# FISH AND SEAL OSTEOLOGICAL DATA AT ŠVENTOJI SITES

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## FISH BONE ANALYSIS OF ŠVENTOJI 4 SITE (part I)

### INTRODUCTION

The main database in L.Daugnora's and A. Giriniukas' book *Osteoarcheologija Lietuvoje. Vidurinysis ir vėlyvasis Holocenas* (Osteoarchaeology in Lithuania. The Early and Middle Holocene) (1996) is comprised of mammal osteological data from East Lithuania. One of the aims of this article is to analyze the osteological fish material of West Lithuania's archaeological sites more precisely and thoroughly. These Western Lithuania data supplements the data of the aforementioned book. A large portion of the bone materials of Lithuania's, Latvia's and Estonia's coastal and island sites is analyzed in various publications (K.Paaver 1965, P.Dolukhanov 1978, R.Rimantienė 1979, 1980, 1984, 1992).

It must be pointed out that for the second year of this project work, we use a wet screening method, wherein all the small materials are washed out. The employment of this methodology requires new optical technology and a significant expenditure of time, as well as highly qualified osteologists.

### METHODS

The fish collection at Bergen Museum's Osteological Dept., the personal fish bone collection of Dr J.Sloka, the faunal and skeletal bone collection of Lithuania's Veterinary Academy's Anatomy and Histology Dept.'s museum and osteological laboratory's repository, as well as the hunted faunal collection of T. Ivanauskas' Zoology Museum were used for the analyses of recovered osteological material.

We used archaeological methodology in recovering the bone material of the Šventoji and Kretuonas site complexes; the osteological artifact's provenience was recorded three dimensionally, both stratigraphically and horizontally.

The bones were washed and weighed (J.H. Barrett 1993). For more precise analysis, we employed the methods of T.E.White (1953), R.E.Chaplin (1971), G.Bull, S.Payne (1982), R.G. Klein et al (1981), R.Baleišis (1991), A.Grant (1982, 1986), S.Payne (1973), and R.W. Casteel (1977).

All excavated site sediment was washed through 1 mm, 2mm and 4 mm screens. All fish bones and scales were picked out with the use of tweezers and analyzed in the Osteology Dept. of the Bergen Museum. The methodologies described in the books and articles by J.Lepiksaar (1981, 1983), A.Morales, K.Rosenlund (1979), A.Wheeler (1980), A.Wheeler, A.K.G.Jones (1989) and W.Harder (1975) were additionally employed.

173 sediment samples (196,5 litres) were collected from the Šventoji 4 and 6 sites for osteological analysis. A sample was taken from each layer of sediment and from every square meter quadrant of the plot being excavated ( Šventoji 6 ).The sample size from each quadrant was 14 x 14 cm and 5 cm deep (about 1000 $cm^3$).

In addition to the finds of bone found in the excavated plot, three column samples were taken at Šventoji 4 for osteological analysis. Each sample of each column was 10x25 cm large and 4 cm thick, constituted about 1000 $cm^3$, and was taken every 8 cm. Where a larger concentration of bones was observed, samples were taken every 8 cm. The total number of samples from Šventoji 4 was 93: 62 (62 litres) systematically taken samples and 31 additional samples.

### RESEARCH RESULTS

The typical faunal composition of that time period (Latest early neolithic R. Rimantienė 1992) was identified at Šventoji 4 (see Tables 1 and 2). We would like to draw attention to the fact that in other sites,

for example at Šventoji 23 (R. Rimantienė 1992:370), a large percentage of elk bones was found, while at Šventoji 4 we found no bones of this animal. It is also interesting to note that in analyzing the seal bones from Šventoji, we identified the species of grey seal (Phoca vitulina), ringed seal (Halychoerus grypus) and harp seal (Pagophylus groenlandicus), as well as sea pig (Phocoena phocoena) (see second part of article).

Table 1. **Results of Šventoji 4 mammal bone analysis.**

| Skeletal unit | Aurochs Bos primigenius | Red deer Cervus elaphus | Boar Sus scrofa | Boar / pig | Roe deer Capreolus capreolus |
|---|---|---|---|---|---|
| Cornus | 1 | | | | |
| Cranium | 1 | 1 | 1 | 1 | 1 |
| Dentes | 2 | | | | |
| Mandibula | 1 | 1 | | | 2 |
| Vertebrae | 1 | | | | |
| Scapula | | | 1 | | |
| Humerus | 2 | 4 | 1 | | |
| Ossa antebrachii | 2 | | | | |
| Carpus | 2 | 1 | | | |
| Metacarpus | 1 | 1 | 1 | | 1 |
| Femur | | 1 | | | |
| Ossa cruris | 1 | 3 | | | |
| Tarsus | 2 | 2 | 1 | | |
| Metatarsus | | | 1 | | |
| Phalanx | | 1 | 1 | | |
| Total: | 16 | 15 | 7 | 1 | 4 |
| % | 37,21 | 34,88 | 16,28 | 2,32 | 9,30 |
| MNI | 3 | 4 | 3 | 1 | 2 |

Table 2. **Results of Šventoji 4 mammal bone analysis.**

| Skeletal unit | Fox Vulpes vulpes | Bear Ursus arctos | Badger Meles meles | Seal Phocidae | Dog Canis familaris | Total |
|---|---|---|---|---|---|---|
| Cranium | | | | 2 | | 2 |
| Dentes | 1 | | | | | 1 |
| Mandibula | 1 | 1 | | 1 | | 3 |
| Vertebrae | | | | 18 | 1 | 19 |
| Scapula | 1 | | | 4 | | 5 |
| Humerus | | | | 1 | | 1 |
| Ossa antebrachii | | | | 2 | 1 | 3 |
| Carpus | | | | | | |
| Metacarpus | | | | 1 | | 1 |
| Ossa coxae | | | | 4 | | 4 |
| Femur | | | | | | |
| Ossa cruris | | | 1 | | 1 | 2 |
| Tarsus | | | | | | |
| Metatarsus | | | | | | |
| Phalanx | | | | | | |
| | | | | | | |
| Total: | 3 | 1 | 1 | 33 | 3 | 41 |
| % | 7,32 | 2,44 | 2,44 | 80,49 | 7,32 | |

Only various skeletal parts of aurochs, red deer, boar and seal are represented. The sparse bones of other mammals such as fox, badger and bear do not provide any information and can be viewed as isolate finds. For this reason [?] , in taking samples for analysis, one aim was to distinguish which layer and at what depth the largest bone concentrations were located – this was at 295–305 cm (L. Daugnora, A.K. Huftham-mer 1999), in each of the three column samples. The fish bones from this concentration was radiocarbon dated to 4875±65 BP (uncalibrated),3505-3635 BC (calibrated) (Tua 2076) (Table 3).

The ichthyological species presented in Table 3 can be classified as freshwater and marine species. The freshwater fish species are pike, perch, cyprinids. These fish are found mostly in lakes and rivers. Pike and perch can also dwell in slowly running water that has little oxygen, as well as in brackish water. Rudd survive with difficulty in saltwater, while stickle-backs (Gasterosteidae) adapt quite well to it.

Species such as cod or saithe (Gadidae), Gobiidae or plaice (Pleuronectes platessa) are marine species. Some of them, like saithe (Pollachius virens), require very salty water, while others, like flounder (Platichthys flesus ) can live in brackish water. Which species live in shallow coastal areas? It is believed that the immature individuals of these fish live in such areas. By the size of their bones, the majority of the cod and plaice family were small individuals, so they could have been caught along the coast in the summer.

Salmonids (Salmonidae) are migrating species, so they can be found in both salt and fresh water. Isolated bones of Salmonidae were found at Šventoji.

Analysis of the fish bone allows us to make some inferences concerning fishing techniques because different skeletal bones belong to different species. In some cases, only single bones were found (e.g., only the operculum and cleitrum of perch, while there were no vertebrae or skull bones) (Table 4). On the other hand, not all fish bones have the same likelihood of being preserved in the ground (Hoglund 1972, Lepiksaar 1983, Lepiksaar, Heinrich 1977). Some species, such as pleuronectes (Pleuronectidae), salmonids (Salmonidae) or eel (Anguilla anguilla) have very fatty bones, which are highly favored for knawing by dogs and foxes. Salmonidae and pike (Esox lucius) bones are less ossified. Bones of species such as those of the perch or cod families are not fatty and generally preserve well amongst archaeological material, although our data do not show this (in all there are only 3 bones of perch in Tables 4, 5 and 6). The vertebrae preserve best (see Table 3 or the analysis of bones from around Kretuonas Lake).

Several species differences are noticeable when comparing the bones found by water screening sediment samples (Table 3) and those found during earlier excavations (Tables 4, 5 and 6). The species previously found included catfish, crucian carp, plaice / flounder, cod and saithe. However, a big difference exits in terms of fish size; many fish scales and small fish bones were found in the washed material.

## DISCUSSION

In the works of S. Bjorck (1995), D.D. Kvasov (1979) and others, the evolution of the Baltic Sea is divided into three major periods and an attempt is made to determine during which periods the Baltic Sea was comprised of freshwater, and when – of salt water. It's a pity that these studies ended with 8000 b.c. and thus are not helpful in analyzing the Baltic Sea's coastal living conditions in the early, middle and late Neolithic. When reviewing the data (see Table 8), the question of whether or not only predatory freshwater fish were caught arises. Does the quantity and quality of data change with the change in methodology? Many uncertainties exist regarding the origins and migratory paths of fish species in the Baltic Sea. J. Lepiksaar (1939,1984), L. Lougas (1996) and other authors consider the origins of various fish species in the Baltic Sea in their articles. The data presented in the following tables is based on the work of these authors.

Since there are no osteologically analyzed fish bones in Lithuania from Mesolithic sites, we used literature references for sake of comparative data. Many authors have analyzed fish bones excavated from Mesolithic sites (S.H. Andersen 1995, I.B. Enghoff 1995, L. Pedersen 1995, L.B.M. Verhart 1995 L. Lougas 1997, J. Sloka 1985). We think that archaeologists can also use the fish species found in these works (Table 7) when discussing this time period's dominating fishing methods at coastal sites in Lithuania. While six species of fish were found in the Mesolithic in Estonia (Table 7, L. Lougas 1997), 41 were discerned by I.B. Enghoff in the analysis of fish species in Denmark's Mesolithic sites (I.B. Enghoff 1995).

During the second half of the Mesolithic, with the change in fishing gear (with the appearance of nets and weirs), large amounts of additional small fish bones are found along side the large fish bones (Gramsch B. 1973).

The sites of Narva and Umbusi are dated to the Late Mesolithic and the typical species of fish for that time period are found there. The majority of

Table 3. **Fish bones found by water screening method at Šventoji 4.**

| Bones | Pike Esox lucius | Perch Perca fluviatilis | Zander Lucioperca lucioperca | Cyprinids Cyprinidae | Percidae | Pleuronectes Pleuronectidae | Salmonids Salmonidae | Common bream Abramis brama | Brill Scophthalmus rhombus |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| Cranium | | | 1 | | | | | | |
| Basioccipitale | | | 1 | 6 | | | | | |
| Palatinum | | 1 | | | | | | | |
| Quadratum | | 2 | | | | | | | |
| Articulare | 2 | 3 | 1 | 1 | | | | 1 | 1 |
| Parasphenoid | | | | 1 | | | | | |
| Dentale | | | 1 | 1 | | 1 | | | |
| Praemaxillare | 1 | 1 | 2 | | | | | | |
| Maxillare | | | | | | | | | |
| Hyomandibulare | | 2 | 1 | 10 | | | | 1 | |
| Preoperculare | 2 | 3 | 1 | 5 | | | | | |
| Operculare | 1 | | 1 | 22 | | | 1 | 3 | |
| Interoperculare | | | | 2 | | | | | |
| Suboperculare | | | 2 | | | | | | |
| Hyoideum | | | | | | | | | |
| Epihyale | 1 | 7 | 2 | | | | | | |
| Keratohyale | | 8 | 1 | | | | | | |
| Urohyale | | 1 | | 1 | | | | | |
| Pharyngeum inferius | | | | 2 | | | | | |
| Vertebrae | 10 | 23 | 20 | 12 | 7 | 28 | 2 | | |
| Scapula | | 1 | | | | | | | |
| Posttemporale | | | 1 | | | | | | |
| Supracleitrale | 1 | | 1 | | | | | | |
| Cleitrum | 4 | | | | | | | | |
| Fish scales | | ++ | | ++ | | | | | |
| Total | 22 | 52 | 36 | 63 | 7 | 28 | 3 | 5 | 1 |
| Percentage | 10.14 | 23.96 | 16.59 | 29.03 | 3.22 | 12.90 | 1.38 | 2.30 | 0.46 |

Table 4. **Fish bones found in previous excavations (1989–1990) at Šventoji 4.**

| Bone | Pike Esox lucius | Perch Perca fluviatilis | Catfish Silurus glanis | Cyprinids Cyprinidae | Bream Abramis brama | Zander Lucioperca lucioperca |
|---|---|---|---|---|---|---|
| | | | | | | |
| Cranium | 3 | | 7 | | | |
| Basioccipitale | 1 | | | | | |
| Palatinum | 2 | | | | | 1 |
| Entopterygoideum | | | | | | |
| Ectopterygoideum | | | | | | 1 |
| Metapterygoideum | | | | | | |
| Vomer | | | | | | 1 |
| Quadratum | | | | | | |
| Articulare | 3 | | | | | 1 |
| Parasphenoid | 1 | | | | | |
| Dentale | 1 | | | | | |
| Praemaxillare | | | | | | 1 |
| Maxillare | | | | | | |
| Hyomandibulare | 1 | | | | 3 | |
| Preoperculare | 1 | | | 3 | | 1 |
| Operculare | 4 | 2 | | 73 | 35 | 6 |
| Interoperculare | | | | | | |

*Continue Table 4*

| | | | | | | |
|---|---|---|---|---|---|---|
| Subopercular | 1 | | 1 | | | |
| Hyoideum | | | | | | |
| Epihyale | 8 | | | | | |
| Keratohyale | | | | | | |
| Urohyale | | | | | | |
| Pharyngeum inferius | | | | | | |
| Vertebrae | 7 | | 7 | | | 5 |
| Scapula | | | | | | |
| Posttemporale | | | | | | |
| Supracleitrale | 1 | | | | | |
| Cleitrum | 7 | 1 | 2 | | | 11 |
| Basipterygium | | | | | | |
| Fish scales | | + | | | | |
| Total | 41 | 3 | 17 | 76 | 38 | 28 |
| Percentages | 18.55 | 1.36 | 7.69 | 34.39 | 17.19 | 12.67 |

Table 5. **Fish bones found in previous excavations (1989–1990) at Šventoji 4.**

| Bones | Salmonidae | Pleuronectidae | Crucian carp Carassius carasius | Plaice Pleuronectes platessa | Tench Tinca tinca |
|---|---|---|---|---|---|
| | | | | | |
| Cranium | | | | | |
| Basioccipitale | | 1 | | | |
| Palatinum | | | | | |
| Entopterygoideum | | | | | |
| Ectopterygoideum | | | | | |
| Metapterygoideum | | | | | |
| Quadratum | | | | | |
| Articulare | | | | | |
| Parasphenoid | | | | | |
| Dentale | | 2 | | | |
| Praemaxillare | | | | | |
| Maxillare | | | | | |
| Hyomandibulare | | | | 1 | |
| Preoperculare | | 10 | 2 | | |
| Operculare | 6 | 1 | 2 | 1 | 1 |
| Interoperculare | | | | | |
| Suboperculare | | | | | |
| Hyoideum | | | | | |
| Epihyale | | 1 | | | |
| Keratohyale | | | | | |
| Urohyale | | | | | |
| Pharyngeum inferius | | | | | |
| Vertebrae | 7 | | | | |
| Scapula | | | | | |
| Posttemporale | | | | | |
| Supracleitrale | | 1 | | | |
| Cleitrum | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Basipterygium | | | | | |
| Fish scales | | | | | |
| Total | 13 | 16 | 4 | 2 | 1 |
| Percentage | 34.21 | 42.11 | 10.53 | 5.26 | 2.63 |

Table 6. **Fish bones found in previous excavations (1989–1990) at Šventoji 4.**

| Bone | Flounder Platichthys flesus | Brill Scophthalmus rhombus | Cod Gadus morhua | Saithe Pollachius virens |
|---|---|---|---|---|
| | | | | |
| Cranium | | | | |
| Basioccipitale | | | | |
| Palatinum | | | | |
| Entopterygoideum | | | | |
| Ectopterygoideum | | | | |
| Metapterygoideum | | | | |
| Vomer | | | | |
| Quadratum | | | | |
| Articulare | | 1 | | |
| Parasphenoid | | | | |
| Dentale | | 4 | 1 | 1 |
| Praemaxillare | | | | |
| Maxillare | 3 | | | |
| Hyomandibulare | | 1 | | |
| Preoperculare | 2 | 1 | | |
| Operculare | | | | |
| Interoperculare | | | | |
| Suboperculare | | 2 | | |
| Hyoideum | | | | |
| Epihyale | | | | |
| Keratohyale | | | | |
| Urohyale | | | | |
| Pharyngeum inferius | | | | |
| Vertebrae | | 5 | | |
| Scapula | | | | |
| Posttemporale | | | | |
| Supracleitrale | | | | |
| Cleitrum | | | | |
| Basipterygium | | | | |
| Fish scale | | | | |
| Total | 5 | 14 | 1 | 1 |
| Percentage | 23,81 | 66,66 | 4,76 | 4,76 |

Table 7. **Fish bones in Estonia's Mesolithic sites.**

| Species | Narva | Kunda | Pulli | Umbusi |
|---|---|---|---|---|
| | | | | |
| Pike Esox lucius | 450 | 66 | | 31 |
| Salmon/ trout Salmo sp. | 1 | | | |
| Perch Serca fluviatilis | 1 | 2 | | |
| Zander Stizostedion lucioperca | 259 | | 94 | |
| Bream Abramis brama | | | 5 | 7 |
| Catfish Silurus glanis | 100 | | | |

Table 8. **Fish bones found at Estonian Mesolithic sites (L. Lougas 1997 Table; data from Lepiksaar 1981, Tsepkin 1984, Sloka (Jaanits 1991), Lougas (1995).**

| Species | Pulli | Kunda | Narva Joaoru | Umbusi |
|---|---|---|---|---|
| | | | | |
| Acipenser sturio | | | | |
| Clupea harengus | | | | |
| Salmo sp. | | | 1 | |
| Coregonus sp. | | | | |
| Thymallus thymallus | | | | |
| Esox lucius | | 66 | 437 | 31 |
| Anguilla anguilla | | | | |
| Rutilus rutilus | | | | |
| Leuciscus idus | | | | |
| Scardinius erythrophthalmus | | | | |
| Tinca tinca | | 1 | | |
| Abramis brama | 5 | | | 7 |
| Abramis ballerus | | | | |
| Vimba vimba | | | | |
| Silurus glanis | | | 98 | |
| Gadus morhua | | | | |
| Lota lota | | | | |
| Stizostedion lucioperca | 94 | | 256 | |
| Perca fluviatilis | | 6 | 1 | |
| Triglopsis quadricornis | | | | |
| Scophthalmus maximus | | | | |

Mesolithic sites in Estonian territory contain fish species that live as much in fresh water as in brackish water (pike, bream, perch).

Bones of pike (Esox lucius), tench (Tinca tinca), bream (Abramis brama), catfish (Silurius glanis), zander (Stizostedion lucioperca) and perch (Perca fluviatilis) have been distinguished in Estonian Mesolithic sites (L. Lougas 1997 Table 8).

Archaeologists R. Rimantienė (1979,1984), A. Girininkas (1990), I. Loze (1979) and others describe the fishing economy, fishing methods and tools at Neolithic sites. Some of the species composition and length of the fish is presented. These authors assert (e.g., R. Rimantienė cites J.G.D. Clark 1948) that the recovered fish bone from the first half of the Mesolithic belonged to "hunted" species of fish. This is supported by the analysis of fish species (pike, catfish), fish size and fishing tools.

Table 9. **Fish bones found in Šventoji sites (R. Rimantienė 1979).**

| Species | Šv.1B | Šv.2B | Šv.3 B | Šv.23 | Šv.26 |
|---|---|---|---|---|---|
| | | | | | |
| Pike Esox lucius | 62% | 55% | 63.6 | 88,2 | + |
| Zander Lucioperca lucioperca | 23% | 32% | 22.8 | 10,0 | + |
| Wells Silurus glanis | 2% | 0,5% | 3.4 | 1,3 | |
| Common bream Abramis brama | 9% | 0,5% | 2.2 | | |
| Tench Tinca tinca | 1% | | 0.9 | | |
| Salmonids Salmonidae | | | | | |
| Perch Perca fluviatilis | | | 0,1 | | |
| Twaithe shad Alosa fallax | | | 0,1 | | |
| Brill Scophthalmus rhombus | 12 | | 6,6 | 0,4 | |
| Pleuronectes Pleuronectidae | 2 | | | | |
| Cod Gadus morhua | 1 | | 0,3 | | |
| Tuna Thunnus thynnus L | | + | | | |

In comparing these data with the fish species recovered from Šventoji 4 water-screening method, we see that at the depth of 290–305 cm, in addition to the species listed in Table 9, flounder/ plaice as well as saithe bones were also found. On the other hand, there were no twaithe shad (Alosa fallax) or tuna (thunnus thynnus L) bones encountered.

In analyzing the fishing tools and methods of the early, middle and late Neolithic, we must agree with Clark's (1948) and other authors' distinctions concerning the "hunted" and "caught" fish in the Mesolithic and Neolithic.

The significance of fishing as a branch of economy is shown by research at Loona (Late Neolithic). The inhabitants of this site were good fishers; the more than 3000 Gadus morhua bones (95% of all fish bones and two thirds of all the bones) found at this site confirm this.

The site's location is very important for fishing, as the rivers and lakes are not far from the site.

Enghoff (1987, 1991, 1993), for example, in researching Danish sites, determined that 21 species of fish were found on Ertebolle sites; marine fish or those liking salty water comprised 12%, freshwater fish – 71%, and migrating species – 17% (moslty roach and eel). According to I. Enghoff (1986), the dominating group of fish at the Ertebolle sites was the carp family (it constituted 67% of all fish bones). Then followed eel Anguilla anguilla (17%), cod (gadidae 8%) and marine pike (Belone belone 1 %) as well as plaice / flounder (Pleuronectes/ Platichthys/ Limanda 1 %). Other species constituted less than one percent (Clupea, Gasterosteidae, Esox, Zoarces, Salmonidae, Gobiidae). Geologic research determined that aside from the bay, not far away were two lakes in which it was possible to fish for eel (S. Andersen and E. Johansen 1986).

Twenty-nine fish species were identified at the site of Bjornsholm (22% favoring marine or saltwater, 15% freshwater, 63% – migrating species (mostly eel) (Enghoff 1993). Eighteen species were identified at Norsminde (91% of which were marine, 0% freshwater, and migrating species – 9% (mostly flounder) (Enghoff 1991). According to our data, fish at Šventoji 4 that were marine or favored saltwater were 1,4 %, freshwater fish – 79,8% and those of indeterminate species – 18,1 %.

Pike bones in the Early Neolithic site of Ossa in northeastern Latvia (J.Sloka 1975) comprised even 94% (31–130 cm) of all fish bones. At Zvejsalas, pike bones constituted 76% of all fish bones, zander – 10 % of all fishbones. The typical river and lake fish variety is narrower at Zvejsalas, and of course there were no marine fish bones found there.

Returning to the matter of fish length, we find such authors as B.Enghoff (1986) who used a net along the coast and caught Anguilla anguilla (28 cm), Limanda limanda (17–23 cm), Platichthys flesus (18–21 cm), Gadus morhua (13–30 cm), Pollachius virens (21–28 cm) ir Zoarcidae (22–30 cm). By J. Sloka's data (R. Rimantienė 1979), the caught or "hunted/ captured" fish at Šventoji 1B, 2B and 3B were 30-142 cm. long; zander was 35–90 cm , catfish – 100–205 cm, while bream, tench and perch reached 22–38 cm in length. We believe it likely that the larger portion of Šventoji fish were caught by nets and weirs. This could especially be said of brill (25–50 cm) and cod (45 cm).

Having only a small amount of osteological data in Lithuania from Late Neolithic sites and seeking to find the differences between coastal and continental fish species, we present the ichthyological data of Kretuonas 1A (Table 10).

Table 11 is presentes in order to summarize the variety of fish species recovered from Mesolithic and

Table 10. **Fish bones found by water screening method at Kretuonas 1A.**

| Skeletal unit | Pike Esoxlucius | Zander Lucioperca lucioperca | Perch Perca fluviatilis | Cyprinidae | Salmonidae | Cottidae |
|---|---|---|---|---|---|---|
| | | | | | | |
| Articulare | 1 | 1 | | | | |
| Ceratohyale | | | | | | |
| Dentale | 2 | | | | | |
| Epihyale | | | | | | |
| Frontale | | | | | | |
| Operculum | | 1 | | 3 | | |
| Preoperculum | | 1 | 2 | | | |
| Suboperculum | 1 | | | | | |
| Palatinum | 1 | | | | | |
| Parasphenoideum | | | | | | |
| Maxillare | | | | | | |
| Praemaxillare | | | | | | |
| Hyomandibulare | | | | | | |
| Pharyngeum inferius | | | | 10 | | |
| Quadratum | | | | | | |
| Vomer | | | | | | |
| Cleitrum | | | | | | |
| Supracleitrale | 1 | | | | | |
| Os pubis | | | | | | |

*Continue Table 10*

| | | | | | | |
|---|---|---|---|---|---|---|
| Vertebae | 5 | 12 | 43 | 6 | 3 | 1 |
| *Ectopterygoideum* | | | | | | |
| Basipterygoideum | | | | | | |
| | | | | | | |
| Total | 11 | 15 | 45 | 19 | 3 | 1 |
| % | 11,70 | 15,96 | 47,87 | 20,21 | 3,19 | 1,06 |

Table 11. **Fish species identified in Stone Age sites in Latvia and Lithuania (J. Sloka's and L. Daugnora's data).**

| Fish species | Mesolihic | Early Neolithic | Middle Neolithic | Late Neolithic |
|---|---|---|---|---|
| Pike Esox lucius | Zvejnieki II, Osa Zvidze | Osa, Zvidze ,Šventoji 4 B, Šventoji 2B, Šventoji 1B | Šventoji 1B Šventoji 3B, Šventoji 4 Šventoji 23, Šventoji 26 Kretuono 1B | Daktariškės 5 Kretuono 1A |
| Eel Anguilla anguilla | Zvejnieki II | Osa | | |
| Salmo sp. | | Šventoji 2B | | Kretuonas 1A, Žemaitiškės 1 |
| Powan/ whitefish Coregonus L. | | Šventoji 4 | Šventoji 3B | |
| Roach Rutilus rutilus | Zvejnieki II | Osa, | | |
| Chub Leuciscus cephalus | Zvejnieki II | | | |
| Rudd Scardinius erythrophthalmus | | Osa, Šventoji 4 | | |
| Asp Aspius aspius | Zvejnieki II | Zvidze | | |
| Tench Tinca tinca | Zvejnieki II, | Osa, Zvidze, Šventoji 4 | Šventoji 4B | |
| Silver or white bream Blicca bjoerkna | Zvejnieki II, | Osa | | |
| Common bream Abramis brama | Zvejnieki II, Osa | Osa, Zvidze, Šventoji 4 B | Šventoji 4B | |
| Blue bream Abramis ballerus | | Osa | | |
| Ide Leuciscus idus | | 4B, Šventoji 2B, | Šventoji 3B | |
| Crucian carp Carassius carassius | Zvidze | Osa, Šventoji 4B | Šventoji 3B, Šventoji | |
| Wells Silurus glanis | Zvejnieki II, Osa , Zvidze | Osa, Zvidze, Šventoji 4B ,Šventoji 2B | Šventoji 3B , Šventoji 4B Šventoji 26 Kretuono 1B | Žemaitiškės 1 |
| Burbot Lota lota | Zvejnieki II | Šventoji 4 | | |
| Zander or pikeperch Stizostedion lucioperca | Zvidze | Zvidze, Šventoji 4B, Šventoji 2B | Šventoji 3B Šventoji 4B Šventoji 3B, Šventoji 26 | Kretuono 1A |
| **Kūjagalvinės** Cottidae | | | | Kretuono 1A |
| Perch Perca fluviatilis | Zvejnieki II, Osa, Zvidze | Osa, Zvidze, Šventoji 4B, Šventoji 2B | Šventoji 3B , Šventoji 4B | Kretuono 1A |
| Brill Scophthalmus rhombus | | Šventoji 4 B | Šventoji 4B | |
| Pleuronectidae | | | | |
| Flounder Platichthys flesus | | Šventoji 4B | Šventoji 4B | |
| Plaice Pleuronectes platessa | | Šventoji 4 | Šventoji 4B | |
| Cod Gadus morhua | | Šventoji 4 | Šventoji 3B, Šventoji 4B? | |
| Saithe Polacius virens | | Šventoji 4 | | |

Table 12. **Fish bones at Kretuonas 1C.**

| Skeletal unit | Pike Esox lucius | Catfish Silurus glanis | Zander Lucioperca lucioperca | Cyprinidae |
|---|---|---|---|---|
| Dentale | 30 | | | |
| Palatinum | 7 | | | |
| Cleitrum | 1 | | | |
| Vertebrae | 491 | 80 | 12 | 1 |
| | | | | |
| Total | 529 | 80 | 12 | 1 |
| % | 85,05 | 12,86 | 1,93 | 0,16 |
| Indeterminate | 184 | | | |

Table 13. **Fish bones at Brikuli (J. Sloka 1985).**

| Species | Bone count | Percentage |
|---|---|---|
| | | |
| Pike Esox lucius | 86 | 9,98 |
| Roach Rutilus rutilus | 3 | 0,35 |
| Chub Leuciscus cephalus | 1 | 0,12 |
| Ide Leuciscus idus | 4 | 0,46 |
| Wells Silurus glanis | 38 | 4,41 |
| Burbot Lota lota | 3 | 0,35 |
| Zander Lucioperca lucioperca | 688 | 79,81 |
| Perch Perca fluviatilis | 39 | 4,52 |
| | | |
| Total | 862 | |

Neolithic sites. A complete analysis of of the fish bones recovered from coastal and inland sites in Lithuania will undoubtedly result in a supplementation of additional species of fish.

At the Early Bronze Age site of Kretuonas 1C, we identified bones belonging to pike, catfish, zander and the carp family (Tale 12). At the site of Turlojiškė we found pike (Esox lucius) and perch (Perca fluviatilis) bones and scales. For comparison, we present J. Sloka's (1985) bone analysis data of the site of Brikuli (Table 13). The data collected thus far show that the typical fish species caught earlier were also fished in the early Bronze Age.

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# SEALS AT THE NEOLITHIC ŠVENTOJI SITES (part II)

## INTRODUCTION

The Baltic Sea is presently inhabited by one family, two genera (Halychoerus and Phoca), and three species of seals: the grey seal (Halychoerus grypus), the harbour seal (Phoca vitulina) and the ringed seal (Phoca hispida) (V. Logminas, J. Prūsaitė, J. Virbickas 1982).

R. Rimantienė's (1984, 1992), D. Duoba's and L. Daugnora's (1994) publications contain much information about the excavated seal and porpoise bones of the Šventoji site complex, however, the species composition had not been analyzed.

The aim of this article is to examine the species of seals that lived in the Neolithic as well as the types of seal bone that were recovered from Šventoji sites.

## METHODS

The faunal collections of the Bergen Museum's Osteological Department and Lithuania's Veterinary Academy's Anatomy and Histology Department's museum and its osteological laboratory's archives', as well as the sea mammal collection of T.Ivanauskas' Zoology Museum were used for the identification of osteological material.

## RESEARCH RESULTS

Examination of the excavated seal bones from the various sites of the Šventoji complex revealed a large quantity of vertebrae and ribs. The other skeletal data are presented in

Table 14.

All species of seal were found at Šventoji 1. The skull of a harp seal and parts of a temporal as well as occipital bone, i.e., the pyramis otica with processus jugularis, were identified. Also distinguished were two pelvic bones (the right and left sides) of a ringed seal as well as the pelvic bone of a grey seal. All the bones were of adult individuals.

Two age groups were discerned in the analysis of the recovered bones from Šventoji 2B: the immature seals (indeterminate species), to which belonged the lumbar vertebra, and the mature seals' four thoracic and one cervical vertebrae. In addition, two scapulas (one of an immature individual), a left mandible, sacrum and four thoracic vertebrae belonging to harp seal were distinguished. Three pyramis otica and two cervical vertebrae (the first and second cervical vertebrae) were those of harbour seal. The pyramis otica recovered from various sites do not have ossified (cartiloginous) skull sutures, a trait characteristic of immature individuals.

Two age groups of seal bones were also discerned at Šventoji 3 B. A humerus (with unfused epiphysis) of a very immature seal of indeterminate species, a scapula belonging to a ringed seal and an immature harp seal's first cervical vertebra and humerus were of one age group. The other bones were of mature individuals: the left mandible and two pelvic bones of grey seal, three ringed seal mandibles (MIS –2), a right radius and pelvic bone of harbour seal. Many various skeletal parts of harp seal (10) were found. An os penis (os baculum) was also found at this site.

Also found at Šventoji 3 B were three porpoise (Phocoena phocoena) lumbar vertebrae.

From the collection of Šventoji 4 B pelvic bones (both sides) of ringed seal and the left mandible of a harp seal were distinguished.

At Šventoji 6, skull fragments, two mandibles and three humeri of harp seal (MIS – 3) were found. A skull fragment, right pelvic bone and tibia belonged to grey seal. The skull fragment and femur were of harbour seal, and a pyramis otica, left humerus, mandible and pelvic bone – ringed seal. Two humeri and one pelvic bone from Šventoji 6 were of indeterminate species.

All species of seal bone were found at Šventoji 23. A right mandible and two pyramis otica belonged to harp seal. A tibia and pelvic bone were of grey seal.Two cervical (first and second) vertebrae, a right humerus and pelvic bone belonged to harbour seal. Also found at this settlement site were a burnt bone fragment – a distal end of a humerus – of a harbour seal.

From the excavated seal bones from Švenotji 26, only two tail vertebrae and phalanges of grey seal were distinguishable. We were unable to identify the species of a right humerus and left radius.

Table 14. **Seal bone analysis.**

| Skeletal part | Šventoji 1 | Šventoji 2B | Šventoji 3 | Šventoji 4 | Šventoji 6 | Šventoji 23 | Šventoji 26 |
|---|---|---|---|---|---|---|---|
| Cranium | 1 | | 3 | | 1 | | |
| Pyramis otica | 1 | 3 | 1 | | 4 | 4 | |
| Mandibula | | 1 | 4 | 1 | 2 | 2 | |
| Columna vertebralis | | 13 | 8 | | | 2 | 2 |
| Scapula | | 3 | 2 | | | | |
| Humerus | | | 2 | | 5 | 2 | 1 |
| Ossa antebrachii | | | 1 | | | 2 | 1 |
| Ossa coxae | 3 | | 3 | 2 | 4 | 2 | |
| Femur | | | | | 1 | | |
| Ossa cruris | | 1 | | | 1 | 1 | |
| Tarsus | | | 2 | | | | |
| Metatarsus | | | 1 | | | | |
| Phalanx | | | | | | | 2 |
| Total | 5 | 21 | 26 | 3 | 18 | 15 | 6 |
| % | 5,32 | 22,34 | 27,66 | 3,19 | 19,15 | 15,96 | 6,38 |

Table 15. **Sea mammal bones at Šventoji sites.**

| Species | Šventoji 1 | Šventoji 2B | Šventoji 3B | Šventoji 4 B | Šventoji 6 | Šventoji 23 | Šventoji 26 |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| Harbour seal Phoca vitulina | 1 | 5 | 2 | | 2 | 5 | |
| | | | | | | | |
| Ringed seal Phoca hispida | 2 | | 4 | 2 | 4 | 4 | |
| | | | | | | | |
| Grey seal Halychoerus grypus | 1 | 3 | 3 | | 3 | 2 | 6 |
| | | | | | | | |
| Harp seal Pagophylus groenlandicus | 1 | 9 | 12 | 3 | 10 | 3 | |
| | | | | | | | |
| Porpoise Phocaena phocaena | | 1 | 3 | | | | |

In the other table (Table 15), we present the seal species composition of the Šventoji sites along with the number of porpoise vertebrae found at Šventoji 2B and 3 B. A large quantity of harp seal bones were found in almost all of the sites, except for Šventoji 1 B and Šventoji 26. If in analyzing the bone material we use the dates presented by archaeologists (Rimantienė 1992) and divide the sites into Early Neolithic (Šventoji 1B, Šventoji 2B, Šventoji 4B), Middle Neolithic (Šventoji 3B, Šventoji 23, Šventoji 26) and Late Neolithic (Šventoji 6), then four species of seals were hunted in all these time periods, while in the Early and Middle Neolithic porpoises were hunted as well.

## DISCUSSION

A large quantity of seal bones from the Mesolithic, Neolithic or Late Bronze Age coastal Baltic Sea sites has been researched by many authors (Lepiksaar 1964, Forsten and Alhonen 1975, Ericson 1989, Lõugas L. 1997) and in various aspects, from territory (Estonia,

Finland, Sweden), climatic and geological changes, their influence on sea fauna (Bjork S. 1995, Kvasov D.D. 1979), to hunting and methods of capture (Sergeant D.E. 1963, 1991).

Large amounts of seal bones are characteristic of coastal Baltic Sea sites in the Neolithic. By the data of various authors, four species of seal bone were found in these sites: grey seal (Halichoerus grypus), harbour seal (Phoca vitulina), ringed seal (Phoca hispida) and harp seal (Pagophylus groenlandicus) (Lepiksaar J. 1940, Цалкин E.A. 1952, Paaver Ź. 1965, Lougas L. 1992,1993,1994).

Different technology must have been used for hunting different species of seal. What types of harpoons were used for seal hunting and what kind of material were they made of? The kind of influence seal hunting had on the economy is still difficult to determine. It is agreed, however, that seals were not only a source of meat and fur, but of fat as well (the traces of sea mammal fat was encountered in the chemical analysis of that time period's "lamps") (Rimantienė 1979 cites Mathiassen 1935, Diest 1981).

R. Rimantienė cites authors who describe seal hunting, its peculiarities, pictographs on rocks of Stone Age people hunting seals, and the hunting tools used (R. Rimantinė 1979: 23 cites Гурина H.H. 1970. Савватеев Ю.А 1973, Ģąnninen J. 1931, Sirelius U.T. 1934).

K. Jaanits (1995) describes two Late Mesolithic/ Early Neolithic Estonian coastal sites from which the palcozoological finds have been analyzed. At Kõnnu, seal bones comprised 79,95%. Also encountered and identified at this site were sparse single finds of marten (Martes martes), elk (Alces alces), fox (Vulpes vulpes), beaver (Castor fiber) and aurochs (Bos primigenius) bones, as well as fish bones of pike (Esox lucius), roach (Rutilus rutilus) and perch (Perca fluviatilis).

A typical seal hunting campsite used in early spring is Kõpu I (Early Neolithic, island). Pusa hispida, Halichoerus grypus and a large amount of indeterminate seal bones were found at this site. Also identified were bones belonging to pike (Esox luius), atlantic cod (Gadus morhue) and turbout (Scophthalmus rhombus). Seasonality is also confirmed by the fishbone vertebrae rings (May and June) (L. Lõugas et al 1995).

We also encounter seal bones in other Estonian Early Neolithic site analyses, i.e., Riigiküla 3 (24,4%) and Riigiküla 1 (11,4%). The osteologists who analyzed the faunal material from these sites also describe the importance of seal hunting in the lives of people of this time period (Paaver 1965, Lõugas L. 1993). That seal hunting was a significant branch of the economy is indicated by the 7029 seal bones found at the Neolithic site of Naakamäe on Saaremaa island; they comprised 98% of all bones (Paaver 1965).

L. Lõugas, K.Liden and D.E. Nelson (1995) describe the different diets of the various seal species by way of stable isotope analyses. Analysis of recovered seal bones from different sites (Naakammäe and Loona) showed that in one case seal species ate more freshwater and brackish (semi-salty) water (Baltic Sea) species of fish, while during migration the harp seal ate saltwater dwelling fish and molluscs (from the Atlantic Ocean).

By the data of various authors, intensive seal hunting began in the Early Neolithic. In the osteological analyses of the Early Neolithic sites of Kõnnu and Kõpu in Estonian territory, we encounter seal bones that were found also at Riigiküla 3 (24,4%) and Riigiküla 1 (11,4%). The importance of seal hunting to the person of that time period is written about by L.Jaanits (1985), K. Paaver (1965), L.Lõugas (1993). Table 16 was compiled from the data of L. Lõugas (1997).

Table 16. **Analyzed seal bones from Mesolithic, Neolithic and Bronze Age sites (Estonia).**

| Site | Harp seal | Ringed seal | Grey seal | Harbour seal |
|---|---|---|---|---|
| Kunda | | 4/2 | | |
| Kõpu | | 54/6 | 45/4 | |
| Kõnnu | | 76/20 | 25/6 | |
| Naakamäe | 1083/113 | 126/19 | 51/10 | |
| Loona | 110/15 | 5/3 | 2/2 | |
| Kudruküla | 15/6 | 3/1 | 2/1 | |
| Asva | 63 | 30 | 43 | 16 |

**Note:** first number = number of seal bones; second number = minimum number of individuals

Boar and beaver bones were found in all the researched Šventoji sites dating to the third mil. b.c. (uncalibrated) – Šventoji 1B, 2B, 3B, 23 and 26. Elk bones were found in all the sites except for Šventoji 26. Seal bones were dominant at Šventoji 2B and Šventoji 26 (R. Rimantienė 1979; L. Daugnora, A. Girininkas 1996).

In our faunal analysis of Šventoji 4, we distinguished ten species of mammals. By the general bone count percentages, four species of seal bone dominated (39,29%); the second and third places were taken by aurochs (19,05%) and red deer (17,86%), and boar bone comprised about 9,5%. Fox, bear, badger and dog bone comprised only a small portion of the analyzed bone. There were no bone identified belonging to elk (First part article )

By our data, the Late Neolithic Švenotji 6 settlement site's faunal assemblage was dominated by seal (41,5%) and boar (25,1%). It thus follows that out of thirteen mammal species, six (seal, boar, red deer, roe deer, elk and aurochs) were hunted for meat, while the other seven belonged to fur animals (D. Duoba, L. Daugnora 1994; L. Daugnora, A.Girininkas 1996).

At the Late Bronze Age settlement site Asva, in addition to the domestic animals, an important position was taken by seal hunting. It is interesting to note that the harp seal dominated the other seals (L. Lõugas 1994).

These data show that a dominant part of the subsistence economy throughout the entire time period in coastal sites is strongly associated with the populations and hunting of seal and boar. We can thus concur with M. Zvelebil's idea (1979), that sea mammal exploitation expanded c. 3500 b.c. (uncalibrated), and that it developed into a purposive specialization between c. 2500–1500 b.c.

**PADĖKA**

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## REFERENCES

**Andersen S.H.,** 1995 – Coastal adaptation and marine exploitation in late Mesolithic Denmark – with special emphasis on the Limfjord region // A.Fischer ( ed.) Man and Sea in the Mesolithic. Oxbow Monograph 53. 1995, p. 41–68

**Andersen S.H., Johansen E.,** 1986 – Ertebolle revisited // Journal of Danish Archaeology. 1986. Vol. 5, p. 31–61

**Baleišis R.,** 1991 – Briedžių atranka // Medžiotojas ir meškeriotojas. 1991, p. 9–11.

**Barrett J.H.,** 1993 – Bone weight, meat yield estimates and cod ( gadus morhua ): a preliminary study of the of the weight method // Journal of Osteoarchaeology. 1993. Vol. 3, p. 1–18.

**Bjorck S.,** 1995 – Late Weichselian to early Holocene development of the baltic sea – with implications for coastal settlements in the southern baltic region // A.Fischer ( ed.) Man and Sea in the Mesolithic. Oxbow Monograph 53. 1995, p. 23–34

**Bull G., Payne S.,** 1983– Tooth eruption and epiphysial fusion in pigs and wild boar // Ageing and sexing animal bones from archaeological sites. Oxford, 1983. Vol. 109, p. 55–77.

**Casteel R. W.,** 1977 – A consideration of the behaviour of the minimum number of individuals index: a problem in faunal characterization // OSSA. 1977. Vol. 3/4; p. 129–151.

**Chaplin R.E.,** 1971 – The study of animal bones from archeological sites. New York and London, 1971.

**Daugnora L. , Girininkas A.,** 1996 – Osteoarcheologija Lietuvoje vidurinysis ir vėlyvasis holocenas .Vilnius: Savastis, 1996.

**Daugnora L., Hufthammer A.K.,** 1999 – Fishes in the Stone age settlement area of Šventoji .A preliminary report from the Bergen– Lithuanian joint excavation project // Fourth Baltic–Nordic Worshop in Veterinary anatomy. Oslo June 4–6, 1999, p. 23–26

**Dolukhanov P.,** 1978 – Ecology and economy in neolithic eastern Europe // C. Renfrew (ed.) New Approaches in Archaeology. New York, 1978.

**Duoba D., Daugnora L.,** 1994 – Osteologinės medžiagos, rastos Šventosios 6-oje gyvenvietėje, tyrimo rezultatai // Lietuvos veterinarijos akademijos mokslo darbai. Vilnius, 1994. Nr. 22, p. 24–28.

**Enghoff I.B.,** 1987 – Freshwater fishing from a sea–coast settlement – the Ertebolle locus classicus revisited // Journal of Danish Archaeology. 1987. Vol. 5, p. 62–76.

**Enghoff I.B.,** 1991 – Fishing from the stone age settlement Norsminde // Journal of Danish Archaeology. 1991. Vol. 8, p. 41–50.

**Enghoff I.B.,** 1993 – Mesolithic el-fishing at Bjornsholm, Denmark, spiced with exotic species // Journal of Danish Archaeology. 1993. Vol. 10, p. 105–118 .

**Ericson P.,** 1989 – Sal och saljakt i ostersjoomradet under stenaldern // Inst. of Archaeology. Report series 33. Lund, 1989, p. 57–64.

**Forsten A., Alhonen P.,** 1975 – The subfossil seals of

Finland and their relations to the history of the Baltic sea // Boreas. 1975. Vol. 4, p. 143–155.

**Girininkas A.,** 1990 – Kretuonas. Vidurinis ir vėlyvasis neolitas // Lietuvos archeologija. Vilnius, 1990. T. 7, p. 6–111.

**Girininkas A.,** 1994 –Tyrinėjimai Kretuono apyeżeryje // Archeologiniai tyrinėjimai Lietuvoje 1992 ir 1993 metais. Vilnius, 1994, p. 10–14.

**Gramsch B.,** 1973 – Das mesolithikum im Flachland zwischen Elbe und oder // Veroffentlichungen des museums fur ur- und fruhgeschichte. Potsdam, 1973, B. S. 71.

**Grant A.,** 1982 – The use of tooth wear as a quide to the age of domestic animals // Ageing and sexing Animals from Archaeological Sites. Oxford, 1982, p. 91–108.

**Grant A.,** 1986 – The use of tooth wear as a quide to the age of domestic animals // Teeth. Cambridge University Press, 1986, p. 327–330.

**Harder W.,** 1975 – Anatomy of fishes. Stuttgart: E. Schweizerbart'sche Verlagsbuchhandlung, 1975.

**Hoglund H.,** 1972 – On the Bohuslan herring during the great herring fishery period in the eighteenth century // Reports of the Institute of Marine Research. Lysekil, Series Biology. 1972. Vol. 20, s. 1–86.

**Jaanits K.,** 1995 – Two late mesolithic/Early neolithic coastal sites of seal hunters in Estonia // A.Fisher (ed) Man and Sea in Mesolithic. Oxbow Books. Oxford, 1995, p. 247–249.

**Klein R.G., Wolf C., Freeman L.G., Allwarden K.,** 1981 – The use of dental crown heights for constructing age profiles of red deer and similar species in archaeological sample// Journal of Archaeological Science. 1981. Vol. 8, p. 1–31.

**Kvasov D.D.,** 1979 – The Late Quarternary history of large lakes and inland seas of eastern Europe // Annales Academiae Scientarum Fennicae. 1979, A 127.

**Lepiksaar J.,** 1940 – Grooni huljesest, Phoca goenlandica, Erxl., Laanemeres, tema uue leiu puhul pronksiaegsest asulast Asvas, Saaremaal // Eesti Loodus. 1940. Vol. 2, lk. 87–90.

**Lepiksaar J.,** 1964 – Subfossile Robbenfunde von der Schwedischen Westkuste // Zeitschrift für saugetierk. 1964. Vol. 29(5), S. 257–266.

**Lepiksaar J.,** 1983a – Djurrester fran den tidigatlantika boplatsen vid Segebro nara malmo I Skane ( Sydsverige) malmofynd 4. 1983, p. 105–128.

**Lepiksaar J.,** 1983b – Osteologia. I. Fisces.Goteborg, 1981, 1983.

**Lepiksaar J.,** 1986 – The holocene History of theriofauna in fennoscandia and Baltic Countries // Striae. 1986. Vol. 24, p. 51–70.

**Lepiksaar J. , Heinrich D.,** 1977 – Untersuchungen an Fischresten aus der fruhmittelalterlichen Siedlung Haithabu // Berichte uber die Ausgrabungen in Haithabu. 1977. Vol. 10, p. 9–122.

**Logminas V., Prūsaitė J., Virbickas J.,** 1982 – Vadovas Lietuvos stuburiniams pažinti. Vilnius, 1982.

**Lougas L.,** 1992 – Subfossil seals from archaeological site of Asva in Saaremaa // Proc. of the I Baltic Theriol. Confer. TU Toim., 955. 1992, p. 163–170.

**Lõugas L.,** 1993 – When Pagophilos groenlandica used to live in the Baltic Sea // Eesti Loodus. 1993. Vol. 3, p. 83–84.

**Lõugas L.,** 1994 – Subfossil vertebrate fauna at Asva site, Saaremaa. Mammals // Reports of the Estonian Archaeological Society. 1994. Stilus 5, p. 71–93.

**Lõugas L.,** 1995 – Analyses of animal remains from the excavations at the Lammasmägi site, Kunda, North–east Estonia // PACT, Estonia 2. Rixensart, Belgium, 1995.

**Lougas L.,** 1997 – Postglacial development of vertebrate fauna in estonian water bodies. A palaeozoological study. Tartu university Press, 1997.

**Lougas L., Liden K., Nelson D.E.,** 1995 – Resource utilization along the Estonian coast during the Stone age // K. Liden dissertation " Prehistoric diet Transitions " Stocholm University, 1995.

**Morales A., Rosenlund K.,** 1979 – Fish bone measurements. An attempt to standardize the measuring of fish bones from archaeological sites. Copenhagen: Streenstrupia, 1979.

**Payne S.,** 1973 – Kill-off patterns in sheep and goats: the mandibles Asvan Kale // Teeth. Cambridge University Press, 1973, p. 331–336.

**Pedersen L.,** 1995 – 7000 years of fishing: stationary fisching structures in the Mesolithic and afterwards // A. Fischer (ed.) Man and Sea in the Mesolithic. Oxbow Monograph 53. 1995, p. 75–86.

**Rimantienė R.,** 1979 – Šventoji. Narvos kultūros gyvenvietės.Vilnius, 1979.

**Rimantienė R.,** 1980 – Šventoji. Pamarių kultūros gyvenvietės.Vilnius, 1980.

**Rimantienė R.,** 1984 – Akmens amžius Lietuvoje. Vilnius, 1984.

**Rimantienė R.,** 1988 – Šventosios gyvenviečių tyrinėjimai // Archeologiniai tyrinėjimai Lietuvoje 1986 ir 1987 metais. Vilnius, 1988, p. 22–23.

**Rimantienė R.,** 1992 – Neolithic hunter-gatherers at Šventoji in Lithuania //Antiquity. 1992, vol. 66, No 251, p. 367–376.

**Sergeant D.E.,** 1963 – Harp seals and the Sealing Industry // Canadian Audubon. 1963. Vol. 25(2), p. 29–35.

**Sergeant D.E.,** 1991 – Harp seals, Man and Ice. 144. Ottawa, 1991.

**Sloka J.,** 1985 – Zivis Brikulu apmetne velaja bronzas laikmeta un dzelzs laikmeta // Latvijas PSR Zinatnu Akademijas Vestis. 1985, lpp.72–75.

**Verhart L.B.M.,** 1995 – Fishing for the Mesolithic. The north sea: a submerged Mesolithic landscape // Fisher A.(ed.), man and Sea in the Mesolithic. Oxbow books. Oxford, 1995, p. 291–302.

**Wheeler A., Jones A.K.G.,** 1989 – Fishes.Cambridge: Cambridge University Press, 1989.

**White T.E.,** 1953 – A method of calculating the dietary percentage of variuos food animals utilized by aboriginal people // American antiquity. 1953. Vol. 18 (4), p. 396–398.

**Zvelebil M.,** 1979 – Of pigs, nuts, fish and seal: a case for indigenous pig husbandry among the hunter–gatherers of northern Europe? Paris: CNRS, 1979.

**Паавер К.,** 1965 – Формирование териофауны и изменчивость млекопитающих Прибалтики в голоцене. Тарту, 1965.

**Цепкин Е.А.,** 1968 – Промысловая ихтиофауна Нарвских неолитических стоянок // Бюл. МОИП биол. 1968. № 73/5, с. 123–129.

**Янитс К.,** 1985 – Некоторые вопросы изучения каменного века в Прибалтике // Новое в археологии в Прибалтики и соседних территориях. Tallinn, 1985, с. 193–201.

**Янитс К.,** 1991 – Рыболовство и морской промысель на территории Эстонской ССР // Рыболовство и морской промысель в эпоху мезолита-раннего металла в лесной и лесостепной зоне восточной Европы. Ленинград, 1991, с. 25–38.

# OSTEOLOGINIAI DUOMENYS APIE ŽUVIS IR RUONIUS ŠVENTOSIOS GYVENVIETĖSE

**Linas Daugnora**

## Santrauka

Visose įvairių laikotarpių Šventosios gyvenvietėse buvo medžiojami keturių rūšių ruoniai: ilgasnukis ruonis (*Halychoerus grypus*), paprastasis ruonis (*Phoca vitulina*), žieduotasis ruonis (*Phoca hispida*) ir Grenlandijos ruonis (*Pagophylus groenlandicus*). Ankstyvajame ir viduriniame neolite buvo jau medžiojami ir delfinai (Jūros kiaulė Phocoena phocoena).

Tiriant Šventosios gyvenviečių žuvų kaulus nustatyta, kad buvo gaudomos tiek gėlavandenės, tiek jūrinės žuvys. Aptikta daug gėlavandenių žuvų rūšių: lydeka, ešerys, raudė ir kitos karpinės žuvys. Tarp jūroje gaudomų žuvų rūšių priklauso atlantinė ir ledjūrio menkės (*Gadidae*), gundalinės (*Gobiide*) ar jūrinės plekšnės (*Pleuronectes platessa*). Lašišos (*Salmonidae*) yra migruojančios rūšys ir jas galima buvo pagauti tiek sūriuose, tiek gėluose vandenyse.

Suskirsčius tirtas gyvenvietes į ankstyvojo neolito (Šventoji 1 B,Šventoji 2 B, Šventoji 4B), vidurinio neolito (Šventoji 3B, Šventoji 23, Šventoji 26) ir vėlyvojo neolito (Šventoji 6) laikotarpius nustatėme, kad visuose laikotarpiuose buvo medžiojami keturių rūšių ruoniai: ilgasnukis ruonis (*Halychoerus grypus*), paprastasis ruonis (*Phoca vitulina)* ir žieduotasis ruonis (*Phoca hispida*), Grenlandijos ruonis (*Pagophylus groenlandicus*), o ankstyvajame bei viduriniame neolite ir delfinai (Jūros kiaulė *Phocoena phocoena*).

## LENTELIŲ SĄRAŠAS

# ОСТЕОЛОГИЧЕСКИЕ ДАННЫЕ О РЫБАХ И ТЮЛЕНЯХ ИЗ ПОСЕЛЕНИЙ ШВЯНТОЙИ

Линас Даугнора

## Резюме

В исследованных неолитических поселениях Швянтойи были обнаруженны четыри вида тюленей: *Phoca hispida, Pagophylus groenlandicus, Halychoerus grypus* ir *Phoca vitulina.* В раннем и среднем неолите жители Швянтойи охотились и на делфинов (*Phocoena phocoena*).

При исследовании остеологических данных риб, усеановленно, что жители ловили пресноводные и морские рыбы. Среди пресноводных рыб доминировали: щука, окунь, красноперка и другие карповые виды. Жители в море ловили: *Gadidae, Gobiidae, Pleuronectes platessa* ir *Salmonidae.*

После распределения исследованных поселений на принадлежащие к периоду раннего неолита (Швянтойи 1В, Швянтойи 2В, Швянтойи 4В), среднего неолита (Швянтойи 3В, Швянтойи 23, Швянтойи 26) и позднего неолита (Швянтойи 6) мы установили, что во всех этих периодах имела место охота на тюленей четырёх видов: длинномордого тюленя (*Halychoerus grypus*), обыкновенного тюленя (*Phoca vitulina*), кольчатого тюленя (*Phoca hispida)* и гренландского тюленя (*Pagophylus groenlandicus*), а в раннем и среднем неолите – и на дельфинов (морских свиней *Phocoena phocoena*).

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