PATHOLOGICAL BONES AMONGST THE ARCHAEOZOOLOGICAL MATERIAL FROM ESTONIAN TOWNS

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Summary. The aim of this study is to survey developmental anomalies of teeth and bone pathologies in the medieval and postmedieval domestic animals from Estonia. The paper is compiled on the basis of the material collected during several archaeological excavations in Estonia. The most numerous pathologies are dental anomalies. However, to a greater or lesser extent, all these collections contain bones deformed as a result of fractures and joint inflammations.
Key words: Estonia, medieval, domestic animals, bone pathologies.

ESTIJOS MIESTUOSE IŠKASTOS ARCHEOZOOLOGINĖS MEDŽIAGOS KAULŲ PATOLOGIJA

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Santrauka. Šio mokslinio darbo tikslas – apžvelgti naminių gyvūnų dantų ir kaulų patologijos raidą ankstyvųjų ir vėlyvųjų viduramžių laikotarpiu. Medžiaga straipsniui surinkta kasinėjant atskirus archeologinius paminklus Estijoje. Didžiąją dalį patologijos sudaro dantų anomalijos, bet daugiau ar mažiau šios kolekcijos kaulų yra pažeisti lūžių ar sąnarių uždegimų.
Raktažodžiai: Estija, viduramžiai, naminiai gyvuliai, kaulų patologija.

Introduction. Archaeozoological material often contains bones with pathological changes. In domestic animals, dental anomalies are very frequent, while bones deformed by fractures and joint inflammations also frequently occur. Since it is difficult to diagnose the diseases on the basis of observed skeletal changes rather than the clinical signs of illness, it is not always possible to establish the actual reason for the changes in the bone tissue. The aim of this study is to survey some developmental anomalies of teeth and bone pathologies amongst medieval and postmedieval domestic animals from Estonia and find out the differences of the rate of bone pathologies in the different towns.

Material and methods. This paper is compiled on the basis of the material collected during archaeological excavations in Tallinn Kohtu street (13th–16th centuries), Roosikrantsi street (13th–14th centuries) and in Tartu road (suburb of Kivisilla, 16th–17th centuries), in Pärnu Munga street (14th–15th centuries) and in Tartu VIIth Quarter (13th–15th centuries) (Fig. 1). All these materials predominantly contain the bones of domestic animals. The results of the archaeozoological studies are published (Maldre 1997a–c; Maldre 2008). In this paper I will explore some pathological animal bone finds – anomalies of dentition and the pathologies of jaws, fractures of limb bones and the pathologies of hip joints. The investigated materials also contains tarsals, metapodials and phalanges with joint lesions; however, these will be more systematically analysed in the future. The percent of bones with pathological changes is represented in the table 1, the distribution of the pathologies by species and skeletal elements is shown in the table 2.

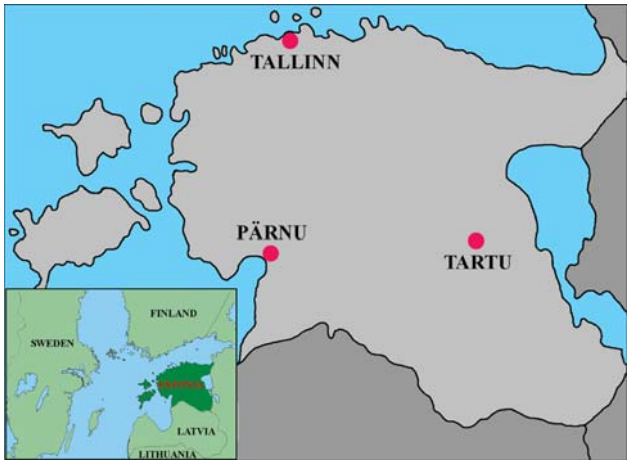

Figure 1. **The location of the sites**

Table 1. **Number and percent of pathological bone finds by deposits**

	Number of identified specimens	Number of pathological specimens	%
Tallinn, Kohtu str.	5560	55	1.0
Tallinn, Roosikrantsi str.	1927	59	3.1
Tallinn, suburb Kivisilla	6984	44	0.6
Pärnu, Munga str.	1884	68	3.6
Tartu, VIIth Quarter	4947	40	0.8

Table 2. **The distribution of pathological bones by skeletal elements (%)**

	Dentition defects				Periodontal diseases and abscesses			Pathologies of vertebraes			Fractures of ribs			Humerus with absent for. supratr.		Ulna	Pathologies of acetabulum pubis		Pathologies of the head of femur	Tibia, fibula				Mc		Mt + tarsale		Mp	Phalanges
	Bos	*Cap/Ov*	*Sus*	*Canis*	*Bos*	*Cap/Ov*	*Sus*	*Bos*	*Cap/Ov*	*Sus*	*Cap/Ov*	*Canis*	*Sus*	*Sus*	*Canis*	*Canis*	*Bos*	*Sus*	*Bos*	*Bos*	*Cap/Ov*	*Sus*	*Canis*	*Bos*	*Cap/Ov*	*Bos*	*Cap/Ov*	*Sus*	*Bos*
Kohtu str.	10.9	1.8	32.7	1.8				1.8		1.8				21.8	3.6		1.8		5.5			1.8				10.9	1.8	1.8	
Roosikrantsi str.	28.8	5.1	23.7	0.0	5.1	3.4			1.7		1.7			16.9		1.7	1.7						3.4			6.8			
Kivisilla	11.4	4.5	18.2	2.3			4.5							43.2						2.3		2.3		2.3		4.5		2.3	2.3
Pärnu	47.1	16.2	14.7		8.8	5.9								?				1.5			1.5				1.5	1.5	1.5		
Tartu	5.0		40.0	5.0	5.0	2.5		2.5	2.5	2.5		2.5	2.5	25.0												5.0			

Dental defects and pathologies of jaws

Dental defects are frequent in mandibles. The abnormal attrition of teeth maybe caused by oligodontia, trauma or the wrong position of the tooth in the opposite jaw (Jubb & Kennedy, 1985). The number of mandibles with missing premolars and reduced third molars is presented in the table 3.

Table 3. **Number of mandibles with missed premolars and shortened third molars**

	Bos taurus			*Ovis / Capra*	*Sus scrofa dom.*	Total
	P_2	M_3	P_2&M_3	P_2	P_1	
Tallinn, Kohtu str.	2	4		1	18	25
Tallinn, Roosikrantsi str.	6	5	1	2	13	27
Tallinn, suburb Kivisilla	4	1		1	8	14
Pärnu Munga str.	14	9	4	11	10	48
Tartu VIIth Quarter	1	1			14	16
Total	27	20	5	15	63	130

In the lower jaws of cattle the P_2 is often missing (Fig. 2) and the third cusp of M_3 is reduced or missing; in some cases, both these anomalies occurs in the same mandible. In one cattle mandible, found from Roosikrantsi street, the M_3 is missing and the caudal part of the P_4 and the rostral part of M_1 are considerably less worn than the other teeth. This may indicate the presence of dental abnormalities (missing teeth?) in the upper jaw. The lower jaws of sheep/goats display the absence of the P_2 as well, but these species do not have any problems with the third cusp of the M_3. One interesting specimen was a sheep/goat mandible from Tartu (Fig. 3). In this specimen, the caudal part of the M_1 is diffracted and fallen out and the M_2 had also been lost during the lifetime of the animal. The shape of the alveolus of the P_2 and P_3 indicate that these teeth had also been lost antemortem. Alveolar bone recession and the loss of teeth have been caused by periodontal disease (Baker and Brothwell, 1980). Missing P_1 are also common in pigs; one mandible found in Tallinn had both the P_1 and P_2 missing (Fig. 4). The frequency of the oligodontia in mandibulas is shown in the figure 5. The missing and shortening of teeth has also been observed in Sweden (Ekman, 1973), Germany (Driesch, 1975) and in The Netherlands (Clason, 1967). The frequency of oligodontia in cattle mandibles noted by these authors is less than 10%. In the material from Haithabu, the rate of absence of P_2 is considerably higher – this teeth is missing in 27% of cattle's mandibles (Johansson, 1982). The rate of oligodontia in pig mandibles is high everywhere – in Germany materials the P_1 was missing in 35–38% of pig mandibles, in Sweden this anomaly occurs a little less, in the material from mediaeval Lund, for example, 20% of pig mandibles do not have the P_1 (Ekman, 1973). In upper jaws oligodontia is less common. Three cases are known

from Pärnu. There is one cattle skull, which do not have right M^3, left teeth row is normal. The second cattle skull do not have both P^4, and in the third skull, only left P^4 is missing. The last named skull belongs to the old animal, that in this case, the ante mortem tooth loss is possible as well.

Figure 2. **Oligodontia and irregulary abraded teeth in cattles' lower jaws**

Figure 3. **Periodontal disease in sheep's or goat's mandible**

Figure 4. **Oligodontia in pig's mandible**

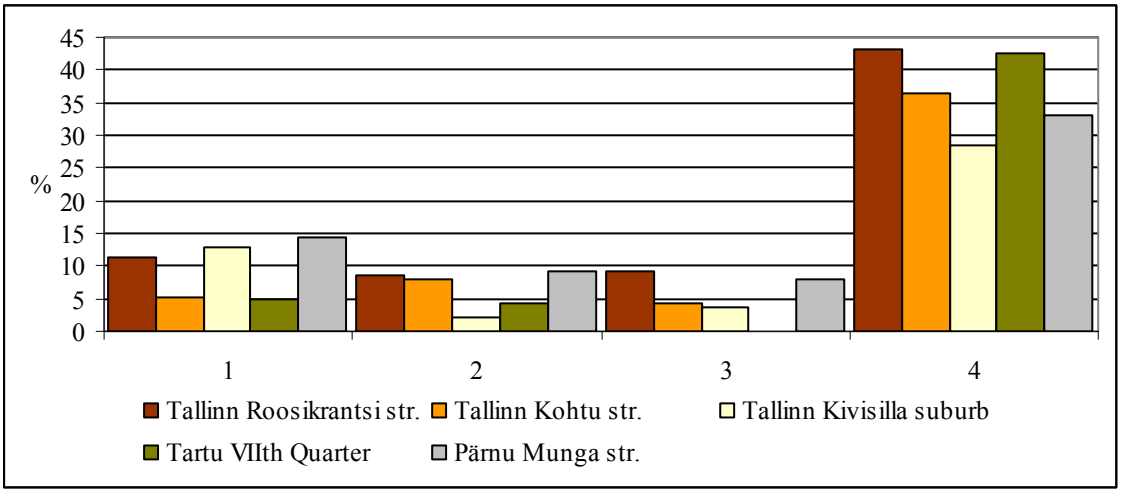

Figure 5. **The frequency of the oligodontia in mandible**

Figure 6. **Polyodontia in dog's upper jaw**

Figure 7. **Pig's mandibulas with pathological changes**

Cases of polyodontia have only been found once to date; a dog skull from Tartu had two P^1 in the upper left jaw, while the right dental row was normal (Fig. 6).

Figure 8. **Cattle's upper jaw, deformed by inflammation**

In figure 7 two pigs mandibles are presented (both from Tallinn), the first of them has a cavity lateral to the dental row which may have developed as result of inflammation, but the possibility of a heterotopic tooth cannot be excluded. The second jaw has a formation on the lateral side, the cause of which is unknown. Another interesting specimen is the upper jaw of cattle presenting a pronounced lesion consequent to inflammation, that may have been caused by actinomycosis (Fig. 8).

Lesions caused by fractures

Lesions caused by fractures are comparably rare amongst the investigated materials. One left metatarsal bone of cattle found from Pärnu has pronounced lesions resulting from inflammation (Fig. 9). X-ray analysis shows that the original reason was a fracture in the distal lateral part of bone. A fracture also caused deformation in a goat metacarpal (Fig. 10) and a sheep metatarsal (Fig. 11); both specimens were found in Pärnu. Since the sheep metatarsal is well healed and the broken ends were not remarkably displaced, it may be suggested that a splint could have been applied. However, rather well-healed metacarpals of wild animals have been observed, so human intervention may not be an issue in this case

(Udrescu and Van Neer, 2005). A very strongly deformed sheep/goat tibia was also recovered from Pärnu. X-ray analysis shows that original reason was a fracture (Fig. 12). Figure 13 shows some better or worse healed fractures on cattle and pig rib fragments found from Tartu and Tallinn.

Figure 9. **Metatarsal bone of cattle with a fracture**

Figure 10. **Metatarsal bone of goat with a fracture**

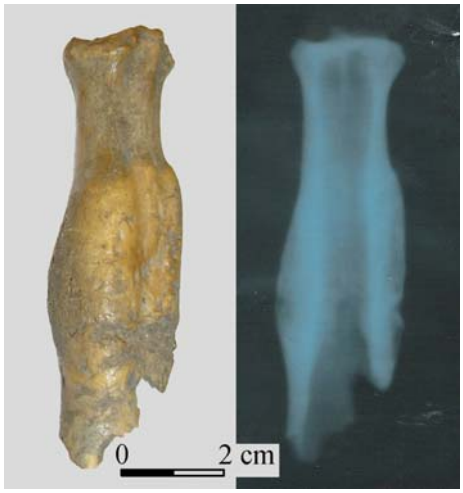

Figure 11. **Metatarsal bone of sheep with a fracture**

Figure 12. **Sheep/goat tibia deformed by the fracture**

Figure 13. **Fractures in cattle and pig ribs**

Hip bones with pathological changes

A fragment of a cattle pelvis found from Tallinn exhibited very interesting lesions (Fig. 14). The acetabulum had lost its original shape, the femoral head had moved outside of acetabulum, and a new "acetabulum" formed in the region of the *foramen obturatum.* The neck of femur was also deformed and the femoral head epiphysis was not fused with bone. The presence of eburnation indicates that the animal was mobile. A pig hip with a serious lesion was found from Pärnu (Fig. 15); the acetabulum had flattened and exostoses had developed near acetabulum. The bones in the acetabulum were fused normally, so the problem had been developed in an adult animal.

Figure 14. **Cattle's hip bone with a new acetabulum and the proximal end of femur with pathological changes**

Figure 15. **Pig's hip bone with flattened acetabulum**

Developmental defects

All investigated materials included the pig's humeri with absent foramen supratrochleare (table 4). This anomalie occurs also in dog's humeri – in the material from Kohtu street are 2 dog's humeri (1 individual) with the same anomalia.

Discussion and conclusions

The most numerous group (149 specimens) of the pathologies were anomalies of the dentition. Both oligodontia and polyodontia were represented in the investigated material. Oligodontia was very frequent (63 cases) in the lower jaws of pigs (absent P_1). Oligodontia also occured in cattle – in 27 cases the P_2 was missing and in 20 cases the aboral section of the M_3 was reduced. In 5 cattle's lower jaws, both theses anomalies occurred. Oligodontia was also observed the lower jaws of sheep/goat and dogs. The cases of polyodontia were very rare. In the material from Kohtu street, Tallinn, a dog skull was found with two first premolars. The periodontal diseases occurs in 10 cattle mandibles (3 in the material from Tallinn Roosikrantsi street, 6 from Pärnu and 1 from Tartu); sheep or goat mandibles are damaged in 7 cases (2 from Roosikrantsi street, 4 from Pärnu and 1 from Tartu). Amongst the material from Kohtu street and suburb of Kivisilla this pathologie was not found.

Table 4. **Number and percent of pig's humeri with absent foramen supratrochleare**

	Number of distal humeri	Foramen supratrochleare is missing	%
Tallinn, Kohtu str.	95	12	12.6
Tallinn, Roosikrantsi str.	31	10	32.3
Tallinn, suburb Kivisilla	66	19	28.8
Pärnu, Munga str.	?	?	?
Tartu, VIIth Quarter	104	10	9.6

The second numerous group is the absence of foramen supratrochleare in the humeri. The rate of this anomalie is very high amongst the material from Roosikrantsi street and suburb of Kivisilla.

To greater or lesser extent, all these collections contain bones, deformed as a result of fractures and joint inflammations. The fractures are healed quite well, but there is not any reason to presume some human intervention in the healing of fractures.

Investigated material shows, that the bone pathology was relatively high in medieval domestic animals from Tallinn Roosikrantsi street and from Pärnu. May be this is due to the quite high slaughter age of animals in these materials (the rate of pathological bones remains in these materials higher also after excluding the dentition anomalies and absence of foramen supratrochleare). The lowest rate of pathologies among the material from suburb Kivisilla may argue with the later dating of the material, but this hypothese needs the futher investigations.

References

1. Baker, J. and Brothwell, D. 1980. Animal Diseases in Archaeology. London: Academic Press.
2. Becker, C. 1980. Untersuchungen an Skelettresten von Haus- und Wildschweinen aus
3. Haithabu. Berichte Über die Ausgrabungen in Haithabu, 15. Neumünster.
4. Clason, A. T. 1967. Animal and man in Holland's past. – H.T. Waterbolk (ed.), Palaeohistoria. Acta et Communicationes Instituti Bio-Archaeologici Universitatis Groninganae, vol. XIII a. Groningen
5. Driesch, A. 1975. Die Bewertung pathologisch-anatomischer Veränderungen an vor- und frühgeschichtlichen Tierknochen. – Archaeozoological Studies, 413–425.
6. Ekman J. 1973. Early Mediaeval Lund – the fauna and landscape. – Archaeologica Lundensia V. Lund: Museum of Cultural History.
7. Johansson, F. 1982. Untersuchungen an Skelettresten von Rindern aus Haithabu (Ausgrabung 1966–1969). Berichte Über die Ausgrabungen in Haithabu, 17. Neumünster.
8. Jubb, K., Kennedy, F. 1985. Pathology of Domestic Animals. New York.
9. Maldre, L. 1997a. Big and small Bovids from mediaeval towns in Estonia. – Anthropozoologica 25–26, 707–714.
10. Maldre, L. 1997b. Koduloomad keskaegses Pärnus. – 100 aastat Pärnu Muinasuurimise Seltsi. Artiklite kogumik. Pärnumaa ajalugu, 1, 99 – 122.
11. Maldre, L. 1997c. Tartu VII kvartali jäätmekastide arheozooloogilisest materjalist. –
12. Arheoloogilisi uurimusi, 1. Tartu Ülikooli Arheoloogia Kabineti toimetised, 9, 99–106.
13. Maldre, L. 2008. Koduloomaluud keskaegsest Tallinnast. – Muinasaja Teadus 17, 277–311.
14. Udrescu, M., Neer, W. 2005. Looking for human therapeutic intervention in the healing of fractures of domestic animals. – Diet and Health in Past Animal Populations. Current research and future directions. Proceedings of the 9th ICAZ Conference. Durham 2002. Oxbow Books, 34–38.

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