

# SUBFOSSIL SEAL FINDS FROM ARCHAEOLOGICAL COASTAL SITES IN ESTONIA, EAST PART OF THE BALTIC SEA

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## Summary

The occurrence of seals in the archaeozoological material from the Baltic Sea during Holocene is discussed on the basis of subfossil remains from Estonian coastal sites. The main reasons for the choice of this subject are the numerous excavations in the area and insufficiency of analyses of earlier seal finds in Estonia.

The species represented are the grey seal (*Halichoerus grypus*), ringed seal (*Pusa hispida*), harp seal (*Pagophilus groenlandicus*) and harbour seal (*Phoca vitulina*), of which the latter two seem to be migrating forms in Estonian waters: harp seal in the past and harbour seal even nowadays. Seal hunting can be one seasonal indicator of the prehistoric coastal sites.

According to the Estonian finds, the importance of seals for prehistoric people increased in the Late Atlantic and Early Subboreal and the main hunted species was the harp seal.

The distribution of the harp seal in the Baltic needs special discussion using also evidences of its migrations and distribution nowadays.

## Résumé

Découvertes de restes subfossiles de phoques dans les sites archéologiques côtiers d'Estonie, Baltique orientale.

La présence de phoques dans le matériel archéozoologique de la Mer Baltique durant l'Holocène est discutée sur la base de restes subfossiles des sites côtiers d'Estonie. La principale raison de ce sujet de recherche réside dans le nombre important de fouilles dans cette région et dans l'insuffisance de l'analyse des restes de phoques en Estonie jusqu'à présent.

Les espèces représentées sont le phoque gris (*Halichoerus grypus*), le phoque marbré (*Pusa hispida*), le phoque du Groenland (*Pagophilus groenlandicus*) et le phoque veau-marin (*Phoca vitulina*), parmi lesquels les deux derniers semblent être migrants dans les eaux estoniennes : le phoque du Groenland dans le passé et le phoque veau-marin encore aujourd'hui. La chasse au phoque peut être utilisée comme indicateur de saisonnalité dans les sites côtiers préhistoriques. Les découvertes estoniennes témoignent que l'importance des phoques pour les Préhistoriques s'est accrue à l'Atlantique final et au Subboréal ancien et que la principale espèce chassée était le phoque du Groenland.

La répartition du phoque du Groenland dans la Baltique requiert une discussion particulière prenant aussi en compte les données sur ses migrations et distribution aujourd'hui.

## Zusammenfassung

Subfossile Robbenfunde aus Küstensiedlungen in Estland, östlicher Teil des Baltischen Meeres.

Auf der Basis von subfossilen Robbenfunden in Küstensiedlungen Estlands wird das Vorkommen dieser Tiere in archäologischen Materialien und entsprechend der holozänen Ostsee diskutiert. Der Hauptgrund für die Wahl dieses Themas liegt zum einen in der großen Zahl an Ausgrabungen im Untersuchungsgebiet, zum anderen darin, daß die Robbenfunde Estlands bisher nur unzureichend untersucht worden sind.

Die vorkommenden Arten sind: Kegelrobbe (*Halichoerus grypus*), Ringelrobbe (*Pusa hispida*), Sattelrobbe (*Pagophilus groenlandicus*) und Seehund (*Phoca vitulina*). Sattelrobbe und Seehund scheinen in estländischen Gewässern nur als saisonale Gäste vorzukommen, Sattelrobbe in der Vergangenheit und Seehund bis heute. Die Robbenjagd kann in den prähistorischen Küstensiedlungen als saisonaler Indikator gelten. In Estland nahm die Bedeutung der Robben für die Bevölkerung während des Späten Atlantikums und des Frühen Subboreals zu. Die am häufigsten bejagte Art war die Sattelrobbe.

Das Vorkommen der Sattelrobbe im Baltikum bedarf noch einiger Diskussion, wobei auch ihre heutige Verbreitung und ihr Wanderverhalten berücksichtigt werden müssen.

## Key Words

Estonia, Stone Age, Bronze Age, Seal, Seasonality.

## Mots clés

Estonie, Préhistoire, Âge du Bronze, Phoque, Saisonalité.

## Schlüsselworte

Estland, Steinzeit, Bronzezeit, Robben, Saisonalität.

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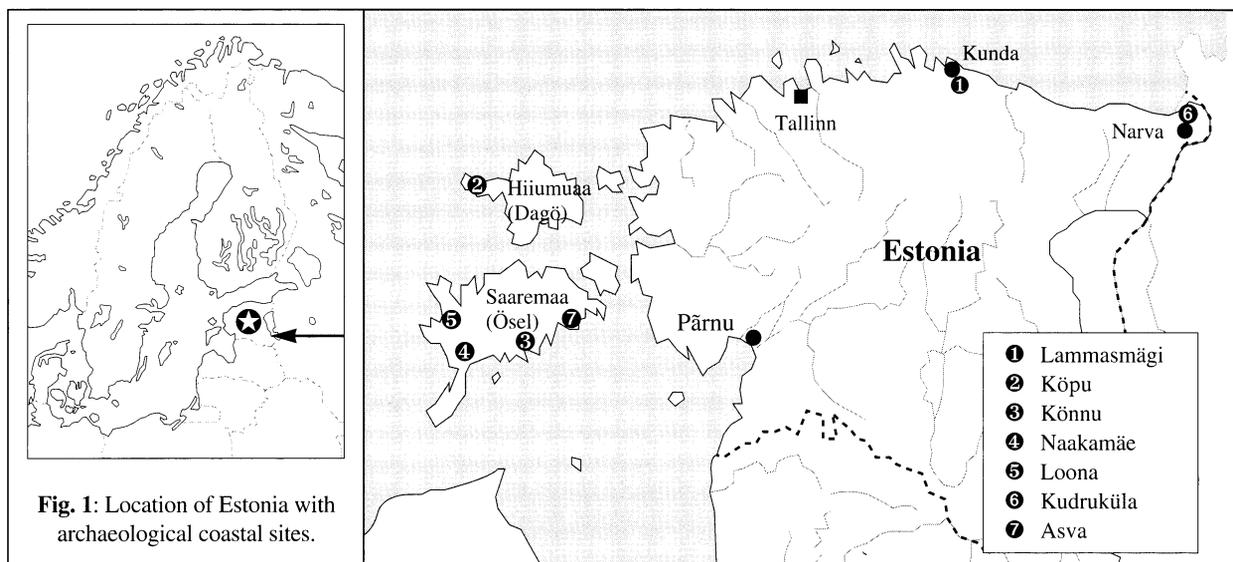
## Introduction

Subfossil bones of the seals which are the basis of this investigation come from Mesolithic, Neolithic and Late Bronze Age coastal sites of Estonia. The aim of this study is to give a survey on the seal finds of Estonia and discuss the harp seal distribution in the Baltic. Also an attempt has been made to precise the seasons of occupation of the prehistoric seal hunter sites in the coastal area of Estonia.

Estonia, the northernmost of the Baltic Countries, borders on the Gulf of Finland in the north and on the Baltic Sea in the west. Two big islands, west of Estonian mainland, Saaremaa (Ösel) and Hiiumaa (Dagö) with lots of small islets, offer good living possibilities for seals. Nowadays the grey seal occurs close to the Estonian

coast, the ringed seal prefers northernmost areas, Bothnian Bay between Sweden and Finland. But thousands of years ago, there were different climatic and geographical conditions in the Baltic and the complex of fauna also differed in some respects. Four species of seals have been found in the archaeozoological material.

The sources for the history of seal distribution during Holocene in the Baltic are quite rich, but the material is not evenly distributed over the period and the area. The earlier investigations in Estonia and other Baltic countries are insufficient and the literature concerning the seal history in the Baltic is mostly based on finds from Finland and Sweden (Pira, 1926; Lepiksaar, 1964; Forstén and Alhonen, 1975; Ericson, 1989).



**Table 1:** Number of fragments and minimum number of individuals of seal species from Estonian coastal sites.

| Site      | Seals indet. | Harp seal | Ringed seal | Grey seal | Harbour seal |
|-----------|--------------|-----------|-------------|-----------|--------------|
| KUNDA     | 5            | –         | 4/2         | –         | –            |
| KÕPU      | 433          | –         | 54/6        | 45/4      | –            |
| KÕNNU     | 143          | –         | 76/20       | 25/6      | –            |
| NAAKAMÄE  | 5471         | 1083/113  | 126/19      | 51/10     | –            |
| LOONA     | 360          | 110/15    | 5/3         | 2/2       | –            |
| KUDRUKÜLA | 47           | 15/6      | 3/1         | 2/1       | –            |
| ASVA      | 569          | 63/       | 30/         | 43/       | 16/          |

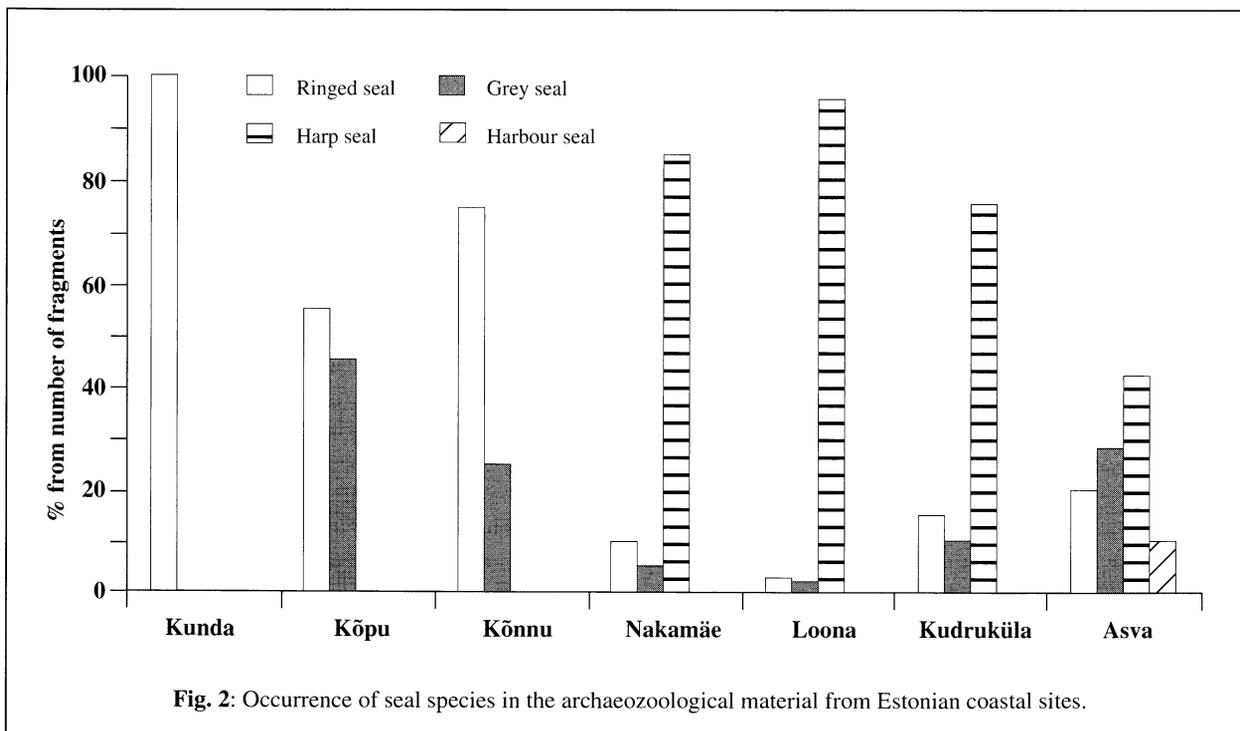
## Material and methods

Subfossil seal remains are known from several places on the coasts of Estonian mainland and from Saaremaa and Hiiumaa (fig. 1). The oldest site, where the ringed seal remains were found in the material (tab. 1), is at Lammasmägi, Kunda, deriving from the Mesolithic Kunda period, 8 000-4 000 bc. This site was situated close to the lake (later river) and the place was visited by hunters and fishers (Jaanits *et al.*, 1982; Åkerlund *et al.*, 1994; Lõugas, 1994b).

However, the intensive seal hunt started during the Early Neolithic and through this period seal populations were strongly hunted by prehistoric coastal settlers. There are several Neolithic sites in Estonia which were occupied by seal hunters.

Two Early Neolithic sites, with primitive Narva-Type Ceramic in the material, were situated at Kõnnu, Saaremaa and Kõpu (TA-1493: 5330 ± 90 bp), Hiiumaa. Kõnnu site has been excavated by Lembit Jaanits in 1980, 1984 and 1985 (Jaanits, 1985) and bone analyses have been conducted by the author in 1993. The ringed seal seems to be the most hunted species (fig. 2), 76 fragments come from 20 individuals, then the grey seal was represented by 25 fragments from 6 individuals (tab. 1). There were also some single skeletal parts from fox, elk, martin, wild boar, dog, beaver, long-tailed duck, goosander, red-breasted merganser, pike, perch and roach in the bone material.

Kõpu site, which was situated on a 1-2 km<sup>2</sup> island in the Littorina Sea (this sea existed in the Baltic Sea basin about 7500-3800 bp), was excavated under the leadership of Aivar Kriiska in July 1994 and financed by the Estonian Academy of Sciences and, through the author, by the Estonian Scientific Foundation. First results of bone analyses are ready and it appears that only the ringed seal and grey seal were hunted, the former being represented by 54 fragments from 6 individuals and the latter by 45 fragments from 4 individuals. Quite a high number of unidentified pieces of seal bone (433) resulted from bad preservation conditions in sandy and stony soil. The excavation area of 1x32 m was a trench for studying the stratigraphy of the site and also the range of the cultural layer. All the soil was sieved by 1 mm and 2 mm hand-sieve, but despite this, there were very few species: beside seals, only the hedgehog, some rodent teeth, the cod, the turbot and the pike. The hedgehog is a very interesting find, because this species cannot populate isolated islands by itself. Hedgehog must have carried a magic meaning for prehistoric people. These four fragments of mandibulas, found in a fireplace of the site, could have been imported to the island within a skin or as part of a complete skull. The site seems to have been used only during the seal hunting season (see about seasonality) in early spring when the hedgehog is in hibernation, so it is doubtful that a living animal had been brought to the site.



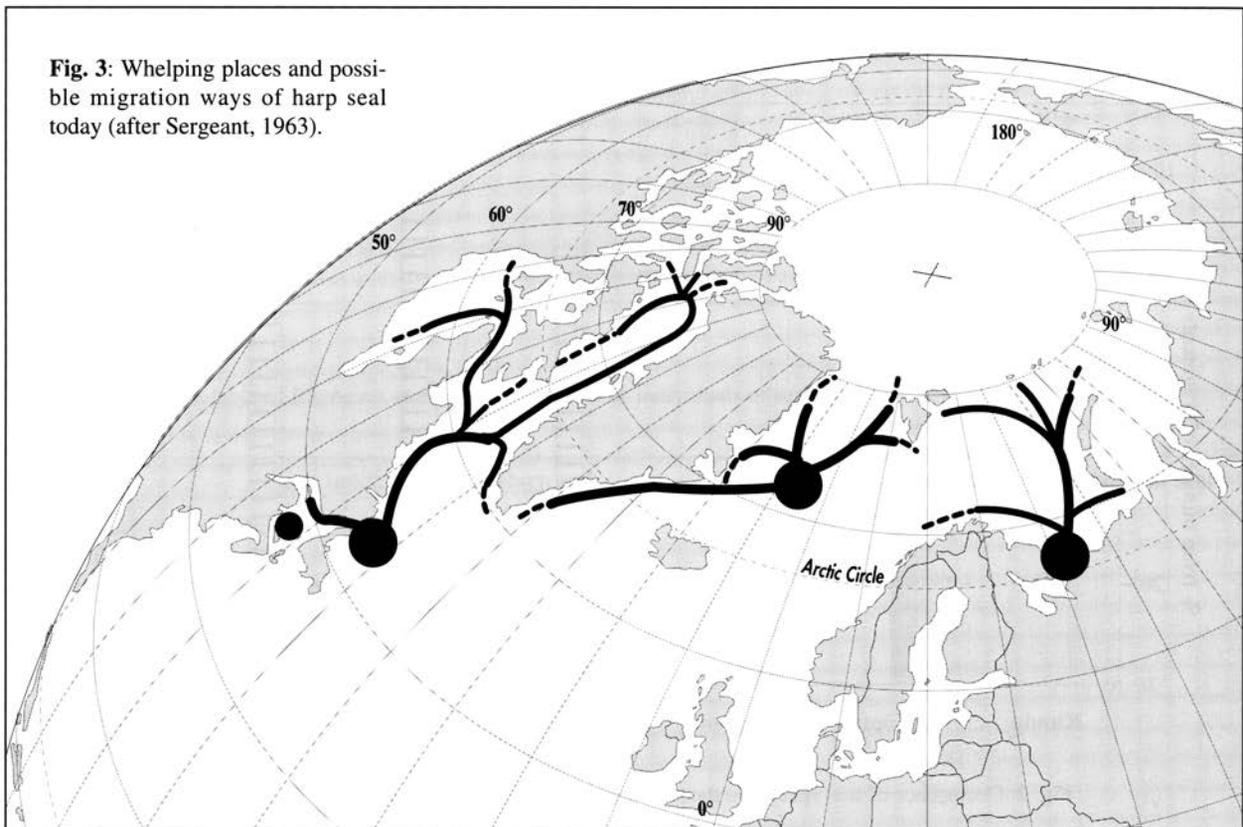
Two sites of Comb Ceramic Culture at Naakamäe and Loona, Saaremaa, have been excavated under the leadership of Lembit Jaanits in the 1950s and 1960s, and bones of terrestrial mammals have been analysed by Kalju Paaver (Paaver, 1965; Jaanits *et al.*, 1982). Bone finds of animals from both sites contain remains of four species of sea mammals: the harp seal, the ringed seal, the grey seal and the porpoise (Lõugas, 1993). As seen in table 1 and figure 2, the harp seal dominates strongly over the other species of seal. Since it is represented by quite a large amount of remains in the coastal area of the Baltic during the Neolithic and even later, the results are presented and discussed separately.

Kudruküla (Narva) is the Typical-Comb Ceramic and Late-Comb Ceramic site ( $4770 \pm 60$  and  $4860 \pm 60$  bp, Lõugas *et al.*, 1996). The domination of species from broad-leaf-forests indicates that the subfossil fauna has been characteristic to the Late Atlantic and Subboreal. Harp seal in the Eastern part of the Gulf of Finland is surprising in some respect. This species is represented by 15 fragments from 6 individuals; at the same time the ringed seal is represented by 3 fragments from 1 individual and the grey seal by 2 fragments, also from a single individual (Lõugas, 1993).

The Late Bronze Age Asva settlement (there are also layers belonging to the Iron Age) in Saaremaa presents interesting osteological material. The amounts of remains of domestic animals and seals are quite equal, which means that the keeping of domestic animals and seal hunting were equally important in the economy of the inhabitants of the Asva (Lõugas, 1994). The harp seal still dominates in the subfossil seal material, but not as strongly as earlier. Asva is the only site in Estonia where the remnants of the harbour seal have been found. Unfortunately, the minimum number of individuals has not been determined from Asva material, but 16 fragments prove that this species existed near the Saaremaa coast in the Late Bronze and Iron Ages (Lõugas, 1992). The remains of seals found in separate excavations of Asva site have also been analysed earlier and the results have been published by various authors (Lepiksaar, 1940; Tsalkin, 1952; Lõugas, 1992, 1994).

All mentioned seal bone determinations have been done according to Gromova (1950), Fortelius (1981) and Lepiksaar (1991). Several skeleton fragments have been investigated by comparative method, using recent bones and also partially subfossil bones of the Institute of History

**Fig. 3:** Whelping places and possible migration ways of harp seal today (after Sergeant, 1963).



in Tallinn, Estonia and the Museum of Natural History in Gothenburg, Sweden.

Only two quantitative methods have been used here: counting of the numbers of fragments and establishing the minimum numbers of individuals, which also considers bone sizes and morphology (Chaplin, 1971).

### **Harp seal (*Pagophilus groenlandicus*) and its relation to the Baltic Sea**

J. Lepiksaar (1986) has summarised the hypotheses about the harp seal occurrence in the Baltic:

1) the species may be a relict from the Yoldia Sea stage of the Baltic,

2) a breeding stock was established in the Baltic in Subboreal by migrants from the Arctic,

3) the finds come from periodical (probably yearly) prolongation of the seasonal feeding-routes southward instead of northward in the population breeding at the drift-ice border, under ecological conditions (extensive ice-forming) peculiar to the Subboreal period and, more sporadically, even later in years after very strong winters in the Arctic.

There is no evidence for the first hypothesis and no remains of harp seal new-born pups have yet been found from the Baltic (Pira, 1926; Lepiksaar, 1964, 1986; Forstén and Alhonen, 1975), although, the harp seal is the easiest to catch during breeding.

The third hypothesis seems to be more realistic. In order to prove the latter, we must look at the ecology of the harp seal today.

As seen on figure 3, the harp seal moves to the ice floes of three main regions: the northern part of the White Sea, the northwestern part of the Greenland Sea in the region of Jan Mayen island, near Labrador, and the region of Newfoundland (Iablokov and Sergeant, 1963). The study of variation in a number of cranial features and a variety of tagging experiments of the harp seal has shown that all three studied populations differ from each other: the Newfoundland population is isolated to a higher degree than the populations of the White Sea and of the Jan Mayen region. An exchange of individual specimens is possible between the latter two populations (Iablokov and Sergeant, 1963). The most highly migratory population of harp seals is the western one, since in the western North Atlantic, seasonal variations of sea temperature, and therefore extent of ice, are more marked. Long migrations are forced upon the harp seal by its necessity to stay at the ice-edge all the year round (Sergeant, 1991). This is one reason why this species could not stay in the Baltic the

whole year. There is no ice during the summer even in the north part of the Gulf of Bothnia.

After the whelping and moulting (seals moult once a year) in March-April, harp seal moves to the North along with the melting of the ice edge. The animals are forced to change their position every few days and this migration proceeds through the month of May. The harp seal summering at North, between 75°-80°N (Sergeant, 1991).

In the autumn the seals leave the arctic in a long front just ahead of formation of local pack ice, exploring and feeding in and out of the bays. On this migration they are easily taken in nets (Sergeant, 1991). Harp seals return to the whelping place at the beginning of March.

It seems that due to the cold and early winters in the Neolithic, the harp seal stocks from Jan Mayen or White Sea entered into the Baltic during autumn, from September to November/December, before the ice formation of the sea.

Harp seal migrations usually take place in different age groups. One example of this grouping is the heavy emigration or invasion along the whole Norwegian coast, with more than 60,000 seals (Wiig, 1988). The majority of emigrating animals were young, 1-2 years old, but some adults also occurred. A few animals were caught bearing tags put on at Jan Mayen in spring 1985 and 1986; calculation and biochemical analyses showed that most animals must have come from the White Sea (Wiig, 1988).

Usually, animals from 1 to 3 years old form separate group; sometimes some adults and/or immatures are also present. The young harp seal, 0-group (i.e. less than one year old), is a solitary animal in spring and the migrations of the young appear to be somewhat separate. The general separation of younger from older animals continues into the summer period, and even into the first winter. The age samples from West Greenland show that the different age groups use also the different areas for summering (Sergeant, 1991).

These experiments show the necessity of studying the age groups and sex of harp seal on the grounds of subfossil bones. Stora (1994) made an attempt to analyse the age distribution in the harp seal bone material from Jettböle Stone Age site on the Åland Islands. The aim of this investigation was to study the strategies for harp seal hunting. No preferred age groups have been seen in the material. Most of the killed seals were juveniles and young adults whereas older individuals were less numerous. No remains of new-born pups were found in the material (Stora, 1994).

The male animals matured between the ages of 6 and 8 years, females between 5 and 8 years, with a peak at 6 years (Sergeant, 1991). There is an urgent need to analyse the ages of the harp seal from subfossil material. If matured

animals are missing from material then it is new evidence for the third hypothesis (see above). Three bigger islands in the Baltic, Gotland, Åland and Saaremaa, which are situated in the west, north and east parts of the sea, offer a good material for making such kind of analyses. Hopefully the work with this interesting species will continue.

### Seasonal indicators of the Estonian coastal sites

An attempt will be made to estimate the degree of seasonal utilization of the Lammasmägi (Kunda), Kõpu (Hiiumaa), Kõnnu and Naakamäe sites (Saaremaa). Loona, Kudruküla and Asva were stationary settlements (Jaanits *et al.*, 1982). The material from Loona site contains large amount of remains of cod fish, pig remains and good equipment for longer living on the site. Kudruküla and Asva finds (remains of meat animals and also a good equipment) indicate stationary sites as well.

It is still questionable what kind of habitation the Lammasmägi site was and whether it was used permanently throughout the year. According to the zoological analyses (annual cycle of development of elk antlers, existing of birds of passage in the material, probable ringed seal hunt, annual rings formation on the vertebrae of the pike) the Lammasmägi site seems to have been used from autumn to spring, with insufficient evidence of summer and midwinter hunting (Lõugas, 1996).

Kõpu site seems to have been used during spring, at the best time of seal hunting. One subfossil femur of a ringed seal was the same size as the femur of a recent individual of about 10 kg. This specimen could be only a few days, maximum a week, old and hunted then at the end of March or at the beginning of April. Using the site throughout the year was quite impossible, because the size of island was about 1-2 km<sup>2</sup>, 80 km from mainland and 40 km from Saaremaa, and did not offer good feeding possibilities, except fish and seal. One seasonal dating method is based on fish vertebrae. The annual rings allow to determine the approximate season of death of the fish. The winter rings are typically marked by grooves on the surface of the vertebrae (Casteel, 1976). The annuli on the vertebral centrum of pike and turbot (both were 3 years old) from Kõpu indicated that the fish had been caught in March.

Kõnnu site seems to be an early spring camp similar to that of Kõpu, but there were more other fur and meat species as well, like elk, wild boar, fox, martin and some duck species. But regardless of these species, the annual using of the site looks quite impossible.

Naakamäe site was settled during autumn when the harp seal and porpoise made invasions into the east part of

the Baltic. A. Forstén and P. Alhonen (1975) wrote that the harp seal followed the receding ice northward and lived in the Gulf of Bothnia in summer and autumn. If the normal breeding area of this species is the Jan Mayen region or the White Sea, then the summering in the Baltic is quite doubtful. J. Lepiksaar's (1986) opinion that the harp seal came into the Baltic during its southward migration in the autumn seems more realistic. Also in autumn the porpoise used to be hunted in the narrow bays and slaughtered (Lepiksaar, 1966; Forstén, 1975).

The possibility that Naakamäe site has been used throughout the year is more evident, because the ringed seal and the grey seal, which have been probably hunted in early spring, were represented by quite a large amount of remains, and other species, like wild boar, elk, fox, birds and fish, offered feeding possibilities for island settlers.

### Discussion

The species represented in the Estonian coastal sites are the grey seal, ringed seal, harp seal and harbour seal.

The ringed seal and the grey seal are the seals with the longest history in the Baltic. Their bones have been found even from clay deposits of the Ancylus Lake stage of the Baltic (8 500-7 500 bp), showing that the species must have arrived into the Baltic during the Yoldia Sea stage (10 000-8 500 bp) through the Närke Sound (Winge, 1904; Lepiksaar, 1964, 1986; Forstén and Alhonen, 1975). There is some doubt whether the more pelagic grey seal could do this, but the earliest Baltic find, at Skatmansö, Uppland, Sweden (Munthe, 1895) has been dated from the Ancylus Lake stage. Maybe it would be necessary to date this find once again by modern methods of dating. The populations of the ringed seal and grey seal have preserved until today in the east part of the Baltic and we have to do everything we can to save and preserve the seals in the Baltic.

Unfortunately there are so few finds belonging to the harbour seal that it is impossible to draw any conclusion as to the occurrence and distribution of this species in the eastern part of the Baltic at that time. In contrast to the other species of seal, the harbour seal gives birth to pups in summer, on the coast or on islets, not on the ice. Nowadays this species is a very rare visitor in the shelf-sea of Estonia (Aul *et al.*, 1957). It seems that this species have occurred quite numerously in the eastern part of the Baltic at the "Asva time", because hunters can hunt them. It could not have been an accidental invasion by a few individuals only.

The harp seal came into the Baltic in the Littorina Phase (7500-3800 bp). New <sup>14</sup>C analyses made in Sweden

showed that the harp seal was in the Baltic (Gotland) 5225 ± 60 bp (Lindqvist and Possnert, 1994). At the Sub-

boreal climatic period the finds of this species were quite numerous in the refuse material of fishers and hunters. Since the Subatlantic climatic change, they have become rare. It is very interesting that at the "Asva time" this species still occurred there as a prey for the hunters. Until now no remains of newborn pups of this seal are known from the Baltic area. These could be only seasonal invasions of certain age groups of the harp seal into the Baltic, probably taking place in autumn.

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