ANIMAL BONES FROM THE VIKING TOWN OF BIRKA, SWEDEN

Bengt WIGH*

Summary

In the spring of 1990 began the largest archaeological investigations thus far of the first urban centre in Sweden, called Birka. During the six years of the excavation, an archaeozoologist has been employed on site to organize and begin analysis of more than 5.5 tonnes of animal bones. This osteological material has proved to be unique, both qualitatively and quantitatively, in the Swedish Viking Period. The analysis of the material (which has just begun) will give us both new and extended knowledge of Viking Period domestic animals and wild fauna in Central Sweden. This paper will present some of the new results, together with some future plans.

Résumé

Ossements animaux de la cité viking de Birka, Suède.

Au cours du printemps 1990, ont débuté les plus grandes fouilles archéologiques effectuées à ce jour du premier centre urbain de Suède : Birka. Pendant les six années de fouilles, un archéozoologue a été employé sur le site pour organiser et commencer l'étude de plus de 5,5 tonnes d'ossements animaux. Ce matériel ostéologique s'est révélé unique, à la fois sur les plans qualitatif et quantitatif, pour la période viking suédoise. L'analyse du matériel vient de commencer ; elle livrera une connaissance nouvelle et approfondie des animaux domestiques de la période viking et de la faune sauvage de Suède centrale. Cet article présente une partie des résultats ainsi que les perspectives d'avenir.

Zusammenfassung

Die Tierknochen aus der Wikingerstadt Birka, Schweden.

Die bisher größten Ausgrabungen in Birka, der frühesten Stadt Schwedens begannen 1990 und wurden 1995 abgeschlossen. Während dieser Jahre sortierte und analysierte ein eigens angestellter Archäozoologe das Knochenmaterial. Bis heute (1994) sind von den Archäologen 5.5 Tonnen Tierknochen ausgegraben worden. Dies ist das bisher größte und am besten erhaltene Material aus der Wikingerzeit Schwedens. Die Analyse der Tierknochen aus Birka wird uns neue und gesicherte Erkenntnisse zur Haus- und Wildtierfauna der Wikingerzeit Schwedens liefern. Dieser Beitrag stellt einige neue Resultate und für die Zukunft geplante Aktivitäten vor.

Key Words

Sweden, Viking Age, Early town-settlement, Meat production, Fur-bearing mammals.

Mots clés

Suède, Époque viking, Premières installations urbaines, Production de viande, Mammifères à fourrure.

Schlüsselworte

Schweden, Wikingerzeit, Frühe Stadt, Schlachttiere, Pelztiere.

Birka was situated on a small island, Björkö, in Lake Mälaren, about 30 km west of modern Stockholm (fig. 1). The town of Birka was founded during the middle of the eighth century AD, and existed barely 200 years before the site was deserted around AD 975 in favour of a new town, Sigtuna. When Birka was at its largest, it has been calculated that between 700 and 1000 people lived and worked there. The site came to be a central point for trade to and from the Svea kingdom. Various artefacts have been found (Arabian silver coins, Finnish and Slavic ceramics, and cowrie shells from the Indian Ocean, among others) which indicate very extensive and long-distance trade. Moreover, the craftsmen of the town manufactured a great amount and variety of goods which formed the basis of Birka's economy (Ambrosiani, 1991).

Björkö, upon which Birka lay, had a very limited surface area during the Viking Period. Today the island is somewhat larger, as a result of a land rise of 5 m over the past 1000 years. This implies that during Birka's occupation, the inhabitants were forced to import virtually all food from outside. As late as the nineteenth century, when Björkö was most intensively farmed, the area could supply meat and grain for only about 30 people (Ambrosiani and Eriksson, 1991).

* *Birkagrävningen, Box 5405, S-114 84 Stockholm, Sweden.*

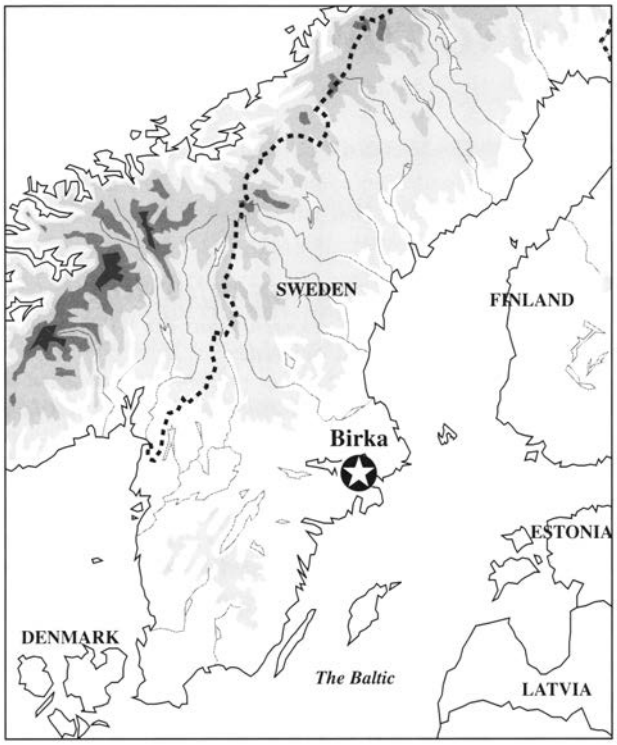

Fig. 1: Birka and its location in Sweden.

As early as 1871, the zoologist Hjalmar Stolpe carried out the first archaeological investigations of Birka, in the so-called "Black Earth" (this is the local name for the very charcoal - and ash - rich urban area). Stolpe had come to Birka to investigate what he believed to be a naturally high occurrence of amber, which proved to be the remains of the Viking town. Subsequently, he concentrated on archaeology. He dug on Björkö for 24 years, and during his excavations in the urban area, he began the first collection of animal bones from the site (Clarke and Ambrosiani, 1993: 67ff). In total, 1.5 tonnes of animal bone have been saved from Stolpe's excavations (Wigh, 1994: 34). As a zoologist, Stolpe also made a certain amount of species identifications, and wrote short summary reports on the bone material (Stolpe, 1872: 11-17; 1873: 62-75). However, he did not have time to carry out more detailed analyses, which he regrets in his reports (Stolpe, 1873: 62).

The next large archaeological project in Birka was not to take place for another 100 years. Hjalmar Stolpe had established that the urban area consisted of very complicated stratified deposits, and therefore no further investigation was permitted before excavation techniques and knowledge of Viking Period structures had been improved. During the three years between 1969 and 1971, archaeologists investigated a small area on the Viking Period water line. A jetty from the tenth century was found. These excavations were the first in Birka to be carried out stratigraphically, which also implied that the extensive animal bone collection was more exactly datable (Ambrosiani *et al.*, 1973). The problem with the finds from Stolpes excavations is that they lack exact dating. Stolpe dug long trenches through the urban area without taking any notice of the sequence of layers.

Parts of the material (ca 10%) from the 1969-71 excavations have been analysed and published in a preliminary report (Ericson *et al.*, 1988). Also, parts of the large amounts of bird bone material have been specially treated (Ericson, 1987a, 1987b). The bird bones indicate large scale hunting of migratory birds, particularly duck, during the Viking Period. The hunting was carried out during spring, in the outer areas of the Stockholm archipelago. Finds from Sigtuna indicate that the same method continued to be used after the end of Birka (Jonsson, 1989: 54ff).

So, in 1990 it was time for the largest excavations since the time of Hjalmar Stolpe. During six years, an area of 350 m^2 with 2.5 m thick culture-layers was to be examined. The goal for this excavation was to establish something of the internal structure and earliest phases of the town. This time, modern measurement techniques and computer programs have been used to help with the investigation of the very complex stratigraphy (Ambrosiani, 1992: 83ff). There is very little preserved wood from the buildings, which means that the interpretation of the character of the different deposits is even more important. The animal bones have, therefore, great significance for the archaeological interpretations. During the five years which the excavations have run, over 3000 layers have been recorded. Working with all these takes time, but with the help of computers, it is calculated that the work will be complete during 1997. This is true also of the analysis of osteological material, which will be based on both archaeological and osteological objectives. The very precise stratigraphic excavation technique will make it possible to study indiviual households and their food waste, perhaps even at a seasonal level, for the first time.

There is a virtual 100% retrieval rate for bone from the present excavations. All soil is water-sieved in a 3 mm sieve, from which all visible bone is picked, and soil samples are taken from each layer. To check the representativity of the bone collection, random tests have been made on the contents of the soil samples. These show that all animal species found are represented in the 3 mm sieve, and no extra species are found in the soil samples. The only new information added from the soil samples was a number of vertebrae from smaller herring.

Table 1: Identified species from Birka (Stolpe, 1872, 1873; Ericson *et al.,* 1988 with additions).

Domesticated animals
Cattle (*Bos taurus*)
Horse (*Equus caballus*)
Pig (*Sus scrofa* dom.)
Sheep (*Ovis aries*)
Goat (*Capra hircus*)
Dog (*Canis familiaris*)
Cat (*Felis catus*)
Domestic fowl (*Gallus gallus*)
Domestic geese (*Anser anser* dom.)

Fur-bearing animals
Red fox (*Vulpes vulpes*)
Red squirrel (*Sciurus vulgaris*)
Pine-marten (*Martes martes*)
Brown bear (*Ursus arctos*)
Wolf (*Canis lupus*)
Lynx (*Lynx lynx*)
Beaver (*Castor fiber*)
Ermine (*Mustela erminea*)
Wolverine (?) (*Gulo gulo*)
Hare (*Lepus timidus*)
Badger (*Meles meles*)
Otter (*Lutra lutra*)
Polecat (*Mustela putorius*)

Pests
Black rat (*Rattus Rattus*)
Water vole (*Arvicola terrestris*)
Field vole (*Microtus agrestis*)
House mouse (*Mus musculus*)

Antler
Elk (*Alces alces*)
Reindeer? (*Rangifer tarandus*)
Roe-deer (*Capreolus capreolus*)

Fish
Perch (*Perca fluviatilis*)
Pike (*Esox lucius*)
Pike-perch (*Lucioperca lucioperca*)
Tench (*Tinca tinca*)
Ide (*Leusiscus idus*)
Roach (*Rutilus rutilus*)
Bream (*Abramis brama*)
Asp (*Aspius aspius*)
Herring (*Clupea harengus*)
Sturgeon (*Acipenser sturio*)
Eel (*Anguilla anguilla*)
White fish (*Coregonus* sp.)
Cod (*Gadus morhua*)
Burbot (*Lota lota*)
Pope (*Acerina cernu*)
Rudd (*Scardinius erythrophtalmus*)

Birds
Great crested grebe (*Podiceps cristatus*)
Cormorant (*Phalacrocorax carbo*)
Whooper swan (*Cygnus cygnus*)
Greylag goose (*Anser anser*)
Shelduck (*Tadorna tadorna*)
Mallard (*Anas plathyrhynchos*)
Eider (*Somateria mollisima*)
King-eider (*Somateria spectabilis*)
Long-tailed duck (*Clangula hyemalis*)
Common scoter (*Melanitta nigra*)
Velvet scoter (*Melanitta fusca*)
Goosander (*Mergus merganser*)
Red-breasted merganser (*Mergus serrator*)
Crow (*Corvus corone cornix*)
Raven (*Corvus corax*)
Golden-eagle (*Aquila chrysaetos*)
White-tailed eagle (*Haliaetus albicilla*)
Sparrowhawk (*Accipiter nisus*)
Peregrine (*Falco peregrinus*)
Capercaillie (*Tetrao urogallus*)
Black grouse (*Lyrurus tetrix*)
Arctic skua (*Stercorarius parasitus*)
Herring gull (*Larus argentatus*)
Great black-backed gull (*Larus marinus*)
Razorbill (*Alca torda*)
Black guillemot (*Cepphus grylle*)
Wood pigeon (*Columba palumbus*)
Swallow (*Hirundo rustica*)
Jackdaw (*Corvus monedula*)
Song-trush (*Turdus philomelos*)

Artefacts
Whale (bone)
Walrus (ivory)

Amphibians
Frog (*Rana* sp.)
Toad (*Bufo* sp.)

Other mammals
Seal (*Phoca* sp.)
Human bones (*Homo sapiens*)

After the bones have been washed in the water sieve, they are dried and then taken over by the osteologist. All the material from the respective layers is roughly sorted in the field into large taxonomic groups: cattle, horse, pig, sheep/goat, bird, fish, and game. The bone from each group is then weighed. The result is then entered in a database for further analysis (Wigh, 1995: 88-89). It is thus already possible to study the species in the bone content of each layer out in the field, and to note the presence of unusual species or amounts of bone. It is possible to adapt the digging according to need and osteological interest.

A very large number of animal species has been identified from the three largest excavations in Birka (Stolpe, 1872, 1873; Ericson *et al.*, 1988). Bone from most of the

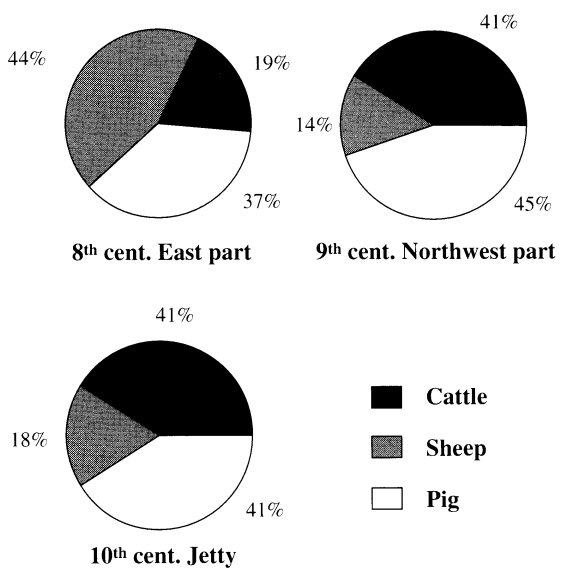

Fig. 2 : Distribution of cattle, sheep and pig in Birka. (% number of fragments)

Swedish mammals, and many bird and fish species, has been found. Amphibians are, however, very rare (tab. 1). Certain species are only represented in the form of horn or antler as raw material for manufacturing: elk, and possibly reindeer (Stolpe, 1873: 68), or artefacts: whale, and possibly walrus.

So far, it has not been possible to begin detailed studies of the bone in the different layers apart from the weight of the contents. The archaeological results are as yet not ready. However, it is possible to do a rough division of the material into two groups from the stratigraphy:

1: bone from the eastern part of the excavations, primarily from layers associated with bronze casting, dating to around AD 750-800.

2: bone from the north-western part of the excavations, from domestic-type deposits dating to ca. AD 800 and later.

The species distribution for the two periods is very different. A substantial change in diet happened around the beginning of the ninth century (fig. 2), from a dependence upon meat from sheep in the earlier time to a dominance by meat from cattle in the later layers. This is also supported by the results from the 1969-71 excavations of the tenth century jetty area.

It is, however, not yet possible to date this transition to beef more exactly, as both the osteological and the stratigraphic analyses have just begun. Therefore it is not yet possible, either, to explain the reasons for such a large change in food intake.

One problem is that we do not now know how trade with the town's hinterland was regulated during the Viking Period. Food delivery may have been a form of tax or tribute to the local king, who then distributed provisions in the town. It may also have been a question of production from the urban residents own, or their kinship's farms in the vicinity.

A hypothesis which may explain why a change took place in food intake is that, during a time near the beginning of Birka's existence, it was still possible for the urban residents to keep a number of smaller grazing animals on the island. During the ninth century Birka expanded so much that the population was forced to shift totally to importing meat, then beef. Another reason for the difference between these two groups may be that the oldest layers come from a casting workshop, while the younger are primarily domestic in character. The food consumption patterns may therefore have been different, as a result of the occupants' different economic conditions. During 1995, the stratigraphy of the casting workshop from the end of the eighth and beginning of the ninth centuries will be investigated, and then, perhaps, these questions may be answered.

In contrast to the pasture animals, it appears from many finds of immature pig bones that pigs may have been kept in town during the whole of Birka's existence. The proportion of pig bones is relatively constant over time. The number of pigs bred, however, was not enough alone to support the population. For extra meat and eggs, the Birka occupants had hens and geese.

Among the wild mammal finds, the bones of Swedish fur-bearing animals clearly dominate. It is known from historical sources that there was a large trade in furs in Sweden during the Viking Period, but never before have such amounts of fur-bearing animal bone been found. This is, then, the first time that it has been possible to document this widespread trade with the help of archaeological finds (Ambrosiani and Eriksson, 1994: 46). What has now been found during the excavations is thousands of phalanges and metapodes from, primarily, fox, pine marten and squirrel. The furs have been brought to Birka untanned, with the paws attached. In the town, craft workers have cut off the paws and worked the furs for sale. Left behind in rubbish deposits are the articulated bones from complete paws. Lesser amounts of paw bones from other fur-bearing animals have also been found, for example bear, lynx, hare,

polecat, beaver and wolverine. In contrast to the later town of Sigtuna, it does not appear that cat pelts have been brought here. A great number of crania and bones from the extremities of cats in Sigtuna bear cut marks from skinning (Hårding, 1991: 106). No cat bones from Birka have similar visible marks. Certain cats from Birka seem to have been left or even buried whole within the area. Of hare bones, primarily phalanges and metapodes have been found, which indicates that the skin was more important than the meat.

It seems that the fur trade existed from the time of Birka's foundation to its abandonment. Primarily squirrel and fox bones have been found in the very earliest layers, but the actual furrier's workshop has not been found within the area of the excavation. Fur-bearing animal bones have been found spread over the whole area, but are more concentrated in rubbish layers on the roads between the house plots.

We do not now know whether tanning of other hides, for example cow hide, took place, as no leather remains have yet been found on the site. There are, however, finds of goat bone which suggest that goat hide was worked. The goat bones which can be identified, namely horn cores and phalanges 1-3, suggest that goat hides were brought into the town. These bones have been interpreted elsewhere as remains of goat-hide tanning (Serjeantsson, 1989: 136). The goat horn cores found at Birka have been most often removed from the rest of the body by cutting away the upper part of the frontal bone together with both the adhering horn cores. This is markedly different from the finds of cattle and sheep horn cores, which have been sawed away at the base of the horn. This was done so as to easily remove the valuable horn from the bone.

Finally, it can be said that Birka, as the first urban settlement in Sweden, experienced some of the more negative results of living in a closely built-up area. Besides problems with rubbish disposal, the inhabitants of Birka were plagued by parasites, in the form of black rats and house mice. During Hjalmar Stolpes excavations in the 1870s, bones from black rats were found, but these could not be dated, so finds from Lund, in southern Sweden, dating to the eleventh century, have been counted as the eldest in Sweden (Bergquist, 1957). Black rats then appear in Sigtuna (Hårding, 1992: 20f), and Eketorp III (Boessneck *et al.*, 1979: 214f). Now, however, there is proof for a great number of black rats in Birka during the Viking Period, as early as the beginning of the ninth century. In total, there are around 50 finds from the present excavations. The finds have not yet been thoroughly examined, so as yet neither an exact number of bones nor an exact dating can ben given. The oldest layers, however, do not seem to include rat bones, though a lesser number of mouse bones have been found. Mouse occurs with black rat sporadically in all types of the more recent layers.

It must also be said that fish and bird remains occur in great amounts, and are to a large extent undamaged by 1000 years in Birka's soil. Around a tenth of the identified bone weight is fish and bird bone, which, in fragment count, probably exceeds the number of all other animal bones. So far, no analysis or count of fish or bird bone fragments has been carried out. The birds which dominate are ducks, as mentioned above, and among the fish, fresh water species from the lake around the island are most common. A considerable number of herring have also come to the island. It is as yet unclear whether the water of Lake Mälaren was sufficiently brackish in the Viking Period that there were local shoals of herring. Further geological studies will answer this question.

In summary it can be said that the analysis of this very well preserved and interesting mass find of osteological material from Swedens first town has just begun. As this is being written, the project has one further excavation season left, with probably another one tonne of bone. After that is finished, the first step is to carry out an archaeological phase and plot division of the material. Following that, certain layers and parts of layers will be chosen for the archaeozoological analysis. It is not economically possible, nor will there be time, to analyse the entire mass of the material in detail, so a number of tests will be made to calculate the optimum size for the different samples from the areas which will be studied. Each sample must be representative for the whole context from which it is taken. How the tests will be carried out is as yet in the planning stage. Thanks to the rough sorting of the whole material in the field, testing should be fairly easy. Furthermore, possible "oddities", such as pathological specimens and unusual species have already been noted during the rough sorting of each layer. These "oddities" or special occurences can be easily located when needed with the help of the database and without needing to consider the sampling method.

Some things which, among others, will be studied in the analysis are species occurrence, species presence, and age and sex composition, to understand Viking Period animal management within and outside Birka. An understanding of what roll the capture of fish and wildfowl played in the survival of the town is very important for its archaeological interpretation. With the help of bone measurements, it should hopefully be possible to see from where domestic animals, and possibly even fur-bearing animals, came. Unfortunately, there is little well-preserved osteological material from the surrounding area, but all the archaeozoological analyses from

nearby sites will be used. Through studies of slaughter age of both domestic animals, and fish and wildfowl, it may be possible to follow Birka's seasons, and with them the shifting patterns of food consumption and to answer the question of whether Birka was occupied the year round.

A very great amount of work remains to be done with the analyses, but the results will be published in the excavation's report series *Birka Studies,* as soon as they are ready.

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