CRAFTING BONE – SKELETAL TECHNOLOGIES THROUGH TIME AND SPACE

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

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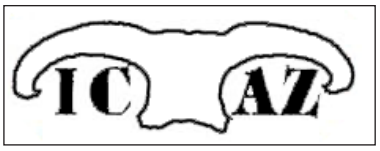

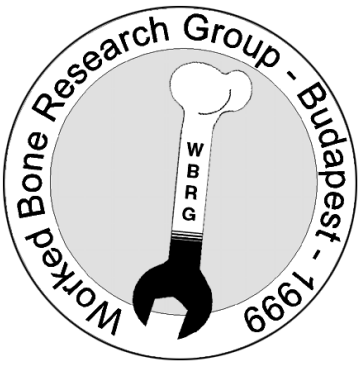

Worked Bone Research Group 2nd Meeting
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Special Assemblages

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 Griffitts, Andreas Northe, Noëlle Provenzano, Jörg Schibler, Nerissa Russell, Colleen Batey, Lyuba Smirnova, László Daróczi-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 n 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 committment 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 traditons 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 sure l'Indistrie de l'Os Prëhistorique*" headed my 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 methodologicial 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 concentate 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 comparitive 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.

THE SOCIAL LIFE OF BONE: A PRELIMINARY ASSESSMENT OF BONE TOOL MANUFACTURE AND DISCARD AT ÇATALHÖYÜK

Nerissa Russell

Abstract: Renewed excavation at the renowned Neolithic site of Çatalhöyük in Anatolia has only begun, but even at this early stage it is possible to discern some intriguing aspects of the bone tool industry at the site. Contrary to the original excavator's claim that no craft activities occurred in what he felt was a 'priestly quarter,' bone tool manufacturing waste has been recovered from this area. Worked bone at the site includes intensively used utilitarian tools, mostly points; and large numbers of ornaments, mostly rings and pendants. Both points and pendants are repaired and reused; both tools and ornaments are also frequently discarded in an apparently fully usable state. In this paper, I use technological and contextual evidence to probe the roles of worked bone objects in Çatalhöyük society.

Key words: Çatalhöyük, Neolithic, Anatolia, manufacture, discard

Résumé: La reprise des fouilles sur le célèbre site de Çatalhöyük en Anatolie est toute récente. Il est cependant possible, à ce stade précoce des investigations, de pointer quelques aspects particuliers concernant l'industrie de l'os. Contrairement aux déclarations du premier fouilleur, selon lesquelles aucune activité artisanale n'avait été pratiquée dans ce qu'il considérait comme un quartier à vocation religieuse, des déchets de fabrication d'objets en os ont été retrouvés dans cette zone. Les objets en os retrouvés sur le site comprennent des outils montrant une utilisation intense, des pointes pour la plupart, ainsi qu'un nombre important d'éléments de parure, anneaux et pendeloques essentiellement. Pointes et pendeloques sont réparées et réutilisées; outils et éléments de parure sont également souvent abandonnés dans un état parfaitement utilisable. Dans cet article, j'utilise des données technologiques et contextuelles pour montrer le rôle des objets en os dans la société de Çatalhöyük.

Mots clés: Çatalhöyük, Néolithique, Anatolie, fabrication, déchets

Zusammenfassung: Aktuelle Ausgrabungen in dem berühmten neolithischen Fundplatz Çatalhöyük in Anatolien erbrachten bereits in dieser frühen Phase Hinweise auf bemerkenswerte Befunde zu einer lokalen Knochenindustrie. Im Gegensatz zu der ursprünglichen Auffassung der Ausgräber, daß in diesem "Heiligen Bezirk" keine handwerklichen Aktivitäten zu erwarten seien, wurden in diesem Areal dennoch Produktionsabfälle gefunden. Die bearbeiteten Knochen umfassen stark abgenutzte Gebrauchsgeräte, zumeist Knochenspitzen und eine große Zahl an Schmuckobjekten wie Ringe und Anhänger. Sowohl Spitzen wie Anhänger wurden repariert und wiederbenutzt. Geräte wie auch Schmuckstücke hat man häufig ausrangiert, offenbar in vollkommen einwandfreiem Zustand. Im vorliegenden Beitrag stütze ich mich sowohl auf technologische als auch aus dem Fundkontext ersichtliche Befunde, um die Bedeutung der Knochenartefakte für die in Çatalhöyük lebende Gemeinschaft zu beleuchten.

Schlüsselworte: Çatalhöyük, Neolithikum, Anatolien, Herstellung, Ausschußware

In the 1960s, James Mellaart spent three seasons excavating the Neolithic site of Çatalhöyük near Konya in central Anatolia, a large tell dating from about 7500-6500 BC. The site rapidly became famous for its size (13 hectares), its elaborate architecture, and especially its spectacular wall paintings and plastered bucrania (Mellaart 1967, Todd 1976). Mellaart also described a rich bone industry: "[b]one tools and implements are very common and range from oval cups and scoops to ladles, spatulae, cosmetic tools (spatulae ending in little carved hand forks, ointment sticks, etc.), to pins, bodkins, awls, punches and polishers for leather working" (Mellaart 1967:214-215). He also refers to knucklebone gaming pieces, belt buckles, antler toggles, bone wrist-guards for archers, hafts, one antler sickle handle, one carved handle for a flint dagger, amulets, pendants, rings and beads. Mellaart argued for specialized craft production on the basis of the high quality of many of the artifacts, and because he found no evidence for craft production in the area he excavated (Mellaart 1967:211), which he believed was a 'priestly quarter'.

In 1993, a major new project was initiated at Çatalhöyük under the direction of Ian Hodder of Cambridge University. After three years of mapping and surface collection, four

N / Column %	Midden	Fill	Burials	Floor	Sweepings	Pit fill	Special deposits	Walls	Bin fixtures	Stabling	Mixed	Total
Point	76 / 51%	53 / 46%	2 / 15%	12 / 55%	3 / 23%	6 / 50%	10 / 36%	3 / 60%		1 / 100%	15 / 60%	181 / 47%
Rounded point		2 / 2%										2 / 1%
Needle	13 / 9%	3 / 3%		1 / 5%	1 / 8%	1 / 8%	1 / 4%				1 / 4%	20 / 5%
Chisel / Gouge		1 / 1%										2 / 1%
Chopper		1 / 1%										1 / < 1%
Pottery polisher	2 / 1%					1 / 8%	1 / 4%					4 / 1%
Plaster tool	2 / 1%	5 / 4%		1 / 5%								8 / 2%
Spoon	1 / 1%		1 / 8%									2 / 1%
Spatula							1 / 4%					1 / < 1%
Bowl / Cup		1 / 1%										1 / < 1%
Handle							1 / 4%	1 / 20%				2 / 1%
Ornament	3 / 2%	1 / 1%									1 / 4%	5 / 1%
Pendant	5 / 3%	5 / 4%	4 / 31%	3 / 14%		1 / 8%	1 / 4%					19 / 5%
Bead	7 / 5%	6 / 5%		1 / 5%	1 / 8%	1 / 8%					1 / 4%	17 / 4%
Ring	22 / 15%	17 / 15%	6 / 46%	1 / 5%		1 / 8%	5 / 18%				5 / 20%	57 / 15%
Harpoon		1 / 1%										1 / < 1%
Fish hook	1 / 1%	3 / 3%		1 / 5%					1 / 50%			6 / 2%
Pressure flaker				1 / 5%				1 / 20%				2 / 1%
Punch	1 / 1%											1 / < 1%
Soft hammer		2 / 2%					1 / 4%					3 / 1%
Hammer							1 / 4%					1 / < 1%
Preform / Waste	7 / 5%	6 / 5%					2 / 7%		1 / 50%		1 / 4%	25 / 6%
Indeterminate	9 / 6%	8 / 7%		1 / 5%	8 / 62%	1 / 8%	4 / 14%				1 / 4%	24 / 6%
Total	149	115	13	22	13	12	28	5	2	1	25	385

Tab. 1 Tool types by context type

years of excavation have now been completed (Hodder 1996a, 1996b, 1997; Hodder and Matthews 1998). Four site areas are being excavated in the new project: South, which is a continuation of Mellaart's excavations; Summit, just to the east of the South area, but currently in much later levels; North, on the northern hump of the mound about 200 meters away; and BACH, immediately to the southeast of the North area. As a major goal is to reach the earliest levels of the site, which Mellaart was unable to achieve, effort has been concentrated in the South area, and by far the greatest volume has been excavated here. Work is proceeding far more slowly than in Mellaart's excavations, but with much greater attention to systematic recovery and careful recording of context. One major difference is that while artifacts were simply handpicked from Mellaart's excavations, in the new project all sediments are screened through 4 mm mesh or else put through flotation.

Here I report on the 415 bone tools that I have recorded from the excavations of the new project. For this paper, I am excluding the tools from the Summit area, which are being studied separately, from the Konya Plain Ancient Landscape Project (KOPAL) trenches that are essentially unstratified, from the Chalcolithic West mound, and from the Roman burials in the BACH area, leaving 385 tools in this analysis. The bone tools from the surface collection have been described elsewhere (Martin and Russell 1996). The tools treated here include all worked bone recognized by the excavators or found in the animal bone that has so far been analyzed. Since much of the animal bone has not yet been studied, many more tools no doubt remain to be discovered. Nevertheless, the current assemblage is sufficiently representative to offer some preliminary statements about the bone industry at Çatalhöyük. For this analysis, I will ignore temporal differences within the Neolithic sequence at Çatalhöyük, and treat the assemblage as a unit. In addition to the taxonomic and taphonomic data recorded for all animal bone at Çatalhöyük, I have noted morphological information for the tools, and examined them for microwear using a binocular light microscope at 40X magnification.

As is true of many Neolithic sites, the majority of bone tools (nearly half) are points (a term I use to designate any pointed tool, including what are often referred to as awls, pins, perforators, and so on). More than a quarter of the worked bone can be classified as ornaments, mostly rings. Other categories are far less frequent. Most of the bone tool types described by Mellaart from the earlier excavations have been found, with some exceptions, such as belt buckles (tab. 1).

My object in this paper is not to provide a systematic description of the bone tools at Çatalhöyük (see Russell 1996, 1997, 1998, 1999 for a preliminary version of this). Rather, I wish to explore attitudes toward bone as a raw material and the meaning of worked bone objects at the site. I will focus on manufacturing and discard practices.

Manufacture

It is noteworthy that in contrast to Mellaart's assertion that craft activities did not take place in the area he excavated, preforms and waste from the manufacture of bone tools have been found in the South area, as have remains of obsidian working (Underbjerg 1998). It is likely that these were simply not recognized in the earlier excavations. Since Mellaart saw Çatalhöyük as a proto-city, he was probably expecting separate workshops with massive amounts of manufacturing waste. He felt that these must be located in a craft quarter elsewhere on the tell, while he had excavated a priestly quarter (Mellaart 1976:141). However, there is every indication that most production at Çatalhöyük occurred at the household level, leaving only relatively subtle traces. It is likely that there was some degree of part-time specialization and inter-household exchange, however. Obsidian caches and, as described below, bead-making are concentrated in certain houses and not others. As far as the bone is concerned, there would not be very much recognizable waste. Since the ancient inhabitants seldom used the groove-and-splinter technique to make the points (the most common tool type), but rather roughed out the shape by fracture, the waste would not usually be detectable. This applies to many of the other tool types as well.

There is some evidence for manufacture, though. The most interesting case occurs in House 18 in the South area. Four separate deposits in this house each have one or more unfinished bone beads, representing two manufacturing techniques (often in the same unit) and three bead types. Some are made by cutting and breaking tubular segments from long bone shafts, and others by grinding chips of large mammal long bone into shape and piercing them. A flat and a more globular shape of these perforated beads are both represented. One of them came from the basal deposit on the floor of a bin. The other three are from oven rake-out deposits in another room in the same house; another rake-out contains waste from making a flat bone 'needle'. These deposits appear to include not only the ash and charcoal swept from the oven, but also the sweepings from the rest of the floor. Incidentally, they usually contain much obsidian debitage, indicating that knapping was regularly practiced inside the houses. These units represent the rake-out from three separate ovens in different areas of the room, and from three different phases. Thus the bead-making was not an isolated event, but an ongoing activity throughout the lifespan of the house. It must have been of a much greater intensity than is suggested by the seven unfinished beads recovered in these units. Most or all of these appear to have been swept up accidentally, as only two are broken, so there must have been many more beads that were successfully manufactured in this house. This might conceivably indicate that a single person was present throughout the occupation of the house, or else that a family tradition of bead-making was passed through the generations.

At Çatalhöyük there is a continuum, rather than a dichotomy, from bone tools that are produced and discarded extremely

casually with minimal modification, to those that are painstakingly crafted and carefully finished. This distinction cross-cuts tool types: there are both crude and carefully finished ornaments, with much variability in between, just as the points span the whole range from pointed fragments used without further modification to intensively ground, carefully shaped tools that must have been prized possessions. Thus sometimes the main consideration was to accomplish the task at hand, but other tools were bound up with the identity of their maker/user.

Another approach to the valuation of bone tools, or at least of bone as a raw material, is to examine the amount of care taken to increase the number of tools made from a given bone and to extend the use life of the finished tools. This can be seen most clearly in the most common bone tool type, the points. At Çatalhöyük, the points are made overwhelmingly on the metapodials of sheep and goat (at least 74%; 94% if one includes those that can only be identified as 'medium-size mammal', the vast majority of which are surely sheep/goat). Other bones are occasionally used, but these points are almost always very crude and expedient, and are discarded after only brief usage without resharpening. One has the sense that other bones are definitely a second choice, and that points made on them are not worth much effort. Metapodials are no doubt favored because they are straight and have a dense cortex; it may also be relevant that they have no meat. The easiest way to make a point on a metapodial is to snap the bone and sharpen the tip. This yields one, or at most two, points per metapodial. It is also possible to split the bone longitudinally. This is more work, but potentially produces two or even four points from a single metapodial (fig. 1). The Çatalhöyük points show an extremely high rate of splitting (89.5%; see table 5 in Russell, this volume) in comparison to other sizable Neolithic bone tool assemblages I have studied.

A different indication of the value placed on the points is how often their use life is extended through resharpening. Since most of the points could have been manufactured with very little labor, this is probably primarily a measure of the value placed on the raw material. As with the splitting, Çatalhöyük has an extraordinarily high rate of resharpening compared to other Neolithic assemblages (87.2%; see table 6 in Russell, this volume).

Thus both the splitting and the resharpening rates tend to suggest that sheep/goat metapodials were not in fact very easily available to the makers of bone points at Çatalhöyük. Either there was uneven access to these animals and their remains, or they were slaughtered quite rarely. The heavy processing of the animal bones, especially those in the sheep size range, at Çatalhöyük supports the idea that these animals were eaten only occasionally, and then every effort was made to extract all possible nutritive value. On the other hand, not all metapodials were used for tools, so the demand did not exceed the supply in the long run. But a sheep/goat metapodial may not always have been available when a point was needed.

The ornaments do not lend themselves so readily to this kind of analysis, as there do not appear to be such well-defined alternative approaches. However, similar considerations may apply. Rings are the most common type of bone ornament. Most rings are made by a very standardized process. A long tube is detached from a sheep/goat femur by using the cut-and-break technique at each end. The outer surface of the bone is then given preliminary grinding and smoothing with fine-grained sandstone. Then the tube is divided into segments with more cut-and-break, and sandstone is used to grind smooth the rough edges that result. Next the inner side of the ring is scraped with an obsidian tool to thin and smooth it, and usually there is further abrading on the outer side. Some rings appear to be finished by polishing with a soft material. There is, naturally, an exception to prove the rule: 4836.F59, a ring that appears to have been made by someone who didn't know how. The edges are ground with sandstone in the usual fashion, but the inside is smoothed with sandstone and in a direction perpendicular to the usual one. The outside is ground with sandstone but very crudely, forming facets. The cortex is thinned mostly from the outside rather than the inside. The contrast of this ring with those made the 'right' way must have been as obvious to its maker's contemporaries as it is to me, and points up the strictness with which the accepted procedure is normally adhered to. Indeed, life in general seems to have been governed by very strict norms at Çatalhöyük.

The exclusive use of femora for rings (really the only bone with a round enough shaft to work well) may have created a demand for raw material similar to that for the metapodials for bone points. If sheep were slaughtered rarely, femora may not always have been available and may have been sought out or curated. One intriguing suggestion of such curation comes from a burial in House 1 in the North area. Five bone rings were found in the grave: one was in place on the thumb, the others seemed to have slipped in two pairs from the index and middle fingers (fig. 2). All five were cut in sequence from a single femur. Two of them had been worn on the same finger extensively in life (this could be seen by matching wear on the surfaces, and by the edges wearing into each other); these were not on the same finger of the skeleton, however. The others had less wear. Thus they had been rearranged on the dead body for the burial. Indeed, it would be very difficult to do anything wearing five bone rings, so they were probably rarely worn all at the same time in life. It may thus be that the rings were made all at one time and kept by one person, who wore some more than others. Or perhaps the tubular preform was kept, and new rings made and worn as time went on, conceivably marking some kind of life events. In either case, there must have been a close relationship between the maker and the wearer of the rings.

There is also another type of ring at Çatalhöyük, much rarer, more elaborate and more difficult to make. The manufacturing process is quite different. Instead of cutting them from a natural tube, they are carved longitudinally from a piece of thick long bone cortex that could probably only come from

large cattle. The hole in the center of the ring and the entire form must be carved out with obsidian tools and smoothed with sandstone. The reason for this much trickier undertaking is that these rings are not simple bands, but are embellished with a knob on a pillar that stands up well above the ring (fig. 3). These rings would have been extremely awkward to wear and would have prevented almost any practical use of the hand. Clearly they are making a statement about being worn on special occasions, and they certainly would have had a very dramatic effect, standing as much as three centimeters above the fingers (fig. 4). The details of the form and decorative notching of the pillar and the knob are different on each of the four examples so far discovered. Combined with the standardized manufacturing technique, this indicates that there was room for variation within limits, so that these rings and probably many other bone artifacts were simultaneously expressions of community and of individuality.

Bone pendants at Çatalhöyük can be simple or elaborate, crudely or carefully finished. Interestingly, broken pendants are sometimes repaired. This may be in some ways analogous to the resharpening of bone points, although I suspect it has more to do with wanting to maintain an attachment to a treasured object with particular associations than conserving raw material. Of course, wanting to continue using a favorite tool may have been as strong a motivation for resharpening the points as the limited availability of metapodials. The most striking instance comes from a child's burial, again in House 1 in the North area. The original pendant was rather elaborate, perhaps a stylized figurine. The perforation was near the top, there was a raised knob in the center surrounded by an oval incision, two horizontal incisions define a 'waist', and the base is marked by diagonal incisions. It was burned to a very even deep black, probably deliberately by burying it in soil and lighting a fire on top. It then broke lengthwise through the perforation. The two halves were repaired by regrinding and repiercing into two smaller pendants, but this time much less thoroughly smoothed and polished. One can imagine a parent hastily reworking a broken pendant for a child, or a child inexpertly adapting the pieces of a cast-off broken pendant for his/her own use, among other scenarios. In any case, it is interesting that the two halves were kept together. There are signs of at least a little wear in the new perforations, so the repair was not made for the funeral.

A shell pendant has also been repaired and reperforated in a similar manner, as have four needles (in fact perhaps netting tools or some such, with flat beveled tips). There are also examples of a different kind of repair. A small bead that is roughly globular on the bottom and thinned at top where it was perforated had broken through the perforation. It was then 'repaired' by grinding down the broken edges into a bevel. It was not redrilled, though, and it is hard to see how it could be, as it becomes too thick immediately below the perforation, and really is too small to move the perforation down in any case. So it could not have been suspended again, but it must have been valued enough to rework the rough edges and keep in a pouch as an amulet or the like. Likewise, a pendant has been repaired by grinding smooth the rough edges after it broke through the perforation, but was not redrilled, so could no longer be worn as a pendant. Thus bone artifacts of various sorts are often worth the trouble of repairing.

The strong associations of points with metapodials and rings with femora can largely be explained by the suitability of these bones for those tool types. However, sometimes the reason for the association of body part with tool type is less obvious. This is particularly the case with a class of artifacts I am tentatively labeling 'plaster tools'. These tools have polish and striations that resemble those created by polishing very fine-tempered pottery. However, the shape does not make much sense for a pottery polisher, and there is in fact very little pottery at Çatalhöyük. I suspect that these tools may be used to form the plaster reliefs and architectural features (benches, pillars, platforms, etc.), and perhaps the mud bricks. They are made exclusively on cattle scapulae, most often by knocking off a large segment of the blade and creating a long beveled edge along it. One large cattle scapula, however, has been made into a rough cylinder with much careful flaking and grinding. It was clearly used to burnish something, and the striations match those of the beveled tools. What is most striking about it, though, is that whatever it was used for could have been done far more easily with an unmodified long bone. And yet its maker felt it necessary to go to a great deal of trouble to make it out of a scapula. I can only conclude that the association of scapulae and plaster work or wall construction was so great that to use a long bone would have been unthinkable. Unmodified scapulae have also been found built into walls, completely concealed, a further indication of this connection. Unmodified large mammal scapulae are also found in other kinds of special deposits less obviously connected to walls, but certainly indicating that this bone could carry special meaning.

Discard

Given these indications that bone tools are often highly valued and curated, it is surprising how frequently complete and apparently usable tools are discarded. This goes well beyond what one would expect from occasional accidental loss. Outside of burial contexts, it is primarily the points that are discarded while still usable (tab. 2). The complete rings, pendants, other ornaments, and other tools found in middens, fills, and other contexts can probably mostly be explained by accidental loss and the like. But the points are a different matter.

I have divided the points into four categories, excluding those where excavation damage prevents such classification: 1) points that have been discarded while complete and still usable, 2) points that are too dull to use but could be resharpened, 3) points that are used up (dull and too short to resharpen), and 4) broken points. There is naturally some judgment involved in deciding whether or not a point is too dull or has room for another resharpening, just as the past inhabitants of Çatalhöyük would have exercised their judgment, but I feel that the general distribution among these categories is reason-

N Category %		Mid-den	Fill	Burials	Floors	Sweep-ings	Pit Fill	Special Depo-sits	Walls	Bin Floors	Stab-ling	Total
Points	Complete, Usable	20 33%	16 41%	1 100%	1 11%	2 100%	1 25%	2 33%				43 34%
	Complete, Resharpenable	13 21%	6 15%		1 11%		1 25%					21 17%
	Complete, Used Up	9 15%	2 5%		1 11%			1 17%	1 50%			14 11%
	Broken	19 31%	15 38%		6 67%		2 50%	3 50%	1 50%		1 100%	47 38%
Rings	Complete		2 18%	5 83%	1 100%							8 19%
	Broken	19 100%	9 82%	1 17%				5 100%				34 81%
Pendants	Complete	1 33%	3 75%	4 100%	1 50%%		1 50%	1 100%				11 69%
	Broken	2 66%	1 25%		1 50%		1 50%					5 31%
Other Ornaments	Complete	3 38%	6 75%		1 100%	1 100%						11 61%
	Broken	5 63%	2 25%									7 39%
Other Tools	Complete	2 8%	8 40%	1 100%	3 60%		1 33%	2 25%	1 100%			18 28%
	Broken	23 92%	12 60%		2 40%	1 100%	2 67%	6 75%				46 72%
Preforms or Waste		7	6		1	8	1	3		1		27

Tab. 2 Use life stage at which tools discarded, by context

N Column %	**Battered**	**Rounded**
Complete, Usable	5 22%	32 58%
Complete, Resharpenable	8 35%	10 18%
Complete, Used Up	2 9%	3 5%
Broken	8 35%	10 18%

Tab. 3 Use life stage at which points with battered and rounded tips discarded

ably accurate. Using these categories, it is apparent that more than half of the points in middens and fills are either still usable or easily resharpenable (a matter of a few minutes of work). A few of these are clearly expedient tools that were not intended to outlive the task for which they were created, although even a substantial number of these (42%) have been resharpened. Most, however, are relatively carefully finished, and usually have already been resharpened at least once. Why have they suddenly become expendable? It might have something to do with the availability of raw material: if a fresh sheep/goat metapodial is handy, it seems less necessary to extend the life of the point in hand. Nevertheless, it would nearly always be less work to resharpen an existing point than to make a new one. There may be less tangible variables: the extent to which one has become attached to the tool, how good it feels in the hand, and so on.

I should also note that the characterization of deposits as 'midden', 'fill', and so on at Çatalhöyük is simplistic, and a little deceptive insofar as such terms tend to map onto our contemporary notions of 'garbage'. In fact there is considerable variation within these context types, and they often contain special deposits of one sort or another (e.g., layers of feasting remains). This suggests that these middens and fills carry real meaning, perhaps associations with the houses from which they come and over and under which they lie, and the ancestors who lived in those houses and hosted those feasts (Martin and Russell 2000). Hence it is certainly possible to imagine that points that had been used in certain tasks may have been considered inappropriate for further use, or that tools associated strongly either with certain specific tasks or with certain individual persons were seen as appropriate offerings to place in the middens along with carefully placed ceremonial remains. These tools seem to have been mainly points.

Unfortunately I do not know exactly what the points were used for. There were at least two functions: one that produces rounding of the tip in wear on about two-thirds of the points, and another that creates battering and chipping at a microscale on the remaining third. In addition, while most points have quite slender tips, a few are much sturdier and are probably used in different task(s). It is disproportionately the points with tips rounded in wear that are discarded while still usable (tab. 3). This does not seem to mean that points used for the function that causes battered tips are more highly valued and curated, as expediently made points occur in the same proportions among the points with battered and with rounded tips. It is possible that I have been too generous in deciding that tips with rounded wear are still usable, but certainly many tips have continued in use until they became much duller than these. Perhaps the most obvious reason to discard genuinely usable points, given the nature of the Çatalhöyük middens and fills, would be if they had been used to produce ceremonial clothing, thus rendering them inappropriate for everyday use.

If one discounts the burial with five rings, rings are discarded/deposited mainly in the 'garbage' deposits: midden and fill. The vast majority of these are broken, and have perhaps lost their value. The intact rings are found in the five-ring burial already described, and in small numbers in the fill and on a floor. Pendants are found both whole and broken in a variety of contexts, but are most common in burials, where they are always complete, and also on floors. Their deposition in burials confirms the impression given by the repair of pendants, that they are valued and probably linked to individual identity.

In conclusion, at Çatalhöyük it would appear that the valuation of bone tools depends on a complex interaction among the availability of the raw material, the labor input in manufacture and curation, the task(s) in which they were used, the degree to which they became bound up with the personal identity of the owner, and the symbolic value of the bone or the artifact. These are, of course, interrelated, the intended task influencing the choice of raw material and the labor input, the perceived need to use a particular kind of bone affecting the availability of raw material, and so on. These values vary even within tool classes and can shift through the use life of a single tool, but they can be glimpsed, if dimly, through the combined analysis of technology and context.

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Fig. 1. Split and unsplit points from Çatalhöyük (Specimens 1657.X1, 1653.F1, 1563.F1)

Fig. 2. Bone rings in reconstructed placement on hand (Specimens 2119.X1, X2, X3, X4, X5)

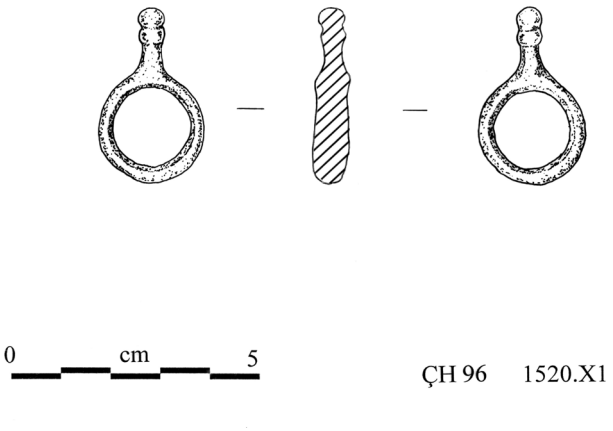

Fig. 3. Ring with knob on pillar (Specimen 1520.X1)

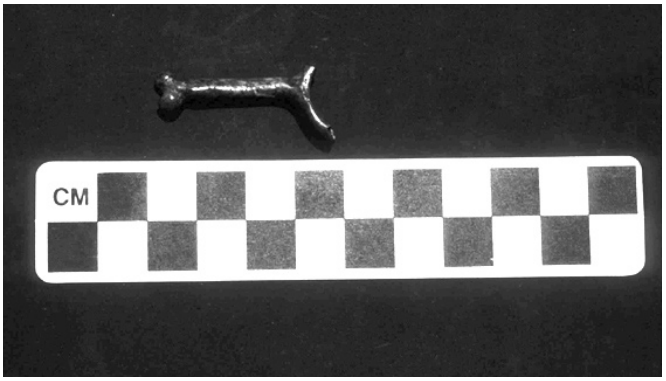

Fig. 4. Fragmentary ring with knob on pillar, 3 cm long (Specimen 4121.F25)