WHEN DID DOMESTICATED HORSES APPEAR IN LITHUANIA?

ALGIRDAS GIRININKAS, LINAS DAUGNORA AND INDRĖ ANTANAITIS-JACOBS

Abstract

The horse bones found in Lithuanian habitation sites that date to the Late Neolithic and to the Early Bronze Age still do not indicate that these horses were ridden upon or used to plough the soil. However, horse bones have been found in Lithuanian territory only in those sites where bones of other animals that were domesticated have been found. This suggests that domesticated horses in Lithuania might have spread together with other domesticated animals by way of cultural diffusion during the Late Neolithic and Early Bronze Age.

Key words: Lithuania, horses, domestic fauna, Late Neolithic, Early Bronze Age, Eneolithic.

Introduction

Thirteen habitation sites are known in the Late Neolithic – Early Bronze Age in Lithuanian territory in which horse bones have been found (Fig. 1). Whether these bones were of wild or domesticated horses will be known only in the future after detailed scientific analyses. At this time, the compiled zooarchaeological data enable a determination of their find sites' affiliation from a cultural and chronological point of view.

K.L. Paaver describes the third to second millennia BC horses living in the East Baltic as wild (Paaver 1965, p.180ff). It was thought that wild horses could have lived here in the Mesolithic and Early Neolithic periods. Their bones have been found in the East Baltic in the habitation sites of Kunda, Zvidze, Osa, Zvejnieki II , Kääpa, Kõnnu, as well as in the Zvejnieki burial ground (Lõugas 1996, pp.273-291; 2006, p.75ff). According to L. Lõugas, there are no reliable data regarding the species of that time's horses that were propagating in the forests. Nor has it yet been determined if the horses' skeletal parts encountered in these sites are actually from later periods (Lõugas 1997, p.281ff).

Pendants made from horse (*Equus ferus*) teeth found in five (possibly six) Zvejnieki burial ground graves (Nos. 12, 42, 86, 100, 122, and possibly 201) in Latvia tell us of the possible mode of life of Mesolithic–earlier Neolithic wild horses (Eriksson 2006, p.190). These pendants generally were found with pendants of teeth from other large mammals (elk, aurochs, boar, deer), and, interestingly, in graves with children (see Zagorskis 1987). No horse bones have been found from investigated Mesolithic or earlier Neolithic sites in Lithuanian territory.

At this time it is difficult to speak about how horses lived in the forests of the East Baltic during the Middle Holocene. Upon reviewing the zooarchaeological material of the site of ventoji 23, considered one of the earliest (Narva Culture) archaeological sites in Lithuania with a domesticated horse find, a horse bone with a spavin pathology was established. This type of pathology is found in collections of later periods as well as in other researched cemeteries with horse burials in Lithuania (Daugnora, Thomas 2005). When chronically inflamed, the separate tarsal bones fuse together and the mobility of the hock (tarsus) joint diminishes. In the case of this ventoji 23 horse, a bilateral ossification of the ligaments between the metapodials also was found, which influenced the medial and lateral splint bones' (MT II – IV) fusion with the third metapodial (MT III). This bone pathology is described as Chronica deformans tarsi et desmoiditis ossificans ligamentum interosseum and is characteristic only of horses who lived from the Roman Period to more recent centuries. This ventoji 23 horse bone was AMS radiocarbon dated to 185±40 BP (Ua-22782). Not only was this horse not bred nor hunted at ventoji in the Neolithic, but the calibration of its radiocarbon date shows the specimen's chronology as cal. AD 1650–1950 (95.4%) (Reimer *et al.* 2004)[1].

However, in Latvia's Abora 1 habitation site, in which Late Narva Culture artefacts dominate (Loze 1979, p.26), and which is dated to 3770+60 BP (TA-394) (2460–1990 cal BC (95.4%)) (Reimer et al. 2004), part

[1] All radiocarbon data in this article were calibrated using the Radiocarbon Calibration Program CALIB REV5.0.2 (copyright 1986-2005 to M. Stuiver and P.J. Reimer), in conjunction with Stuiver and Reimer 1993. The reference for all (IntCal04) calibration datasets is Reimer *et al.* 2004. All calibrated dates are expressed as extremes of the 2 sigma range, i.e., with 95.4% probability.

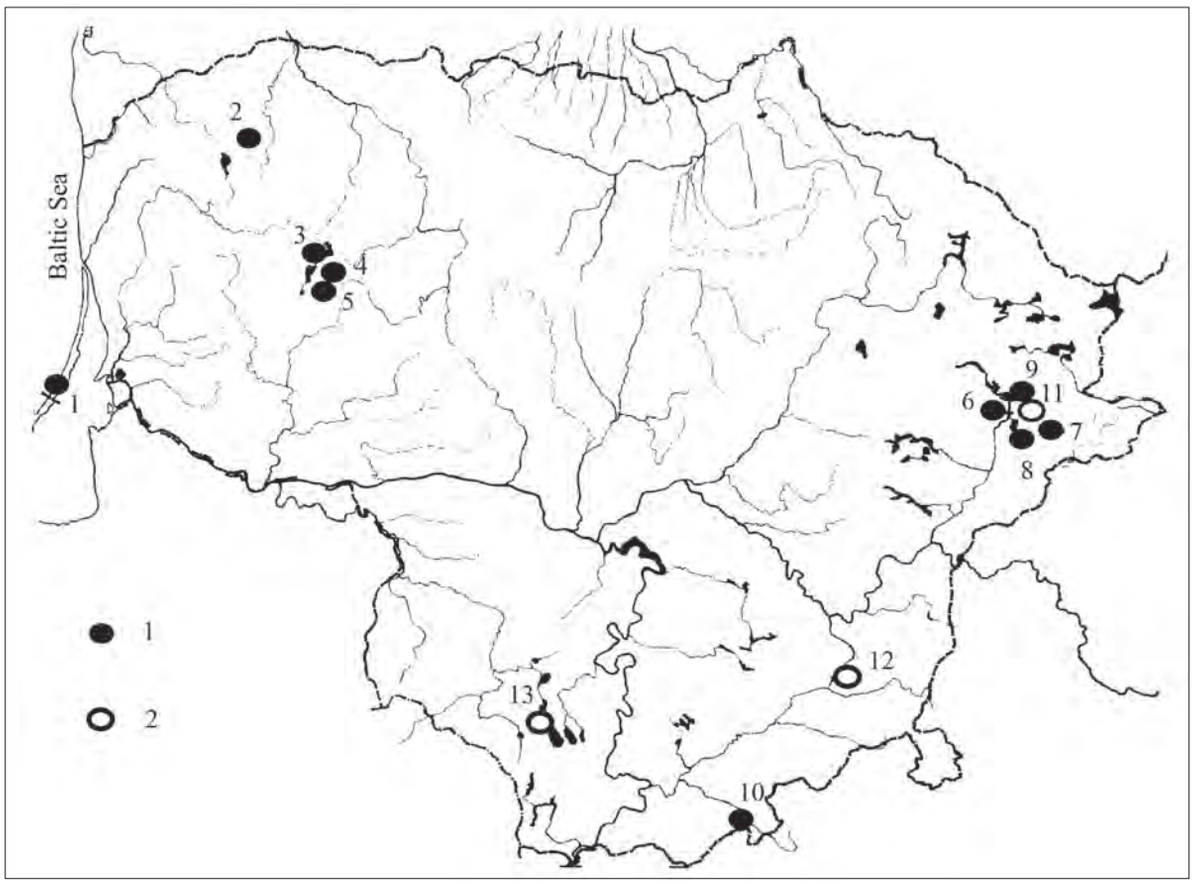

Fig. 1. Late Neolithic (1) and Early Bronze Age (2) sites (in some sites these periods overlap) in which horse bones have been found: Late Neolithic: 1 Nida; 2 Šarnelė; 3 Donkalnis; 4 Daktariškė 1; 5 Daktariškė 5; 6 Žemaitiškė 1; 7 Žemaitiškė 2; 8 Kretuonas 1B; 9 Kretuonas 1D; 10 Katra Ištakos 1. Early Bronze Age: 11 Kretuonas 1C; 12 Papiškės 4; 13 Dusia 8.

of a bridle's corneous fitting or cheekpiece was found (Loze 1997, p.25), which would suggest that horses were controlled or ridden upon. Remains of seventeen (MNI - minimum number of individuals) horses have been found in the Late Neolithic sites surrounding Lake Lubana in Latvia (Loze 1997, p.25). Analogous horse bridle parts made from red deer antler and which date to the Early Iron Age were found in Biskupin (Drzewicz 2004, plate XVII). These latter artefacts belong to the Lusatian Culture. Small analogous horn fittings or cheekpieces found in East Lithuania near Lake Kretuonas at the Žemaitiškė 2 site and dated to the end of the Late Neolithic also might have been designed for bridles (Girininkas 1990, p.87). The cross-sections of these small fittings are D-shaped with small, drilled V-shaped holes. It would have been possible to join leather bridle parts with corneous tacks through these holes in the places where they fastened on to the bridle's spacer plates (Fig. 2). Moreover, the horn fittings could have been glued onto the leather with pitch or resin. Cheekpieces were made in this fashion and riveted with corneous tacks in bone workshops in this very same way in Middle Age sites in Lithuania (Jarockis 1992, p.171).

By the most recent data, 20 individuals (MNI) of horses have been found in sites dated to the Late Neolithic and Early Bronze Age in Lithuanian territory (Table 1). The **proportionately** large amount of horse remains found in Late Neolithic Lithuania and Latvia, together with the cheekpieces, suggest that the horse **might** have been used for riding and controlled by leather reins (but see Levine on cheekpieces 2005, p.9ff; and Clutton-Brock on bridles 1999, p.10ff).

So far there are no data regarding the use of the horse for other work in East Baltic territory during this early prehistoric period. Nor are there many in Western and Northern Europe. The only known scene of ploughing hewn into stone, in which a horse is depicted pulling a plough, is from the Tegneby area in Western Sweden and is dated to the Late Bronze Age (Glob 1951) (Fig. 3).

Our aim in this article is to compile and systematize the earliest known archaeological and zooarchaeological data regarding horses in Lithuania in order to theorize when and in what environment horses, possibly domesticated, first appeared in Lithuanian territory.

Table 1. Distribution of number of horse bones and minimum number of individual horses alongside number of domestic animal bone total and MNI where available in excavated Late Neolithic to Early Bronze Age sites in Lithuania

Site (Archaeological culture)	Number horse bones / MNI	Unit (horse bones)	Number of total domestic animal bones (incl. horses) / MNI (where available)
Nida (Rzucewo)	7/ 2	*Ossa tarsi, Tibia, Phalanx, Dentes*	About 50
Šarnelė (Narva, Corded Ware)	5/ 2	*Ossa tarsi, Phalanx, TibiaTibia Tibia*	27
Daktariškė 1 (Narva, Corded Ware)	2/ 1	*Dentes*	4
Daktariškė 5 (Narva, Corded Ware)	3/ 1	*Phalanx, Metatarsus*	39 / 15
Donkalnis (Narva, Corded Ware)	2/ 1	*Tibia, Phalanx*	23
Žemaitiškė 1 (Narva)	2/ 1	*Ossa tarsi, Phalanx*	2
Žemaitiškė 2 (Narva)	3/ 1	*Mandibula, Ossa tarsi*	5
Kretuonas 1D (Narva)	3/ 2	*Humerus, Femur*	19 / 5
Kretuonas 1B (top cultural layer) (Narva, Globular Amphora)	29/ 3	*Metacarpus, Phalanx Os tarsi centrale*	306 / 31
Katra Ištakos 1 (Nemunas, Globular Amphora)	1/ 1	*Dentes*	1
Kretuonas 1C (Narva)	12/ 2	*Femur, Ossa tarsi, Tibia, Digiti*	271 / 25
Papiškės 4 (Narva, Nemunas)	17/ 2	*Dentes*	17
Dusia 8 (Brushed Pottery)	3/ 1	*Dentes*	10

Materials and methods

Domesticated animal bones of cattle, sheep or goat (and possibly pig?) first make their appearance in Lithuanian territory in Narva and Bay Coast Culture (also known as Rzucewo, Rutzau, Baltic Coastal, Baltic Haff, or Haffküsten Culture) sites starting in the Middle Neolithic; their amounts generally increase in Narva and Bay Coast Culture sites over the course of the Middle Neolithic (Daugnora, Girininkas 2004, p.104ff). No horse bones, however, have been found among them. Horse bones in Lithuanian territory are known only starting in sites dated to the Late Neolithic (4400/4300–3500 BP or 3100/2900–1800 cal BC) (Antanaitis-Jacobs, Girininkas 2002, p.11), and they occur among bones of animals known to be domesticated. An even larger amount of domesticated animal bone has been established from the zooarchaeological material in sites of the Early Bronze Age (Fig. 1). The most current periodization of the Early Bronze Age in Lithuania is 2000–1650 cal BC (Girininkas 2007, pp.3-14), which would modify the previously published end date

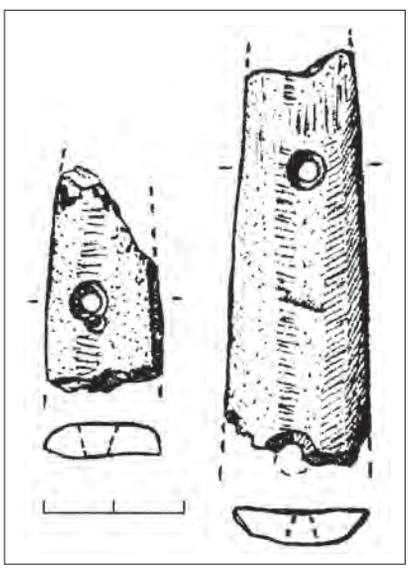

Fig. 2. Cheekpieces of perforated antler plate from Žemaitiškė 2 habitation site. Drawing by A. Girininkas.

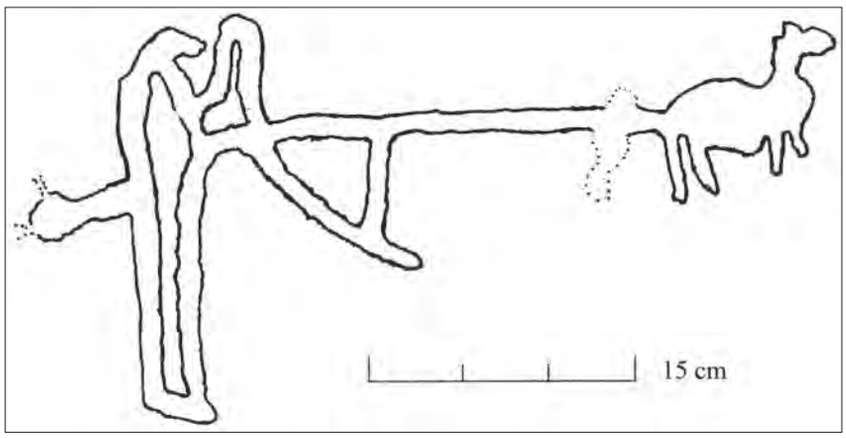

Fig. 3. The Tegneby ard petroglyph (Western Sweden). After P.V. Glob 1951, p.56 fig.63.

of the Late Neolithic period. By current archaeological and zooarchaeological material, 13 Late Neolithic – Early Bronze Age sites have been found in Lithuanian territory in which horse bones have been discovered. The minimum number of individual horses found within each site is small: from one to three (Table 1). This would at least suggest that the communities of the time did not rear (or consume?) many horses.

The sites

Nida

By 1973-1977 research data from the habitation site of Nida (on the Curonian Spit), among the domesticated animal teeth of dog and cattle, as well as bone of sheep and goat, the middle phalanx (phalanx media), tibia, and calcaneus of a horse were found (Table 1) (Rimantienė 1989, p.67). E. Hollack also mentions having found cattle teeth and a phalanx media of horse at Nida (Hollack 1895, p.241ff). The site belongs to the late phase of the Bay Coast Culture and the end of the Middle Neolithic Narva Culture. The Osteological Laboratory's depository at the Lithuanian Veterinary Academy stores four small wrist (carpal) bones, a caudal vertebra, phalanx media (GL 5.73; Bp 6.35; SD 5.26; Bd 5.42 cm (measurements according to Von den Driesch 1976), and calcaneus fragment from the Nida site. The radiocarbon date obtained from Nida's hearth no. 24 is 4620±110 BP (Vs-631) which gave a calibrated radiocarbon date of 3640–3030 cal. BC. The radiocarbon date from hearth no. 56 is 4070±50 BP (Bln-2592), with a calibrated radiocarbon date of 2860–2470 cal BC.

Šarnelė

The Šarnelė habitation site was excavated in 1973 and 1981–1982 (Girininkas 1977, p.57ff; Butrimas 1996, pp.174-191). Domesticated animal bones were found among the wild animal bones, three of which were horse bones (A horses left leg's radius (measuring GL 30.5; BFp 7.10; Bp 7.82; SD 3.56; Bd 7.06; BFd 5.92 cm) and fragment of left pelvis was found during the 1973 excavation, and right shoulder blade or scapula (SLC – 5.42; LG 4.88; BG 4.30 cm) as well as phalanx proximalis (Bp 4.90; SD 3.39 cm) were found during the 1982 excavation.). Two more horse bones were found during the excavation of 1996 (Table 1). By the number of specimens, the horse bones comprise only 2% of domesticated animal bones discovered at this site. The site contains an artefact inventory characteristic of the Narva and Corded Ware Cultures and has a Late Neolithic radiocarbon date of 4260±90 BP (Vs-318) or 3260–2580 cal BC.

Daktariškė 1

Daktariškė 1 was excavated in 1979–1980 (Butrimas 1982a). Two horse bones were found in the site's Late Neolithic cultural layer (Table 1), which also contained domesticated animal bones. The site contains Middle and Late Neolithic Narva Culture as well as Corded Ware Culture artefacts (Butrimas 1982, pp.4-36). The site has a radiocarbon date of 3770±110 BP (Vs-363) (2480–1890 cal BC).

Daktariškė 5

Daktariškė 5 was investigated in 1987–1990 (Butrimas 1988, p.5ff; 1990, p.7ff; Iršėnas, Butrimas 2000, pp.125ff; Butrimas, Ostrauskienė 2004, p.128ff) and two cultural layers were established within the site: a Narva Culture layer of both the Middle and Late Neolithic, as well as a Late Neolithic Corded Ware Culture layer. Three horse bones were found at the site: two vertebrae and a phalanx proximalis (from the top, Corded Ware Culture layer) (Daugnora, Girininkas 1996, p.78) (Tables 1; 2). Later excavations yielded the following bones and measurements (after Von den Driesch 1976): fragments of a tooth and hoof, a talus (GB 5.48; GH 5.96; LmT 5.86 cm), and a phalanx proximalis (GL 7.40; SD 3,17; BFd 4.03; Bd 4.17 cm). The site itself has three radiocarbon dates: 5530±110 BP (Vs-808) (4610–4050 cal BC); 4360±90 BP (Vs-809) (3350–2760 cal BC); and 4020±100 BP (Vs-813) (2880–2290 cal BC).

Table 2. Proportions of domestic animals and horse at Daktariškė 5 by zooarchaeological data

SPECIES	Number bones	MNI
Wild game (TOTAL)	240	34
Domestic animals:		
Cattle (*Bos Bovis*)	30	11
Sheep/goat (*Ovis Aries/ et Capra Hircus*)	3	1
Pig (*Sus Suis*)	1	1
Dog (*Canis Canis*)	2	1
Horse (*Equus Caballus*) (possibly domestic)	3	1 (6.6% of domestic animals) (2% of total faunal remains)
Domestic animal total	39	15 (30.6% of all faunal remains belong to domesticated animals)

Donkalnis

The Donkalnis habitation, burial ground, and cult site was investigated in 1981-1983 (Butrimas 1985, p.30ff). Here, Late Neolithic and Bronze Age cultural layers were found, with affiliated Narva and Corded Ware Culture finds, including Brushed Pottery Culture artefacts in the so-called sacrificial area or cult part of the site. Two horse bones were found in the habitation area (Butrimas 1985, p.31) (Table 1). The burial locus has been dated to the Mesolithic (grave no. 2: 7405±45 BP (CAMS-85221) (Česnys and Butrimas, fortcoming) or 6400–6110 cal BC and grave no. 4: 6995±65 BP (OxA-5924) (Ramsey *et al.* 2000) or 5990–5740 cal BC) and Early Neolithic (grave no. 3: 5785+40 BP (CAMS-85220) (Česnys and Butrimas forthcoming) or 4730–4530 cal BC) periods. The habitation area has no radiocarbon dates; it is dated by cultural typology alone to the Late Neolithic and Bronze Age.

Žemaitiškė 1

The Žemaitiškė 1 habitation site was researched in 1978–1979 (Girininkas 1980, p.6ff), revealing end of the Middle Neolithic and Late Neolithic Narva Culture layers. Two horse bones were found in the site; one calcaneus bone and one phalanx proximalis (Table 1) (Daugnora, Girininkas 2004, p.114). The site has one radiocarbon date of 4420±60 BP (Bln-2593) (3340–2910 cal BC).

Žemaitiškė 2

Žemaitiškė 2 was excavated in 1979–1981 (Girininkas 1994, pp.161-177); a Late Neolithic Narva Culture layer was found there. The site material generally is of the very end of the Late Neolithic. Three horse bones were found: a lower jawbone and two hock bones. The astragalus (talus) measurements are GB 6.28; GH 6.16; BFd 5.63cm) (Table 1). The site has a radiocarbon date of 3570±120 BP (Vs-311) (2280–1610 cal BC), a date indicative of the Early Bronze Age.

Kretuonas 1D

Kretuonas 1D was excavated in 1992–1993 (Girininkas 1994a, p.10ff) and revealed a Late Neolithic Narva Culture layer, of the very end of the Late Neolithic. Three horse bones belonging to two individuals were found: two humerus bones and one femur bone (Daugnora, Girininkas 1996, p.70) (Table 1). These horse bones were dated to 3560±80 BP (Ki-9466) (2140–1690 cal BC) and 3330±80 BP (Ki-10638) (1870–1440 cal BC). The date of the horse bones is indicative of the Early Bronze Age.

Kretuonas 1B (top layer)

The Kretuonas 1B habitation site was excavated from 1978 to 2001 (Girininkas 2002, p.7ff). A Late Neolithic Narva Culture layer containing domesticated animal bones was found, and among them, 29 bones belonging to three horses (Daugnora, Girininkas 1996, p.27) (Tables 1; 3). The measurements of one of the horse's phalanx proximalis were GL 7.50, Bp 4.92, SD 3.32, and Bd 4.21 cm. The horse bones were radiocarbon dated to 3650±80 BP (Ki-10636) (2280–1770 cal BC). This radiocarbon date is indicative of the Early Bronze Age.

Katra I takos 1

The Katra I takos 1 habitation site was investigated in 1997–1998 (Ostrauskas, Rimantienė 2000, p.61ff). The chronology of this site spans the Late Palaeolithic, Mesolithic, Neolithic, and Early Bronze Age. Much osteological material was found in the site, including possible horse teeth fragments (Table 1). The three fragments were found in different areas of the site and were ascribed to the Late Neolithic – Early Bronze Age. Two obtained radiocarbon dates for the teeth, indicative of the Late Neolithic, are 4060±70 BP (Ki-7619) (2870–2470 cal BC) and 4135±65 BP (Ki-7620) (2890–2500 cal BC).

Table 3. Proportions of domestic animals and horse at Kretuonas 1B (top layer) by zooarchaeological data

SPECIES	NF	MNI
Wild game (TOTAL)	3740	161
Domestic animals:		
Cattle (*Bos Bovis*)	168	15
Sheep/goat (*Ovis Aries/ et Capra Hircus*)	4	2
Pig (*Sus Suis*)	77	7
Dog (*Canis Canis*)	28	4
Horse (*Equus Caballus*) (possibly domestic)	29	3 (9.7 % of domestic animals) (1.6% of total faunal remains)
Domestic animal total	306	31 (16% of all faunal remains belong to domesticated animals)

Table 4. Proportions of domestic animals and horse at Kretuonas 1C by zooarchaeological data

SPECIES	NF	MNI
Wild game (TOTAL)	2641	116
Domestic animals:		
Cattle (*Bos Bovis*)	187	11
Sheep/goat (*Ovis Aries/ et Capra Hircus*)	2	1
Pig (*Sus Suis*)	57	7
Dog (*Canis Canis*)	25	4
Horse (*Equus Caballus*) (possibly domestic)	12	2 (8% of domestic animals) (1.4% of total faunal remains)
Domestic animal total	271	25 (17.7% of all faunal remains belong to domesticated animals)

Kretuonas 1C

Kretuonas 1C was excavated during 1987–1992 (Daugnora, Girininkas 2004a, pp.233-250). A Late Narva Culture layer of the Early Bronze Age containing domestic animal bones and an abundance of artefacts was found therein. Among the domestic animal bones were 12 pieces of horse bones that belonged to two individuals (Tables 1; 4). According to the deciduous teeth and fusion of the epiphyses and diaphyses of the femur and tibia, it was determined that one of the horses died at 1–2 years of age, while the other died at 3–3.5 years of age. The measurements of the first horse's talus (after Von den Driesch 1976) were BFd – 4.58 cm, GB – 5.42 cm, and GH – 5.10 cm. The measurements of the older horse's left talus were BFd – 4.90 cm, GB – 5.13 cm, GH – 5.52 cm, LmT – 5.43 cm (Daugnora, Girininkas 2004a, p. 236). The horse bones were radiocarbon dated to 3460±70 BP (Ki-10102) (1960–1560 cal BC).

Papiškės 4

The Papiškės 4 habitation site was excavated in 1989–1991 (Brazaitis 2004, pp.187-220). Aside from the Mesolithic and Early–Middle–Late Neolithic cultural layers, an Early Bronze Age cultural layer also was found at the site, which was radiocarbon dated to 3685±75 BP (T-10602) (2300–1880 cal BC). Seventeen horse teeth and their fragments, belonging to two individuals, were encountered at the site (Table 1) (Daugnora, Girininkas 2004, p.155).

Dusia 8

The Dusia 8 site was researched in 1990–1995 (Juodagalvis 1999, pp.239-279). This site is dated by cultural typology to the Early – Middle Bronze Age. Three horse teeth, belonging to one individual, were found at the site (Table 1) (Daugnora, Girininkas 2004, p.155).

Discussion

Almost all the horse bones found in Lithuanian territory in early prehistorical sites were encountered in Late Neolithic and Early Bronze Age cultural layers. It must be pointed out, however, that the most reliable horse chronology is that of the actual horse remains that have been radiocarbon dated (those of Šventoji 23, Kretuonas 1D, Kretuonas 1B, Katra I takos 1, and Kretuonas 1C). The Šventoji 23 horse is modern. The other, radiocarbon dated horses, all do date either to the Late Neolithic, or the Early Bronze Age, or the junction of these two periods – a period often termed Eneolithic[2] and also often associated with the earliest horse domestication (see Levine 2005).

Among the domestic animal bones, the amount of horse bones is rather small (see Table 1). The data examined in detail within this article, i.e., available MNI counts, illustrate that horses comprise 6.6 to 9.7% if counted among the domestic animal remains (Tables 2; 3; 4). If horses had lived in the forests at the end of the Atlantic and in the Subboreal climatic periods and

[2] Also called the Copper Age or Chalcolithic, implying the joint use of copper and stone. In general, copper at its first appearance was scarce and certainly not ubiquitous; the term is more a matter of convenience, indicating a transitional period between the Late Neolithic and Bronze Age.

they had been hunted, their percentages among the other zooarchaeological material would likely be larger. This suggests that horses were not a target in the hunt and that the hunting of horses in the Late Neolithic was not practiced.

The archaeological data suggest that wild horses might have lived in the East Baltic in the Preboreal and Boreal. Their numbers, however, were small, because they comprised such a small portion of the zooarchaeological remains – usually from one to seven individuals at the documented sites (Paaver 1965, p.182). Nor were any wild horse remains found on the Deer Island (Oleni' ostrov) burial ground (Gurina 1956, p.160ff). The zooarchaeological material of the Neolithic Kääpa habitation site stands out among East Baltic sites since 21 individuals of horse were found there (Paaver 1965, p.182). But these horse bones found in Latvian and Estonian territories have not been radiocarbon dated, thus their chronological affiliation still is not altogether clear.

Assuming that horses did appear in Lithuanian territory in the Late Neolithic, how and precisely when did this happen? Usually archaeologists indicate that horses appeared in conjunction with Corded Ware Culture inhabitants (Loze 1979, p. 25ff). However, after having analysed all of that time period's burial data known in the East Baltic, there is no evidence that horses were interred with any people in the Late Neolithic (Girininkas 2002a, pp.73-92; Žukauskaitė 2007, pp.71-90). The use of the riding horse for the needs of war or transportation in the forest zone would have been difficult because of the time's environmental constraints. Corded Ware Culture inhabitants of the time might have and likely travelled along water routes (Girininkas 2002a, p.76); it is in such places that the remains of Corded Ware Culture bearers are encountered. They transported goats and/or sheep along with them; the bones of these animals or items manufactured from their bones have been found in Corded Ware Culture graves. Horse bones are more often found in Narva Culture sites, less often in Narva – Corded Ware Culture sites. It is possible that horses were used more extensively for food there, for example, for milk and meat, as per general suggestion (disregarding cultural affiliation) of Gimbutas (1997, p.30), Levine (1998), and Drews (2004, p.169). A recent study's stable carbon and nitrogen isotope values of Late Neolithic Battle Axe and Corded Ware Culture bearers in Lithuanian territory also support the possibility of meat or milk animal protein consumption (Antanaitis-Jacobs *et al.*, forthcoming 2009).

Domestication is an evolutionary process by which humans actually modify the genetic makeup of a population of plants or animals (Haviland 2000, p.283). Marsha A. Levine makes this point regarding horse domestication (2005, p.16ff). There is a difference between horses being domesticated and merely being tamed, as a species cannot be truly domesticated until it will reliably breed in captivity. Taming would likely have been the first step toward domestication (Clutton-Brock 1999). Perhaps this view is worthy of consideration for these early prehistoric Lithuanian horses.

According to the osteological material (by which horses constitute a low percentage of faunal remains) and the archaeological material (the appearance of cheek-pieces), one possibility is that these animals' **gradual** domestication and possible utilization for transportation began in the Late Neolithic and Early Bronze Age.

The measurement data of individual horses provide little information about the stature of that period's horses. The forecannon measurements of the horse bone excavated from the top layer of the Kretuonas 1B site resemble those of the forecannon bone length of the riding horses excavated from the Marvelė cemetery (10th-12th centuries. See: Bertašius' Daugnora 1997). The Kretuonas 1B horse's wither height was 120 cm, i.e., it belonged to a smaller type of horse. The remaining metatarsal bone measurements indicate that these bones must have belonged to slightly more stocky individuals. When compared to the width of the proximal part of the horse metacarpal bones found in the Ver vai cemetery, the horse forecannon bone excavated from Kretuonas 1B belonged to a more stocky horse. The individual phalanx bone measurements are presented in Daugnora's and Girininkas's 1996 book (p.53). By the horse bone measurement data we have from sites dated to the Late Neolithic and Early Bronze Age, we can say that the horses of that time were short, with the wither height reaching up to 120 cm or slightly more. More than 70% of the Late Eneolithic horses at Dereivka in Ukraine and Botai in Kazakhstan stood 136-144 cm at the withers. The horses ridden into battle by Roman cavalrymen typically were 120-155 cm at the withers, and those of American Plains Indians stood about 130-140 cm (Anthony and Brown 2009)

In what is called the latter Neolithic in the East Baltic, Lithuanian territory was on the border of a "Forest Neolithic" and an "Agricultural Neolithic (the Globular Amphora and Corded Ware Cultures)." Lithuanian territory came closer to a pastoral-agricultural culture in the beginning of the Subboreal, when the steppe and forest steppe zone receded north, i.e., the steppe moved into the forest zone (Klimenko *et al.* 2001, p.190ff). That is when neighbouring southern and southeastern Baltic region Forest Neolithic communities found

themselves in the horizon of the Late Neolithic Globular Amphora and Corded Ware Culture communities.

The animal husbandry that was practiced among the Forest Neolithic communities in the Late Neolithic and Early Bronze Age developed along the lines of a "settled" or non-nomadic animal husbandry, presumably because the nomadic pastoral economic model practiced by the Corded Ware Culture bearer communities was likely not suitable in forest conditions. That would explain why horse bones are found in the habitation sites of the Narva and Nemunas Culture communities, and not in exclusively Corded Ware Culture sites.

When investigating East Baltic Late Neolithic forest zone sites, it is noticeable that the Corded Ware Culture communities had ties with the Forest Neolithic communities of the Late Narva, Nemunas, and Bay Coast Cultures who lived alongside them. Whether these relations were peaceful or strained it currently is difficult to say, but during archaeological investigations almost always the Corded Ware Culture material is found together with other, Forest Neolithic material. This suggests that the Corded Ware Culture bearers would stay in places already adapted for residence; they even appear to have buried their dead in the burial grounds of the Forest Neolithic communities (Loze 2006, p.313ff; Zagorska 2006, p.103ff), that is if they passed away when not in transit. Perhaps they were mediators who spread the concept of using the horse for transportation? The view suggested by the sites that have been excavated is that Corded Ware Culture bearers did not live in one place for a long time and were not settled farmers. If the opposite were true, the sites' cultural layers and zooarchaeological material found within them would be more pronounced. The plausible view suggested by the material remains of Corded Ware Culture sites is that in the forest zone, these people lived a half-nomadic life, subsisted from trading, and organized themselves in places where rich resources of raw materials could be extracted. This view also would explain why their burial sites so often are found near rivers, lake channels, or the seashore (Girininkas 2002a, p.76), i.e., alongside transit routes.

Currently, the most recent research regarding the world's earliest horse domestication (at 3500 BC of the Chalcolithic Botai Culture in Kazakhstan) examined bitwear, the relative gracility of domestic horse shin bones or metacarpals, and the presence of horse milk fat lipids on the insides of ceramic pots to support arguments regarding horse domestication (Outram *et al.* 2009). We are hopeful that future research of the earliest horse domestication in Lithuania and the East Baltic can include additional similar approaches, from various lines of evidence, including DNA studies.

Conclusions

1. Based on zooarchaeological research data, bones of horses, possibly domestic, spread with other domesticated animal bones in Lithuanian territory in the Late Neolithic and Early Bronze Age. Horse bones are only encountered in those sites where domesticated animal bones are found.

2. Lithuania's Late Neolithic and Early Bronze Age horses were short. Their wither height might have reached 120 cm. The age of the horses found at investigated habitation sites was 1–3.5 years.

3. The utilization of the horse for transport might have been expedited as a result of environmental changes, when the forest-steppe zone spread northward during the Subboreal and the forested territory of Lithuania grew closer to the forest-steppe zone in which horses were used for transportation.

4. The archaeological and zooarchaeological material does not prove that the possibly domesticated horses spread only as a consequence of Corded Ware Culture bearer activities. The domestication of horses in Lithuanian territory could have occurred over a long period of time, for example, by way of cultural diffusion. Perhaps the Bay Coast, Narva, and Nemunas Culture bearers gradually adopted the idea of using the horse for transport from the Globular Amphorae Culture inhabitants in the forest steppes if not from the same Corded Ware Culture inhabitants.

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Algirdas Girininkas
Klaipėda University,
Institute of Baltic Sea Region History and Archaeology
Herkaus Manto street 84
LT-92294 Klaipėda
Lithuania
E-mail: algisg@post.skynet.lt

Linas Daugnora
Klaipėda University,
Institute of Baltic Sea Region History and Archaeology
Herkaus Manto street 84
LT-92294 Klaipėda
Lithuania
E-mail: daugnora@gmail.com

Indrė Antanaitis-Jacobs
Corresponding author
Klaipėda University,
Institute of Baltic Sea Region History and Archaeology
E-mail: indreaj@hotmail.com

KADA LIETUVOJE PASIRODĖ PRIJAUKINTI ARKLIAI?

Algirdas Girininkas, Linas Daugnora, Indrė Antanaitis-Jacobs

Santrauka

Lietuvos teritorijoje vėlyvojo neolito – ankstyvojo bronzos amžiaus laikotarpiu žinoma 13 gyvenviečių (1 pav.), kuriose buvo aptikta arklių kaulų. Ar tai buvo laukinių ar naminių arklių kaulai, tiksliai galima bus atsakyti tik ateityje, atlikus detalius mokslinius tyrimus. Šiuo metu sukaupti osteoarcheologiniai duomenys įgalina nustatyti jų radimo vietų priklausomumą kultūriniu ir chronologiniu požiūriu.

Remiantis osteologinės medžiagos tyrimų duomenimis, naminių arklių kaulai Lietuvos teritorijoje išplito kartu su kitų naminių gyvulių kaulais vėlyvuoju neolito ir ankstyvuoju bronzos amžiais (1–4 lent.). Arklių kaulų aptinkama tik tose gyvenvietėse, kur randama ir naminių gyvulių kaulų (2 pav.). Lietuvos vėlyvuoju neolito ir ankstyvuoju bronzos amžiais arkliai buvo žemi. Gogo srityje jų ūgis galėjo siekti 120 cm ar šiek tiek daugiau. Gyvenvietėse aptinkamų arklių amžius siekė 1–3,5 m.

Arklių naudojimas transportui galėjo paspartėti dėl gamtinių pokyčių, kai subborelio laikotarpiu miškastepių zona prasiplėtė šiaurės kryptimi ir miškinga Lietuvos teritorija tapo netolima miškastepių zonai, kurioje arkliai buvo naudojami transportui.

Archeologinė ir zooarcheologinė medžiaga neleidžia tvirtinti, kad prijaukinti arkliai išplito tik dėl virvelinės keramikos kultūros gyventojų veiklos. Arkliai ir jų jaukinimas Lietuvos teritorijoje galėjo vykti ilgai – kultūrinės difuzijos būdu Pamarių, Narvos, Nemuno kultūroms perimant arklių naudojimo transportui idėją iš miškastepių teritorijose gyvenusių rutulinių amforų ir tų pačių virvelinės keramikos kultūros gyventojų bei panaudojant miškuose gyvenusius ar atvarytus iš miškastepių arklius.