MIGRATION PERIOD ANIMAL REMAINS FROM THE 1966 EXCAVATIONS OF TREBY BORG (ÖLAND, SWEDEN)

NÉPVÁNDORLÁS KORI ÁLLATMARADVÁNYOK TREBY BORG (ÖLAND, SVÉDORSZÁG) 1966-OS ÁSATÁSÁBÓL•

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Abstract

This paper summarizes the first archaeozoological results of a project aimed at investigating a period of climate change in Scandinavia, which coincided with a societal crisis between 300–700 CE. Research is carried out in a clearly defined geographical area, the island of Öland in the Baltic Sea. We will study one of the more prominent features of Ölandic societies at that time, so-called ringforts whose exact function is still to be understood. A well-known example of these features is the settlement of Eketorp, fully excavated in the 1960s. The material studied here comes from the 1966 excavation of a house from the nearby ringfort of Treby borg. It is the time of the excavation that connects the two sites: half a century ago, animal bones were collected by hand, evidently influencing the resolution of recovery. Thus, two sites can be reliably compared to each other, rather than to future materials resulting from the extensive use of sieving. The majority of large bones retrievable by hand include those of domesticates, especially bovids. Pigs also played a role in meat provisioning. The evidence of hunting is practically absent, which makes the occurrence of a wild boar tooth even more interesting. All this information will be integrated with future results within the framework of the interdisciplinary project.

Kivonat

Ez a tanulmány egy olyan projekt első régészeti állattani eredményeit foglalja össze, amelynek célja egy éghajlatváltozási időszak vizsgálata Skandináviában. A Kr. u. 300 és 700 közötti évszázadok egybeestek az akkor zajló társadalmi válsággal. A kutatás egy jól körülhatárolt területen, a balti-tengeri Öland szigetén zajlik. Ott a korabeli társadalmak egyik legkiemelkedőbb jellegzetességét, az úgynevezett körerődöket célozza, amelyek pontos szerepe mindmáig ismeretlen. Ezek egyik jól ismert példája Eketorp, amelyet az 1960-as években tártak fel. Az itt vizsgált anyag a közeli Treby borg körerődítményében található ház 1966-os ásatásából származik. Ezt a két lelőhelyet a feltárások ideje köti össze: fél évszázada még csak kézzel gyűjtötték az állatcsontokat, ami nyilván befolyásolja az adatok pontosságát. Következésképpen, míg ez a két lelőhely egymással jól összehasonlítható, a mai ásatások a szitálás széles körű használatának köszönhetően más összetételű leletanyagokat eredményeznek. Az itt vizsgált leletegyüttesben a kézzel gyűjtött, nagyméretű csontok többsége háziállatoké, különösen kérődzőké, de a sertések is szerepet játszottak a húsellátásban. Vadászatra utaló leletek lényegében nincsenek, ami az egyetlen vaddisznómaradványt még érdekesebbé teszi. Ezeket az megfigyeléseket a jövőbeli eredményekkel az interdiszciplináris projekt keretében vetjük majd egybe.

KEYWORDS: ARCHAEOZOOLOGY, CLIMATE CHANGE, RING-FORTS, INTERDISCIPLINARY RESEARCH

KULCSSZAVAK: RÉGÉSZETI ÁLLATTAN, KLÍMAVÁLTOZÁS, KÖRERŐDÖK, INTERDISZCIPLINÁRIS KUTATÁS

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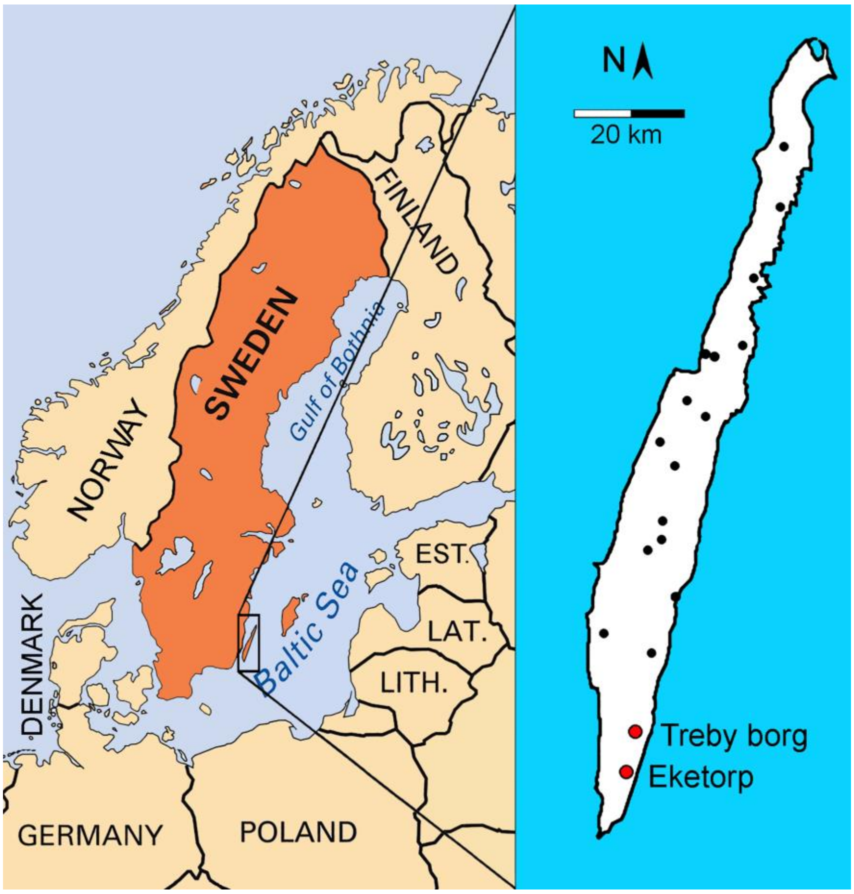

Fig. 1.: The locations of Treby borg and Eketorp on the southern tip of Öland

1. ábra: Treby borg és Eketorp elhelyezkedése Öland déli részén

Introduction

The Migration Period (370–550 CE) was a turbulent time in Europe. The gradual collapse of the Western Roman Empire, invasions by Huns and various Germanic tribes as well as the deterioration of climate after 536 CE had far-reaching on societies across Europe, including Scandinavia (Lund Hansen 1987; Büntgen et al. 2016; Arjava 2005; Gräslund 2007; Anagnostou et al. 2024). A current project, titled "*Crisis, conflict and climate – societal change in Scandinavia 300–700 CE*", has addressed various dimensions of this complex phenomenon. The island of Öland, only about 5 km off the mainland across the Kalmar Strait in the Baltic Sea was selected as the area of investigations due to its clearly defined natural boundaries.

The area of Öland is 1342 km^2, with a length of 137 km, that is its average width of the island is only 10 km. The highest point is Högsrum, rising 55 m above sea level (**Fig. 1**). A special geological feature, *Stora Alvaret*, is a 37 km long and 15 km wide barren limestone terrace in the southern half of the island (Gidstam 1998), being the world's largest contiguous biotope of this type. The thin soil and limestone make it suitable mostly for grazing and haymaking. Additional habitats include coastal meadows, another important scene for grazing. The rest is covered by a mosaic landscape that includes a mixture of deciduous forest, hazel-dominated bushland, as well as calcareous bogs and pastures. Öland's contemporary environment is characterised by a unique agricultural landscape shaped by the climate, the limestone bedrock and a long history of human exploitation, mainly through grazing. In 2000, the *Agricultural Landscape of Southern Öland* was granted the World Heritage Site status (UNESCO 2000).

In spite of the more northerly latitude, the climate of Öland's northern section is milder than the south, since daytime warm air over the nearby landmass is better retained by the sea during the night. The south, where the two settlements under discussion are located is relatively cooler as the island narrows into a pointed tip (Areskog 1941).

A zoological, albeit episodic curiosity of Öland's history is that it served as royal game reserves beginning with the late Middle Ages and became an officially designated royal game park between 1569–1801. During this period, islanders did not own their land and had limited hunting rights.

Fig. 2.: Coat of arms granted to Öland in the late Middle Ages, visually referring to its status as a game reserve (Wikimedia Commons CC BY-SA 3.0)

2. ábra: Öland késő középkorban adományozott címere képileg is utal a sziget akkori vadrezervátum voltára (Wikimedia Commons CC BY-SA 3.0)

The coat of arms, granted to Öland in 1560, originally showed a stag, but was transferred to the island of Åland in 1569. In 1944, a red collar was added and the antlers and claws were colored red in the Öland coat of arms to distinguish it from that used by Åland (**Fig. 2**). Human use of the landscape, which was protected for part of the island's history, still plays a central role in shaping the current environment.

Archaeological research is focused on the abandonment of some 15 known ring-forts on the island, as a putative symptom of multiple crises during the Migration Period. It must be noted, however, that interpretations of these stone constructions have strongly varied. While the term 'fort' has military connotations, in addition to a possible defensive function other uses need to be also considered. According to Fallgren (2009, 40), the prehistoric ring-forts should not be necessarily seen as elite settlements inhabited by people who exploited their respective settlement districts: from this point of view, they cannot be compared to the medieval fortified manors provisioned by farmers in the surrounding areas. "Despite … their high walls and relatively large dimensions, the biggest of the Iron Age farms in the agricultural areas would only just fit inside one of the very largest forts" (Fallgren 2009, 41). There are several signs that make researchers to conclude that the ring-forts on Öland functioned as sites for various meetings and communal events (e.g. Stenberger 1933, 242; Näsman 1976, 51) as important central places for the surrounding villages (Fallgren 2009, 46-47).

Jun. 8 ÖLAND. Ottenby. Halterstad. 93

Gårdar lågo här några stycken på de ställen af Allwarden, hwaräst jorden är djupare och landet mera högländt: ty på de sidlänte ställen af Allwarden står watnet öfwer alt, winter wåhr och höst.

Allwarden war intet deld til wißa Sochner eller Byar, om man undantager deße små gårdar, som lågo på sidan, altså ei eller afstängd med gärdesgårdar alt ifrån Ottenby Mur, in til Borgholms Slott; dock hålla hästarna sig, som här gå i bet, på den tracten de äro wane.

Gräsgårds Giästgifwaregård låg ¼ mihl ifrån Ottenby, men efter wår krotresa långt längre; där sågs ett stort och frodigt Folk, klädt efter gammalt åhrligt mode, med stora wida byxor och med en twärfingers bred flik, där armen fästes wid lifwet på tröjan.

Trebyborg låg ei långt ifrån wägen på högra handen: ty reste wi honom at bese; Denna Borg låg på Allwarden, och war hopsatt af 3 mindre Borgar ställde i rad: then första war minst, den medlersta störst, den nordaste medelmåttig; murarna hafwa i honom warit 8 alnar breda; altså sielfwa Borgen tämmelig fast at pågå; wid inre sidan af muren sågs rudera efter kamrar, i hwilka folket ofelbart haft sina nattläger.

Seger-

Fig. 3: Linnaeus' sketch of the triple ringfort of Treby borg (Linnaeus 1745)

3. ábra: Linné vázlata Treby borg hármas körerődjéről (Linnaeus 1745)

Material and Method

The triple ring-fort of Treby borg has been known for a considerably long time; it appears in Linnaeus' account (**Fig. 3**) when he travelled to Öland in May 1741 accompanied by his students from Uppsala University (Linnaeus 1745). The animal remains discussed in this paper originate from the excavations at a small section of the triple stone construction. An authentic archaeological site plan (**Fig. 4**) was published in Mårten Stenberger's PhD thesis (Stenberger 1933). Treby's three conjoined ring-forts revealed 76 house foundations, placing it somewhere between the medium-sized and the large ring-fort s on Öland in Fallgren's (2009, 29) classification. The exact chronology of the ring walls defining the three spatial units is unknown. The structure suggests that the central section may have been built first, but it is impossible to tell how soon the additions were made.

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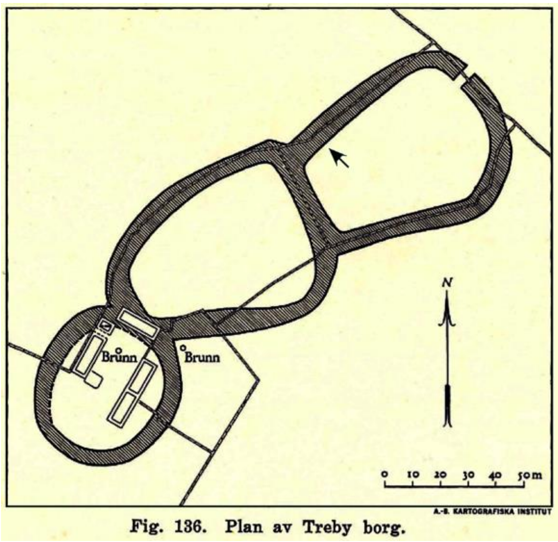

Fig. 4: The site plan of Treby borg (Sternberger 1933). The remains of a modern farmstead are shown in the SW section. The small arrow was added to indicate the approximate place of the 1966 excavation in the NE section

4. ábra: Treby borg helyszínrajza (Sternberger 1933). A délnyugati egységben modern kori tanya maradványai láthatók. Az utólag berajzolt nyíl az 1966-os ásatás hozzávetőleges helyét jelzi az északkeleti egységben

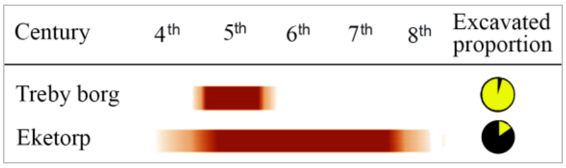

Fig. 5: The chronological positions of Treby borg and Eketorp and the approximate degree of excavation at the two sites (the black slices of the pie charts)

5. ábra: Treby borg és Eketorp időrendi helyzete és a két lelőhelyen végzett feltárások hozzávetőleges aránya (a kördiagramok fekete szeletei)

The excavations of limited extent were carried out at the site by Birgitta Skarin Frykman in 1966, as a spin-off of the large-scale Eketorp project. The site is located only 6.72 km north of that famous, almost fully excavated ring-fort, part of a UNESCO World Heritage Site. Chronologically, Treby borg represents Eketorp's I (300±50 to 500±50 CE) and II (400±50 to 700±50 CE) phases (**Fig. 5**). Based on its distance from the ring-forts at Eketorp and Triberga as well as its location in relation to neighboring agrarian settlements, Treby borg may have been used by three different settlement districts (Fallgren 2009, 37).

In this report, the material will be interpreted along two non-derived (i.e. direct, empirical) measures:

- The number of identifiable specimens (NISP henceforth) is conventionally used in the specialist literature but is biased by both fragmentation and redundancies caused by the possibility that several bone specimens (and their disparate fragments) originate from the same individual.
- Specimen weights partially compensate for the bias caused by fragmentation and due to the correlation between the weight of the skeleton and the entire body; they may be seen as a better proxy to meat consumption than NISP. However, the specific weight of bones may be influenced by the state of preservation (leaching vs fossilization).

Based on highly fragmented and commingled food remains reconstructing the contradictory minimum number of individuals (MNI) can be laden with inaccuracies (Bartosiewicz & Bonsall 2018) and was not attempted in this report. It is a method that is useful in the evaluation of special deposits such as multiple animal burials.

Due to the high fragmentation of the material, series of at least three adjacent lower cheek teeth were not consistently available for the precise dental ageing of livestock (Grant 1982). However, information on tooth eruption as well as wear on loose teeth was taken into consideration whenever possible. The epiphyseal ageing of postcranial skeletal elements was carried out when the degree of fusion was recognizable (Chaix & Méniel 2001). An important caveat in epiphyseal ageing is that the missing epiphysis of incomplete bones might show a different degree of fusion. Such fragments, therefore, provide only a *terminus post quem* estimate in the case of elements whose absent epiphysis may be fusing later (Bartosiewicz 2017). As epiphyseal age depends on the environment, including nutrition (influenced by latitude/climate), the ages identified were not expressed in absolute (years) but in biological terms (juvenile, subadult, etc.). This also facilitates the comparison of age distributions between different species.

Due to heavy fragmentation, only 17 mammalian bones were found in a measurable condition (cattle: n=3, sheep: n=8, pig: n=4, horse: n=1, wild boar: n=1). The metric analysis of these specimens was therefore postponed until a statistically viable data base can be built up using several ringfort assemblages within the framework of the project.

Table 1.: The taxonomic composition of mammalian remains
1. táblázat: Az emlősmaradványok rendszertani összetétele

Taxon	NISP	Weight, g	NISP, %	Weight, %
Cattle (*Bos taurus* L., 1758)	197	1910.5	32.6	65.5
Sheep (*Ovis aries* L., 1758)	24	88.0	4.0	3.0
Sheep or goat (Caprinae Gray, 1852)	212	323.1	35.1	11.1
Domestic pig (*Sus domesticus* Erxl. 1777)	151	515.3	25.0	17.7
Wild pig (*Sus scrofa* L., 1758)	1	3.9	0.2	0.1
Horse (*Equus caballus* L., 1758)	3	66.6	0.5	2.3
Mountain hare (*Lepus timidus* L., 1758)	4	7.0	0.7	0.2
Vole sp. (*Microtus* sp.)	2	1.0	0.3	0.0
Water vole (*Arvicola amphibius* L., 1758)	10	1.9	1.7	0.1
Identifiable	**604**	**2917.3**	**100.0**	**100.0**
Large ungulate	280	454.8		
Small ungulate	256	158.0		
Non-identifiable	**536**	**612.8**		
Total	***1128***	***3527.2***		

Results and Discussion

The hand-collected material brought to light during the 1966 field season contained 1154 specimens (3538.6 g), not including a single femur diaphysis fragment from a human. The overwhelming majority of animal remains (NISP=587, 2903.5 g) were attributable to domestic livestock that apparently served as a main source of meat in the single house excavated in 1966. Sporadic remains of hare, a few bird bones and possibly intrusive rodents do not modify this overall picture.

A special result of the analysis of animal remains was the discovery of a human femur diaphysis fragment amongst the ordinary-looking refuse bone material. The detailed evaluation of this isolated fragment is beyond the scope of zooarchaeological studies. From a taphonomic point of view, however, it is interesting that no other human remains were found in the small section of the settlement excavated in 1966. None of the non-identifiable large animal bones stood out as having a special structure, reminiscent of human bones. The random occurrence of the human femur may be considered a taphonomic red flag, indicating that considerable re-deposition of the osteological material may have taken place at the settlement.

The mammalian animal remains are summarized in **Table 1**. Due to their different anatomical as well as taphonomic properties (Bartosiewicz & Gál 2007), the small set of bird remains recovered from the site will be discussed separately. While the taxonomic composition of the material lends itself to relatively easy interpretation, the quality and quantity of non-identifiable bone fragments is also of key importance in characterizing zoo-archaeological assemblages. The proportions of identifiable vs non-identifiable mammalian remains (both by specimen numbers and weights) are shown in **Fig. 6**. This is an important taphonomic indicator as hand-collection tends to increase the proportion of identifiable remains of larger species.

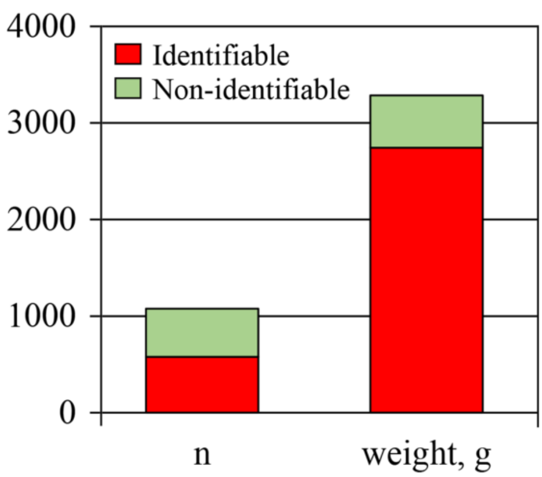

Fig. 6: The numbers and weights of identifiable vs non-identifiable specimens

6. ábra: A meghatározható és nem meghatározható példányok száma és tömege

The simple graph of average fragment weights for each taxon (**Fig. 7**), calculated from the values of **Table 1** clearly shows that high fragmentation stood in the way of taxonomic identification in most cases, as identifiable bones (relevant to archaeological interpretation) were on average far heavier than the numerous small fragments that could not be assigned to taxonomic categories beyond the generic "large" (cattle/horse) and "small" (sheep/goat/pig) ungulate group. Notable outliers in **Fig. 7** include horse, whose rare but large remains are an indirect indication that horsemeat was probably not consumed in the studied section of the site. The other outlier is a single lower cheek tooth (M_3) of a wild boar (**Fig. 8**), which was heavier that the average weight of heavily butchered cattle bones. Notably, the identifiable remains of sheep and domestic pig, on average, weighed largely the same.

The figures discussed so far indicate that meat consumption in the excavated section of the settlement was primarily based on domestic bovids (cattle and sheep), but pork also played a role in the diet. Parallels to the 1966 material from Treby borg are found in the monographic analysis of faunal remains from nearby Eketorp, a publication of ground-laying importance (Boessneck et al. 1979). There are two chronological units relevant from the viewpoint of Treby borg. A smaller, somewhat mixed assemblage labelled phase I–I/II, and the overwhelming majority of remains assigned to phase II (NB: phase I = ca 300–500 CE; phase II = ca 400–700 CE). The major medieval component of the faunal assemblage from Eketorp cannot be discussed here. Thanks to their quantities (especially with regard to phase II); these materials can serve as a reliable background against which the animal remains from the 1966 excavations of Treby borg can be interpreted. However, it is important to keep in mind that one is dealing with assemblages of very different sizes, whose percentual compositions cannot be compared directly without considering the major differences in NISP.

A fundamental similarity between the Treby borg and Eketorp materials is the overwhelming reliance on meat from domestic livestock. Even in the large Eketorp II assemblage, the remains of wild animals occur but sporadically. Bones of large game may often originate from import such as antler fragments of European elk (*Alces alces* L. 1758), used as raw material in manufacturing at Eketorp.

The relatively small size of Öland probably offered limited space for large game habitats as long as land cultivation and grazing were practiced.

The percentual contributions of the three major groups of livestock in all three assemblages can be compared in **Fig. 9** by specimen numbers (top) and weights (bottom). The proportion of cattle NISP varied considerably between the three assemblages making up about one third or half of the fragments originating from the three compared taxa. The relative number of caprine bones showed similar oscillations, reaching almost half of the total during phase II of Eketorp. The smallest component by fragment numbers was pig, best represented in the Treby borg collection. The few fragmented pig remains from Eketorp I-II, did not contribute visibly to the percentages of bone weights. These proportions could be tested using non-parametric statistics and have proven to be significantly different between the three assemblages of different sizes (χ^2=286.035, df=4, p=0.000).

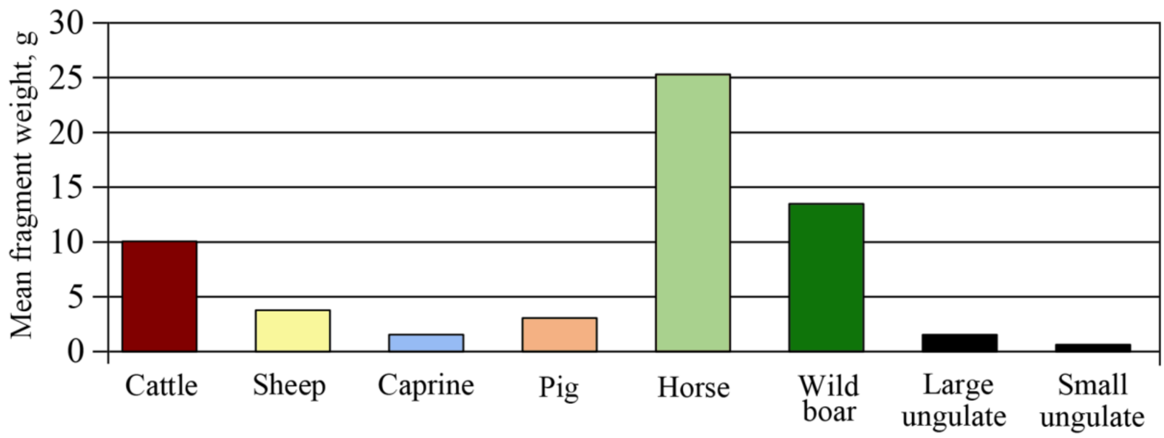

Fig. 7: The mean fragment weights (g) of various mammalian taxa

7. ábra: Különböző emlős taxonok átlagos töredéksúlya (g)

Fig. 8: Buccal view of the wild boar M_3 tooth from Treby borg. Measurement scale: 50 mm

8. ábra: A Treby borgból származó vaddisznófog arcfelőli nézete. Mérce: 50 mm

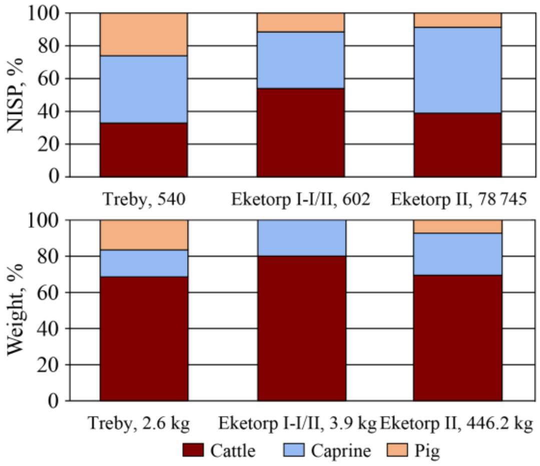

Fig. 9: Livestock species in hand-collected assemblages from Treby borg and two phases of Eketorp by specimen numbers (top) and bone weights (bottom, kg)

9. ábra: Haszonállatfajok Treby borg és Eketorp két fázisának leletanyagában darabszám (fent) és csonttömeg (lent) szerint

Fig. 10: Cervical vertebra of a sheep showing a clear butchering mark left by a sharp metal blade. Measurement scale: 50 mm

10. ábra: Juh nyakcsigolyája, éles fémpenge okozta vágásnyommal. Mérce: 50 mm

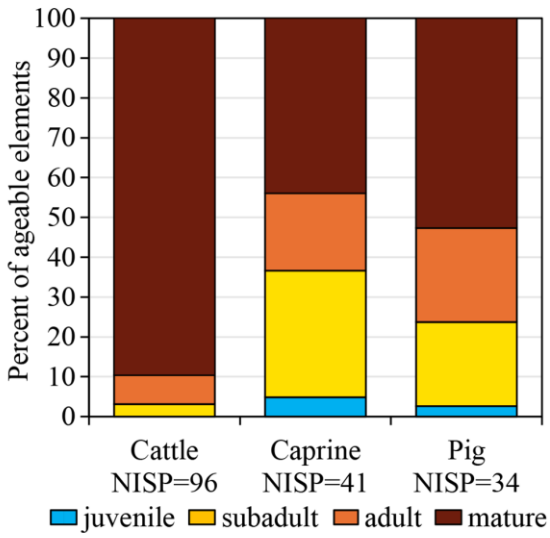

Fig. 11: The distributions of ageable livestock remains from Treby borg

11. ábra: Treby borg meghatározható korú haszonállat-maradányainak százalékos eloszlása

A parallel comparison between bone weights in **Fig. 9** (bottom) shows that beef was of overwhelming importance in feeding the community of Treby borg, making up 70% of the meat represented by the 1966 excavation of the settlement. This is congruent with the 70–80% contributions calculated for Eketorp. Unless large-scale preservation (salting or smoking) is assumed, slaughtering large livestock such as cattle (or horse) is only profitable when a relatively large group of people is concentrated at the place of consumption.

This may have been the case in the ring-forts studied, whatever the actual function of the stone 'fortification' was. In comparison, a smaller mass of mutton was eaten in the studied area of Treby borg. However, this species yielded one of the most spectacular butchering marks. The fourth cervical vertebra of a sheep was completely cut across using a very sharp metal blade. The cut surface is very clear and flat. The use of metal tools is unsurprising by this historical time. However, the sheer force and direction of hacking are noteworthy. It is unlikely that the animal was killed by this cut, the mark looks rather than an indication of carcass partitioning (**Fig. 10**).

The overwhelming majority of cattle remains originate from adult and mature individuals. Longevity is a clear indication of exploitation for renewable secondary products such as milk and draught power. In both caprines and pig only about half of the ageable remains fall into the mature category, although over three quarters of the pig bones also come from adult and mature individuals (**Fig. 11**). However, the difference between the age distributions of caprines and pig is not significant in statistical terms (χ^2=1.576, df=3, p=0.665), in part possibly due to the small number of ageable bones (NISP<100). In both groups the contribution of juvenile and subadult elements is relatively small, but still larger than in the case of cattle.

Uerpmann (1973: 316) grouped skeletal elements into three meat quality categories of decreasing "value" (A, B, C) based on the associated relative meat content. **Table 2** shows the anatomical composition of mammalian taxa (with the exception of probably intrusive rodents) by this practical grouping. While Uerpmann's system does not account for the demonstrable cultural diversity in the appreciation of various cuts (Bartosiewicz 1997), it offers a practical perspective on meat consumption. At Treby borg, the three economically important domestic taxa (cattle, caprines and pigs) show a remarkable homogeneity in the distribution of their bones across Uerpmann's meat quality categories (on average: A=31%, B=41%, C=28%), with no statistically significant difference between these proportions in cattle, caprines and pigs (χ^2=1.144, df=4, p=0.884). Some deviations from the basic pattern seem taphonomic in nature. For example, high fragmentation is typical of caprine tibia diaphyses, while pig humeri seem to be remarkably well-preserved.

Caprine remains dominated in the assemblage by NISP (39.9%) but yielded only 14.1% by weight. However, eating mutton seems to have gained in importance by phase II in Eketorp, while it was relatively less significant in the diet of the studied part of Treby borg: at the excavated part of this latter settlement (in addition to the unquestionable dominance of beef), pork contributed relatively most to the meat diet among the three materials compared. Although pork undeniably played some role during phase II of Eketorp as well, it was less important. Moreover, it was almost completely missing from the relatively small assemblage from Eketorp's earlier phase. Given its biological properties, in comparison with bovids, domestic pig requires most care-giving in cold climates. Piglets born early in the year need protection from the cold and after weaning would prefer grazing in high energy forests and/or freshwater marshland habitats, not typical of the natural environment in the Great Alvar. Pigs may have thrived better in close proximity to humans, including the settlement itself, possibly within the ring-fort where, in addition to shelter, omnivorous domestic pigs found human food refuse and agricultural by-products to subsist on. In this scenario, not even the consumption of faeces can be ruled out.

Similarly to domestic pigs, their wild ancestors prefer forested wetland habitats. In the absence of bushy vegetation, large wild pigs would be quite visible in the landscape. They often emerge as serious competition to sedentary communities causing crop damage or even posing physical threat to humans, especially when wild sows protect their young. This is why the large lower molar tooth found at Treby borg (**Fig. 12**) is of particular interest. The estimated withers height of the extant wild boar, whose jaws are shown in the picture (KO–237, *Osteologiska forskningslaboratoriet*) was calculated from five different skeletal elements as 89.8 cm (Teichert 1969). Judged by the length of its lower third molar tooth, the individual from Treby borg was evidently larger. The withers heights of extant wild boar range between 70–100 cm, averaging 94.6 cm (n=158) in Central Europe (Faragó 2002, 366–367). Even if phenotypic size is not a reliable taxonomic variable, the 45.7 mm greatest length of the M_3 tooth from Treby borg exceeds the 40 mm minimum value reported for wild boar in Central Europe (Bökönyi 1995) and fits well within the ranges of measurements of Mesolithic wild boar teeth from southern Scandinavia (**Fig. 13**; Magnell 2004).

Even if some local habitats in southern Öland may have been suitable for wild pig, it is unlikely that the island could have sustained major populations without conflicts with local farmers. Hunting did not play a noteworthy role in meat provisioning at Treby borg (similarly to phase II at Eketorp, represented by tens of thousands of identifiable animal remains). Given the relative proximity of the mainland (ca 5 km across the Kalmar strait), it is a question whether strong individuals may have swum onto Öland or stragglers walked across the ice when the sea was occasionally frozen. Pieces of wild pigs may also have been imported by humans. These competing hypotheses remain to be tested during the project.

While the evidence of large game at Treby borg is limited to the previously discussed single boar tooth, sporadic remains of hare indicate that the wild fauna played a supplementary role in meat consumption. This also holds true for the fourteen bird bones (weighing a total of 8.5 g) that could also be identified in the hand-collected 1966 assemblage (**Table 3**). Sieving tends to increase the accuracy of recovering small bird bones.

All avian species listed in this table are edible, although in the absence of cutmarks their consumption cannot be directly proven. Crows (whose species-level identification was impossible) are important commensal birds that may have died a natural death on site. The rest of the birds represent a broad range of grassland, woodland and marine habitats and were likely taken to the settlement by humans. Tern, smew, and common shelduck are temporary spring and autumn visitors, although they sometimes overwinter on the island. The rest may be considered resident species.

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Table 2.: The anatomical composition of mammalian remains (except rodents) by Uerpmann's (1973) meat quality categories

2. táblázat: Az emlősmaradványok anatómiai összetétele (kivéve rágcsálók) Uerpmann (1973) húsminőségi csoportosítása szerint

Element NISP	Cattle	Caprine	Sheep	Pig	Hare	Horse	Wild boar	Large ung.	Small ung.	Total
atlas	1	2		1						4
cervical vert.	5	2		4				1		12
thoracic vert.	11	4		3				5	1	24
lumbar vert.	6	6		3						15
sacral vert.	2	3		1						6
scapula	15	13		4				9	1	42
humerus	7	6		10	1			2	1	27
pelvis	6	5								11
femur	4	32		21				1	8	66
Total A	**57**	**73**		**47**	**1**			**18**	**11**	**207**
mandibula	10	9		2						21
costae	33	23		18				72	34	180
radius	10	12		7						29
ulna	6			3						9
tibia	25	52	2	24						103
fibula				3						3
Total B	**84**	**96**	**2**	**57**				**72**	**34**	**345**
skull	9	3	2	14	1			4	1	34
teeth	32	18	4	6		1	1			62
carpals	1	1		3						5
metacarpus		4	3	7						14
phalanx prox.		1	3	4	1	1				10
phalanx media	1	1	1	4						7
phalanx dist.	1			2						3
sesamoid	1									1
astragalus	2		3	1						6
calcaneus	2				1					3
centrotarsale	1			1						2
metatarsus	6	9	6							0
Total, C	**56**	**37**	**22**	**42**	**3**	**2**	**1**	**4**	**1**	**168**
long bone		6		5				77	134	222
flat bone								109	68	177
Total	**197**	**212**	**24**	**151**	**4**	**2**	**1**	**280**	**248**	**1119**

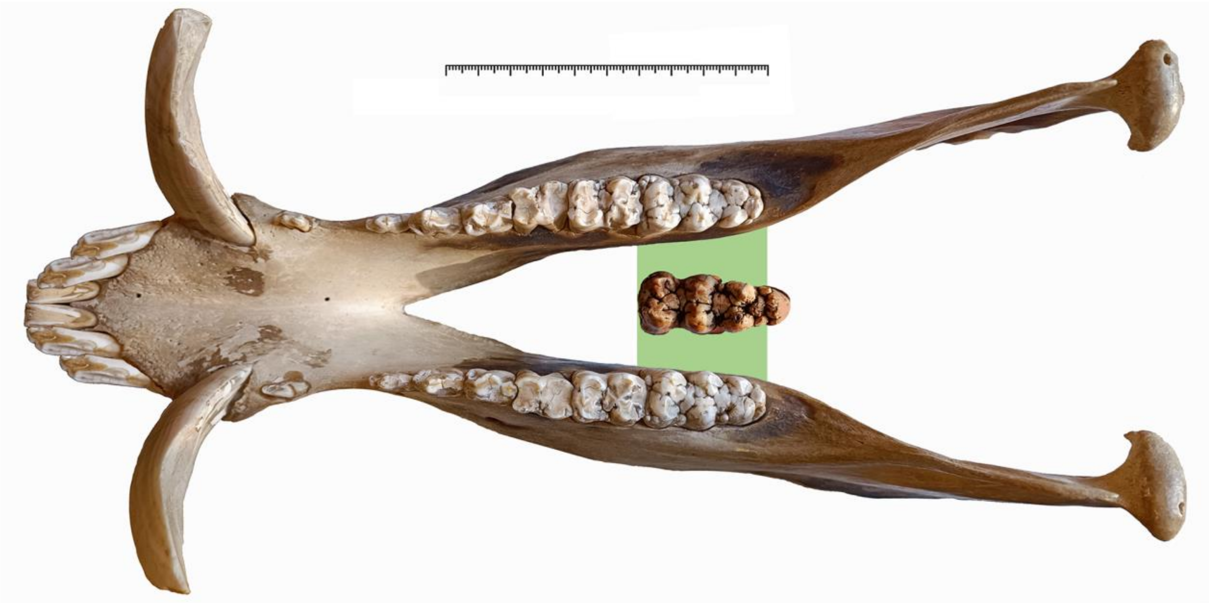

Fig. 12: Occlusal view of the wild pig tooth from Treby borg (centre) compared to the mandible of a fully grown extant wild boar (KO–237, Osteologiska forskningslaboratoriet). The length of extant M_3 teeth is indicated by shading. Measurement scale: 100 mm

12. ábra: A Treby borgból származó vaddisznófog rágófelületi nézete (középen) kifejlett mai vadkan (KO–237, Osteologiska forskningslaboratoriet) állkapcsához viszonyítva. A mai M_3 fogak hosszát árnyalás jelzi. Mérce: 100 mm

Table 3: The taxonomic composition of avian remains

3. táblázat: A madármaradványok rendszertani összetétele

Taxon	NISP	Weight, g
Tern (*Sterna hirundo* L., 1758)	1	0.1
Smew (*Mergellus albellus* L., 1758)	1	0.2
Woodcock (*Scolopax rusticola* L., 1758)	1	0.3
Hazel grouse (*Tetrastes bonasia* L., 1758)	4	0.8
Common shelduck (*Tadorna tadorna* L., 1758)	1	3.5
Crow (*Corvus* sp.)	2	1.3
Identifiable	**10**	**6.2**
Duck family (*Anatidae*)	1	0.8
Bird, general (*Aves*)	3	1.5
Non-identifiable	**4**	**2.3**
Total	***14***	***8.5***

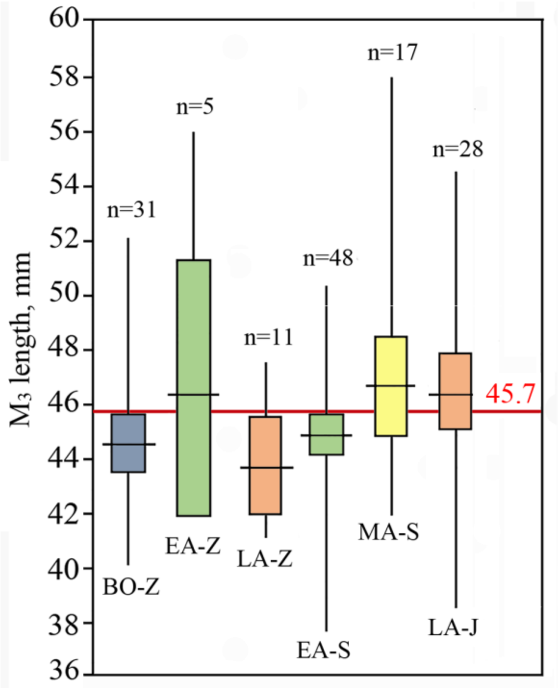

Fig. 13: The length of the wild boar tooth from Treby borg (red line) compared to wild boar tooth measurements from southern Scandinavia (Magnell 2004, 121, Fig. 3). Dating: BO – Boreal, EA – Early Atlantic, MA – Middle Atlantic, LA – Late Atlantic/Early Subboreal. Geographic areas: Z – Zealand, S – Scania, J – Jutland. Magnell's data show the mean, range and standard error (95% confidence interval) of the lower third molar teeth

13. ábra: A Treby borgból származó vaddisznófog hossza (vörös vonal) összehasonlítva a dél-skandináviai vaddisznófogak méreteivel (Magnell 2004, 121, 3. ábra). Korszakok: BO – boreális, EA – korai atlanti, MA – középső-atlanti, LA – késői atlanti/korai szubboreális. Földrajzi területek: Z – Sjælland, D – Skåne, J – Jütland. Magnell adatai az alsó harmadik őrlőfogak átlagát, terjedelmét és standard hibáját (95%-os konfidencia intervallum) mutatják

Conclusions

The hand-collected animal remains collected at Treby borg in 1966 form a representative assemblage whose taxonomic composition can be successfully compared to larger samples from Eketorp phases I and II. The settlement refuse shows the near-exclusive role domestic livestock played in meat consumption at the studied small section of Treby borg. In comparison with Eketorp, statistically significant differences between the percentages of cattle, caprines and pig suggest that less beef was consumed at Treby borg, while the contribution of pork was larger than at Eketorp. However, in terms of bone weights the overall importance of beef is unquestionable. Horsemeat was unlikely to have been eaten. The single wild boar tooth recovered in the material raises interesting questions, even if large game hunting had no role to play at this settlement. The sporadic bones of mountain hare and game birds are indicative of the opportunistic killing of small game, originating from a variety of habitats in the settlement's environment.

Excavations at Treby borg were resumed almost 60 years later, during 2024. They were carried out using up-to-date, intensive recovery techniques, including sieving, resulting in more bird and fish bones, as well as tiny, non-identifiable fragments. Preliminary work on that recently recovered material shows that it is fundamentally different in character from the hand-collected assemblage presented here and will offer information complementary to these results, rather than adding to already existing knowledge. The aim thus will be to critically appraise differences possibly caused by excavation methods and mitigate their impact on the synthetic interpretations of faunal data in the future.

Contribution of the author

Bartosiewicz László Writing – original draft.

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References

ANAGNOSTOU, E., LINDERHOLM, J. & LIDÉN, K. (2024): The AD 536/540 climate event in Sweden – a review. *Boreas* **2024** 1–13. https://doi.org/10.1111/bor.12672

ARESKOG, C. (1941): *En bok om Öland* [A book about Öland]. C. W. K. Gleerups Förlag, Lund, 369 pp.

ARJAVA, A. (2005): The mystery cloud of the year 536 CE in the Mediterranean sources. *Dumbarton Oaks Papers* **59** 73–94. https://doi.org/10.2307/4128751

BARTOSIEWICZ, L. (1997): This little piggy went to market... An archaeozoological study of modern meat values. *Journal of European Archaeology* **5/1** 170–182.

BARTOSIEWICZ, L. (2017): How large a sheep, how big a sample? In: MASHKOUR, M. & BEECH, M., eds., *Archaeozoology of the Near East* **9** Oxbow, Oxford, 217–226.

BARTOSIEWICZ, L. & BONSALL, C. (2018): 1. 'Herd mentality'. In: IVANOVA, M., ATHANASSOV, B., PETROVA, V., TAKOROVA, D. & STOCKHAMMER, P.W., eds., *Social Dimensions of Food in the Prehistoric Balkans*. Oxbow, Oxford & Philadelphia, 1–13.

BARTOSIEWICZ, L. & GÁL, E. (2007): Sample size and taxonomic richness in mammalian and avian bone assemblages from archaeological sites. *Archeometriai Műhely* **IV/1** 37–44. http://www.ace.hu/am/2007_1/AM-2007-01-BL.pdf

BOESSNECK, J., VON DEN DRIESCH, A., & STENBERGER, L., eds., (1979): *Eketorp IV: Befestigung und Siedlung auf Öland/Schweden. Die Fauna*.Almqvist & Wiksell International, Stockholm, 504 pp.

BÖKÖNYI, S. (1995): Problems with using osteological materials of wild animals for comparisons in archaeozoology. *Anthropologiai Közlemények* **37** 3–11.

BÜNTGEN, U., MYGLAN, V.S., CHARPENTIER LJUNGQVIST, F., MCCORMICK, M., DI COSMO, N., SIGL, M., JUNGCLAUS, J., WAGNER, S., KRUSIC, P.J., ESPER, J., KAPLAN, J.O., DE VAAN, M.A.C., LUTERBACHER, J., WACKER, L., TEGEL, W. & KIRDYANOV, A.V. (2016): Cooling and societal change during the Late Antique Little Ice Age from 536 to around 660 AD. *Nature Geoscience* **9** 231–236. https://doi.org/10.1038/ngeo2652

CHAIX, L. & MÉNIEL, P. (2001): *Archéozoologie. Les animaux et l'archéologie*. Éditions Errance, Paris, 240 pp.

FALLGREN, J.-H. (2009): The Ölandic ring-forts and the Iron Age and Medieval agricultural landscapes. In: SEGSCHNEIDER, M., ed., *Ringwälle und verwandte Strukturen des ersten Jahrtausends n. Chr. an Nord- und Ostsee: Internationales Symposium, Utersum auf Föhr 29. September - 1. Oktober 2005*. Karl Wacholtz Verlag, Neumünster, 27–49.

FARAGÓ, S. (2002): *Vadászati Állattan*. Mezőgazda Kiadó, Budapest, 496 pp.

GIDSTAM, B. (1998): *Öland: kultur och natur* [Öland: culture and nature]. Norstedts, Stockholm, 263 pp.

GRANT, A. (1982): The use of tooth wear as a guide to the age of domestic ungulates. In: WILSON, B., GRIGSON, C. & PAYNE, S., eds., *Ageing and sexing animal bones from archaeological sites*. British Archaeological Reports, British Series109, Oxford, 91–108.

GRÄSLUND, B. (2007): Fimbulvintern, Ragnarök och klimatkrisen år 536–537 e. Kr. [The Fimbul Winter, Ragnarök and the climate crisis in 536–537 CE]. *Saga och sed. Kungl. Gustav Adolfs akademiens årsbok* 2007 93–123.

LINNAEUS, C. (1745): *Olandska och Gothlandska resa på riksens hògloflige stan̈ders befallning forrättad ah̊r 1741* [Öland and Gotland trip at the behest of the noble estates of the kingdom, carried out in year 1741]. Gottfried Kiesewetter, Stockholm och Uppsala, 390 pp.

LUND HANSEN, U. (1987): *Römischer Import im Norden. Warenaustausch zwischen dem Römischen Reich und dem freien Germanien während der Kaiserzeit unter besonderer Berücksichtigung Nordeuropas*. Det Kongelige nordiske Oldskriftselskab, København, 487 pp.

MAGNELL, O. (2004): The body size of wild boar during the Mesolithic in southern Scandinavia. *Acta Theriologica* **49/1** 113–130.

NÄSMAN, U. (1976): Introduction to the Descriptions of Eketorp-I, -II & -III. In: BORG, K., NÄSMAN, U. & WEGRÆUS, E., eds., *Eketorp. Fortification and Settlement on Öland/Sweden. The Monument*. Royal Academy of Letters, History and Antiquities, Stockholm, 45–60.

STENBERGER, M. (1933): *Öland under äldre järnåldern: en bebyggelsehistorisk undersökning* [Öland during the Early Iron Age: a study in settlement history]. Dissertation. Uppsala Universitet, Uppsala, 306 pp.

TEICHERT, M. (1969): Osteologische Unter-schungen zur Berechnung der Widerristhöhe bei vor- und frühgeshcichtlichen Schweinen. *Kühn Archiv* **83/3** 237–292.

UERPMANN, H.-P. (1973): Animal bone finds and economic archaeology: A critical study of the osteoarchaeological method. *World Archaeology* **4/3** 307–322.

UNESCO (2000): United Nations Educational, Scientific and Cultural Organization. https://whc.unesco.org/en/list/968