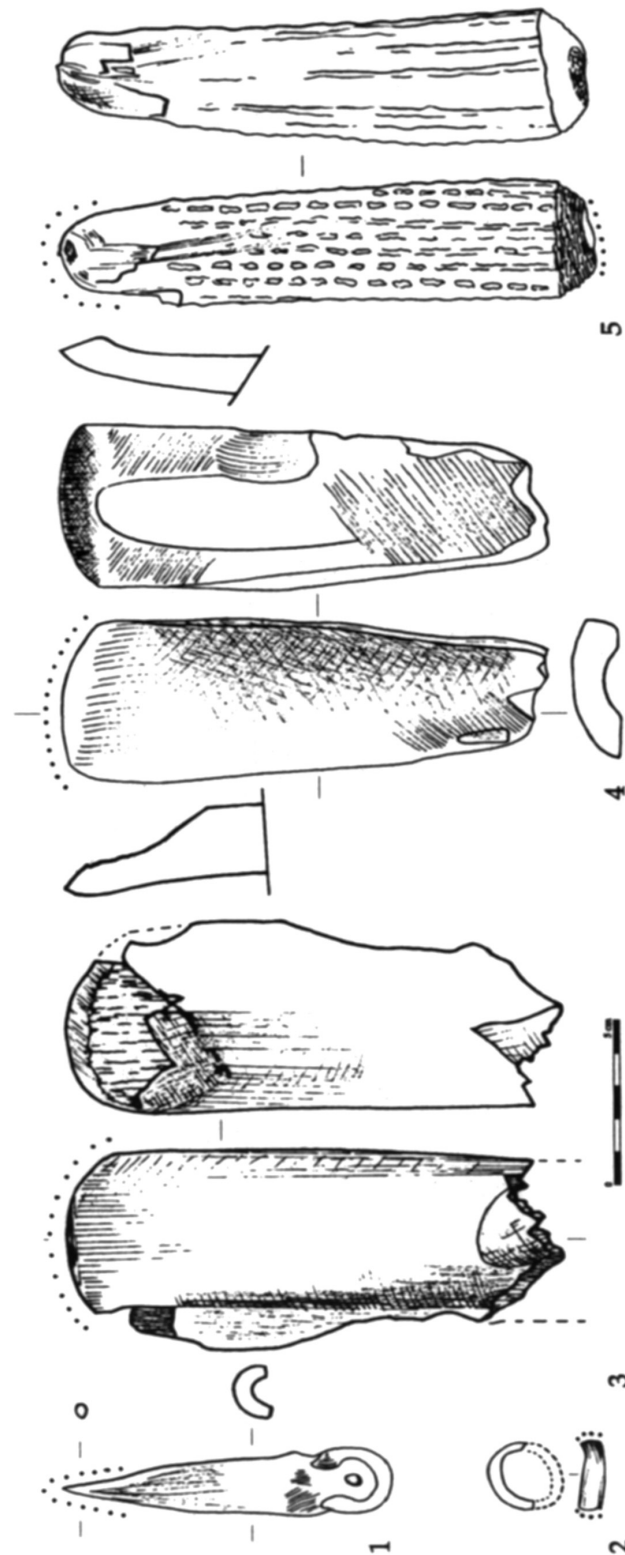


Fig. 1 Linear Band pottery culture settlement tool kit (principal types)

1. Perforating tool made from a distal small ruminant metapodium, sawn in two (Cuiry-les-Chaudardes, Aisne, France). 2. Small ruminant tibia ring (Balloy, Seine-et-Marne, France). 3. Cattle rib scraper (Berry-au-Bac, Aisne, France). 4. "Shoe-last" scraper (Cuiry-les-Chaudardes, Aisne, France). 5. Tine pick (Chamly, Oise, France)



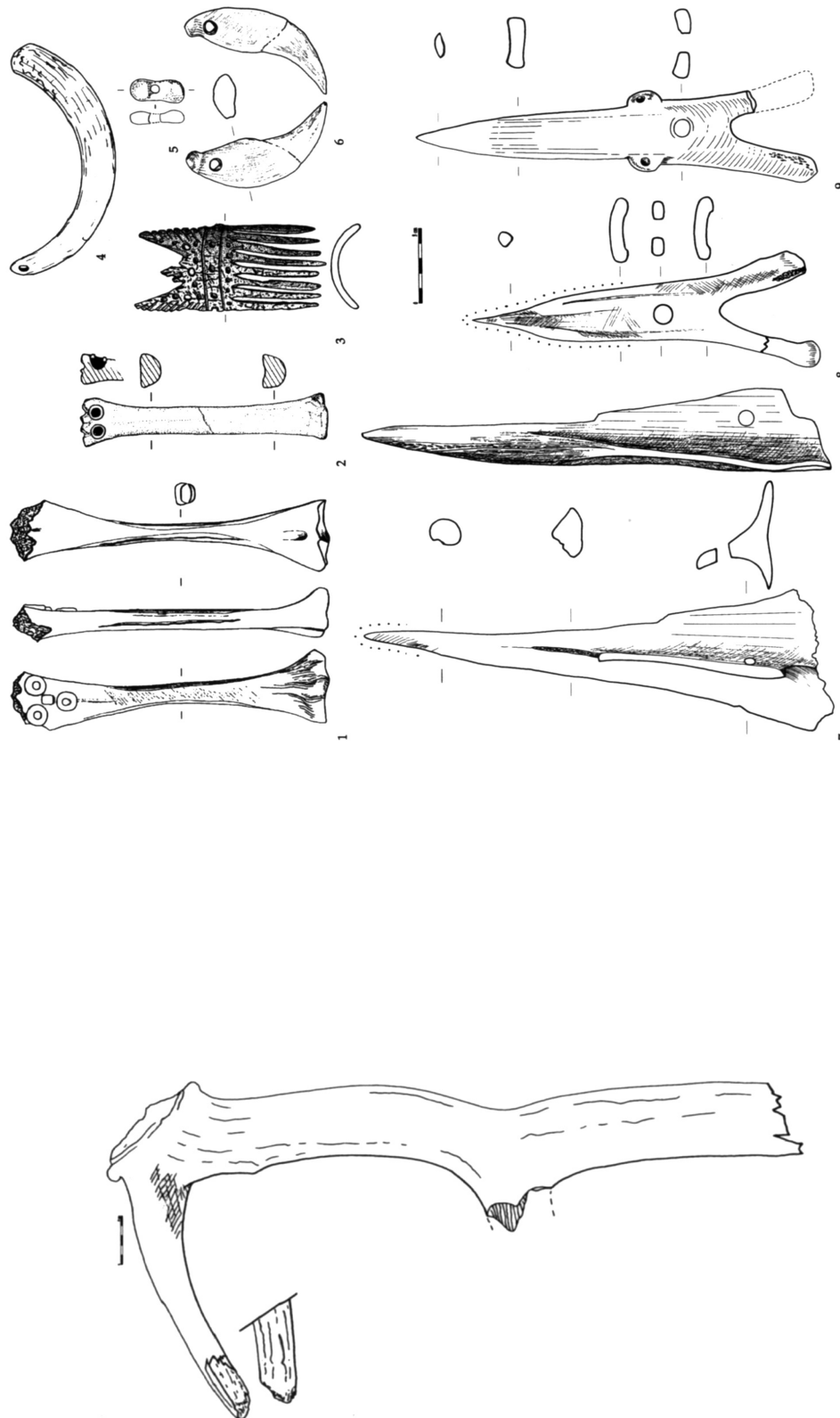


Fig. 2 Antler pick from the Villeneuve-Saint-Germain culture beginning of extensive antler use (Passy, Yonne, France)

Fig. 3 Rare and extraordinary artifacts

- 1 & 2. anthropomorphic miniatures made from small ruminant metapodia with mother-of-pearl features
1. Berry-au-Bac grave 2566 (Aisne, France, final Linear Pottery culture)
2. Ensisheim "Les Octrois" grave 13 (after Gallay et al 1988, 371; Haut-Rhin, France late or final Linear Pottery culture)
3. Bone or antler comb, Aiterhofen-Ödmühle grave 143 (Bavaria, Germany, middle Linear Pottery culture)
4. Perforated boar pendants, Trebur grave 1 (Hesse, Germany, Grossgartach; after Lichardus-Iten 1980)
5. Perforated bead made from a reworked deer canine (Berry-au-Bac, Aisne, France, late Linear Pottery culture grave 196; after Farruggia et al. 1995, 157)
6. Perforated bear canine bead (Cuiry-les-Chaudardes, Aisne, France, late Linear Pottery culture settlement).
- 7 - 9. Anthropomorphic perforating tools or weapons (Cerny culture). 7. Cattle scapula (Balloy, Seine-et-Marne, France, enclosure); 8-9. Long bones, (8. Passy, Yonne, France, grave 6.1) and (9. Passy, no context)



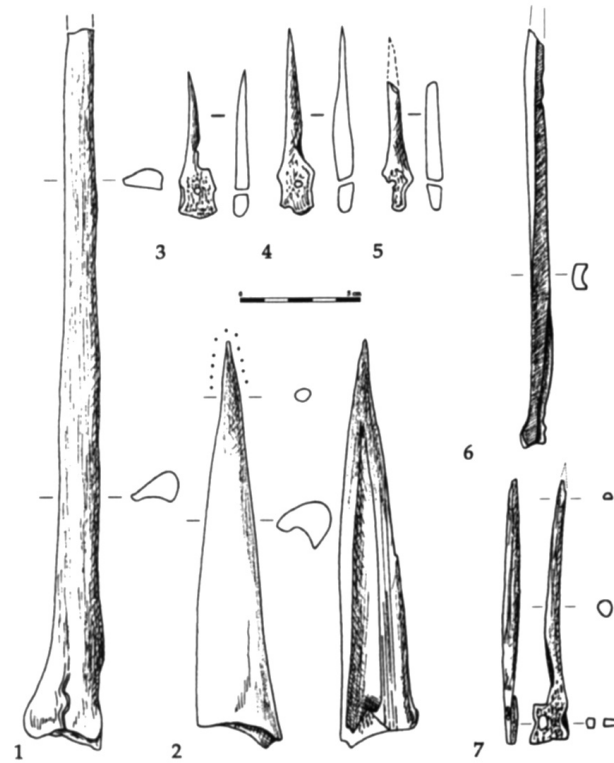


Fig. 4 New types of tools in the Paris basin Linear Pottery and Villeneuve-Saint-Germain cultures:

1& 2. Perforating tools made from proximal big ruminant metapodia, sawn in quarters (Jablins, Seine-et-Marne, France, Villeneuve-Saint-Germain settlement)

3-7. Perforating tools made by abrasion of distal small ruminant metapodia (3-5. Jablins, Seine-et-Marne, France, Villeneuve-Saint-Germain settlement; 6. Cuiry-les-Chaudardes, Aisne, France, late Linear Pottery culture settlement; 7. Balloy, Seine-et-Marne, France, final Linear Pottery culture settlement)