

New dates for the Late Neolithic Corded Ware Culture burials and early husbandry in the East Baltic region

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ABSTRACT: The appearance of the Corded Ware Culture in the eastern Baltic area has been associated with the beginning of animal husbandry in this region. The culture is quite well represented by artefacts around the Baltic Sea basin, whereas its animal bone material seems to have been partly mixed with either that of the Combed Ware Culture, whose economy was based on hunting, fishing and gathering, or with later material. Radiocarbon dates have placed the beginning of the Corded Ware Culture in the eastern Baltic region in the time interval 3000-2700 cal BC. New dates from Estonia confirm that the phenomenon appeared here at that time. The beginning of animal husbandry in the East Baltic is discussed on the basis of the new dates and the animal bone finds from Corded Ware Culture settlement sites and burials. Important factors in the spreading of early farming in addition to climate, were geographical and environmental conditions.

KEYWORDS: EAST BALTIC, ESTONIA, LATE NEOLITHIC, CORDED WARE CULTURE, DOMESTIC ANIMALS

RESUMEN: La cultura de las cerámicas cordadas en el Báltico oriental se asocia con el inicio de la ganadería en la zona. Esta cultura se encuentra bien representada a nivel de utensilios por toda la cuenca del Báltico mientras que los restos óseos animales parecen haberse mezclado parcialmente bien con los de la cultura de las cerámicas a peine, cuya economía era cazadora, recolectora y pesquera, bien con materiales más tardíos. Las fechas de radiocarbono sitúan el inicio de la cultura de las cerámicas cordadas en el Báltico oriental dentro del intervalo 3000-2700 cal BC lo que coincide con nuevos fechados realizados en yacimientos estonios. El comienzo de la ganadería en el Báltico Oriental es valorado en este trabajo sobre la base de nuevas fechas de radiocarbono y de las faunas asociadas a yacimientos de la cultura de las cerámicas cordadas. Factores clave en la dispersión de la agricultura en la zona parecen haber sido el clima así como las condiciones geográficas y ambientales.

PALABRAS CLAVE: BÁLTICO ORIENTAL, ESTONIA, NEOLÍTICO TARDÍO, CULTURA DE LAS CERÁMICAS CORDADAS, ANIMALES DOMÉSTICOS

INTRODUCTION

The appearance of the Corded Ware Culture has often been associated with the migrations of the ancestors of the Indo-Europeans or with strong Indo-European influence. Similarities in the material culture across a wide area have been discussed by many researchers. There is a variety of opinion concerning the origin of the culture: the most widely-held views are that it formed in the area north of the Black Sea (e.g. Gimbutas, 1991) or in the area of the Vistula and Rhine (e.g. Jaanits *et al.*, 1982: 102). Some researchers (e.g. Huurre, 1998) have suggested that there occurred a relatively fast and sometimes violent expansion from that area, an idea supported by the pattern of distribution of boat-shaped (battle) axes. In opposition to the theory of rapid expansion, the idea has been put forward that it was a process lasting centuries (Rimantienø, 1996).

No researcher has identified a definite area of origin for such a population spread, and it is probable that the indigenous populations participated in the creation of the phenomenon that we nowadays know as the Corded Ware Culture (e.g. Malmer, 1962; Lang, 1998). No mass migrations have been observed.

Recent DNA studies of the ancestors of the Indo-Europeans have also showed that there was no spread of genes from the Near East to Western Europe accompanying the spread of farming (Haak *et al.*, 2005). Researchers have concluded that it was the culture itself that spread, without the people originally carrying these ideas. This includes the possibility that small pioneer groups carried farming into new areas of Europe, and that once the technique had been established, the surrounding hunter-gatherers adopted the new culture and then outnumbered the original farmers.

Thus, the Corded Ware Culture also spread to the eastern Baltic area and for a while probably existed alongside the Combed Ware, Narva and Nemunas Cultures. In the eastern Baltic, the beginning of the Neolithic is traditionally reckoned from the «first» use of ceramic vessels (not farming) at about 5500-5000 cal BC, and the period is divided into three subperiods: Early Neolithic (Narva and Nemunas Cultures), Middle Neolithic, starting about 4000 cal BC (Typical and Late Combed Ware Cultures, the Narva and Nemunas Cultures also continuing), and Late Neolithic, about 3000-1800 cal BC (different subtypes of the Combed Ware and Corded Ware Cultures, contin-

uation of the Narva and Nemunas Cultures) (e.g. Lang & Kriiska, 2001).

The exact time of the beginning of the Corded Ware Culture in Estonia was not known, since no reliable radiocarbon dates had previously been obtained. There was only one date, from the Riigiküla XIV site in north-eastern Estonia, which indicates that people with cultural traits of the «later» Corded Ware Culture lived there at about 2600-2300 cal BC (Ta-2680: 3970±100 BP; Kriiska, 2000). Based on dates from Latvia and Finland, it was considered that the culture arrived here, too, at about 3000 cal BC (e.g. Lang & Kriiska, 2001; Eriksson *et al.*, 2003 and references therein). Now, new dates obtained at Poznan AMS Laboratory, Poland, are available for Estonian material.

The spread of early domesticates, such as cattle (*Bos taurus*), sheep (*Ovis aries*), goat (*Capra hircus*) and pig (*Sus scrofa domestica*), has been discussed by many researchers. Most of the studies undertaken in Europe focus on the spread of Indo-Europeans, along with domestic animals, into Central and Western Europe (e.g. Clason, 1980; Vigne, 1999; Guilaine, 2000; Tresset, 2003; Vigne *et al.*, 2005), as well as on the probable domestication of cattle in the eastern Azov-Pontic steppe areas (Bibikova, 1978; Krizhevskaja, 1992; Benecke, 1997; Stanko, 2003). Apart from local-scale analyses, there are few studies from north-eastern Europe. The aim of this study is to focus on north-eastern Europe, namely, on the region east of the Baltic Sea –Estonia and neighbouring areas– and try to place it into a wider European context (Figure 1).

CORDED WARE CULTURE SITES IN ESTONIA AND NEW AMS DATES

In Estonia, we know approximately 50 settlement sites where finds of the Corded Ware Culture have been obtained (Figure 2). Most of these were discovered during the excavation of sites of other cultures, such as the Combed Ware Culture. Only in a few places were Corded Ware Culture finds not mixed with layers of other periods. The cultural layer on Corded Ware settlement sites is usually very thin, and so the number of finds is quite low. In general, it has been observed that the settlement pattern differs from that of the previous periods –the sites are not situated on the coast or by the



FIGURE 1

Map showing the distribution of domestic animals (sheep, goat, cattle and pig) in different parts of Europe and the approximate time of their appearance. Arrows indicate possible migration routes; bold lines indicate the probable geographical barrier (approximate border between the steppe and forest zone). Compiled by L. Lõugas after Clason (1980), Horwitz *et al.* (1999), Vigne (1999), Guilaine (2000), Storå (2000), Stanko (2003), Tresset (2003), Woodman & McCarthy (2003) and Vigne *et al.* (2005)

shore of a water-body, but somewhat further from the water, probably because of the presence of better agricultural land (Kriiska, 2003).

About 19 burial sites are known in Estonia so far. It has been possible to undertake research at only a few of them, since in very many cases the graves have been destroyed before any research was possible. The only well-preserved and documented graves are those at Ardu (Indreko, 1938), Sope (Indreko, 1935) and Kunila (Jaanits, 1983); we have somewhat less information about the Karlova and Tika burials (Figure 2). The material for AMS dating was selected from these graves.

In general, the burial grounds of the Corded Ware Culture are rather small in Estonia, as elsewhere in the eastern Baltic: there are generally Archaeofauna 16 (2007): 21-31

only one to three (rarely more) single graves, where the deceased have generally been buried in flexed position. This position has earlier been associated with the Corded Ware Culture (e.g. Kriiska & Tvauri, 2002) or regarded as suggesting at least some influence of the culture (Jaanits *et al.*, 1982), and this idea has been applied to the seven burials found at the Stone Age settlement site of Tamula. However, the new dates (Table 1) do not provide support for either of these two ideas, which are mainly based on burial position.

Seven AMS dates were obtained for the Estonian Neolithic burials (Table 1). The samples were taken from human bone found in these graves. Five of these (Ardu, Sope, Kunila, Tika and Karlova) appeared to be Late Neolithic and therefore

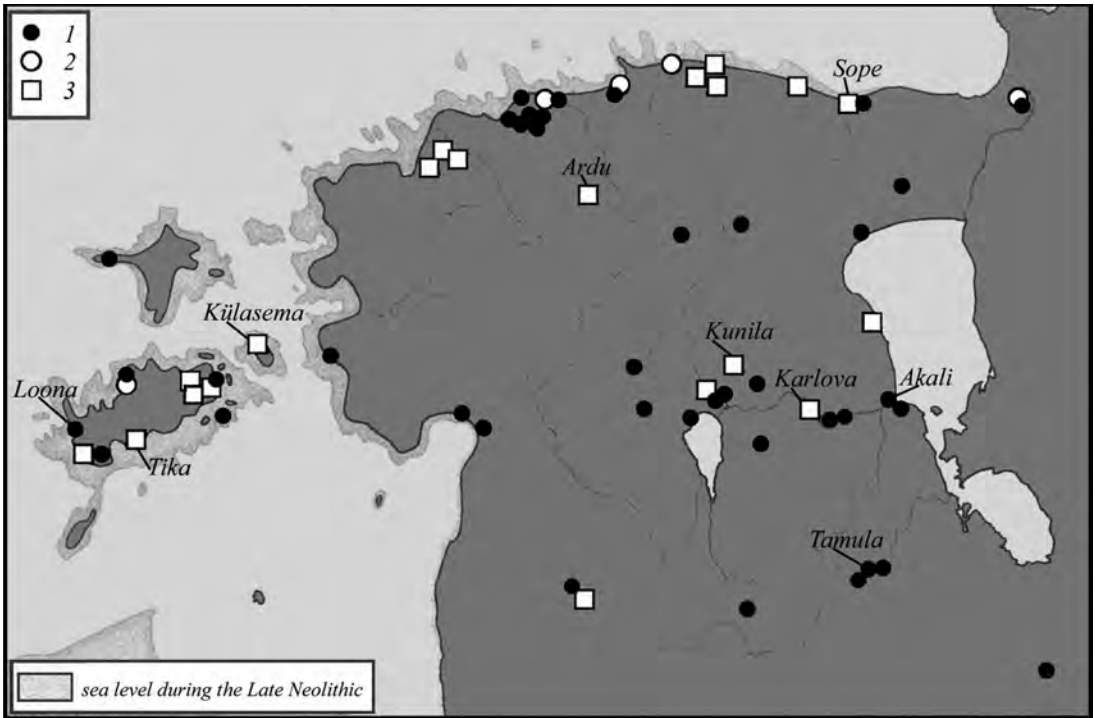


FIGURE 2

Map of Estonia showing the settlement and burial sites of the Corded Ware Culture. The names are given for sites mentioned in the text. 1 – one settlement site, 2 – two or more settlement sites, 3 – burials.

Site and grave number	¹⁴ C-years	Calibrated date 2 sigma (cal BC)*	Calibrated date 1 sigma (cal BC)	Lab no.	Sample material
Ardu, grave II	4110±40	2860-2580	2880-2500	Poz-10824	Human, male, <i>Ulna sin. diaphysis</i>
Sope, grave II	4090±35	2850-2570	2870-2490	Poz-10827	Human, female, <i>Phalanx</i>
Kunila, grave II	3960±40	2570-2350	2580-2340	Poz-10825	Human, <i>Mandibula</i>
Tika	4035±35	2620-2480	2840-2470	Poz-10803	Human, <i>Mandibula</i>
Karlova	3805±35	2300-2150	2460-2130	Poz-15499	Human, <i>Mandibula</i>
Tamula, grave III**	4940±40	3770-3650	3800-3640	Poz-10826	Human, <i>Costa</i>
Tamula, grave I	4680±40	3520-3370	3630-3360	Poz-15645	Human, <i>Femur</i>

* All calibrations according to: Atmospheric data from Reimer et al. (2004); OxCal v3.10 Bronk Ramsey (2005); cub r:5 sd:12 prob usp[chron].

** Only 0.04 % collagen in sample, which may affected the result

TABLE 1

AMS dates from Estonian Neolithic burial sites.

help to date the spread of the Corded Ware Culture, and since these graves contained bones of domestic animals, they also shed some light on the timing of the adoption of animal husbandry in the East Baltic region. These burials took place approximately between 2900 and 2100 cal BC. The Tamula graves, where the deceased were likewise buried in flexed position, turned out to be older and so we cannot consider them Corded Ware Culture burials. Neither are there any finds from these burials clearly indicating affiliation to that culture.

ANIMAL BONES FROM CORDED WARE CULTURE SITES

Only a few bones of domestic animals have been found at Estonian Late Neolithic settlement sites –from Akali, eastern Estonia, there is one tooth of goat or sheep (Jaanits, 1959), from Tamula settlement, south-eastern Estonia, there are 21 bones of domesticated pig, belonging to at least five individuals, as well as two bones of goat or

sheep and one bone of cattle (Paaver, 1965). In addition to Combed Ware ceramics, which are somewhat earlier, these sites also yielded sherds of Corded Ware, and the domesticates may be connected with the latter culture. However, we have to consider the possibility that all the bones of domesticates may derive entirely from later periods. No radiocarbon dates have been done so far. Thirty bones of pig, from at least nine individuals, have been found at the Loona site on Saaremaa Island, West Estonia, where Corded Ware Culture artefacts have been discovered together with Late Combed Ware (Paaver, 1965). A few bones of pig have also been found in grave II at Kunila. One pig skull has been discovered near graves I and II at Kunila, about 5 m from the burials (Jaanits, 1952), but, in the absence of ¹⁴C dating, we do not have any reason to consider this find as contemporary with the burials. Grave goods in the Corded Ware Culture burials are quite limited. One of the typical artefacts is the boat-shaped stone axe. The bone artefacts are mainly points or awls made of tubular bones of sheep or goat, and chisels (Table 2; Figure 3 and 4). From grave I at Kunila, there are two «knives» made of wild boar tusk (Jaanits

Burial site	Accession No.	Species	Skeletal unit	Type of item
Ardu I	AI 2745: 2	Large ungulate	<i>os metatarsale</i> (?)	fastener
Ardu II	AI 3499: 11	Large ungulate	<i>radius</i>	chisel
	AI 3499: 13	<i>Alces alces</i>	<i>cornus</i>	fastener
	AI 3499: 14	<i>Alces alces</i>	<i>cornus</i>	worked antler
	AI 3499: 15	<i>Ovis aries</i>	<i>os metacarpale</i>	awl
	AI 3499: 66	<i>Bos taurus</i>	<i>os ilium</i>	unworked bone
Karlova	AI 2411	<i>Bos taurus</i>	<i>tibia</i>	unworked bone
Kunila I	AI 3989: 8, 10	<i>Sus scrofa ferus</i>	<i>Canini</i> (2)	knives
	AI 3989: 7, 9, 11	<i>Castor fiber</i>	<i>Incisivi</i> (3)	unworked tooth
Kunila II		<i>Sus scrofa dom.</i>	(3 bones)	unworked bone
Külasema	AI 1228: 2	Mammal (indet.)	Long bone	fish spear
Sope I	AI 2607: 1	<i>Ovis/Capra</i>	<i>tibia</i>	awl
	AI 2607: 2	<i>Ovis aries?</i> (<i>Capra?</i>)	<i>radius</i>	worked bone
	AI 2607: 3	<i>Sus scrofa (dom?)</i>	<i>tibia</i>	worked bone
	AI 2607: 4	<i>Sus scrofa sp.</i>	<i>incisor (inferior)</i>	unworked tooth
	AI 2607:	<i>Bos taurus</i>	<i>os metatarsale</i>	cleaved
	AI 2607:	<i>Ovis/Capra</i>	<i>pelvis</i>	unworked bone
Sope**	AI 2671: 43	Large ungulate	<i>Tibia</i> (?)	chisel
	AI 2671: 44	<i>Ovis/Capra</i>	<i>tibia</i>	awl
	AI 2671: 45	<i>Ovis/Capra</i>	<i>tibia</i>	awl
Sope II	AI 3175: 1	<i>Ovis aries</i>	<i>os metacarpale</i>	awl
Tika	AI 3663: 1	<i>Alces alces?</i>	<i>os metatarsale</i> (?)	fish spear
	AI 3663: 5	<i>Ovis/Capra</i>	<i>molar (superior)</i>	unworked tooth

TABLE 2

Animal bones and bone/antler tools from the Corded Ware Culture burials in Estonia.

et al., 1982; Jaanits, 1983), as well as three incisors of beaver. There is one fishing spear from Tika (Figure 4) and one from Külasema (Jaanits *et al.*, 1982). In addition to these items, some unworked bones were also found. In interpreting the meaning of these finds, we should be very careful, since some mixing of layers may have occurred, especially during recent ploughing or digging. In this way, some stray animal bone not related to the archaeological context may end up in a grave. Only radiocarbon dating can resolve the question in this case, showing whether the bone represents the remains of food provided with the burial or derives from the later periods.



FIGURE 3

Burial (grave II) from Ardu. Grave goods: 1 – boat-shaped stone axe; 2 – flint adze; 3 – flint knife; 4 – bone chisel; 5 – bone awl; 6 – antler point; 7 – bone fastener; 8 – a fragment of cattle pelvis.

DISCUSSION

The purpose of this study was to date the appearance of the Corded Ware Culture and early animal husbandry in Estonia. However, we must consider whether we wish to date the first domestic

animal(s) that appeared in this region, or establish the date of a fully effective system of farming characterised by a dependence on domestic animals. These two events might be separated by a long time interval, a whole millennium or more, especially in an area such as the East Baltic region, considering the climatic and geographical situation. Clearly, local circumstances must be taken into account when discussing the spread of farming.

Five dates for Estonian Corded Ware Culture burials place the culture in the time interval *ca.* 2900–2100 cal BC. Although we do not have any reason to conclude that they mark the absolute beginning and/or the end of the Corded Ware Culture in Estonia, they do provide general chronological anchors. These dates are not in disagreement with the dates from neighbouring areas (e.g. Edgren, 1992; Loze, 1992; Grinevičiūtė, 2000): rather, they support the previously-obtained dates. It is clear that the Corded Ware Culture in the eastern Baltic was not a short-term phenomenon, but lasted for dozens of generations.

Although the bone material of domestic animals found on Estonian Late Neolithic settlement sites and burials is not numerous, and many of these finds are worked bones, we may suppose that small-scale animal husbandry was practiced in the region already at that time. Worked metacarpal bones of sheep from Ardu and Sope may reflect sheep-rearing. No direct evidence has been obtained concerning goat, since it was impossible to find definite remains from this species. Thus, we do not have any evidence of goat-rearing in our Late Neolithic material. Neither are there any goat remains from the Alvastra site in Sweden, for example (During, 1986). In the European context, it has also been observed that sheep predominates in Neolithic material (Zeuner, 1963; Bökönyi, 1974). Goats were mainly kept in regions where cattle breeding was difficult or impossible. Elsewhere, cattle were the main source of milk (Zeuner, 1963).

One pelvis fragment from Ardu and one metatarsal bone from Sope provide evidence of Late Neolithic cattle husbandry in Estonia. Also, if we consider that there is no mixing of layers at Karlova, then the one tibia of cattle from this site can also be regarded as evidence in support of this idea. All these bones come from small animals (compared with recent breeds). Although the biological age was impossible to determine, we can exclude animals of calf age (only the tibia found at Karlova derives from an animal two to four years old).

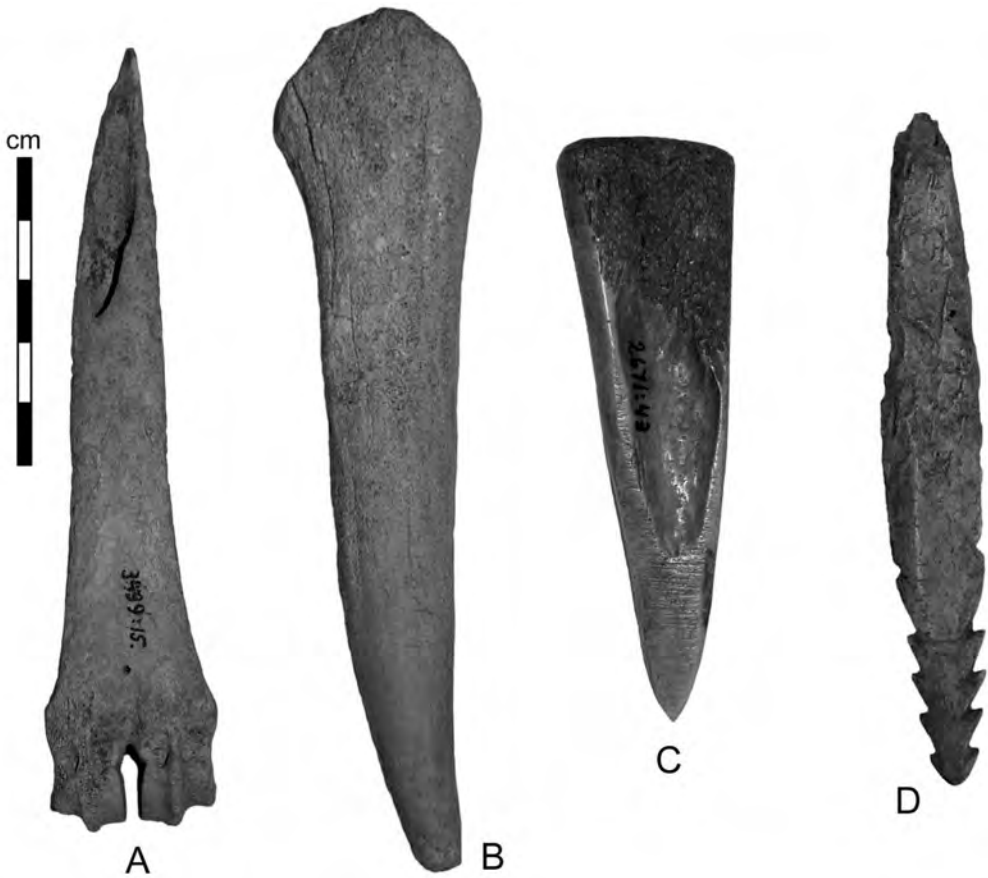


FIGURE 4

Bone tools from Ardu grave II (A, B) and from the Sope (C) and Tika (D) burials. A – point made of sheep metapodium; B – point made of elk antler; C – chisel made of the tibia of a large ungulate (cattle or elk); D – fish spear from a long bone of a large ungulate.

There is more evidence for the keeping of pigs, provided by the finds from Loona and Tamula. According to Kalju Paaver (1965), the osteometric data indicates domestic rather than wild pigs, and Paaver suggests that these pigs may have been so-called semidomesticated animals. In Sweden, many authors (e.g. Jonsson, 1986; Lepiksaar, 1986; Lindquist & Possnert, 1997) are of the opinion that the wild boar could not have settled an isolated island, such as Gotland in the Baltic Sea, on their own; instead, pigs must have been transported to the island by man. On this same basis, Marek Zvelebil (1978) has suggested that the pig bones from Neolithic settlements on Saaremaa derive from domestic or semi-wild individuals, rather than wild boar. At the same time, it is known that Stone Age hunters have transported wild animals

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to islands in different parts of the world, and so the transport of boar to Gotland at the beginning of the Neolithic does not prove the presence of domesticated pigs there (Rowley-Conwy & Storå, 1997). This may also be the case with the boar on Saaremaa Island. However, the water barrier between Saaremaa Island and the Estonian mainland, via Muhu Island, is shorter than the distance between Gotland and the Swedish mainland, short enough even for swimming across, which wild boar sometimes do nowadays. Jonsson (1986) has investigated the bones of Neolithic pigs and wild boar from Sweden and concluded that in this period pigs do not differ very much by their measurements from wild boar. Thus, we may suppose that some of the wild boar bones excavated at Estonian Late Neolithic settlement sites may actually be those of

domestic or semi-wild animals. On the other hand, it has been established that in Sweden the size of wild boar bones decreases during the Holocene, and this may be caused by hybridisation between domestic and wild forms. According to Jonsson (1986), in Eastern Europe, this decrease in the mean size of wild boar has not been observed. However, based on osteometric data, Paaver (1965) concludes that wild boar in the East Baltic were rather large during the Atlantic climatic period, their size diminishing during the Subboreal period (Late Neolithic/Bronze Age) and increasing again later. He connects such change in size with climatic conditions. Rowley-Conwy & Storå (1997) conclude that pig bones found at Swedish Pitted Ware Culture sites come from the wild boar. As grain was not cultivated at these sites, there would not have been sufficient food refuse for feeding pigs. Considering the date of one pig bone (matching the dates of Corded Ware Culture burials) found at Loona, Saaremaa Island (Lõugas *et al.*, 1996), this individual might have been a domestic pig. Whether the boar was locally domesticated is open to question: we do not have enough evidence to prove it. Stable isotope analyses made on the Loona pig did not show that they ate much human food refuse (Lõugas *et al.*, 1996), i.e. remains of marine fish and seals (there are plenty of fish and seal bones at Loona), but the reason might also lie in the difference in date (see the dates of the Loona pig and harp seal, below). However, the corresponding Subboreal chronozone is known to have been an oak-rich period on Saaremaa Island, as well as on the mainland. Acorns and the rich humus layer around oaks, full of worms and snails, could also have been a source of food for pigs, so we do not have any reason to expect that they necessarily ate only human food remains.

No horse bones have been found at Estonian Corded Ware Culture sites. The older material (Mesolithic, Early Neolithic) contains bones of the wild horse, and in the Late Bronze Age material the domestic horse already constitutes a significant part of the material (Maldre & Lõugas, 2001). Thus, the present study does not shed any new light on the history of the domestic horse in the eastern Baltic region. In Europe, Funnel Beaker Culture sites have yielded considerable amounts of horse bone (Barker, 1985). In Denmark, many Battle-Axe (Single Grave) Culture burials and settlement sites have been found to contain bones of domestic horse (Barker, 1985), while in Sweden

horse bones have been found in megalithic graves (Lepiksaar, 1973). Daugnora & Girininkas (1996, 1998) have dated some horse bones found in Lithuania to the Middle Neolithic. However, it is not clear if these finds represent the domestic or wild form. The earliest remains of domestic horse in Latvia come from the *piivutkalns* graves, dated to the middle of the 2nd millennium cal BC (Vasks *et al.*, 1999).

In Latvia, the Corded Ware Culture, and hence also the early domestic animals, could be slightly older than in Estonia. This is supported by the radiocarbon dates from the Corded Ware Culture graves of Zvejnieki, Selgas and Sarkani, averaging between 3100 and 2500 cal BC (Ericsson *et al.*, 2003). Storå (2000) has placed early animal husbandry in the Åland Islands, western Finland, in the Middle Neolithic period (in the Swedish periodisation), i.e. about 3300-2350 cal BC (corresponding approximately to the Late Neolithic according to Estonian Stone Age periodisation –Lang & Kriiska, 2001), which was supported by the bone finds from the cultural layer of that period. However, radiocarbon dating undertaken on the cattle, sheep and pig bones produced dates between 2300 and 800 cal BC (Storå, 2000). Thus, it is not evident that animal husbandry was practiced at such an early date on the Åland Islands.

There is only one direct dated Neolithic pig bone in Estonia –from Loona. Most of the site material consists of remains of seals and cod. An AMS date from a harp seal bone places the Loona site in the time interval of about 3000-2800 cal BC, while the pig bone gave a result of about 2700-2500 cal BC (Ua-4825: 4050±80 BP; Lõugas *et al.*, 1996). More or less contemporary with the latter occupation period is a date obtained from the burned layer on a piece of textile-impressed pottery from the same settlement site (Kriiska *et al.*, 2005). Different occupation periods within one site, which may confuse our conclusions regarding early animal husbandry, have recently also been observed in Sweden. The Neolithic grave and dwelling material from Västerbjers on Gotland yielded a single pig bone, which gave a slightly younger result than expected for early domesticates (similar to Loona), while the cattle and sheep/goat bones gave Bronze Age dates (Eriksson, 2003). It seems that at many of the Neolithic sites here, the domesticates are somewhat younger than the dominating material of the site (also at Ire in Sweden; Eriksson, 2003). Therefore, it is important to date directly bones of domestic animals,

rather than drawing conclusions from the cultural layer in which they were found. The Pitted Ware Culture in Sweden was connected with early farming (e.g. Lindqvist & Possnert, 1997; Storå, 2000), but stable isotope analysis has shown that these people were not dependent either on cereals, or on domestic animals ^{13}C concentrations in bone collagen did not show any dependence on farming products (Lidén, 1995; Eriksson, 2003). Also, microwear on tooth surfaces did not show any evidence of the chewing of cereals (Lidén, 1995; Eriksson, 2003).

On the basis of current knowledge, it seems that the spread of ceramics, cereals (e.g. Kriiska, 2003; Poska *et al.*, 2004) and domestic animals (e.g. Paaver, 1965; Lepiksaar, 1986; Lõugas & Maldre, 2000) in the Estonian territory took place during a quite long time –between 5000 and 2700 cal BC, and that agriculture as an everyday subsistence activity developed no earlier than 1000 cal BC, i.e. the middle of the Bronze Age. Here we may agree with Christian Lindqvist (1987), who wrote: *The late agricultural activities in north-eastern Europe as well as other Baltic Sea areas are probably due to the fact that the Corded Ware culture expanded into vast areas with dense forests and woodlands with fairly rich large-game fauna, and coasts with extremely rich aquatic resources, supporting a comparatively dense population of more or less permanently settled, pottery-using hunters, fishers and gatherers. ... The spread of domesticated animals to northeast Europe was nevertheless inhibited for thousands of years, probably due to the fact that this environment was not suitable for the Mediterranean domesticates, and that there still existed a comparatively rich fauna and flora, which was utilized by a hunting and gathering population.*

CONCLUSIONS

The Corded Ware Culture in Estonia is dated by new AMS dates to at least between 2900 and 2100 cal BC.

Early domesticates (sheep, cattle and pig) were present in the Late Neolithic period in Estonia (they absent in Middle Neolithic material), i.e., first appearing in the time interval of about 2900-2700 cal BC. The material from Latvia may indicate that they spread somewhat earlier here.

Domestic horse is not represented in Corded Ware Culture material in Estonia.

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At the time of the first appearance of domesticates, the Neolithic hunter-gatherers were strongly adapted to their environment, and the adoption of new subsistence activities probably caused some kind of stress for both sides.

It is apparent that there was quite a long transitional period from a hunter-gatherer lifestyle to a farming society.

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