The Bones from Hindby Votive Fen

Delicate Problems of Interpretation

BY LENA NILSSON

Abstract

Nilsson, L. 1995. The Bones from Hindby Votive Fen: Delicate Problems of Interpretation. Lund Archaeological Review 1, 1995, pp. 65-74.

There is a great difficulty in distinguishing between sacred and profane bone assemblages. It is therefore necessary to study the bones from the Hindby votive fen from as many angles as possible. One starting point for this analysis is the taphonomic processes that have affected the bones before and after deposition. In the interpretation it is important, however, to set the bone remains in their contemporary environmental and archaeological context.

Lena Nilsson, Institute of Archaeology, University of Lund, Sandgatan 1, S–223 50 Lund.

Introduction

Hindby votive fen, located in what is now the south-east of the city of Malmö in Scania in southern Sweden (Fig. 1), is an archaeologically unique phenomenon. This kettle hole measuring about 900 m² with two find-bearing layers of peat was found intact, and the entire fen was totally excavated during three seasons, 1989–1991. The decisive factor for the interpretation of the fen as a votive site was the deposit of about 50 axes, of differing types spanning 3000 years, ranging from the Late Mesolithic to the Early Bronze Age. Other groups of artefacts and the large quantity of animal and human bones were mostly deposited in the Late Neolithic and Early Bronze Age. The majority of the bones are from the most common domestic animals, including the dog, with a small element of game, birds, and fish. The aim of my work is to use the findings about taphonomic factors, species composition, age and sex distribution, seasonal indicators, and the representativeness of different regions of the body, to put the bones in their environmental and archaeological context in order to arrive at a total picture, on the basis of which I attempt to interpret the link between bones and offerings. The emphasis in the interpretation of the bones will be placed on the taphonomic processes which affected the bones before and after they were deposited in the fen. These processes are very important for an understanding of the

Fig. 1. Map of Scania with the location of the votive fen.

affinity of the bones with the archaeological context, and for elucidating the difficulty of distinguishing profane from sacred remains of meals and refuse from slaughtering.

The material

The past landscape of the site differed significantly from today's, being characterized by a gently undulating moraine plain with numerous small lakes, brooks, and wetlands (Svensson 1993, p. 6). An environmental reconstruction based on analyses of pollen and seeds shows that the votive site consisted of an alder carr which was open water during parts of the year. The flora in these damp surroundings was dominated by various species of sedge, bulrush, duckweed, and water crowfoot (ibid., pp. 6 f.).

The two find-bearing layers of fenwood peat varied in thickness between 10 and 80 cm. The lower layer of peat contained finds from the Late Mesolithic to the Late Neolithic, while the upper one contained finds from the Late Neolithic and the Early Bronze Age. For some reason, the deposition of artefacts appears to have ceased during a period of about 800 years. There are none of the key artefacts from two of the culture groups of the Late Stone Age, the later phase of the Funnel Beaker culture and the Battleaxe culture. The dating of the votive fen has been based partly on the archaeological objects and partly on C14 datings of charcoal and bones. The fifty or so axes consist of different types, mostly of flint and rock, but there is also a palstave of bronze. These are the only artefact type deposited throughout the time when the fen was used. By far the largest category of artefact, however, is the grinding and crushing stones, of which about a hundred were found. Other common tools include sickles, scrapers, and daggers. In addition there were wooden structures, tools of bone and antler, pottery, smoothing stones, refuse and debitages of flint and rock, and a large quantity of animal bones and about 30 human bones (ibid., pp. 6 ff.). The composition of some deposits has led to their interpretation as hoard finds. These consist, among other things, of two core axes which were placed close together without contact with other objects, and two daggers deposited in a similar way. A third hoard find consisted of different kinds of objects, including a large fire-damaged fragment, probably from a thin-butted flint axe, and two human bones, three boar tusks, and several animal bones. In the shallower parts of the fen and beside the shores various kinds of pits had been dug, such as hearth pits and small, stone-filled pits including axes and other things (ibid., pp. 9 ff.). There is no evidence that there were settlement sites in the immediate vicinity of the fen during the time when it was used. On the other hand, not far away there is a large number of settlements and graves from the Neolithic and the Early Bronze Age. Mesolithic settlement is only hinted at through surface finds (ibid., pp. 6, 10 f.).

The majority of the bones are very well preserved in the sense that they have not split or lost their solidity. The occurrence of quite a large number of small bones from animals such as piglets and mice also indicates good preservation conditions in the fen. The collagen content in the bones, however, is low, as was discovered from several unsuccessful attempts to date selected bones by C14. This is probably because of the neutral pH of the fen (Tomas Lindell, pers. comm.). The bone remains were scattered over the whole fen, both horizontally and vertically, with the largest quantity being found in the upper layer of peat. The bones consist of remains from slaughtering and meals, but a certain amount of craft refuse is also included. Not all the material has been analysed as yet, but preliminary results show that it consists of 10,860 bone fragments both whole bones and parts of bones, weighing together 115.6 kg. Of this, 104.5 kg, or 5488 fragments, have been determined to species. The material mostly contains domesticated species, predominantly

cattle, followed by pigs, ovicaprids, and dogs. Both sheep and goats have been identified in the material, but individually they are poorly represented, as are horses and wild species. The latter include red deer and roe deer. Bones of birds and fish, which will be used as seasonal indicators, are among the material that has not yet been analysed. The human bones come from at least three individuals, two adults and a child.

There are a couple of depositions indicating that almost whole animals or parts of animals were deposited in the fen. One of these is a pup which was lying anatomically correctly in the sense that between the lower jaw and the tail bones lay the trunk, the pelvis, and the extremities; the latter were partly disturbed within each region of the body, as if they had floated around a little; a few fragments of the skull were found but no paws. The second deposit proved to be parts of the pelvis, forelegs, and hind legs of a lamb which had been placed in a collection of stones.

My study is part of an interdisciplinary project with collaboration between osteology, archaeology, and Quaternary geology.[1] None of the material has been fully processed yet, which means that the results presented here are only preliminary and may be changed in the final phase of the analysis. This is a first presentation of the material and of some of the problems encountered when interpreting contexts as complicated as this one.

This article will primarily deal with two of the taphonomic processes that are significant for the interpretation of bone finds, namely, human and carnivore bone modifications.

Methods and results

Taphonomy

It was the Russian palaeontologist I. A. Efremov who coined the term *taphonomy* in the 1940s, using the Greek words *taphos* (burial) and *nomos* (law). The term refers to the stages which an organism passes through from its death until its discovery in palaeontological or archaeological contexts (Efremov 1940). To put it simply, taphonomic studies ascertain whether excavated bones are remains of human activity or natural deposits, and examines the physical, biological, and geological factors that have affected the bone assemblage. A major task in archaeological contexts is to try to understand how taphonomic processes influence the quantifications of collections of animal bones, for example, why the quantity of bones differs from species to species and why certain types of bone are more frequent than others. Other important tasks are to chart the spread of the deposited bones and the causes, as well as the presence or absence of cutting and gnawing marks. We know that different species have different numbers of skeletal elements, and the task of taphonomy is to find out how and why the archaeologically discovered bones differ from a complete skeleton (Lyman 1994, p. 97). Many scholars have worked and are working with the description of different patterns of fracture and marks, and their causes. They include Behrensmeyer and Hill (1980); Binford (1981); Johnson (1985); Richter (1988); Gifford-Gonzales (1989); Marshall (1989); Noe-Nygaard (1989); Lyman (1994).

Human influence

The human modification of bones involves various butchering processes, such as filleting, dismembering, and marrow-fracturing, and also the manufacture of tools. Bones are fractured in different ways depending on whether they are fresh, wet, dry, or weathered; the primary types of fragment are shown in fig. 2. Humans fracture bones in many ways, but there are other forces, for example sedimentary pressure and trampling, which also could cause a similar break of the bone. A spiral fracture, for example, indicates only that the bone was broken when in a fresh state, but it does not say anything about what caused the fracture. Bones which

have been allowed to dry and weather somewhat can be split longitudinally or broken vertically, leaving a soft, smooth surface (Marshall 1989, p. 14).

Ethnographical studies show that there are various ways to fracture limb bones to extract the marrow (Binford 1981; Gifford-Gonzales 1989). A common way that has frequently been described is to place a bone on a flat stone and hit it with, for example, a stone, at one end of the shaft, near the spongy part (Johnson 1985, p. 193). The size and shape of the bone then determine what part of the bone to strike to get at the marrow. The actual blow leaves an impact scar, and the bone is broken into different parts. It is more difficult to extract the marrow from a fresh bone which has been fractured into two halves than out of a bone with the ends broken off. One also avoids getting bone fragments in the marrow if the blow is aimed at the end instead of the middle of the shaft (Binford 1981, pp. 158 f.). Long limb bones and lower jaws from young animals are rarely fractured for the marrow, since they do not contain the fat yellow marrow that is found in older animals (Gifford-Gonzales 1989, p. 195). In Hindby votive fen there are smooth perpendicular fractures on bones which were broken in the course of the excavation and transportation. Slaughtered animals usually have spiral fractures, but longitudinal and stepped fractures also occur.

Humans not only break bones but also frequently leave various marks. Cutting marks (Fig. 3) are usually placed at the joint ends of limb bones, in areas with muscular attachments, sinews, and ligaments (Marshall 1989, p. 17). They are located in different places depending on the part of the butchering process where they were handled (von den Driesch and

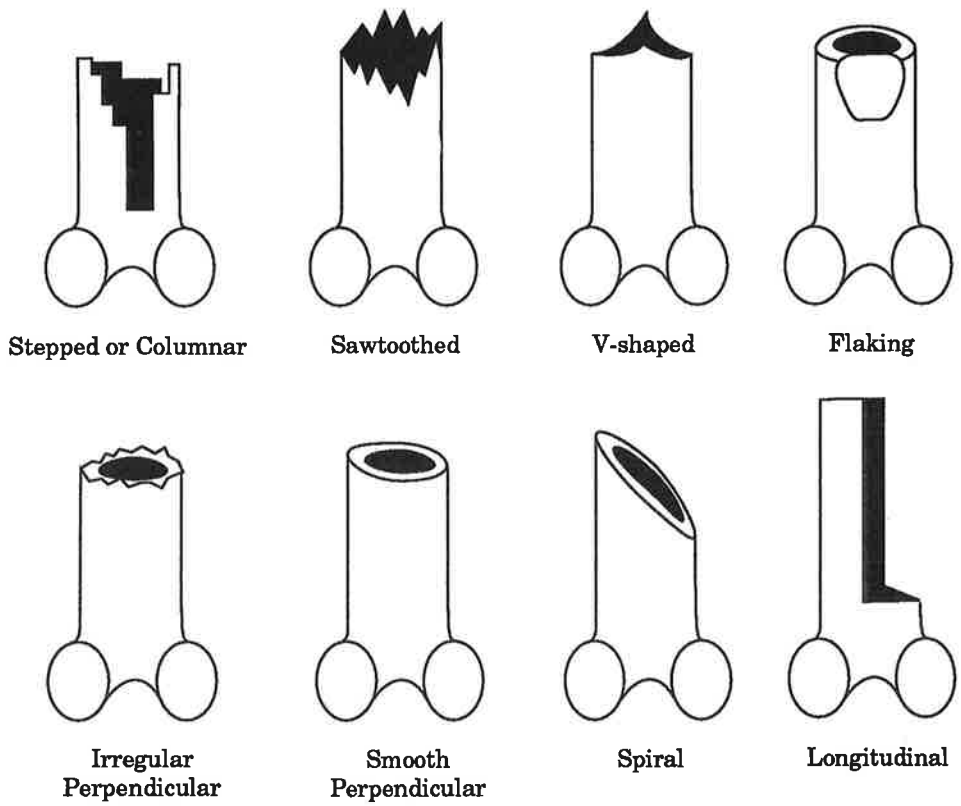

Fig. 2. Types of fracture.

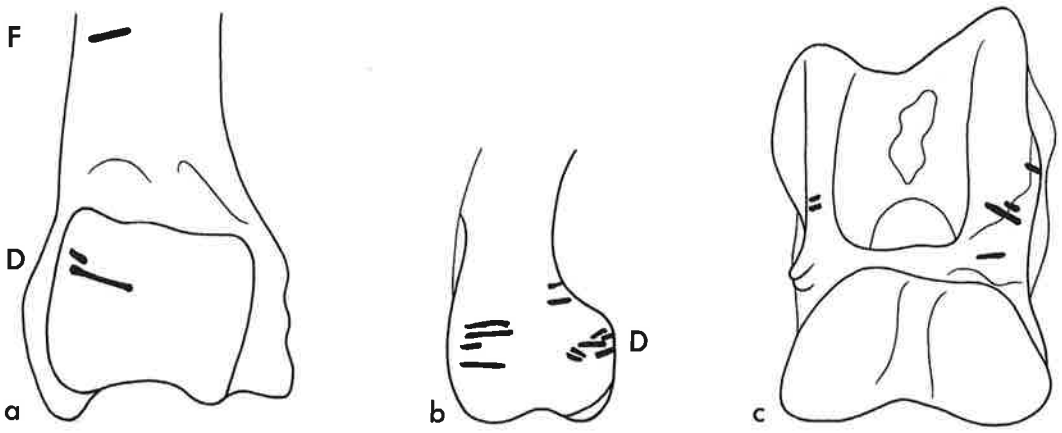

Fig. 3. Cutting marks. The lower part of a bovine humerus: (a) filleting and disjointing mark (F and D), (b) disjointing mark (D), (c) filleting mark: bovine talus.

Boessneck 1975; Binford 1981). Marks of filleting are mostly found on the cranium and the lower part of the extremities (Fig. 3c). Dismembering marks occur, for example, at the joint ends, showing where the carcass was dismembered, and on the vertebrae after segmentation into smaller bits (Fig. 3a, b). Filleting marks, like dismembering marks, are found at the joint ends, although mostly a little farther up or down the shaft (Fig. 3a).

Scavenging

Predatory animals, in this case chiefly dogs, can fragment bones by gnawing and chewing in ways that can sometimes resemble human modifications so much that it is difficult to distinguish them. Binford (1978; 1981) has studied how dogs affect bones in his ethnoarchaeological analyses, for instance, by examining bones from Eskimo dog yards. He not only distinguishes four basic types of gnawing marks but also different types of fragmentation which can lead to almost total destruction of the bone. The four basic types of gnawing marks are called (a) punctures, (b) pits, (c) scores, (d) furrows (Binford 1981, p. 44). Punctures (Fig. 4) often occur in the spongy parts of a bone, where the tooth that penetrates the bone leaves distinct holes. Thin bones are also subject to punctures which form crenulated edges (Fig. 5).

Dogs normally begin to gnaw on the soft, spongier part of a bone, for example, at the ends of long limb bones, making their way towards the compact shaft. This part does not collapse as a result of the gnawing, but tiny pits rise instead. These pits are not the effect of eating or the

Fig. 4. Punctures and furrowing. The lower part of a bovine metatarsal. Drawing: Anette Nilsson.

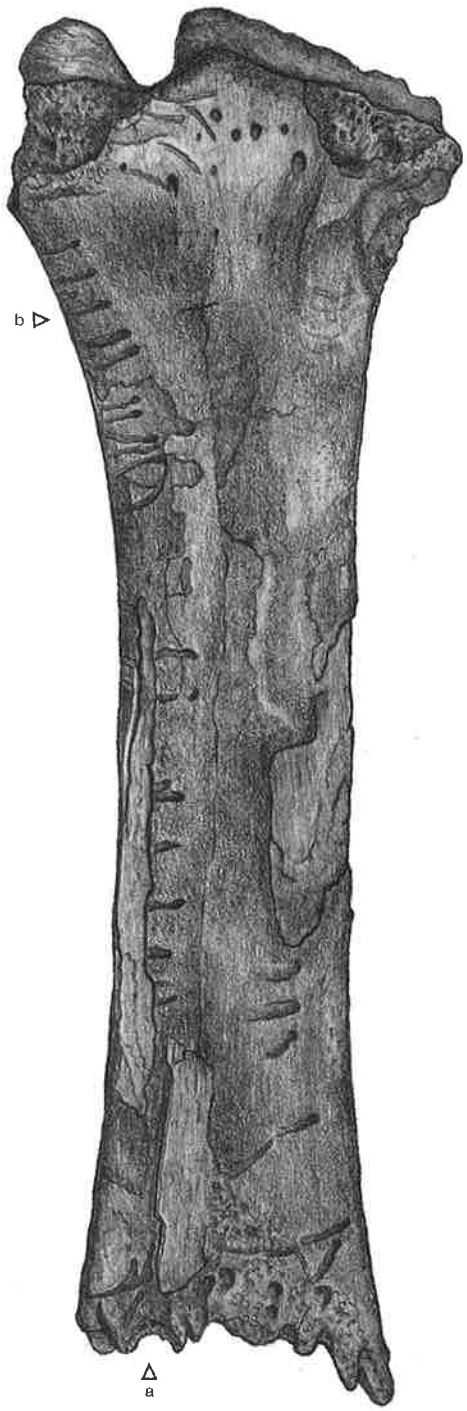

Fig. 5. Bovine radius: (a) crenulated edges, (b) scoring. Drawing: Anette Nilsson.

removal of meat but of intensive gnawing in an attempt to break through the cylinder of a limb bone shaft (ibid., p. 46).

Scoring (Fig. 5) arises when the dog turns the bone or draws his teeth across a limb bone shaft, which leaves a linear scar on the surface. The marks are close together, mostly parallel, and can be difficult to distinguish from cutting marks (ibid., p. 46).

Furrowing (Fig. 4) is the result of repeated jaw activity with either canine or carnassial teeth, located in the spongy part of a bone. If there is a lot of meat left on the bone, a limb bone can become furrowed and even polished without punctures, pits (Fig. 7), or scoring on the more compact shaft (ibid., p. 49).

One type of fragmentation which has been considered unique to gnawing by predatory animals and unlike any human fragmentation technique is channelled bones (Fig. 6). To get at the marrow, the dog punctures the back of a bone cylinder from the transverse side, which results in a channel running along the bone (ibid., p. 51). It has been shown, however, that humans can also cause similar cylinders (Gifford-Gonzales 1989, pp. 207 f.). These cylinders mostly lack scores and punctures, which would then distinguish them from dog-eaten cylinders. Another characteristic of animal-gnawed bones is that animals tend to gnaw on bulges and thin ends, which are often the seats of various muscles, sinews, and ligaments. Dogs can also remove a large splinter of bone along the shaft to expose more of the marrow cavity. This splinter is usually pointed but scarred, with the opposite side showing step fractures (Fig. 2). This pattern is common in the archaeological material and is mostly interpreted as human influence. Dogs' licking of ends and fragments of bones can result in a polished surface resembling the abrasion traces produced by humans (ibid., pp. 51 ff.).

Spiral fractures have long been considered to be solely produced by humans, but dogs and wolves can also break bones in their mouths in

a way that produces this type of fracture.

Human cutting marks and scoring by dogs can be difficult to distinguish, but the placing on the bone mostly indicates who caused the mark. The difference is that human cutting marks rarely follow the contour of the bone (Binford 1981, p. 46). It must be pointed out that both cut marks and scoring occasionally are difficult to distinguish from trampling marks.

In Hindby votive fen the juvenile bones of slaughtered animals, that is, bones with joint ends which have not grown together, are often heavily gnawed. These soft, spongy ends have typical punctures and furrowing. Quite a few limb bones show scoring on the shaft and pitting at the ends after the joints were gnawed away. Channelling marks are most common on limb bones from smaller animals such as pigs, sheep, and goats.

Discussion

The interpretation of bone remains from butchering and meals does not only concern the kind of animals that were eaten but also the way prehistoric man handled waste. This is expressed in many ways, making it difficult to grasp the overall picture. Residual bones can be buried in the earth, burnt, or deposited in lakes and watercourses. The interpretation of bones as remains of human activities requires a find context and marks of human influence. Bone remains of this type usually occur in occupation layers or refuse layers, on or directly beside a settlement site.

At Hindby votive fen we have no direct remains of settlements, but the usual remains

Fig. 6. Channelled bone. Ovicaprid radius. Drawing: Anette Nilsson.

Fig. 7. Pits and initial punctures in the lower part of an ovicaprid tibia shaft. Drawing: Anette Nilsson.

of butchering and meals are found there together with carnivore and human bones. The latter bone remains show few or no marks of cutting and gnawing. Other bones have been subjected to human activities but they do not show the same degree of fragmentation as settlement site material. This was seen in a preliminary comparison with my analysis of some of the bones found at the Middle Neolithic Hindbymosse settlement site, which lay about 500 m north-west of the votive fen. The reason that bones in votive contexts are not as fragmented as bones from settlements may be that they were not used in the same way. The aspect of time is also relevant here. Meals cooked and eaten during a relatively short visit to the fen may have meant that people did not fracture the bones for the marrow and boil stock from them to the same extent as when the meals were cooked and eaten at the permanent habitation. Perhaps people did not spend any time manufacturing tools on these special occasions either, since slightly weathered bone appears to be better for tool-making than fresh bone (Frison 1982). Another question is how far Stone Age people transported their waste and how long the bone remains were allowed to lie on the site before they were moved away, if they were moved away at all. We can never ignore the possibility that there may be elements of waste from other activities, both profane and sacred, in the collections of bones, and that they can be very difficult to distinguish.

Religious acts are often very complex, comprising many different activities which together lead to a shared goal, such as a sacrifice. These activities are performed in different ways depending on what the sacrifice is intended to achieve. Slaughtering and eating are intrinsically profane acts, but when performed in a specially selected place, at a special time of the year, and with a special purpose, they can be transformed into sacred activities. It is very difficult to draw clear boundaries between profane and religious activities, because they no doubt overlapped. It is probably the action – the deposition of one or more object – that is most important.

The 17 Mesolithic lower jaws of wild boars from Sludegårds Sømose are an example showing the difficulty of distinguishing refuse from offerings. The jaws, which come from individuals in three different age groups, consist of remains of meals but are not as fragmented as bone remains from settlements. The determination of the age shows that the animals were slaughtered some time between October and December (Noe-Nygaard and Richter 1990, pp. 175 ff.). It is nevertheless impossible to determine whether this action took place during a single season or in the same season over several years. The archaeological find context shows that the depositions continued for 2000 years. Although there is much that speaks in favour of offerings, the lower jaws could be remains of ordinary waste.

Hindby votive fen was dry for periods during spring and summer (Mats Regnéll, pers. comm.), which means on the one hand that deposited bones lay open and accessible to dogs. On the other hand, the bones have not weathered very much and must therefore have ended up in the water fairly quickly. They may have been deposited directly in the water during wet seasons and exposed during the dry period, and then been submerged with the return of the water. Waste from settlement sites should in that case only have been deposited in wet seasons so as not to attract unwelcome predators and to avoid the smell. Here again the aspect of time comes in: one wonders how long the bones could have lain exposed without weathering, and how old and dry bones can be and still be gnawed by dogs. Another problem is how much and in what way dogs spread bones around them and perhaps even bury and hide good parts. It seems that fresh bones float better than weathered and broken bones, which should mean that the pup mentioned above, possibly after the removal of its skin, was deposited directly in the fen (Behrensmeyer 1990, p. 233). It is possible that

from the beginning there were depositions of different parts of animals which were then spread in different directions by dogs. Intensive gnawing rather suggests that there was not such a large supply of bones and that the dogs had to be content with what there was. This could mean that they were at the scene on this special occasion and received their share, and that when the offering was completed the remaining bones and waste were tidied up and thrown in the water.

In the Danish Neolithic votive finds the amount of deposited remains of meals and human bones appears to increase during the Middle and Late Neolithic (Becker 1948, pp. 276 ff.) This tendency agrees well with the changes in the quantity of deposited bones during these periods in Hindby votive fen. Unlike the fen, which has been completely excavated, many of the Danish votive finds were discovered in circumstances where we cannot be sure how much material there was and what was actually retrieved. There are many factors which influence the form and composition of bone finds in different contexts. The question is whether we should place the emphasis on the bones or on the find context. The best solution would include as many angles of approach as possible, and this is achieved by combining the potential of all the discovered material.

We now have a unique opportunity to obtain answers to many more questions than previously as regards the significance of Stone Age and Early Bronze Age deposits of artefacts and remains of meals in wetlands. The osteological material in particular, with the aid of detailed analyses on different levels, will contribute fascinating new information about the significance of bones in votive contexts.

Acknowledgements

Hearty thanks are due to Caroline Arcini, Titti Fendin, Carina Håkansson, and Mac Svensson for their critical scrutiny and valuable comments on the manuscript. I am particularly grateful to Anette Nilsson for the fine drawings of bones.

Note

[1] The archaeological analysis is being done by Mac Svensson of the Central Board of National Antiquities, Archaeological Excavations Department Southern Sweden. The palaeobotanical analyses are being conducted by Mats Regnéll at the Department of Quaternary Geology, Lund University.

References

Becker, C. J. 1948. *Mosefundne lerkar: Studier over tragtbægerkulturen i Danmark.* Copenhagen.

Behrensmeyer, A. K. & Hill, A. P. (eds). 1980. *Fossils in the Making: Vertebrate Taphonomy and Paleoecology.* Chicago.

– 1990. Transport-hydrodynamics: Bones. In Briggs, D. E. G. & Crowther, P. R. (eds.), *Paleobiology: A Synthesis.* Oxford.

Binford, L. 1978. *Nunamitut Ethnoanchaeology.* Academic Press. New York

– 1981. *Bones: Ancient Men and Modern Myths.* London.

Efremov, J. A. 1940, Taphonomy, a New Branch of Palaeontology. *Pan-American Geology* 74.

Frison, G. C. 1982. Bone Butchering Tools in Archaeological Sites. *Canadian Journal of Anthropology* 2.

Gifford-Gonzales, D. 1989. Ethnographic Analogues for Interpreting Modified Bones: Some Cases from East Africa. In Bonnichsen, R & Sorg, M. (eds.),*Bone Modification.* Orono.

Johnson, E. 1985. Current Developments in Bone Technology. In Schiffer, M. B. (ed.), *Advances in Archaeological Method and Theory,* vol. 8. New York.

Lyman, R. L. 1994. *Vertebrate Taphonomy.* Cambridge.

Marshall, L. G. 1989. Bone Modification and "The Laws of Burial". In Bonnichsen, R & Sorg, M. (eds.),*Bone Modification.* Orono.

Noe-Nygaard, N. 1989. Man-made Trace Fossils on Bones. *Human Evolution* 4.

Noe-Nygaard, N. & Richter, J. 1990. Seventeen Wild Boar Mandibles from Sludegårds Sømose – Offal or Sacrifice? In Robinson, D. E. (ed.), *Experimentation and Reconstruction in Environmental Archaeology.* Oxford.

Richter, J. 1988. *A Taphonomic and Palaeoecological Study of a Subfossil Bone Material from Kainsbakke, Djursland.* Unpublished Ph.D. thesis, Copenhagen University. Copenhagen.

Svensson, M. 1993. Hindby offerkärr – en ovanlig och komplicerad fyndplats. *Fynd* 1993:2.

von den Driesch, A. & Boessneck, J. 1975. Schnittspuren an Neolithischen Tierknochen: Ein Beitrag zur Schlachttierzerliegung in Vorgeschichtlicher Zeit. *Germania* 53.

Translated by Alan Crozier