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DEVELOPMENT OF FISHERY DURING THE 1st AND 2nd MILLENNIA AD IN THE BALTIC REGION

Some results of an interdisciplinary study combining identifications of fish remains and finds of fishing equipment at archaeological sites and historical data are presented. The fish bones analysed originate mainly from Estonian archaeological sites, but a huge number of Viking Age fish bones come from Birka in East Sweden. Comparative material has been obtained also from the other Baltic Sea area. The development of the fishery in Estonia is considered against the background of other countries around the Baltic during the 1st millennium and the first half of the 2nd millennium AD. Based on finds of fish and fishing equipment, one can conclude that fishing in northern Estonia and even on the islands was inhibited during the 1st millennium. In coastal areas fishing recommenced in medieval times. In southern Estonia, where the landscape is uneven and the climate is more continental than in coastal areas, mostly hunting and fishing were still practised to a greater degree.

On esitatud interdistsiplinaarne uurimus, mis ühendab endas kalaluude analüüse, arheoloogiliste kalastusvahendite ülevaadet ja teisi ajaloolisi andmeid. Uuritud kalaluud pärinevad põhiliselt Eesti arheoloogilistest muististest, kuid suurim siin käsitletud luuaines on saadud Birka viikingiaja linna kaevamistelt Rootsis. Samuti on kasutatud võrdlusandmeid teistest Läänemere maadest. Arutelu kalastustaseme üle puudutab I aastatuhandet ja II aastatuhande algupoolt. Toetudes luuleidudele ning kalastusvahendite vähesusele materjalis, võib järeldada, et kalapüügi areng pidurdus I aastatuhandel nii Eesti rannikul kui ka saartel. Teatav progress taastus keskajal. Siseveekogudel sellist järsku muutust ei ilmne.

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Introduction

The only information about the fishery of prehistoric times originates from finds of preserved fish remains and/or fishing equipment. As early as the 1930s, Dr. Johannes Lepiksaar began to analyse fish remains gathered from Estonian archaeological sites. After 1944 he continued this field of study in Sweden. An overview of the formation of fish fauna in Estonian water bodies as well as in the Baltic is available in several publications (Lepiksaar 1935, 1938; Lõugas 1997;

Paaver & Lõugas in print). One study also concerns fishing strategies and equipment found at Estonian archaeological sites (Lõugas 1996). These papers are mainly focused on the earlier stages of the development and use of fish fauna, i.e. Stone Age/Early Metal Ages. However, many local studies of fish remains around the Baltic are known from later periods. Based upon her own studies and those by other authors, Bødker-Enghoff (1999) presents many fish bone materials from around the Baltic Sea and provides an overview of fishery in the period from the 5th century BC to the 16th century AD.

No comprehensive survey of fishing in Estonia during the 1st millennium and the first half of the 2nd millennium AD is available in Estonian archaeological publications. The only information tells us that the role of fishing diminished in the Iron Age and that some fish bones and a few finds of hooks, trolls, and net sinkers are known from that period (Jaanits et al. 1982; Lang 1996, 2000). No discussions or explanations are provided. The purpose of the present paper is to find an explanation to the diminishing of the role of fishery during the Iron Age and describe the situation with fishing in Estonia during the 1st millennium and the first half of the 2nd millennium. The discussion is based only on finds and not on written sources, with comparative material mainly from Birka, East Sweden, but also from other temporary sites around the Baltic Sea. A special chapter of the paper deals with the fish trade.

Material and methods

The original material (analysed by the author) comes from the sites of Saadjärve, Pöide, Viljandi, Tallinn, Pärnu, and Tartu (see Fig. 1). The fish bone material from Lõhavere hillfort was analysed by Lepiksaar (1935). Huge numbers of the Viking Age fish bones have been recovered from Birka, Björkö Island in East Sweden. These were analysed by the author in 1995–2000. The comparison with other Baltic sites has been performed using a publication by Bødker-Enghoff (1999). Fish bones were identified osteomorphologically, using the reference collections at the Institute of History, Tallinn, and J. Lepiksaar's collection of fish bones.

The quality of fish bones is very variable, having been affected by several factors: different conditions of preservation, the influence of various treatments and excavation techniques. The excavation technique is very important in the case of small fish which can be separated from the soil by sieving (Fig. 2).

ESTONIA

Fish bone samples from the Iron Age and medieval sites in Estonia are rather limited. This is partly because sieves were not used during the excavations. Below, the material recovered is presented in the order of the sites.

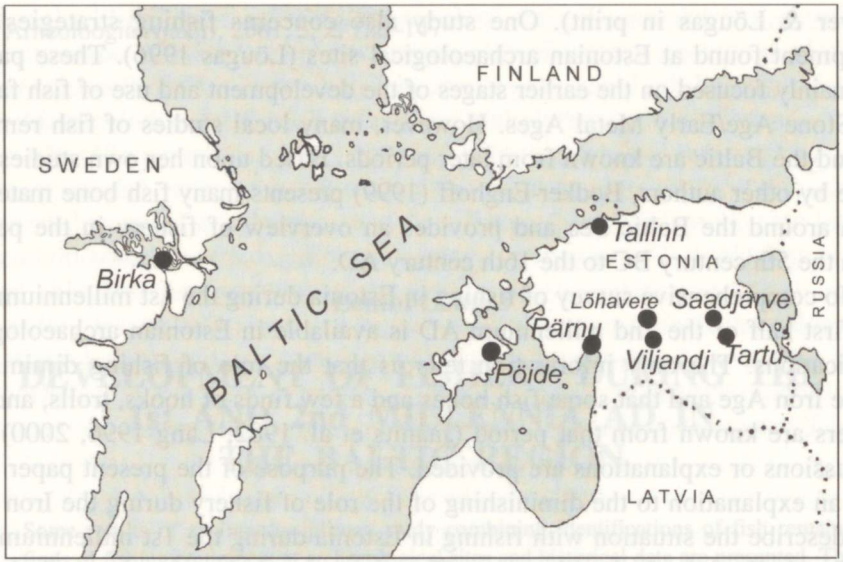

Fig. 1. Location of the archaeological sites mentioned in text.

Joon 1. Tekstis mainitud arheoloogiliste muististe asukohad.

Fig. 2. Small bones of the perch (*Perca fluviatilis*) from Birka.

Joon 2. Väikesed ahvena luud Birkast.

Saadjärve

Saadjärve is the Iron Age settlement situated at the foot of Saadjärve hillfort, close to lakes Saadjärv and Soitsjärv in central Estonia (Fig. 1). It was excavated by Ain Lavi in 1984 (Lavi 1984). One radiocarbon dating gave a result of 1310±40 yr BP (725–845 AD). A small amount of material has been hand-collected from this site. All fish bones are from freshwater species, mostly pike, *Esox lucius* (20 specimens), and bream, *Abramis brama* (23 specimens), but 8 fragments come from the burbot, *Lota lota*, and 4 from the perch, *Perca fluviatilis* (Lõugas 1997, 1999).

Pöide

Pöide stronghold is situated in the southeastern part of Saaremaa Island (Fig. 1). It was excavated in 1990 and 1991 by Vello Lõugas and Marika Mägi (Lõugas 1991; Lõugas & Mägi-Lõugas 1994). The period of occupation of the stronghold was dated to the Pre-Viking Age and the beginning of the Viking Age, i.e. the 8th–9th centuries. Material was hand-collected. All fish species are of freshwater origin, with the perch predominating over the other fish species (Lõugas 1997, 1999; Bødker-Enghoff 1999). Perch is represented by 18 bone fragments and 148 squamae, pike by 9 and roach, *Rutilus rutilus*, only by 2 bone fragments. It seems that the stronghold was used in the case of emergency and therefore the composition of refuse fauna is poor.

Lõhavere

Lõhavere (Fig. 1) is a very famous hillfort in Estonia and was a strong centre at the end of prehistoric times (in the 12th–13th centuries in Estonia). It was mentioned in *Heinrici Chronicon Livoniae* (Chronicle of Henry of Livonia) in connection with the insurrection against Christianity. Excavations have been carried out at Lõhavere several times during the 20th century (Jaanits et al. 1982). Fish bones have been analysed by J. Lepiksaar, who identified five species of fish from Lõhavere material: pike, perch, roach, ide (*Leuciscus idus*), and rudd (*Scardinius erythrophthalamus*) (Lepiksaar 1935). As expected, no marine species were recorded.

Viljandi

In the summers of 1999 and 2000, excavations took place outside the medieval town, on the high bank of Lake Viljandi, 100–150 m south of the ruins of the convent house of the Livonian Order Castle (Valk 2000, 2001). The Kivimägi site includes material from the 10th–11th centuries up to 1223 (Table 1). The Suusahüppemägi site, which was occupied by the so-called social upper class, dates to the time interval between the middle of the 12th century and the beginning of the 13th century. Fish bones from the Order Castle originate from the 13th century (Haak 2001).

Table 1. Fish bones from the excavations of Viljandi Order Castle and its surroundings

Tabel 1. Kalaluud Viljandi ordulinnuse ja selle ümbruse kaevamistelt

Species	Kivimägi	Suusahüppemägi	Order castle
Pike (*Esox lucius*)	59 + 1 squama	30	3 + 1 squama
Perch (*Perca fluviatilis*)	72 + 84 squamae	68 + 3 squamae	1 squama
Pikeperch (*Stizostedion lucioperca*)		3	
Whitefish sp. (*Coregonus* sp.)	8	15	
Trout (*Salmo trutta*)		2	
Bream (*Abramis brama*)	30	2	2
Roach (*Rutilus rutilus*)	18	3	
Ide (*Leuciscus idus*)	6	3	
Dace (*Leuciscus leuciscus*)		1	
Vimba bream (*Vimba vimba*)	1		
Tench (*Tinca tinca*)	1		
Cyprinidae	36 + 183 squamae	28 + 4 squamae	2 + 1 squama
Burbot (*Lota lota*)		1	

Tallinn

Several fish bone collections have been gathered during rescue excavations in Tallinn Old Town and its surroundings. These are mainly from the medieval times, but also from later periods. It should be mentioned that Tallinn was one of the Hanseatic trade centres, which probably notably influenced fishery as well. The samples are from 25 Maakri Street (excavated in 1995), 10 Sauna Street (1998 and 1999), 10 Viru Street (1995), and from the settlement layer under the medieval St. Barbara cemetery (1995) on Kaarli Avenue (Table 2). The Maakri

Table 2. Fish bones from the excavations in Tallinn

Tabel 2. Kalaluud Tallinna kaevamistelt

Species	25 Maakri Street	10 Sauna Street	10 Viru Street	St. Barbara
Pike (*Esox lucius*)	10	10	9	21 + 3 squamae
Perch (*Perca fluviatilis*)	3	21	1	37 + 31 squamae
Pikeperch (*Stizostedion lucioperca*)		2		3
(Baltic?) herring (*Clupea harengus*)				2
Bream (*Abramis brama*)	2	1	1	7
Roach (*Rutilus rutilus*)				6
Ide (*Leuciscus idus*)	1			
Cyprinidae	19	2 + 2 squamae	4	1 + 5 squamae
Sturgeon (*Acipenser sturio*)	3			
Cod (*Gadus morhua*)	17	7	11	20
Turbot (*Scophthalmus maximus*)	1			
Flounder (*Platichthys flesus*)	5		1	5

Fig. 3. Cod (*Gadus morhua*) vertebrae from medieval Tallinn.

Joon 3. Tursa selgroolülid keskaegsest Tallinnast.

Street, Sauna Street, and St. Barbara excavations were investigated by Tael Ltd. under the guidance of Vladimir Sokolovski. The excavation in Viru Street was performed by Agu Ltd. and supervised by Peeter Talvar (the results see in Talvar 1995). Fish bones from these excavations were hand-collected. Only a limited number of specimens were obtained, but both marine and freshwater fish species were represented. All species identified occur in the Baltic basin also today. There is some doubt only about very large cod bones which are assumed to have been imported (Fig. 3).

Tartu

The history of the town of Tartu also dates back to prehistoric times. Fish remains were found here from two quite close-lying excavations: the trench in Vanemuise Street (excavated in 1995) and the site of the new Central Post Office in Küüni Street (excavated in 1993). Excavations were carried out under the guidance of Mare Aun (Аун 1994a, 1994b, 1996). Stratigraphy of the excavation areas covered the sequence that ranged from the end of prehistoric times until recent times. The majority of the material originates from the 14th–18th centuries. The samples were hand-collected. Mostly they represented bones of freshwater fish (Table 3), but some few bones were from cod (from the medieval layers of the excavation). Cod was certainly imported from the coast.

Table 3. Fish bones from the excavations in Tartu

Tabel 3. Kalaluud Tartu kaevamistelt

Species	Vanemuise Street	Küüni Street
Pike (*Esox lucius*)	33 +10 squamae	13 + 1 squama
Perch (*Perca fluviatilis*)	71 + 5 squamae	86 + 41 squamae
Pikeperch (*Stizostedion lucioperca*)	4	1
Bream (*Abramis brama*)	32	15
Ide (*Leuciscus idus*)	2	
Roach (*Rutilus rutilus*)	1	8
Tench (*Tinca tinca*)	1	
Vimba bream (*Vimba vimba*)	1	6
Cyprinidae	8 + 21 squamae	17
Cod (*Gadus morhua*)	5	
Burbot (*Lota lota*)	2	4
Wels (*Silurus glanis*)	1	

Pärnu

Several excavations have also been carried out in Pärnu. Two fish bone assemblages are included in this paper: from 2 Munga Street and from 15 Malmö Street. The former was excavated under the guidance of Ülle Tamla in 1991 and the latter by Aivar Kriiska and Aldur Vunk in 1992. Material was recovered by hand-collection, as well as by sieving at 15 Malmö Street in places where the concentration of fish bones was greater. The samples include marine, migratory, and freshwater species of fish (Table 4). All of them could have been caught near Pärnu. Perch predominates in the material, followed by pikeperch and herring. Fish bone finds from Malmö Street are also discussed in Bødker-Enghoff (1999).

Table 4. Fish bones from the excavations in Pärnu
Tabel 4. Kalaluud Pärnu kaevamistelt

Species	2 Munga Street	15 Malmö Street		
		14th cent.	15th–16th cent.	17th–18th cent.
Sturgeon (*Acipenser sturio*)		1		
Pike (*Esox lucius*)		5	20 + 71 squamae	7 + 6 squamae
Perch (*Perca fluviatilis*)	24 + 1 squama	3	241 + 2134 squamae	147 + 515 squamae
Pikeperch (*Stizostedion lucioperca*)	8	5	63 + 12 squamae	82 + 19 squamae
Whitefish sp. (*Coregonus* sp.)			5	1
Trout (*Salmo trutta*)	2		3	
Eel (*Anguilla anguilla*)			2	1
Cod (*Gadus morhua*)	1		20	17
(Baltic?) herring (*Clupea harengus*)	10		78	42
Flounder (*Platichthys flesus*)			2	5
Roach (*Rutilus rutilus*)			80	35
Ide (*Leuciscus idus*)			5	5
Dace (*Leuciscus leuciscus*)			1	
Vimba bream (*Vimba vimba*)			5	1
Cyprinidae			8 + 13 squamae	1 + 20 squamae

SWEDEN

Birka

The fish bone material included in this paper consists of finds collected in 1990–95 under the guidance of Björn Ambrosiani and Kenneth Svensson. Fish bones were recovered by wet sieving. About 16 000 fragments, which forms only

a small proportion of the total fish bone material excavated, have been analysed by the author (partly published in Lõugas 1997; Bødker-Enghoff 1999; Wigh 2001). These come from 20 different species of fish. The pikeperch, herring, pike, and bream predominate over the other species. Migrating species, such as eel, salmon, and trout, could have been imported, since otherwise more remains could be expected. Marine species, such as flounder and cod, are represented by only a few fragments (Tables 5 and 6). It is questionable how intensive marine fishery was and whether it was practised by Birka settlers at all. Large amounts of herring bones could be the result of fish trade. It has been argued that herring could occur even in Lake Mälar, since the lake had a connection with the Baltic Sea at that time. The observations, however, allow one to assume that the "Birka herring" might have been derived from the southern part of the Baltic or even from the North Sea. This is because of the size of the vertebrae, which were larger than the Baltic herring usually has. Table 5 shows the anatomical representation of fish bones and Table 6 the occurrence of bones of different fish species between the eight phases of the excavation area. The dates of these phases are according to Wigh (2001). Fish species and bone units are in alphabetical order.

Fishing and equipment

It seems that, with only a few exceptions, all of the fish included in this paper occurred in local water bodies and were caught close to the sites. Therefore it would be interesting to examine how the amount of fish bones reflects the fishing equipment found at these sites.

It was a difficult task to find information about fishing equipment dated to the 1st millennium in Estonia. The book *Eesti esiajalugu* (Estonian prehistory, Jaanits et al. 1982) contains only two pictures of fish hooks: one from the Rõuge settlement/hillfort and the other from Lõhavere hillfort. The rest is general information, that "we know of some hooks, net sinkers/floats or trolls from that period..." (Jaanits et al. 1982, pp. 301, 391).

It appears that no finds indicative of fishing have been discovered at the Saadjärve settlement (Lavi 1984). However, fish bones have been found among the remains of food. Also, no fishing equipment has been found at Pöide hillfort either (M. Mägi, pers. comm. 2001). Fish remains in the bone material represent only a small proportion of the animal bone collections. At least one iron hook has been found from Lõhavere hillfort, which was mentioned in Jaanits et al. (1982, fig. 219).

Three rather large hooks (c. 5 cm) have been found at the Suusahüppemägi excavations in the town of Viljandi (H. Valk, pers. comm. 2001). The same complex of finds includes also an iron stick (VM 10741: 128).

Table 5. Anatomical representation of fish bones from the material of the Birka Viking Age town (excavated 1990–95), Björkö Island, East Sweden

Tabel 5. Birka viikingiaja linna 1990.–1995. aasta kaevamistelt kogutud kalaluude anatoomiline jaotus

Bone unit	*Abramis ballerus*	*Abramis brama*	*Acipenser sturio*	*Anguilla anguilla*	*Carassius carassius*	*Clupea harengus*	*Coregonus* sp.	Cyprinidae	*Esox lucius*	*Gadus morhua*	*Leuciscus idus*	*Leuciscus leuciscus*	*Lota lota*	*Perca fluviatilis*	*Pleuronectes* sp.	*Rutilus rutilus*	*Salmo* sp.	*Salmo* sp. (*salar*)	*Salmo* sp. (*trutta*)	*Silurus glanis*	*Stizostedion lucioperca*	*Tinca tinca*
Articulare						28		21	83				1	9							61	1
Basioccipitale		22				2		21	12		2			3		25					29	1
Basipterygium		7						5	6		1										13	
Branchiostegale									5												10	
Cleithrale																					2	
Cleithrum		26				1		60	119		2			40							145	1
Costa		10						130														
Dentale	1	11		5		101		26	155		1			11		1	1				114	1
Ectopterygoideum									46					2							85	
Entopterygoideum									1												6	
Epihyale						15		11	18					2							53	
Exoccipitale								1													9	
Frontale						25			4					5							15	
Hyomandibulare		30				28		21	50		5			12		2					61	1
Hypurales																					1	
Infraorbitale																					1	
Interoperculare	1	3				11		2	1					4							12	
Keratohyale		10				123		36	44		1			17			1			2	81	1
Maxillare		2		4		71		6	40				1	11		1					65	
Metapterygoideum						1								2							4	
Operculare		13				86		44	6		2			11		5					9	
Opisthoticum						1			1													
Os pharyngeum	5	56						21			18	3				167						7

Table 5 continued

Bone unit	*Abramis ballerus*	*Abramis brama*	*Acipenser sturio*	*Anguilla anguilla*	*Carassius carassius*	*Clupea harengus*	*Coregonus* sp.	Cyprinidae	*Esox lucius*	*Gadus morhua*	*Leuciscus idus*	*Leuciscus leuciscus*	*Lota lota*	*Perca fluviatilis*	*Pleuronectes* sp.	*Rutilus rutilus*	*Salmo* sp.	*Salmo* sp. (*salar*)	*Salmo* sp. (*trutta*)	*Silurus glanis*	*Stizostedion lucioperca*	*Tinca tinca*
Os suspensorium		3						1			1											1
Palatinum									78								2				50	
Parasphenoideum						3		1	7					4							63	
Postcleithrale														3							8	
Posttemporale		1												5							42	
Praemaxillare		2		2				1	2					5							83	
Praeoperculare		5				80		37	27		1			22							99	
Prooticum						187																
Quadratum		4				4		11	62					8				1			76	
Scapula		1						1			2										6	
Scuta			4																			
Squama		10						189	1					40							3	
Suboperculare		3				46		3	2					3							13	
Supracleithrale								8	3					8							34	1
Supramaxillare						2																
Supraoccipitale		3																				
Symplecticum									1													
Tripus								1														
Urohyale		9				1		6	1					1							8	
Vertebra caudales	75	658		36	33	1877	140	1321	321	1	97		11	227	1	115	25	4	3		893	4
Vertebra praecaudales	3	350		29	8	2071	79	998	542	4	39		8	268		72	15		9		1063	10
Vertebra praecaudales I		35						3			3		1	2		3					45	
Vomer		1		1					12					6							43	
Total (15 826 fragments)	85	1275	4	77	41	4764	219	2986	1650	5	175	3	22	731	1	391	44	5	12	2	3305	29

Table 6. Fish bones from different layers of the Birka excavations

Tabel 6. Kalaluud Birka kaevamistelt erinevatest kihtidest

Species	Phase 1 (mid 8th cent.)	Phase 2 (2nd half of 8th cent.)	Phase 3 (c. 810–830 AD)	Phase 4 (c. 830–840 AD)	Phase 5 (c. 840–860 AD)	Phase 6 (2nd half of 9th cent.)	Phase 7 (c. 900–930/40 AD)	Phase 8 (mid 10th cent.)	Phase No. is not known	Total
Abramis ballerus		2	4	1	1	48	23	6		85
Abramis brama	12	46	162	339	99	219	281	174	5	1337
Acipenser sturio							4			4
Anguilla anguilla	14	16	3	3	10	16	6	9		77
Carassius carassius						41				41
Clupea harengus	334	579	284	253	193	2151	652	245		4691
Coregonus sp.	26	19	4	2	26	76	39	21		213
Cyprinidae	429	464	45	119	183	1083	375	219	2	2919
Esox lucius	233	202	276	293	91	265	140	148	1	1649
Gadus morhua	3		2							5
Leuciscus idus	4	5	25	16	8	37	28	58		181
Leuciscus leuciscus						2		1		3
Lota lota		4	4	2		8	3	1		22
Perca fluviatilis	80	83	22	71	47	274	87	67		731
Pleuronectes sp.	1									1
Rutilus rutilus	15	27	8	16	49	172	69	35		391
Salmo sp.	14	12	3			1		3		33
Salmo sp. (*salar*)	2		3							5
Salmo sp. (*trutta*)			12							12
Silurus glanis		1				1				2
Stizostedion lucioperca	366	496	620	660	261	401	346	240	9	3399
Tinca tinca	4	1	11	6	2	1				5
Total	1537	1957	1488	1781	970	4796	2053	1227	17	15826

One iron fish hook (AI 5777: 191, Fig. 4: 3) was found in the settlement layer under the St. Barbara cemetery in Tallinn. In grave No. 1112 one rather large needle was discovered, which was assumed to have been used for making nets (Sokolovski 1996). The other site in Tallinn, 10 Viru Street, yielded no finds of fishing equipment (Talvar 1995).

In Tartu one fish spear (TM 2126/A51: 5511) was found at the excavations on Vanemuise Street (Ayн 1996), and one fish hook (TM 2176: 578) was discovered in the early medieval layer of the Küütri Street excavations in 1992 (Pogodin 1994). Some net floats made of pinewood and fish hooks were discovered at the 15 Malmö Street excavations in Pärnu (A. Kriiska, pers. comm. 2001). One net float (Fig. 5) and a fish hook (PäM 14350: A 2501: 216) were found from the medieval layers in Munga Street.

No finds of fishing equipment were recorded during the excavations at Birka in 1990–95 (B. Ambrosiani, pers. comm. 2000). Bødker-Enghoff (1999) writes: "Net sinkers, hooks and leisters have been found at Birka and Eketorp III", but this probably does not pertain to the same excavation at Birka.

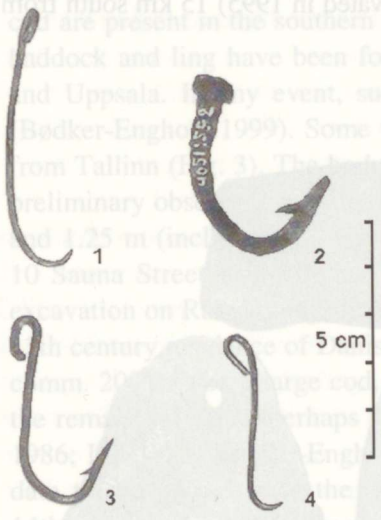

Fig. 4. Fish hooks from Iru hillfort (1 – AI 3428: 449, 2 – AI 4051: 552), settlement layer of the St. Barbara excavation (3 – AI 5777: 191), and Vaabina (4 – AI 5354: 134).

Joon 4. Kalakonksud Iru linnusest (1, 2), asulakihist Püha Barbara kalmistu all (3) ja Vaabinast (4).

Fig. 5. Net float from medieval Pärnu (PäM 14350: A 2501: 125).

Joon 5. Võrgukäba Pärnu keskajast.

Many items of fishing equipment have been found in southern Estonia. H. Valk (pers. comm. 2001) provided information about a bronze fish hook from the Vaabina medieval site (Fig. 4: 4), net sinkers from the bottom of Lake Võrtsjärv (TÜ 435, 474), Late Iron Age/medieval clay net sinkers from the Värska site (TÜ 191), and 15th–16th centuries stone net sinkers from the Uue-Kastre Bishop's Castle.

One iron fish hook that has become lost (Kustin 1962; AI 3884: 2797), a fragment of a fish spear, two ice picks (AI 3884: 2151, 2527), and 28 net sinkers made of local limestone (Fig. 6) are known from the Viltina grave, Pöide parish on Saaremaa Island, which is dated to the 11th–12th centuries. One iron fish hook (AI K 1: 192) has been reported from the Ilpla grave on Saaremaa Island, which is dated to the same time period as Viltina (Kustin 1962).

Some finds of fishing equipment are known from northern Estonia. The hillfort and settlement site of Iru close to Tallinn represents a good example of the way of life of that time (Jaanits et al. 1982; Lang 1996). Finds from the hillfort area, dating to the second part of the 1st millennium AD, include an iron fish hook (Fig. 4: 1) and a bronze fish hook (Fig. 4: 2), an iron net needle (AI 4051: 977), and a bone needle (AI 4051: 221) (Lang 1996). However, about 2000 artefacts, found from the medieval village of Lehmja (excavated in 1995) 15 km south from Tallinn, contained no finds of fishing equipment.

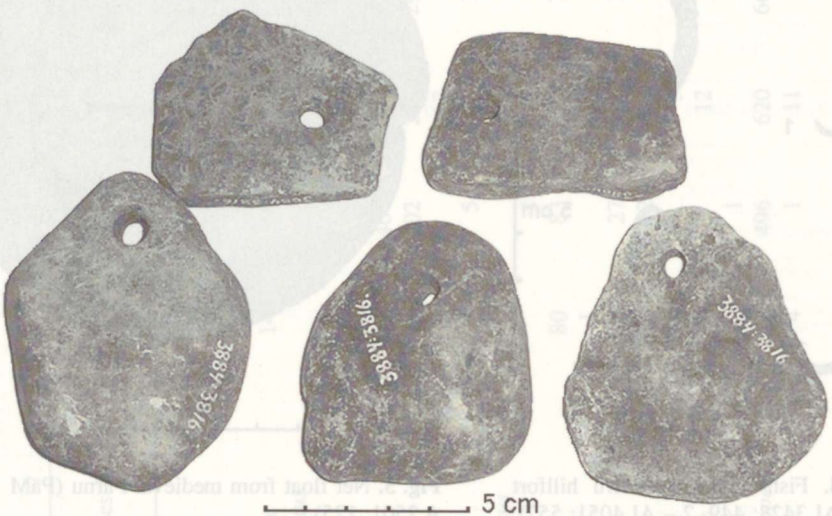

Fig. 6. Net sinkers from the Viltina grave material (AI 3884: 3816).

Joon 6. Võrguraskused Viltina kalmematerjalist.

Evidence of fish trade

Most of the identified fish were probably caught in local water bodies. The main evidence of the fish trade is unexpected finds of fish remains, i.e. the occurrence of the remains of the fish species that could not have lived in water bodies surrounding the site. In Estonia, one example is cod bones in the medieval material from Tartu. Also, five herring bones and 11 smelt (*Osmerus eperlanus*) bones (identified by Tiit Paaver) are known from the 14th century material of Viljandi obtained by the excavation at Jaani Church in 1990. Bødker-Enghoff (1999) presented many more similar examples from Denmark, Sweden, Germany, and Poland. Several times she called attention to the existence of large cod (over 1 m in body length) in the Viking Age and medieval materials. The cod in today's catches in the Baltic (except the southern part) is 40–60 cm, in deeper parts of the sea up to 75 cm long (Mikelsaar 1984). Approximately the same size variation was noticed in the Late Neolithic Loona site, Saaremaa Island, where a huge assemblage of cod bones was collected (Lõugas 1997). Therefore, individuals over 1 m long are presumed to have originated from the ocean. According to Bødker-Enghoff (1999), however, it should be taken into consideration that large cod are present in the southern part of the Baltic, as are ling and hake. Bones of haddock and ling have been found at a few sites in East Sweden, e.g. Eketorp and Uppsala. In any event, such finds must be regarded as a result of trade (Bødker-Enghoff 1999). Some finds of large cod exist in the medieval material from Tallinn (Fig. 3). The body size of these fish has not yet been analysed, but preliminary observations of vertebrae show that it could have been between 0.95 and 1.25 m (including ten vertebrae from 10 Viru Street, seven vertebrae from 10 Sauna Street, and at least eight vertebrae from 4 Rahukohtu Street). The excavation on Rahukohtu Street is still in progress, but it is known to represent a 13th century residence of Danish conquerors in Toompea Castle (P. Talvar, pers. comm. 2001). These large cod, represented only by vertebrae, are interpreted as the remains of dried, perhaps salted fish, i.e. stockfish, in Scandinavia (Jonsson 1986; Lie 1988; Bødker-Enghoff 1999). Since all these cod bones from Tallinn date to the period from the end of the 13th century to the beginning of the 14th century, they probably are connected with "Danish time" in North Estonia. The trade in seafood is evidenced by a rather large amount of oyster finds in medieval Pärnu (PäM 14350: A 2501: 7, 42, 58, 79, 163, 197, 389, 439, etc.). These were recovered from the same place as fragments of wine bottles, which were also imported.

The Viking Age trade centre at Birka was a strategically good place for the fur and handicraft trade, but also for fishing and, why not, for the fish trade. At that time, the connection between Lake Mälar and the Baltic Sea probably favoured the diversity of fish fauna around the island. Not only

freshwater fish, but also fish from brackish water could live there. These species are tolerant to salinity and could therefore inhabit both freshwater and brackish water bodies. Most of the fish identified in the Birka material could have been caught from Lake Mälar. Theoretically, even a form of the Baltic herring could live in a lightly brackish lake-like water body. If it lived in Lake Mälar, then we have no firm proof of the fish trade at Birka. Nevertheless, the estimation of the body size of the herring shows that many individuals were 25–30 cm long, which is a rather great length for the Baltic herring (*Clupea harengus membras*) today and is maybe too great for herring living in lakes/bays. Therefore, the fish trade (herring trade) was possible at Birka. Perhaps it was salted herring that was transported. We can argue that the absence of fish squamae in the material (see Table 5) indicates the processing of fish outside residential houses and their surroundings, perhaps even outside the town.

An example of the collection of taxes from fishermen comes from the Uue-Kastre medieval Bishop's Castle between Tartu and Lake Peipsi, eastern Estonia. A huge, not yet identified fish bone assemblage has been excavated from the castle (deposited at the University of Tartu). Fishermen from Lake Peipsi who travelled along the Emajõgi River to sell fish at Tartu market had to pay taxes to the castle (A. Tvauri, pers. comm. 2001).

Discussion

The development of fishery in Estonia during the 1st millennium seems to have been inhibited. This was largely due to the progress in agriculture and animal husbandry, the products of which satisfied most of the people's needs, especially for food. At the same time, the absence of sufficient material from Iron Age settlements does not permit us to draw any final conclusions. It appears, however, that after transition of the Baltic Sea from the salty Litorina Sea stage into the brackish Limnea Sea stage human interest in the seashore and marine fishery diminished in comparison with earlier times (especially with the Late Neolithic). This has not been observed in Denmark and surrounding areas, since the salinity of the water and the composition of fauna (and biomass) did not change there as much as in the eastern part of the Baltic Sea.

Quite probably special villages of fishermen existed during the Iron Age or perhaps even earlier. These are simply not yet known from that time in Estonia. The economy in Estonian coastal areas was based on agricultural activity during the Iron Age and later (Lang 1996, 2000). Fish bones from the materials of that region indicate some fishing, but their proportion in the bone material is very small. At the same time, the absence of fishing instruments shows that the

equipment was probably kept in special places (villages or sheds) close to the water. Even at Birka, where a large amount of fish bones was unearthed, the fishing equipment was obviously kept somewhere else, perhaps close to the shore, since no finds of these are known from the sites of residential houses and passages.

In southern Estonia, where only freshwater fish was available, fishing was still practised, but it was perhaps not as important as prior to the rise of agriculture. The basins of lakes Peipsi and Võrtsjärv offered a good possibility for freshwater fishery. In southeastern Estonia, where old traditions are still in use, fishing is quite intensive.

Marine fishery, i.e. fishing of herring, cod, flounder, and probably sprat (*Sprattus sprattus*), was once again developed during medieval times in Estonia. This conclusion is based on fish finds from Pärnu and Tallinn, and the appearance of large herring catches in the materials of the 10th–13th centuries around the Baltic Sea (even earlier in Denmark and neighbouring areas; see Bødker-Enghoff 1999). It appears that the efficient methods, such as net fishing, were used more widely. Also, ships were developed and trade became more intensive.

Marine fishery and traditions are relatively conservative in the coastal areas of the European forest zone (incl. Estonia, Latvia, Lithuania, and Poland), where, for instance, the marine element is completely absent in the Iron Age material (Makowiecki 1998, 1999; Bødker-Enghoff 1999; Lõugas 1997, 1999). In these regions hunting (later agriculture) began over time to play a more important role than fishing. Fishing in lakes and rivers was more developed, and weirs, tramps, lines and hooks, and spears were used.

Comparison of the fishery and fish-eating traditions in Estonia with western Baltic Sea countries (Denmark, Sweden) nowadays shows the continuation of the tendency that was already underway during the Iron Age. The fish market and the traditions for preparing food from fish are rather unvaried in Estonia and also in other eastern Baltic countries.

Conclusions

Based on finds of the fish remains and fishing equipment, one can conclude that fishing in northern Estonia and even on the islands was, compared to the previous periods (Lõugas 1997), inhibited during the 1st millennium. The situation was not as drastic in the southern part of the country, where freshwater species had been exploited down through the centuries. In coastal areas of Estonia people were more engaged in agriculture and animal husbandry, because of the favourable topography and climate. In southern Estonia, where the landscape is uneven

and the climate is more continental than in coastal areas, hunting and fishing were still more important.

Marine fishery in coastal areas of Estonia developed during medieval times, when contacts between Hanseatic towns became closer. Yet, it was not as intensive as during the salty Litorina Sea stage or at the beginning of the Limnea Sea stage, i.e. during the Late Neolithic period.

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Lembi Lõugas

KALASTUSE ARENG LÄÄNEMERE REGIOONIS I JA II AASTATUHANDEL

Resümee

Artikkel põhineb interdistsiplinaarsetel uuringutel ja koondab arheoloogiliste kalaluude analüüsi tulemusi, kalastusvahendite käsitlust ning ajaloolisi andmeid. Kalaluud pärinevad järgmistest Eesti muististest: Saadjärve asulakoht (I aastatuhande teine pool), Pöide linnamägi (I aastatuhande teine pool), Lõhavere linnus (hilisrauaaeg), Viljandi ordulinnus ja selle ümbrus (muinasaja lõpp/keskaja

algus) ning Tallinna, Tartu ja Pärnu keskaegsed kihid. Suur kogus kalaluid (ligi 16 000) on Rootsist Birka viikingiaja linn–kaubakeskuse 1990.–1995. aasta kaevamistelt.

Siin käsitletud Eesti muististest on kalaluude kogumine olnud väga juhuslik, s.t korjatud on vaid suuremaid kalaluid ning pinnase sõelumist on kasutatud üksnes Pärnu Malmö tänav 15 kaevandi kohtades, kus kalaluude kontsentratsioon oli suurem. Tänu sõelumisele saadi ka räime ja teiste väiksemate kalade luid. Rauaaegses leiumaterjalis on täheldatav kalaluude vähesus, eriti rannikul ja saartel, rohkem on neid Lõuna-Eestis. See viitab merekalanduse taandarengule I aastatuhandel, kuid näitab mageveekalade püügi edasikestmist siseveekogudel.

Birka viikingiaegne leiuaines sisaldab ohtralt kalaluid, mis pärinevad peaasjalikult magevee või kerge riimvee kaladelt. Merekalad on esindatud vaid paari luuga, kui mitte arvestada heeringa või räime (heeringa ja räime luudel võib vahet teha vaid suuruse järgi, see aga on ebakindel kriteerium) luude hulgalisust. On arutletud nende kalade võimaliku leviku üle ka Mälari järves, millel oli viikingiajal ühendus Läänemerega. Kalade päritolu vastu siseveekogust räägib analüüsitud selgroolülide suurus, mis viitab pigem kogukamatele isenditele Läänemere lõunaosast kui väikesekasvulisele lahesopi populatsioonile.

Kalapüügivahendite leide on suhteliselt vähe. Siin käsitletud mitmes rauaaegses kollektsioonis need küll puuduvad, aga seda ei saa väita kogu Eesti kohta. Näib, et jälle on paremini esindatud Eesti lõunapoolsed leiukohad. Ka keskaegses materjalis on püügivahendeid väga vähe. Ilmselt tuleb arvesse võtta kalurikülade olemasolu või kalapüügivahendite hoidmist veekogu lähedal kuuris või mujal. Püügivahendid puuduvad ka Birka 1990.–1995. aasta kaevandi materjalis. Kuna kaevand hõlmas vaid elumajade piirkonda, siis võib oletada, et kalariistu hoiti eraldi veekogu lähedal. Soomuste puudumine viitab kalade töötlemisele väljaspool elurajooni.

Enamik siin analüüsitud kalajäänustest pärineb kohalikust kalafaunast ning on suure tõenäosusega püütud ümbruskonna veekogudest. Kalakaubandusele viitavad eelkõige selliste kalade luud, mida kohalikust veekogust pole võimalik püüda. Üheks näiteks on tursa esinemine Tartu keskaegses materjalis ning teiseks räime ja meritindi leidumine Viljandi keskaegses materjalis. Inge Bødker-Enghoff (1999) interpreteerib suurte turskade selgroolülide olemasolu keskaegses leiuaineses kui importi Läänemere lõunaosast või Põhjamerest. Need rohkem kui meetrise kehapikkusega tursad võivad olla transporditud soolatult ja kuivatatult. Suurte turskade selgroolülisid on leitud Tallinna keskaegsetest kihtidest suhteliselt palju. 13. ja 14. sajandist pärinevatena seostuvad need Taani ajaga Põhja-Eestis. Birka viikingiaegne kaubakeskus Björkö saarel võis olla ka kalakaubanduse keskus, kuid kindlad tõendid selle kohta puuduvad. On mõeldav, et suur räime- või heeringaluude hulk on pärit just soolakala impordist, kuid tõestada on seda raske.

Kalastuse areng Eestis pidurdus I aastatuhandel märgatavalt. See tendents näib olevat kestnud juba sellest ajast, kui soolane Läänemere arengustaadium – Litoriinameri – muutus riimveeliseks Limneamereks. Erinevalt Rootsist (v.a põhjaosa) ja Taanist, kus nimetatud protsessi tulemusel kalade biomass nii palju ei muutunud kui Läänemere idaosas, näib Euroopa metsavöötme rannikualadel (sinna kuuluvad Eesti, Läti, Leedu ja Poola) rauaajal merekalastus peaaegu kaduvat. Sisemaal siiski mõningane kalapüük ja jahipidamine säilis. Merekalandus elavnes uuesti alles keskajal, kui võeti kasutusele paremad võrgud. Samas arenes ka merelaevandus.