

## Sesalska favna iz bronastodobnega najdišča Mali Otavnik pri Bistri na Ljubljanskem barju

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### Izvleček

V sicer skromnem (N = 148, NISP = 72) favnističnem vzorcu iz bronastodobnega najdišča Mali Otavnik pri Bistri (Ljubljansko barje, osrednja Slovenija) je bilo zastopanih najmanj 13 vrst velikih sesalcev, od tega le pet domačih. Lovne vrste prevladujejo tudi po številu določenih primerkov, saj njihov delež presega 70 % NISP. V tem smislu Mali Otavnik bistveno odstopa od večine sočasnih najdišč v širši regiji, kjer je (ostankov) lovnih vrst praviloma le za vzorec. Med verjetnejše vzroke za nenavadno favnistično sliko tukaj obravnavanega najdišča sodijo kulturne preference tam živečih ljudi, specifične naravne danosti Ljubljanskega barja v bronasti dobi ter morda tudi sama funkcija naselbine.

**Glavne besede:** Slovenija, Ljubljansko barje, zgodnja bronasta doba, sesalski ostanki, lov

### Abstract

The faunistic sample from the Bronze Age site at Mali Otavnik near Bistra (the Ljubljansko barje, central Slovenia) is rather small (N = 148, NISP = 72), but nevertheless revealed at least 13 species of large mammals, only five of which were domestic. Game species predominate also in the number of identified specimens (NISP), with their share exceeding 70 %. In this respect, Mali Otavnik differs considerably from most contemporary sites in the wider region, where the (remains of) wild animals usually appear in very small numbers. The most plausible reasons for the unusual faunistic picture revealed by this site lie in the cultural preferences of the people living there, in the specific natural characteristics of the Ljubljansko barje during the Bronze Age, but possibly also in the function of the settlement.

**Keywords:** Slovenia, Ljubljansko barje, Early Bronze Age, mammal remains, hunting

### UVOD

Živalski ostanki z arheoloških najdišč so pomemben vir podatkov o načinu življenja in (prehranskih) navadah naših prednamcev. Izpovednost najdb je v veliki meri odvisna od stopnje ohranjenosti kostne substance, ta pa od fizikalnih, kemijskih in bioloških dejavnikov, ki so jim kosti v tleh izpostavljene (Von Endt, Ortner 1984; Lyman 1999). Vodnato anaerobno okolje z rahlo bazično pH-vrednostjo in stabilnim temperaturnim režimom, v kakršnem ležijo ostanki eneolitjskih koliščarskih naselbin z Ljubljanskega barja v osrednji Sloveniji (Tancik 1965), diagenozo kostnega tkiva nedvomno bistveno upočasnjuje. Žal je ohranjenost organskih ostankov iz večine mlajših naselbin z istega območja bistveno slabša. Zaradi postopnega zamočvirjanja v eneolitiku še ojezerjenega Ljubljanskega barja so namreč posteneolitjske skupnosti postavljale

naselbine na njegovo že nekoliko dvignjeno obrobje, kjer pa je sedimentno okolje bistveno manj naklonjeno ohranitvi različnega organskega materiala. Tako sta nestabilni vodni režim in aerobno okolje plitkih karbonatnih tal s peščeno-prodnatim podtaljem Iškega vršaja (Tancik 1965) nedvomno močno pospešili dekompozicijo oz. razpad kosti iz tamkajšnjega bronastodobnega planega naselja Iška Loka, tako da je bila s sondiranji pridobljena le peščica favnističnih ostankov (Toškan 2005). Podobno velja tudi za bronastodobno naselbino Žabji grad pri Kamniku pod Krimom (izkopavanja leta 2007, neobjavljeno). Nikakor torej ne preseneča, da velika večina živalskih (in sploh organskih) najdb z območja Ljubljanskega barja izhaja prav iz dobe koliščarjev (Drobne 1973; 1974; 1975; Toškan, Dirjec, 2004a; 2006a; Velušček et al. 2004), medtem ko je gradiva iz mlajših obdobj neprimerno manj (glej npr. Drobne 1983; Dirjec

B. 1991; Toškan 2005). Obdelava po obsegu sicer skromnega števila sesalskih ostankov iz bronastodobnega najdišča Mali Otavnik pri Bistri je v luči navedenega zato nedvomno smiselna. Toliko bolj zato, ker je razpoložljivih podatkov o bronastodobni favni malo tudi iz ostalih predelov Slovenije (glej npr. Bartosiewicz 1987; Turk 1991; Turk et al. 1992; 1993; Dirjec J. 1996).

## NAJDIŠČE IN MATERIAL

Najdišče Mali Otavnik je bilo odkrito na območju istoimenske ledine pri podvodnem pregledu struge potoka Bistra na Ljubljanskem barju (osrednja Slovenija). Podrobne podatke o metodologiji terenskega raziskovanja ter o najdišču samem podaja A. Gaspari (2008), zato se na tem mestu omejujem na predstavitev arheozoološke analize. Živalski ostanki so bili pobrani ročno z dna struge ter iz plasti peska z organskim detritom in kulturnimi ostanki, ki se je odložila v okolici lesenih pilotov v desni brežini potoka (območje Mali Otavnik I, cf. Gaspari 2008, sl. 1, sl. 2: I). V celoti je bilo pridobljenih 148 ostankov velikih sesalcev (ob tem pa še ribje vretence in dve ptičji koščici). Vsaj do nivoja rodu je bilo mogoče določiti 72 kosti in zob. Skoraj 50-odstotna določljivost je pričakovana posledica ročnega pobiranja ostankov brez sejanja sedimenta skozi sita (cf. Toškan, Dirjec 2004b). Večina kosti je obrušeni zaradi izpostavljenosti tekoči vodi. Zavrlo slabe ohranjenosti kostne substance ni bilo mogoče verodostojno oceniti števila in mesta pojavljanja urezov, usekov in ugrizov na ostankih posameznih skeletnih elementov. V skladu s pričakovanji je večina kosti fragmentiranih (izjemo predstavljajo posamezne prstnice ter po dve skočnici in petnici), zdrobljenih pa je tudi mnogo zob. Tri najdbe jelena (tj. dva fragmenta rogovja in lopatica) kažejo sledi obdelave.

Kronologija lončenine in stratigrafska situacija na območju lesenih pilotov v profilu desne brežine kaže, da je Mali Otavnik enofazna koliščarska naselbina iz zgodnje bronaste dobe (Gaspari 2008).<sup>1</sup> V to obdobje gre torej umestiti tudi kostne najdbe z desne brežine potoka. Preostanek tukaj obravnavanih živalskih ostankov je bil pobran s poglobljenega dna struge. Ker gre za presedimentirane najdbe, njihova navezava na koliščarsko naselbino Mali Otavnik ni povsem zanesljiva.

## TAKSONOMIJA

V favnističnem gradivu iz Malega Otavnika (I) je zastopanih najmanj 12 vrst velikih sesalcev iz šestih družin (*tab. 1*). Prevladujejo ostanki velikih rastlinojedov (NISP<sup>2</sup> = 55), medtem ko je zveri (NISP = 6) in glodalcev (NISP = 1) le za vzorec. Večina vrst še danes naseljuje Ljubljansko barje z zaledjem. Izjemo predstavljajo v srednjem veku globalno izumrlo pragovedo (*Bos primigenius*) ter lokalno iztrebljena los (*Alces alces*) in bober (*Castor fiber*). Metrični podatki za zadostno ohranjene kosti in zobe iz Malega Otavnika so podani v *prilogah A-H*.

### *Cervus elaphus* Linnaeus, 1758

Med gradivom iz Malega Otavnika je daleč najbolje zastopana vrsta velikih sesalcev jelen, ki mu pripada dobra polovica vseh najdb. Vrsta po številu ostankov prednjači tako med gradivom z dna struge kot tudi med tistim iz profila v desni brežini (*tab. 1*). Jelen je bil torej za prebivalce Malega Otavnika očitno pomemben vir mesa, čeprav vseh najdenih ostankov ni utemeljeno povezovati z lovom. To velja predvsem za fragmente rogovij, ki predstavljajo dobro tretjino vseh jelenjih najdb (*tab. 2*). Ker je bila rogovina v prazgodovini cenjena surovina za izdelavo orodij in orožja so namreč ljudje pobirali in v naselbine pogosto prinašali tudi odpadlo rogovje. Vsaj en takšen primer je bil najden tudi v okviru Malega Otavnika.

Dimenzijsko se ostanki jelena iz Malega Otavnika umeščajo znotraj variacijske širine za bronastodobne primerke iste vrste iz severne Italije, Istre in Avstrije (*sl. 1*). Z izjemo po enega primerka lopatice in distalnega fragmenta stopalnice imajo vse kosti že popolnoma zrasli epi- in diafizo, kar kaže na preferenčen lov odraslih živali. Študije današnjih jelenov so pokazale, da se osifikacija lopatice zaključi pri starosti okrog 20 mesecev (Mariezkurrena 1983). Iz tega izhaja, da je zgoraj omenjena lopatica<sup>3</sup> najverjetneje ostanek pozno pozimi oz. zgodaj spomladi uplenjene živali. V zimskem obdobju je bil domnevno uplenjen tudi osebek, ki je v gradivu zastopan s fragmentom spodnje čeljustnice. Iz stopnje obrabe žvekalne površine četrtega mlečnega predmeljaka namreč izhaja, da je bila žival ob uplenitvi verjetno stara

<sup>1</sup> Radiokarbonska analiza je fragment domnevno jelenje stegenice iz točke N 52 datirala v prvo četrtino 2. tisočletja pr. n. št. (Gaspari 2008, 61 op. 5, 62 tab. 1).

<sup>2</sup> NISP - število določenih primerkov (*Number of Identified Specimens*; Grayson 1984).

<sup>3</sup> Ob poginu / uplenitvi je bil lopatični trn (*tuber scapulae*) ravno v fazi zraščanja.

Tab. 1: Število določenih primerkov (NISP) posameznega taksona velikih sesalcev iz Malega Otavnika (I). Pri jelenu je v oklepaju podano tudi število določljivih ostankov brez fragmentov rogovja.

Tab. 1: Number of identified specimens (NISP) of individual taxa of large mammals from Mali Otavnik (I). For red deer, the number of identifiable remains without antler fragments is additionally given in brackets.

Takson Taxon	Dno struge River-bed	Desni breg Right bank	SKUPAJ TOTAL	
	NISP	NISP	NISP	% NISP
<i>Bos taurus</i>	7	3	10	13,9
<i>Bos cf. primigenius</i>	1	1	2	2,8
<i>Sus scrofa</i>	3	1	4	5,6
<i>Sus scrofa s. domesticus</i>	4	-	4	5,6
<i>Ovis aries</i>	-	1	1	1,4
<i>Canis familiaris</i>	-	1	1	1,4
<i>Cervus elaphus</i>	19 (12)	18 (13)	37 (25)	51,2 (41,6)
<i>Alces alces</i>	2	4	6	8,3
<i>Capreolus capreolus</i>	1	-	1	1,4
<i>Ursus arctos</i>	2	2	4	5,6
<i>Felis cf. catus</i>	1	-	1	1,4
<i>Castor fiber</i>	1	-	1	1,4
SKUPAJ / TOTAL	41	31	72	100

Tab. 2: Zastopanost (izražena z NISP) posameznih taksonov velikih sesalcev in njihovih skeletnih elementov v gradivu z Malega Otavnika (I). Zvezda (\*) označuje primerke, katerih determinacija ni povsem zanesljiva.

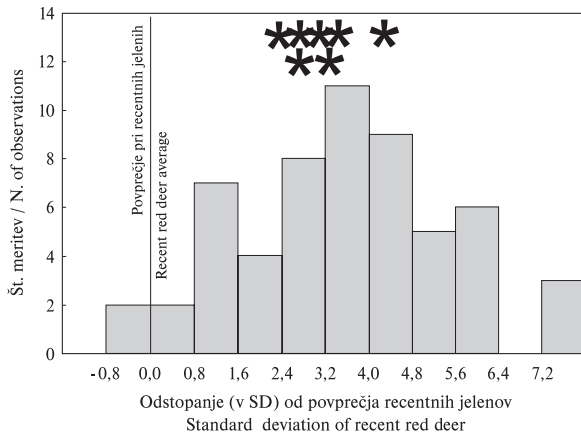
Tab. 2: Representation of individual large mammal taxa (expressed as NISP) and their skeletal elements in the material from Mali Otavnik (I). Specimens for which determination is not fully reliable are marked with an asterisk (\*).

Takson Taxon	Cornua	Cranium	Maxilla	Mandibula	Dentes	Vertebrae	Costae	Scapula	Humerus	Ulna, Radius	Metacarpalia	Phalanges	Pelvis	Femur	Tibia	Tarsalia	Metatarsalia
<i>B. taurus</i>					4					1	2	1					1
<i>B. cf. primig.</i>																1	1
<i>S. scrofa</i>		2			1												
<i>Sus sp.</i>			1		1	1		1				1					
<i>O. aries</i>									1								
<i>C. familiaris</i>				1													
<i>C. elaphus</i>	12		2	1		1		2	1	1	4	1	2		2	3	5
<i>A. alces</i>	1*		1									4					
<i>C. capreolus</i>				1													
<i>U. arctos</i>			2		1											1	
<i>F. cf. catus</i>					1												
<i>C. fiber</i>					1												
Indet. sp.						2	20			2			1	3			
Σ	13	2	6	3	9	4	20	3	2	3	6	7	3	3	2	5	7

približno osem mesecev (cf. Mariezkurrena 1983). Ker obe navedeni najdbi izvirata iz kronološko relativno dobro opredeljenega gradiva iz profila desne brežine, lahko tako s precejšnjo gotovostjo sklepamo na naseljenost koliščarske vasi (tudi) v zimskem oz. zgodnjepomladanskem času.

### *Bos taurus* Linnaeus, 1758

Domače govedo je druga najbolje zastopana sesalska vrsta v gradivu iz Malega Otavnika, obenem pa tudi najbolje zastopana vrsta domačih živali. Z izjemo fragmenta komolčnice vzorec vključuje



le ostanke najmanj mesnatih delov trupa: zobe in kosti spodnjih delov okončin (tab. 2). Vse kosti imajo zraščeni epi- in diafizo: gre torej za ostanke vsaj subadultnih osebkov. Iz morfologije skoraj v celoti ohranjene stopalnice iz točke N 37 se zdi, da je ta najverjetneje pripadala kastratu. Kost je namreč relativno dolga, z dokaj robustnima epifizama, a z razmeroma gracilno diafizo.

### *Bos cf. primigenius* Bojanus, 1827

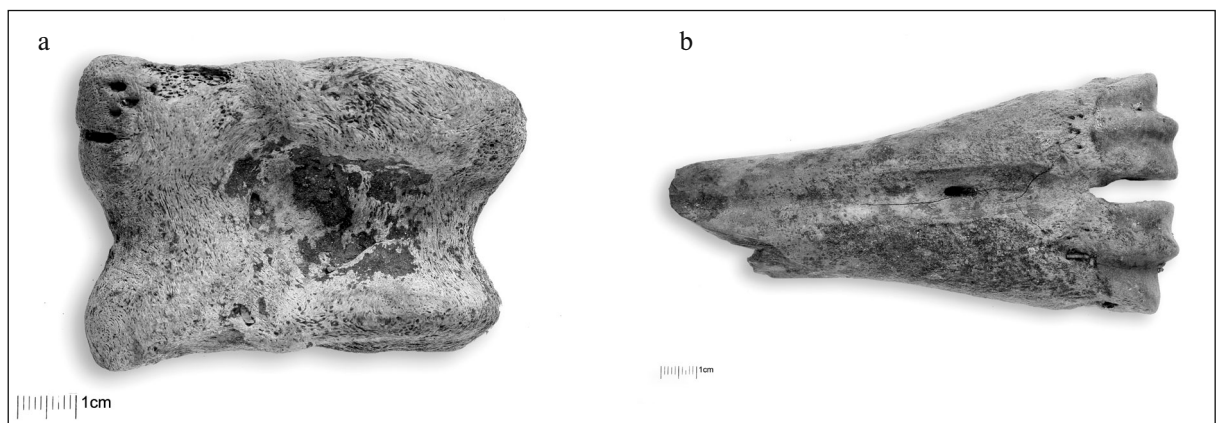
Bovidni skočnica in distalni del stopalnice iz Malega Otavnika sta precej večji od skočnic in stopalnic bronastodobnih domačih goved iz širše regije (glej prilogo C), tako da bi bilo najdbi načeloma utemeljeno pripisati pragovedu.<sup>4</sup> Žal je razlikovanje med obema bovidnima vrstama težavno, saj se večji samci (pa tudi kastrati) domačega

Sl. 1: Porazdelitev standardiziranih dimenzij (SD) merljivih ostankov jelena (*Cervus elaphus*). Zvezdica (\*) označuje primerke iz Malega Otavnika (I), stolpci pa tiste iz bronastodobnih plasti najdišč Barche di Solferino (Riedel 1976), Nogarole Rocca (Riedel 1992), Monkodonja (Brajković et al. 1998) in Unterhautzenthal (Pucher 2001). Povprečje recentnih jelenov se nanaša na obsežen vzorec iz Španije, kjer so samice zastopane s približno dvotretjinskim deležem (Mariezcurrera, Altuna 1983). V analizo so bili vključeni le popolnoma osificirani primerki, od katerih je vsak zastopan s po eno meritvijo. Obrazložitev simbola: SD – standardna deviacija pri komparativnem vzorcu recentnih jelenov iz Španije, ki tukaj služi kot enota za različnost (cf. Toškan 2007).

Fig. 1: Distribution of standardized dimensions of measurable red deer remains (*Cervus elaphus*). Specimens from Mali Otavnik (I) are marked with an asterisk (\*), those from the Bronze Age layers of sites Barche di Solferino (Riedel 1976), Nogarole Rocca (Riedel, 1992), Monkodonja (Brajković et al., 1998) and Unterhautzenthal (Pucher, 2001) are marked with bars. The average value for modern red deer refers to the large sample from Spain, where the females are represented with an approximately two-thirds' share (Mariezcurrera, Altuna, 1983). The analysis included only the completely ossified specimens, each of which is represented with one measurement. Symbol key: SD – standard deviation in a comparative sample of recent red deer from Spain, serving here as the unit of difference (cf. Toškan 2007).

goveda dimenzijsko prekrivajo z manjšimi samicami pragoveda (Bökönyi 1995). Ker pa je stopalnica iz Malega Otavnika razmeroma gracilna (sl. 2b) in jo lahko torej z veliko verjetnostjo pripišemo samici, se zdi njena determinacija za pragovedo vendarle upravičena. Obravnavani primerek nenazadnje po svojih dimenzijah presega celo stopalnice relativno velikih prazgodovinskih goved z Madžarskega, medtem ko odstopanj od tamkajšnjih pragoved ni opaziti (Bökönyi 1995).

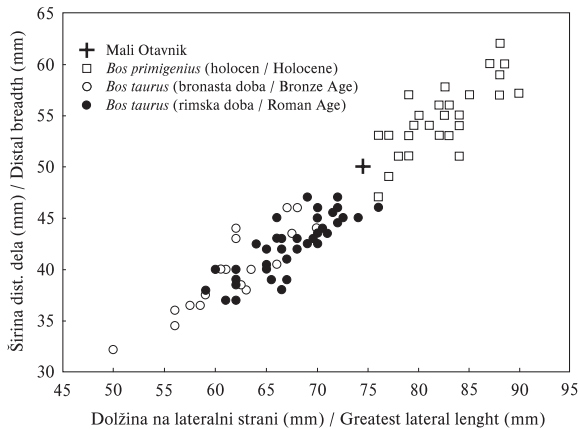
Na podobnem sklepanju temelji tudi determinacija zgoraj omenjene skočnice (sl. 2a). Primerek iz Malega Otavnika dimenzijsko namreč ne presega le skočnic



Sl. 2: Najdbi pragoveda (*Bos cf. primigenius*) iz Malega Otavnika: a – skočnica (I, točka N 6), b – distalni del stopalnice (I, točka N 38). Foto: Igor Lapajne.

Fig. 2: Aurochs finds (*Bos cf. primigenius*) from Mali Otavnik: a – astragalus (I, Point N 6), b – distal part of a metatarsus (I, Point N 38). Photo: Igor Lapajne.

<sup>4</sup> Izhajajoč iz morfologije obeh kosti (sl. 2) velja možnost njune determinacije za zobra (*Bison bonasus* [Linnaeus, 1758]) z gostovostjo ovreči (cf. Boessneck et al. 1963; Sala 1986).



Sl. 3: Dimenzije skočnic domačega goveda (*Bos taurus*) in pragoveda (*B. primigenius*) iz več srednjeevropskih najdišč. Podatki so povzeti po: Vörös (1985, 2002); Brajković et al. (1998); Chaix, Arbogast (1999); Pucher (2001).

Fig. 3: Measurements of astragali of cattle (*Bos taurus*) and aurochs (*B. primigenius*) from several Central European sites. Data taken from: Vörös (1985, 2002); Brajković et al. (1998); Chaix, Arbogast (1999); Pucher (2001).

bronastodobnih domačih goved iz Istre, Avstrije, Italije in Madžarske, ampak celó tiste naprednih rimskodobnih pasem. Po drugi strani pa se tukaj obravnavani primerek zanesljivo umešča znotraj variacijske širine za skočnice holocenskih pragoved iz različnih srednjeevropskih najdišč (sl. 3).

### *Sus scrofa* Erxleben, 1777

Rod prašičev je bil v vzorcu iz Malega Otavnika zastopan z osmimi ostanki, od katerih je bilo mogoče dva z gotovostjo pripisati divjemu prašiču.

Tab. 3: Dimenzije tretjega spodnjega meljaka pri bronastodobnih prašičih (*Sus* sp.). Podani so povprečna vrednost (X), razpon vrednosti (Min.-Max.) in velikost vzorca (N). Primerjalni podatki se nanašajo na najdišči Unterhautzental (Pucher 2001) in Barche di Solferino (Riedel 1976). Vse mere so v mm.

Tab. 3: Measurements of the third lower molar in Bronze Age wilde boars/pigs (*Sus* sp.), including average value (X), range (Min.-Max.) and sample size (N). Comparative data refer to the sites at Unterhautzental (Pucher 2001) and Barche di Solferino (Riedel 1976). All measurements are given in mm.

Meritev Measurement	Statistika Statistics	Unterhautz. <i>S. domesticus</i>	Barche <i>S. domesticus</i>	Barche <i>S. scrofa</i>	Mali Otavnik
Dolžina Length	X	34,6	33,9	41,7	42,0
	Min.-Max.	33,0-38,0	28,6-37,7	38,5-45,7	
	N	7	23	7	
Širina Breadth	X	15,9	16,2	18,4	19,0
	Min.-Max.	15,0-17,0	14,0-18,5	16,8-19,3	
	N	7	10	6	

<sup>5</sup> V tem prispevku se poimenovanje *Ovis aries* Linnaeus, 1758 uporablja izključno za domačo ovco. Navedena precizacija je potrebna zaradi sklepa Mednarodne komisije za zoološko nomenklaturu (*International Commission on Zoological Nomenclature*; presoja št. 2027, marec 2003), v skladu s katerim se za podivjane forme (vsaj delno) udomačenih sesalskih vrst uporablja isto znanstveno poimenovanje kot za ustrezajočo domačo žival (Gentry et al. 2004). Takšen primer predstavlja tudi evropski muflon, sicer podivjan potomec v neolitiku napol udomačenega azijskega muflona (*Ovis orientalis* Gmelin, 1774), ki mu tako pritiče enako znanstveno poimenovanje kot domači ovci: *Ovis aries* Linnaeus, 1758 (Giusti 2005).

Gre za spodnji podočnik iz točke N 37 in fragment lobanje iz točke N 32. Determinacija prvega temelji na metriki, v primeru drugega pa je bilo mogoče izhajati tudi iz morfologije. Pri fragmentu lobanje iz Malega Otavnika je namreč dolžina solznice (*os lacrimale*) najmanj dvakrat večja od njene največje širine in ne enaka ali manjša, kot je to značilno za domačega prašiča (Kryštufek 1991).

Pogojno sta bila k vrsti *S. scrofa* pripisana še dva ostanka: čelni podaljšek ličnice (*os zygomaticum, processus frontalis*) iz točke N 36 in tretji spodnji meljak iz točke N 53. Prvi kljub še nezaraščenim šivom (*suturæ*) dimenzijsko presega prazgodovinske primerke domačega prašiča z Ljubljanskega barja, dolžina in širina M<sub>3</sub> pa prav tako presejata vrednosti ustreznih dimenzij pri bronastodobnih domačih prašičih v regiji (tab. 3). Sicer pa so bili trije od obravnavanih štirih ostankov divjega prašiča najdeni na dnu struge, tako da njihova umestitev v kontekst kolišča Mali Otavnik ni zanesljiva.

### *Sus scrofa* seu *domesticus*

Sedem suidnih ostankov iz Malega Otavnika ni bilo mogoče specifično determinirati. Nekateri od njih (npr. prsno vretence iz točke N 20) so dimenzijsko bližje domačemu prašiču, drugi (npr. fragment lopatice iz točke N 32) pa divjemu. Vseh sedem najdb izvira z dna struge.

### *Ovis aries*<sup>5</sup> Linnaeus, 1758

Drobnica je v vzorcu iz Malega Otavnika zastopana le s fragmentom ovčje nadlahtnice. Ugotovitev

je presenetljiva, saj so kože in (predvsem) ovce na sočasnih najdiščih severne Italije, Istre, zahodne Madžarske in Avstrije vedno zelo dobro zastopane, skupno pogosto celo z več kot 50-odstotnim deležem vseh določljivih najdb (Riedel 1976; 1992; 2003; Karoušková-Soper 1983; Brajković, Paunović, Poje 1998; Becker 1999; Pucher 2001; Miracle, Pugsley 2006). Na relativno velik pomen drobnice kažejo tudi sicer pičli razpoložljivi podatki iz slovenskih bronastodobnih najdišč (Bartosiewicz 1987; Turk et al. 1992; 1993; Dirjec J. 1996).

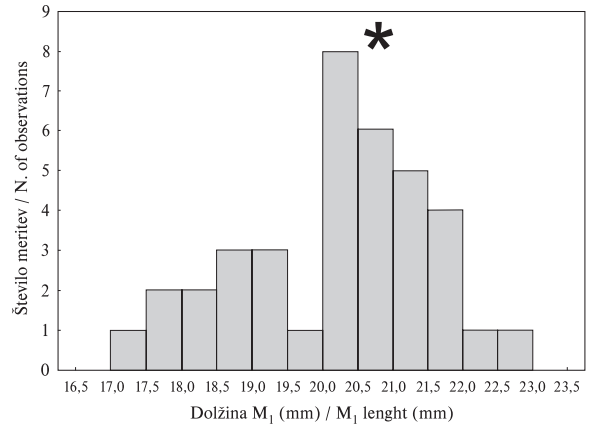
### *Canis familiaris* Linnaeus, 1758

Pes je v obravnavanem vzorcu zastopan le s fragmentom spodnje čeljustnice (sl. 4). Ker je bila najdba pobrana iz profila desne brežine, jo je mogoče s precejšnjo gotovostjo navezati na kolišče Mali Otavnik. Po dolžini derača ( $M_1$ ) se čeljustnica umešča znotraj variacijske širine za primerke iste vrste iz poznoeneolitskih-zgodnjebronastodobnih plasti t. i. Dežmanovih kolišč pri Igu, ki prav tako ležijo na Ljubljanskem barju (sl. 5). Sodeč po edini razpoložljivi najdbi se torej zdi, da so bili psi na območju Ljubljanskega barja tudi še ob koncu zgodnje bronaste dobe razmeroma majhni. O podobnih dimenzijah poročajo tudi raziskovalci bronastodobnih najdišč v soseščini (Riedel 1976; 1992; Pucher 2001; Miracle, Pugsley 2006). To kaže na razširjenost razmeroma enotne oblike psov na celotnem območju južno in jugovzhodno od Alp, ki je očitno nastala pod vplivom selektivnega pritiska podobnega načina življenja v bližini človekovih bivališč. V zgodnji bronasti dobi torej ljudje psov skoraj zagotovo še niso načrtno vzrejali v "passe" za specifične, ožje opredeljene naloge (npr. lovski psi, psi čuvaji ipd.; cf. Bartosiewicz 2002).



Sl. 4: Spodnja čeljustnica psa (*Canis familiaris*) iz Malega Otavnika (I, točka N 45). Foto: Igor Lapajne.

Fig. 4: Mandible of a dog (*Canis familiaris*) from Mali Otavnik (I, Point N 45). Photo: Igor Lapajne.



Sl. 5: Dolžina prvega spodnjega meljaka pri psu (*Canis familiaris*). Zvezdica (\*) označuje primerke iz Malega Otavnika (I), stolpci pa tiste iz poznoeneolitskih-zgodnjebronastodobnih plasti t. i. Dežmanovih kolišč pri Igu (Bartosiewicz 2002).

Fig. 5: Frequency distribution of the lengths of the first lower molars in dogs (*Canis familiaris*). The specimen from Mali Otavnik (I) is marked with an asterisk (\*), those from the Late Eneolithic-Early Bronze Age layers at the so-called Dežman's pile-dwelling sites near Igu are marked with bars (Bartosiewicz, 2002).

### *Felis cf. catus* Linnaeus, 1758

Fragment felidne spodnje čeljustnice, sicer edini ostanek rodu *Felis* med gradivom iz Malega Otavnika, najverjetneje pripada domači mački. Najdba je namreč manjša tako od subfosilnih primerkov divje mačke z Danske kot tudi od današnjih divjih mačk iz različnih predelov Evrope (cf. Kurtén 1965). Obravnavana spodnja čeljustnica je bila pobrana z dna struge (točka N 36) in očitno ne sodi v kontekst kolišča Mali Otavnik; domače mačke namreč v bronasti dobi na tleh srednje Evrope še niso poznali (Clutton-Brock 1999). Še več: v zgodnjebronastodobnih najdiščih severne Italije, Istre in zahodne Madžarske so izjemno redke celo najdbe divjih mačk, s slovenskega ozemlja pa te sploh (še) niso poznane.

### *Alces alces* (Linnaeus, 1758)

Los je v vzorcu iz Malega Otavnika zastopan s šestimi najdbami, od katerih sta bili dve pobrani z dna struge. Med preostalimi štirimi ostanki prevladujejo prstnice, ki tako morfološko (cf. Chaix 1981) kot tudi dimenzijsko (tab. 4) povsem ustrezajo losu. Podobno velja tudi za prstnico z dna struge ter za fragment zgornje čeljustnice. Težavnejša je determinacija drobca rogovja, saj je morfološko

Tab. 4: Metrični podatki za prstnice losa (*Alces alces*) iz Malega Otavnika (I). Primerjalni podatki se nanašajo na povprečno vrednost (X) in razpon vrednosti (Min.-Max.) ustreznih dimenzij pri prvih (N = 30) in drugih (N = 31) prstnicah subfosilnih losov iz Francije ter prvih (N = 10) in drugih (N = 8) prstnicah bronastodobnih jelenov iz Italije, Avstrije in Istre. Primerjalni podatki so povzeti po: Riedel (1976, 1992); Chaix (1981); Brajković et al. (1998); Pucher (2001); Miracle, Pugsley (2006). Dimenzije so predstavljene v prilogi B. Vse mere so v mm.

Tab. 4: Measurements of the phalanges in moose (*Alces alces*) from Mali Otavnik (I). Comparative data refer to average value (X) and range (Min.-Max.) of appropriate measurements for the first (N = 30) and second (N = 31) phalanges of subfossil moose from France as well as first (N = 10) and second (N = 8) phalanges of Bronze Age red deer from Italy, Austria and Istria. Comparable data taken from: Riedel (1976, 1992); Chaix (1981); Brajković et al. (1998); Pucher (2001); Miracle, Pugsley (2006). Dimensions are presented in the Appendix B. All measurements are given in mm.

Skeletni element Skeletal element	Dimenzija Dimension	Mali Otavnik	<i>A. alces</i> X (Min.-Max.)	<i>C. elaphus</i> X (Min.-Max.)
Phalanx I	GL	75,0 & 75,5	76,49 (68,5-87,5)	57,89 (52,8-60,0)
	Bp	29,0 & 30,0	31,22 (28,0-35,0)	22,37 (20,0-24,8)
	Bd	24,5	27,28 (20,3-31,5)	21,13 (19,0-23,5)
Phalanx II	GL	53,5	55,20 (48,5-61,0)	44,35 (41,9-46,2)
	Bp	25,0	28,05 (24,2-31,8)	22,09 (19,7-23,5)
	Bd	21,5	23,10 (21,2-27,3)	19,15 (17,5-23,2)

blizu tako losu kot damjaku (*Dama dama* [Linnaeus, 1758]). Slednji sicer iz bronastodobnih najdišč na Slovenskem ni poznan, zastopan pa je v gradivu z Monkodonje v Istri (Becker 1999).

#### *Capreolus capreolus* (Linnaeus, 1758)

Srna je v vzorcu zastopana s fragmentom spodnje čeljustnice. Najdena je bila na dnu struge (točka N 24) in je zato ni mogoče neposredno navezati na koliščarsko naselbino Mali Otavnik.

#### *Castor fiber* Linnaeus, 1758

V gradivu iz Malega Otavnika je zastopan tudi bober, in sicer s fragmentom spodnje čeljustnice. Le-ta se po svojih dimenzijah umešča znotraj variacijske širine za poznoeneolitske/zgodnjebronastodobne primerke iste vrste z bližnjih Dežmanovih kolišč (tab. 5). Ker je bila čeljustnica iz Malega Otavnika pobrana z dna struge, je sicer ni mogoče z gotovostjo povezovati s koliščarsko naselbino. Prisotnost bobrov na Ljubljanskem barju v zgodnji

Tab. 5: Dimenzije spodnje čeljustnice bobra (*Castor fiber*) iz Malega Otavnika (I). Primerjalni podatki za poznoeneolitske/zgodnjebronastodobne primerke iste vrste z Dežmanovih kolišč pri Igu (Ljubljansko barje) so povzeti po Rakovcu (1958). Vse mere so v mm.

Tab. 5: Measurements of the mandible of a beaver (*Castor fiber*) from Mali Otavnik (I). Comparative data for the Late Eneolithic/Early Bronze Age specimens of the same species from Dežman's pile-dwellings near Ig (Ljubljansko barje) are taken from Rakovec (1958). All measurements are given in mm.

Dimenzija / Dimension	Mali Otavnik	Ljubljansko barje
Alveolarna dolžina P <sub>4</sub> -M <sub>3</sub> Alveolar length P <sub>4</sub> -M <sub>3</sub>	36,0	32,5-39,2 (N = 14)
Višina čeljustnice pri sprednjem alveolarnem robu P <sub>4</sub> Height of the mandible at the anterior alveolar edge of P <sub>4</sub>	29,0	26,2-34,2 (N = 14)
Največja debelina čeljustnice pri zadnjem robu M <sub>3</sub> Greatest thickness of the mandible at the posterior edge of M <sub>3</sub>	17,0	13,9-17,2 (N = 14)
Največja debelina čeljustnice pri M <sub>1</sub> Greatest thickness of the mandible at M <sub>1</sub>	19,0	17,5-20,6 (N = 11)
Največja debelina čeljustnice pri mentalni odprtini Greatest thickness of the mandible at the <i>foramen mentale</i>	11,5	10,8-16,4 (N = 15)
Dolžina P <sub>4</sub> Length of P <sub>4</sub>	9,5	8,7-10,4 (N = 10)
Dolžina M <sub>1</sub> Length of M <sub>1</sub>	8,0	7,0-8,2 (N = 7)
Dolžina M <sub>2</sub> Length of M <sub>2</sub>	8,0	6,4-9,3 (N = 6)
Dolžina M <sub>3</sub> Length of M <sub>3</sub>	8,0	6,5-7,5 (N = 7)



bronasti dobi pa kljub temu ni vprašljiva, saj se najdbe omenjene vrste na tem območju pojavljajo v najdiščih iz vseh časovnih obdobij od mezolitika do antike (Rakovec 1955; Drobne 1973; Pohar 1984; Toškan, Dirjec 2004a; 2006a; 2006b).

### *Ursus arctos* Linnaeus, 1758

Najdbe rjavega medveda se pojavljajo v večini prazgodovinskih najdišč z Ljubljanskega barja, je pa njihovo število vedno skromno. Najpogostejši so ostanki čeljustnic z zobmi (npr. Riedel 1948; Pohar 1984) in spodnji deli okončin (Toškan, Dirjec 2004a; 2006a; 2006b); slednji so zastopani tudi v gradivu iz Malega Otavnika (*tab. 2*).<sup>6</sup> Relativna pogostnost prstnic in fragmentov čeljustnic bi lahko kazala na odiranje medvedov zaradi krzna, sami zobje (sploh podočniki) pa so morda imeli okrasno ali kulturno vlogo. Tudi sicer nekateri avtorji (npr. Riedel 1989) lov na medveda povezujejo z obredji, s čimer bi bilo mogoče razložiti tudi skromno število uplenjenih osebkov. Iz razpoložljivih arheozooloških podatkov namreč izhaja, da je bil medved v zaledju Ljubljanskega barja v prazgodovini vseskozi prisoten.

### Nedoločljivi ostanki

Med 76 taksonomsko nedoločljivimi ostanki velikih sesalcev jih je bilo mogoče 26 determinirati vsaj anatomske. Prevladujejo ostanki reber (N = 20) in posameznih dolgih kosti (N = 5), nedoločeni pa so ostali tudi fragmenti medenice in dve razmeroma slabo ohranjeni vretenci. Večinoma gre za najdbe, ki se po svojih dimenzijah uvrščajo v velikostni razred jelena oz. goveda, tudi sicer najboljše zastopanima vrstama v vzorcu.

### ALOPATRIČNE IN ALOHRONE PRIMERJAVE

Bronastodobna favna Slovenije je zelo slabo poznana. Še največ objavljenih podatkov se nanaša na najdišča s Krasa. Tam so takrat domnevno močno prevladovali ostanki domačih živali (predvsem drobne), med sicer skromnim deležem lovnih pa je po podatkih I. Turka prednjačil poljski zajec (Turk et al. 1992; 1993). Prevladujoč delež domačih živali je bil ugotovljen tudi na Ormožu (KŽG; Bartosiewicz

1987), v Gornji Radgoni (KŽG; neobjavljeno) in Kostelu (konec srednje oz. začetek mlajše bronaste dobe in pozna bronasta doba; Dirjec J. 1996) ter v bronastodobnih najdiščih severne Italije, Istre, vzhodne Avstrije in zahodne Madžarske (Riedel 1976; 1992; 2003; Karoušková-Soper 1983; Brajković et al. 1998; Becker 1999; Pucher 2001; Miracle, Pugsley 2006). Favna iz Malega Otavnika se torej od zgoraj naštetih bistveno razlikuje predvsem po očitno večjem (celo večinskem) deležu ostankov lovnih živali, v prvi vrsti jelena. Temu je tako, tudi če ostanke rogovja pri kvantitativnih primerjavah ne upoštevamo<sup>7</sup> oz. če upoštevamo le najdbe iz profila desne brežine, ki jih je mogoče neposredno navezati na zgodnjebronastodobno koliščarsko naselbino (*tab. 1*).

V zvezi s favnističnim gradivom iz Malega Otavnika velja izpostaviti tudi njegovo vrstno pestrost, saj ta bistveno presega pestrost podobno obsežnih vzorcev iz sočasnih najdišč Italije, Istre, Avstrije in Madžarske (*sl. 6*). Po številu zastopanih sesalskih vrst je namreč tukaj obravnavano gradivo primerljivo z vzorci, ki izstopajo po bistveno večjem številu določljivih najdb (NISP > 1500). Še več: če vrstno pestrost najdišč s *sl. 6* utežimo z velikostjo vzorca, dobljeni rezultati izstopajoč položaj Malega Otavnika le še poudarijo (*sl. 7*). Pri tem je pomembno izpostaviti, da število vrst velikih sesalcev iz Malega Otavnika presega vrednosti primerljivo velikih vzorcev iz sosednjih pokrajin, tudi če v primerjavo vključimo le kronološko bolj opredeljene ostanke z desne brežine potoka (*sl. 6* in *7*). Izstopajoča vrstna pestrost Malega Otavnika gre seveda predvsem na rovaš številčnosti lovnih vrst; vrstna pestrost domačih je namreč zavoljo odsotnosti kože celo nekoliko skromnejša od tiste, ugotovljene pri primerljivo obsežnih vzorcih iz sosednjih pokrajin. To spoznanje pa, v kombinaciji z zgoraj že omenjeno številčnostjo ostankov lovnih vrst (*tab. 1*), vsekakor nakazuje relativno velik pomen lova v ekonomiji obravnavane koliščarske naselbine, kar je za bronastodobno najdišče na območju srednje Evrope razmeroma nenavadno.

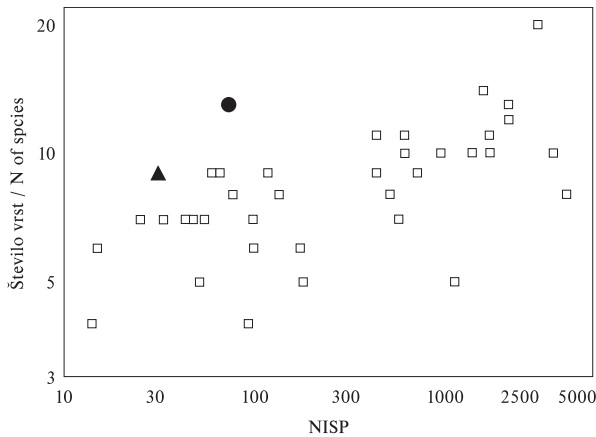
Med možnimi vzroki za nekoliko nepričakovano sliko favnističnega gradiva iz Malega Otavnika velja vsekakor izpostaviti neustrezno vzorčenje<sup>8</sup> in

<sup>7</sup> Ker so ljudje pobirali tudi odpadlo rogovje, bi njihovo prištevanje k ostankom uplenjenih jelenov lahko prispevalo k nekoliko precenjenemu deležu zastopanosti omenjene vrste v prehrani lokalne skupnosti.

<sup>8</sup> Sporno je predvsem pobiranje najdb iz struge, kjer je možnost kontaminacije vzorca s starejšimi in/ali mlajšimi najdbami povečana. Sám ročno pobiranje najdb je v tem pogledu manj problematično, saj bi spiranje sedimenta skozi sita vrstno pestrost pridobljenega favnističnega vzorca kvečjemu še dodatno povečalo (cf. Toškan, Dirjec 2004a).

<sup>6</sup> Stopnja obrabe žvekalne površine P<sup>4</sup> iz ene od obeh zgornjih čeljustnic kaže, da je ta pripadala mlajši odrasli živali (cf. Stiner 1994).

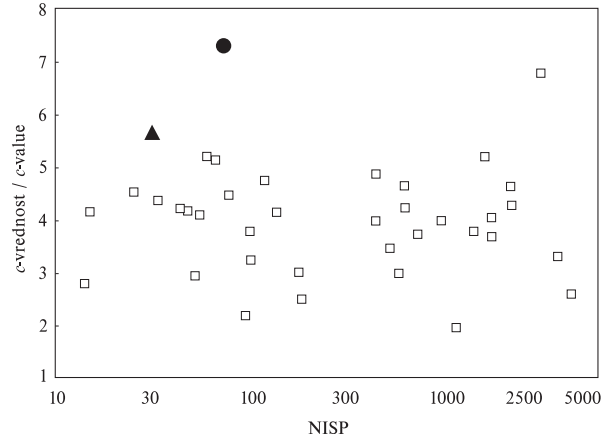




Sl. 6: Razmerje med velikostjo vzorca (NISP) in številom vrst pri favnističnih vzorcih iz bronastodobnih najdišč iz Slovenije in sosednjih pokrajin. Trikotnik (▲) označuje material iz desne brežine Malega Otavnika (I), pika (●) celotno gradivo iz Malega Otavnika, kvadrati (□) pa vzorce iz nekaterih bronastodobnih najdišč v Sloveniji in sosednjih pokrajinah. Podatki so povzeti po: Riedel (1976, 1984, 1992, 2003); Karoušková-Soper (1983); Clark (1989); Turk et al. (1992, 1993); Brajković et al. (1997, 1998); Becker (1999); Choyke, Bartosiewicz (1999); Pucher (2001) ter Miracle, Pugsley (2006). Obe koordinatni osi imata logaritemsko skalo.

Fig. 6: Relationship between the number of identified specimens (NISP) and the number of species in the faunistic samples from the Bronze Age sites from Slovenia and the neighbouring countries. The material from the right bank at Mali Otavnik (I) is marked with a triangle (▲), the entire material from Mali Otavnik is marked with a dot (●), samples from certain Bronze Age sites in Slovenia and neighbouring countries are marked with squares (□). Data taken from: Riedel (1976, 1984, 1992, 2003); Karoušková-Soper (1983); Clark (1989); Turk et al. (1992, 1993); Brajković et al. (1997, 1998); Becker (1999); Choyke, Bartosiewicz (1999); Pucher (2001); Miracle, Pugsley (2006). Both coordinate axes have a logarithmic scale.

pa pičlo število najdb. Problematičnost slednjega zelo lepo ponazarjajo objave favne iz bližnje eneolitke koliščarske naselbine Maharski prekop pri Igu, kjer se deleži zastopanosti ostankov lovnih in domačih vrst velikih sesalcev med posameznimi deli naselbine bistveno razlikujejo (Drobne 1974; 1975). Pri skromnih vzorcih, kakršen je tisti iz Malega Otavnika (glej tudi Toškan, Dirjec 2004a; Velušček et al. 2004), bodo tako jasnejšo sliko o ekonomiji lokalne bronastodobne skupnosti lahko dala šele nadaljnja izkopavanja. Seveda pa to ne pomeni, da so tukaj predstavljene ugotovitve o favni (in ekonomiji) Malega Otavnika *a priori* zgrešene. Posamezna bronastodobna najdišča z nekoliko večjim (čeprav resda nikoli večinskim) deležem lovnih živali so namreč poznana tudi iz sosednjih pokrajin (npr. Karoušková-Soper 1983; Choyke, Bartosiewicz 1999; Battisti, Marconi 2003). Podrobnejša analiza omenjenih najdišč pa je izpostavila tudi kar precejšnja odstopanja v



Sl. 7: Razmerje med velikostjo vzorca (NISP) in pa z velikostjo vzorca uteženim številom vrst (*c*-vrednost) pri favnističnih vzorcih iz bronastodobnih najdišč iz Slovenije in sosednjih pokrajin. Izračun *c*-vrednosti sledi iz Arrheniusove enačbe (Rosenzweig 1996). Trikotnik (▲) označuje material iz desne brežine Malega Otavnika (I), pika (●) celotno gradivo iz Malega Otavnika (I), kvadrati (□) pa vzorce iz nekaterih bronastodobnih najdišč v Sloveniji in sosednjih pokrajinah. Osnovni podatki o vrstni sestavi posameznih vzorcev so povzeti po: Riedel (1976, 1984, 1992, 2003); Karoušková-Soper (1983); Clark (1989); Turk et al. (1992, 1993); Brajković et al. (1997, 1998); Becker (1999); Choyke, Bartosiewicz (1999); Pucher (2001); Miracle, Pugsley (2006). Abscisna koordinatna os ima logaritemsko skalo.

Fig. 7: Relationship between the number of identified specimens (NISP) and the number of species weighed with sample size (*c*-value) in the faunistic samples from the Bronze Age sites from Slovenia and neighbouring countries. The calculation of the *c*-value follows from the Arrhenius' equation (Rosenzweig 1996). The material from the right bank at Mali Otavnik is marked with a triangle (▲), the entire material from Mali Otavnik is marked with a dot (●), the samples from certain Bronze Age sites in Slovenia and neighbouring countries are marked with squares (□). Basic data on species composition of individual samples are taken from: Riedel (1976, 1984, 1992, 2003); Karoušková-Soper (1983); Clark (1989); Turk et al. (1992, 1993); Brajković et al. (1997, 1998); Becker (1999); Choyke, Bartosiewicz (1999); Pucher (2001); Miracle, Pugsley (2006). The x-coordinate has a logarithmic scale.

deležu zastopanosti posameznih vrst domačih živali (tab. 6) kot tudi razlike v tem, katera je v okviru posameznega najdišča vodilna lovna vrsta (Riedel 1992; Turk et al. 1992; 1993; Choyke, Bartosiewicz 1999; Miracle, Pugsley 2006).

Navedene mednajdiščne razlike v vrstni pestrosti in abundanci posameznih taksonov gre do neke mere nedvomno iskati v naravnem okolju naselbin (tj. geomorfologija območja, vrsta podlage, pokrovnost terena ipd.), kar se je v živinoreji domnevno odražalo predvsem na dihotomiji ovca : domači prašič. Slednji namreč preferira gozdnato, lahko tudi močvirnato okolje, medtem ko ovci bolj ustreza suha, gričevnata pašniška krajina. Pomembno so na ekonomijo prazgodovinskih skupnosti vplivala tudi klimatska nihanja (npr. Choyke, Bartosiewicz

Tab. 6: Delež (% NISP) zastopanosti posameznih taksonov velikih sesalcev v favnističnem gradivu iz nekaterih bronastodobnih najdišč v širši regiji. Identifikacija najdišč in njihov časovni okvir. A - Sonnenburg, Alto Adige (zgodnja bronasta doba; Riedel 1984). B - Nogarole Rocca, Veneto (uvodni del srednje bronaste dobe; Riedel 1992). C - Podmol pri Kastelcu, Kras: plast 4 in zgornji del plasti 5 (prehod eneolitika v zgodnjo bronasto dobo in bronasta doba; Turk et al. 1993). D - Acijev spodmol pri Petrinjah, Kras: zgornji in srednji del plasti 2 (prehod eneolitika v zgodnjo bronasto dobo in bronasta doba; Turk et al. 1992). E - Pupičina peč, Istra: horizonta E in F (srednja bronasta doba; Miracle, Pugsley 2006). F - Monkodonja, Istra (zgodnja in srednja bronasta doba; Brajković et al. 1998). G - Mezókomárom - Alsóhegy, Transdanubija (zgodnja bronasta doba; Choyke, Bartosiewicz 1999). H - Igar - Vámpusztá, Transdanubija (zgodnja bronasta doba; Choyke, Bartosiewicz 1999). I - Unterhauzenthal, vzhodna Avstrija (zgodnja bronasta doba; Pucher 2001).

Tab. 6: Share (% NISP) of the representation of individual large mammals taxa in the faunistic material from certain Bronze Age sites in the wider region. Identification of sites and their chronological frame: A - Sonnenburg, Alto Adige (Early Bronze Age; Riedel 1984). B - Nogarole Rocca, Veneto (initial part of the Middle Bronze Age; Riedel 1992). C - Podmol near Kastelec, Kras plateau: Layer 4 and upper part of Layer 5 (transition from the Eneolithic to the Early Bronze Age as well as the Bronze Age; Turk et al. 1993). D - Acijev spodmol near Petrinje, Kras plateau: upper and middle part of Layer 2 (transition from the Eneolithic to the Early Bronze Age as well as the Bronze Age; Turk et al. 1992). E - Pupičina peč, Istria: Horizons E and F (Middle Bronze Age; Miracle, Pugsley 2006). F - Monkodonja, Istria (Early and Middle Bronze Age; Brajković et al. 1998). G - Mezókomárom - Alsóhegy, Transdanubia (Early Bronze Age; Choyke, Bartosiewicz 1999). H - Igar - Vámpusztá, Transdanubia (Early Bronze Age; Choyke, Bartosiewicz 1999). I - Unterhauzenthal, eastern Austria (Early Bronze Age; Pucher 2001).

Šifra najdišča Site code →	S Italija N Italy		Slovenski Kras Slovene Karst		Istra Istria		Z Madžarska W Hungary		Avstrija Austria
	A	B	C	D	E	F	G	H	I
% <i>Ovis s. Capra</i>	38,0	32,8	44,1	47,7	63,1	56,0	19,8	26,4	29,3
% <i>Bos</i>	51,2	36,6	-	-	21,0	33,3	50,6	45,2	48,6
% <i>Sus</i>	8,5	22,1	-	-	10,5	6,1	15,0	15,5	15,2
% Divjadi / Wild	0,0	11,6	13,6	26,0	5,2	3,5	5,4	13,4	3,6
Σ NISP	129	1332	59	65	171	941	1381	431	605

1999; Schibler 2004).<sup>9</sup> Še tretji zelo pomemben dejavnik sooblikovanja takratne ekonomije pa je bil seveda človek. Prav kulturnim preferencam gre namreč pripisati razlike v tipu živinoreje (in ekonomije nasplah) med sočasnimi skupnostmi, ki so naseljevale geomorfološko, višinsko, klimatsko in vegetacijsko podobna okolja (Choyke, Bartosiewicz 1999; Battisti, Marconi 2003). V tem smislu je imela pomembno vlogo že sama namembnost posameznih naselbin (postojank, taborov ipd.). Različne aktivnosti v okviru npr. sezonskega pastirskega zatočišča proti tistim v osrednji, utrjeni naselbini so se namreč neogibno odražale tudi v drugačni favnistični sestavi obeh tipov najdišč (cf. Brajković et al. 1998; Becker 1999; Miracle, Pugsley 2006). Prevlada lovnih vrst med gradivom iz Malega Otavnika tako morda nakazuje prav specifično funkcijo obravnavane naselbine, podobno kot je bila prevlada divjačine v bronastodobnih plasteh jame Veliki Zjot v Beli Krajini verjetno posledica njene uporabe kot začasno in kratkotrajno zatočišče manjšim skupinam ljudi med lovom, raznimi drugimi pohodi in v času neprilik (Turk 1991).

<sup>9</sup> Relativno večji delež zastopanosti lovnih vrst v favni Malega Otavnika bi lahko bil odraz dejanskega povečanja pomena lova zaradi poslabšanja klimatskih razmer (cf. Choyke, Bartosiewicz 1999). Nekateri avtorji namreč v obdobje med 3.800 in 3.300 cal. BC umeščajo srednjeevropsko hladno fazo (Haas et al. 1998; a glej tudi npr. Magny 2004).

## SKLEP

Favnistično gradivo iz zgodnjebonastodobne koliščarske naselbine Mali Otavnik se od tistega iz sočasnih naselbin v širši regiji praviloma razlikuje predvsem v dveh pogledih: po nepričakovano veliki vrstni pestrosti vzorca in po prevladi ostankov lovnih vrst nad domačimi. Razumljivo je, da je pri interpretaciji navedenih specifik potrebno upoštevati omejitve zaradi izbranega načina vzorčenja (tj. ročno pobiranje ostankov iz struge potoka) ter pičlega števila najdb (NISP = 72). Vendar pa to samo po sebi še ne pomeni, da ugotovljena vrstna pestrost in/ali večinski delež lovnih vrst nista vsaj do neke mere vzročno-posledično povezana (tudi) s klimatskimi razmerami, okoljskimi danostmi in/ali kulturološkimi specifikami obravnavane koliščarske skupnosti.

Ob koncu zgodnje bronaste dobe je na Ljubljanskem barju najverjetneje že prihajalo do zamočvirjanja območja, kjer se je v eneolitiku razprostiralo jezero (cf. Velušček 2005; Toškan 2005), okolje pa je bilo kljub temu še vedno zelo vlažno, vodnato. Na to med drugim kažejo tudi ostanki losa in bobra v gradivu iz Malega Otavnika (cf. Bauer, Nygrén 1999; Kryštufek et al. 2006). Na drugi strani je prevladujoč delež ostankov na gozd vezanih lovnih vrst (jelen, divja svinja, medved, los, bober) proti tistim iz mozaičnih in odprtih habitatov (srna) mogoče

razumeti kot kazalec pretežno gozdnatega zaledja tukaj obravnavane naselbine. Takšno (tj. vlažno, gozdnato) okolje je bilo primerno predvsem za rejo prašičev, tako da skromna zastopanost ovce v gradivu iz Malega Otavnika morda niti ni le naključna posledica pičlega števila najdb. Nenazadnje ostanki omenjene vrste manjkajo tudi v sicer skromnih favnističnih vzorcih iz edinih dveh<sup>10</sup> arheozoološko raziskanih bronastodobnih najdišč z Ljubljanskega barja: Malemu Otavniku sočasnega kolišča Zornica pri Blatni Brezovici (Dirjec B. 1991) in mlajše- oz. zgodnjepoznobronastodobne naselbine pri Iški Loki (Toškan 2005; Velušček 2005). Zgodnjebronastodobni horizont je bil sicer raziskan tudi na Dežmanovih koliščih pri Igu in v okviru najdišča Notranje Gorice, ki obe prav tako ležita na Ljubljanskem barju. Žal pa so favnistične najdbe iz tega obdobja v obeh navedenih primerih pomešane s poznoeneolitskimi, tako da med enimi in drugimi danes ni več mogoče razlikovati. Na obeh najdiščih sicer delež ovce močno presega delež prašiča, kar pa gre prej pripisati tesni povezavi tam živečih skupnosti s tradicijo kot pa prilagajanju naravnim danostim življenjskega prostora. Na nekaterih ovčjih ostankih z Dežmanovih kolišč je namreč opaziti deformacije, ki so nastale prav kot posledica življenja v vodnatem, močvirnatem, tj. za drobnico neugodnem naravnem okolju (Bartosiewicz et al. 2009).

<sup>10</sup> Nekateri avtorji (npr. Drobne 1983; Bartosiewicz 1999) so v zgodnjo bronasto dobo umestili še nekaj arheozoološko obdelanih koliščarskih naselbin z Ljubljanskega barja, ki pa so jih kasnejše raziskave pomaknile v pozni eneolitik (Velušček, Čufar 2003).

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Sicer pa se zdi v zvezi z gradivom z Dežmanovih kolišč in iz Notranjih Goric potrebno izpostaviti še nekaj: podobno kot je bilo to ugotovljeno v primeru Malega Otavnika, je število ostankov lovnih vrst v favni obeh navedenih najdišč (bistveno) večje od števila ostankov domačih (Drobne 1973). Ker gre za obsežna vzorca ta najverjetneje razmeroma verodostojno izkazuje razmerje v številčni zastopanosti lovnih in domačih vrst, s tem pa tudi relativni pomen živinoreje in lova v ekonomiji koliščarjev z Ljubljanskega barja na prehodu iz bakrene v bronasto dobo. Je torej ta podatek lahko razumeti kot argument v prid tezi o lovu kot pomembni komponenti tudi v ekonomiji sicer od Dežmanovih kolišč in Notranjih Goric nekoliko mlajšega Malega Otavnika? Dokončnega odgovora na to vprašanje zaenkrat še ni mogoče dati. Vendar si v luči paleoekološke slike Ljubljanskega barja in morebitnih kulturoloških specifik tam živečih bronastodobnih skupnosti ta možnost vsekakor zasluži ustrezno pozornost. Nenazadnje se je tudi ekonomija bakrenodobnih prebivalcev takrat sicer še ojezerjenega Ljubljanskega barja bistveno bolj naslanjala na lov kot sočasne skupnosti s Krasa (Velušček 2005) ali z Dolenjskega (Pohar 1983; 1988), podobne medregionalne razlike pa so poznane tudi iz sosednjih pokrajin (npr. Petrucci 2006).

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## Mammal fauna from the Bronze Age site at Mali Otavnik near Bistra in the Ljubljansko barje

Translation

### INTRODUCTION

Animal remains from archaeological sites represent an important source of data on the way of life and on the (nutritional) habits of past inhabitants. How much such remains reveal depends, in large measure, on the degree of preservation of the bone substance, which depends on physical, chemical and biological conditions to which the bones were exposed (Von Endt, Ortner, 1984; Lyman 1999). The anaerobic water environment with a slightly alkaline pH value and stable temperatures, in which lie the remains of the Eneolithic pile-dwelling settlements on the Ljubljansko barje in central Slovenia (Tancik 1965), certainly considerably decelerates the diagenesis of the bone tissue. The preservation of the organic remains from most later settlements in the same area is, unfortunately, significantly poorer. The gradual transformation of the Eneolithic lake on the Ljubljansko barje into a marsh caused the post-Eneolithic communities to set up their settlements on the slightly raised outskirts. There the sedimentational environment is substantially less favourable to the preservation of various organic materials. The unstable water regime and the aerobic environment

of the shallow carbonate soil with sandy-gravelly subsoil of the Ig alluvial cone (Tancik 1965) undoubtedly greatly accelerated the decomposition of the bones from the Bronze Age open-air settlement at Iška Loka, so that few faunistic remains could be collected by trenching (Toškan 2005). A similar situation can be observed for the Bronze Age settlement at Žabji grad near Kamnik beneath the mountain of Krim (excavations in 2007, unpublished). It is therefore not surprising that a great majority of the animal (organic in general) finds from the area of the Ljubljansko barje originates from the period of the pile-dwellers (Drobne 1973, 1974, 1975; Toškan, Dirjec 2004a, 2006a; Velušček et al., 2004), while the material from later periods is considerably scarcer (see for example Drobne 1983; Dirjec B. 1991; Toškan 2005). Due to this, the analysis of the mammal remains from the Bronze Age site at Mali Otavnik near Bistra, even though in small numbers, is entirely reasonable. It is even more reasonable if we consider the fact that the available data on Bronze Age fauna in other parts of Slovenia are not known in greater quantities (see for example Bartosiewicz 1987; Turk 1991; Turk et al. 1992, 1993; Dirjec J. 1996).

## SITE AND MATERIAL

The site at Mali Otavnik was uncovered during the underwater survey of the bed of the Bistra stream on the Ljubljansko barje (central Slovenia), in the area of the fallow bearing the same name. Detailed information on the methodology of the fieldwork as well as on the site itself is given by A. Gaspari (2008), wherefore this paper will be limited to presenting the archaeozoological analysis. Animal remains were collected by hand from the bottom of the stream bed as well as from the layer of sand with organic detritus and cultural remains deposited around the wooden piles in the right bank of the stream (area of Mali Otavnik I, cf. Gaspari 2008, fig. 1, fig. 2: I). The survey yielded altogether 148 finds of large mammals (as well as a fish vertebra and two small bird bones). Of these, 72 bones and teeth could be identified at least to the genus level. The almost 50-per cent identification is an expected consequence of hand collection without sediment sieving (cf. Toškan, Dirjec 2004b). Most bones are abraded through exposure to running water. The poor preservation of the bone substance prevented a credible estimation of the number and location of cut-marks, chop-marks and gnawing marks on the remains of individual skeletal elements. According to expectation, most bones are fragmented (with the exception of individual phalanges as well as two astragali and two calcanei); numerous teeth are also crushed. Three finds of red deer (two antler fragments and a scapula) show traces of working.

The chronology of the pottery and the stratigraphic situation in the area of the wooden piles in the section of the right bank show that the Mali Otavnik site represents a single-phase pile-dwelling settlement from the Early Bronze Age (Gaspari 2008).<sup>1</sup> This is also the period into which the bone finds from the right bank of the stream should be ascribed. The rest of the animal remains discussed in this paper were collected from the deepened bottom of the stream bed. Since these finds were presedimented, their connection to the pile-dwelling settlement at Mali Otavnik is not entirely reliable.

## TAXONOMY

The faunistic material from Mali Otavnik (I) is represented by at least 12 species of large mammals from six families (*tab. 1*). The predominating remains are those of large herbivores (NISP<sup>2</sup> = 55), while carnivores (NISP = 6) and rodents (NISP = 1) are present in very small numbers. Most of these species inhabit the Ljubljansko barje with its hinterland still today. The exception is the aurochs (*Bos primigenius*), which became globally extinct in the Middle Ages, as well as the locally exterminated moose (*Alces alces*) and beaver (*Castor fiber*). Metric data for the sufficiently preserved bones and teeth from Mali Otavnik are given in *Appendices A-H*.

### *Cervus elaphus* Linnaeus, 1758

The large mammal species that is by far best represented in the material from Mali Otavnik, with more than half of the finds, is red deer. It is the leading species both in the material from the bottom of the bed as well as in the material from the section in the right bank (*tab. 1*). Red deer apparently represented an important source of meat to the inhabitants of Mali Otavnik, although it would be erroneous to tie all the recovered remains to hunting. This is particularly relevant in connection with the antler fragments, which represent a good third of all

red deer finds (*tab. 2*). In prehistory, antler was a prized raw material for making tools and weapons so the collection of shed specimens which were then brought to the settlement was widespread. At least one such example was found also within the Mali Otavnik site.

In their size, the red deer remains from Mali Otavnik fall within the range for Bronze Age specimens of the same species from northern Italy, Istria and Austria (*fig. 1*). With the exception of a scapula and the distal fragment of a metatarsus, all bones show completely fused epi- and diaphyses, which indicates a preferential hunt for adult animals. The studies of modern red deer have shown that ossification of the scapula ends at the age of approx. 20 months (Mariezkurrena 1983), whence it follows that the above-mentioned scapula<sup>3</sup> most probably represents the remains of an animal killed in late winter or early spring. The individual represented by a fragment of a mandible was supposedly also killed in winter, whereby the degree of wear of the fourth deciduous pre-molar points to the animal's age of approximately eight months at the kill (cf. Mariezkurrena 1983). Since both mentioned finds originate from the chronologically relatively well defined material from the section in the right bank, it can be inferred with a high degree of certainty that the pile-dwelling village was inhabited (also) during winter or early spring.

### *Bos taurus* Linnaeus, 1758

Cattle are the second best represented mammal species in the material from Mali Otavnik, while they are the best represented species of domestic animals. With the exception of the fragment of an ulna, the sample includes only the remains of the least meat-bearing body parts: teeth and bones of the lower parts of limbs (*tab. 2*). All bones have fused epi- and diaphyses and are thus the remains of at least subadult individuals. The morphology of the almost completely preserved metatarsus from Point N 37 seems most probably to have belonged to a castrate, since the bone is relatively long with fairly robust epiphyses, but a relatively gracile diaphysis.

### *Bos cf. primigenius* Bojanus, 1827

The bovid astragalus and the distal part of the metatarsus from Mali Otavnik are much larger when compared to the astragali and metatarsi of the Bronze Age cattle from the wider region (see *Appendix C*). For this reason, it would be reasonable to ascribe them to aurochs.<sup>4</sup> Unfortunately, the distinction between the two bovid species is difficult, since larger males (as well as castrates) of cattle overlap in size to the smaller females of aurochs (Bökönyi 1995). Nevertheless, since the metatarsus from Mali Otavnik is relatively gracile (*fig. 2b*) and may very probably be ascribed to a female, its determination as belonging to an aurochs seems justified. Furthermore, the specimen in question exceeds in size the metatarsi of the relatively large prehistoric cattle from Hungary, while no deviation from the aurochs of that area can be observed (Bökönyi 1995).

A similar inference can be drawn also for the determination of the above-mentioned astragalus (*fig. 2a*). In its size, the specimen from Mali Otavnik exceeds not only the astragali of Bronze Age cattle from Istria, Austria, Italy and Hungary, but even those of the advanced Roman period breeds. On the other hand, the specimen

<sup>3</sup> The *tuber scapulae* was in the fusing phase at the time of death / kill.

<sup>4</sup> The morphology of the bones (*fig. 2*) allows us to positively refute their possible determination as European bison (*Bison bonasus* [Linnaeus, 1758]) (cf. Boessneck et al. 1963; Sala 1986).

<sup>1</sup> The radiocarbon analysis dated the fragment of a femur, supposedly red deer, from Point N 52 to the first quarter of the 2nd millennium BC (Gaspari 2008, 72 n. 5, 62 *tab. 1*).

<sup>2</sup> NISP - Number of Identified Specimens (Grayson 1984).

certainly falls within the range for the astragali of the Holocene aurochs from various Central European sites (*fig. 3*).

***Sus scrofa* Erxleben, 1777**

The genus *Sus* is represented in the sample from Mali Otavnik with eight finds. Two of these could positively be ascribed to a boar, namely a lower canine from Point N 37 and a skull fragment from Point N 32. The determination of the former is based on metrics, while that of the latter is founded also on its morphology: the skull fragment from Mali Otavnik shows the *os lacrimale* at least twice as long as compared to its maximum width rather than equal or shorter, which is characteristic of the domestic pig (Kryštufek 1991).

Two other remains were conditionally ascribed to *S. scrofa*: the frontal process of the zygomatic bone from Point N 36 and the third lower molar from Point N 53. The first one exceeds in size the prehistoric specimens of domestic pigs from the Ljubljansko barje in spite of the not yet fused sutures, while the length and width of the  $M_3$  exceed the values of corresponding dimensions in Bronze Age domestic pigs in the region (*tab. 3*). However, three of the four treated wild boar remains were found on the bottom of the bed, which makes their position within the context of the Mali Otavnik pile-dwelling site unreliable.

***Sus scrofa* seu *domesticus***

Seven suid remains from Mali Otavnik could not be determined further. In their size, some of them (for example the thoracic vertebra from Point N 20) are closer to the domestic pig, while others (for example the scapula fragment from Point N 32) to the wild boar. All seven originate from the bottom of the stream bed.

***Ovis aries*<sup>5</sup> Linnaeus, 1758**

The subfamily Caprinae is represented in the sample from Mali Otavnik with a single find: a fragment of a sheep humerus. This finding is surprising, since goats and (especially) sheep are as a rule very well represented on the contemporary sites of northern Italy, Istria, western Hungary and Austria, often even with a share that exceeds 50 per cent of all identified finds (Riedel 1976, 1992, 2003; Karoušková-Soper 1983; Brajković et al. 1998; Becker 1999; Pucher 2001; Miracle, Pugsley 2006). The relatively great significance of the Caprinae is indicated also by the (scarce) available data from the Bronze Age sites in Slovenia (Bartosiewicz 1987; Turk et al. 1992; 1993; Dirjec J. 1996).

***Canis familiaris* Linnaeus, 1758**

The dog is represented in the Mali Otavnik sample with a single fragment, that of a mandible (*fig. 4*). It was collected from

<sup>5</sup> The name *Ovis aries* Linnaeus, 1758 is used in this paper exclusively for domestic sheep. This specification is necessary due to the decision of the International Commission on Zoological Nomenclature (Opinion 2027, March 2003), in accordance with which the same scientific name is used for the feral forms of (at least partially) domesticated mammal species as well as for the corresponding domestic animal (Gentry et al. 2004). An example is represented by the European mouflon, which is a feral descendant of the Asian mouflon half-domesticated in the Neolithic period (*Ovis orientalis* Gmelin, 1774), and thus bears the same scientific name as the domestic sheep: *Ovis aries* Linnaeus, 1758 (Giusti 2005).

the section in the right bank and can thus quite conclusively be tied to the pile-dwelling site at Mali Otavnik. The length of the  $M_1$  molar places the mandible within the range for specimens of the same species from the Late Eneolithic - Early Bronze Age layers of the so-called Dežman's pile-dwelling sites near Ig, also situated on the Ljubljansko barje (*fig. 5*). This only available find thus appears to indicate a relatively small size of dogs in the area of the Ljubljansko barje (also) at the end of the Early Bronze Age. Similar sizes were reported by researchers of the Bronze Age sites in neighbouring areas (Riedel 1976, 1992; Pucher 2001; Miracle, Pugsley 2006). This points to the distribution of the relatively uniform appearance of dogs across the entire area south and south-east of the Alps, which apparently appeared under the influence of selective pressure of similar lifestyles near human dwellings. People in the Bronze Age thus almost certainly did not deliberately raise dogs into "breeds" for specific, more narrowly defined tasks (such as hunting or watch dogs; cf. Bartosiewicz 2002).

***Felis* cf. *catus* Linnaeus, 1758**

The fragment of a felid mandible, otherwise the only remains of the genus *Felis* in the material from Mali Otavnik, belongs most probably to the domestic cat. The find is smaller than the subfossil wild cat specimens from Denmark as well as the modern wild cats from different parts of Europe (cf. Kurtén 1965). The mandible in question was collected from the bottom of the bed (Point N 36) and it probably does not belong to the context of the Mali Otavnik site, also because domestic cats are not known in Central Europe in the Bronze Age (Clutton-Brock 1999). Moreover, the Early Bronze Age sites of northern Italy, Istria and western Hungary revealed even wild cats only exceptionally, while in Slovenia these are not (yet) known at all.

***Alces alces* (Linnaeus, 1758)**

The moose in the Mali Otavnik sample is represented by six finds, two of which were collected from the bottom of the bed. The remaining four finds represent phalanges that exactly correspond to the moose in both morphology (cf. Chaix 1981) and size (*tab. 4*). Similar holds true for the phalanx from the bottom of the stream bed as well as for the maxilla fragment. The determination of the small antler fragment is more difficult, since it is morphologically close to both moose and fallow deer (*Dama dama* [Linnaeus, 1758]). The latter is unknown on the Bronze Age sites in Slovenia, but is represented, for example, in the material from Monkodonja in Istria (Becker 1999).

***Capreolus capreolus* (Linnaeus, 1758)**

Roe deer is represented in the sample by a mandible fragment. It was found on the bottom of the bed (Point N 24) and can therefore not be directly tied to the pile-dwelling settlement at Mali Otavnik.

***Castor fiber* Linnaeus, 1758**

The material from Mali Otavnik includes also beaver remains, more precisely one mandible fragment. In its size, this find falls within the range for Late Eneolithic/Early Bronze Age specimens of the same species from the near-by Dežman's pile-dwelling sites (*tab. 5*). The mandible from Mali Otavnik was collected from the bottom of the bed and can therefore not be tied to the pile-dwelling settlement with certainty. Nevertheless, the presence of beavers on the Ljubljansko barje during the Early



Bronze Age is unquestionable, since the finds of the species appear in the area on sites that date from all periods, from the Mesolithic to the Roman times (Rakovec 1955; Drobne 1973; Pohar 1984; Toškan, Dirjec 2004a, 2006a, 2006b).

#### *Ursus arctos* Linnaeus, 1758

Finds of the brown bear appear on most prehistoric sites from the Ljubljansko barje, though always in small numbers. The commonest finds are those of mandibles with teeth (for example Riedel 1948; Pohar 1984) and lower parts of limbs (Toškan, Dirjec 2004a, 2006a, 2006b); the latter are represented also in the material from Mali Otavnik (*tab. 2*).<sup>6</sup> The relatively frequent appearance of phalanges and mandible fragments could point to skinning of bears for fur, while the teeth (especially canines) may have had a decorative or cult significance. Some authors (for example Riedel 1989), in fact, connect bear hunting to rituals, which would help explain also the small number of killed individuals. The available archaeozoological data for the hinterland of the Ljubljansko barje reveal that the bear was present in the area throughout prehistory.

#### Undetermined remains

The 76 taxonomically undetermined finds of large mammals include 26 that could nevertheless be determined at least anatomically. Predominating remains are those of ribs (N = 20) and individual long bones (N = 5), while a pelvis and two relatively poorly preserved vertebrae also remained undetermined. The undetermined finds mostly fall into the size class of red deer or cattle, which are in general the best represented species in the sample.

#### ALLOPATRIC AND ALLOCHRONIC COMPARISONS

The Bronze Age fauna of Slovenia is very poorly known, with most published data being provided by the sites from the Kras plateau. That area supposedly shows a strong predominance of the remains of domestic animals (particularly ovicaprids), while the modest share of wild animals includes, according to information by I. Turk, a predominant number of those belonging to brown hare (Turk et al. 1992, 1993). A predominant share of domestic animals was established also at Ormož (Urnfield Culture period; Bartosiewicz 1987), Gornja Radgona (Urnfield Culture period; unpublished) and Kostel (end of the Middle or beginning of the Late Bronze Age and the Late Bronze Age; Dirjec J. 1996), but also on the Bronze Age sites of northern Italy, Istria, eastern Austria and western Hungary (Riedel 1976; 1992, 2003; Karoušková-Soper 1983; Brajković et al. 1998; Becker 1999; Pucher 2001; Miracle, Pugsley 2006). The fauna from Mali Otavnik markedly differs from the above-enumerated sites, primarily in the apparently bigger (even majority) share of remains of wild animals, principally of red deer. The latter observation is true even if we disregard the antler remains in quantitative comparisons<sup>7</sup> or if we take into consideration only the finds from the section in the right bank that can be directly tied to the Early Bronze Age pile-dwelling settlement (*tab. 1*).

<sup>6</sup> The degree of wear of the P<sup>4</sup> from one of the two maxillas shows that the latter belonged to a prime adult animal (cf. Stiner 1994).

<sup>7</sup> People were collecting also shed antler, whereby the inclusion of such finds into the remains of the killed red deer could contribute to the somewhat overestimated share of the species in the nutrition of the local community.

Also noteworthy is the species richness of the faunistic material from Mali Otavnik, since this substantially surpasses the richness of similarly-sized samples from contemporary sites in Italy, Istria, Austria and Hungary (*fig. 6*). In the number of represented mammal species, the Mali Otavnik sample is comparable to samples with substantially greater numbers of identified specimens (NISP > 1500). Moreover, if the species richness of sites from *figure 6* is weighed with sample size, the obtained result further emphasizes the particular position of Mali Otavnik (*fig. 7*). Having said that, it is also important to point out that the number of large mammal species from the site exceeds the values of comparably-sized samples from neighbouring regions even if only the chronologically well determined remains from the right bank of the stream figure in the comparison (*figs. 6 and 7*). The outstanding species richness of Mali Otavnik is mostly due to the great number of wild species (the species richness of domestic animals is even more limited than the one established in comparably-sized samples from neighbouring regions, particularly due to the absence of goat remains). This observation, together with the above-mentioned great (majority) share of the remains of wild species (*tab. 1*), certainly indicates a relatively great significance of hunting in the economy of the pile-dwelling settlement at Mali Otavnik, which is relatively unusual for a Bronze Age site of Central Europe.

The possible reasons for the somewhat unexpected picture provided by the faunistic material from Mali Otavnik certainly include inappropriate sampling<sup>8</sup> and the very small number of finds. The problematic nature of the latter is well illustrated by the publications of the fauna from the near-by Eneolithic pile-dwelling settlement at Maharski prekop near Ig, where the shares of represented remains of hunting and domestic large mammal species vary substantially between various parts of the settlement (Drobne 1974, 1975). In case of quantitatively small samples, such as the one from Mali Otavnik (see also Toškan, Dirjec 2004a; Velušček et al. 2004), a clearer picture of the economy of the local Bronze Age community will only be given by further excavation. This, of course, does not signify that the observations presented in this paper on the fauna (and economy) of Mali Otavnik are *a priori* erroneous. In fact, individual Bronze Age sites with a somewhat larger (though never majority) share of hunting animals are known also from neighbouring regions (for example Karoušková-Soper 1983; Choyke, Bartosiewicz 1999; Battisti, Marconi 2003) and a more detailed analysis of these sites revealed, among other things, also considerable deviations in the share of the individual domestic animals represented (*tab. 6*) as well as differences as to the leading hunting species within individual sites (Riedel 1992; Turk et al. 1992, 1993; Choyke, Bartosiewicz 1999; Miracle, Pugsley 2006).

The reasons for the above-enumerated intersite differences in species richness and in the abundance of individual taxa should, to a certain degree, undoubtedly be sought in the natural environment of the settlements (geomorphology of the area, soil type, land cover and so forth). In stock-breeding this was supposedly primarily reflected in the sheep : domestic pig dichotomy. The latter prefers a wooded, even marshy environment, while the sheep prefers drier, hillier pasture land. An important influence on the economy of the prehistoric communities were also climatic oscillations (for example Choyke, Bartosiewicz 1999; Schibler 2004).<sup>9</sup> The third very important

<sup>8</sup> Particularly questionable is the collection of finds from the bed of the stream, since there is an increased possibility of sample contamination with earlier and/or later finds. The hand-collection in itself is, in this respect, less problematic, since sediment sieving could only increase the species richness of the obtained faunistic sample (cf. Toškan, Dirjec 2004a).

<sup>9</sup> The relatively large share of represented hunting species in the Mali Otavnik fauna could be a reflection of the actual increase in the importance of hunting due to worsening climatic

factor in forming the economy of the period was, of course, man. In fact, the differences in the type of stock-keeping (and economy in general) between contemporary communities that inhabited the geomorphologically, altitudinally and vegetationally comparable environments should be attributed precisely to cultural preferences (Choyke, Bartosiewicz 1999; Battisti, Marconi 2003). In that respect, the function of individual settlements (posts, camps and others) played an important role. Different spectra of activities within, for example, seasonal shepherds' shelters as opposed to those in central fortified settlements, were inevitably mirrored also in the different faunistic composition of the two site types (cf. Brajković et al. 1998; Becker 1999; Miracle, Pugsley 2006). The predominance of wild species in the material from Mali Otavnik may thus indicate a specific function of the said settlement, similarly as the predominance of game in the Bronze Age layers of the cave of Veliki Zjot in Bela Krajina probably represented the consequence of the cave's use as a temporary and short-lived shelter to smaller groups of people during hunting, various other expeditions and in times of difficulty (Turk 1991).

### CONCLUSION

The faunistic material from the Early Bronze Age pile-dwelling settlement at Mali Otavnik differs from that of contemporary settlements in the wider area in two principal aspects: the unexpected high species richness of the sample and the predominance of the remains of wild animals over those of the domestic ones. It is understandable that the interpretation of the above-stated observations needs to take into consideration the limitations of the selected sampling method (hand-collection of the remains from the bed of the stream) and a very small number of finds (NISP = 72). However, this in itself does not signify that the established species richness and/or majority share of hunting species do not have a cause-and-effect relationship with the climatic conditions, characteristics of the environment and/or culturological specifics of the pile-dwelling community in question.

The Ljubljansko barje witnessed, most probably already at the end of the Early Bronze Age, the appearance of a marsh where a lake had been during the Eneolithic (cf. Velušček 2005; Toškan 2005), but the environment remained very wet, watery. This is indicated, among other things, by moose and beaver remains in the Mali Otavnik material (cf. Bauer, Nygrén 1999; Kryštufek et al. 2006). On the other hand, the predominant share of remains of wild animals tied to a woodland habitat (red deer, wild boar, brown bear, moose, beaver) as opposed to the share of the animals from mosaic or open habitats (roe deer) may be understood as an indicator of a mainly woody hinterland of the settlement. Such an environment (wet, woody) was suitable primarily for keeping pigs, whereby the low representation of sheep in the material from Mali Otavnik might not be only a coincidental consequence of the small number of finds. The remains of *O. aries* are missing also in the small faunistic samples from the only two<sup>10</sup> archaeozoologically investigated Bronze Age sites from the Ljubljansko barje: Zornica near Blatna Brezovica, which is a pile-dwelling

conditions (cf. Choyke, Bartosiewicz 1999). In this context it seems worth mentioning that some authors set the Central European cold phase precisely in the period between 3,800 and 3,300 cal. BC (Haas et al. 1998; but see also, for example, Magny 2004).

<sup>10</sup> Some authors (for example Drobne 1983; Bartosiewicz 1999) have dated also some other archaeozoologically treated pile-dwelling settlements from the Ljubljansko barje to the Early Bronze Age, but later research moved them into the Late Eneolithic (Velušček, Čufar 2003).

site contemporary to Mali Otavnik (Dirjec B. 1991), and the settlement near Iška Loka, dated to the early Late Bronze Age (Toškan 2005; Velušček 2005). The Early Bronze Age horizon was investigated also at Dežman's pile-dwelling sites near Ig as well as within the Notranje Gorice site, both of which are situated on the Ljubljansko barje. Unfortunately, however, the faunistic finds from this period from both above-stated sites are mixed with those from the Late Eneolithic period so that it is now impossible to distinguish between the two. The share of sheep on both sites greatly exceeds that of the pig, but this might be attributable more to the close connection of the communities to their tradition rather than to the adaptation to the natural conditions of the living space. Some of the sheep remains from Dežman's pile-dwelling sites, in fact, show symptoms of environmental stress, indicating that the swampy area was less than ideal for this species (Bartosiewicz et al. 2009).

Another observation should be emphasized in connection with the material from Dežman's pile-dwelling site and from Notranje Gorice: similarly as was established for Mali Otavnik, the number of finds of wild species in the fauna of both sites is (significantly) greater than the number of finds of domestic ones (Drobne 1973). These two samples are extensive and should therefore relatively credibly indicate the relationship in the numerical representation of game and domesticates as well as the relative significance of hunting and animal keeping in the economy of the pile-dwellers from the Ljubljansko barje in the transition from the Copper to the Bronze Ages. Can this information be understood as an argument in support of the hypothesis of hunting as an important component also in the economy of Mali Otavnik, although it is somewhat later than the Dežman's pile-dwellings and Notranje Gorice? A final answer to this question can as yet not be given. However, in the light of the palaeoenvironmental picture of the Ljubljansko barje and possible culturological specifics of the Bronze Age communities living there, this possibility certainly deserves due attention. After all, even the economy of the Copper Age inhabitants of the Ljubljansko barje relied much more on hunting than the contemporary communities from the Kras plateau (Velušček 2005) or from Dolenjska (Pohar 1983, 1988), while similar interregional differences have been known also from neighbouring regions (see for example Petrucci 2006).

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## PRILOGE / APPENDICES

*Pril. A-H: Metrični podatki za ostanke sesalske favne iz Malega Otavnika (I). Vse mere so v mm. Dimenzije so povzete po von der Drieschevi (1976).*

*Appendices A-H: Metric data for mammal fauna remains from Mali Otavnik (I). All measurements are given in mm. Dimensions are taken from von der Driesch (1976).*

Obrazložitev okrajšav za posamezne dimenzije / Explanation of abbreviations for individual dimensions:

B - širina / breadth

Bd - največja širina distalne epifize / breadth of distal end

BG - širina *cavitas glenoidalis* / breadth of *cavitas glenoidalis*

Bp - največja širina proksimalne epifize / breadth of proximal end

BT - širina *trochlea* / breadth of the *trochlea*

DD - najmanjša globina diafize / smallest depth of the diaphysis

Dd - največja globina distalne epifize / greatest depth of distal end

DI - največja globina lateralne polovice / greatest depth of lateral half

DLS - diagonalna dolžina spodnjega dela / diagonal length of the sole

Dm - največja globina medialne polovice / greatest depth of medial half

GB - največja širina / greatest breadth

GL - največja dolžina / greatest length

GLl - največja dolžina lateralne polovice / greatest length of lateral half

GLm - največja dolžina medialne polovice / greatest length of medial half

GLP - največja dolžina *processus articularis* / greatest length of *processus articularis*

L - dolžina / length

Ld - dolžina dorzalne površine / length of the dorsal surface

LG - dolžina *cavitas glenoidalis* / length of the *cavitas glenoidalis*

MBS - širina na sredini spodnjega dela / middle breadth of the sole

OnR - obseg nad rožo / distal circumference above the burr

OR - obseg rože / circumference of the burr

SD - najmanjša širina diafize / smallest breadth of diaphysis

SLC - najmanjša dolžina *collum scapulae* / smallest breadth of *collum scapulae*

*Pril. A: Ostanke jelena (Cervus elaphus).*

*App. A: Red deer remains (Cervus elaphus).*

Skeletni element Skeletal element	Dimenzija Dimension	Mere (v mm) Measurements (in mm)	
Cornua	OR	265,0	
	OnR	200,0	
Maxilla	P <sup>2</sup> -P <sup>4</sup>	47,0	
Scapula	BG	47,5	
	LG	47,0	
	GLP	61,0	
	SLC	40,0	
Humerus	Bd	58,0	
	BT	53,0	
Metacarpus	Bp	42,0	
Phalanx III	Ld	46,0	
	DLS	47,0	
	MBS	14,0	
Tibia	Bp	74,5	-
	Dd	-	47,0
Astragalus	GLl	55,5	
	GLm	51,0	
	DI	29,5	
	Dm	31,0	
	Bd	33,5	
Calcaneus	GL	114,0	126,0
	GB	34,0	36,0

Pril. B: Ostanke losa (*Alces alces*).

App. B: Moose remains (*Alces alces*).

Skeletni element Skeletal element	Dimenzija Dimension	Mere (v mm) Measurements (in mm)		
Maxilla	P <sup>2</sup> -P <sup>4</sup> (a)	59,0		
	P <sup>2</sup> -P <sup>4</sup>	61,0		
	M <sup>1</sup> L	24,0		
	M <sup>1</sup> B	24,0		
Phalanx I	GL	75,5	-	75,0
	Bp	30,0	30,0	29,0
	SD	22,5	-	-
	Bd	24,5	-	-
Phalanx II	GL	53,5		
	Bp	25,0		
	SD	17,0		
	DD	25,0		
	Bd	21,5		

Pril. C: Ostanke pragoveda (*Bos cf. primigenius*).

App. C: Aurochs remains (*Bos cf. primigenius*).

Skeletni element Skeletal element	Dimenzija Dimension	Mere (v mm) Measurements (in mm)
Astragalus	GLl	74,5
	GLm	67,0
	Dl	41,0
	Dm	39,0
	Bd	50,0
Metatarsus	Bd	67,0
	DD	31,5
	SD	37,0

Pril. D: Ostanke domačega goveda (*Bos taurus*).

App. D: Cattle remains (*Bos taurus*).

Skeletni element Skeletal element	Dimenzija Dimension	Mere (v mm) Measurements (in mm)
Metacarpus	Bd	56,0
	DD	21,0
Phalanx I	GL	37,0
	Bp	27,0
	Bd	23,0
Metatarsus	Bp	42,0
	SD	22,0
	DD	23,0

Pril. E: Ostanke spodnje čeljustnice psa (*Canis familiaris*).

App. E: The mandible of a dog (*Canis familiaris*).

Skeletni element Skeletal element	Dimenzija Dimension	Mere (v mm) Measurements (in mm)
Mandibula	P <sub>1</sub> -M <sub>3</sub>	74,0
	P <sub>2</sub> -M <sub>3</sub>	70,0
	M <sub>1</sub> -M <sub>3</sub>	35,0
	P <sub>1</sub> -P <sub>4</sub>	39,0
	P <sub>2</sub> -P <sub>4</sub>	34,0
	M <sub>1</sub> L	21,0
	M <sub>1</sub> B	8,0
	M <sub>1</sub> L (a)	18,5
	Višina za M <sub>1</sub> / Height behind M <sub>1</sub>	21,0
	Višina za P <sub>2</sub> / Height behind P <sub>2</sub>	19,0

Pril. F: Ostanke spodnje čeljustnice domače mačke (*Felis cf. catus*).

App. F: The mandible of a domestic cat (*Felis cf. catus*).

Skeletni element Skeletal element	Dimenzija Dimension	Mere (v mm) Measurements (in mm)
Mandibula	P <sub>3</sub> -M <sub>1</sub>	17,0
	M <sub>1</sub> L	7,0
	M <sub>1</sub> B	3,0
	Višina za M <sub>1</sub> / Height behind M <sub>1</sub>	9,0
	Višina pred P <sub>3</sub> / Height in front of P <sub>3</sub>	8,5

Pril. G: Ostanke prašiča (*Sus sp.*).

App. G: Pig/wild boar remains (*Sus sp.*).

Skeletni element Skeletal element	Dimenzija Dimension	Mere (v mm) Measurements (in mm)
Dens	M <sub>3</sub> L	42,0
	M <sub>3</sub> B	19,0
Scapula	SLC	25,0
Phalanx I	GL	41,0
	Bp	19,0
	Bd	18,0
	SD	15,5
	DD	11,0

Pril. H: Ostanke rjavega medveda (*Ursus arctos*).

App. H: Brown bear remains (*Ursus arctos*).

Skeletni element Skeletal element	Dimenzija Dimension	Mere (v mm) Measurements (in mm)	
Maxilla	P <sup>4</sup> -M <sup>2</sup>	69,5	-
	P <sup>4</sup> L	15,0	-
	M <sup>1</sup> L	20,0	21,0
	M <sup>1</sup> B	16,0	15,0
	M <sup>2</sup> L	35,0	35,0
	M <sup>2</sup> B	17,0	18,0
	M <sup>1</sup> -M <sup>2</sup>	-	54,0
Calcaneus	GL	69,0	
	GB	46,0	