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Animal exploitation at Birka — a preliminary report

By Per G.P. Ericson, Elisabeth Iregren and Maria Vretemark

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Through the ages, numerous animal bones have been excavated at the settlement area of the Viking Period town of Birka (Björkö). Despite its great archaeological and zoological importance, only a minor part of the total material has been analyzed. In this paper, husbandry, hunting and fishing are studied from both a geographic and a temporal point of view. Cattle and pigs were the most important meat-producers while sheep seem to have been raised predominantly for wool. Consumption of horse-meat cannot be proven, and horse bones are remarkably few. The important role of Birka in the fur trade is implied by finds from several wild fur-bearing species, representing diverse biotopes and geographic areas. Waterfowl too seem to have been hunted to a surprisingly great extent. The birds were most probably caught in the outer archipelago and brought to Birka for trading purposes. On the other hand, almost all the species of fish found belong to a fauna still typical of Lake Mälaren, which indicates that they were caught locally.

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The Viking Age (A.D. 800–975) trade-center at Birka (Björkö) in Lake Mälaren, has been subject to several archaeological excavations. Only two of them, however, concerned the real settlement area, the Black earth (Sw. *svarta jorden*). The first was that executed by Hjalmar Stolpe in the early 1870's (Stolpe 1872, 1873). Almost a century elapsed before a new excavation of the Black earth of Birka was undertaken. At this time the former harbour was investigated under the direction of Drs. Björn Ambrosiani and Birgit Arrhenius (B. Ambrosiani et al. 1973).

Apart from the fact that the two excavations were separated by almost one hundred years, their aims were also different. At the time of Stolpe's visit, the knowledge of Björkö's prehistory was sparse although the place was commonly regarded as the Ansgarian Birka. The early excavations by Stolpe sought to confirm this oral tradition.

Stolpe dug several trenches in the settlement area and reported the discovery of many archaeological finds and a large quantity of ani-

mal remains. From an archaeo-zoological point of view, it is interesting to note the enormous number of bones collected; the 1872 excavation alone yielded "... approximately 50 barrels of large bones, and 80 small cases of small bones, mostly of birds and fish" (translated from Stolpe 1873 p. 62). Furthermore, the bones are in remarkably good condition and "... even the most fragile parts of the skeleton are preserved" (translated from Stolpe 1872 p. 10). The Stolpe material has, however, one major drawback: nobody knows either where exactly in the settlement area Stolpe placed his trenches or whether he dug them stratigraphically.

The 1969–71 excavations are far better documented than that of Stolpe. Since their aim was to investigate the former harbour, the actual settlement area was only marginally concerned. Notwithstanding, an up to 140 cm thick cultural layer was found and an impressive amount of artifacts and ecofacts was collected, including that approximately 1500 kg of animal remains (Danielsson & Kihlberg 1973 p. 216).

The cultural layer was excavated in units of 10 cm thick m². It was possible to distinguish temporal sequences (B. Ambrosiani et al. 1973; K. Ambrosiani 1981). The bone-material is, however, less extensive and more fragmented than that from the earlier excavation.

Obviously, the osteological materials derived from the two main excavations in the settlement area at Birka differ in quality; the Stolpe material is very large and extremely well preserved but could not be divided into chronological sub-samples. The material from the 1969–71 excavations is highly fragmented but accurately dated. This difference makes the two material complementary.

The present paper is based on an analysis of animal remains collected at the Ambrosiani–Arrhenius excavation and constitutes a preliminary report from a project financially supported by a grant from the Council for Research in the Humanities and Social Sciences for which the authors are most indebted.

Material and methods

A total of approximately 120 kg (200 l) of bones, teeth and antlers have been analysed. The bones derive from four m² excavated in layers of 10 cm to a depth of about 1 m. Since the four uppermost layers are contaminated by later ac-

tivities they have been excluded from the investigation. The remaining layers in the stratigraphy date from the 10th century (B. Ambrosiani 1973 p. 243).

The participants analysed different parts of the material: Ericson identified the remains of birds and fish, Iregren the wild mammals, cats and dogs, and Vretemark the domestic stock. The analyses were conducted at the Museum of National Antiquities in Stockholm and the Museum of Natural History in Gothenburg.

The calculations of meat-weight are to be seen as rough estimates based on a multiplication of the MNI (minimum numbers of individuals) by the suggested mean individual meat-weight of each species (100 kg in cattle, 40 kg in pig and 25 kg in sheep, Vretemark 1982).

The estimation of the height of the cattle at the whithers follows Fock (1966).

Husbandry

Domestic animals dominate the material and the species identified are those usually found at contemporary North-European urban sites; cattle, pig, sheep, goat, horse, dog, cat, domestic fowl, and goose (Table 1). Considering the restricted area of the Island of Björkö, it has sometimes been thought that sheep were the main animals kept in the vicinity of the settlement. This analysis, however, shows that cattle and pig dominate while sheep is less frequent (Fig. 1). Expressed as meat-weight, beef represents 68% of the total meat production, pork 25%, and mutton only 7%.

During the century represented in the stratigraphy, there seems to be no radical change in the trend of husbandry. Both cattle and sheep reached high ages before they were slaughtered which implies that production of milk and wool played a major role in the economy. Pigs, however, usually were killed while young (mostly before three years old) indicating that they were primarily used as food.

There is no doubt that most domestic animals have been slaughtered in Birka judging from their anatomical distribution; all parts of the skeleton are represented (Table 2). The only exception are those parts of the skeleton which are used for artefacts, i.e. horn-cores, metacarpals, and metatarsals of cattle. Consequently,

Table 1. Mammalian species present in the Birka faunal sample. — Identifierade däggdjursarter.

Domestic Mammals	
Pig (<i>Sus domesticus</i>)	4023
Cattle (<i>Bos taurus</i>)	4481
Sheep (<i>Ovis aries</i>)	1876
Goat (<i>Capra hircus</i>)	8
Horse (<i>Equus caballus</i>)	2
Dog (<i>Canis familiaris</i>)	18
Cat (<i>Felis catus</i>)	21
Wild Mammals	
Mountain hare (<i>Lepus timidus</i>)	5
Squirrel (<i>Sciurus vulgaris</i>)	1
Beaver (<i>Castor fiber</i>)	5
Fox (<i>Vulpes vulpes</i>)	34
Ermine (<i>Mustela erminea</i>)	1
Pine marten (<i>Martes martes</i>)	3
Badger (<i>Meles meles</i>)	1
Wolverine (<i>Gulo gulo</i>)	1
Otter (<i>Lutra lutra</i>)	1

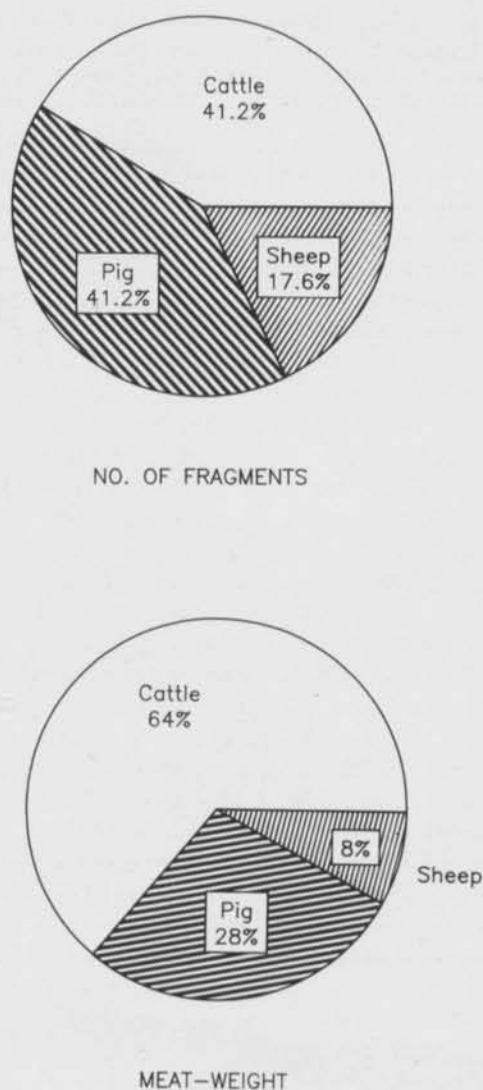


Fig. 1. As calculated from the number of fragments, cattle and pig are almost evenly represented in the osteological material while sheep is less common. In terms of the quantity of meat produced cattle is by far the most important species. — Beräknat utifrån fragmentantal är nötkreatur och svin i stort sett lika väl representerade i materialet medan får är ovanligare. Ser man till mängden producerat kött var nötkreatur i särklass viktigast för invånarna i Birka.

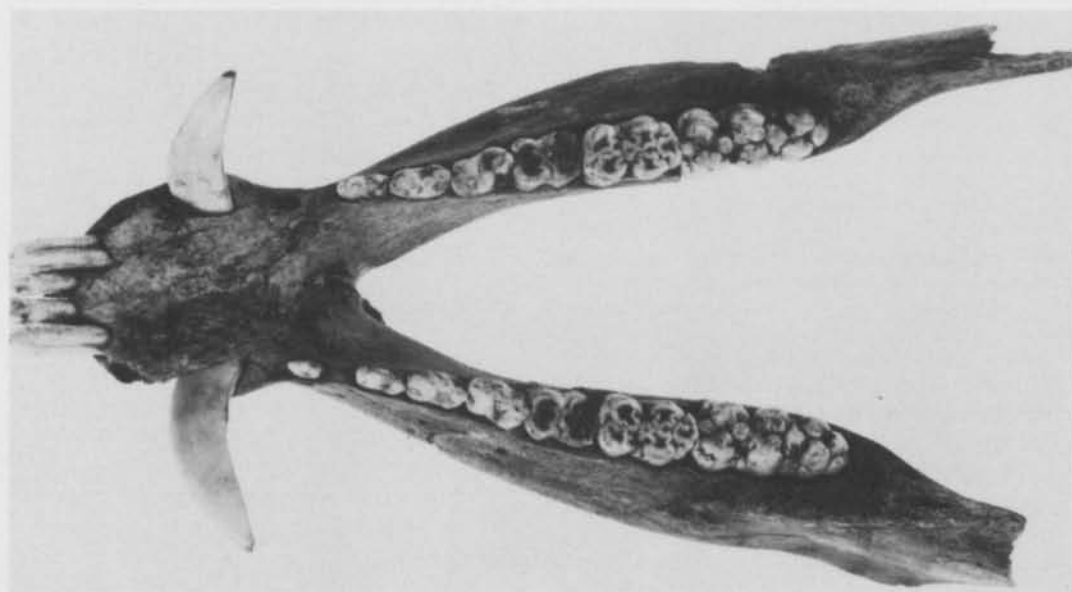
these parts are under-represented in the food remains.

Important information about the physical status of the domestic stock *before* the urbanization is given by the Birka material: the heights of the withers of cattle, sheep, and pig are on average greater at Birka than in the late Medieval towns of central Sweden. The mean height of cattle is 112 cm in Birka, as compared with estimations of 106 cm for Medieval cows in Stockholm (Vretemark 1982), of 106 cm in Uppsala (Ersgård et al. 1984), and of 105 cm in Örebro (Vretemark 1985 a). Cows in Early Medieval Sigtuna were, however, the same size as the Birka animals (Vretemark 1985 b). Therefore, in cows there actually seems to be a decrease in size from the 10–13th century to the 14–16th century. This was probably caused by a more intensive live-stock breeding in response to an increasing population density. Observations of this kind are common in the history of mammalian domestication. Another example of this is the dramatic change in length of the snout of the domestic pig in the period from the Stone Age to the present. During this time the length of the row of teeth decreased to an extent that led to a decrease in the sizes of the individual teeth and to the failure of some teeth to evolve in highly bred animals. The latter is the case with the lower first premolar (Fig. 2) and the frequency of this anomaly may be used as a rough measure of the "degree of domestication". In Birka this anomaly is less frequent than in the succeeding late Medieval material implying that the Birka breed were not as highly bred as were the Medieval.

Taken as a whole, the poultry at Birka are quite similar to those found in the Medieval towns of central Sweden (c.f. Vretemark 1982, Jonsson 1984). This is also true of the horses which have left almost no traces in the food remains. The absence of horse bones in the Medieval material is often explained as a consequence of the Christian ban on the eating of horse-meat. It is often assumed that horses were commonly eaten in prehistoric times. Despite the rumour that Birka was a center of the Aesir cult, horses were obviously not regularly used as food here.

Table 2. Anatomical distribution of the mammalian species identified at Birka. A: Pig, B: Cattle, C: Sheep, D: Goat, E: Horse, F: Dog, G: Cat, H: Mountain hare, I: Squirrel, J: Beaver, K: Fox, L: Ermine, M: Pine marten, N: Badger, O: Wolverine, P: Otter. — Fördelning på benslag hos däggdjuren i Birka. A: Svin, B: Nötkreatur, C: Får, D: Get, E: Häst, F: Hund, G: Katt, H: Skogshare, I: Ekorre, J: Bäver, K: Räv, L: Hermelin, M: Mård, N: Grävling, O: Järv, P: Utter.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Calvarium	470	212	111	3												
Mandibula	157	270	154				3									
Dentes	710	695	288				4									
Os hyoides	10	29	6													
Vertebrae	363	475	159			1	2			1	1					
Sternum	6	15	11													
Scapula	180	147	57		1											
Costae	608	1557	500													
Humerus	102	84	18				2									
Radius	69	45	39					2								
Ulna	134	61	31				1			1	2					
Os coxae	125	103	53				1									
Femur	119	122	43				1								1	
Tibia	106	71	54				3	1								
Malleolus	114	20	18													
Metacarpus	39	54	47	2		3		1			11					1
Metatarsus	27	49	25			2	1				9	1	1			
Metac./metat.	172	16	29			1							1			
Carpus	75	97	38								1					
Patella	12	6	5													
Astragalus	40	20	12			1					2					
Calcaneus	78	19	23				1				4					
Tarsalia cct.	56	29	35		1	4	2		1		1					
Phalanx I	89	33	37			2		1		1	3		1			
Phalanx II	91	23	37			4				2						
Phalanx III	71	65	29	1											1	
Phalanx indet.			1													
Sesamoidea		164	16													



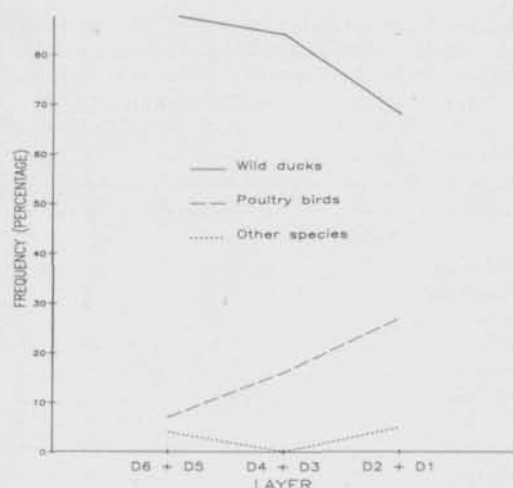


Fig. 3. Variation in the frequency of some bird taxa at Birka during the 10th century. The frequency is given in percent of the total number of identified bird bones. — Variation i den relativa andelen av vissa fågelgrupper under 900-talet.

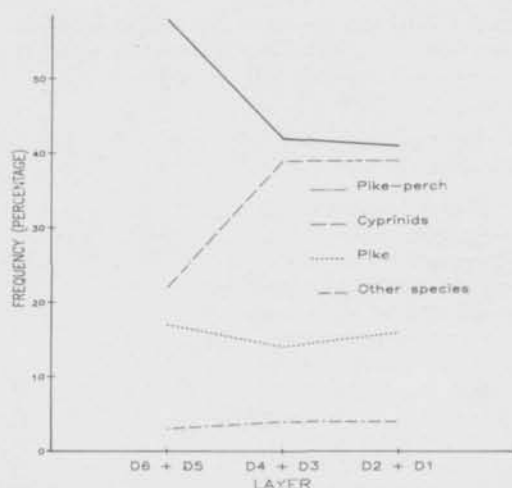


Fig. 4. Variation in the frequency of some fish taxa in Birka during the 10th century. The frequency is given in percent of the total number of identified fish bones. — Variation i den relativa andelen av vissa fiskgrupper under 900-talet.

Hunting and fishing

The importance of Birka as a trading center is reflected in the remains of wild animals. The species may be roughly clustered in three different categories according to their significance; mainly hunted for fur, for food, or for handicraft.

A number of the wild mammals (Table 1) seem to have been brought to Birka as furs. Of these species we normally find only those skeletal elements which are left in the skins, mostly claws (Table 2). Mountain hare, squirrel, beaver, fox, ermine, pine marten, badger, wolverine, and otter are examples of such species. Remains from the axial skeleton of some of them have also been found indicating that the whole carcasses were brought to Birka. The fur trade seems to have been well organized and skins of e.g. wolverine may have been transported a

← Fig. 2. A mandible of a boar. The frequency of individuals with the first premolar present, i.e. the tooth just behind the canine, is higher in the Birka material than in late Medieval pig populations implying that pigs were less highly bred during the Viking Age. — Underkäke av en galt. I Birka förekommer den första premolaren, tanden närmast bakom beten, hos relativt sett fler individer än fallet är hos svin i högmedeltida material. Detta kan tolkas som att den vikingatida svinhållningen varit mindre intensiv.

Table 3. Bird and fish species present in the Birka faunal sample. — Identifierade fågel- och fiskarter.

Birds	
Domestic fowl (<i>Gallus gallus</i>)	71
Domestic geese (<i>Anser anser</i>)	6
Mallard (<i>Anas platyrhynchos</i>)	1
Eider (<i>Somateria mollissima</i>)	200
Velvet scoter (<i>Melanitta fusca</i>)	14
Long-tailed duck (<i>Clangula hyemalis</i>)	7
Red-breasted merganser (<i>Mergus serrator</i>)	4
Goosander (<i>Mergus merganser</i>)	2
Unident. mergansers (<i>Mergini</i>)	3
Unident. anatids (<i>Anatinae</i>)	73
White-tailed eagle (<i>Haliaeetus albicilla</i>)	1
Capercaillie (<i>Tetrao urogallus</i>)	1
Razorbill (<i>Alca torda</i>)	5
Black quillmot (<i>Cephus grylle</i>)	2
Unident. alcids (<i>Alcidae</i>)	2
Raven, (<i>Corvus corax</i>)	1
Unidentified bird remains	250
Fish	
Herring (<i>Clupea harengus</i>)	22
Salmon unident. (<i>Salmonidae</i>)	1
Whitefish (<i>Coregonus sp.</i>)	5
Pike (<i>Esox lucius</i>)	195
Roach (<i>Rutilus rutilus</i>)	10
Ide (<i>Leuciscus idus</i>)	2
Tench (<i>Tinca tinca</i>)	7
Bream (<i>Abramis brama</i>)	352
Blue bream (<i>Abramis ballerus</i>)	3
Unident. cyprinids (<i>Cyprinidae</i>)	99
Eel (<i>Anguilla anguilla</i>)	2
Burbot (<i>Lota lota</i>)	3
Perch (<i>Perca fluviatilis</i>)	20
Pike-perch (<i>Lucioperca lucioperca</i>)	548
Unidentified fish remains	409

long way to the Lake Mälaren district, perhaps even from the northernmost parts of Scandinavia.

The antlers of reindeer found by Stolpe (1873) probably also derive from northern Scandinavia. Like the antlers of elk, these were brought to Birka as raw materials for artefacts.

A complex support to the inhabitants' economy is illustrated by the intensive hunt for waterfowl (Table 3, and Ericson 1987). The birds, mainly eider, long-tailed duck, scoters, and mergansers, were brought to Birka as almost intact carcasses which is shown by the fact that

Table 4. Anatomical distribution of the most common bird taxa identified at Birka. A: Domestic fowl, B: Eider, C: Remaining wild anatids. — Fördelning på benslag hos de vanligast förekommande fågelgrupperna i Birka. A: Tamhöns, B: Ejder, C: Övriga vilda andfåglar.

	A	B	C
Calvarium		10	4
Mandibula		7	1
Syrinx			2
Sternum	2	10	6
Scapula	9	20	9
Coracoid	9	32	12
Furcula		5	4
Humerus	8	38	16
Radius	2	10	6
Ulna		8	9
Carpometacarpus	6	11	4
Carpi		1	
Phalanx manus	1	9	
Os coxae	4	9	3
Femur	4	6	7
Tibiotarsus	11	23	16
Fibula		1	
Tarsometatarsus	15		5

every part of the bird is represented (Table 4). Probably both the meat and the feathers, or indeed the whole skin, were used. Finds of bird species restricted to a marine habitat indicate that the hunt was conducted far from Birka, probably in the archipelago off central Sweden.

The relative number of waterfowl in the identified avian material is largest in the oldest layers, 88%, and decreases to 66% in the youngest (Fig. 3). The absolute number of waterfowl actually increases throughout the stratigraphy; this is not due to a less intensive hunt but to the increasing economic importance of domestic fowl. It is notable that remains of terrestrial species are rare in the material. During the High Middle Ages, such species, particularly game birds, are very common in towns in central Sweden (Jonsson 1984).

Although the bird remains show that the Lake Mälaren district was in close touch with the outer part of the coastal area, no such inferences could be drawn from the fish material. Indeed, all the evidence indicates local fishing, resulting in a fauna similar to that now present

in Lake Mälaren. The only species which was certainly caught in brackish water is the hering, of which 22 bones were found, corresponding to less than 2% of the identified specimens of fish. The pike-perch is the most frequent fish in the material, followed by several species of cyprinids among which the bream is the most common (Table 3). The relative number of the pike-perch is largest in the oldest layers and steadily decreases in the younger (Fig. 4). The relative number of cyprinids shows an opposite trend.

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Sammanfattning

Trots att stora mängder djurben tillvaratagits vid utgrävningar i Svarta jorden i Birka (på Björkö i Mälaren) har endast en obetydlig del analyserats osteologiskt. I föreliggande arbete redovisas resultat från forskningsprojektet "Bosättning i Birka — animalieproduktion och konsumtion", finansierat av Humanistisk-Samhällsvetenskapliga Forskningsrådet. Undersökningen baserar sig på djurben tillvaratagna vid grävningar i svarta jorden utförda mellan 1969 och 1971.

Resultaten visar att nötkreatur och svin varit de mest betydelsefulla köttproducenterna för invånarna i Birka medan fåren främst förefaller ha hållits för ullens skull. Frekvensen av de olika delarna i skelettet antyder att alla delar av djuren är representerade lika i materialet, d.v.s. djuren har slaktats och styckats lokalt i Birka. Eftersom Birkas och asatrons blomstringstider sammanfaller kan man tro att förtäringen av hästkött, som spelat en central roll i asatron, skulle avsätta spår i matresterna från Birka. Så

är dock inte fallet. Endast enstaka hästben har påträffats och i detta avseende överensstämmer Birkamaterialet väl med förhållandena i senare medeltida matavfall. Någon vardagskonsumtion av hästar tycks det därför inte vara tal om under vikingatid i Mälardalen.

Av djurbenen i Birka framgår klart att jakt och fiske spelat en stor roll. Somliga arter, som t. ex. skogshare, ekorre, bäver, räv, hermelin, mård, grävling, järv och utter, har haft stor betydelse för pälshandeln. Att flera av dessa arter förts till Birka enbart i form av pälsvor visat av att de i fyndmaterialet endast representeras

av sådana skelettdelar som normalt lämnas kvar i skinnen. Ett annat mycket viktigt jaktbyte har sjöfåglarna, främst olika änder, varit. Att sjöfågeljaktens omfång varit så stort som här kunnat beläggas har tidigare varit helt okänt. Fåglarna har med all sannolikhet fångats under vårflyttningen norrut i det som nu är Stockholms skärgård och kontakterna med den regionen måste tidvis ha varit intensiva. Denna kontakt återspeglas dock inte i fiskmaterialet där de traditionella målarterna gös, gädda och karpfiskar, helt dominerar.