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From hunter-fisher-gatherer to farmer – Changes in the Neolithic economy and settlement on Estonian territory

Aivar Kriiska

Publications about the Metal Age often give the impression that it was only then that people awoke from the lethargy of the Stone Age and began to lead an entirely different life, both socially and economically. Looking at the data gathered so far, one can see that some of the important representations of economy, settlement and society date back as far as the Neolithic[1]. It was then that foraging began to lose its importance, and agriculture became the main means of hunter/gathering food. The settlement pattern changed completely, and the coastal areas that had until then been densely inhabited were now left unoccupied. Use of the coast intensified again only in the Middle Ages (1200–1500 AD) or in the Late Iron Age (1050–1200 AD), when coastal villages occupied by Swedish resettlers arose in northwestern and western Estonia (for example Mandel, 1993, p. 50; Markus, 2002, p. 127–128). This could hardly have failed to influence the social organization, religion, ideology and mentality.

In order to understand the process and extent of "neolithization" on Estonian territory, one must observe the rather long period from the Late Mesolithic (6500–5000 cal BC[2]) to the Early Bronze Age (1800–1100 cal BC), analyzing how people managed their lives, the settlement system, the use of natural and anthropogenic/anthropohoric (including especially animals and plants) supplies, possible means of land cultivation, exchange patterns etc. This article is able only to sketch the outlines of this issue, presenting a vision that is based on one hand on the results of new fieldwork research and analyses, and on the other hand on the changes in theoretical understandings that have taken place in Estonian archaeology during the past ten years. This has brought about a need to revise many earlier viewpoints, looking for new interpretations and creating hypotheses that seem more accurate or more explanatory.

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ESTABLISHED FORAGING SETTLEMENT

By the Late Mesolithic (Fig. 2), a foragers' settlement had been established on Estonian territory. The main features of this settlement – the settlement pattern, orientation towards the foraging economy, use of resources etc. – can be observed (although more eminently) for thousands of years and in some places even in the Late Neolithic. In about 7000 cal BC, a dual settlement pattern, in which inland and coast are distinguished, began to develop. Inlanders lived by the shores of lakes and rivers; coastal people inhabited the seaside or, if possible, nearby river deltas. At that time people often took advantage of the areas of contact of several habitat types (ecological border effect), where favorable conditions generated more varied and abundant flora and fauna than in neighboring areas. The Litorina Sea, which was saltier than the Baltic Sea is now, probably offered very good conditions for the growth of all marine biomass, and thereby also for the seals at the top of the food chain, thus remarkably increasing their population. This new natural niche was taken advantage of by people living close to the seaside (Kriiska, 2001c).

[1] In Estonia, as in many places in eastern and northern Europe (for example Lithuania, Latvia, Finland and other countries) the transition to the Neolithic is not marked by the beginning of agriculture but the introduction of pottery making (on the periods and chronology of Estonian prehistory, see Lang & Kriiska, 2001)

[2] All dates are presented in the solar calendar, ^{14}C dates are calibrated with the computer program CAL40DATA OxCal v2.18 cub r:4 sd:12 prob[chron]

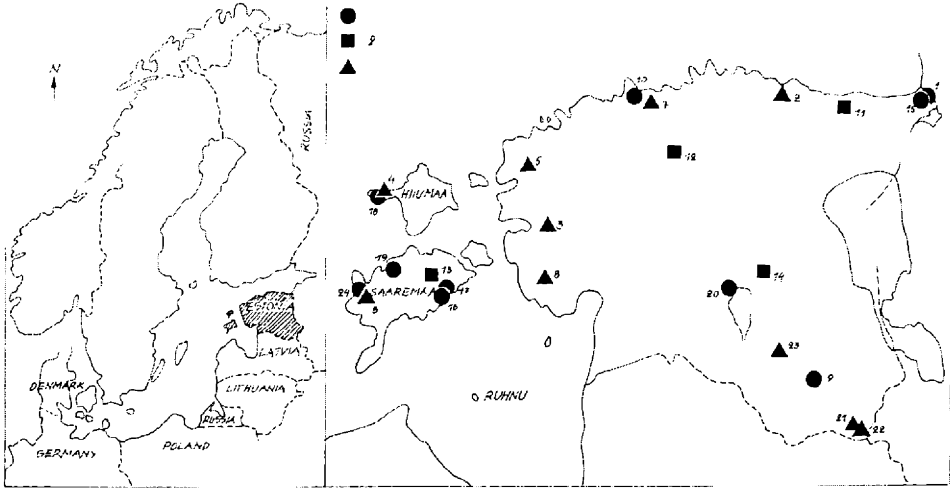

Fig. 1. Places mentioned in the text: *1* – Riigiküla I, *2* – Kunda Arusoo, *3* – Velise, *4* – Kõivasoo, *5* – Mustjärv, *6* – Veduka, 7 – Maardu, *8* – Tõhela, *9* – Tamula I, *10* – Iru, *11* – Sope, *12* – Ardu, *13* – Tika, *14* – Kunila, *15* – Riigiküla XIV, *16* – Asva, *17* – Ridala, *18* – Kõpu I, *19* – Võhma I, *20* – Valma, *21* – Hino, *22* – Mustjärv, *23* – Ala-Pika, *24* – Loona. Symbols: *1* – Stone Age or Bronze Age settlement site, *2* – Stone Age burial site, *3* – bog or lake.

1 pav. Vietos, paminėtos tekste: *1* – Riigiküla I, *2* – Kunda Arusoo, *3* – Velise, *4* – Kõivasoo, *5* – Mustjärv, *6* – Veduka, *7* – Maardu, *8* – Tõhela, 9 – Tamula I, *10* – Iru, *11* – Sope, *12* – Ardu, *13* – Tika, *14* – Kunila, *15* – Riigiküla XIV, *16* – Asva, 17 – Ridala, *18* – Kõpu I, *19* – Võhma I, *20* – Valma, *21* – Hino, *22* – Mustjärv, *23* – Ala-Pika, *24* – Loona. Sutartiniai ženklai: *1* – akmens ar bronzos amžiaus gyvenvietė, *2* – akmens amžiaus laidojimo paminklas, *3* – pelkė arba ežeras.

It was probably during seal-hunting trips that the distant western Estonian islands were discovered, and there is reason to believe that permanent habitation already developed on Saaremaa Island (Fig. 3) during the Late Mesolithic (Kriiska, 2002b). The islands of Hiiumaa and Ruhnu, then only a few square kilometers in size, where traces of Mesolithic settlement have also been found, were suitable only for temporary hunting camps. At that time inhabitation of the coast and islands took place on a very large area around the Baltic Sea, and many Finnish islands like Kemiö (Asplund, 1997, p. 218), Åland (Nuñez & Gustavsson, 1995, p. 233) and Vantaa Kilteri and Jönsas (Purhonen & Ruonavaara, 1994, p. 91) were at least seasonally colonized. Around this time, the coastal settlement of Denmark developed (Andersen, 1993, p. 66–67) and considerably expanded settlement on the coast of southern Sweden (Larsson, 1997, p. 14).

In the Late Mesolithic, the size of the territory occupied by individual communities decreased in Estonia and neighboring countries. One of the reasons for this change was probably the increase in the population. More globally, on the Fennoscandian level, the decrease in the size of the territories in use could be related to the slower formation of new mainland territories (that was previously caused by the retreat of glaciers and rapid compensatory land upheaval), which, while correlated with the growth of population and new natural conditions formed during the Atlantic period, led to changes in the settlement pattern (Halinen, 1999, p. 38). Diminished opportunities to make a living with seasonal migrations on vast communal territories inevitably caused the need to intensify foraging and make it more complex. The latter in turn increased the role of central habitat in the settlement model, and it is likely that during the Late Mesolithic, year-round villages began to arise in many places. The intensification of human impact at this time is evident also in the pollen diagrams of Estonian bog and lake sediments (Veski, 1998, Fig. 32, 93; Poska, 2001). Ruderal areas, larger than before, as well as more sparse woodlands and felled areas generated by the gathering of firewood and timber – developed in the surroundings of year-round villages.

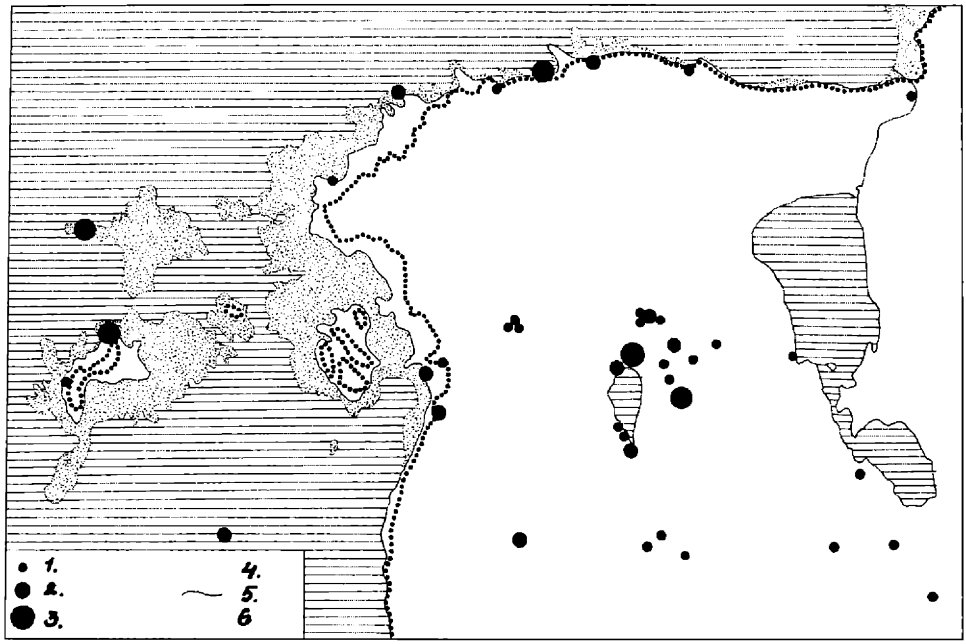

Fig. 2. Mesolithic settlement sites. Symbols: *1* – 1 site, *2* – 2–5 sites, *3* – more than 6 sites, *4* – maximum shore-line of Ancylus Lake, *5* – maximum shore-line of the Litorina Sea, *6* – present shore-line (the spots cover the area inundated by the Litorina Sea).

2 pav. Mezolito gyvenvietės. Sutartiniai ženklai: *1* – 1 paminklas, *2* – 2–5 paminklai, *3* – daugiau kaip 6 paminklai, *4* – maksimali Ancyliaus ežero kranto linija, *5* – maksimali Litorinos jūros kranto linija, *6* – dabartinė kranto linija (taškeliais padengtas plotas, kurį buvo užliejusi Litorinos jūra).

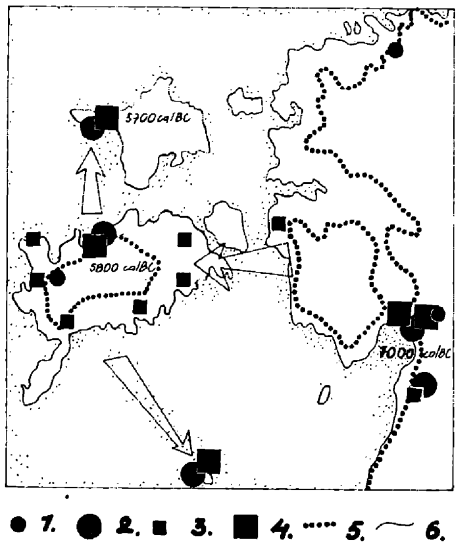

Fig. 3. The Stone Age settlement sites and the settlement pattern of the western Estonian islands and mainland. Symbols: *1* – one Mesolithic site, *2* – two or more Mesolithic sites, *3* – one Neolithic site, *4* – two or more Neolithic sites, *5* – the maximum shoreline of the Litorina Sea transgression, *6* – present shoreline.

3 pav. Akmens amžiaus gyvenvietės ir Vakarų Estijos salų bei žemyno gyvenvietės modelis (pavyzdys). Sutartiniai ženklai: *1* – vienas mezolito paminklas, *2* – du ar daugiau mezolito paminklų, *3* – vienas neolito paminklas, *4* – du ar daugiau neolito paminklų, *5* – maksimali kranto linija Litorinos jūros transgresijos metu, *6* – dabartinė kranto linija.

The Late Mesolithic is a time of innovation throughout the Northern Europe. In many places changes in settlement and economy took place, as well as demographic processes that probably affected the entire society. Such development of more sedentary habitation is noticeable in many parts of Europe. This may also explain the appearance of large (and in some cases long-term) burial sites – for example Oleni Ostrov in Karelia, Zvejnieki in Latvia, Skateholm in Sweden – in Eastern and Northern Europe. The same phenomenon is also observed as the reason for the development of the rock art in the Vingen fjord in western Norway (Lødøen, 2002, p. 198).

During the Neolithic the institution of the Stone Age village reached the peak of their development. At that time settlement sites covered huge areas, had thick cultural layers rich in finds, and their osteological material indicates the best hunting-catching times for various animals and fish. To these characteristics one could probably also add houses with stronger structure, including large[3] dwellings with sunken floors (Kriiska, 2002a). The Stone Age villages in the forest zone were probably never too crowded, and most likely the number of inhabitants there remained below 50 (estimated average 20). Apparently it was the existence of long-term year-round villages and the system of established communal territories that made the spread of agriculture possible.

THE RISE OF AGRICULTURE

Although the overall appearance of the settlement did not change, several very important processes took place in the Middle Neolithic. The Typical Combed Ware Culture developed in the Baltic Sea region at about 4000 cal BC. In addition to Estonia, the culture spread in Finland as far as Rovaniemi (Carpelan, 2002, kartta D) and partly even reached northern Sweden in the north (Halén, 1992), also encompassing the majority of Karelia in the north-east (Vitenkova, 1996), St. Petersburg and Novgorod region in the east (Timofeejev, 1993, p. 26–30) and Latvian territory in the south (Loze, 1984). In Lithuania individual artifacts characteristic of Combed Ware Cultures[4] (Rimantienė, 1996, p. 152–153) and a few fragments of pottery have also been found (Girininkas, 2000a, p. 103), but the latter are still exceptions in the context of another material culture (the Narva Culture), the exceptions that one can see almost everywhere in the contact areas.

This was a time when very broad contacts were reflected in the material culture. While the raw material and some of the readymade items had already moved hundreds of kilometers during the earlier period, even as far as 750 km[5] within the territory of the Kunda Culture in the Early Mesolithic, although in the case of the Combed Ware Cultures the distances had more than doubled. Flint from Central Russia, slate from the Onega region and amber from the Eastern Baltic spread throughout the entire territory occupied by the culture. From Lillberget, a Typical Combed Ware Culture settlement site in Northern Sweden, investigators have found flint originating from an area 650–1600 km away in Central Russia, reddish-green jasper originating from the Ural region (around 2100 km away) and in an extreme case, from somewhere in Northern Russia, and copper, the chemical structure of which also shows Uralic origin (Halén, 1996, p. 288–291). A sledge runner and two spoons of arolla pine found in Finland also offer evidence of Uralic origin (Edgren, 1984, p. 57). In addition to Lillberget, copper from a specific context of the Combed Ware Culture has also been obtained in Finland, the settlement site of Rääkkylä Vihi I[6] (Pesonen, 1998, p. 26).

[3] Only two clear dwelling depressions from the Stone Age have been found in Estonia to date. Both were found at the Riigiküla I settlement site and are connected to the Late Combed Ware Culture. On the basis of the sunken floors, the dwellings occupied an area of 50–60 sq. m (Gurina, 1967, p. 22–23; Kriiska, 2002a, p. 137).

[4] On the described area, two main stages are distinguished on the basis of the pottery found: from 4200/4000 BC the Typical Combed Ware and from 3700/3600 BC the Late Combed Ware Culture period. In my opinion the question does not concern only the change of the ornamentation style but it is somewhat evident also in the other artefacts, and I have come to treat them as two separate archaeological cultures. In the case of the Late Combed Ware Culture in Estonia, I have distinguished two chronological subgroups (Kriiska, 1995, p. 92–94), whereas in Finland four subgroups are distinguished (Uskela, Pyheensilta, Kierikki and Pöljä – Carpelan, 1999, p. 259–260).

[5] On the basis of the settlement finds made at Finnish sites Lahti Ristola and Kuurmanpohja Saarenoja 2, one can consider the Early Mesolithic area of distribution of the high quality flint of Cretaceous system occurring in northern Belarus and southern Lithuania to be roughly this size (to some extent I have treated the spread of this flint in Kriiska, 2001b, p. 24–25).

[6] There are more copper finds from Finland that belong to the Neolithic, but for various reasons it is impossible to date these with greater precision (summary presentation Pesonen, 1998, p. 27).

Table 1. The pollen of cereals dating from before the Corded Ware Culture, in Estonian bog and lake sediments

No	Location	Area	Plant	Date (cal BC)	Reference
1	Kunda Arusoo Bog	Northeast Estonia	*Cerealia*	4300	Poska, 1994
2	Velise Bog	Western Estonia	*Avena**	4000	Veski, 1998
3	Kõivasoo Bog	Hiiumaa Island	*Hordeum* *Avena*	3900 3200	Königsson *et al.*, 1998
4	Mustjärv Bog	Western Estonia	*Avena* *Triticum*	3800 3500	Veski, 1998
5	Vedruka Bog	Saaremaa Island	*Avena*	3700	Poska & Saarse, 2001
6	Maardu Lake	Northern Estonia	*Triticum*	3500	Veski, 1998
7	Tõhela Lake	Southeast Estonia	*Cerealia*	3500	Veski, 1998

* The pollen of other big *Cerealia* can be identified as *Avena* (Ph.D. Siim Veski personal comment 13.02.2002).

The Typical Combed Ware Culture that seems uniform as a material heritage still demonstrates distinctive local features. Just as the author believes that there is no reason to think that this culture belonged to one ethnos, there is also no reason to assume uniformity in the socio-economic communities and religion. The territory of Estonia differs from other regions in that agriculture was known here even at the beginning of the Typical Combed Ware Culture.

Until the mid 1990s the Typical Combed Ware Culture was considered to have been a purely foraging culture. It is true that the possibility of farming during this period has not been ruled out either (for example Jaanits, 1992, p. 46). However, probably to the surprise of many archaeologists, during the past decade the pollen of crops have been found in layers of bogs and in lake sediments, the dating of which correlates with the Middle Neolithic (Veski, 1998; Poska *et al.*, 1999; Poska, 2001).

The pollen of cereals from that period has been collected from a total of seven places in Estonia (Table 1; Fig. 4), and wheat, barley and oats are represented. The latter may have been a weed in barley fields at this time, and not an independent cereal. The existence of many find locations seems to rule out randomness and the possibility that pollen might have been blown onto Estonian territory from somewhere else. The fact that the people of Combed Ware Cultures deforested fields could indirectly be supported by the decrease in tree pollen and the increase in the proportion of herbaceous plants evident in bog and lake sediments (Veski, 1998; Poska, 2001).

It remains unclear how important a role farming played in the economy. During this early period agriculture, next to hunting and fishing, probably remained an exceptional activity that did not cause changes in settlement strategy and material culture. The relatively stable development of combed ware cultures that did not include any great and abrupt changes allows one to assume that the local people learned to use the cereals.

It is remarkable that all of the evidence of early agriculture comes from the coast of mainland Estonia and the islands, which may indirectly point to oversea contacts. The seal-hunting trips and high seas fishing indicated in the archaeological and palaeo-zoological material leave no doubt that the coastal inhabitants of the Stone Age period undertook long fishing and hunting trips. On those distant journeys they probably met people from other regions. Established contacts may have developed into long-term communication, trading or, via marriages, even into family relations. As regards the development of farming in neighboring countries, the crops and basics of agricultural activity may have been obtained either from the northern part of Central Europe or southern Scandinavia. Southern influences cannot be ruled out, as a few signs of Middle Neolithic farming have also been identified in eastern Latvia and southern Lithuania (Vasks *et al.*, 1999, p. 296; Poska, 2001, Fig. 5, Tab. 4). One should also consider the possibility that the differentiation of the coastal areas on the basis of the pollen of crops from the rest of Estonia does not offer a realistic picture of the past, but reveals the shortcomings of research in inland areas[7].

At present no bones of livestock specifically dating back to the Middle Neolithic have been found on Esto-

[7] Preliminary results of the bog sediments of eastern Estonia do indicate that *Cerealia* pollen predating the Corded Ware Culture can also be found in that area (PhD Annelii Poska, pers.comm. 13.02.2003).

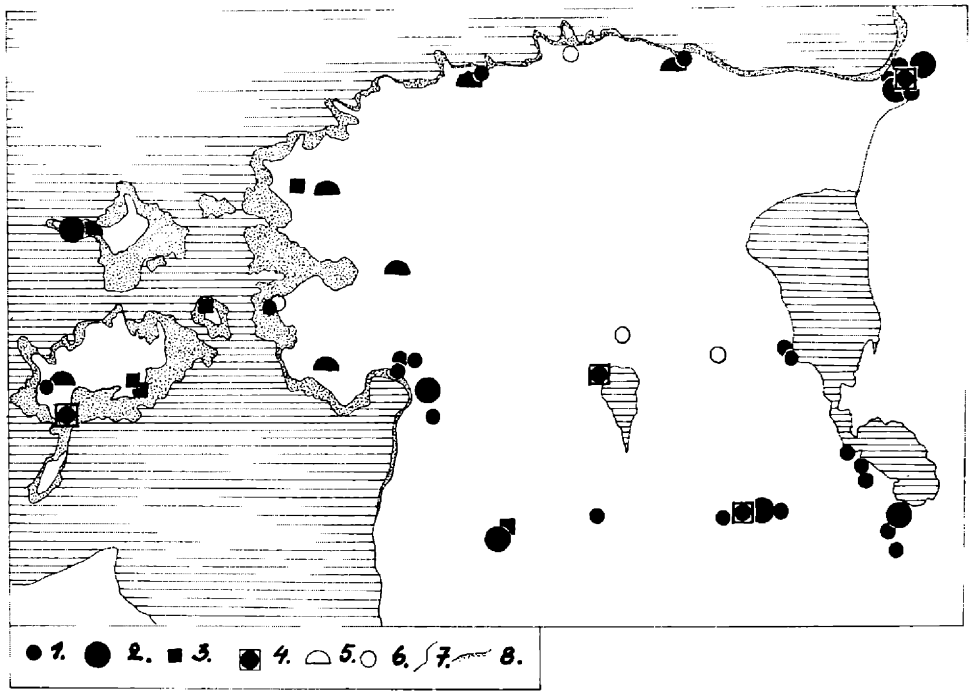

Fig. 4. Typical and Late Combed Ware Culture sites, and places with Middle Neolithic *Cerealia* pollen. Symbols: *1* – 1 settlement site, *2* – 2-5 settlement sites, *3* – burial site, *4* – settlement site and burial site, *5* – a bog or a lake where *Cerealia* pollen from the Middle Neolithic has been collected, *6* – pottery find, *7* – present sea border, *8* – the area inundated by the Litorina Sea in the Middle Neolithic.

4 pav. Tipinės ir vėlyvosios šukinės keramikos kultūros paminklai bei viduriniojo neolito Cerealia *žiedadulkių radimvietės.* Sutartiniai ženklai: *1* – paminklas, *2* – 2–5 paminklai, *3* – laidojimo paminklas, *4* – gyvenvietė ir laidojimo paminklas, *5* – pelkė ar ežeras, kur buvo surinktos *Cerealia* žiedadulkės iš viduriniojo neolito, *6* – keramikos radiniai, *7* – dabartinė jūros riba, *8* – plotas, kurį viduriniajame neolite buvo apsėmusi Litorinos jūra.

nian territory. Considering the fact that Estonian osteological material from the Stone Age has been almost entirely analyzed (more thorough summaries by Paaver, 1965 and Lõugas, 1997), this picture may also be objective, although at the same time the Typical Combed Ware Culture on the coast and the island has clearly been insufficiently investigated.

THE LATE NEOLITHIC BREAKTHROUGH

In the Late Neolithic the Corded Ware or Battle Axe Cultures arose across vast areas of Northern, Central and Eastern Europe. These cultures, which share common features (more than 20 in total), are distinguishable from the Volga River in Russia to the Rhein in Germany, and from Scandinavia to Switzerland, the Czech Republic and the middle reaches of the Dniepr in the Ukraine (see for example Carpelan, 1999, p. 261, fig. 4; Kruk & Milisauskas, 1999, p. 334). Due to the shortage of radiocarbon dates the beginning of the Corded Ware Culture in Estonia has not yet been precisely determined, but based on the dates in neighboring countries this may have taken place at approximately 3000 years cal BC.

There is already plenty of evidence of an agricultural economy, including pastoralism, during the period of the Corded Ware Culture in Estonia. The bones of domestic animals – sheep, goats, pig and cattle, and artifacts made from those animals, have been found at burial sites (Table 2). It is possible that the few bones of domestic animals, mostly pigs, collected from the upper part of the cultural

Table 2. The bones of animals and fish definitely connected to the settlement stage of the Corded Ware Culture

Site	Area	Goat or sheep (*Capra/Ovis*)	Domestic pig (*Sus domesticus*)	Cattle (*Bos taurus*)	Pig (*Sus sp.*)	Pike (*Esox lucius*)	Perch (*Perca fluviatilis*)	Carp (*Cyprinidae*)	Birds (*Aves*)	Publication
Sope burial site	Northeast Estonia	+		+	+					Jaanits, 1952
Ardu burial site	Northern Estonia	+								Indreko, 1938
Tika burial site	Saaremaa Island	+								Jaanits, 1952
Kunila burial site	Central Estonia		+							Jaanits, 1952
Riigiküla XIV settlement site	Northeast Estonia				+	+	+	+	+	Kriiska, 2000

layer of the Tamula I settlement site in southeast Estonia[8] are also related to the Corded Ware Culture (Paaver, 1965, p. 440; Jaanits, 1992, p. 48). A Corded Ware shard with burnt barley seed on its surface was obtained from Iru settlement site near Tallinn in northern Estonia (Jaanits, 1992, p. 49).

In several Estonian bogs and lakes there has been found pollen of crops that indicates the cultivation of barley and wheat (Veski, 1998; Poska *et al.*, 1999; Poska, 2001)[9]. While earlier signs of agriculture are found mainly on the coast, the pollen of cereals from the Corded Ware Culture period has also been found in eastern Estonia (Pirrus & Rõuk, 1988) and pollen from the Early Bronze Age in southeastern Estonia (Laul & Kihno, 1999b, p. 11). The pollen diagrams include oats, but as indicated before, this may have been a weed in the barley fields. The first rye pollen from the bog of Maardu in northern Estonia also dates to about 2000 years cal BC (Ph.D. Siim Veski, pers. comm. 13.02.2002), at which time it was probably a weed of other cereals. The constant representation of cereal pollen in the diagrams offers evidence of intensive farming in the Late Neolithic. The increase in the share of herbaceous plants, especially photophilous and typical meadow species, is clearly evident. The amount of particles of tree charcoal is also greater; this may be connected with the fires caused by human activity – the use of fire to clear forest and brushwood for fields and pastures. The natural banks of rivers, lakes, and seashore – periodically flooded pastures and coastal pastures – were used for grazing cattle, but seminatural communities – forest pastures similar to wooded meadows – also developed.

Unlike the field-systems of the Late Bronze Age and later times (for example Lang, 1994; Lang, 2000, p. 221–249; Kriiska, 1998a), the field patches of the Stone Age, from which stones were not gathered, have not left any visible marks on the ground. It is likely that slash-and-burn agriculture was practiced, and the soil was loosened manually without using a plough.

We know very little about cattle breeding during this period. According to the classification of animal bones gathered from Late Neolithic and Early Bronze Age dwelling sites in Latvia and Lithuania (Ostrauskas, 1998,

[8] At the Tamula I settlement site, which existed mostly in the Late Neolithic, and where the find material includes late combed pottery as well as corded pottery, the bones of 21 domestic pigs, 1 cattle and 2 goats or sheep have been found. The find context of the bones cannot be interpreted definitively, and since the traces of later habitation have also been obtained from the same place, they cannot be linked to the stage of the Corded Ware Culture with full certainty.

[9] Unlike Southern Scandinavia, where rich material has already been collected (burnt grains, the imprints of grains on pottery and pollen), indicating that barley was dominant during the Corded Ware Culture (Andersen, 1993, p. 88; Ahlfont *et al.*, 1995, p. 194), the Estonian material is not yet sufficiently representative to make such decisions.

p. 271), one could assume that foraging may have formed an even more prominent part of food supplies. But the importance of pastoralism must have proceeded at an increasing pace, since by the time of the Late Bronze Age (1100–500 cal BC) the meat of cattle and goats/sheep made up a considerable part of food consumption on Estonian territory (63.7% among the animal bones of Asva fortified settlement and 78.1% among the mammal bones of Ridala fortified settlement; the basis of the calculations: Paaver, 1965 appendix II; Lõugas, 1994, p. 74)[10]. During the Late Neolithic and the Early Bronze Age, domestic animals were probably kept through the winter in open paddocks – enclosed pastures. For the winter, however, extra fodder was apparently needed. During the early phase of pastoralism, made. It is very difficult to date the beginning of haymaking with any great precision, but cutting tools suitable for this work were only introduced in the Pre-Roman Iron Age (500 cal BC–50 cal AD) (Laul & Tõnisson, 1991, p. 76). In historic times, twigs from aspen, birch, rowan, ash and other trees have been used as animal fodder (Kukk & Kull, 1997, p. 34–35). Dried sheaves helped animals to survive even winters with abundant snowfall. Pastures and fields were initially situated in the vicinity of dwellings, but one should not rule out the exploitation of islets close to the coast for agricultural purposes.

Several artifacts and a few animal bones obtained from the dwelling sites indicate that the people went on hunting and fishing trips. The charred bones of birds and fish

[10] In Brikuļi fortified settlement in Latvia, for example, the bones of domestic animals make up 75% of all mammal bones (Vasks *et al.*, 1999, p. 300).

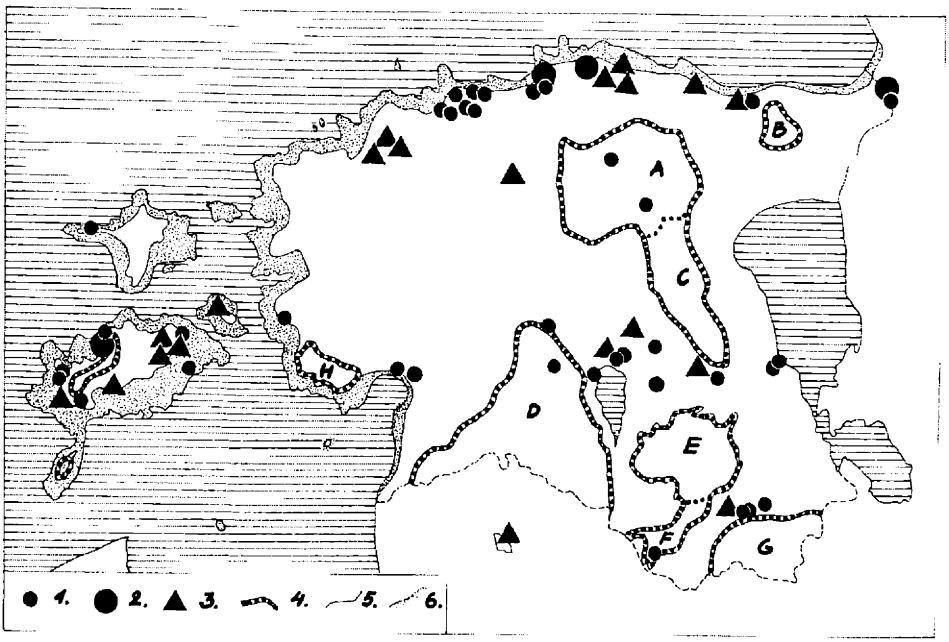

Fig. 5. Corded Ware Culture sites. Symbols: *1* – 1 settlement site or find location with pottery, *2* – 2 - 4 settlement sites or finds locations with pottery, *3* – cemetery, *4* – Height (A – Pandivere, B – Jõhvi, C – Vooremaa, D – Sakala, E – Otepää, F – Karula, G – Haanja, H – Tõstamaa), *5* – present sea border, *6* – the area inundated by the Litorina Sea in the Late Neolithic.

5 pav. Virvelinės keramikos kultūros paminklai. Sutartiniai ženklai: *1* – gyvenvietė ar keramikos radimvietė, *2* – 2–4 gyvenvietės ar keramikos radimvietės, *3* – kapinynas (*cemetery*), *4* – A – Pandivere, B – Jõhvi, C – Vooremaa, D – Sakala, E – Otepää, F – Karula, G – Haanja, H – Tõstamaa, *5* – dabartinė jūros riba, *6* – plotas, kurį vėlyvajame neolite buvo apsėmusi Litorinos jūra.

have been found at the Riigiküla XIV settlement site (Kriiska, 2000, p. 74), and spearheads made of bone appear among the goods in a few graves (Jaanits, 1985, p. 26, fig. 5). Agriculture, however, was so important that it changed the entire settlement pattern.

In Estonia, more than 50 Corded Ware Culture sites are known (Fig. 5). These are unfortunately found by chance in the course of excavating other sites (Kriiska, 2000, p. 70). Only in a few places have the traces of settlement left by the culture not become mixed with finds from other periods or destroyed during later farming. Usually the cultural layer of the Corded Ware Culture sites is rather weak, as a result of which few finds are collected during excavations – from a handful to a couple of thousand pottery sherds, some stone tools and debris from processing flint and quartz.

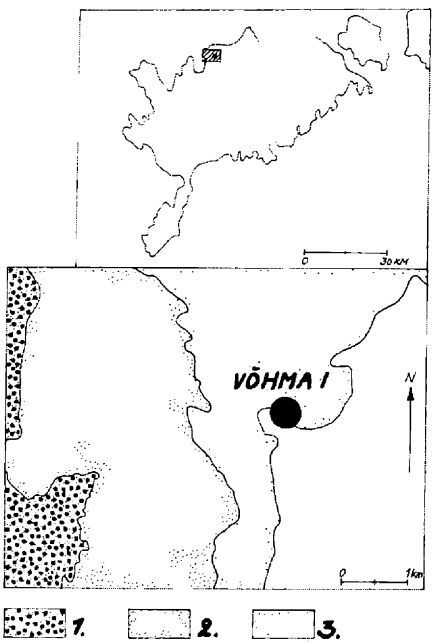

Fig. 6. Võhma I Late Mesolithic and Late Neolithic (the Corded Ware Culture) settlement site. Symbols: *1* – present sea, *2* – sea in the Late Neolithic, *3* – sea in the Late Mesolithic.
6 pav. Võhma I vėlyvojo mezolito ir vėlyvojo neolito (virvelinės keramikos kultūra) gyvenvietė. Sutartiniai ženklai: *1* – dabartinė jūra, *2* – jūra vėlyvajame neolite, *3* – jūra vėlyvajame mezolite.

The Corded Ware Culture people based their choice of settlement location on entirely different principles than used in previous times. Living in the close vicinity of large bodies of water was no longer important. Several coastal and island areas known from earlier times but by then already far from the seashore were now re-inhabited (see for example Kriiska, 1998b, p. 18; Kriiska, 2000, p. 72). In Kõpu (site I) on the island of Hiiumaa, the settlement site of the Corded Ware Culture period was located about 1 km, in Võhma (site I), northwest Saaremaa, about 1.5 km (Fig. 6) and the XIV site in Riigiküla, in northeast Estonia, on the lower reaches of the Narva River, was situated about 1.5 km from the seashore. A similar change seems to have taken place on the banks of Lake Võrtsjärv in central Estonia.

It is obvious that the resources used are directly connected to the natural habitat of the Stone Age people. Thus one can assume that the choice of settlement location reflects their economic strategy, and the type of ancient landscape helps to determine the nutritional base. This position of dwelling sites was probably conditioned by the needs of agricultural activity, since the places included both good natural pastures for breeding cattle and suitable soil for farming. In northern Estonia people preferred to live on the lowlands near the Glint (Lang, 1996, fig. 101, 120; Lang & Konsa, 1998; Lang, 2000, p. 77, 79), where they found easily cultivated alvar soils rich in humus. In southwest and eastern Estonia the settlement of the Corded Ware Culture seems to have remained connected to the banks of rivers (Kriiska, 2000; Kriiska & Saluäär, 2000), but these places are also the best farming areas of otherwise boggy land. At a time when almost all of Estonian territory was covered with forests and bogs, the floodplain meadows were the only open areas with rich flora, and the periodically flooded parcels of land were also suitable for farming (Järvekülg, 2000, p. 56). For example, due to the boggy and moist soil the agricultural lands in southwest Estonia were even during historic time situated as narrow strips on the banks of the Pärnu River where the runoff was better (Must, 1977, p. 668).

An analogous shift in the settlement pattern in connection with the development of agriculture can be observed in many parts of Europe, but also in the Corded Ware Culture in Finland (for example Pohjakallio, 1994, p. 65), although such ancient remains of farming activity have not been found there.

The small settlements and burial sites of the Corded Ware Culture, where usually one or two, and less fre-

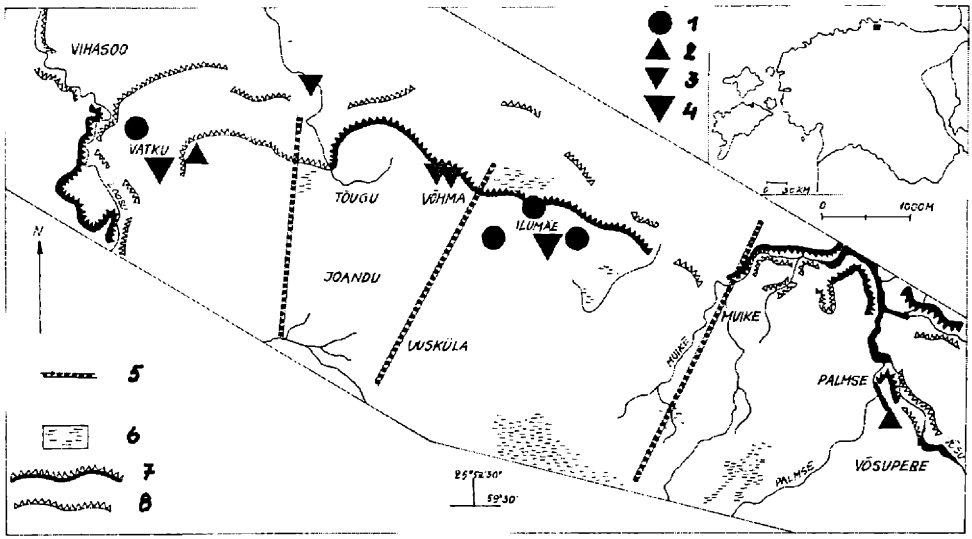

Fig. 7. Vihasoo-Palmse area in the Late Neolithic and Early Bronze Age and areas supposedly used, on the basis of Thiessen Polygons (for the basis, see Lang 2000, Fig. 7). Symbols: *1* – settlement site, *2* – boat axe, *3* – late stone axe, *4* – several stone artifacts, *5* – the border of the supposedly used territory, on the basis of Thiessen Polygons, *6* – wet area, *7* – high glint, *8* – low glint.

7 pav. Vihasoo-Palmse regionas vėlyvajame neolite ir ankstyvajame bronzos amžiuje ir plotai, kurie, kaip spėjama, buvo naudoti (žr. Lang, 2000, 7 pav.). Sutartiniai ženklai: *1* – gyvenvietė, *2* – laivinis kirvis, *3* – vėlyvasis akmeninis kirvis, *4* – keletas akmens dirbinių, *5* – menamai naudotų plotų riba, *6* – drėgna sritis (plotas), *7* – aukštuma, *8* – žemuma.

quently as many as ten people were buried, have previously been considered an indication of the frequent change of dwelling place (Jaanits, 1966, p. 65). Considering the possibilities of moving around in the forest zone with an established settlement pattern and the fact that agriculture seems in the past to have been and still is among today's primitive cultures related to the use of very clearly defined territories, one can observe this manifestation as a sign of single family households (Lang, 1996, p. 444; Kriiska, 2000, p. 74). The fact that people did not live in villages but in single farms is supported by research done in the Vihasoo-Palmse region in northern Estonia, where the spread of sites and stray finds indicates that the settlement units of the Corded Ware Culture were very small. The area of the units remained under 10 square kilometers (Lang, 2000, p. 80; Fig. 7), which is as much as 10–20 times less than in the supposed communal territories – the economic hinterlands of settlement units – during the time of the Combed Ware Culture (Kriiska, 2001a, p. 9; Fig. 8).

One may suppose that the groups of farmsteads were in a way socially connected and performed some joint activities, for example seasonal fishing, seal hunting etc. It is possible that we deal with exactly the same kind of remains of common fishing camp of several farms in Valma, situated in central Estonia on the shore of Lake Võrtsjärv, where on the basis of fireplaces three dwellings are assumed to have been situated (Jaanits *et al.*, 1982, p. 67–68).

The spread of stone axes from the end of the Stone Age and the Bronze Age (1800–500 cal BC) indicates that it was during this time that a considerable intensification of settlement took place on the territory of Estonia. The signs of agriculture at this time are revealed in the sediments of many bogs and lakes (Veski, 1998; Poska, 2001). While the settlement of the Corded Ware Culture has to a certain degree already covered areas on the margins of the heights, finds from the Bronze Age – mostly so-called late stone axes with a shaft-hole – from several places in the Vooremaa, Sakala, Pandivere, Karula,

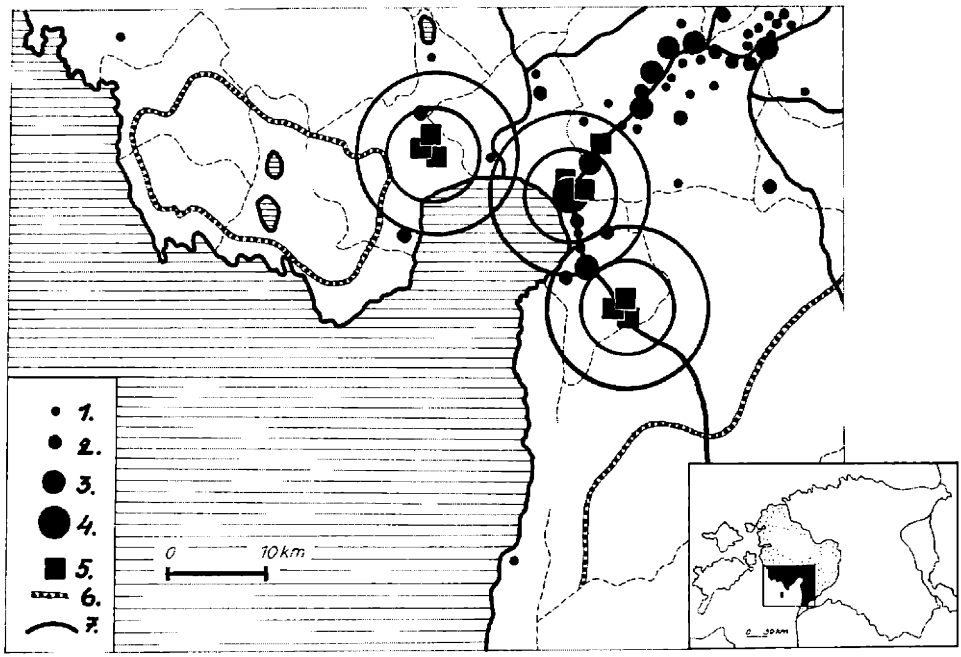

Fig. 8. The Stone Age sites in southwestern Estonia and the territories presumably used by the communities. Symbols: *1* – 1 stone artifact (stray find), *2* – 2-5 stone artifacts (stray finds), *3* – 6-10 stone artifacts (stray finds), *4* – Mesolithic settlement site, *5* – Neolithic settlement site, *6* – Height, *7* – the supposed used area of the communities (smaller circle 10 km in diameter, larger circle 15 km in diameter).

8 pav. Akmens amžiaus paminklai šiaurės vakarų Estijoje ir teritorijos, kuriomis, matyt, naudojosi bendruomenės. Sutartiniai ženklai: *1* – 1 akmens dirbinys (atsitiktinis radinys), *2* – 2–5 akmens dirbiniai (atsitiktiniai radiniai), *3* – 6-10 akmens dirbinių (atsitiktiniai radiniai), *4* – mezolito gyvenvietė, *5* – neolito gyvenvietė, *6* – aukštuma, *7* – menamas plotas, kuriuo naudojosi bendruomenės (mažesniojo apskritimo skersmuo 10 km, didesniojo – 15 km).

Haanja and Otepää Heights indicate that in these areas the agricultural economy was also developing, and tougher soils were cultivated (Fig. 9). The pollen of barley and oats, dated to about 1700 years cal BC has remained in the sediments of Hino Lake on the southeastern slope of Haanja Heights (Laul & Kihno, 1999a, p. 246). The amount of pollen of typical meadow plants becomes constant in the diagrams since the Early Bronze Age. The increase in human impact, which actually already begins from the end of the Stone Age, is evident also in the sediments of Lake Mustjärv, the small lake adjacent to Hino Lake, although the crops appear in the Late Bronze Age layer (Laul & Kihno, 1999b, p. 9). From the end of the Early Bronze Age pollen from crops has also been obtained from Lake Ala-Pika in Otepää Heights (Kihno & Valk, 1999, p. 233–234). Slash-and-burn agriculture probably continued, whereas considering the oldest plough finds in the northern part of Europe[11] (Behre, 2000, p. 135) and the marks of crosswise plowing found under the cultural layer of the fortified settlement of the Late Bronze Age in Dievukalns in Latvia (Zariņa, 1982), one cannot rule out the use of ploughs, at least in Coastal Estonia, during the Early Bronze Age. The oldest plough marks found in Estonia are, however, dated only to the Roman Iron Age (50–450 AD) (Lang, 2000, p. 178–179).

[11] In South Scandinavia ploughing is also depicted in Bronze Age rock art (Malmer, 1981, p. 47–48), but it is impossible to determine whether and to what extent they belong to the earlier half of the period.

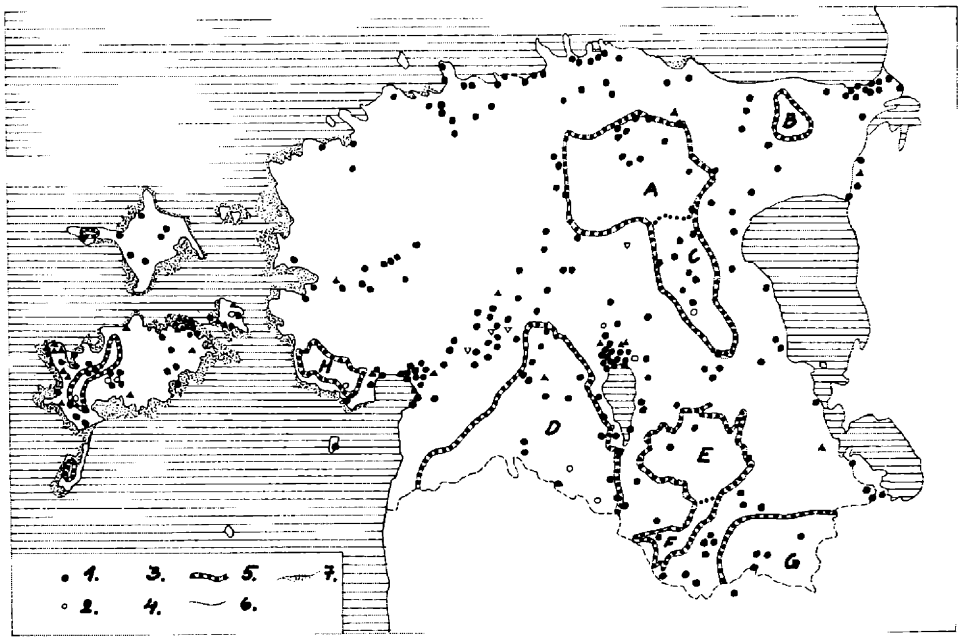

Fig. 9. Stray finds from the end of the Stone Age and the beginning of the Bronze Age on Estonian territory (map compiled by Arvis Kiristaja). Symbols: *1* – stone axe with shaft-hole, *2* – bronze artifact from the Early Bronze Age, *3* – stone wedge, *4* – stone hoe, *5* – Height (A – Pandivere, B – Jõhvi, C – Vooremaa, D – Sakala, E – Otepää, F – Karula, G – Haanja, H – Tõstamaa), *6* – present sea border, *7* – the area inundated by the Limnea Sea in the Late Neolithic.

9 pav. Atsitiktiniai radiniai Estijos teritorijoje, datuojami akmens amžiaus pabaiga ir bronzos amžiaus pradžia (žemėlapį sudarė Arvis Kiristaja). Sutartiniai ženklai: *1* – akmeninis kirvis su skyle kotui, *2* – bronzos dirbinys, datuojamas ankstyvuoju bronzos amžiumi, *3* – akmeninis pleištas, *4* – akmeninis kaplys, *5* – A – Pandivere, B – Jõhvi, C – Vooremaa, D – Sakala, E – Otepää, F – Karula, G – Haanja, H – Tõstamaa), *6* – dabartinė jūros riba, *7* – plotas, kurį vėlyvajame neolite buvo užliejusi Limnėjos jūra.

SUMMARY

On Estonian territory as well as in many other parts of northern Europe, the transition to the agricultural economy was a long-term process involving several stages[12]. The pollen diagrams obtained from sediments on the Estonian coast and islands indicate that cereals (barley, wheat, oats) already spread here in the Middle Neolithic. Crops and probably the skills required to grow them were adopted by the strong communities that supported themselves with versatile foraging (hunting of land and sea mammals, fishing on the high seas and inland bodies of water). We are hardly dealing with the alleviation of food shortage through a new product. We should instead look elsewhere for the reasons for the rise of farming, and the security gained by sedentary broad-based foraging as a specific basis and "guarantee" that made the beginning of cultivation possible.

The initially marginal "side interest" of the foraging communities of the Typical Combed Ware Culture (living on the coast and islands?) developed into an important means of livelihood in the Corded Ware Culture during the Late Neolithic. From this period there is already abundant direct as well as indirect proof of farming and also the bones of cattle. The role of agriculture must have been so strong that it brought about the transition to a

[12] Many researchers have presented the transition to farming in the eastern Baltic region as a slow process: in recent years, for example Lang, 1999a; 1999b; Girininkas, 2000b; Antanaitis *et al.*, 2000.

different settlement strategy and the splitting of the Stone Age village into smaller settlement units – farmsteads. The latter is typical to most of Estonian territory practically throughout the first half of the Iron Age (Lang, 2002, p. 13). If and to what extent it was caused or at least supported by migration – new people who acquired farming skills somewhere else moving to Estonian territory – is not explicitly clear. Previously rather generally emphasized "mass" migration (for example Moora, 1956, p. 55; Jaanits *et al.*, 1982, p. 102) has been justifiably called into question (in Estonia for example Lang, 1998), and at the same time there is no reason to rule out the addition of smaller groups of people, for instance a few families.

Unlike in the past, the people of the Corded Ware Culture on the coast established their dwelling sites far from the immediate shoreline, and in the inland different places were inhabited, although the disappearance of water-related settlement is evident there also. Analogous to the Scandinavian Pit Ware Culture (for example Burenhult, 1999, p. 317–348) another – the Late Combed Ware Culture – persisted alongside the Corded Ware Culture on Estonian territory. The members of the former lived on the banks of bodies of water and collected their main food supplies from foraging. On the basis of this close Scandinavian parallel (Ahlfont *et al.*, 1995, p. 64, 66), it is also possible that in addition to hunting and fishing, pigs were grown on the Estonian islands[13]. This dual cultural and economic picture can be observed until the end of the Stone Age. The youngest dates of the Late Combed Ware Culture belong to the period 2000–1900 ca BC (Lang & Kriiska, 2001, p. 92, Fig. 1).

At the end of the Stone Age and the beginning of the Bronze Age, stray finds and pollen diagrams indicate the expansion of agricultural settlement, also comprising the areas of the heights that in previous investigations were considered to be inhabited only around the middle of the I millennium AD (Moora, 1966, p. 129–138), leaving untouched only the highest central areas. Based on the existing material, it is impossible to say whether and to what extent the Combed Ware Culture and "almost pure" foraging continued, but by the next period, i. e. the Late Bronze Age, for which the data is sufficiently representative, cultural as well as economic differences had disappeared.

[13] In the osteological material of the Loona Late Combed Ware Culture settlement site in Saaremaa (radiocarbon dates on average between 2850 and 2650 BC – preliminary data Lõugas *et al.*, 1996, p. 405), the bones of 30 pigs have been separated, and these have been interpreted as belonging to young individuals in the process of being domesticated (Paaver, 1965, p. 440; Jaanits, 1992, p. 50).

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NUO MEDŽIOTOJO-ŽVEJO-RINKĖJO IKI ŽEMDIRBIO: NEOLITO ŪKIO IR GYVENVIEČIŲ ESTIJOS TERITORIJOJE POKYČIAI

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Santrauka

Estijos teritorijoje, kaip ir kitose šiaurės Europos dalyse, perėjimas prie žemės ūkio ekonomikos buvo ilgas procesas, apimantis keletą etapų[1]. Žiedadulkių diagramos, išskirtos iš nuosėdų Estijos pajūryje ir salose, rodo, kad javai (miežiai, kviečiai, avižos) čia augo viduriniajame neolite. Tvirtos bendruomenės, kurios vertėsi įvairiopu maisto ieškojimu (sausumos ir jūros žinduolių medžioklė, žvejyba atviroje jūroje ir vidaus vandenyse), perėmė javus ir greičiausiai jų auginimo įgūdžius. Tačiau vargu ar tai įvyko siekiant sumažinti maisto trūkumą. Greičiau žemdirbystės atsiradimo ir saugumo, kurį teikė sėslus didelio masto maisto ieškojimas, sudarantis ypatingą pagrindą ir „garantiją", leidusią atsirasti žemės dirbimui, priežasčių reikėtų pasidairyti kitur.

Iš pradžių nedidelis domėjimasis žemdirbyste, kurį rodė tipiškos šukinės keramikos kultūros maisto ieškančios bendruomenės (gyvenančios pajūryje ir salose?), tapo svarbiu pragyvenimo šaltiniu virvelinės keramikos kultūroje vėlyvajame neolite. Nuo šio laikotarpio jau gausiai randama tiesioginių ir netiesioginių žemdirbystės įrodymų bei galvijų kaulų. Žemdirbystės vaidmuo buvo toks svarbus, kad lėmė perėjimą prie kitokios gyvenviečių strategijos ir akmens amžiaus kaimo susiskaidymo į smulkesnius vienetus, t. y. ūkio sodybas. Pastarasis gyvenviečių tipas yra būdingas didžiumai Estijos teritorijos beveik visą pirmąją geležies amžiaus pusę (Lang, 2002, p. 13). Nėra visiškai aišku, ar ir kokiu mastu tai sukėlė arba bent jau paskatino migracija, t. y. nauji gyventojai, įgiję žemdirbystės įgūdžių pakeliui į Estijos teritoriją. Anksčiau gana apibendrintai pabrėžiama masine migracija (pvz., Moora, 1956, p. 55; Jaanits *et al*, 1982, p. 102) buvo pagrįstai imta abejoti (pvz., Estijoje Lang, 1998). Kartu nėra priežasties atmesti mažesnių gyventojų grupių, pavyzdžiui, keleto šeimynų, prisijungimą.

Virvelinės keramikos kultūros pajūrio gyventojai, kitaip nei jų protėviai, kūrė savo gyvenvietes toli nuo artimiausios pakrantės. Krašto gilumoje buvo apgyvendintos įvairios vietos. Čia, taip pat prie vandens, kuriamos gyvenvietės akivaizdžiai išnyko. Estijos teritorijoje greta virvelinės keramikos kultūros gyvavo ir kita, t. y. vėlyvoji šukinės keramikos kultūra, analogiška Skandinavijos duobelinės keramikos kultūrai (pvz., Burenhult, 1999, p. 317–348). Šios skandinavų kultūros gyventojai buvo įsikūrę vandens telkinių pakrantėse ir vertėsi daugiausia maisto ieškojimu. Remiantis šiuo artimu panašumu su skandinavų kultūra (Ahlfont *et al.*, 1995, p. 64, 66) galima numanyti, kad, be medžioklės ir žvejybos, Estijos salose buvo auginamos kiaulės[2]. Toks dvilypis kultūrinis ir ekonominis vaizdas išlieka iki pat akmens amžiaus pabaigos. Anksčiausios vėlyvosios šukinės keramikos kultūros datos priskiriamos 2000–1900 m. pr. Kr. (Lang & Kriiska, 2001, p. 92, pav. 1).

Nuklydusių galvijų radiniai ir žiedadulkių diagramos akmens amžiaus pabaigoje ir bronzos amžiaus pradžioje rodo, kad žemdirbių gyvenvietės, be visų kitų, išaugo ir aukštumų plotuose, kurie, ankstesnių tyrimų duomenimis, buvo laikomi apgyvendinti tik I tūkstantmečio po Kr. viduryje (Moora, 1966, p. 129–138). Tad neapgyvendintos liko tik centrinės aukštumų teritorijos. Remiantis dabartine medžiaga neįmanoma nustatyti, ar ir kokiu mastu šukinės keramikos kultūra ir „beveik grynas" maisto ieškojimas toliau gyvavo, tačiau iki kitos epochos, t. y. vėlyvojo bronzos amžiaus, iš kurio surinkta pakankamai pavyzdinių duomenų, išnyko ir kultūriniai, ir ekonominiai skirtumai.

Iš anglų kalbos vertė A. Kuncevičius

[1] Daugelis tyrinėtojų apibūdina rytinio Baltijos regiono perėjimą prie žemės ūkio kaip lėtą procesą: pavyzdžiui, pastaraisiais metais Lang, 1999a, 1999b; Girininkas, 2000b; Antanaitis *et al.*, 2000.

[2] Osteologiniu metodu iš Loona vėlyvosios šukinės keramikos kultūros gyvenvietės Saaremaa teritorijoje (radiokarboninis datavimas maždaug tarp 2850 ir 2650 m. pr. Kr. – pirminiais duomenimis Lõugas *et al.*, 1996, p. 405) buvo išskirta 30 kiaulių kaulai, kurie vertinami kaip jaunų pradėtų jaukinti gyvulių (Paaver, 1965, p. 440; Jaanits, 1992, p. 50).

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