An analysis of osteological material from the late Funnel Beaker culture settlement in Brozany, northwestern Bohemia

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An analysis of the bones from the settlement in Brozany nad Ohří (*Litoměřice district*) *dated to the Salzmünde phase of the Funnel Beaker culture revealed standard characteristics for the reconstruction of the paleoeconomic situation and provided information regarding several unusual and interesting finds. There is a distinct predominance of domestic animals over wild species, with cattle being the most prominent domestic species. A total of sixteen species of wild animals were identified. Interesting finds include pig skulls, a complete skeleton of a fox, bones from perhaps synanthropic field mice, a fragment of an eagle bone, a vertebra from a large salmonid fish, scales from asp and chub and an assemblage of eight probably intentionally perforated shells. The skeletal remains of eight puppies were found in two settlement features, and skeletal remains of three newborn humans were also found in two settlement features. The co-occurrence of puppies and newborns in the same context indicates their equal depositional status. The material also contains a number of bone artefacts.*

archaeozoology – Eneolithic – puppies – human newborns – fox – bird – fish – *Apodemus* – *Unio* – bone artefacts

Analýza osteologického materiálu ze sídliště mladšího stupně kultury nálevkovitých pohárů v Brozanech. *Rozbor kostí pocházejících ze sídliště v Brozanech nad Ohří* (*okr. Litoměřice*), *datovaného do salzmündské fáze kultury nálevkovitých pohárů, přinesl jak standardní charakteristiku paleoekonomické situace, tak i informace o několika neobvyklých a zajímavých nálezech. V materiálu výrazně převládají domácí zvířata nad divokými a mezi domácími zvířaty dominuje tur. Divokých živočichů bylo detekováno celkem 16 druhů. Zajímavými nálezy jsou kompletní lebky prasat, skelet lišky, kosti snad synantropních myšic, fragment kosti orla, obratel velké lososovité ryby a kumulace šupin bolena a jelce a soubor osmi perforovaných lastur velevrubů. Ve dvou sídlištních objektech byly nalezeny pozůstatky celkem osmi štěňat a ve dvou sídlištních objektech byla nalezena torza kostříček tří lidských novorozenců. Unikátní je spolu-výskyt štěňat a novorozenců v témže kontextu naznačující jejich rovnocennost při deponování. Materiál obsahuje i soubor kostěných artefaktů.*

archeozoologie – eneolit – štěňata – lidští novorozenci – liška – ptáci – ryby – velevrub – kostěné artefakty

1. Introduction

The article analyses an assemblage of osteological finds dating to the late stage (the Salzmünde phase) of the Funnel Beaker culture (TRB) found in archaeological features during an excavation in the cadastre of Brozany nad Ohří near Hostěnice[1] (site midpoint: 50°26'34.200"N, 14°8'51.139"E), in the Litoměřice district, between 1985 and 1987 under the guidance of M. Dobeš. This article builds on the preceding archaeological evaluation of the excavation (*Dobeš – Zápotocký 2013*), which includes details on individual find situations. The material is part of an earlier, broader comparison that made an assessment from the perspective of the archaeozoology of the entire Eneolithic period (*Kyselý 2010*; *2012*).

The site is located on a terrace approximately 15–20 metres above the river bed south of the village of Brozany, on the left bank of the Ohře River. The site is situated in the flat lowlands of northwest Bohemia, in an area that has the driest climate in Bohemia today (cf. *Tolasz et al. 2007*).

Accompanying pottery was used to date the osteological material to the Salzmünde phase of the TRB (cf. *Dobeš – Zápotocký 2013*). The features with a questionable dating and features containing strong ceramic contamination were excluded from the analysis. Following this treatment, bones from

[1] In earlier texts (*Kyselý 2005*; *2008b*; *2010*; *2012*) the site is also referred to as Hostěnice, the nearest village to the site. Only the name Brozany is used in this work.

a total of sixteen sunken features were included in the analysis. The majority of the features (fourteen) were silos; only feature nos. 110/95 and 16/96 were identified as a clay pit and a grave, respectively (details in *Dobeš – Zápotocký 2013*). Aside from the grave and the clay pit, no significant amount of intrusions is anticipated in the analysed osteological material. A smaller amount of intrusions from later Hallstatt culture settlement is not ruled out in the case of feature no. 110 (based on pottery, about 5%), and a quite rare appearance of fragments from an earlier Linear Pottery culture settlement was detected in other features. With respect to the function of the features and the nature of the site, it can be assumed that, aside from the grave (feature no. 16), the features contain settlement waste. Besides the fox (Chapter 2.8), the radiocarbon dating of the other six analysed bone samples (*Dobeš – Zápotocký 2013*, Tab. 5; *Graph 3* in this text) corresponds closely to the Salzmünde phase of the TRB, thus ruling out, in the given cases, intrusions from the preceding Linear Pottery culture settlement.

Although a later deeper disruption of the evaluated archaeological features was not observed directly in the field, the unidentified presence of burrows made by carnivorans cannot be ruled out. The author bears it in mind, for example, in the case of finds of fish bones and scales and bird bones in the feature in which the skeleton of an adult fox was discovered (feature no. 6, Chapter 2.8). However, the combination of the wild species documented in feature no. 6 (incl. eagle, goose, fish; see Chapters 2.9 and 2.10) does not represent a typical fox diet. Nevertheless, even in the unlikely case that the species represent the prey of the discovered fox, the dating of the fish and birds from feature no. 6 still falls into the Eneolithic (cf. the radiocarbon dating of the fox in Chapter 2.8 and Chapter 2.10).

Feature no. 16/96 is the lone Salzmünde grave discovered during the investigation (according to *Dobeš – Zápotocký 2013*) and hence 'probably indicated the border of the residential area' and perhaps even a 'remnant of a larger barrow cemetery that was subsequently destroyed by ploughing'. While not analysed in this article, the human skeleton from the given grave represents an 'inhumation burial of a child around the age of six months, perhaps in a crouched position' (from *Dobeš – Zápotocký 2013*).

Abbreviations, terminology and methods

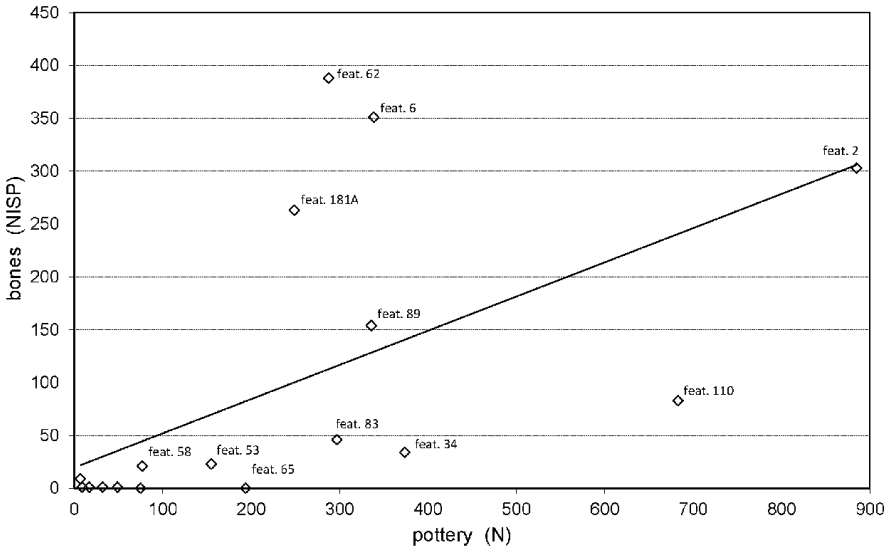
TRB = Funnel Beaker culture, feat. = archaeological feature, MNI = minimal number of individuals (see Chapter 2.1), CRL = Czech radiocarbon laboratory (*crl.odz.ujf.cas.cz*), NISP = number of identified specimens (i.e. bones, shells, or their fragments, see Chapter 2.1), SSD = *Sus domesticus*, max. = maxilla, mand. = mandible, M = molar, P = premolar, prox. = proximal, dist. = distal, GL = greatest length, GB = greatest breadth, GD = greatest depth, GH = greatest height, f.? = unidentified form. Measurement acronyms after *Driesch 1976*.

The Latin names of the domestic species follow the recommendations in the publication by *Gentry – Clutton-Brock – Groves 2004*. See *Tab. 1* for the English equivalents of the discovered taxons. The anatomical terminology and concepts of the Eneolithic (ca. 4400–2200 BC) and the archaeological cultures occurring in the Czech Republic are in line with the commonly used customs and methods (Nomina Anatomica Veterinaria 2012 – I.C.V.G.A.N.; *Jiráň – Venclová eds. 2007–2008*). All of the analysed material was obtained using standard manual collection. Measurements were evaluated according to *Driesch 1976*.

2. Analysis of assemblage and discussion

2.1. Material, taxonomic determination and quantification

Due to a relatively large amount of material, this work does not attempt to present a complete compilation of material and data; a detailed list of all the determined finds is on file in the archive of the Institute of Archaeology of the Academy of Sciences of the Czech Republic in Prague (no. TP-2013-714), and additional primary data (osteometric data, age determination, etc.) is part of the author's dissertation (*Kyselý 2010*). The analysis gives priority to the quantification conducted



Graph 1. Brozany: Correlation of number of pottery and number of bone fragments in particular archaeological features. The line presents linear regression.
Graf 1. Brozany: Korelace počtu keramických střepů a počtu fragmentů kostí v jednotlivých sídlištních objektech. Přímka představuje lineární regresi.

by the NISP method, which is practically a number of finds (for the quantification, see *Tab. 1*; for the quantification methods, see *Reitz – Wing 2005*; *Kyselý 2004*; *2010*; *2012*). During the quantification by NISP, fragments or elements that were apparently related were counted as a single item. The concept, according to which all material is counted in NISP, is used in this work. Finds for which a more detailed identification (in terms of zoological species) has been made are also alternatively quantified using the method of MNI (minimum number of individuals). During the quantification by MNI anatomical superposition, individual age and sex, as well as individual size (i.e. dimensions of elements) were taken into account. The total MNI (right side of *Tab. 1*) was determined using all of the material taken as a single assemblage (i.e. regardless of the affiliation of finds to individual archaeological features) and therefore does not represent a simple sum of separate MNI values from individual features. The analysis in *Graph 1* provides a basic impression of the number of bones and the amount of pottery in individual features; the graph also reveals that the correlation between the number of bone finds and the number of pottery finds is positive.

A fragment of a painter's mussel (*Unio pictorum*) shell discovered in the grave (feature no. 16) perhaps represents an intentional grave good. Additional shell fragments, part of a rib from a large mammal and another unidentifiable fragment from the same grave could represent random additions to the grave. The anatomical determination of the material from the other (settlement) features is presented collectively in *Tab. 2*.

2.2. A taphonomic description of the assemblage

The osteological material, which was mostly a sandy colour, is quite decalcified, which could have led to the removal of certain marks on the surface of the bones (e.g. cuts). Some finds are corroded by plant roots. With the exception of the special finds discussed in Chapters 2.6 to 2.8, the other material has the nature of common waste, since the following typical features of common waste were observed: (1) high level of fragmentation of the bones, (2) traces were found on a total of forty-four

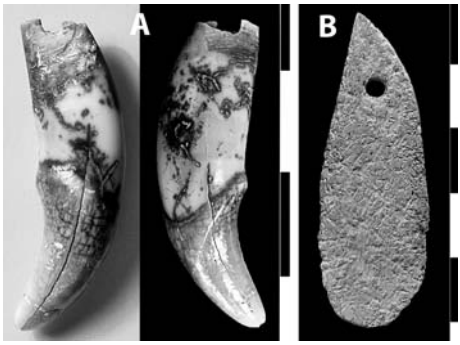


Fig. 1. Brozany: A – dog canine (*Canis familiaris*, caninus inferior, sinister) worked into a pendant viewed from two sides from feature no. 83; B – another perforated bone artefact from feature no. 181A. Scale: 1 piece = 1 cm. Photo figs. 1–2 and 8–13: R. Kyselý.

Obr. 1. Brozany: A – pohled ze dvou stran na psí špičák (*Canis familiaris*, caninus inferior, sinister) upravený do podoby závěsku z obj. 83; B – kostěný artefakt s otvorem z obj. 181A. Měřítko: 1 dílek = 1 cm.

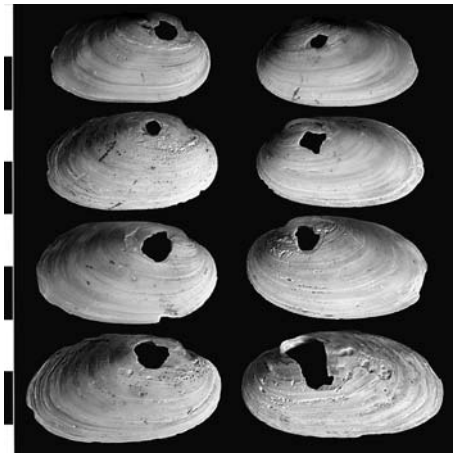


Fig. 2. Brozany, feature no. 181A: shells of mussels *Unio crassus* fully preserved, found in the same context. All have a perforation in the top of the shell. Scale: 1 piece = 1 cm.

Obr. 2. Brozany, obj. 181A: vcelku zachované schránky velevrubů *Unio crassus* z jednoho kontextu. Všechny mají v oblasti vrcholu lastury otvory. Měřítko: 1 dílek = 1 cm.

fragments from feature nos. 2, 5, 6, 62, 83, 89, 110 and 181A that represent (in some cases with certainty, in others probable) bites by carnivorans, most probably dog, (3) traces of fire were observed on eighty-nine finds from features 2, 6, 10, 53, 83, 89, 110 and 181A (mostly in the form of entirely burnt bones). The burnt bones most often belong to domestic cattle, in rare cases also to sheep; there was also a burnt phalanx of a large bird (feature no. 89), a burnt fragment of red deer antler (feature no. 6), a burnt tooth of a domestic pig (feature no. 6) and possibly even a fragment of a burnt radius of a dog (feature no. 89). Bite marks from carnivorans were observed on the bones of domestic cattle, domestic pig, sheep/goats, on human pelvis (Chapter 2.7; *Fig. 10*) and perhaps also on the pelvis of a horse (feature no. 181A). A rodent bite was found on the phalanx of a red deer from feature no. 6.

A total of twenty-one finds from feature nos. 2, 6, 62, 89, 110 and 181A bear traces of kitchen/butcher activity (cuts and chops). Mainly the bones of cattle (9x), less often sheep/goats (3x), in rare cases red deer (cuts on humerus) and horse (see below) are marked in this manner. The metatarsal bone of a sheep from feature no. 6 has ten cuts circling the diaphysis, apparently the result of skinning; a fragment of a metatarsal bone from a different sheep or goat individual from the same feature is marked in a similar manner. Observed cuts on the metatarsal and tarsal bones and mandible of domestic cattle evidently also document skinning activity. Other cuts were identified on the basis of domestic cattle horn (feature no. 181A), and irregular chops were present on a sheep skull from the same feature (specifically on the parietal bone, in front of the horn at the orbit and at the base of the skull). Part of a horse ilium with chops (feature no. 181A), perhaps representing the separation of the pelvis from the sacrum (see *Kyselý 2012*, photo 8), was a noteworthy find. On the skull of a pig from feature no. 2 part of its frontal bone is missing (*Fig. 3*), which can perhaps be related to slaughter or the opening of the braincase.

A thick anthropogenic ashy layer in the lower part of feature no. 6 (specifically in layers 7–10 according to the original documentation, with a depth of at least 75 cm below the topsoil; for a drawing see *Dobeš – Zápotocký 2013*) provided particularly favourable local conditions for the preservation

	Year of excavation		1995									1996			1997				Σ NISP (total MNI)	% of Σ NISP	% of Σ NISP of domestic or wild mammals	
	Feature no.		2	5	6	83	89	110	128	166	181A	9A	10	16	53	58	62	66				
	Interpretation (SP = storage pit, CP = clay pit, GR = grave)		SP	SP	SP	SP	SP	CP	SP	SP	SP	SP	SP	GR	SP	SP	SP	SP				
domestic mammals	*Bos taurus*	cattle	56 (5)	1 (1)	28 (4)	8 (1)	14 (3)	19 (3)	2 (1)		40 (3)				6 (1)	2 (1)	55 (4)		**231 (8)**	**13.7**	**54.6**	100%
	Bos cf. *taurus*	cattle (domestic?)	2			1													**3**	**0.2**	**0.7**	
	Sus domesticus	pig	12 (3)		22 (7)	5 (1)	5 (3)	4 (4)	1 (1)		3 (2)		3 (1)				2 (1)		**57 (9)**	**3.4**	**13.5**	
	Capra hircus	goat			1 (1)			1 (1)									3 (1)		**5 (3)**	**0.3**	**1.2**	
	Ovis aries	sheep			9 (4)		6 (2)				4 (3)								**19 (7)**	**1.1**	**4.5**	
	Ovis / Capra	sheep/goat	2 (1)		30 (1*)	1 (1)	16 (2*)	8 (0*)	2 (1)		2 (0*)		1 (1)				2 (1*)		**64 (0*)**	**3.8**	**15.1**	
	Canis familiaris	dog	13** (4)		1 (1)	1 (1)	2 (1)				25** (5)	1 (1)					1 (1)		**44** (10)**	**2.6**	**10.4**	
mammals domestic / wild	*Equus ferus* f. ?	horse	1 (1)								1 (1)								**2 (1)**	**0.1**		
	Large *Bovini* indet.	large bovine			1						4						1		**6**	**0.4**		
	Bos primigenius f. ?	domestic cattle / aurochs			1			2											**3**	**0.2**		
	Bos / Cervus	cattle / red deer													2		1		**3**	**0.2**		
	Ovis / Capra / Capreolus	small ruminant	2		3	3	2										1		**11**	**0.7**		
	Sus scrofa f. ?	domestic pig / wild boar	1				1	1									1		**4**	**0.2**		
	Canis lupus f. ?	dog / wolf						1											**1**	**0.1**		
	Vulpes / Canis familiaris	fox/dog			1														**1**	**0.1**		
wild mammals	*Bos primigenius*	aurochs			1 (1)			1 (1)			1 (1)					1 (1)			**4 (1)**	**0.2**	**6.8**	100%
	Cervus elaphus	red deer	2 (1)		3 (1)						1 (1)					1 (1)	3 (1)		**10 (3)**	**0.6**	**16.9**	
	Sus scrofa	wild boar															28 (1)		**28 (1)**	**1.7**	**47.5**	
	Lepus europaeus	european hare					1 (1)	1 (1)											**2 (1)**	**0.1**	**3.4**	
	Vulpes vulpes	red fox			1 (1)***														**1 (1)***	**0.1**	**1.7**	
	cf. *Vulpes vulpes*	red fox?			1														**1**	**0.1**	**1.7**	
	Felis silvestris	wildcat																1 (1)	**1 (1)**	**0.1**	**1.7**	
	Apodemus cf. *flavicollis*	yellow-necked? mouse			1 (1)														**4 (2)**	**0.1**	**1.7**	
	Apodemus sp.	field mouse									3 (2)									**0.2**	**5.1**	
	Rodentia	rodent									8								**8**	**0.5**	**13.6**	
mammals indet.	Large mammal	large mammal	50		21	2	23	11		1	26		16		4	9	24		**187**	**11.1**		
	Medium mammal	medium mammal	3		59	13	29	9	1		3		1				2		**120**	**7.1**		
	Small mammal	small mammal					1												**1**	**0.1**		
	Unspecified mammal	unspecified mammal	148		70	11	51	24	2		124		13	1	11	8	248		**711**	**42.3**		
birds	*Anser anser / fabalis*	greylag goose / bean goose			2 (1)														**2 (1)**	**0.1**		
	Anser erythropus / albifrons / brachyrhynchus / Branta sp.	lesser white-fronted / greater white-fronted / pink-footed goose			4 (1)														**4 (1)**	**0.2**		
	Anser sp.	goose			2														**2**	**0.1**		
	Aquila pomarina / Aquila clanga	lesser / greater spotted eagle						1 (1)											**1 (1)**	**0.1**		
	Avis indet.	unspecified bird			8		2	1											**11**	**0.7**		
amphibians and fish	cf. *Bufo*	toad?			1 (1)														**1 (1)**	**0.1**		
	Anura	frog			1														**1**	**0.1**		
	Salmo sp.	salmon/troat					1 (1)												**1 (1)**	**0.1**		
	Aspius aspius + cf. *Squalius cephalus*	asp + ?european chub			65 (2)*****														**65 (2)*****	**3.9**		
	Squalius cephalus / Leuciscus idus	chub			1 (1)														**1 (1)**	**0.1**		
	Cyprinidae	cyprinid			1														**1**	**0.1**		
	Piscis indet.	unspecified fish			3														**3**	**0.2**		
molluscs	*Unio crassus*	thick shelled river mussel	4 (3)		5 (4)						9 (8)						1 (1)		**19 (15)**	**1.1**		
	Unio pictorum	painter's mussel												1 (1)			4 (3)		**5 (4)**	**0.3**		
	Unio sp.	freshwater mussel	7		3						5			1			10		**26**	**1.5**		
	Unionidae	freshwater mussels				1													**1**	**0.1**		
	Homo sapiens	human			2 **** (2)						4**** (2)						1 (1)		**7**** (4)**	**0.4**		
Σ			**303**	**1**	**351**	**46**	**154**	**83**	**9**	**1**	**263**	**1**	**34**	**3**	**23**	**21**	**388**	**1**	**1682**	**100**		

of the osteological finds. This conclusion is based on the presence of a large amount of fragile fish scales and several small bones or fragments of bones from fish, frogs, birds, field mice and the skeleton of a newborn human (see Chapters 2.7, 2.9, 2.10) found in feature no. 6; existing documentation indicates that all, or a majority, of these finds come from the lower ashy layers.

Besides a large number of silos, feature no. 110 is the only settlement feature with a different function (clay pit) included in the analysis. Nevertheless, from the point of view of zoological composition the feature no. 110 does not differ significantly from the average (cf. *Tab. 1*); the find of an eagle bone is the only peculiarity from this feature. Due to its conformity, the clay pit is evaluated with the other settlement features.

2.3. Artefacts

As is the case at other sites, part of the osteological material at Brozany is also composed of artefacts (23 or 24 specimens, *Tab. 3*) discovered in a total of eight settlement features. These artefacts, representing only fragments of bone in all cases, are typically shaped as awls, chisels or pegs. An exception is a lower canine tooth from a medium-large adult dog (with dimensions of GL = ca. 34.5 mm, GB = 6.1 mm, GD = 8.8 mm; feature no. 83) made into a pendant by perforating the root (*Fig. 1*). An identification of the zoological species could be made for only a small number of the artefacts; among others, cattle, sheep/goat, red deer antler and dog tooth were detected (*Tab. 3*). Of particular interest is an accumulation of nine apparently intact and functional bone tools among 253 mammal bones/bone fragments in feature no. 6.

Tab. 1. Brozany: Quantification of osteological finds sorted by zoological determination and by affiliation to archaeological features. Quantified by NISP (value not in brackets) and closer specified taxons also by MNI (values in brackets); see Chapter 2.1 for definition of "total MNI" and other details of the quantification methods. * MNI for category *Ovis*/*Capra* is counted as extra individuals detected in addition to specimens closely identified as *Capra hircus* or *Ovis aries* (MNI for *Ovis* + *Capra* consists of sum of Ovis MNI + Capra MNI + Ovis/Capra MNI); ** most of the material in features no. 2 and 181A consists of neonatal or very young dog skeletal elements, two nearly complete skeletons are counted as 1 each; *** fox skeleton; **** parts of newborn (human) skeletons (one newborn in feature no. 6 and two in feature no. 181A); ***** fish scales.

Tab. 1. Brozany: Kvantifikace osteologických nálezů rozdělených dle archeologických objektů a zoologické determinace. Kvantifikováno dle NISP (údaje mimo závorky), blíže determinované taxony kvantifikovány i dle MNI (údaje v závorkách); definice „total MNI" a další aspekty kvantifikačních metodik v kap. 2.1. * MNI pro kategorii *Ovis*/*Capra* bylo vypočítáno jako počet jedinců rozpoznaných navíc k jedincům identifikovaným na základě kostí určených blíže jako *Ovis aries* a *Capra hircus* (tj. MNI ovce + kozy = MNI ovce + MNI kozy + MNI ovce/kozy); ** v obj. 2 a 181A tvoří většinu elementy skeletů novorozených / velmi juvenilních psů, dva kompletnější skelety započítány vždy jako 1 položka; *** skelet lišky; **** části skeletů novorozeňat (jeden v obj. 6 a dva v obj. 181A); **** šupiny ryb.

České ekvivalenty latinských názvů druhů (pořadí jako v *tab. 1*): *Bos taurus* = tur domácí, *Bos* cf. *taurus* = tur ?domácí, *Sus domesticus* = prase domácí, *Capra hircus* = koza, *Ovis aries* = ovce, *Ovis/Capra* = ovce/koza, *Canis familiaris* = pes, *Equus ferus* f. ? = kůň, Large *Bovini* indet. = velcí turi neurčení, *Bos primigenius* f. ? = domácí tur/pratur, *Bos/Cervus* = tur/jelen, *Ovis/Capra/Capreolus* = ovce/koza/srnec, *Sus scrofa* f. ? = prase, *Canis lupus* f. ? = pes/vlk, *Vulpes/Canis familiaris* = liška/pes, *Bos primigenius* = pratur, *Cervus elaphus* = jelen evropský, *Sus scrofa* = prase divoké, *Lepus europaeus* = zajíc polní, *Vulpes vulpes* = liška obecná, cf. *Vulpes vulpes* = ?liška obecná, *Felis silvestris* = kočka divoká, *Apodemus* cf. *flavicollis* = myšice ?lesní, *Apodemus* sp. = myšice, Rodentia = hlodavec, *Anser anser*/*fabalis* = husa velká/polní, *Anser erythropus*/*albifrons*/*brachyrhynchus*/*Branta* sp. = husa malá/běločelá/krátkozobá, *Anser* sp. = husa, *Aquila pomarina*/*Aquila clanga* = orel křiklavý/volavý, Avis indet. = neurčený pták, cf. *Bufo* = ropucha?, *Anura* = žába, *Salmo* sp. = losos/pstruh, *Aspius aspius* + cf. *Squalius cephalus* = bolen dravý + jelec (tloušť ?), *Squalius cephalus*/*Leuciscus idus* = jelec tloušť/jesen, *Cyprinidae* = kaprovití, Piscis indet. = neurčená ryba, *Unio crassus* = velevrub tupý, *Unio pictorum* = velevrub malířský, *Unio* sp. = velevrub, *Unionidae* = velevrubovití, *Homo sapiens* = člověk.

	skeleton/part of skeleton*****	Calva	Mandibula	Processus cornualis	Dentes	Vertebrae	Costa	Scapula	Humerus	Radius / ulna	Metacarpus	Pelvis	Femur	Tibia, fibula et tibiotarsus	Calcaneus	Carpale et tarsale	Metatarsus et tarsometatarsus	Metapodium indet.	Phalanx	others	undetermined	Σ
Bos taurus		35	21	6	19	10	1	11	10	13	11	11	8	17	9	17	12	3	20			234
Bos cf. *taurus*						2	1															3
Sus domesticus		18	3		14	3		3	3	2	1			4			2	2	2			57
Capra hircus				5																		5
Ovis aries		3	4	2	1				4		1			1		1	2					19
Ovis / Capra		8	5	1	11	1		1	5	7	2	1	2	5		1	6		8			64
Canis familiaris	2	7	7		4		1	4	5	5		4	6	2			1	2				50
Equus ferus f.?						1						1										2
Large *Bovini* indet.			1						1	1	2	1										6
Bos primigenius f.?													1				2					3
Bos / Cervus								3														3
Ovis / Capra / Capreolus		1			1			1		1	1		2	4			1					12
Sus scrofa f. ?					3								1									4
Canis lupus f. ?							1															1
Vulpes / Canis familiaris		1																				1
Bos primigenius								1		1		1				1						4
Cervus elaphus								2	1			1		2			1		1	2*		10
Sus scrofa					1					2	6				1	5	3	1	10			29
Lepus europaeus							1										1					2
Vulpes vulpes	1																					1
cf. *Vulpes vulpes*						2																
Felis silvestris			1																			1
Apodemus cf. *flavicollis*												1										1
Apodemus sp.		2	1																			3
Rodentia					1	4				1			1	1								8
Large mammal		45				15	28	6	2			2	4	1		1			1	1	80	186
Medium mammal		1			1	4	33	1	1	1				4				1		1	71	119
Small mammal							1															1
Unspecified mammal		1		11	2	2	23					1		1				1			668	710
Anser anser / fabalis								1												1**		2
Anser erythropus / albifrons / brachyrhynchus / Branta sp.			2							1										1**		4
Anser sp.		1							1													2
Aquila pomarina / Aquila clanga																	1					1
Avis indet.						2			2	1				1					1	1	3	11
cf. *Bufo*									1													1
Anura						1																1
Salmo sp.						1																1
Aspius aspius + cf. *Squalius cephalus*																				65***		65
Squalius cephalus / Leuciscus idus																				1****		1
Cyprinidae							1															1
Piscis indet.																					3	3
Unio crassus																				19		19
Unio pictorum																				4		4
Unio sp.																				25		25
Unionidae																				1		1
Homo sapiens	3	1	1			1			1			1		2								10
Σ	6	124	46	25	58	47	91	34	37	36	24	25	25	45	10	26	32	10	43	124	825	1693

Tab. 2. Brozany: Quantification of osteological finds sorted by zoological and anatomical determination. Quantified by NISP (i.e. number of finds), some of merged bones or fragments counted in Tab. 1 as one are here separated by anatomy. * antler; ** coracoideum; *** fish scales; **** branchiale 5 (pharyngeal teeth); ***** other osteological finds of puppies or humans (which do not form parts of skeletons) are quantified as isolated elements.

Tab. 2. Brozany: Kvantifikace sídlištních osteologických nálezů rozdělených dle anatomické a zoologické determinace. Kvantifikováno dle počtu nálezů (kostí/fragmentů, NISP), některé případy považované v tab. 1 jako jeden (sloučený) nález, zde rozděleny dle anatomie. * paroh; ** coracoideum; *** rybí šupiny; **** požerák; ***** ostatní nálezy štěňat a novorozenců, které netvoří souvislé anatomické celky, jsou kvantifikovány jako jednotlivé kosti.

Fig. 3. Brozany, feature no. 2: Calvaria of domestic pig (*Sus domesticus*), lateral aspect. Scale: 1 piece = 1 cm. Photo figs. 3–7 and 14: H. Toušková and R. Kyselý.
Obr. 3. Brozany, obj. 2: Lebka prasete domácího (*Sus domesticus*), pohled z boku. Měřítko: 1 dílek = 1 cm.

In addition, eight shells of *Unio crassus* (thick shelled river mussel) – four right and four left shell valves, though evidently from eight individuals – found in the same place in feature no. 181A (s. 693, 50 cm-bottom) have irregular holes always located in the same place, i.e. beneath the top of the shells, marks that cannot be explained by the activity of natural predators. Although signs of artificial perforation are not apparent and the holes give the impression of being the result of corrosion (*Fig. 2*), the repeated occurrence of the holes in the same location suggests intentional working. Hence, the assemblage could represent the remnants of an ornament (e.g. necklace) or rattle in the form of shells strung on a cord.

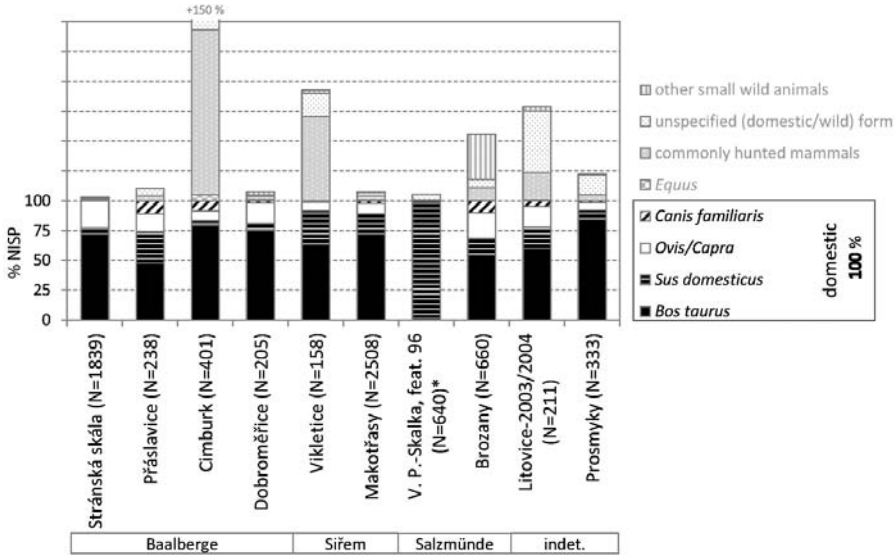
2.4. The paleoeconomic testimony of the assemblage. Animal husbandry and hunting

A rough impression of the scope of hunting in the community is provided by the ratio of bones of hunted and domestic mammals (cf. the methodological analysis in *Kyselý 2012*). The share of hunting at Brozany stated below is based on a summary quantification using all the finds from settlement features, most of which were silos. Excluding mammals of an unspecified form (domestic/wild), the NISP method revealed a ca. 10% share of game at Brozany (423 finds of domestic mammals and 46 finds of commonly hunted wild mammals; from *Tab. 1*). If a larger amount of bones originating from probably only one wild boar individual (see below and *Tab. 1* and *2*) is excluded from the calculation, the resulting level of hunting according to NISP is ca. 8%. According to the MNI method (the testimony of which the author regards as more biased and less reflective of reality; *Kyselý 2004*; *2010*; *2012*), the level of hunting in Brozany is analogically ca. 18% (by total MNI 37 : 8; *Tab. 1*).

Domestic species. The NISP method using the reliably identified bones of domestic animals produced a cattle / pig / sheep + goats / dog share of around 55% / 14% / 21% / 10% (for the absolute values of NISP and a quantification according to the alternative MNI method, see *Tab. 1*). Sheep and goats are relatively well documented among small domestic ruminants (in more than one feature for both species); however, greater numbers of sheep were identified (*Tab. 1*). Horse is represented by only two finds, which is only 0.45% of reliably identified domestic animals plus horses, according to the

feature	layer, context	zoological determination	anatomical determination	description of the artefact, notes, dimensions (GL = max. length)
2	western sector	Large mammal (cf. *Bos*)	Costa	worked (smoothed) and polished, smoother?, broken, GL (fragment) = 70.1 mm
6	southern sector	Large mammal		chisel, whole artefact surface smoothed, GL = 71.4 mm
6	southern sector	Medium mammal	diaphysis	peg shape, GL = 78.2 mm
6	southern sector	*Ovis/Capra*	Metatarsus, prox.	awl/spike, marks by processing, GL = 95 mm
6	southern sector	Small ruminant	Tibia, dist. diaphysis	awl/spike, GL = 79.5 mm
6	southern sector	Large mammal (cf. *Bos*)	? Ulna	chisel shape, GL = 34.9 mm
6	southern sector	Unspecified mammal		awl/spike, GL = 69.4 mm
6	southern sector	Large mammal		worked (smoothed) to shape of chisel/smoother, GL = 80.1 mm
6	northern sector	Unspecified mammal		awl, GL = 48.4 mm
6	northern sector, layer 7-10	*Cervus elaphus*	Antler, tine	worked, GL = 152 mm
62	southern sector, 180-200 cm	Large *Bovini*	Metacarpus	worked, GL = 169.5 mm
62	southern sector, 180-200 cm	Large mammal		worked to shape of chisel, part broken off, width = 15.3 mm
62	lower part of feature, by wall	Large mammal	Scapula	worked (smoothed) to shape of chisel and polished, GL = 100.8 mm
83	western sector	*Canis familiaris*	Caninus inferior	tooth with artificially perforated apex of root, root sanded from two sides, GL (estimation) = 34.5 mm; Fig 1-A
89		Small ruminant	Metatarsus	pin, GL = 109.5 mm
89	at bottom	Unspecified vertebrate (small mammal or bird)		small spike, GL = 37 mm
110	eastern sector	*Bos taurus*	Costa	worked (smoothed), smoother/spatula, GL = 130.3 mm
110	eastern sector	Large mammal	Costa	worked (smoothed) to shape of long spike, GL = 108 mm
110	eastern sector	Unspecified mammal	Costa	worked (smoothed), probably only fragment of tool, GL = 77.4 mm
110	western sector	Small ruminant	Metacarpus, diaphysis	small stick, all sides smoothed, one end probably broken off, GL = 76.8 mm
110	western sector	Large mammal	diaphysis ?tibiae	one end smoothed to blunt point, maybe gnawed by carnivore, GL = 125.4 mm
166	northern sector, upper part	Large mammal	Costa	awl, smoothed + two cuts partly weared away, GL = 130.4 mm
181A	northern sector	Unspecified (large?) mammal	? Costa	shape of flat long droplet, with perforation for hanging, GL = 49.7 mm; Fig. 1-B
181A	0-bottom	Unspecified mammal		artefact?, smoothed or digested by carnivore?, burned, triangular shape, GL = 21.3 mm

Tab. 3. Brozany: List of bone artefacts.
Tab. 3. Brozany: Přehled nalezených kostěných artefaktů.



Graph 2. Proportions in particular domestic animals representation, ratio of hunting and other categories, according to animal bone finds from eight Czech and two Moravian Funnel Beaker culture assemblages. Quantified by number of finds (NISP). Absolute numbers are converted to %, so that domestic species together constitute 100%. Sites, primary data and refs. in *Kyselý 2010*; *2012*. * see commentary in Chapter 2.4.

Graf 2. Srovnání zastoupení jednotlivých domácích savců, podílu lovných savců a dalších kategorií zvířat dle nálezů zvířecích kostí z osmi českých a dvou moravských souborů kultury nálevkovitých pohárů. Kvantifikováno dle počtu nálezů (NISP). Data jsou převedena na % tak, že domácí druhy spolu tvoří 100 %. Lokality, data a literatura viz *Kyselý 2010*; *2012*. * viz komentář v kap. 2.4.

NISP method. These finds do not permit a determination of the horse as domestic or wild. Chops observed on the ilium (Chapter 2.2) are circumstantial evidence of the consumption of horse.

The predominance of cattle and the comparable share of sheep/goat and pig are common during the Eneolithic in the territory of today's Czech Republic (*Kyselý 2012*). Aside from several small assemblages, only one larger assemblage of bones is available for a comparison from the late phase of the TRB in the Czech Republic – specifically, the assemblage from feature no. 96 in Velké Přílepy-Skalka (parcel no. 64/39, archaeological description in *Daněček 2008*). However, this assemblage is apparently abnormal due to an accumulation of the remains of domestic pig evidently arising as a result of the one-time deposition following mass consumption perhaps connected to a celebration or ritual event. The predominance of pig in this feature (ca. 98%) is completely exceptional (in greater detail in *Kyselý 2008e*; *2010*; *2012*). A meaningful comparison within the TRB as a whole is provided by larger assemblages from the Bohemian sites of Cimburk (Baalberge phase), Dobroměřice (Baalberge phase), Makotřasy (Sířem phase), Vikletice (Sířem phase), Prosmyky (undetermined TRB) and Litovice (undetermined TRB) and from the Moravian sites of Stránská Skála (predominantly Baalberge phase) and Přáslavice (Baalberge phase). This comparison is presented in *Graph 2* (in greater detail in *Kyselý 2010*). If the abnormal feature from Velké Přílepy is excluded, this comparison can be used to characterise the situation in Brozany in the framework of the Funnel Beaker culture as a settlement with a relatively larger number of sheep/goats and a somewhat smaller number of domestic cattle. The material from Brozany does not reveal an orientation on animal husbandry that was as strong as the situation detected at Makotřasy, where the share of wild mammals was only 3.3% (*Clason 1985*).

Feature	species	anatomy	1	2	3	4	5	6	7	7a	8	9	9a	10	11	12	13	14	14a	15	16
181A	Ovis	calva										68.4									
2	SSD	calva						46.4							(127.1)						88.7
181A	SSD	mand.							126.1	108.2	71.9	52.4	35.6	36.1 x 16	41.8	66.1					
181A	Canis	mand.	122.4	124.9	118.2	105.7	102	105.7	67.3		63	59.4		30.5	32.7	28.9	19.5	17.9		8.1 x 6.1	
		calva	160.5	151	144.5				79.3			93.1				(64.2)	77.7	27		55.8	14.3
62	Canis	mand.												(30.9)							
6	Vulpes	calva							61.9					53.3					21	53.7	13.1
		mand.	104.1	104.4	99.9	92.6	89.1	93.5	63.7		59	54.1		25.1	33.6	28.3	14.6 x 5.5	14		7.5 x 5.7	3.6 x 6.2

Tab. 4. Brozany: Cranial measurements of better preserved skulls of sheep, domestic pig, dog and fox. In column headers there are codes after *von den Driesch 1976* (note: fox measured as a dog). The values are given in mm, inaccurate values are presented in brackets. SSD = domestic pig, mand. = mandible.

The somewhat higher share of dog is the result of finds of puppies (in greater detail in Chapter 2.7). Without the puppy finds the share of dog is approximately 2%, which is approximately the average value at Eneolithic settlements (cf. *Kyselý 2012*). A very low share of horse is observed in both Brozany (0.45%) and in the territory of today's Czech Republic in general (summarily ca. 1%; *Kyselý 2012*). The almost complete absence of horse at the described settlement is interesting since the site is located in the driest part of Bohemia. Due to the dry climate, this area of Bohemia is one of the last possible places where steppes – regarded as the original and natural habitat of wild horses – could have existed.

The age composition of animals according to dental finds is evaluated and compared with other sites in other places (*Kyselý 2010*; *2012*, Graphs 38–42). The individual age categories of cattle are represented quite evenly in Brozany, and the relatively high share of adult animals (approximately above the age of four years) shows that the given settlement was not focused exclusively on the production of meat. Although relatively little data are available for interpreting the use of sheep/goats according to finds of teeth, the analysed data (which provide testimony primarily on sheep; see *Kyselý 2012*, Graph 42) suggest slaughter at a very young age to obtain high quality meat.

Hunted species. *Tab. 1* and *2* present the quantification and find context of documented mammal species commonly regarded as hunted game (i.e. aurochs, red deer, wild boar and hare). There is a distinct predominance of wild boar bones, which makes the assemblage from Brozany rather different from the other Eneolithic sites (cf. *Kyselý 2012*). However, the high share could be vastly overevaluated, since all of the wild boar finds come from a single feature (no. 62) and, with respect to their dimensions, age-related marks and the anatomical representation (*Tab. 1*, *2*), could easily belong to a single individual. The assemblage of wild boar bones is composed mainly of elements of distal parts of limbs, specifically: twenty-six of twenty-nine finds represent the mostly fully preserved left and right tarsal, carpal, metapodial and phalanx bones. Due to the low nutritional value of the represented body parts, the unusual anatomical composition can be explained as a one-off disposal of useless parts of the same animal that were then immediately or soon covered with soil. The age of the animal was estimated according to *Silver* (*1969*) at 2–2.5 years, based on the fused epiphyses of the metapodials and unfused *tuber calcanei*.

The absence of beaver bones is rather surprising given the proximity of a large river (Ohře) and its not-too-distant smaller tributaries. Although beaver is heavily represented in other phases of the Czech Eneolithic (*Kyselý 2008a*; *2012*) as well as in other archaeological periods (*Kyselý 2005*), its low share in TRB assemblages other than Brozany is also established (*Kyselý 2012*). But the category of wild mammals is not so heavily represented in the assemblage from Brozany that it would permit reliable conclusions to be drawn. In addition to two antler fragments, red deer is also represented by various postcranial bones (*Tab. 2*). Aurochs (*Bos primigenius*) was identified based on morphological traits and with the assistance of metric values and criteria (see Chapter 2.5). Finds of wild species that are not mammals are discussed in Chapters 2.9 to 2.11.

17	18	18a	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
													20.2	19.2	44.7										58.9	45.7
												70					105.3	52.3	74.2	21.4	26.4	62.2	52.4	30.6		
					15.9																					
	51.3		22.8	16.9																						
44.5	17.5	9.2	16.8	11.2 x 14		19.4	61	58.7	35.6	49.5	18.9	(15.2)	55.8	98.2				59.9	32	33.7		52		26.3	34.4	
	45		23.6																							
41.5	12.5	6.3		9.3 x 11	? x 8.5		46.4		25.8	34.5	14.8	12.4	48.1	73.4	23.8	32.9	28.4	37.4	19.7		23	41		30.8		
6.2	38.3		15.9	12	25.6																					

Tab. 4. Brozany: Lebeční rozměry lépe zachovaných nálezů ovce, domácích prasat, psů a lišky. V hlavičce sloupců kódy dle *von den Driesch 1976*, liška měřena dle vzoru pes. Měřeno v mm, v závorkách ne zcela přesně změřené hodnoty. SSD = prase domácí, mand. = mandibula.

2.5. Osteometric description and body size

The material was subjected to an osteometric examination, and the collected data are part of special comparisons (*Kyselý 2008b*; *2010*). A comparison of the dimensions of domestic cattle with the metric distributions of bovids from the Bohemian Eneolithic (*Kyselý 2008b*) shows that the size of the domestic cattle from Brozany corresponds to the standard dimensions at the time, i.e. between the size of aurochs and small medieval cattle. Specific data reveal an average size of domestic Eneolithic cows of around 114–117 cm (according to *Kyselý 2010*). The dimensions of sheep/goat and pig bones from Brozany are also in line with Eneolithic dimensions (based on a comparison with *Kyselý 2010*).

In the assemblage from Brozany, only two long bones of domestic cattle permitted a calculation of the height of the animal specifically: the metatarsus (probably from a cow, GL = 192.5 mm) gives a shoulder height of 115–117 cm (when using the index for cows) or 120–122 cm (when using the index for bulls); a second cattle metatarsus (GL = 228 mm) gives a shoulder height of 120–122 cm (when using the index for cows) or 126–128 cm (when using the index for bulls).[2] A complete metatarsus (GL = 130.3 mm) was used to calculate a shoulder height of sheep of 59.2 cm (according to *Teichert 1975*).

A metric examination of two horse bone finds from Brozany gives the following values: *pelvis*: SH = 46.9 mm, LA = 66.5 mm, LAR = 62 mm; *atlas*: GL = 89 mm, GLF = 86.4 mm, BFcr = 87.1 mm, BFcd = 83.2 mm). These dimensions from Brozany do not differ from the values derived from other Eneolithic settlements in the Czech Republic (according to a comparison with *Kyselý 2010*).

Finds from Brozany specified as aurochs (*Bos primigenius*) have the following dimensions: dist. *scapula*: GLP = 99.2 mm, SLC = 77.3 mm, LG = 83.7 mm; dist. *radius*: Bd = 97.9 mm, Did = 110.2 mm; *corpus ilii*: SH = 57.7 mm, SB = 35.4 mm; *centroquartale*: GB = 74 mm. All of these values exceed the maximum values given in the works of *Degerbøl – Fredskild* (*1970*) and *Bökönyi* (*1995*) for domestic cattle. Teichert's indexes (1969) were used on the wild boar metapodial bones mentioned above (Chapter 2.4) to calculate a shoulder height of 101–108 cm (μ = 105 cm, n = 5).

For the skull dimensions, see Chapter 2.6 and *Tab. 4*. For the fox dimensions, see Chapter 2.8.

2.6. Pig and dog skulls, horn core finds and notes on the morphology of domestic animals

Two mostly intact calvariae from domestic pigs were found in feature nos. 2 (above the bottom – layer 2 in the original documentation, *Fig. 3*) and 89 (on the bottom, *Fig. 4*). They are the best preserved pig skulls from the Bohemian Eneolithic. Thus, they allow to describe the morphology of the skull and head, a process that is commonly highly limited when working with pig bone material,

[2] Based on a combination of calculations using the indexes from *Calkin 1960*; *Fock 1966* and *Matolcsi 1970*.

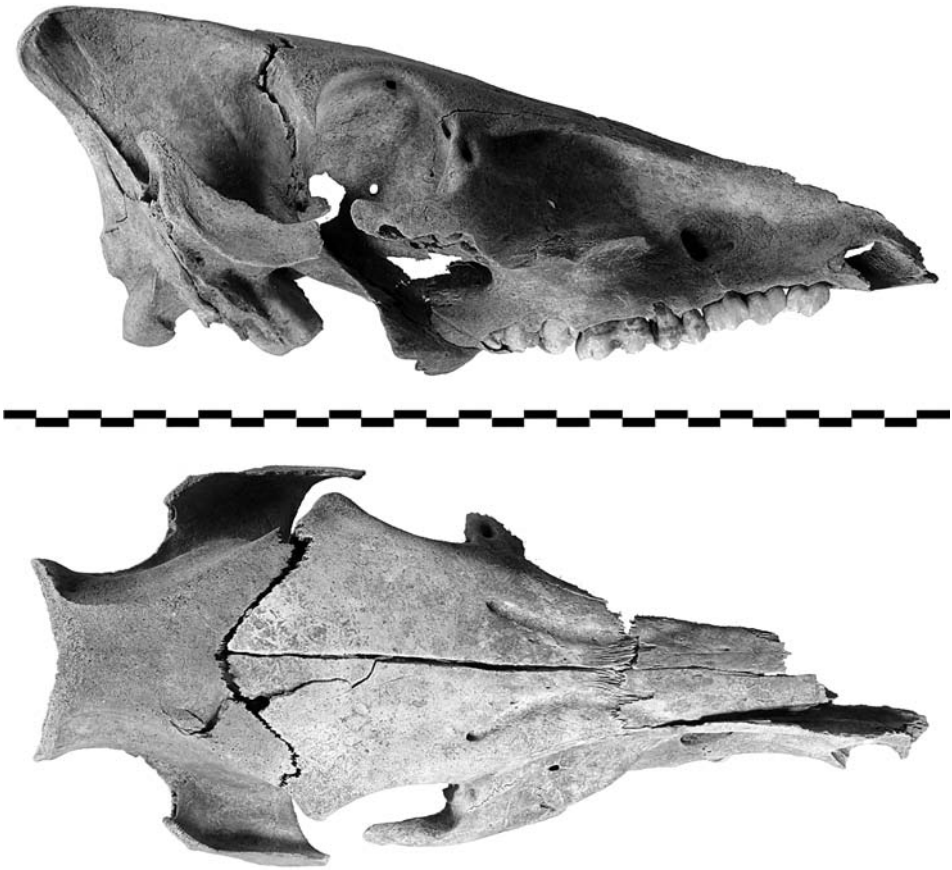


Fig. 4. Brozany, feature no. 89: Calvaria of domestic pig (*Sus domesticus*), lateral and dorsal aspects. Scale: 1 piece = 1 cm.
Obr. 4. Brozany, obj. 89: Lebka prasete domácího (*Sus domesticus*), pohled z boku a shora. Měřítko: 1 dílek = 1 cm.

which is mostly very fragmented and unsuitable due to young age. The age in the case of the skull (undetermined sex) from feature no. 2 was estimated at 5–6 years (the abrasion of the 3rd molar corresponds to stage G according to *Grant 1982*; the *sutura frontolacrimalis* and *squamosa* are obliterated, the *sutura lacrimozygomatica*, *palatina transversa* and *synchondrosis sphenooccipitalis* unobliterated). The age the case of the skull of the sow from feature no. 89 was estimated at 22–32 months (the 3rd molar is just erupting from the crypt, the skull is crumbling in the *sutura coronalis*, *interfrontalis*, *palatina mediana*, though the *sutura sagittalis* is obliterated; P^1 are present). See *Tab. 4* for the skull dimensions.

The skulls in both cases are those with a flat forehead without a concave curve (i.e. the profile of the *os fronale* and *nasale* is straight in the *norma lateralis*), the rostrum is elongated, and the overall shape of both skulls is reminiscent of a wild boar (see *Figs. 3* and *4*). In this sense, the pigs differ significantly from today's common domestic breeds characterised by a short snout and a heavily curved (i.e. concave) forehead. Signs of forehead concavity or the shortening of the snout were not observed even on other fragments from the site or at other sites in the Czech Republic (*Kyselý 2010*).

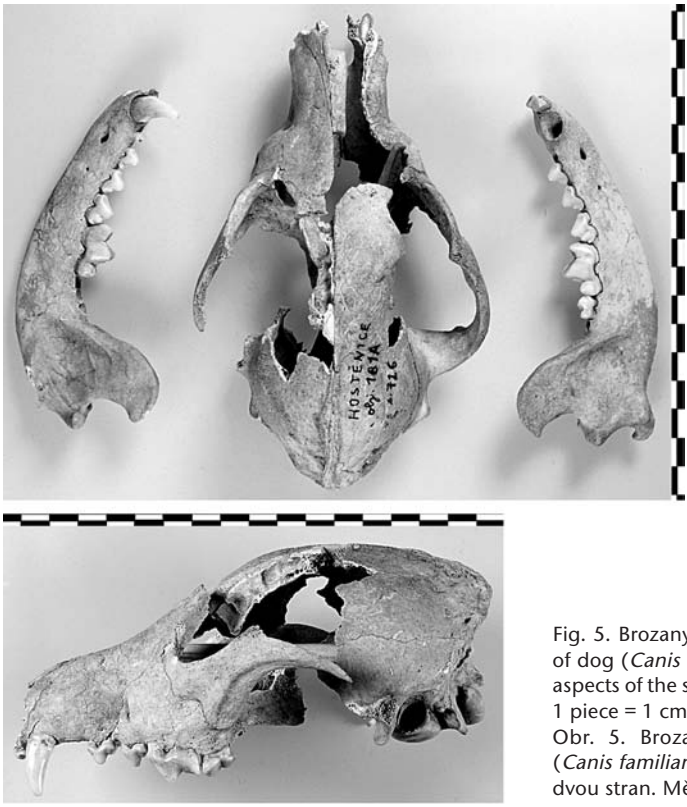


Fig. 5. Brozany, feature no. 181A: Cranium of dog (*Canis familiaris*), lateral and dorsal aspects of the same calvaria depicted. Scale: 1 piece = 1 cm.
Obr. 5. Brozany, obj. 181A: Lebka psa (*Canis familiaris*), pohled na tutéž lebku ze dvou stran. Měřítko: 1 dílek = 1 cm.

A three-quarters preserved dog skull (calvaria and mandibles, *Fig. 5*) from feature no. 181A makes it possible to describe the morphology of dogs. All of the premolars in the maxilla and mandible are in a row; they do not overlap one another, and there are no gaps between the teeth. Although a shortening of the tooth row was not observed, the rostrum is relatively short and the skull on the whole also appears somewhat shorter. Nevertheless, the shape of the skull is not abnormal. The boundary lines of the insertions of the *musculi temporales* touch one another but do not form a sagittal crest. The right zygomatic bone shows a small deformation that is perhaps related to missing adjacent molar 1 (both possibly the result of the same injury). The abrasion of the teeth (especially the heavy abrasion of the incisors) indicates the advanced age of the individual. The mandible from feature no. 62 again holds the front teeth in a single row, without overlap or gaps. See *Tab. 4* for the dimensions.

The presence of dogs with a different physical construction in the same culture (i.e. Salzmünde) is indicated by the morphology of the postcranial bones in the puppies (Chapter 2.7, *Fig. 8*). The relatively large differences in the robustness of the bones in the early stages would probably be much more distinct once the dogs were full-grown. This finding is interesting because great morphological differences in freely mating dog communities at a single settlement are not assumed in the Eneolithic.

Fig. 6 depicts better-preserved finds of domestic cattle horns. These horns belong to a longhorn cattle breed (*primigenius* type) that was common during the Eneolithic in the territory of the Czech Republic (cf. *Kyselý 2010*) and in neighbouring parts of central Europe (e.g. *Bökönyi 1974*). As previous summarizations (e.g. *Bökönyi 1974*; *Benecke 1994*; *Kyselý 2010*) revealed, the horns of Eneolithic sheep are commonly arched (semicircular) toward the back and bent to the side, with a rounded front edge; the horns of males have a triangular to semicircular cross-section and are spirally twisted.

Fig. 6. Brozany, feature no. 181A: For major part preserved horncores of domestic cattle (*Bos taurus*). Scale: 1 piece = 1 cm.
Obr. 6. Brozany, obj. 181A: Lépe zachované rohové výběžky tura domácího (*Bos taurus*). Měřítko: 1 dílek = 1 cm.

This description is not contradicted by the find of a ram's horn (despite being only partially preserved) from Brozany (in feature no. 181A).

Two horns of a female goat from features nos. 62 and 110 have the scimitar shape, i.e. straight on the sagittal plane and slightly arched toward the back, not twisted, with a sharp rostral edge and with a flat medial side (*Fig. 7*). The find of a non-adult individual of an unspecified sex from feature no. 6 also matches this description. The given type is common in central Europe during the Eneolithic (*Bökönyi 1974*; *Benecke 1994*), and no other morphotype has been also identified among the Eneolithic skull material originating from the sites in the Czech Republic (*Kyselý 2010*). The horn of a goat from feature no. 110 reveals swelling along half of its length (*Fig. 7*). While horn deformation could be the result of castration (*Davis 2000*; *Albarella 1995*), the described horn from Brozany is classified as female, which suggests a different cause for this pathology.

2.7. Puppies and human newborns

A peculiar feature of the osteological assemblage from the settlement features at Brozany is the presence of a larger number of skeletal remains of (a) puppies and (b) human newborns.

a) The remains of puppies were found:

(1) in *feature no. 2*: Three puppies were identified based on fifteen preserved elements of skulls and front and hind limbs; all of the elements were found in the lower part of the feature, probably in the layer just above the bottom of the feature. At least one of the puppies is without erupted deciduous teeth (i.e. perinatus maximally ca. 1 month old), while in another the deciduous teeth have emerged but an M_1 has not yet appeared (age of ca. 3–4 months). The different age indicates that the puppies came from at least two litters (see below);

Fig. 7. Brozany: A – feature no. 62: female goat horncore (*Capra hircus*) preserved on the whole. B – feature no. 110: partly preserved female goat horncore (*Capra hircus*) bearing pathology (arrow). Scale: 1 piece = 1 cm.
Obr. 7. Brozany: A – obj. 62: vcelku zachovaný rohový výběžek samice kozy domácí (*Capra hircus*). B – obj. 110: zčásti zachovaný rohový výběžek samice kozy domácí (*Capra hircus*) s patologií (šipka). Měřítko: 1 dílek = 1 cm.

(2) in *feature no. 181A*: Two skeletons, one in the north half at the bottom of the feature (48 fragments making up about half of the skeleton preserved, aged ca. 3–4 months; I.D. 687), the second in the north half 10 cm above the bottom (143 fragments making up about three-quarters of a skeleton, including skull elements and teeth, preserved; permanent molars and the canines can be seen in the crypts, but have not yet erupted, aged ca. 3–4 months; I.D. 689). In addition, another twenty bones, including skull elements, were scattered about the north and south half of the feature, perhaps also at the bottom or above it, though reliably in the lower half of the fill. Altogether at least four puppies of various sizes and ranging in age from two to five months were detected in feature no. 181A; specifically, two of the dogs are around 3–4 months old, one was about 4–5 months old, and the fourth about 2–4 months old (cf. femurs in *Fig. 8*). Nevertheless, the distribution of the finds and their anatomical and morphological description do not rule out that the feature contains the remains of five or even more puppies. Based on size/age differences of the bone finds and considering the conceivable size variability within the same litter, the puppies in feature no. 181A come from at least three litters. Differences were also observed in the bone morphology of individuals of similar, or the same, age (see the shape of the femur and tibia, *Fig. 8*). If at least three puppies from feature no. 2 are figured in as possibly being from the same mothers as the puppies from feature no. 181A, the studied material from Brozany contains the remains of at least seven puppies from a minimum of three litters. The most complete skeleton, about three-quarters preserved, was found in the north half of feature no. 181A (I.D. 689) and corresponds with an age of around three to four months. Other skeletons are represented by only smaller skeletal parts or separate bones.

Fig. 8. Brozany, feature no. 181A: Variability in morphology of femurs (left of the scale) and tibiae (right of the scale) of puppies found in the same context (compare length vs. width of the bones). Scale: 1 piece = 1 cm.
Obr. 8. Brozany, obj. 181A: Různá morfologie femurů (vlevo od měřítka) a tibií (vpravo od měřítka) štěňat z téhož kontextu, srov. šířka vs. délka kostí. Měřítko: 1 dílek = 1 cm.

b) The remains of newborn humans were found:

(1) in *feature no. 6*: Bones forming about three-quarters of a skeleton, including elements of the skull and both lower and upper limbs (a total of forty-five elements plus skull fragments) were found in one place in the lower ashy layer (layers 7–10, north half, I.D. 146), in addition one bone in the south half of the feature. All of the remains probably belonged to a single individual in the perinatal stage;

(2) in *feature no. 181A*: The remains of at least two individuals in the perinatal stage: (A) one approximately one-half preserved skeleton, including elements of the skull and both lower and upper limbs (a total of forty-one elements or bone fragments found in one place in the south half of the feature, I.D. 724 and 726) and (B) a more poorly represented individual (five postcranial elements from the north half of the feature, and perhaps skull fragments belonging to this individual found at the bottom of the north half of the feature). All of the finds reliably come from the lower half of the fill; like the puppies, they were probably lying on the bottom of the feature. Together with the newborn from feature no. 6, there are at least three newborn individuals reported in Brozany.

The age of newborns from both features was established according to *Fazekas – Kósa* (*1978*) based on the length of all complete diaphyses of long bones[3] at an age around birth, the dating supported by the development stage of the deciduous incisors in the mandible from feature no. 6, which apparently had not yet erupted. Thus the babies could have died during the delivery, but it is not also excluded that the skeletons labelled here as newborns represent miscarriages, i.e. foetuses in an advanced stage of development, or that they could possibly have been babies several days old.

[3] Diaphysis length: feature no. 6: humerus – 65.7 mm, radius – 53.6 mm, femur – 75,8 mm, tibia – 65.9 mm and 66.2 mm; feature no. 181A: humerus – 66.1 mm, femur – 75.5 mm and 71 mm, tibia – 61.1 and 60.9 mm.

Fig. 9. Brozany, feature no. 181A: separated human newborn's (right of the scale) and puppy's (left of the scale) bones found in the same context (I.D. 726). Scale: 1 piece = 1 cm.
Obr. 9. Brozany, obj. 181A: separované kosti kostříček novorozeněte (vpravo od měřítka) a štěněte (vlevo od měřítka) pocházející zjevně z téhož místa objektu (s.č. 726). Měřítko: 1 dílek = 1 cm.

Contextual connections and discussion. The precise appearance and position of the puppy and newborn human skeletons and bone finds in features are not documented, and the original degree of bone articulation is not known. Nevertheless, the presence in several cases of a large number of bones of matching age in one location of a feature and the low fragmentation of the bone elements indicate an original anatomical connection of the bodies or at least parts of the bodies. It is highly possible that the whole bodies of the puppies and the newborn humans were originally present in the features and that some of the smaller bones were overlooked during the excavation or that they were destroyed by post-depositional taphonomical processes. This is suggested at least in several cases by the observed co-occurrence of elements of all the main parts of the bodies, i.e. the skull, upper and lower limbs, vertebrae and ribs (see above).[4]

Noteworthy (and not documented elsewhere in the Czech Republic) is the spatial relationship and corresponding age of the skeletons of newborn humans and puppies in the same feature and in the same layer – specifically in feature no. 181A (silo) containing at least five puppies and two human

[4] A detailed summary of the determination of individual skeletal elements and the details for determining the individual ages is provided in *Kyselý 2010*.

newborns (see above). Although the precise position of finds in the feature is not known, in some cases the remains of the puppies and the newborn humans were in close spatial contact (skeletal elements of two puppies mixed with the elements of a single newborn human, I.D. 726, *Fig. 9*). This connection could imply the equal status of newborn humans and puppies during deposition (regardless of whether it was a ritual act or not).

In addition to the puppies, adult dogs are also documented in both of the relevant features in Brozany: a lower premolar in feature no. 2 and a metatarsal and a skull (*Fig. 5*) in feature no. 181A. At the same time, the presence of dog bones is not limited to these two features; one mandible, an isolated tooth, a rib, a fragment of a metapodial bone and a radius were discovered in five other features (*Tab. 1*), where they already have the nature of common settlement waste. In addition to the human newborns, a fragment of a left human pelvis (acetabulum) was found in the lower part of the fill of feature no. 6 (*Fig. 10*). It represents an adult or almost adult individual, since the acetabulum is fused and thus, according to *Dobisíková et al.* (*1999*), belongs to an individual at least sixteen years of age (acetabulum diameter = 55.3 mm). This fragment shows apparent bite marks from a carnivoran on the broken edges. Further evidence of an adult or sub-adult human is a fragment of the diaphysis of the left humerus found at a level of 200 cm in feature no. 62. Although these finds of bones from adult dogs and humans are fragmented, they revealed no signs of cuts. The burnt radius of a dog (Chapter 2.2) and bite marks on the human pelvis are typical for settlement waste. Aside from the remains of the child from grave no. 16 (see *Dobeš – Zápotocký 2013*) and the finds of human bones described in the presented article, no other Salzmünde graves or human bones were found at the Brozany site and no signs of the existence of a cemetery belonging to a culture other than TRB are present.

Due to the fact that the small, fragile bones of very young mammals are extremely susceptible to quick pre-depositional degradation (weathering, consumption by dogs, trampling, etc.), the described skeletons of puppies and newborn humans, which are not significantly fragmented and are at least partially intact, could not have been left exposed for long on the surface of the ground. Hence, the death of the puppies and the newborn humans must have always occurred shortly before their burial in the feature – i.e. more or less synchronised for the same feature. Since the killing or death of the puppies and the newborn humans originating from the single feature apparently always occurred in the same time, the finds document the fact that at least three bitches gave birth to puppies within a short period of time. This information suggests a higher number of dogs at the settlement (even in the case of the synchronisation of the estrous cycle). Although dog puppies cannot be distinguished from wolf pups on the basis of bone morphology, the age differentiation observed on the bones from feature no. 181A is evidence against the possibility that all of the described bones belonged to the young from a single female wolf. The high phenotype variability described above directly absolutely rules out the possibility that all of the recorded puppies belong to a single wild species (i.e. to wolf).

While the three newborn humans could theoretically have come from a single birth, it is highly unlikely due to the fact that they were found in two different features and due to the low probability of triplets. It is somewhat more probable that they come from two births, since the two newborns from feature 181A with the same age could represent twins.

Interpretation. The information available on the described finds of puppies and newborn humans in settlement features does not permit a definite interpretation. Since the relevant features with these finds are regarded as closed and undisturbed (*Dobeš – Zápotocký 2013*), the finds cannot be connected with a burial area that was possibly discovered on the border of the residential area in the form of a single grave (feature no. 16/96, see Chapter 1). The very low age of the individual from grave no. 16 (ca. 0.5 years) is likewise noteworthy.

Due to the combination of individuals of various ages and various species as well as the occurrence of newborn humans and/or puppies in up to three features (feature nos. 2, 6 and 181A), it is possible to speculate that this phenomenon was not accidental and that it involved, for example, sacrifices and intentional deposition. Significant in this context is the fact that next to cattle, dogs were the most commonly occurring species in ritual situations in Central Europe during the Eneolithic

Fig. 10. Brozany, feature no. 6: Part of a human pelvis with marks of gnawing by a carnivoran. The position of bites are indicated by arrows. Scale: 1 piece = 1 cm.
Obr. 10. Brozany, obj. 6: Část lidské pánve okousané šelmou (místa okusu ukazují šipky). Měřítko: 1 dílek = 1 cm.

(cf. *Stuchlík 2004*; *Behrens 1964*; *Kyselý 2010*; *Zalai-Gaál 1994*). Additional peculiarities in feature no. 181A, that could have been potentially related to the finds of the puppies and newborn humans, are the presence of shells, which possibly represented a necklace or rattle (see Chapter 2.3, *Fig. 2*), and the presence of a nearly fully intact skull of an adult dog (Chapter 2.6). Uncommon finds also come from other features with newborn humans and puppies. A well-preserved pig skull (Chapter 2.6) was present in feature no. 2, while feature no. 6 contained fish scales (Chapter 2.10) and the skeleton of a fox (Chapter 2.8). Nevertheless, according to M. Dobeš (*Dobeš – Zápotocký 2013*), no signs of ritual activities were observed in any of the given features; the accompanying non-osteological material was always of the character of common settlement waste. Therefore, even this unusual combination of special finds can simply be the result of the liquidation of the remains of dead animals and children, for example after an epidemic or some type of tragic event. Nevertheless, terrain observations do not rule out the simple discarding of potential sacrifices in the features, analogically to 'non-ritual' burials *sensu Rulf 1996*.

So-called 'pit burials' or 'settlement burials' found at the settlements of the majority of cultures have a non-standard or impious character. Often seen, for example, at Knovíz culture settlements, the burials are interpreted in a variety of ways and in some cases are perhaps the result of cannibalism (*Bouzek – Koutecký 1980*; *Koutecký 1990*; *Rulf 1996*). Although children appear to predominate among sacrifices (*Rulf 1996*), the cases from the Czech lands listed by the cited author are mostly in the juvenile, rather than newborn, category. While no signs of cutting or burning were observed on the described bones of the puppies and newborns from Brozany, their absence does not rule out consumption as the result of a food crisis or for ritual reasons, for example. Consumption does not seem likely in cases when the skeleton was probably originally intact (see above); on the other hand, the studied material and the available field documentation do not make it possible to rule out the potential portioning of the bodies.

The origin of the fragments of bones from a subadult/adult human (feature nos. 6 and 62) is entirely unclear; due to the smaller size of the fragments it is perhaps possible to consider a random mix without direct intentional and ritual reasons.

Analogies. In the Czech Eneolithic, accumulations of skeletal remains of more than one puppy (ranging from neonatal to several months of age) were only found in the Proto-Eneolithic and Early Eneolithic (TRB). Specifically, the skeleton of an adult dog and four puppies discovered above the bottom of a Jordanów culture silo (feature no. 83/1979) in Úhřetice is regarded by V. Vokolek (*Vokolek 1980*; *Vokolek – Zápotocký 2009*) as the burial of a bitch and her litter due to the careful placement of the bodies and the presence of grave goods in the form of a standing jug found in the same horizon. A minimum of four puppies with a maximum age of five months originating from at least three bitches were found in Hostivice-Litovice (in pit no. 6, TRB, Baalberge; *Kyselý 2002*). Finds of puppies are also known from surrounding countries (e.g. Weissenfels – five puppies in two pits; *Behrens 1964*).

Location	southern part											northern part		
max. diameter (approximately, in mm)	7.2	7.3	7.3	7.8	7.8	7.9	8.1	8.1	8.4	8.8	?	7.1	?	?
estimated age (years)	6	?	7–9	6–7	?	?	5	6–7	6–8	7	7–8	5	7	6–7

Tab. 5. Brozany, feature no. 6: Dimensions and age estimation of fish scales of *Cyprinidae* family.
Tab. 5. Brozany, obj. 6: Rozměry a odhad věku nalezených šupin ryb čeledi *Cyprinidae*.

The individual bones and skeletons of neonatal or juvenile dogs are also documented in Řivnáč culture settlement situations (*Kyselý 2010*). A young dog between the age of six and eight months old was found in Bell Beaker culture human grave no. 67/1956 in Brandýsek (*Zikmundová 1960*). An adult dog along with a child and a cow were in an equal position (all sacrifices?) in pit no. 5 in Hostivice-Litovice (cf. *Pleinerová 2002*; *Kyselý 2002*). Thus, analogies to the puppy and newborn human finds from Brozany do not have a uniform character in the Czech Eneolithic.

Remains of perinatal humans were observed repeatedly in the Salzmünde phase of the TRB. In addition to at least three individuals from Brozany, other finds come from Mochov (one individual at the bottom of feature no. 17/1980 according to *Kyselý 2010* and one or two other individuals according to *Moucha – Špaček 1981*) and from Velké Přílepy-Skalka (from the bottom of post hole no. 9/2006 in a hut (feature no. 2A/06); see *Kyselý 2008e*; *2010*; archaeological description in *Daněček 2008*). Additionally, individual bones of human perinatals found among animal bones coming from settlements were observed in a number of other cases in the Bohemian Eneolithic (*Kyselý 2010*) and frequently in Vliněves near Mělník (according to a preliminary investigation, still undated).

2.8. A fox skeleton and its dating

The nearly complete skeleton of a red fox (*Vulpes vulpes*), including the skull and postcranial elements (*Fig. 11*), was found in feature no. 6. Although the degree of articulation and the precise position of the skeleton in the feature are unknown, it probably comes from the lower part of the feature. The absence of several small elements (a number of vertebrae, the premaxilla and the metacarpals) is probably the result of losses caused by the fact, that during the excavation the contents of the feature were not sifted or floated, or as the result of disturbance by small subterraneous vertebrates.

Although a burrow was not observed during the excavation (*Dobeš – Zápotocký 2013*), it could not be ruled out entirely that the skeleton represents a later intrusion in the feature in the form of a fox that had died in its den, or the highly unlikely possibility that the fox was dragged underground as the prey of another carnivoran.[5] For this reason sample of the fox skeleton was dated using the radiocarbon method and compared with the dating results of six samples from bone fragments of cattle from four various features at the site (see below and *Dobeš – Zápotocký 2013*, Tab. 5).

All of the compared cattle bones (*Dobeš – Zápotocký 2013*, Tab. 5), show similar radiocarbon analysis results, roughly in the range of 3650–3100 cal BC (1σ). Two cattle bone samples from feature no. 6 are in the range of 3714–3365 cal BC (P = 94%; sample: CRL-8002) and 3640–3323 cal BC (P = 88%; sample: CRL-10280), whereas the fox bone sample is in the range of 3367–2860 cal BC (P = 92%; sample: CRL-8001). On the basis of the overlapping of the probability distribution for the cattle and fox bone samples (*Graph 3*), it is possible to state that the fox is dated to the period of settlement occupation by Salzmünde people (and hence can be an intentional component of the feature fill) with a probability of 14.2% (according to a comparison with sample CRL-10280) or 2.8%

[5] The dragging of the bones underground by rodents or other small animals can be ruled out on the basis of the completeness of the discovered skeleton, which also includes small bones such as auditory ossicles and phalanges.

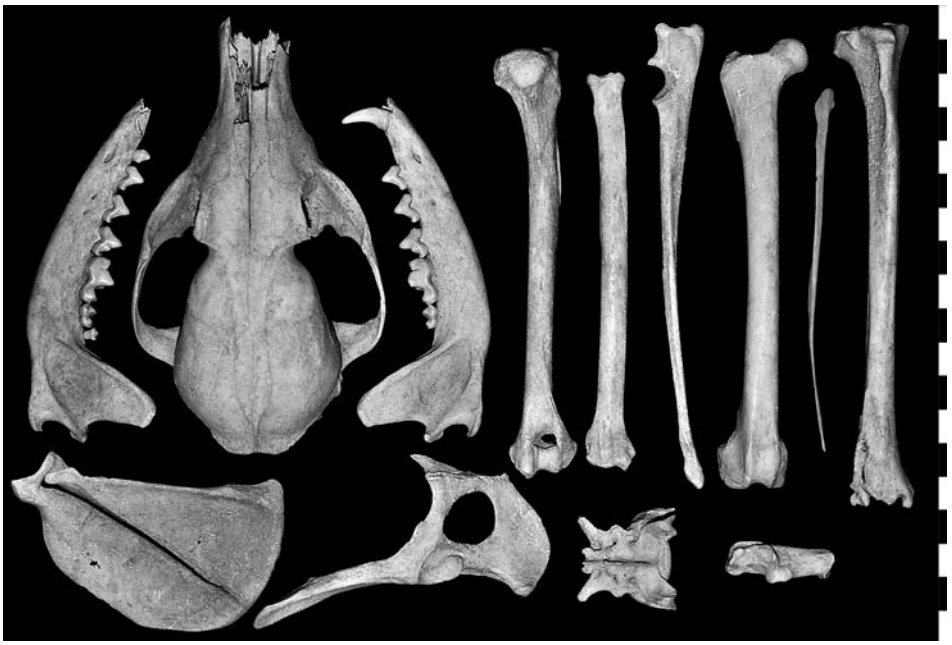


Fig. 11. Brozany, feature no. 6: Some bones of the fox skeleton. Scale: 1 piece = 1 cm.
Obr. 11. Brozany, obj. 6: Vybrané kosti skeletu lišky. Měřítko: 1 dílek = 1 cm.

(according to a comparison with sample CRL-8002). This probability is much lower than the congruity of the dating of the two cattle bones from the same feature, which is 54.3%.[6]

All of the epiphyses of the long bones and the vertebral plates are fused, indicating full adult age. The distal part of the right fibula is fused to the tibia. Although the baculum was not found, this does not reliably rule out that the individual was a male. The skeletal bones show no signs of cutting, burning or bite marks from carnivorans and are minimally fragmented (see *Fig. 11*). An overview of discovered elements and osteometric data are presented in *Kyselý 2010*. The following is a selection of osteometric data: max. height (HS) of scapula = 84 mm, max. length (GL) of humerus = 128.7 mm, GL of radius = 119.8 mm, GL of pelvis = 91.1 mm, GL of femur = 134.7 mm, GL of tibia = 145.6 mm, GL of calcaneus = 32.1 mm. Skull dimensions are given in *Tab. 4*.

The reason for the presence of the fox skeleton in the feature cannot be reliably determined on the basis of the available information. Radiocarbon analyses show a low likelihood (for P see above) for the possibility that people intentionally deposited or tossed the body of the fox into the feature while the settlement was still in operation and indicates a high probability that the fox built a den at the site several hundred years (ca. 200–800 years) later and died in it. In any case, the Eneolithic age of the fox seems to be confirmed, thus ruling out recent contamination.

The given analyses and related debates have general methodological importance for the dating of the find inventory of the culturally identified archaeological features. They are also significant for an evaluation of the testimony of the specific characteristics of the discovered skeleton.

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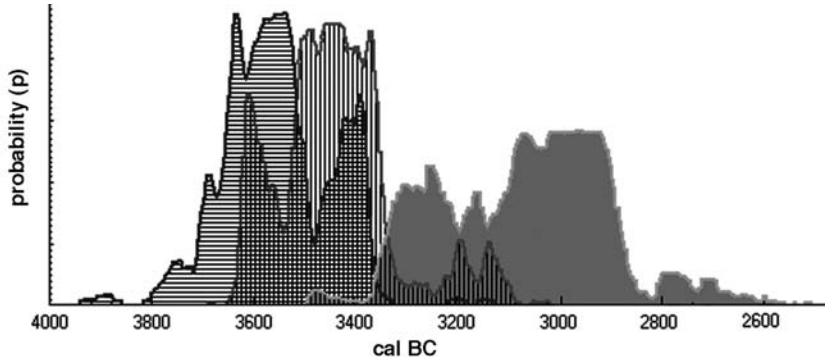
[6] See the overlap in the distribution of P in *Graph 3*. The values of the calculated distribution overlap of 14.9%, 2.9% or 57.2% indicating the relative probability were multiplied by a coefficient of 0.95 (corresponding to 2σ) in order to obtain the absolute probability.



Graph 3. Brozany, feature no. 6: Comparison of probability distributions of radiocarbon dating the bone of fox (grey area) and two bone samples of domestic cattle (areas hatched horizontally and vertically) originating from the same archaeological context based on analyses CRL-8001, CRL-8002, CRL-10280.
Graf 3. Brozany, obj. 6: Srovnání distribuce pravděpodobností radiokarbonového datování kostí lišky (šedá plocha) a dvou kostí turů (horizontálně a vertikálně šrafované plochy) z téhož kontextu na základě analýz CRL-8001, CRL-8002, CRL-10280.

2.9. The bones of a cat, synanthropic (?) field mice, an eagle and anseriform birds

Cat. An interesting find was the mandible of a wildcat (*Felis silvestris*) with a healed alveolus following the loss of a carnassial tooth (feature no. 66, Photo 14 in *Kyselý 2012*), which led to speculation on the possible captivity of this handicapped individual (*Kyselý 2010*; *2012*). However, the survival of such an individual in nature is not improbable. The idea of possible collection and captivity of wolf pups (cf. Chapter 2.7) is also interesting in this context.

Field mice. The isolated bones of field mice from the species *Apodemus sylvaticus* or *A. flavicollis* found in two features (nos. 6 and 181A, *Tab. 1*) could represent evidence for synanthropic rodents in that time. The synathropization of *Apodemus* species is sometimes assumed even for pre-medieval agricultural history in Europe (e.g. *Cucchi et al. 2011*). However, the dating of the bones of small rodents (which are often burrowing animals) is problematic in general, thus making it difficult to determine their origin. Arguing against the possibility of contamination in the case of the mouse finds from Brozany is the fact that all of the finds come from the deep lower parts of the features (at the bottom of feature no. 181A and in the lower half of feature no. 6, i.e. always around 75–150 cm below the topsoil[7]), and the given mouse species (especially *A. flavicollis*) burrow underground just rarely and live mainly above ground (*Niethammer – Krapp 1978*). This information supports the notion of the contemporaneity of the mouse finds with the Salzmünde human activity and the interpretation that the species were synanthropes.

Existing published evidence of mice from the Eneolithic in the territory of the Czech Republic come from: a depth of 40–70 cm below the topsoil of one feature at the Úholičky site (*Kyselý 2008c*), a depth 20–40 cm below the topsoil of feature no. 125 at Kutná Hora-Denemark (*Kyselý 2008a*) and an isolated mouse find from a Řivnáč culture hut in Dolní Beřkovice (*Kyselý 2010*). Other and relatively extensive mouse bone finds come from four to five features at the Velké Přílepy-Skalka site (*Kyselý 2008e*; *2010*); all are dated to the Early to Middle Eneolithic (3800–2800 BC), three of them more narrowly to the TRB. Some of the bones were found at a depth of up to 80–90 cm below the topsoil. Many finds, especially those from Velké Přílepy-Skalka, belong to large individuals whose

[7] The topsoil is typically 20–40 cm thick; in order to determine the actual depth of the find from the surface of the ground it is therefore necessary to add this value to the stated depth.

Fig. 12. Brozany, feature no. 6: Bird bones of *Anseridae* family. Details of the parts of the bones with signs of being cut off are shown in the figure inset, the positions of cuts are indicated by arrows. Scale: 1 piece = 1 cm.
Obr. 12. Brozany, obj. 6: Kosti vrubozobých (*Anseridae*). Ve vloženém okně detaily kostí se stopami ořezávání (pozice řezů indikována šipkami). Měřítko: 1 dílek = 1 cm.

bones are larger than the maximum dimensions given for *Apodemus flavicollis*[8] living in the studied region of Bohemia today (based on a comparison with the dimensions provided in *Kuncová – Frynta 2009*). For this reason, the bones can be ascribed, with a high degree of probability, to the species *Apodemus flavicollis*.

Birds. Along with a large number of bones from large and medium-sized domestic and wild mammals, eight bones fragments from anseriform birds (geese, *Anserini*) were identified, all in the same feature (silo, feature no. 6). The manner of fragmentation corresponds to the breaking of the bones in a fresh condition. Two of the fragments (distal radius and coracoideum of small goose species) show signs of cutting or chopping with a relatively sharp tool (*Fig. 12*). At least some of the bones reliably come from the ashy layer of the relevant feature. A closer study revealed the presence of certain species of large geese species as well as small geese species (see *Tab. 1* and *2*). This predominance of water birds in the material suggests the presence of a convenient habitat near the settlement, which is not surprising in the case of the given location near the Ohře River. No medullary bone was observed in case of bird bone finds from Brozany.

In addition to finds of geese, an eagle was also identified based on a small fragment of a tarsometatarsus in feature no. 110, specifically a lesser spotted eagle (*Aquila pomarina*) or greater spotted eagle (*Aquila clanga*; determined by T. Tomek). An unidentifiable fragment of a synsacrum from the same context (feature no. 110) could also belong to the same species and individual. To date, only one or two finds from the *Aquila* genus have been made in prehistoric Bohemia (cf. *Peške 1981*;

[8] *Apodemus flavicollis* is, on average, the largest species among Central European field mice species (*Niethammer – Krapp 1978*).

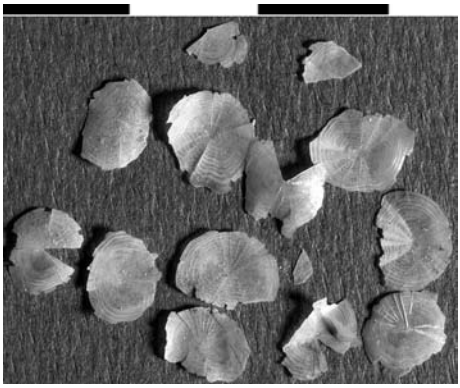


Fig. 13. Brozany, feature no. 6: Some of found fish scales (*Cyprinidae* family). Scale: 1 piece = 1 cm.
Obr. 13. Brozany, obj. 6: Lépe zachované šupiny ryb čeledi *Cyprinidae*. Měřítko: 1 dílek = 1 cm.

Fig. 14. Brozany, feature no. 89: Vertebra of large salmonid (*Salmo* sp.). Scale: 1 cm.
Obr. 14. Brozany, obj. 89: Obratel velké lososovité ryby (*Salmo* sp.). Měřítko: 1 cm.

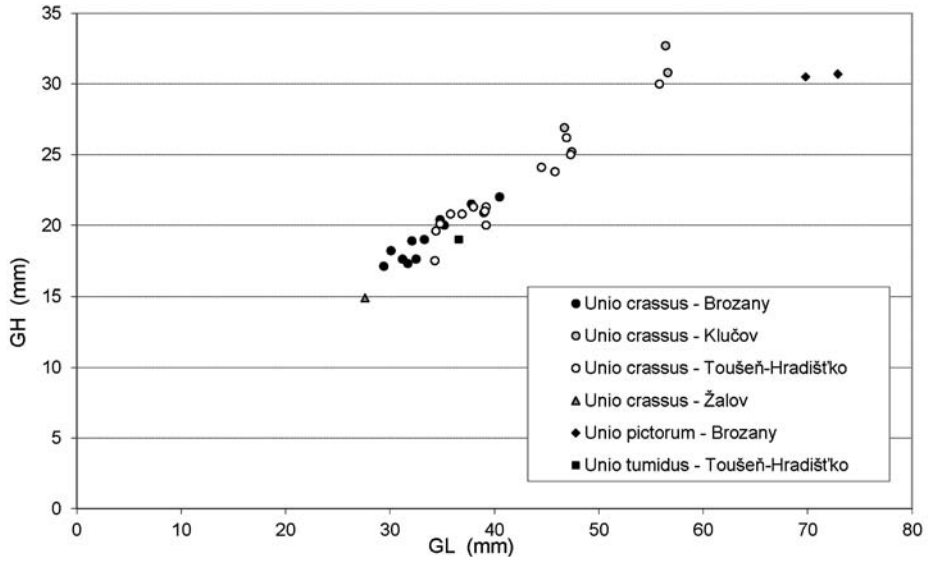
1993), no one originates from the Eneolithic. Although both stated *Aquila* species exist today in the Czech Republic, they are highly rare (*Hudec – Šťastný eds. et al. 2005*).

The method of the bird bone fragmentation, the burning of one bone (feature no. 89, Chapter 2.2), the cutting of the goose bones described above and the contextual origin of the assemblage of bird remains in feature no. 6 (probably whole from the lower ashy layer with anthropogenic origin) does not support the idea that the body or parts thereof were later dragged below ground by a carnivoran (e.g. a fox). Although the possibility that the bird bones are an intrusion from Hallstatt settlement, or another culture, cannot be ruled out altogether, it is (as in the case of the fish remains) highly unlikely, especially in the case of finds from the ashy layer of feature no. 6 (cf. Chapter 1 and 2.10).

2.10. Finds of fish and amphibian bones and fish scales

Despite the fact that flotation was not conducted, several small fish bones (feature nos. 6 and 89) and a larger number of fish scales (feature no. 6) were found along with an abundance of bones from large and medium-sized mammals. A total of sixty-five discovered scales come partly from the lower ashy layers (north half), partly from an unspecified depth (south half), apparently also from the lower ashy layers. The cycloid scales are partly fragmented, though otherwise relatively well preserved (*Fig. 13*). According to M. Švátora, some of the scales reliably belong to asp (*Aspius aspius*), while others belong to chub, probably to European chub (*Squalius cephalus*). *Tab. 5* presents the dimensions and ages obtained from well preserved scales; according to this data, and taking into consideration a possible error in age estimates, the scales could come from fish approximately 6–8 years old with lengths of around 30–40 cm. Seven scales probably end with that phase of *annuli* (wide growth lines) indicating death around the end of summer; one scale ends with a narrow growth line, which perhaps corresponds to the end of winter. Therefore, the scales mainly indicate fishing at the end of the summer.

Other evidence of fish from feature no. 6 is the pharyngeal bone of a chub (*Squalius cephalus*/*Leuciscus idus*); the length of the fish was estimated at about 32–35 cm. A large precaudal vertebra of a salmon or trout (*Salmo* sp.) was found in feature no. 89 (max. diameter and length of the vertebra is 15.5 × 13.3 mm, *Fig. 14*). The length of the fish estimated at 100–105 cm and age estimated according to the number of growths at 7–8 years corresponds to an individual that must have migrated from the sea. As there are no known migratory obstacles on the relatively large Ohře River, it is highly possible that the large fish was caught in the river near the settlement. Evidence of migrating



Graph 4. Dimensions of mussel shells from sites Brozany (TRB, Salzmünde; this study), Toušeň-Hradišťko (Řivnáč culture; *Kyselý 2010*), Klučov (Globular Amphora c.; *Kyselý 2009*; *2010*) and Žalov (Řivnáč c.; *Kyselý 2010*). GL = max. length of shell, GH = max. height of shell.
Graf 4. Rozměry lastur velevrubů z lokalit Brozany (TRB, Salzmünde, tato studie), Toušeň-Hradišťko (řivnáčská k., *Kyselý 2010*), Klučov (k. kulovitých amfor, *Kyselý 2009*; *2010*) a Žalov (řivnáčská k., *Kyselý 2010*). GL = max. délka lastury, GH = max. výška lastury.

fish species from the Eneolithic period in the territory of today's Czech Republic also comes from Kutná Hora-Denemark (eel *Anguilla anguilla*, Řivnáč culture; *Kyselý 2008a*; *2012*) and Hlinsko (salmonid fish, perhaps *Salmo trutta labrax*, 6–7 years of age, ca. 80–100 cm in length, caught possibly in the autumn during their migration; *Pavelčík et al. 1975*; also *Pavelčík 1991*).

The finds of fish bones in Brozany can most likely be regarded as evidence of fishing and consumption by the prehistoric population. The connection between the finds of scales and bones from feature no. 6 and people is directly indicated by their presence in the ashy layer (as is also the case with the bird bones, Chapter 2.9). Natural contamination from the river during flooding is eliminated by the location of the settlement on a high promontory (Chapter 1 and *Dobeš – Zápotocký 2013*). The presumed way the fill of feature nos. 6 and 89 was created, i.e. probably while the Salzmünde settlement was still occupied, reduces the probability that the fish bones were food consumed later by carnivorous animals such as otters, minks, bears or fish-eating birds. Furthermore, the settlement was located somewhat away from the hunting (or gathering) grounds of these predators since it was away from water, and, moreover, was positioned high on the terrace (Chapter 1) where no rocky cliffs suitable for perching occur. Consumption by fish-eating birds and carnivorans is also not supported by the character of the bones and scales of the fish, which show no signs of digestion, or by the large body size of some of the documented fish (ca. 1 m in length, cf. above). It seems unlikely that the combined occurrence and relatively diverse representation of fish and bird species and mass find of scales in feature no. 6 is the result of a chance intrusion from a different culture (which, based on pottery finds from feature no. 6 is entirely negligible; *Dobeš – Zápotocký 2013*). At the same time, the combination of recorded species (e.g. eagle, goose, larger fish) is far from the normal diet of even one of the possible burrowing or occasionally den-dwelling carnivorans (fox, otter, badger, polecat, mink, wild cat). The preservation of this accumulation of bones from small vertebrates was apparently

made possible by the locally favourable chemistry of the anthropogenic ashy layer, which presumably conserved the bone remains actually occurring at the site (cf. Chapter 2.2 and 2.9).

On the other hand, two discovered frog bones (see *Tab. 1*), i.e. an animal that usually digs holes on its own, could easily represent contamination.

2.11. The testimony of shell finds

A total of fifty-one shells or their fragments (MNI = 21) were found in six features at the site, the most in feature no. 62/97. All were identified as freshwater mussels (*Unionidae*). The most frequent species in Brozany among the finds identified in greater detail is the thick shelled river mussel (*Unio crassus*), while painter's mussel (*U. pictorum*) also occurred sporadically; *Tab. 1*.

Unionidae are relatively common finds in prehistoric Czech territory (e.g. *Kyselý 2012*). However, a larger accumulation of shells has only been found at several Eneolithic settlements, specifically, aside from Brozany, in Toušeň-Hradišťko, in Klučov (*Kyselý 2008c*; *2010*) and at Bohnice-Zámka (*Mašek 1971*). A striking observation is the unusually large number of shells from the Bronze Age pit published in the past (4,350 shells from Klučov site, Únětice culture; *Kudrnáč 1955*). These accumulations are evidence of the collection of bivalves, apparently for consumption.

Based on the better preserved and thus measurable specimens from four Eneolithic sites, the size of the shells were evaluated in *Graph 4*. The graph indicates the smaller size of specimens of *Unio crassus* found in Brozany compared to those from Toušeň-Hradišťko and especially Klučov (regardless of whether the differences are measured using average values or marginal values). The differences could be the result of environmental factors such as water ecosystems with different aeration and nutrient level (stream × river × pond). It is concluded that the sites with small shells (Brozany, Toušeň-Hradišťko) are near larger rivers, whereas the site with larger shells (Klučov) is near a smaller watercourse but far from a larger river. The influence of predation and hunting on the shell size is also not ruled out; specifically, the presence of smaller shells in Brozany could be the result of previous intensive collection by humans (logically from a nutritional perspective) focused on larger individuals.

3. Summary

An analysis of the bones from the settlement in Brozany nad Ohří (Litoměřice district, Bohemia) dated to the Salzmünde phase of the Funnel Beaker culture (cf. *Dobeš – Zápotocký 2013*), from which the vast majority of material comes from silos, revealed standard characteristics for the paleoeconomic situation and provided information regarding several unusual and interesting finds. The summary of the results and findings is listed as follows:

(1) The material indicates a settlement with a distinct predominance of animal husbandry over hunting (ca. 92% based on NISP, *Tab. 1*; *Graph 2*).

(2) Domestic animals included cattle, sheep, goats, pigs and dogs, with a predominance of cattle (see *Tab. 1*; *Graph 2*). Both sheep and goats are represented. The status of horse was not established (two fragments were found at Brozany, one of which is chopped).

(3) The shape of the horns of domestic cattle (*primigenius* type, *Fig. 6*), goats (scimitar type, *Fig. 7*) and sheep (arched) and the shape of the skull of domestic pigs (with a flat forehead and a long rostrum, *Figs. 3* and *4*) match observations from other Eneolithic sites (cf. *Bökönyi 1974*; *Benecke 1994*; *Kyselý 2010*). Also found was the skull of a dog with a condylobasal length of 124.9 mm (*Fig. 5*) and bones of puppies indicating a high morphological variability of dogs (*Fig. 8*).

(4) The following wild species were detected in Brozany: *Bos primigenius*, *Cervus elaphus*, *Sus scrofa*, *Lepus europaeus*, *Vulpes vulpes*, *Felis silvestris*, *Apodemus* cf. *flavicollis*, *Anser anser/fabalis*, *Anser erythropus/albifrons/brachyrhynchus* / *Branta* sp., *Aquila pomarina/clanga*, cf. *Bufo*, *Salmo* sp., cf. *Squalius cephalus*, *Squalius cephalus/Leuciscus idus*, *Unio crassus*, *Unio pictorum*.

(5) Interesting finds include a complete skeleton of a fox (*Fig. 11*; *Graph 3*), the mandible of a wildcat with a healed alveolus in the position of carnassial tooth, a fragment of an eagle (*Aquila pomarina* / *clanga*) bone, an accumulation of anseriform bird bones (*Fig. 12*), a vertebra from a large

salmonid fish, proving migration from the sea (cca 100–105 cm long, 7–8 years old, *Fig. 14*) and an accumulation of scales from two cyprinid species (including asp, *Aspius aspius*, *Fig. 13*; *Tab. 5*). The absence of beaver is peculiar due to the proximity of the river. The documented field mice (*Apodemus*) could represent the remains of synanthropic rodents at the Eneolithic settlement.

(6) The skeletons of puppies were found in feature nos. 2 and 181A (at least three puppies in feature no. 2, at least five puppies in feature no. 181A – altogether from a minimum of three litters) and remains of three newborn humans were discovered in settlement features nos. 6 and 181A (one in feature no. 6, two in feature no. 181A). The co-occurrence of puppies and newborns in the same feature (181A, apparently in the same feature context, *Fig. 9*) is unique and indicates their equal depositional status. In addition, this settlement material also contained two adult human bone fragments of unknown status, one of which was evidently bitten by a carnivoran (*Fig. 10*).

(7) Although the radiocarbon dating of a sample of the fox skeleton from feature no. 6 indicates an age several hundred years younger than the age of the archaeological feature, their contemporaneity cannot be ruled out entirely (estimates of the probability of the joint occurrence: 14.2%, or 2.8%).

(8) The shells of the predominant species of mussels found in Brozany (i.e. *Unio crassus*) are smaller than the shells of the same species from other compared Czech Eneolithic settlements, probably the result of environmental conditions or previous predation (*Graph 4*).

(9) The material contains twenty-three or twenty-four bone artefacts, including one antler artefact and a perforated canine tooth of a dog (*Fig. 1*; *Tab. 3*). Nine artefacts were concentrated in the same feature (no. 6). The lone feature identified as a grave (feature no. 16) contained the shell of a painter's mussel (*Unio pictorum*) that perhaps had been placed intentionally next to the vessel. An assemblage of eight mussel shells (feature no. 181A), which were probably intentionally perforated, could be used perhaps as a rattle or necklace (*Fig. 2*).

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English by *Zuzana Maritzová*

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Analýza osteologického materiálu ze sídliště mladšího stupně kultury nálevkovitých pohárů v Brozanech

Studium kostí pocházejících ze sídliště v Brozanech nad Ohří (okr. Litoměřice, Čechy) datovaného do salzmündské fáze kultury nálevkovitých pohárů (srov. *Dobeš – Zápotocký 2013*) přineslo jak standardní charakteristiku paleoekonomické situace, tak informace o několika neobvyklých a zajímavých nálezech. Naprostá většina materiálu pochází ze sil, jediný objekt byl identifikován jako hrob (obj. 16). Níže je uveden přehled základních výsledků a závěrů archeozoologické analýzy:

Materiál ukazuje na sídliště s výraznou převahou chovu nad lovem (dle NISP ca 92 %, *tab. 1*, *graf 2*).

Mezi domácími zvířaty jsou přítomni tur, ovce, koza, prase a pes (viz *tab. 1*; *graf 2*). Tur dominuje. Poměrně dobře je reprezentována jak ovce, tak koza. Status koně nebyl stanoven (v Brozanech dva fragmenty, z nichž jeden nese záseky).

Tvar rohů domácího tura (typ *primigenius*; *obr. 6*), kozy (šavlovitý typ; *obr. 7*) a ovce (obloukovitě zatočené) a tvar lebky domácích prasat (s rovným čelem a dlouhým rostrem, *obr. 3* a *4*) odpovídají poměrům pozorovaným v eneolitu i jinde (srov. *Bökönyi 1974*; *Benecke 1994*; *Kyselý 2010*). Nalezena byla i lebka psa s kondylobazální délkou 124,9 mm (*obr. 5*) a kosti štěňat naznačující vysokou morfologickou variabilitu psů (*obr. 8*).

Mezi divokými zvířaty byly detekovány tyto taxony: *Bos primigenius*, *Cervus elaphus*, *Sus scrofa*, *Lepus europaeus*, *Vulpes vulpes*, *Felis silvestris*, *Apodemus* cf. *flavicollis*, *Anser anser/fabalis*, *Anser erythropus/albifrons/brachyrhynchus* / *Branta* sp., *Aquila pomarina/clanga*, cf. *Bufo*, *Salmo* sp., cf. *Squalius cephalus*, *Squalius cephalus/Leuciscus idus*, *Unio crassus*, *Unio pictorum* (české ekvivalenty názvů taxonů v *tab. 1*).

Zajímavými nálezy jsou kompletní skelet lišky (*obr. 11*, *graf 3*), mandibula kočky divoké se zhojeným alveolem po trháku, fragment kosti orla (*Aquila pomarina* / *clanga*), kumulace kostí vrubozobých (*obr. 12*), obratel velké lososovité ryby dokládající migraci z moře (ca 100–105 cm, 7–8 let, *obr. 14*) a kumulace šupin kaprovitých ryb zahrnující šupiny bolena dravého (*Aspius aspius*; *obr. 13*, *tab. 5*). Vzhledem k blízkosti řeky je zvláštní absence bobra. Myšice (*Apodemus*) mohou představovat pozůstatky synantropních hlodavců na eneolitickém sídlišti.

V objektech 2 a 181A byly nalezeny kostřičky štěňat (v obj. 2 min. tři štěňata a v obj. 181A min. pět štěňat, celkem z min. tří vrhů). Zároveň byla v sídlištních objektech 6 a 181A nalezena torza kostřiček lidských novorozenců (v obj. 6 min. jeden a v obj. 181A min. dva novorozenci). Unikátní je spoluvýskyt štěňat a novorozenců v témže objektu (obj. 181A, v tomtéž místě, *obr. 9*) naznačující jejich rovnocennost při deponování. Kromě toho sídlištní materiál obsahuje dva fragmenty kostí více méně dospělých lidí, z nichž jeden je zřejmě okousán šelmou (*obr. 10*).

Radiokarbonové datování vzorku kostry lišky z obj. 6 naznačuje stáří o několik set let nižší, než je stáří archeologického objektu, nicméně souvěkost zcela nevylučuje (odhady pravděpodobnosti společného výskytu: 14,2 % resp. 2,8 %).

Lastury dominujícího druhu v Brozanech nalezených mlžů (tj. *Unio crassus*) mají menší velikost než lastury téhož druhu pocházející z jiných porovnaných českých eneolitických sídlišť, což je patrně podmíněno ekologicky, nebo způsobeno předchozí predací (*graf 4*).

Materiál obsahuje 23 nebo 24 kostěných artefaktů, mezi nimi jsou jeden parohový artefakt a jeden provrtaný špičák psa (*obr. 1*; *tab. 3*). Devět artefaktů bylo soustředěno v témže objektu (obj. 6). Hrob (obj. 16) obsahoval lasturu velevruba *Unio pictorum* patrně záměrně položenou vedle nádoby. Objekt 6 obsahoval soubor osmi patrně intencionálně perforovaných lastur, které snad mohly být součástí chřestítka nebo náhrdelníku (*obr. 2*).

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