# HOČEVARICA

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# HOČEVARICA ENEOLITSKO KOLIŠČE NA LJUBLJANSKEM BARJU AN ENEOLITHIC PILE DWELLING IN THE LJUBLJANSKO BARJE

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## AN ENEOLITHIC PILE DWELLING IN THE LJUBLJANSKO BARJE


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ZALOŽBA
Z R C

**LJUBLJANA 2004**

# VSEBINA

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# SPREMNA BESEDA IN ZAHVALA

Leta 1995 je ekipa Inštituta za arheologijo Znanstvenoraziskovalnega centra SAZU v sodelovanju z Dendrokronološkim laboratorijem iz Oddelka za lesarstvo Biotehniške fakultete, ki ga vodi Katarina Čufar, pričela z intenzivnim raziskovanjem Ljubljanskega barja.

V okviru teh raziskav smo v letu 1998, po več kot desetletni prekinitvi, na Ljubljanskem barju ponovno zastavili manjšo sondo, tokrat na območju kolišča Hočevarica. Pri sondiranju smo se poskušali držati v Švici, Nemčiji in Franciji že preizkušene, toda na Ljubljanskem barju še nikoli uporabljene izkopavalne metodologije. Rezultati niso izostali. V sondi, ki je obsegala vsega 8 m$^2$, smo pridobili tolikšno količino ustreznih podatkov, da smo lahko s pomočjo sodelavcev in kolegov sestavili skupino kar 16 raziskovalcev iz Slovenije in tujine. Nekateri med njimi so v arheologiji že zelo uveljavljeni in cenjeni strokovnjaki. Drugim, čeprav so že priznani strokovnjaki na svojih področjih, pa sodelovanje v monografiji predstavlja prvo srečanje z arheološko vedo.

Na neki način sem se tudi sam pri sondiranju na Hočevarici šele kalil, čeprav je bilo to sondiranje del moje doktorske disertacije, ki sem jo uspešno obranil leta 2001. Danes, po vsega dobrih petih letih, bi se marsičesa zagotovo lotil drugače.

Kljub temu, da so v monografiji nekatere pomanjkljivosti, morda včasih ne povsem izpeljane interpretacije, me ob pisanju teh vrstic preveva prijeten občutek in osebno zadovoljstvo, da smo vsi skupaj zmogli in za strokovno javnost napisali znanstveno delo, ki zagotovo presega po službeni dolžnosti obvezno zaključno poročilo o posegu na arheološkem najdišču.

Čeprav pričujoča monografija predstavlja zaključek projekta, pa je to hkrati tudi dober imperativ za nadaljevanje intenzivnih raziskav na Ljubljanskem barju. Menim, da smo s skupnimi močmi postavili soliden temelj. In ravno zato se na tem mestu najprej zahvaljujem sodelavcu Janezu, ki je v raziskavah na Hočevarici vseskozi zelo tvorno sodeloval, ter vsem ostalim soavtorjem: Ani, Berndu, Borutu, Dragomirju, Francu, Jerneju, Katarini, Marjeti, Marijanu, Nicoletti, Petri, Vesni, Zoranu in Žigi. Brez njihovega velikodušnega sodelovanja bi bilo to delo gotovo zelo pomanjkljivo. Hvala!

# PREFACE AND ACKNOWLEDGMENTS

In 1995 a team from the Institute of Archaeology of the Scientific Research Center at the Slovenian Academy of Sciences and Arts in collaboration with the Dendrochronological Laboratory from the Department of Wood Science and Technology at the Biotechnical Faculty, directed by Katarina Čufar, initiated intensive investigations on the Ljubljansko barje.

These investigations incorporated the re-establishment of a small trench on the Ljubljansko barje in 1998, after an interruption of more than a decade, this time in the region of the Hočevarica pile dwelling. The goal during the sample trenching was to sustain the excavation methods already tested in Switzerland, Germany and France, and yet still novel to the Ljubljansko barje. The results were promising. The sample trench, comprising a total of 8 m$^2$, proffered such a quantity of applicable data to substantiate the composition of a team of 16 investigators from Slovenia and abroad; some of whom are already well established and esteemed professionals in the field of archaeology. And yet for some, although well recognized professionals in their own fields, collaboration in this monograph embodied their first encounter with the field of archaeology.

I, myself, somewhat evolved during the sample trenching at Hočevarica, despite that it comprised a segment of my doctoral dissertation, which I successfully defended in 2001. Today, a good five years later, I would certainly approach a number of matters quite differently.

Regardless of the select insufficiencies in the monograph, and perhaps interpretations not entirely complete, in writing these lines I am truly moved and filled with a sense of personal satisfaction that together we succeeded in writing a scientific work for the professional public. After all, it certainly exceeds the official and obligatory final report regarding our intervention at the archaeological site.

Although this monograph represents the finale of the project, it also solicits the imperative for continuation of intensive investigations on the Ljubljansko barje. I believe that our joined forces have established a solid foundation. It follows that I would hereby like to extend my gratitude to my colleague Janez, who was a

Prav tako se zahvaljujem sodelavki Mateji Belak, ki je za tisk pripravila tabele, slike, priloge in zemljevide. Posebna zahvala gre tudi naši risarki Tamari Korošec Lavrič, ki je narisala večino risb, nekatere na predlogo Dragutina Valoha, ki je skupaj z Lucijo Lavrenčič poskrbel za računalniško skeniranje slikovnega gradiva. Tudi onadva sta sodelavca na Inštitutu za arheologijo. Posebej se zahvaljujejm vsem fotografom in ostalim risarkam.

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Nenazadnje se zahvaljujem tudi študentom, ki so sodelovali pri sondiranju na Hočevarici, ter tudi lastnikom parcel na Ljubljanskem barju in za Ljubljansko barje na neki način odgovornim osebam, med katerimi bi posebej izpostavil g. Janeza Drašlerja, kmetijskega svetovalca z Vrhnike, ki nam je že velikokrat velikodušno priskočil na pomoč.

In končno, a nič manj od srca, zahvala tudi Slovenski akademiji znanosti in umetnosti ter še posebej Ministrstvu za šolstvo, znanost in šport Republike Slovenije, ki sta nam s temeljnim raziskovalnim projektom »Arheološke in dendrokronološke raziskave na Ljubljanskem barju« raziskave dejansko omogočila.

Urednik in odgovorni nosilec projekta
Anton Velušček

V Ljubljani, 2. februar 2004

source of creative contributions throughout the investigations at Hočevarica, as well as to all co-authors: Ana, Bernd, Borut, Dragomir, Franc, Jernej, Katarina, Marjeta, Marijan, Nicoletta, Petra, Vesna, Zoran and Žiga. Without their generous contributions this monograph would surely be inordinately inadequate. Thank you!

I am also grateful to my colleague Mateja Belak, who prepared the tables, figures, appendixes and maps for publication. I owe a special thank you to Tamara Korošec Lavrič, who drew the majority of drawings, some of them on the recommendation of Dragutin Valoh, who together with Lucija Lavrenčič (both of whom are also colleagues at the Institute of Archaeology) attended to all computer-scanned illustrational materials. I am also much obliged to all the photographers and other drawers.

Many thanks to Janez Dular, Ivan Turk and Peter Turk, who adeptly reviewed the text and to Karmen Gradišek for her editorial assistance.

I am filled with gratitude to the former and current directorships of the Institute of archaeology at the SRC SASA, who generously supported the investigations on the Ljubljansko barje throughout. I would also like to extend my appreciation to my mentor Biba Teržan, an associate member of the Slovenian Academy for Arts and Sciences, who assumed mentorship over my post graduate studies some years ago and thus enabled the very onset of my research on the Ljubljansko barje.

I am thankful to the students that collaborated in the trench excavations at Hočevarica, and to the owner of the land plot on the Ljubljansko barje as well as to those individuals in some way responsible for the Ljubljansko barje, among them Mr. Janez Drašler in particular, the agricultural adviser from Vrhnika who already many times kindly jumped to our assistance.

Last but not least, I owe my gratitude to the Slovenian Academy of Sciences and Arts and especially the Ministry of Education, Science and Sportk of the Republic of Slovenia, which with the primary research project of »Archaeological and Dendrochronological Investigations on the Ljubljansko barje< rendered our investigations possible.

Editor and Project Leader
Anton Velušček

Ljubljana, 02. 02. 2004

# 1 UVOD

ANTON VELUŠČEK

Leta 1992 je A. Šemrov iz Narodnega muzeja Slovenije pri potapljanju v Ljubljanici odkril zelo zanimivo arheološko najdišče – koliščarsko poselitveno točko, ki leži ob izlivu Hočevarice v Ljubljanico, in sicer na Ljubljanskem barju med Blatno Brezovico in Verdom.[1]

Šest let pozneje smo sodelavci Inštituta za arheologijo ZRC SAZU na najdišču zastavili manjšo sondo. Na podlagi nekaj fragmentov keramike iz jarka smo pričakovali, da gre za naselbino, ki jo lahko uvrstimo v horizonta Ljubljansko barje III in IV po H. Parzingerju (1984), se pravi v srednjeeneolitsko obdobje oziroma okvirno v drugo polovico 4. tisočletja pr. Kr.

Pri sondiranju pa smo odkrili nekoliko starejše najdbe, ki spreminjajo kulturno podobo Ljubljanskega barja v prazgodovini, saj se je pojavila keramika z brazdastim vrezom. Dotlej je na Ljubljanskem barju še nismo poznali.[2] Paralele zanjo so na Gradcu pri Mirni na Dolenjskem (glej Dular et al. 1991). Pregled inventarja z osrednjeslovenskih najdišč je pokazal, da se podobna keramika pojavlja tudi drugod, in kar je še pomembnejše, da jo lahko povežemo z iskalci bakrove rude ter metalurgi.

V osrednji Sloveniji so eneolitske raziskave, kljub več kot stoletni tradiciji proučevanja koliščarskih naselbin na Ljubljanskem barju, šele na začetni stopnji in predstavljajo izziv za bodoče generacije raziskovalcev.[3]

Za to obdobje uporabljamo več izrazov. V literaturi se poleg termina eneolitik uporablja tudi termin kuprolitik,[4] ki je bil priljubljen predvsem pri Ložarju, enako velja za dobo bakra (npr. Ložar 1941a, 179; 1942,

[1] Monografija je nekoliko predelana in s prispevki drugih avtorjev dopolnjena doktorska disertacija A. Veluščka z naslovom »Srednja bakrena doba v osrednji Sloveniji«, ki je bila maja 2001 uspešno obranjena na Univerzi v Ljubljani.

[2] Keramiko z brazdastim vrezom dejansko poznamo s t. i. »vučedolskih« Dežmanovih kolišč pri Igu in še z nekaterih drugih naselbin na Ljubljanskem barju (glej npr. Korošec, Korošec 1969). Ker je kronološko precej mlajša, je v študiji ne obravnavamo (za kronološko uvrstitev Dežmanovih kolišč glej Parzinger 1984; radiokarbonske datacije pri: Durman, Obelić 1989; Forenbaher 1993; Velušček, Čufar, Levanič 2000; Velušček, Čufar 2002; 2003).

[3] Preglede zgodovine raziskav eneolitskega obdobja v osrednji Sloveniji dobimo pri: Korošec 1973, Leben 1979; Budja 1983; Harej 1986; Velušček 1999b.

[4] Kuprolitik je sinonim za eneolitik.

# 1 INTRODUCTION

In 1992, diving in the Ljubljanica A. Šemrov from the National Museum of Slovenia discovered a truly important archaeological site – a pile dwelling settlement point situated at the influx of the Hočevarica ditch into the Ljubljanica, on the Ljubljansko barje (the Ljubljana Moor) between Blatna Brezovica and Verd.[1] Circumstances dictated that six years later a team of colleagues from the Institute of Archaeology at the SRC SASA (Scientific Research Center at the Slovenian Academy of Sciences and Arts) carried out a small-scale excavation at the site. Select pottery fragments from the trench are indicative of the site being a settlement, which can be attributed to the Ljubljansko barje III and IV horizons according to Parzinger (1984), that is the Middle Eneolithic or approximately the second half of the 4th millennium B.C.

The excavation also disclosed somewhat older finds of pottery with furrowed incisions, which now alter the cultural portrait of the Ljubljansko barje in prehistory. Such pottery had not yet been known from the Ljubljansko barje.[2] We promptly realized that parallels for such pottery existed at Gradec pri Mirni in the Dolenjska region (check Dular et al. 1991). A review of the inventory from central Slovenian sites demonstrated that similar pottery was known also elsewhere, and even more importantly, that such pottery could be associated with the search for copper ore and with metallurgy.

Despite the more than century long tradition of researching pile dwelling settlements in the Ljubljansko barje, Eneolithic investigations in central Slovenia are only at their initial phase and as such they present a challenge for the future generations of researchers.[3]

[1] The monograph is somewhat remade and is now a supplemented version, including contributions from other authors, of A. Velušček's doctoral thesis, »The Middle Copper Age in central Slovenia«, which was successfully defended in May 2001 at the University of Ljubljana.

[2] Pottery with furrowed incisions is actually known from the so-called »Vučedol culture Dežman's pile dwellings near Ig« as well as from a few other settlements on the Ljubljansko barje (check e.g. Korošec, Korošec 1969). This pottery, being much younger, is not considered in this contribution (check Parzinger 1984 for the chronological position of Dežman's pile dwellings; and for radiocarbon dates check: Durman, Obelić 1989; Forenbaher 1993; Velušček, Čufar, Levanič 2000; Velušček, Čufar 2002; 2003).

[3] Reviews of the history of investigations on the Eneolithic in

93). Pojavljajo se tudi termini prehodno obdobje ali prehodni čas in pogosto tudi bakrena doba. Označujejo isti kronološki okvir, ki zajema obdobje med mlajšo kameno in bronasto dobo (prim. Gabrovec 1987a, 388 ss; Budja 1993a, 183 s; Parzinger 1993).

Čeprav se zdi kronološki okvir eneolitika v Sloveniji povsem jasen, se že več kot 20 let zavedamo, da ni tako.[5] Kompleksnost problema, ki se je pojavil z definiranjem alpskega faciesa lengyelske kulture (Korošec 1958) in lasinjske kulture (Dimitrijević 1961; 1979b), je pred leti predstavil M. Budja (Budja 1983). V analizi povojnih neolitskih in eneolitskih raziskav se je osredotočil predvsem na kritiko takrat veljavnih interpretativnih modelov o dogajanju v neolitiku in eneolitiku v takratni severozahodni Jugoslaviji. V prispevku je jasno pokazal na nezmožnost domače prazgodovinske arheološke stroke, da bi za naš prostor izdelala srednjeevropsko primerljiv periodizacijski sistem za neolitsko in eneolitsko obdobje. Tako je za osrednjo Slovenijo predlagal novo kronološko zaporedje naselbin: Resnikov prekop, Kevderc (del najdb), Maharski prekop; to zaporedje je v glavnem sprejeto in še danes veljavno ter vsebinsko primerljivo s srednjeevropskimi kronološkimi shemami.

H. Parzinger (1984) je s tipološko analizo keramike z najdišč na Ljubljanskem barju prišel do podobnih zaključkov. V študiji je obdelal najdbe z eneolitskih in zgodnjebronastodobnih naselbin in jih razdelil na 7 horizontov. Ti obsegajo časovni razpon, primerljiv z obdobjem začetka eneolitika v Karpatski kotlini do konca zgodnje bronaste dobe, ki ga opredeljuje horizont pramenaste keramike. Kot najstarejšo naselbino na Ljubljanskem barju je označil Resnikov prekop, ga razdelil na dva horizonta ter predvideval, da obstaja še tretji, ki naj bi bil paralelen s starejšim horizontom na Maharskem prekopu. Maharski prekop je razdelil na dva horizonta, ki sta vzporedna s celotnim razvojem badenske kulture v srednjem Podonavju. Sledijo horizonti najdišč iz okolice Iga, ki so po kronološkem vrstnem redu vzporedni z vučedolsko, vinkovško kulturo ter s horizontom pramenaste keramike.

H. Parzinger je na podlagi teh analiz ugotovil, da so bile nekatere naselbine dalj časa poseljene, tako npr. Resnikov in Maharski prekop. Na nekaterih drugih mestih pa je predvideval prekinitve v poselitvi, kot npr. v Notranjih Goricah. Kronološko je pomembno, da je predvideval kontinuiteto v poselitvi Ljubljanskega barja ter našel primerljivost razvoja v kulturah v Karpatskem bazenu, manj pa z mediteranskim svetom.

Pravilno zaporedje kultur oziroma horizontov v Parzingerjevi kronološki shemi so kmalu potrdila raziskovanja na višinskih naselbinah na Dolenjskem (Dular et

[5] Ker razpravljamo o starejši keramiki z brazdastim vrezom, poudarjamo predvsem problematiko, ki je povezana z zgodnejšim razdelkom eneolitika.



Many expressions exist for this period. In addition to the term »Eneolithic«, the term »cuprolithic«[4] – referring to the Copper Age – is also known in literature, especially in contributions by Ložar (e.g. Ložar 1941a, 179; 1942, 93). Terms also exist for the transitional period or time, and frequently also for the »Copper Age«. Important is that these terms refer to the same chronological time frame of the period between the Late Stone Age and the Bronze Age (cf. Gabrovec 1987a, 388 pp; Budja 1993a, 183 p; Parzinger 1993).

The chronological time frame for the Eneolithic period in Slovenia perhaps seems perfectly clear, however we have been for more than 20 years aware that this is not so.[5] M. Budja (Budja 1983) already presented the complexity of the issue regarding the definitions of the Alpine Facies of the Lengyel culture (Korošec 1958) and the Lasinja culture (Dimitrijević 1961; 1979b). In the analysis of postwar Neolithic and Eneolithic investigations, he focused on the critique of the then accepted interpretative models on the occurrences during the Neolithic and Eneolithic in the northwest of the former Yugoslavia. In his contribution he clearly demonstrates the incompetence of the local prehistory archaeological profession to create a periodization system for the Neolithic and Eneolithic periods in our region, which would be comparable with that for central Europe. Consequently, he proposed a new chronological sequence of settlements for central Slovenia: Resnikov prekop, Kevderc (a part of the finds), Maharski prekop. Comparable with the central European chronological schemes, this sequence is validated still today.

H. Parzinger (1984) developed similar conclusions on the basis of typological analyses of the pottery from sites in the Ljubljansko barje. His study comprised the examination of the material finds from Eneolithic and Bronze Age settlements which he classified into seven horizons. These horizons extend over a time span that is comparable with the beginning of the Eneolithic in the Carpathian basin through to the end of the Early Bronze Age, which is determined by the horizon of Litzen pottery. He designated Resnikov prekop as the oldest settlement in the Ljubljansko barje and divided it into two horizons; he also anticipated a third horizon, which would correspond with the oldest horizon at Maharski prekop. He divided Maharski prekop into two horizons, both of which are parallel with the entire development of the Baden culture in the central Danube region. Horizons from settlements around Ig follow; these horizons are concurrent with the Vučedol and Vinkovci cultures as well as with the horizon of Litzen pot-

central Slovenia are in: Korošec 1973; Leben 1979; Budja 1983; Harej 1986; Velušček 1999b.

[4] Cuprolithic is a synonym for Eneolithic.

[5] Since older pottery with furrowed incisions is under discussion, the emphasis primarily concerns the issue corresponding to the division of the earlier Eneolithic.

al. 1991; 1995). Stratigrafija Gradca pri Mirni je pokazala, da so na višinskih naselbinah ugotovljive faze, ki so časovno vzporedne z Resnikovim prekopom in t. i. »boleraško stopnjo badenske kulture« na Maharskem prekopu.

Vendar so te raziskave tudi opozorile na nekoliko drugačen razvoj poselitve višinskih naselbin, ki se razlikuje od razvoja poselitve na Ljubljanskem barju. Na Gradcu pri Mirni je bila namreč odkrita stratigrafska faza z najdbami, katero se uvršča med horizonta Resnikov prekop – b (Ljubljansko barje II) in Maharski prekop – a (Ljubljansko barje III) (Dular et al. 1991, 89). Postalo je jasno, da v koliščarski dobi Ljubljansko barje vendarle ni bilo kontinuirano poseljeno, kot smo domnevali.

Kasneje je H. Parzinger posredno sam opozoril na nekatere pomanjkljivosti kronološkega sistema za Ljubljansko barje (1993, 17). Pri vključevanju horizonta Ljubljansko barje I (Resnikov prekop – a), ki ga je še leta 1984 primerjal s stopnjama Lengyel III na zahodu Madžarske in Sopot-Lengyel III na severozahodu Hrvaške, v kronološko shemo jugovzhodnoevropskega in maloazijskega neolitika ter eneolitika, je prišel do zaključka, da je najstarejša faza na Resnikovem prekopu globoko neolitska, saj njen začetek postavlja v horizont 6.

Rezultat tega je dejstvo, da za območje osrednje Slovenije še vedno, kljub navezi z uveljavljenimi kronološkimi sistemi, nimamo definirane skupine najdb, stopnje ali kulture, ki bi vsaj formalno predstavljala ločnico med neolitikom in eneolitikom. V tej zmešnjavi nekateri avtorji posamezne najdbe označujejo kot neolitske, drugi pa te iste najdbe kot eneolitske. Ker se s tem dotikamo problematike, ki presega okvir monografije o Hočevarici, naj opozorimo, da se pri pisanju poskušamo izogibati tema terminoma. Kjer pa to ni izvedljivo, ju zapišemo, kadar govorimo na splošno o obdobju, ki sledi srednji kameni dobi in predhodi bronasti dobi, v takšnem primeru uporabljamo termina neolitik-eneolitik oziroma neolitik ali eneolitik, ko je termin neolitik ali eneolitik edina informacija, ki opredeljuje starost najdišča, najdbe, naselbine ali grobišča, največkrat pa takrat, ko iz sobesedila ni mogoče razbrati, o katerem časovnem obdobju teče beseda.

Vsak termin, s katerim se označuje neko obdobje, bi moral imeti tudi svoje kulturno zgodovinsko ozadje. Tako je v slovenski literaturi zaslediti povezovanje eneolitskega obdobja s pojavom prvih bakrenih predmetov. Sprva so to bile zelo splošne hipoteze, ki so temeljile na skromnih in ne preveč izpovednih najdbah oziroma kontekstih (Ložar 1941a; 1943; Teržan 1987, 171 s). V zadnjem času se je vedenje o prvem pojavu bakrenih predmetov v Sloveniji močno spremenilo. Z novimi raziskavami smo pridobili veliko kvalitetnih podatkov, tako da že danes eneolitsko poselitev lahko pojasnimo s pojavom bakra,

tery. On the basis of these analyses, H. Parzinger established that select settlements were inhabited for a longer period of time, such as at Resnikov prekop and Maharski prekop. He also anticipated a discontinuation of settlement at certain other settlements, such as at Notranje Gorice. From a chronological perspective, it is significant that he foresaw settlement continuity in the Ljubljansko barje and that he found comparability in the development of cultures in the Carpathian basin, less so in the Mediterranean world.

The correctness of the sequence of cultures, or horizons in Parzinger's chronological scheme was soon confirmed by investigations of upland settlements in the Dolenjska region (Dular et al. 1991; 1995).

The stratigraphy at Gradec pri Mirni demonstrated the presence of phases chronologically corresponding to Resnikov prekop, or the »Boleraz phase of the Baden culture« at Maharski prekop, at upland settlements.

Nevertheless, these investigations also cautioned as to the somewhat different settlement development at upland settlements, diverse from the settlement development in the Ljubljansko barje. At Gradec pri Mirni, for instance, a stratigraphic phase with material finds attributed between the horizons Resnikov prekop – b (Ljubljansko barje II) and Maharski prekop – a (Ljubljansko barje III) was discovered (Dular et al. 1991, 89). It became clear that the Ljubljansko barje was not, as was initially presumed, continuously settled during the pile dwelling period.

Later, H. Parzinger indirectly pointed out select faults in the chronological system of the Ljubljansko barje (1993, 17). In the process of incorporating the Ljubljansko barje I (Resnikov prekop – a) horizon, which in 1984 he still equated with the levels Lengyel III in western Hungary and Sopot-Lengyel III in northwestern Croatia, into the chronological scheme for the Neolithic and Eneolithic of southeastern Europe and Asia Minor, he came to the conclusion that the earliest phase at Resnikov prekop lay deep in the Neolithic; he sets its beginnings in horizon 6.

The result is the fact that for the region of central Slovenia, despite the tie with other valid chronological systems, there is still no definitive group of finds, level or culture that would at least formally represent the dividing line between the Neolithic and Eneolithic. And amidst this muddle some authors designate individual finds as Neolithic while other authors designate the very same finds as Eneolithic. Thus toying with an issue that certainly exceeds the framework of a monograph on Hočevarica, this contribution aims to avoid the topic of terminology. Wherever this is not possible the terms are written: when referring generally to the period that follows the Middle Stone Age and precedes the Bronze Age, in such an instance the term Neolithic-Eneolithic or Neolithic or Eneolithic is used, when the term »Neolithic« or »Eneolithic« is the sole piece of information that classiz iskanjem surovinskih virov[6] in metalurgijo bakra. Ne smemo namreč prezreti, da se v Sloveniji prvi bakreni predmeti pojavijo že na začetku eneolitskega obdobja, se pravi v obdobju, ki je paralelno z epilengyelskim obdobjem v Avstriji, in da so vse kasnejše eneolitske faze tesno povezane prav z bakrom in dejavnostmi, ki iz tega izhajajo (Durman 1983; Velušček, Greif 1998).

Delo »Hočevarica – eneolitsko kolišče na Ljubljanskem barju« temelji na proučevanju naselbinske keramike, manjšina najdb pa izvira iz slabo poznanih jamskih nekropol.[7] Za izhodišče služijo keramične najdbe ter vertikalna stratigrafija Hočevarice na Ljubljanskem barju. V študiji so zajete tudi ostale arheološke najdbe in primerjalna analiza s sosednjimi najdišči. Tako na podlagi primerjav definiramo horizont keramike z brazdastim vrezom (HKBV). Pišemo tudi o metalurgiji, pravzaprav o začetkih metalurgije bakra v osrednji Sloveniji, in o prvih iskalcih bakrove rude. Predstavljamo rezultate paleobotaničnih, arheozooloških in drugih naravoslovnih raziskav.

Zelo pomemben, morda celo najpomembnejši rezultat za prazgodovinsko arheologijo jugovzhodnoalpskega prostora, je absolutno datiranje Hočevarice in horizonta keramike z brazdastim vrezom. S pomočjo dendrokronoloških raziskav in z radiokarbonskim datiranjem smo pridobili razmeroma natančno datacijo predvsem za Hočevarico, zgolj okvirno pa za celoten horizont. Kot temeljni relativno kronološki okvir nam je služila nekoliko prilagojena kronološka shema, ki jo je za zahodno Panonijo izdelal N. Kalicz (Kalicz 1991). Skratka, v monografiji izrazito interdisciplinarno predstavljamo Hočevarico z Ljubljanskega barja in njen čas v osrednji Sloveniji.

[6] Tj. bakra in bakrove rude.

[7] Koblarska jama, morda Lukenjska jama itd.



fies the age of a site, find, settlement or cemetery, and mostly when it is not possible to discern from the literature which chronological period is being alluded to.[6]

Each term that designates a period should also have its own cultural-historical background. Hence, the Eneolithic period in Slovenian literature is linked with the appearance of the first copper finds. Initially these were merely general hypotheses, founded upon only a few not particularly illuminating finds or contexts (Ložar 1941a; 1943; Teržan 1987, 171 p). Recent times have brought about great changes in the general stance of knowledge regarding the first appearance of copper objects in Slovenia. New research has disclosed much new data that now allows for added clarification of Eneolithic settlement with the appearance of copper, the search for raw materials[6] and copper metallurgy. That the first copper objects appearing in Slovenia date to the beginning of the Eneolithic period, that is the period concurrent with the Epi-Lengyel period in Austria, should not be overlooked. Furthermore, all later Eneolithic phases are closely linked with »copper« itself and all activity thereof (Durman 1983; Velušček, Greif 1998).

This contribution, *Hočevarica – an Eneolithic pile dwelling in the Ljubljansko barje* is based upon the research of settlement pottery finds, while a selection of the material finds originate from very poorly known cave necropolises.[7] The pottery finds and the vertical stratigraphy from Hočevarica in the Ljubljansko barje serve as the starting point. The remaining archaeological finds are also incorporated in the study, as well as a comparative analysis with neighboring sites. It is on the basis of comparison that the horizon of pottery with furrowed incisions (HKBV) is defined. The field of metallurgy or rather the beginnings of copper metallurgy in this region is touched upon, as well as the first seekers of copper ore. The results from paleobotanical, archaeozoological and other scientific investigations are also presented. Of particular significance for prehistoric archaeology in the southeastern Alpine region, perhaps even the most important result is the absolute dating of Hočevarica and the horizon of pottery with furrowed incisions (HKBV). Dendrochronological investigations and radiocarbon datings also aided in assessing a relatively precise dating for Hočevarica in particular, and more generally for the entire horizon. A somewhat adapted chronological scheme, originally created by N. Kalicz for western Pannonia (Kalicz 1991), served us as the fundamental relative chronological frame.

In short, this monograph is an exceptionally interdisciplinary representation of Hočevarica settlement in the Ljubljansko barje, as well as its time period in central Slovenia.

[6] That is, copper and copper ore.

[7] Koblarska jama, perhaps Lukenjska jama, etc.

# 2 GEOGRAFSKI ORIS OSREDNJE SLOVENIJE S PODATKI O NEOLITSKIH-ENEOLITSKIH ARHEOLOŠKIH NAJDIŠČIH

# 2 GEOGRAPHIC DESCRIPTION OF CENTRAL SLOVENIA INCLUDING DATA REGARDING NEOLITHIC-ENEOLITHIC ARCHAEOLOGICAL SITES

ANTON VELUŠČEK

## 2.1 GEOGRAFSKI ORIS

Ljubljansko barje je sestavni del osrednje Slovenije. To je območje, kjer se stikata alpski in dinarski svet in ki je hkrati tudi središčni del geografsko zelo raznolike dežele, v kateri se prepletajo štiri pomembne reliefne evropske enote: Alpe, Dinarsko gorstvo, Panonska in Jadranska kotlina in tudi dve podnebji: celinsko ter sredozemsko (Kladnik 1996, 123 ss).

### 2.1.1 RAZVOJ POKRAJINE V OSREDNJI SLOVENIJI

Razvoj hidrografske mreže sega daleč v preteklost. V zgornjem terciaru se je v osrednji Sloveniji iz morja dvignilo dinarsko-alpsko kopno. Ker se je severni del širše Panonske kotline dvigoval, južni pa ugrezal, se je nekdanji neposredni odtok voda proti vzhodu preusmeril proti jugovzhodu. Reke so se močno vrezovale in prestavljale svoja povirja navzgor, kar je povečevalo njihov strmec in erozivno moč. Tako ima večina naših rek povirja v goratem svetu, od koder skozi predalpski in gričevnat svet prehajajo v ravninski (Kolbezen 1998, 7).

V terciaru so zaradi ugrezanja nekaterih območij nastale lokalne udorine. V pleistocenu so vanje reke nanesle ogromno gradiva in ustvarile obsežna ravninska območja. Lep primer je Ljubljansko polje (Žlebnik 1971).

V pleistocenu je zgornjo Savsko dolino prekrival Bohinjski ledenik. V najmlajšem stadiju, ob koncu würmske poledenitve,[1] je segal do Radovljice (*sl. 2.1*). Ko je ledenik zastal, je prišlo do zasipanja, ob umiku pa

[1] III. würmski stadial (Lenardić, Pohar 1995, sl. 1).

## 2.1 GEOGRAPHIC DESCRIPTION

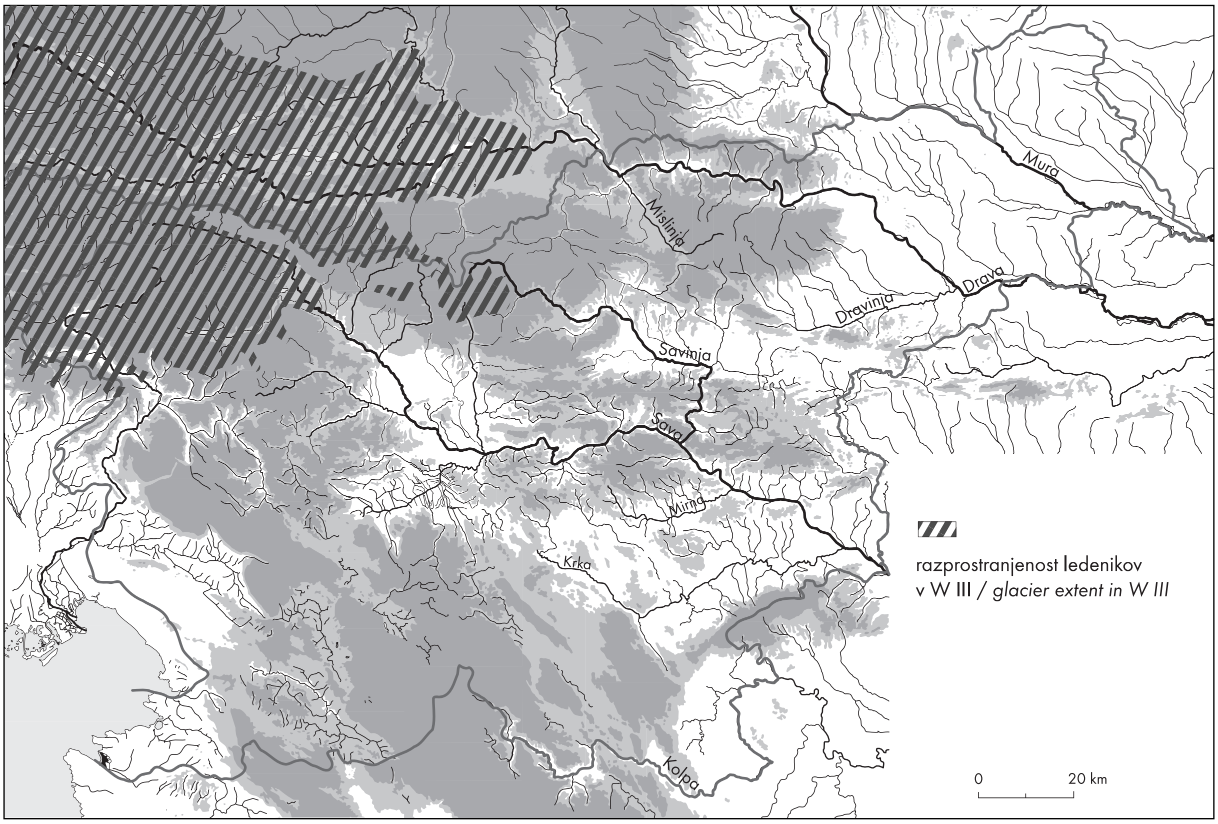
The Ljubljansko barje is a comprising component of central Slovenia. This is a region where the Alpine and Dinaric worlds meet and which at the same time marks the central part of a geographically variegated landscape. Four important European relief units intertwine here – the Alps, the Dinaric Alps, the Pannonian basin, and the Adriatic basin, as well as two climates – the Continental and the Mediterranean (Kladnik 1996, 123 pp).

### 2.1.1 THE DEVELOPMENT OF THE LANDSCAPE IN CENTRAL SLOVENIA

The development of the hydrographic network reaches far into the past. During the Upper Tertiary the Dinaric-Alpine land raised up from the sea in central Slovenia. As the northern part of the wider Pannonian basin was rising and the southern part was sinking, the formerly direct outflow of water to the east was diverted southeastwards. Rivers cut through and redirected their upper river basins upwards, thus increasing their incline and erosive power. The upper currents of most rivers in Slovenia are high in the mountains, from where they flow through the sub-Alpine and hilly worlds into the plains (Kolbezen 1998, 7).

Local hollows were formed during the Tertiary due to the sinking of certain areas. Rivers then deposited large amounts of material in these hollows during the Pleistocene and also formed extensive plains. The Ljubljansko polje (field or plain) is a good example (Žlebnik 1971).

The Bohinj glacier covered the upper Sava valley during the Pleistocene. It reached all to Radovljica (*fig. 2.1*) in the latest stadium at the end of the Würm Gla-




*Sl. 2.1:* Razprostranjenost ledenikov v tretjem würmskem stadialu (po Lenardić, Pohar 1995).
*Fig. 2.1:* Extent of glaciers during the Würm III stadium (according to Lenardić, Pohar 1995).

do erozije (Šifrer 1969, 205). Tako so se ustvarile številne terase. V holocenu je na teh terasah nastala za kmetijstvo ugodna prst. Podobno prst najdemo tudi v južnem delu Savske ravni predvsem na Ljubljanskem polju in na Kamniškobistriški ravni.

Pelodnih diagramov za območje osrednje Slovenije, iz katerih bi lahko razbrali podatke o vegetaciji 4. tisočletja pr. Kr., je malo. Uporaben je pelodni diagram z Ledine na Jelovici (1120 m), ki kaže vegetacijo od konca kasnega glaciala do danes (Culiberg, Šercelj, Zupančič 1981; Culiberg, Šercelj 1996, 691, sl. 20.4). Diagram je radiokarbonsko datiran. V 4. tisočletje pr. Kr. spada del odseka med globinama 640 in 460 cm.[2] Prevladoval naj bi jelovo-bukov gozd, v katerem je včasih prišlo do prevlade smreke (*sl. 2.2*).

[2] Radiokarbonska datacija vzorca iz globine 640 cm: 6960 ± 90 let BP (Z-577) (Culiberg, Šercelj, Zupančič 1981). Radiokarbonska datacija vzorca iz globine 460 cm: 4020 ± 80 let BP (Z-576) (Culiberg, Šercelj, Zupančič 1981).

cial.[1] Once the glacier halted, the valley was filled up with fluvial alluvium and then erosion came on when the glacier retreated (Šifrer 1969, 205). This is how numerous terraces were formed. During the Holocene, these terraces then produced good soil for agricultural purposes. Similar soil can be found in the southern part of the Savska ravan, particularly in the Ljubljansko polje and the Kamniškobistriška ravan.

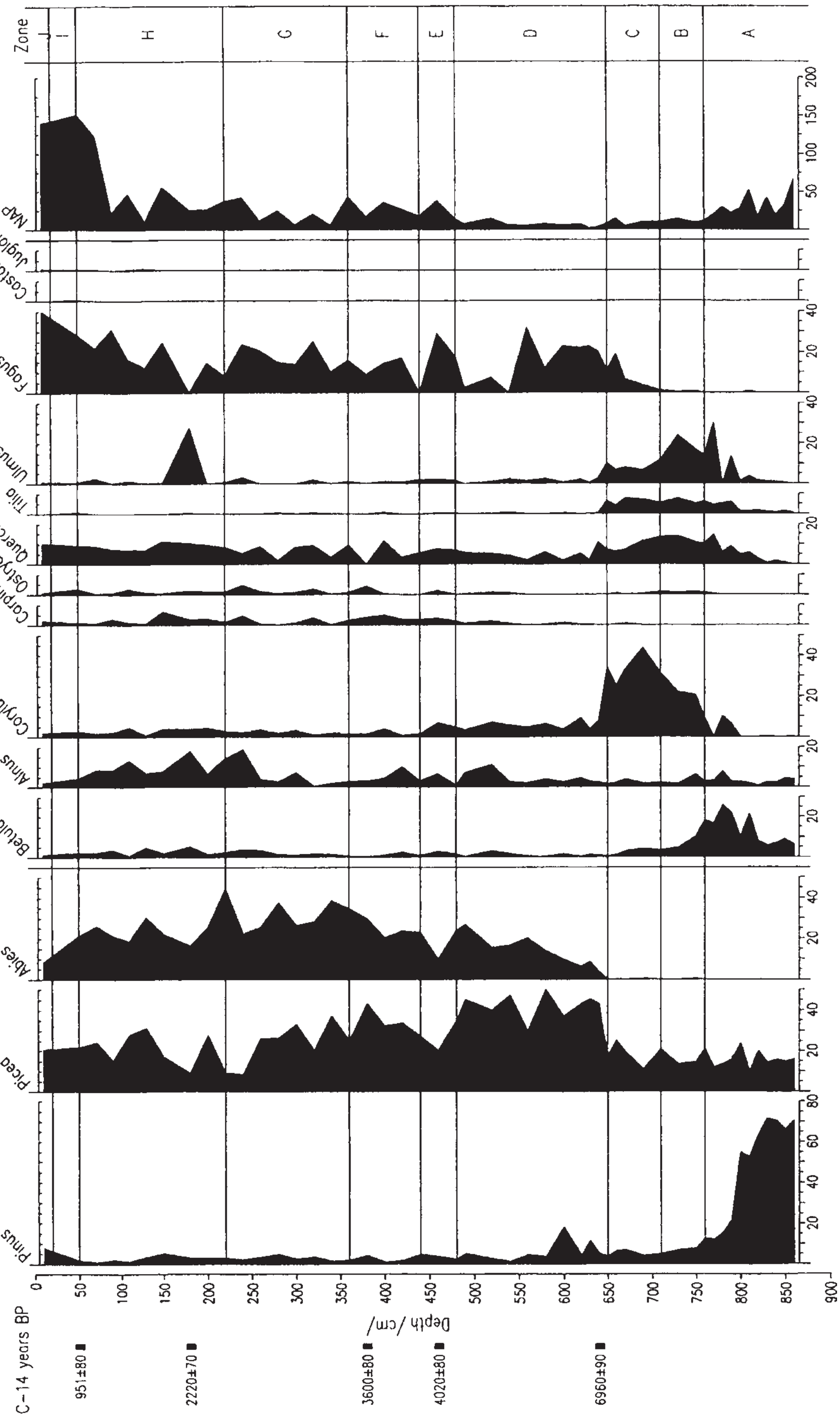
There are few pollen diagrams for the region of central Slovenia which proffer data concerning vegetation during the 4$^{th}$ millennium B.C. The pollen diagram for Ledina upon Jelovica (1120 m), which indicates the presence of vegetation from the end of the late Glacial through to today, is of some use (Culiberg, Šercelj, Zupančič 1981; Culiberg, Šercelj 1996, 691, fig. 20.4). The diagram is also radiocarbon dated. A portion of the segment between the depths of 640 and 460 cm is attributed to the 4$^{th}$ millennium B.C.[2] A fir-beech tree forest probably predominated, with the occasional pine tree (*fig. 2.2*).

The Ljubljansko barje lies southwest of the Ljubljansko polje. The theory is that the area of the Ljubljansko barje was during the 4$^{th}$ millennium B.C. predominated by a mixed oak forest, which developed as a deg-

[1] III$^{rd}$ Würm Stadial (Lenardić, Pohar 1995, fig. 1).

[2] Radiocarbon dates for the sample from the depth of 640 cm: 6960 ± 90 yrs BP (Z-577) (Culiberg, Šercelj, Zupančič 1981). Radiocarbon dates for the sample from the depth of 460 cm: 4020 ± 80 yrs BP (Z-576) (Culiberg, Šercelj, Zupančič 1981).

*Sl. 2.2:* Ledina na Jelovici. Pelodni diagram izbranih drevesnih vrst in NAP (po Culiberg, Šercelj, Zupančič 1981).
*Fig. 2.2:* Ledina na Jelovici. Pollen diagram of selected tree species and NAP (according to Culiberg, Šercelj, Zupančič 1981).




Jugozahodno od Ljubljanskega polja leži Ljubljansko barje. Domneva je, da je v 4. tisočletju pr. Kr. v okolici Ljubljanskega barja dominiral kvercetalni (hrastov mešani) gozd, ki se je razvil kot degradacijska stopnja bukovo-jelovega gozda (Abieti-Fagetum). Abieti-Fagetum, nekdaj klimaksni gozd, je namreč zaradi človekovega delovanja prešel na nižjo razvojno stopnjo (Culiberg, Šercelj 1991; 1996; Gardner 1999a; Jeraj 2000; 2002).

Palinološki profil Hočevarice (glej *poglavje 3.2*), ki prikazuje razvoj vegetacije krajšega časovnega obdobja

radative level of the fir-beech tree forest (Abieti-Fagetum). Abieti-Fagetum, which was formerly a climax forest, changed to a lower developmental level due to human activity (Culiberg, Šercelj 1991; 1996; Gardner 1999a; Jeraj 2000; 2002).

The palynological profile of Hočevarica (check *chapter 3.2*), which shows the development of vegetation through a shorter time period in the 4th millennium B.C., indicates a secondary, zoogenic and anthropogenic vegetation. The high values of hazel (*Corylus*) allow v 4. tisočletju, kaže na sekundarno, zoogeno in antropogeno vegetacijo. Iz visokih vrednosti leske (*Corylus*) se da sklepati na precej skrčen, odprt gozd. Visoke vrednosti jelše (*Alnus*) kažejo na močvirnato, vodnato pokrajino. Iz diagrama je razvidna tudi izrazita krivulja žit (Cerealia), ki dokazuje poljedelstvo, kar je potrjeno tudi z žitnimi zrni iz kulturne plasti. Na razmeroma ugodne klimatske pogoje pa opozarja velika količina grozdnih pešk.

### **2.1.2** GEOGRAFSKE ZNAČILNOSTI OSREDNJE SLOVENIJE

Površje se danes deli na več pokrajin oziroma naravnih geografskih enot (Perko, Kladnik 1998): Ljubljansko barje na jugozahodu, proti zahodu se širi Cerkljansko, Škofjeloško, Polhograjsko in Rovtarsko hribovje, na severu je Savska ravan, proti vzhodu se razprostira Posavsko hribovje, ki ga na jugu zapira Dolenjsko podolje (*sl. 2.3*).

**Ljubljansko barje** (289 m) je eno najjužnejših visokih barij v Evropi in tvori skrajni južni del Ljubljanske kotline. Na severu in severovzhodu sega do Ljubljanskih vrat med Golovcem (Mazovnik, 450 m), Gradom (376 m) in Šišenskim hribom (429 m), na severozahodu in zahodu do jugovzhodnega dela Polhograjskega hribovja, na jugu do dinarskih planot, iznad katerih se dvigata Krim (1107 m) in Mokrec (1059 m), na jugovzhodu pa se dviga Šmarska suha dolina. Dolgo je dobrih 20 km in široko približno 10 km. Značilno je obsežno naplavljeno dno z osamelci, visokimi od približno 5 do približno 100 m, ki so manj ugreznjeni deli dna Ljubljanskega barja (Lovrenčak, Orožen Adamič 1998, 380).

Barje predstavlja široko tektonsko udorino, ki se pojavlja na stiku dveh tektonskih enot. Nastalo je pred približno dvema milijonoma let. Hitrost ugrezanja je bila razmeroma velika. Ta proces se z do 25 mm/leto še nadaljuje (Černe, Lovrenčak 1996, 87 s). Udorino so zapolnjevali površinski vodotoki s prodom in občasne ojezeritve z glinenim materialom. Profil vrtine pri Črni vasi kaže, da ležita nad triasnim, močno zdrobljenim dolomitom pesek in prod. Nad prodom je plast karbonatne gline z rastlinskimi ostanki. Sledi več prodnatih plasti, ki se med seboj ločijo s plastmi mineralogenih in organogenih glin. V zgornjem delu profila se pojavi več kot 15 m debela plast gline – polžarice,[3] ki je včasih prepredena s plastmi peska. V njej dobimo bogato favno polžev in školjk. Nad polžarico sledijo plasti, bogate z rastlinskimi ostanki. Sledijo rjava glina, šotno blato, šota in končno humus (Pavšič 1989, 6 ss).

Plast polžarice oziroma jezerske krede dokazuje, da je od kasnega glaciala do koliščarske dobe tu obstajalo razmeroma globoko jezero (Šercelj 1966, 431, 443;

[3] Za »polžarico« glej npr. R. Tancik (1965, 58 ss) ter A. Grimšičar in V. Ocepek (1967, 279 ss).



the inference that the forest was strongly reduced and open. High values of alder (*Alnus*) indicate a marshy, watery landscape. The grain (Cerealia) curve is also distinctive in the diagram, thus attesting to the presence of agriculture. Cereal grains in the cultural layer further confirm this. The presence of grape pits is also indicative of the relatively favorable climatic conditions.

### **2.1.2** GEOGRAPHIC CHARACTERISTICS OF CENTRAL SLOVENIA

The surface of the earth today is divided into a number of landscapes or natural geographical units (Perko, Kladnik 1998): the Ljubljansko barje to the southwest, westwards extend the Cerkljansko, Škofjeloško, Polhograjsko and Rovtarsko hribovje, the Savska ravan lies in the north, and the Posavsko hribovje extends eastwards and closes in the Dolenjsko podolje (tract of lowland surrounded by hills in the Dolenjska region) in the south (*fig. 2.3*).

The **Ljubljansko barje** (289 m) is one of the southernmost moors in Europe and it forms the far southern segment of the Ljubljana basin. To the north and northeast it reaches to the »Ljubljanska vrata« between Golovec (Mazovnik, 450 m), Grad (376 m) and the Šišenski hrib (429 m). Northwest and west it extends to the southeastern part of the Polhograjsko hribovje. Southwards it reaches to the Dinaric plateaus above which rise Krim (1107 m) and Mokrec (1059 m). And southeastwards the Šmarska suha dolina rises above it. It is a good 20 km long and approximately 10 km wide. The extensively deposited ground is characteristic with its isolated hills that are anywhere from 5 to 100 m high and which are the least sunken parts of the bottom of the Ljubljansko barje (Lovrenčak, Orožen Adamič 1998, 380).

The Ljubljansko barje is a wide tectonic depression, which is at the juncture of two tectonic units. It formed approximately two million years ago. Its rate of sinking was relatively fast. The process continues at a rate of up to 25 mm/year (Černe, Lovrenčak 1996, 87 p). Surface water currents filled the depression with gravel and the occasional lake filled it with clay material. The profile of the borehole from Črna vas shows that a strongly crushed dolomite sand and gravel lie above the Triassic. Several gravel layers follow, all of which are separated from each other by layers of mineralogic and organogenetic clays. Lying in the upper part of the profile is a clay layer of snail-clay soil,[3] more than 15 m thick, which is sometimes interwoven with layers of sand. A large selection of fauna, snails and shells are comprised within. Above the loamy chalk are layers rich with vegetal

[3] Regarding snail-clay soil, or »*Seekreide*«, check R. Tancik (1965, 58 pp), as well as A. Grimšičar and V. Ocepek (1967, 279 pp).

prim. Šifrer 1983, 7 ss), ki je v koliščarski dobi naglo plahnelo. V tedaj že plitvem jezeru se je odložil organski detritus (gyttja) (Šercelj 1966, 443 ). Pred osuševalnimi deli v 19. stoletju je bilo barje težko prehodno močvirje (Melik 1927), danes pa je večinoma osušeno in prepredeno z drenažnimi jarki. Tu prevladujejo travniki, njivskih površin je le 15 %.

Glavna vodna žila je kraška Ljubljanica, ki teče v smeri od jugozahoda proti severovzhodu. Po osušitvi holocenskega jezera je reka večkrat spreminjala strugo (Puc 1984, 12). Zadnjo večjo spremembo naj bi doživela z regulacijami v rimski dobi (Vuga 1982, 23).[4] V antiki sta se ob Ljubljanici razvili urbani naselbini *Nauportus* (Horvat 1990) in *Emona* (Šašel 1968). Ostali pomemb-

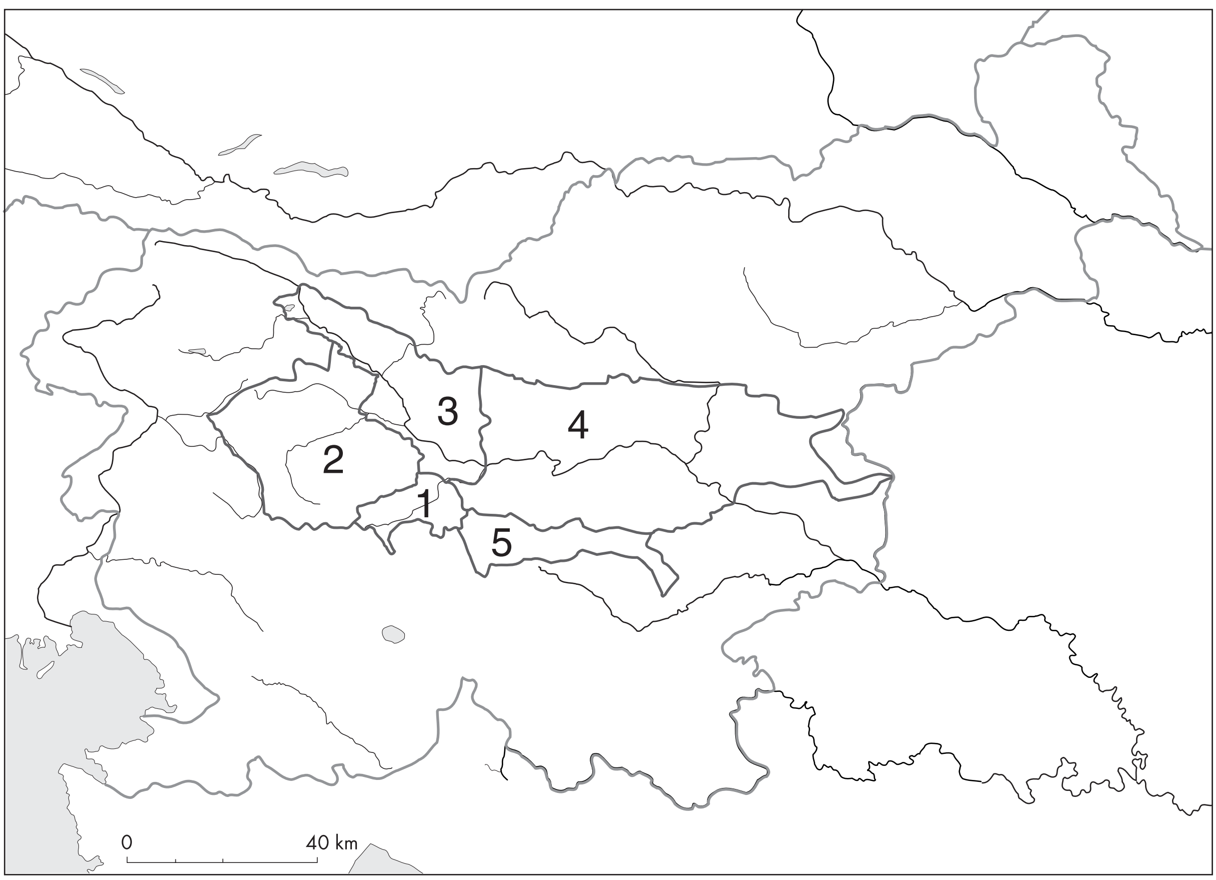
remains, and then brown clay, muddy peat, peat and finally humus (Pavšič 1989, 6 pp).

The layer of snail-clay soil, or sea-chalk from the lake, is evidence of the presence of a relatively deep lake from the Late Glacial through to the pile dwelling period (Šercelj 1966, 431, 443; cf. Šifrer 1983, 7 pp), when it rapidly subsided. Organic detritus (gyttja) was then deposited in the by-then shallow lake (Šercelj 1966, 443). Prior to the drainage efforts in the 19th century, the Ljubljansko barje was more of a difficult to traverse swamp (Melik 1927); while today it is for the most part dried up and intertwined with drainage canals. Grassland predominates; fields of soil constitute only approximately 15 %.

The main influx of water is from the karstic Ljubljanica river, which flows from the southwest and heads northeastwards. Following the drying up of the Holocene lake, the river altered its course a number of times (Puc 1984, 12). The last great change supposedly occurred during the amelioration efforts in the Roman period (Vuga 1982, 23).[4] The two urban settlements of *Nauportus* (Horvat 1990) and *Emona* (Šašel 1968) developed along the Ljubljanica in antiquity. The other significant influxes of water are of a torrential character and they pour out into

*Sl. 2.3:* Geografske enote v osrednji Sloveniji: 1. Ljubljansko barje, 2. Cerkljansko, Škofjeloško, Polhograjsko in Rovtarsko hribovje, 3. Savska ravan, 4. Posavsko hribovje in 5. Dolenjsko podolje (po Perko, Kladnik 1998).

*Fig. 2.3:* Geographical units in central Slovenia: 1. Ljubljansko barje, 2. Cerkljansko, Škofjeloško, Polhograjsko and Rovtarsko hribovje, 3. Savska ravan, 4. Posavsko hribovje and 5. Dolenjsko podolje (according to Perko, Kladnik 1998).




[4] V novejšem času je A. Gaspari (1998) ponovno aktualiziral problematiko regulacij Ljubljanice v arheoloških dobah, kjer je kot vprašljivo in malo verjetno označil predvsem rimskodobno regulacijo Ljubljanice.

[4] More recently, A. Gaspari (1998) reinitiated the issue concerning amelioration of the Ljubljanica during the archaeological eras; primarily he questioned the regulation of the Ljubljanica during the Roman period and determined it highly unlikely.

ni vodotoki imajo hudourniški značaj in se izlivajo v Ljubljanico, predvsem Iška prinaša na Barje velike količine proda.

**Cerkljansko, Škofjeloško, Polhograjsko in Rovtarsko hribovje** je hribovita pokrajina, ki leži v zahodnem delu slovenskega predalpskega sveta. Na severozahodu meji na Julijske Alpe, na severovzhodu na Savsko ravan, na jugu pa prehaja v dinarski svet. Povprečna nadmorska višina pokrajine je 645,5 m, s povprečnim naklonom ozemlja 18,7 ° in najvišjo točko na Poreznu (1630 m).

Glavne poti potekajo v smeri vzhod zahod po dolinah hudourniških rek in potokov: Poljanska in Selška Sora, Gradaščica in Horjulščica. Med Staro in Novo Oselico so v rimski dobi postavili obrambno zaporo, ki naj bi varovala cesto iz Poljanske doline do Cerknega, od koder drži vzdolž Idrijce pot v dolino Soče (Šašel 1971, 82). Potek te ceste se domneva po dolini Poljanske Sore, pri Hotavljah naj bi se povzpela na Staro Oselico ter nadaljevala po grebenu do doline Cerknice (Brank 1977, 268).

Okoli 25 % pokrajine prekrivajo dolomiti. Za ta območja so značilne velike strmine s povprečnim naklonom 23 °. Tu so reke izdolble ozke doline in soteske: med Staro Loko in Praprotnim, med Železniki in Zalim Logom, med Hotavljami in Trebijo. Manj kot 20 % površja je pokrito z apnenci. Zanje so značilni kraški pojavi, ki pa so redki, saj se plasti apnenca marsikje menjavajo s plastmi drugih kamnin. Najbolj kraška pokrajina je Ledinska planota zahodno od Žirov z vrtačami in manjšimi ponikalnicami. Ostalo površje prekrivajo različne neprepustne kamnine. Vulkanske kamnine se pojavljajo v Šmohorskem hribovju med Selcami in dolino Besnice. Zaradi kislosti tal so ta območja nadpovprečno porasla z gozdovi. Kjer so permokarbonski temnosivi glinovci in peščenjaki, ki so zelo nestabilne kamnine, so tla podvržena pogostemu plazenju: med Cerknim in Sovodnjem (Gabrovec 1998).

V rdečih permskih peščenjakih, imenovanih tudi grödenske plasti, ki se raztezajo od Žirovskega vrha proti zahodu in mimo Sovodenj do Cerknega, v dolini Ločnice, pri Sveti Katarini in pri Svetem Ožboltu so nahajališča urana in nahajališča bakrove rude (Drovenik, Pleničar, Drovenik 1980, 37 ss). Z bakrovo rudo je posebno bogato rudišče pod Škofjem nad Cerknim, ki so ga med 2. svetovno vojno kratko obdobje izkoriščali Italijani (Jelenc 1953, 18).

Pokrajina je bogata tudi z železovo rudo (glej Drovenik, Pleničar, Drovenik 1980, Metalogenetska karta SR Slovenije). Iz bližine rudišč je znanih več železnodobnih posamičnih najdb in domnevno halštatskih višinskih naselbin (glej *Arheološka najdišča Slovenije* 1975, 169 ss), kar morda kaže, da so rudo izkoriščali že v železni dobi. V kolikšnem obsegu naj bi se to dogajalo, ni znano. Pelodni diagram z Ledine na Jelovici (*sl. 2.2*) nedvoumno kaže na močnejši človekov vpliv na okolje šele pred približno 1000 leti. Takrat upadeta vrednosti

the Ljubljanica; in particular, the Iška river brings large amounts of gravel to the Ljubljansko barje.

The **Cerkljansko, Škofjeloško, Polhograjsko and Rovtarsko hribovje** present a hilly landscape that lies in the western part of the Slovene sub-Alpine world. This landscape borders with the Julian Alps to the northwest, the Savska ravan to the northeast, and to the south it proceeds into the Dinaric world. The average height above sea level measures 645.5 m, and the average incline of the land measures 18.7 °; the highest point is atop Porezen (1630 m).

The main routes of communication run from east to west through the valleys of torrential rivers and streams: the Poljanska and Selška Sora, the Gradaščica and the Horjulščica. A defense barricade was built between Stara Oselica and Nova Oselica during the Roman period; it was supposed to protect the road from the Poljanska dolina to Cerkno, from where it followed alongside the Idrijca river into the Soča valley (Šašel 1971, 82). The course of this road it presumed to run through the valley of the Poljanska Sora river, at Hotavlje to turn and rise up to Stara Oselica and continue along the ridge to the Cerknica valley (Brank 1977, 268).

Dolomite covers approximately 25 % of the land. Steep slopes are characteristic for this region; the average incline is 23 °. Rivers carved out steep valleys and ravines through these parts: between Stara Loka and Praprot, between Železniki and Zali Log, between Hotavlje and Trebija. Less than 20 % of the surface is covered with limestone. Karst features are otherwise characteristic here, although they are rare due to the fact that these layers interplay with layers of other rocks. West of Žiri, the Ledinska planota (plateau), with its sinkholes and small underground streams, is the most characteristically karstic landscape. The rest of the landscape is covered with various impermeable rocks. Volcanic rocks are in the Šmohorsko hribovje between Selca and the Besnica valley. Due to the acidity of the soil, this region is overgrown with more than the average amount of forests. Wherever there are Permian-Carboniferous dark gray claystones and sandstones, which are very unstable rocks, the ground is prone to frequent landslides: between Cerkno and Sovodenj (Gabrovec 1998).

Uranium deposits and copper ore deposits are situated in the red Permian sandstones, also called Gröden layers, which extend from Žirovski Vrh westwards, past Sovodenj and all to Cerkno, in the Ločnica valley, near Sveta Katarina and near Sveti Ožbolt (Drovenik, Pleničar, Drovenik 1980, 37 pp). A particularly rich copper ore deposits lie beneath Škofje above Cerkno; the Italians exploited it for a brief period during WW II (Jelenc 1953, 18).

The land is also rich with iron ore (check Drovenik, Pleničar, Drovenik 1980, Metallogenetic map of the Republic of Slovenia). Numerous Iron Age individual chance finds and presumably Hallstatt upland settle-peloda jelke in kasneje tudi bukve, naraste pa vrednost peloda smreke in zelišč. Razlog za te spremembe je iskati v srednjeveški kolonizaciji pokrajine in v železarstvu (Culiberg, Šercelj, Zupančič 1981). Od konca srednjega veka do 19. stoletja je bilo tu železarstvo pomembna gospodarska panoga. Ker je ta zahtevala veliko bukovega oglja, je prišlo do začasnega propada jelovo-bukovega gozda. S prenehanjem te dejavnosti se je začel gozd obnavljati, kar se vidi v zgornjem delu diagrama z Ledine (Leskovec 1989, 170 ss).

Hribovita pokrajina je znana tudi po kamninah, ki so primerne za izdelavo žrmelj. V obilici jih najdemo na žirovsko-škofjeloškem ozemlju. Analize so namreč pokazale, da kamnina, iz katere so Emonci izdelovali žrmlje, izvira od tu (Horvat, Županči 1987, 105 ss).

Podnebje je zmerno celinsko, s povprečno letno višino padavin med 1536 mm v Brišah pri Polhovem Gradcu in 2096 mm na Bukovem pod Kojco. Padavinski režim je submediteranski, z glavnim padavinskim viškom jeseni in drugotnim na prehodu pomladi v poletje. Temperaturno izstopa termalni pas na prisojnih pobočjih med 600 in 800 m nadmorske višine s povprečno letno temperaturo 8,3 °C, kar je za stopinjo več kot v 200 m nižjih Žireh v dolini. Višja povprečna letna temperatura je posledica zimskega in jutranjega toplotnega obrata v dolinah. Zaradi takih podnebnih razmer so v toplem pasu nastala razmeroma velika naselja.

Ugodnih površin za kmetijstvo je razmeroma malo. Pokrajino večji del prekriva gozd, predvsem bukov, ki prekriva kar pet šestin ozemlja (Gabrovec 1998).

**Savska ravan** leži v zgornjem porečju Save in obsega skoraj celotno dno Ljubljanske kotline. Na severu jo obdajajo Karavanke in Kamniško-Savinjske Alpe, na severozahodu Julijske Alpe, na zahodu Škofjeloško in Polhograjsko hribovje, na vzhodu Posavsko hribovje, na jugu pa prehaja v Ljubljansko barje. Povprečna nadmorska višina znaša 393,5 m, s povprečnim naklonom ozemlja 4,3 °.

To je osrednji del velike udorine, kamor so reke v pleistocenu čez terciarne usedline nanesle ogromno gradiva. Zato so se terciarne kamnine na površju ohranile le na obrobju, na primer pri Škofji Loki, Tržiču in Kamniku. V ledenih dobah so sem segali ledeniki. Največji je bil Bohinjski ledenik, ki je zapolnjeval ves Blejski kot in velik del ravnine na levem bregu Save med Žirovnico in Begunjami, proti jugovzhodu pa je segal južno od Radovljice, skoraj do Brezij in Kamne Gorice. Ledeniške vode so nasule prod ponekod tudi do 100 m na debelo. Vanj so reke vrezale globoke, ponekod prav kanjonske doline: Kokra pri Kranju.

Skoraj štiri petine površja prekrivajo karbonatni prod, grušč, til, konglomerat, breča in tilit. Precej manj je gline, melja, glinavca, meljevca, laporja ter kremenovega peščenjaka in konglomerata (Pak 1998, 84 ss).

Reliefno razgibana pokrajina je značilna predvsem za severni del ravni, kjer so Sava in pritoki vrezali široke

ments are known from the vicinity of the iron ore deposits (check *Arheološka najdišča Slovenije* 1975, 169 pp); perhaps this is an indication that the ore was mined already during the Iron Age. However, to what extent is not yet known. The pollen diagrams from Ledina upon Jelovica (*Fig. 2.2.*) indubitably demonstrate an increase in the effects of human activity on the environment, although only about 1000 years ago. The values of fir tree pollen decline at that point, and somewhat later also of beech tree pollen; however, the values of pine tree and herb pollens increase. The explanation for these changes lies in the medieval colonization of the landscape and in the development of ironworks (Culiberg, Šercelj, Zupančič 1981). Ironworks manifested an important branch of the economy from the end of the Middle Ages to the 19th century. And as it required enormous amounts of beech tree coal, a temporary decline in the fir and beech tree forest ensued. The forest began to regenerate once this line of work was ceased; this is visible in the upper part of the diagram from Ledina (Leskovec 1989, 170 pp).

The hilly landscape is also well known for its rocks, suitable for making querns. Ample examples were found in the territory of Žiri and Škofja Loka. Analyses have demonstrated that the rocks used by the Emonians to make querns originate from these parts (Horvat, Županči 1987, 105 pp).

A moderate continental climate predominates here; the average annual measure of rainfall is between 1536 mm at Briše near Polhov Gradec and 2096 mm at Bukovo beneath Kojca. The rainfall regime is sub-Mediterranean, with the rainfall climax in the autumn and again at the transition from spring to summer. The average annual temperature in the thermal zone on the sunny slopes between the above sea level heights of 600 and 800 m is exceptional in measuring 8.3 °C, which is a whole degree higher than that at Žiri 200 m lower, in the valley. A higher average annual temperature is the result of the winter and morning warmth inversion in the valleys. The development of relatively large settlements in the warmer zone is due to such climatic conditions.

There are relatively few favorable agricultural surfaces. The landscape is largely covered by a predominantly beech tree forest,which covers five sixths of the territory (Gabrovec 1998).

The **Savska ravan** is situated in the upper basin of the Sava river and it extends almost throughout the entire Ljubljana basin. The Karavanke mountains and the Kamniške and Savinjske Alps enclose it at the north, the Julian Alps in the northwest, the Škofjeloško and Polhograjsko hribovje in the west and the Posavsko hribovje in the east. In the south it proceeds into the Ljubljansko barje. The average height above sea level measures 393.5 m, and the average incline is 4.3 °.

This is the central part of a large hollow, where enormous amounts of alluvium were deposited over the Tertiary deposits by rivers in the Pleistocene. Conseterase. Pri Radovljici so ledeniki pustili sledi v nekaj metrov visokih slemenih, ki so ostanki čelnih in robnih morenskih nasipov. Na Bledu je zastalo ledeniško jezero (Pak 1996, 3). V južnem delu pokrajine se je z nasipavanjem Save in pritokov ustvarilo 60 km$^2$ veliko Ljubljansko polje. Trdo sprijet konglomerat je v glavnem prekrit z nizko prodno nasipino. Od ostalega dela ravni ga ločujejo Šmarna gora (669 m), Grmada (676 m), Rašica (M. vrh, 489 m; Vrh S. Kosca, 641 m; Debeli vrh, 595 m) in Soteški hrib (405 m) med Nadgorico in Podgorico.

Sava je osrednja vodna žila pokrajine. Ima pet večjih pritokov: Tržiška Bistrica, Kokra, Kamniška Bistrica, Sora in Ljubljanica. Za večino je značilno, da imajo visoko vodo spomladi, ko se tali sneg in začne spomladansko deževje, ter v jeseni.

Padavin je dovolj čez vse leto, zato ima ravan zmerno vlažno celinsko podnebje. V zgornjem delu ravni se uveljavlja alpsko podnebje, ki se krajevno spreminja glede na lego in na nadmorsko višino. V spodnjem in osrednjem delu so poletja toplejša in zime milejše. Na podnebje pomembno vpliva tudi lega med gorami. Visokogorsko in hribovito obrobje zmanjšuje vetrovnost in pospešuje toplotni obrat. Pozimi se na dnu Ljubljanske kotline nabere in zadržuje hladen zrak. Zato je tu bolj hladno in megleno kot na višjem obrobju.

V severnem delu pokrajine, na Ljubljanskem polju in na Kamniškobistriški ravni, prekriva mlajše prodne terase in morene za kmetijstvo ugodna, 20 do 30 cm globoka rendzina. Na starejših prodnih terasah so nastale evtrične rjave prsti, ki so globlje od rendzine in vsebujejo manj karbonatov. Pokrivajo dele Kranjskega in Sorškega polja, ponekod pa so tudi na Kamniškobistriški ravni. Kjer so manj kakovostne, se na njih ponekod pojavlja antropogeni, večinoma smrekov gozd. Gozd prekriva dobro tretjino ravni, kar je največ od vseh ravninskih pokrajin v Sloveniji (Pak 1998, 88).

**Posavsko hribovje** obsega osrednji in najizrazitejši del Posavskih gub med alpskim visokogorjem na severu in dinarskim krasom na jugu. Gube sestavljajo antiklinale ter sinklinale, ki se v reliefu kažejo kot vrsta podolžnih slemen in vmesnih podolij, ki se v vzporedniški smeri vlečejo od Polhograjskega in Škofjeloškega hribovja proti vzhodu na Hrvaško.

Pokrajina obsega širok pas hribovitega sveta na obeh straneh reke Save med Ljubljanskim poljem in Sevniško kotlinico. Na severu omejujejo hribovje Kamniško-Savinjske Alpe, Savinjska ravan, Ložniško in Hudinjsko ter Voglajnsko in Zgornjesotelsko gričevje, na jugu Dolenjsko podolje, Raduljsko hribovje ter Krško, Senovsko in Bizeljsko gričevje. Na zahodu sega do Savske ravni in Ljubljanskega barja, na vzhodu do Srednjesotelskega gričevja (Hrvatin 1998, 178 s).

V bakreni, še bolj pa v železni in rimski dobi, so dala poseben pečat pokrajini razmeroma bogata rudišča bakrove, železove in svinčeve rude (Drovenik, Pleničar,

quently, Tertiary rocks on the surface are only preserved along the edges, for instance at Škofja Loka, Tržič and Kamnik. The glaciers reached all to here during the Ice Ages. The Bohinj glacier was the largest: it filled the entire area of Bled and a large part of the plain along the left bank of the Sava between Žirovnica and Begunje, southeastwards it extended south of Radovljica, almost to Brezje and Kamna Gorica. The glacial waters deposited gravel even up to 100 m thick. Rivers cut deeply through the Savska ravan – sometimes even deep canyons: Kokra near Kranj.

Almost four fifths of the surface is covered with carbonate gravel, rubble, till, conglomerates, breccia and tillite. The remainder consists of clay, silt, siltstone, marl as well as quartz sandstone and conglomerate (Pak 1998, 84 pp).

The uneven terrain is especially characteristic of the northern part of the plain, where the Sava and its tributaries incised wide terraces. Near Radovljica the glaciers left traces in ridges measuring a few meters high; these are the remains of frontal and marginal morainic deposits. A glacial lake remains at Bled (Pak 1996, 3). Southwards, the 60 km$^2$ large Ljubljansko polje is the result of alluvium deposits by the Sava river and its tributaries. The tough agglutination is chiefly covered with a low gravel deposit. It is separated from the rest of the plain by Šmarna gora (669 m), Grmada (676 m), Rašica (M. vrh, 489 m; Vrh S. Kosca, 641 m; Debeli vrh, 595 m) and Soteški hrib (405 m) between Nadgorica and Podgorica.

The Sava is the central waterway in the landscape. It has five important tributaries: the Tržiška Bistrica, the Kokra, the Kamniška Bistrica, the Sora and the Ljubljanica. Characteristic for the majority is a high level of water in the spring, when the snow melts and the spring rainfall begins, and in the autumn.

There is plenty of rainfall throughout the entire year. Consequently, the plain has a moderately humid continental climate. An Alpine climate reins in the upper part of the plain, locally changing depending upon the positioning and height above sea level. Summers are warmer and winters are milder in the lower and central parts of the plain. The positioning among the mountains is also a significant influence on the climate. The high mountains and the hilly edges decrease the wind factor and increase the inversion of warmth. Cold air builds up and gets retained in the Ljubljana basin during the winter. Consequently, fog gathers and the temperature is lower here than along the higher edges of the basin. An agriculturally favorable 20 to 30 cm deep Rendzina soil (USA: Rendoll) layer covers the younger gravel terrace and moraine in the northern part of the landscape, the Ljubljansko polje and the Kamniškobistriška ravan. Eutric brown soils (USA: Ustoll or Xeroll), deeper than the Rendzina soil and containing less carbonate minerals, formed on the older gravel terraces. They cover parts of the Kranjsko polje and the Sorško

Drovenik 1980, 19 ss). Rude so v karbonskih in permskih kamninah.[5] Ker so te kamnine neprepustne, so tu nastale tesne grape in globoke doline. Najdemo jih med Dolom pri Ljubljani in naseljem Sava, v večjem delu porečij Radomlje, Sevnične Rečice in Sopote ter v povirjih Orehovice, Kotredeščice, Trboveljščice in Bolske. Mezozojske pretežno karbonatne kamnine pokrivajo slabo polovico pokrajine. Na njih se je izoblikovalo fluviokraško in kraško površje. Iz teh kamnin so najvišja slemena in vrhovi. Terciarne usedline pa so zapolnile dno Tuhinjske doline in Moravško-Trboveljsko podolje, pogoste so v vzhodnem delu pokrajine. Na strmejših pobočjih s terciarno kamninsko podlago se zelo pogosto prožijo usadi. V razširjenih delih dolinskega dna ob Savi se je v kvartarju karbonatni prod odložil v akumulacijskih terasah (Hrvatin 1998, 179 s).

Prevladuje zmerno celinsko podnebje s povprečno letno temperaturo med 8 in 10 °C. Količina padavin se giblje med 1200 in 1300 mm. Najbolj deževen mesec je junij.

Površje Posavskega hribovja je močno razčlenjeno s številnimi dolinami in grapami ter je težko prehodno. Ravnega sveta je malo, prevladujejo nakloni med 12 in 30 °. Večina hribovja leži v višinskem pasu med 300 in 600 m in le posamezni vrhovi segajo več kot 1000 m visoko. Gozd prekriva skoraj dve tretjini ozemlja. Njivskih površin je malo. Največ rodovitnega njivskega sveta je v osrednjem delu Moravško-Trboveljskega podolja in na prisojnih terasah.

**Dolenjsko podolje** leži na stiku panonskega, alpskega in dinarskega sveta. Vleče se v 45 km dolgem in od 3 do 12 km širokem pasu od Ljubljanskega barja in Turjaške pokrajine na zahodu do Raduljskega hribovja in Novomeške pokrajine na vzhodu. Na severu se dviga v Posavsko hribovje, na jugu pa v planotasto Suho krajino.

Pokrajina je del dinarskega sveta z značilnim fluviokraškim in kraškim reliefom s povprečno nadmorsko višino 320 m.

Večina pokrajine ima zmernocelinsko vlažno podnebje. Proti vzhodu se krepijo panonski podnebni vplivi. Pomembne so tudi razlike med višje ležečimi prevetrenimi kraji ter tistimi v kotanjah in dnu dolin, kjer se pojavlja toplotni obrat in z njim pogosteje slana in megla.

Prevladujejo poletne konvekcijske padavine, proti zahodu pa so vse izrazitejše jesenske frontalne padavine. Zaradi velikega deleža prepustnega kraškega sveta v sušnem obdobju marsikje občutijo pomanjkanje vode (Topole 1998, 460 ss).

**Osrednjo Slovenijo** torej označuje strm, hribovit svet. Glavne prometne poti potekajo po dolinah vzdolž

[5] Skrilavi glinavci ter kremenovi peščenjaki in konglomerati pokrivajo tretjino ozemlja in sestavljajo jedro antiklinal (Hrvatin 1998, 179).

polje, as well as sections of the Kamniškobistriška ravan. Anthropogenic, chiefly pine tree forests cover select areas of the lesser quality soil. Forest covers approximately one third of the plain, which is the most of all the plains throughout Slovenia (Pak 1998, 88).

The **Posavsko hribovje** comprises the central and most pronounced part of the Posavsko folds between the high Alpine mountains in the north and the Dinaric karst in the south. Anticlines and synclines constitute the folds; in relief they look like a series of oblong ridges with intermediary valleys that run parallel from the Polhograjsko and Škofjeloško hribovje eastwards to Croatia.

The landscape comprises a wide, hilly zone along both sides of the Sava river between the Ljubljansko polje and the Sevnica basin. Setting the northern limit are the Kamniške and Savinjske Alps, the Savinjska ravan, and the Ložnica, Hudinja, Voglajna and Zgornjesotelsko gričevje. To the south are the Dolenjsko podolje, the Raduljsko hribovje, and the Krško, Senovsko and Bizeljsko hribovje. Westwards the Posavsko hribovje reaches to the Savska ravan and the Ljubljansko barje, and eastwards to the Srednjesotelsko gričevje (Hrvatin 1998, 178 p).

During the Copper Age, and even more so during the Iron Age and the Roman period, a rich selection of copper, iron and lead ore deposits bore a special seal for the area (Drovenik, Pleničar, Drovenik 1980, 19 pp). Ores are in Carboniferous and Permian rocks.[5] As these rocks are impermeable, mountain gorges and deep ravines were formed, such as between Dol pri Ljubljani and the village Sava, in the greater part of the Radomlje, the Sevnična Rečica and the Sopota, river basin, as well as in the upper basins of the Orehovica, the Kotredeščica, the Trboveljščica and the Bolska rivers. Mesozoic, predominantly carbonate rocks cover almost half of the landscape. A fluvial-karstic and karst surface formed upon them. These rocks form the highest ridges and peaks. Tertiary deposits filled the floor of the Tuhinjska dolina and the Moravško-Trboveljsko podolje; they are frequent in the eastern part of the landscape. Landslides are often triggered upon the steeper slopes with a Tertiary rock foundation. During the Quaternary period, carbonate gravel was deposited in accumulative terraces in the wider parts of the valley floor along the Sava (Hrvatin 1998, 179 p).

A moderate continental climate predominates, the average annual temperature being between 8 and 10 °C. The amount of rainfall varies between 1200 and 1300 mm; the most rain falls in June. The surface of the Posavsko hribovje is extremely divided by numerous valleys and ravines and is thus difficult to traverse. There is little level ground; most inclines are between 12 and 30 °. Most of the hills are situated in the higher zone

[5] Slate claystone pits, quartz sandstones and conglomerates cover one third of the territory and they compose the core of the anticline (Hrvatin 1998, 179).

rek predvsem Save, Ljubljanice in obeh Sor ter z jugovzhoda čez Dolenjsko podolje. Območje ima malo sveta, ki je izrazito ugoden za poljedelstvo. Še največ ga najdemo na ravninskem Ljubljanskem polju. Ne smemo namreč pozabiti, da je v koliščarski dobi Ljubljansko barje najbrž prekrivalo po površini razmeroma veliko, toda plitvo jezero. Nasprotno pa je območje precej bogato z bakrovo rudo, ki jo najdemo predvsem v Posavskem ter Cerkljansko-Škofjeloškem hribovju. Na območju prevladuje zmerno celinsko podnebje z okoli 1200–1500 mm padavin/leto in s povprečno letno temperaturo okoli 9 °C.

between 300 and 600 m, and only select peaks reach above 1000 m. Forest covers almost two thirds of the territory. There are few fields. The larger segment of fertile fields lies in the central part of the Moravško-Trboveljsko podolje and upon the sunny terraces.

The **Dolenjsko podolje** lies at the junction of the Pannonian, Alpin and Dinaric worlds. It runs 45 km long and from 3 to 12 km wide all the way from the Ljubljansko barje and the Turjak landscape at the west, to the Raduljsko hribovje and the Novo mesto landscape in the east. It rises into the Posavsko hribovje in the north and in the south it spreads into the Suha Krajina plateau.

The landscape is part of the Dinaric world with its characteristic fluvial-karstic and karst relief, and its average height above sea level of 320 m.

A moderate continental climate predominates in the major part of the landscape. The Pannonian climatic influences increase towards the east. Other important differences are those between the more elevated and windy places and those down in the basins at the foot of the valleys, where warm inversions occur, and consequently frost and fog are more frequent. Summer rains are predominant, while towards the west the autumn frontal rains are more distinctive. Many places suffer from water shortages in the dry season due to the large amount of permeable karst land (Topole 1998, 460 pp).

**Central Slovenia** thus comprises a steep, hilly world. The main traffic routes run through the valleys alongside rivers, primarily the Sava, the Ljubljanica and both Sora rivers, as well as from the southeast across the Dolenjsko podolje. There is little cultivatable land in this region; the largest section lies in the plain of the Ljubljansko polje. After all, let us not forget that a large and shallow lake probably covered the Ljubljansko barje area during the pile dwelling period. Contrarily, the region is relatively rich with copper ore deposits, most of which can be found in the Posavsko and Cerkljansko-Škofjelośko hribovje. A moderate continental climate is predominant in the region, with an average of approximately 1200–1500 mm rainfall/year and an average annual temperature of approximately 9 °C.

## **2.2** NEOLITSKA-ENEOLITSKA ARHEOLOŠKA NAJDIŠČA V OSREDNJI SLOVENIJI

### **2.2.1** LJUBLJANSKO BARJE

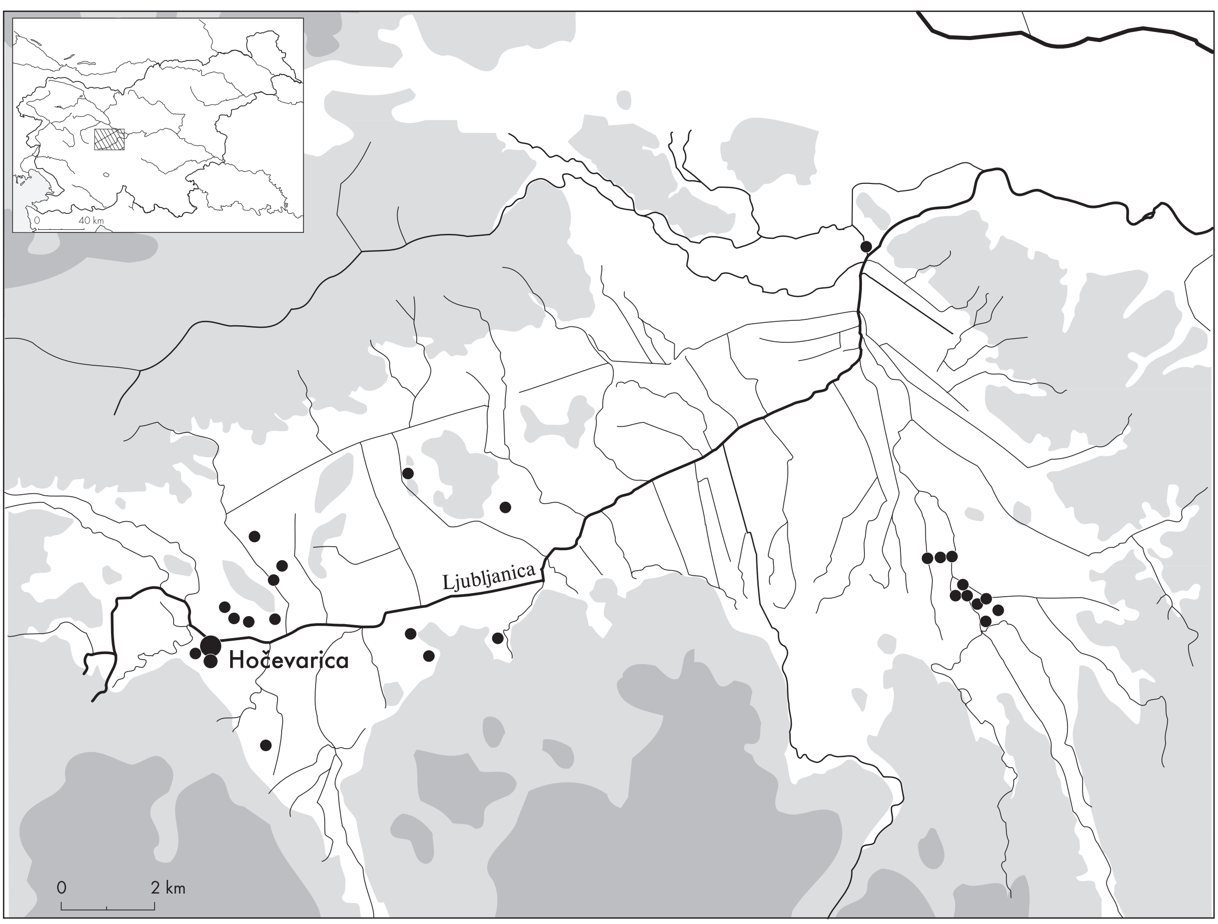
Neolitske-eneolitske naselbinske najdbe na Ljubljanskem barju poznamo z barja, osamelcev, Iškega vršaja in s trdinskega sveta v okolici barja. Danes je znanih več kot 30 neolitskih-eneolitskih naselbinskih lokacij na mokrih tleh. Velika večina med njimi je kataloško predstavljena v magistrski nalogi A. Veluščka (Velušček

*Sl. 2.4:* Ljubljansko barje. Označene so samo bolje poznane koliščarske naselbine.
*Fig. 2.4:* Ljubljansko barje. Only the better known pile dwelling settlements are marked.

## **2.2** NEOLITHIC-ENEOLITHIC ARCHAEOLOGICAL SITES IN CENTRAL SLOVENIA

### **2.2.1** THE LJUBLJANSKO BARJE

Neolithic-Eneolithic settlement finds from the Ljubljansko barje are primarily known from the Ljubljansko barje itself, the isolated hills, the Iška low, wide fluvial deposit and the solid land surrounding the Ljubljansko barje. More than 30 Neolithic-Eneolithic settlement locations upon wet ground are known today. The large majority among them is presented in the catalogue of A. Velušček's master's thesis (Velušček 1997b). Most were discovered in the vicinity of Ig and near Blatna Brezovica, and also near Prevalje, around Plešivica, in Ljubljana, at the foot of Kamnik pod Krimom and near Bistra (check *fig. 2.4*).



1997b). Največ je bilo odkritih v okolici Iga in pri Blatni Brezovici, po številu sledijo naselbine pri Prevaljah, okoli Plešivice, v Ljubljani, pod Kamnikom pod Krimom in pri Bistri (glej *sl. 2.4*).

### **2.2.2** CERKLJANSKO, ŠKOFJELOŠKO, POLHOGRAJSKO IN ROVTARSKO HRIBOVJE

O neolitski in eneolitski poselitvi pokrajine je na voljo zelo malo podatkov (*sl. 2.5*). Najpomembnejši najdišči sta jama Kevderc in Lubniška jama, ki sta v Škofjeloškem hribovju. Jami se odpirata na višini 810 m na južnem pobočju kopastega Lubnika (1025 m). Vhoda sta okoli 100 m nad strugo potočka, ki je v srednjem pliocenu izdolbel jamske prostore. Raziskave so pokazale, da sta bili jami ob nastanku v geomorfološki zvezi (Kiauta, Leben 1960, 174). Leta 1958, 1959 in 1962 so v jamah, in tudi nad jamo Kevderc, potekala izkopavanja, ki so potrdila eneolitsko jamsko poselitev (prim. Leben 1958-1959, 295; 1959, 83 ss; 1962, 53 s; 1963, 213 ss; 1973, 19 ss; Korošec 1959, 17 s).

Jama Kevderc

V prvi dvoranici so naleteli na enotno kulturno plast s prazgodovinskimi ostanki in kuriščem. Prevladuje keramika, ki je ornamentirana z vrezi in vbodi ter belo inkrustirana. Oblikovno gre za vrče, sklede in pečatnik. Številna so tudi kamnita in koščena ter rožena orodja (Leben 1963, 216 ss).

Lubniška jama

V jami so sondirali leta 1959 ter sistematično izkopavali leta 1962. Tudi tu so naleteli na enotno kulturno plast s podobnimi najdbami kot v Kevdercu (Leben 1963, 223 ss).

Posamične najdbe

Z obrobja Trebije, severovzhodno od glavnega cestnega križišča, poznamo kamnito kladivasto sekiro.[6] Leta 1980 so jo našli pri kopanju temeljev za vikend.[7] Iz Stare Oselice poznamo kamnito puščično ost s stranskima zajedama, ki je bila najdena približno 40 m stran od hiše Stara Oselica 18, kjer je ležala v globini od 15 do 20 cm.[8] V muzeju v Škofji Loki hranijo kamnito kladivasto sekiro iz Sovodenj.[9] Na Taboru južno od Vrzdenca so

[6] Širina = 7 cm; dolžina = 12 cm; š. luknje = 2,5 cm.

[7] Osnovne podatke o najdbi, mestu in okoliščinah najdbe nam je posredoval najditelj V. Oblak iz Škofje Loke, za kar se mu najlepše zahvaljujemo. Sekiro namerava objaviti najditelj, ki jo tudi hrani.

[8] Podatke nam je posredoval D. Breščak, ki bo najdbo tudi objavil. Za izkazano prijaznost se mu najlepše zahvaljujemo.

[9] Podatke o sekiri nam je posredovala Z. Šubic, za kar se ji najlepše zahvaljujemo.

### **2.2.2** CERKLJANSKO, ŠKOFJELOŠKO, POLHOGRAJSKO AND ROVTARSKO HRIBOVJE

Very little data regarding Neolithic and Eneolithic settlement throughout the landscape is available (*fig. 2.5*). The most important sites are the Kevderc cave and the Lubnik cave, both situated in the Škofjeloško hribovje. The two caves open at an above sea level height of 810 m, on the southern slope of the cumulous Lubnik (1025 m). The entrances are both situated approximately 100 m above the riverbed that carved out these two caves in the middle of the Pliocene. Investigations have shown that the two caves were originally linked in terms of geomorphology (Kiauta, Leben 1960, 174). Excavations were carried out in the two caves, as well as above the Kevderc cave, in the years 1958, 1959 and 1962; these investigations confirmed settlement within the cave during the Eneolithic period (cf. Leben 1958-1959, 295; 1959, 83 pp; 1962, 53 p; 1963, 213 pp; 1973, 19 pp; Korošec 1959, 17 p).

The Kevderc cave

A unified cultural layer with prehistoric remains and an open hearth were discovered in the first, small hall. Pottery remains are predominant; they display incised and stitched ornamentation, as well as white encrustation. The forms comprise of pitchers, dishes and a seal. There are also numerous tools made of stone, bone and horn (Leben 1963, 216 pp).

The Lubnik cave

Sample trenches were dug in this cave in 1959, and systematic excavations followed in 1962. A unified cultural layer was discovered here as well; the material finds were similar to those found at Kevderc (Leben 1963, 223 pp).

Chance finds

A stone hammer-form axe is known from the edge of Trebija, northeast of the main road crossing.[6] The axe was found in 1980 while digging the foundations for a cottage.[7] A stone arrowhead with two side indentations is known from Stara Oselica; lying at a depth of 15 to 20 cm underground, it was found approximately 40 m away from the house at Stara Oselica 18.[8] The museum in Škofja Loka also preserves a stone hammer-form axe from Sovodenj.[9] In addition to the metal finds from later periods

[6] Width = 7 cm; length = 12 cm; w. of hole = 2.5 cm.

[7] We would like to extend our gratitude to V. Oblak from Škofja Loka, who mediated the basic information concerning the find, its location and circumstances. The finder, who preserves the axe, also intends to publish it.

[8] We are grateful to D. Breščak for kindly mediating the information regarding this find.

[9] We thank Z. Šubic for mediating the information regarding this axe.

poleg kovinskih najdb iz mlajših obdobij našli tudi zglajeno sekiro iz serpentina (Müllner 1892, 79). Na skrajnem južnem robu pokrajine pri Lesnem brdu nad Ljubljanskim barjem sta bili najdeni še dve sekiri iz serpentina (Rutar 1899, 166).

### **2.2.3** SAVSKA RAVAN

Savska ravan ima pomembno prometno vlogo, kar se odraža tudi v številu arheoloških najdišč iz neolitika ali eneolitika in kasnejših obdobij (*sl. 2.5*).[10] Na tem območju prevladujejo naselbine na naravno zavarovanih dominantnih vzpetinah. Poznamo tudi naselbine, ki so visoko nad sotesko reke ali nekdanjim rečnim rokavom. Pred kratkim je bila odkrita domnevno nezavarovana nižinska naselbina pri Dragomlju (Turk 1999, 26 s).

**Na dominantnih vzpetinah ležijo:**

Malijevo gradišče pri Golniku

Naselbina je na manjšem hribu, kjer so vidne terase in umeten nasip. Leta 1969 je na gradišču ekipa arheologov s Filozofske fakultete iz Ljubljane zastavila 5 sond ter odkrila najdbe alpskega faciesa lengyelske kulture, prazgodovinske najdbe nedoločene starosti in tri žgane rimske grobove (Bregant 1968-1969, 179; glej še Dular 2001, 91, sl. 2).

Gradišče na Štuclju

Gradišče je na 20 m visoki labornati pečini nad vasjo Pivka pri Naklem. Teren prepadno pada proti severu in severozahodu. Proti vzhodu pa je raven oziroma se rahlo spušča. Iz te dostopne strani sta branila dohod na gradišče obrambni jarek in nasip v obliki polkroga.

Leta 1935 je najdišče raziskoval R. Ložar (Žontar 1939, 12 s), v šestdesetih letih pa A. Valič (Valič 1968, 485 ss). Raziskave so potrdile prazgodovinsko poselitev ter poznoantično obrambno utrdbo. Redke prazgodovinske najdbe: kremenova puščična ost, odbitek, strgalo in keramika imajo najbližje analogije na Drulovki (Valič 1968, 488, t. 6: 1,2,6; 8: 3,5).

Mali grad

Najdišče je na grajskem griču v Kamniku. Leta 1950 je na Malem gradu sondiral S. Jesse. V manjši sondi je našel srednjeveško keramiko iz 13. in 14. stoletja. Od leta 1978 dalje tu potekajo raziskave ZVNKD Kranj pod vodstvom M. Sagadina (Sagadin 1996; glej še Dular 2001, 91, t. 4).

Prazgodovinske najdbe so bile odkrite na obrobju ravnice pod malograjsko kapelo. V enotni prazgodovin-

[10] O poteku rimskih cest preko Savske ravni glej Šašel 1972, 139 ss; 1975a, 63 ss.



discovered at Tabor, just south of Vrzdenec, there was also a burnished axe made of serpentine (Müllner 1892, 79). Two axes made of serpentine were also found at the far southern edge of the landscape near Lesno brdo above the Ljubljansko barje (Rutar 1899, 166).

### **2.2.3** SAVSKA RAVAN

The Savska ravan plays an important trafficking role; this is also reflected in the number of archaeological sites dating to the Neolithic and Eneolithic, as well as to later periods (*fig. 2.5*).[10] Settlements that are naturally well protected and situated upon dominant elevations predominate in this region. There are also settlements that are situated high above a ravine or a former branch of a river. Just recently a supposedly unprotected lowland settlement was discovered near Dragomelj (Turk 1999, 26 p).

**Settlements situated upon dominant elevations:**

Malijevo gradišče near Golnik

This fortified settlement lies upon a hill with still visible terraces and a man-made rampart. A team of archaeologists from the Faculty of Arts, University of Ljubljana, established five trenches over the site in 1969. Material finds attributed to the Alpine Facies of the Lengyel culture, prehistoric finds of undeterminable age and three Roman cremation graves were discovered (Bregant 1968-1969, 179; check also Dular 2001, 91, fig. 2).

Gradišče na Štuclju

Gradišče is situated upon a 20 m high cliff above the village of Pivka near Naklo. The terrain falls in a precipice towards the north and northwest. Eastwards the terrain is level, with only a slight decline. A semi-circular rampart and defense ditch protected the entryway to the fortification along this more easily accessible side.

R. Ložar investigated the site in 1935 (Žontar 1939, 12 p), and A. Valič continued in the 1960s (Valič 1968, 485 pp). Investigations confirmed prehistoric settlement as well as the presence of a Late Roman defense fortification. The rare prehistoric finds include: a flint arrowhead, a flint, a scraper and pottery, with closest analogies at Drulovka (Valič 1968, 488, Pl. 6: 1,2,6; 8: 3,5).

Mali grad

The site is situated upon the castle hill in Kamnik. S. Jesse excavated sample trenches in 1950. Medieval pottery dating to the 13th and 14th centuries was found in the smaller trench. M. Sagadin from the Institute for the Pres-

[10] Regarding the routes of Roman roads across the Savska ravan, check Šašel 1972, 139 pp; 1975a, 63 pp.

ski plasti prevladujejo najdbe iz neolitika ali eneolitika, nekaj fragmentov pa bi bilo lahko tudi iz bronaste oziroma starejše in mlajše železne dobe. Posebno zanimiva najdba iz te plasti je latenski udarni nož (Sagadin 1996, 110 ss).

Za neolitsko-eneolitsko keramiko so značilne rdeče barvane sklede na nogi, fragmenti piriformnih amfor in zajemalka s tulastim držajem. Ob ornamentalnih značilnostih alpskega faciesa lengyelske kulture se kot ornament na nekaterih fragmentih pojavlja tudi brazdasti vrez. Poleg keramike so bili najdeni tudi poškodovana jezičasta sekira, retuširane kline in odbitki (Sagadin 1996, 110 ss).

Kriški grad

Prazgodovinska naselbina je na pravokotni terasi,[11] ki obvladuje ravninsko območje med Križem, Duplico in Mengšem, severovzhodno od vasi Križ. Tu je v 16. stoletju postavljen grad, ki je bil med 2. sv. vojno požgan.

Arheološko najdišče je leta 1998 odkril M. Bremšak. Na severovzhodnem robu terase je očistil usek kolovozne poti ter našel prazgodovinsko rdeče barvano keramiko, zajemalke s tulastim držajem in silekse (Železnikar 1999, 55, foto: 11,12; Velušček 1999a, 23).

Homški hrib

Osamelec Homški hrib (394 m) obvladuje ravnino med Kamniško Bistrico in Pšato. Leta 1998 so na vzhodnem ravninskem delu vrha M. Bremšak, T. Cevc in F. Stele izkopali nekaj manjših sond in naleteli na fragmente keramike in kamnito orodje iz neolitika ali eneolitika ter fragmente žarnogrobiščne keramike (Cevc 1998, 9 ss; Velušček 1999a, 23; Železnikar 1999, 55 s, foto: 9,10,15; Dular 2001, 91, sl. 4). Že pred mnogimi leti je pod Marijino cerkvijo J. Kastelic našel fragment domnevno halštatske keramike (Gabrovec 1965, 101).

Šumberk

Iz Šumberka izvira sekira iz serpentina, ki jo je leta 1893 F. Ogrinc podaril Narodnemu muzeju v Ljubljani (Müllner 1893, 79; Gabrovec 1965, 91, t. 13: 13). Pri lomljenju kamenja v kamnolomu Šumberk pa so 1953. v ilovnatem udoru med skalami našli kremenovo strgalo, dva kosa žrmelj in živalske zobe (Gabrovec 1965, 92).

Naselbina nad Spodnjim Dobenim

Prazgodovinska naselbina je na lepo izoblikovani terasi elipsaste oblike. Terasa je dolga približno 75 m, široka približno 40 m in leži nad Sp. Dobenim zahodno od vrha, imenovanega Gradišče, na nadmorski višini 469 m. Na severovzhodni in severni strani se terasa zaključi v prepadnih strminah. Dostop z jugozahoda je lažji, a še vedno strm. Ta stran je bila dodatno zavarovana z

[11] Terasa obsega pribl. 100 × 75 m in se razprostira na višini 407 m.

ervation of Cultural Heritage, Regional Office in Kranj has been conducting excavations here since 1978 (Sagadin 1996; check also Dular 2001, 91, Pl. 4).

Prehistoric finds were discovered along the edge of the field just below the small castle chapel. Material finds from the Neolithic or Eneolithic predominate in the unified prehistoric layer, while some fragments could also be attributed to the Bronze or even Early or Late Iron Ages. Particularly noteworthy from this layer is the La Tenè striking knife (Sagadin 1996, 110 pp).

Red-slip footed bowls are characteristic for Neolithic-Eneolithic pottery, as well as fragments of pyriform amphorae and ladles with socketed handles. Among the ornamental characteristics of the Alpine Facies of the Lengyel culture is also the ornamentation of select fragments with furrowed incisions. In addition to the pottery finds were also a damaged flanged axe and retouched flints (Sagadin 1996, 110 pp).

Kriški grad

The prehistoric settlement is situated upon a rectangular terrace,[11] which dominates over the lower plain between Križ, Duplica and Mengeš, just northeast of the village Križ. A castle was built here in the 16th century, although it was then burned during WW II.

M. Bremšak discovered the archaeological site in 1998. While clearing the rut in a cart track along the northeastern edge of the terrace he happened upon prehistoric red-slip pottery, a ladle with a socketed handle and silexes (Železnikar 1999, 55, photo: 11,12; Velušček 1999a, 23).

Homški hrib

The isolated hill of Homški hrib (394 m) dominates over the plain between the Kamniška Bistrica and the Pšata rivers. In 1998, M. Bremšak, T. Cevc and F. Stele excavated a few sample trenches atop, along the eastern, level section. They discovered a few fragments of pottery and stone tools dating to the Neolithic or Eneolithic, as well as fragments of Urnfield cemetery pottery (Cevc 1998, 9 pp; Velušček 1999a, 23; Železnikar 1999, 55 p, photo: 9,10,15; Dular 2001, 91, fig. 4). Already many years ago, J. Kastelic found a fragment of supposedly Hallstatt pottery at the foot of the Church of St. Mary (Gabrovec 1965, 101).

Šumberk

An axe made of serpentine originates from Šumberk; F. Ogrinc donated it to the National Museum in Ljubljana in 1893 (Müllner 1893, 79; Gabrovec 1965, 91, Pl. 13:13). While quarrying stone at the Šumberk quarry in 1953, a flint scraper was found in a clay hollow between the rocks, as well as two fragments of a quern and animal teeth (Grabrovec 1965, 92).

[11] The extent of the terrace is approximately 100 × 75 m at an elevation of 407 m above sea level.

obrambnim nasipom, kar je lepo vidno v rahlo napetem terenu. Na severozahodnem robu terase je približno 1 × 1 m velika odprtina, ki se nadaljuje v plitvo brezno.

Naselbinske ostanke nad Sp. Dobenim je leta 1998 odkril M. Bremšak. Na jugozahodnem robu terase je izkopal manjšo sondo in našel nekaj fragmentov prazgodovinske keramike ter ploskovno retuširano puščično ost. Najdbe trenutno hrani Inštitut za arheologijo ZRC SAZU (Velušček 1999a, 23).

**Visoko nad sotesko reke ali nekdanjim rečnim rokavom so:**

Gradišče v Bodeščah

Gradišče je približno 15 m visok in 75 m dolg skalnat hrbet, ki se dviguje ob bodeški cerkvi Sv. Lenarta. Na južni strani ga omejujejo prepadne stene, ki se končajo v strugi Save Bohinjke.

Leta 1979 je na Gradišču raziskovala ekipa PZE za arheologijo FF in IzA SAZU. Na polici vrh Gradišča so zastavili manjšo sondo, v kateri so našli nekaj odbitkov in kamnito puščično ost, ki so jo časovno opredelili v eneolitik (Knific, Pleterski 1981, 197 s).

Gradišca v Radovljici

Najdišče leži na trapezasto oblikovani ravni terasi, ki je naravno zavarovana na zahodni strani z radovljiškim, na vzhodni pa s predtrškim Dolom.

Leta 1996 so bili na Gradišci pri ogledu gradbenih jam najdeni prazgodovinska keramika, fragmenti žrmelj in retuširane kline (Horvat 1998, 99 s). Leta 1997 in 1998 je na najdišču ekipa ZVNKD Kranj opravila zaščitno izkopavanje in odkrila tloris domnevno neolitske hiše (Felc 1997, 14; Meterc 1999, 143).

Drulovka pri Kranju

Prazgodovinska naselbina leži na ledini Špik na ravni terasi, ki jo na eni strani obdaja soteska Save, na drugi pa nekdanji slepi rokav Save (Korošec 1956a; 1960; Knific 1970, 141; Josipovič 1988, 192 ss).

Leta 1955 in 1956 je na terasi izkopaval J. Korošec. Naletel je predvsem na keramične in kamnite najdbe alpskega faciesa lengyelske kulture ter na keramiko z brazdastim vrezom. Korošec je naselbino datiral v pozni neolitik, prehodno in zgodnjo bronasto dobo (Korošec 1960, 41 ss).

Leta 1987 so na Drulovki pri zemeljskih delih našli retuširana kamnita orodja in puščične osti. Sledilo je zaščitno izkopavanje, ki sta ga vodili T. Bregant in P. Korošec. V treh sondah skupne površine 34 m$^2$ sta naleteli na naselbinske ostanke iz obdobja kulture žarnih grobišč (Josipovič 1988, 192 ss, sl. 9).



Settlement above Spodnje Dobeno

The prehistoric settlement is positioned upon a nicely shaped ellipsoidal terrace. The terrace is about 75 m long and 40 m wide; it is situated above Spodnje Dobeno, just west of the top, which is named Gradišče and has an above sea level elevation of 469 m. The terrace concludes with steep precipices along the northeastern and northern sides. Access from the southeastern side is easier, albeit steep. This side was additionally fortified with a defense rampart; it is still slightly discernible in the relief of the terrain. There is an opening of 1 × 1 m at the northwestern edge of the terrace, which continues into a shallow precipice.

M. Bremšak discovered the settlement remains above Spodnje Dobeno in 1998. He excavated a small trench along the southwestern edge of the terrace and found prehistoric pottery as well as a flatly retouched arrowhead. The Institute of Archaeology at the SRC SASA currently preserves the finds (Velušček 1999a, 23).

**Settlements situated high above ravines or former branches of rivers:**

Gradišče in Bodešče

Gradišče is a rocky ledge, approximately 15 m high and 75 m long, which rises up from behind the St Lenart church in Bodešče. Steep precipices that fall to the riverbed of the Sava Bohinjka delimit it along its southern side.

A team of archaeologists from the Faculty of Arts and the Institute of Archaeology at the SASA investigated Gradišče in 1979. A few flints and a stone arrowhead, which was attributed to the Eneolithic were found in a small sample trench atop Gradišče. (Knific, Pleterski 1981, 197 p).

Gradišca in Radovljica

The site is positioned upon a trapezoid, level terrace that is naturally protected along its western side with the Radovljica hollow and along its eastern side with the Predtrg hollow.

In 1996, prehistoric pottery, quern fragments and retouched flints were discovered at Gradišca during review of a construction ditch (Horvat 1998, 99 p). A team from the Kranj Institute for the Preservation of the Natural and Cultural Heritage carried out rescue excavations in 1997 and 1998 and disclosed the ground plan of a supposedly Neolithic house (Felc 1997, 14; Meterc 1999, 143).

Drulovka near Kranj

This prehistoric settlement lies upon the Špik field on a level terrace that is enclosed along one side by the Sava ravine and along the other side by the former, dead-end branch of the Sava (Korošec 1956a; 1960; Knific 1970, 141; Josipovič 1988, 192 pp).

**Nižinska naselbina:**

Dragomelj

Prazgodovinska naselbina je na prodnati ravnici vzhodno od vasi Dragomelj. Gre za nižinsko najdišče, v katerem so zastopani naselbinski ostanki iz različnih obdobij: iz neolitika ali eneolitika, iz pozne bronaste dobe in pozne antike ali zgodnjega srednjega veka (Turk 1999; 2002).

Od najstarejše naselbine so se ohranili sledovi hiše, zamejene z delno ohranjenimi luknjami za kole. Izredno številni so bili ostanki prostoročno izdelanih keramičnih posod – loncev, skled, vrčev, zajemalk, in kamnitega orodja – kremenih strgal, klin, puščičnih osti in

J. Korošec excavated the site in 1955 and 1956. He happened upon mainly pottery and stone finds of the Alpine Facies of the Lengyel culture, as well as pottery with furrowed incisions. Korošec dated the settlement to the Late Neolithic, the transitional period and the Early Bronze Age (Korošec 1960, 41 pp).

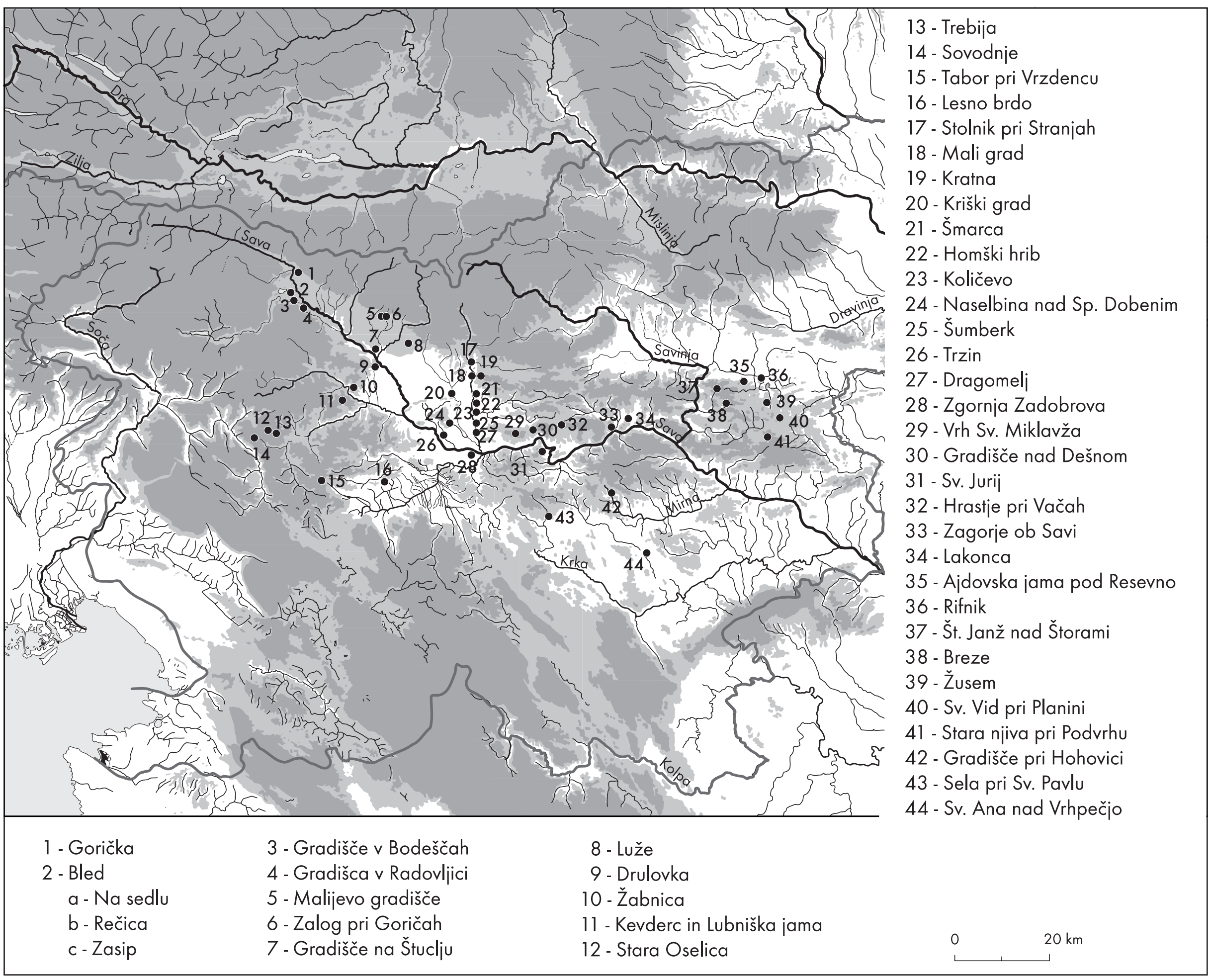
During construction efforts in 1987, retouched stone tools and arrowheads surfaced. Rescue excavations led by T. Bregant and P. Korošec followed. Three trenches with a combined surface of 34 m$^2$ revealed settlement remains dating to the Urnfield Cemetery period (Josipovič 1988, 192 pp, fig. 9).

**Lowland settlements:**

Dragomelj

The prehistoric settlement is positioned upon a gravel plain, east of the village Dragomelj. This is a lowland site bearing settlement remains from various periods: the Neolithic or Eneolithic, the Late Bronze Age and the Late Roman period or Early Middle Ages (Turk 1999; 2002).

Traces of houses, delimited with partly preserved postholes, were preserved from the oldest settlement. There




*Sl. 2.5:* Arheološka najdišča iz neolitske oziroma eneolitske dobe v osrednji Sloveniji, brez Ljubljanskega barja.
*Fig. 2.5:* Neolithic or Eneolithic archaeological sites, except the Ljubljansko barje, in central Slovenia.

sekir (Železnikar 1999, 54, foto: 5–8). Oblike in ornament na keramiki povezuje najdišče z Resnikovim prekopom in Drulovko. Predpostavlja se tudi, da gre za prvo izmed mnogih nezavarovanih nižinskih naselbin, ki naj bi spremenile poselitveno sliko neolitika-eneolitika na Savski ravni (Turk 1999, 26 s; 2002, 79 ss).[12]

Posamične najdbe

Poleg neolitskih-eneolitskih naselbin so z območja Savske ravni znane tudi posamične najdbe. Tako je bila v Zalogu pri Goričah najdena kamnita kladivasta sekira (Valič 1970, 185, sl. 1). V Blejskem kotu sta bili najdeni kamniti sekiri Na sedlu (Petru 1960-1961, 223) in v Rečici (Petru 1960-1961, 223) ter kladivo v Zasipu (Valič 1975a, 165).

Eneolitske ali zgodnje bronastodobne najdbe naj bi izvirale tudi iz Goričke na zahodni strani Mosta pri Žirovnici (Meterc 1999, 150, op. 4). Na severovzhodnem delu Kranjskega polja pri Lužah so bila najdena kamnita orodja in puščične osti (Josipović 1984, 73 ss). V Žabnici med Kranjem in Škofjo Loko je bilo najdeno kamnito kladivo (Valič 1975b, 174).

Iz Stolnika pri Stranjah izvira kamnita sekira (Vuga 1979, 244, sl. 2–3). Iz okolice Šmarce pri Kamniku naj bi izhajala dva kamnita nožička in kremenova puščica, najdena leta 1939.[13] V razpoki v kamnolomu pri Trzinu je bila najdena kamnita sekira (Gabrovec 1965, 92, t. 13: 7). Blizu papirnice na Količevem sta v strugi Bistrice 1933. leta študenta iz Jarš našla kamniti sekirici iz serpentina (Gabrovec 1965, 92, t. 13: 8,9). V Sadnikarjevem muzeju so tri serpentinaste kladivaste sekire, za katere se domneva, da izhajajo s kamniškega območja (Gabrovec 1965, 92, t. 15: 6–8). V Zg. Zadobrovi so bili pri kopanju temeljev neke hiše najdeni kamnita sekira, razne izkopanine in dva kamnita predmeta, ki sta opredeljena kot gorjača in sveder (Stare 1975b, 196).

## **2.2.4** POSAVSKO HRIBOVJE

V Posavskem hribovju so že več kot 100 let arheološko najodmevnejše najdbe z naselbin in grobišč železne dobe (glej Gabrovec 1987b, 29 ss; 1999, 145 ss; Dular 1999b, 129 ss). Šele v zadnjem času pa so bile odkrite tudi neolitske-eneolitske višinske naselbine na Kratni, na Vrhu Sv. Miklavža, na Gradišču nad Dešnom in pri Hohovici (*sl. 2.5*):

[12] Glede na naravo Pšate pred regulacijo, ki je močno meandrirala, se zdi verjetna tudi hipoteza, da je naselbina ležala v enem izmed njenih okljukov ter je bila tako naravno zavarovana (prim. Teržan 1999, 105).

[13] Najdiščni podatki so nezanesljivi. S. Gabrovec ne izključuje, da kamnito orodje lahko izvira tudi z Ljubljanskega barja (iz zbirke Pfeiffer) (Gabrovec 1965, 92, t. 13: 10–12).



were numerous remains of pottery vessels formed freehand – pots, bowls, pitchers, ladles, as well as of stone tools – flint scrapers, blades, arrowheads and axes (Železnikar 1999, 54, photo: 5–8). The forms and ornaments of the pottery link the site with Resnikov prekop and Drulovka. Furthermore, Dragomelj presumably represents one of the first among many unprotected lowland settlements, playing the influential role in altering the settlement pattern of the Neolithic-Eneolithic throughout the Savska ravan (Turk 1999, 26; 2002, 79 pp).[12]

Chance finds

In addition to the Neolithic-Eneolithic settlements known from the region of the Savska ravan are also chance finds. A stone hammer-form axe was found in Zalog near Goriče (Valič 1970, 185, fig. 1).

Two stone axes were found at Sedlo (Petru 1960-1961, 223) and Rečica (Petru 1960-1961, 223) in the Bled region, as well as a hammer at Zasip (Valič 1975a, 165).

Eneolithic and Early Bronze Age finds supposedly also originate from Gorička on the western side of Most pri Žirovnici (Meterc 1999, 150). Stone tools and arrowheads were also found in the northeastern part of the Kranj plain near Luže (Josipović 1984, 73 pp). A stone hammer was found at Žabnica between Kranj and Škofja Loka (Valič 1975b, 174).

A stone axe was discovered at Stolnik near Stranje (Vuga 1979, 244, fig. 2–3). Supposedly from the vicinity of Šmarca near Kamnik are two small stone knives and a flint arrowhead, found in 1939.[13] A stone axe was found in a crevice at the quarry near Trzin (Gabrovec 1965, 92, Pl. 13: 7). Two students from Jarše happened upon a small stone axe made of serpentine in the riverbed of the Bistrica in 1933 near the paper mill at Količevo (Gabrovec 1965, 92, Pl. 13: 8,9). Sadnikar's Museum preserves three hammer-form axes made of serpentine; they presumably originate from the region around Kamnik (Gabrovec 1965, 92, Pl. 15: 6–8). While digging the foundations of a house in Zgornja Zadobrova, two stone axes were happened upon, as well as various other material finds and two stone objects that are classified as a club and a borer (Stare 1975b, 196).

## **2.2.4** POSAVSKO HRIBOVJE

For more than 100 years, the Posavsko hribovje has disclosed the most extraordinary finds from Iron Age

[12] Considering the meandering nature of the Pšata river before its amelioration, the hypothesis that the settlement was positioned amidst one of its meanders and was thus naturally protected, seems quite plausible (cf. Teržan 1999, 105).

[13] The data regarding this site is unreliable. S. Gabrovec does not exclude the possibility that the stone tools may perhaps originate from the Ljubljansko barje (from the Pfeiffer collection) (Gabrovec 1965, 92, Pl. 13: 10–12).

Kratna

Leta 1996 so M. Bremšak, T. Cevc in F. Stele nad kmetijo Kratnar na grebenu, ki ima dva ločena vrha, našli fragment rdeče barvane keramike, fragment sklede z ježičastim izrastkom, fragment posode z zoomorfnim držajem in puščično ost s trnom in krilci iz belega prozornega sileksa (glej še Dular 2001, 91, sl. 3). Najdbe imajo analogije na Drulovki, Gradišču pri Stiški vasi. Poleg so našli tudi nekaj fragmentov halštatske keramike.[14]

Najdišče je poznal že S. Gabrovec, saj je leta 1955 pri obhodu »Gradišča« našel fragment prazgodovinske glinaste uteži. Gabrovec je najdbo povezal s kamnitim obdelanim predmetom in keramiko iz leta 1938, ki so bili najdeni pri gradnji ceste na Palovče. Te povezuje z dvema bronastima tulastima sekirama iz Sadnikarjeve zbirke, ki sta bili prav tako najdeni pri gradnji iste ceste, zato najdišče na Kratni postavlja v obdobje kulture žarnih grobišč (Gabrovec 1965, 94).

Vrh Sv. Miklavža

Naselbina je na enem izmed vrhov visoko nad Savo. M. Sagadin je posredoval podatek, da so leta 1998 pri gradbenih delih na Vrhu Sv. Miklavža naleteli na neolitske oziroma eneolitske najdbe z analogijami na Kratni.[15]

Na vrhu je bil ugotovljen tudi približno 90 × 80 m velik utrdbeni prostor, ki naj bi sodil v arheološka obdobja (Ciglenečki 1987, 291 s). Iz leta 1995 izvira močno zlizan novec domnevno iz 4. stoletja in železen okov z luknjicami, po analogijah datiran v 6. stoletje.[16]

Gradišče nad Dešnom

Naselbina se nahaja na vrhu grebenastega masiva nad Savo, približno 3 km severovzhodno od Vrha sv. Miklavža.

Leta 1997 so na Gradišču sodelavci Inštituta za arheologijo ZRC SAZU zastavili dve sondi. Ugotovili so, da je bila višinska točka poseljena v zgodnjem eneolitiku – morda tudi že v poznem neolitiku – kar pričajo zajemalke s tulastim držajem in fragment rdeče barvane sklede na nogi. Na nekoliko mlajši eneolitski razdelek kaže fragment redukcijsko žgane keramike, ki je ornamentiran z brazdastim vrezom. Dve kamniti puščični osti pa je kronološko težko opredeliti (Bizjan 1997, 11, foto; Velušček, Greif 1998, 42; glej še Dular 2001, 93, sl. 6).

Značilna keramika, železni nožek ter žlindra naj bi dokazovali, da je bila točka poseljena tudi v starejši železni dobi (Bizjan 1997, 11, foto).

14 Ustna informacija M. Bremšak, T. Cevc in F. Stele.

15 M. Sagadinu se za podatek o neolitskih-eneolitskih najdbah z Vrha sv. Miklavža najlepše zahvaljujemo.

16 Vir: S. Ciglenečki 1995, ARKAS 082512.01, IZA ZRC SAZU.

settlements and necropolises (check Gabrovec 1987b, 29 pp; 1999, 145 pp; Dular 1999b, 129 pp). Only in recent times have the Neolithic-Eneolithic upland settlements at Kratna, at Vrh Sv. Miklavža, at Gradišče nad Dešnom and at Hohovica been discovered (*fig. 2.5*).

Kratna

In 1996, M. Bremšak, T. Cevc and F. Stele discovered, just above the Kratnar farm upon the ridge, which has two separate peaks, fragments of red-slip pottery, fragments of bowls with a flanged knob, fragments of vessels with zoomorphic handles, and an arrowhead with a thorn and wings made of white transparent flint stone (check also Dular 2001, 91, fig. 3). The finds have analogies at Drulovka, Gradišče pri Stiški vasi. Some fragments of Hallstatt pottery were also found alongside.[14]

This site was already recognized by S. Gabrovec, who found a fragment of a prehistoric clay loom weight while traversing the area in 1995. Gabrovec associated the find with the stone object and pottery from 1938, which were discovered during the construction of the road to Palovče. And he associated these with two bronze socketed axes from Sadnikar's collection, both of which were also found during the construction of a road. Consequently, he attributes the Kratna site to the period of the Urnfield Cemetery culture (Gabrovec 1965, 94).

Vrh Sv. Miklavža

The settlement lies atop one of the peaks high above the Sava. M. Sagadin mediated the information that Neolithic and Eneolithic finds, analogous to those from Kratna, were happened upon during construction efforts at Vrh Sv. Miklavža.[15]

A fortified area measuring approximately 90 × 80 m was also discovered atop; presumably it dates to the archaeological periods (Ciglenečki 1987, 291 p). In 1995, a poorly preserved coin supposedly from the 4th century and an iron perforated belt plate dated to the 6th century on the basis of analogies were also discovered.[16]

Gradišče nad Dešnom

The settlement is situated atop the ridge of the massif above the Sava, approximately 3 km northeast of Vrh Sv. Miklavža.

A team of archaeologists from the Institute of Archaeology at the SRC SASA set up two trenches at Gradišče in 1997. They determined that the peak was settled during the Early Eneolithic – perhaps even during the Late Neolithic already – as attested to by the presence of ladles with socketed handles and a fragment of a red paint-

14 By word of mouth: M. Bremšak, T. Cevc and F. Stele.

15 We are very grateful to M. Sagadin for the information regarding the Neolithic-Eneolithic finds from Vrh Sv. Miklavža.

16 Source: S. Ciglenečki 1995, ARKAS 082512.01, IZA ZRC SAZU.

Gradišče pri Hohovici

Naselje leži na majhnem hribu nad reko Mirno. S poskusnim sondiranjem so odkrili naselbinske najdbe iz mlajše kamene oziroma zgodnje bakrene dobe (Dular 1998-1999, 66, karta 1: 7; 2001, 93, sl. 7).

Rifnik

Prazgodovinsko naselje je na 568 m visokem hribu južno od Šentjurja. Sledovi neolitske poselitve so bili odkriti leta 1961 na dnu železnodobnih naselbinskih plasti 1,95 m globoko ter obsegajo večinoma fragmente keramike z analogijami na Drulovki in v spodnjih plasteh Ajdovske jame (Bolta 1962-1963, 287 ss; 1975e, 291; Pirkmajer 1994, 16 s).

Posamične najdbe

Iz Posavskega hribovja so poznane tudi neolitske oziroma eneolitske posamične najdbe in najdbe, ki domnevno izvirajo iz grobov.

Tako je bilo nasproti železniške postaje v Zagorju ob Savi najdenih več kamnitih sekir in zatič iz serpentina, dve kamniti krogli ter bakrena uhata sekira s podaljšanim nastavkom za toporišče tipa Kozarac. Najdbe domnevno izvirajo iz uničenih skeletnih grobov (Müllner 1894, 221; Gabrovec 1966, 19 ss, t. 1; 2: 1–6; Velušček, Greif 1998, 36, 41).

Na Dunaju hranijo kamnito kladivo, ki je bilo najdeno v Lakonci pri Trbovljah (Bolta 1975a, 267). Kamnito sekiro so izkopali pri polaganju vodovodnih cevi v Hrastju (Stare 1958-1959, 317, t. 5: 3). Pri Litiji na južnem pobočju hriba s cerkvijo sv. Jurija je bil slučajno najden prazgodovinski kamnit artefakt (Stare 1975a, 186). V okolici Sv. Vida pri Planini so pri kopanju v neki jami našli kamnito sekiro (Bolta 1975c, 285). O kamnitih sekirah in kladivih so poročali tudi iz Ajdovske jame pod Resevno (Leben 1975, 293). Domnevno neolitsko kamnito orodje je bilo najdeno še v Brezah (Bolta 1975b, 279), kamniti sekiri pa na Št. Janžu nad Štorami (Bolta 1975f, 294) in nekje v okolici Žusma (Bolta 1975g, 297). Kamnito kladivo, ki je v *Arheoloških najdiščih Slovenije* pripisano Logu (glej Bolta 1975d, 288), dejansko izvira z lokacije Stara njiva pri Podvrhu.[17]

### **2.2.5** DOLENJSKO PODOLJE

Lahka prehodnost od severozahoda proti jugovzhodu je omogočila najkrajšo prometno povezavo med Ljubljansko in Krško kotlino. Le preval Peščenik (440 m) pri Višnji Gori predstavlja manjšo oviro. Prav zato je presenetljivo, da sta v pokrajini iz neolitskega ali eneolitskega obdobja znani samo kronološko težko opredeljiva kamnita sekira iz Sela pri Sv. Pavlu (Ložar 1933, 45

[17] Vir: S. Ciglenečki 1978, ARKAS 164003.01, IZA ZRC SAZU.

ed footed bowl. Indicative of somewhat younger Eneolithic section is a pottery fragment fired in a reducing atmosphere and ornamented with furrowed incisions. Two stone arrowheads are difficult to classify (Bizjan 1997, 11, photo; Velušček, Greif 1998, 42; check also Dular 2001, 93, fig. 6). Characteristic pottery finds, a small iron knife and slag all demonstrate that the site was settled also during the Late Iron Age (Bizjan 1997, 11, photo).

Gradišče pri Hohovici

The settlement lies upon a small hill just above the Mirna river. Trial trenches led to the discovery of settlement finds dating to the Late Stone Age and Early Copper Age (Dular 1989-1999, 66, map 1: 7; 2001, 93, fig. 7).

Rifnik

The prehistoric settlement lies 568 m above sea level, high upon a hill south of Šentjur. Traces of Neolithic settlements were discovered in 1961 at the bottom of Iron Age settlement layers, 1.95 m deep. These remains comprise mostly of pottery fragments that are analogous with those from Drulovka and those from the lower layers at Ajdovska jama (Bolta 1962-1963, 287 pp; 1975e, 291; Pirkmajer 1994, 16 p).

Chance finds

Neolithic and Eneolithic chance finds supposedly originating from graves are also known from among the Posavsko hribovje.

Discovered across from the train station in Zagorje along the Sava were numerous stone axes and a bung made of serpentine, two stone spheres and a copper collared axe with an extended shaft for helve, of the type Kozarac. The finds supposedly originate from destroyed inhumation graves (Müllner 1894, 221; Gabrovec 1966, 19 pp, Pl. 1; 2: 1–6; Velušček, Greif 1998, 36, 41).

A stone hammer that was discovered at Lakonca near Trbovlje is preserved in Vienna (Bolta 1975a, 267). A stone axe was uncovered while laying the water line in Hrastje (Stare 1958-1959, 317, Pl. 5: 3). Near Litija, along the southern slope of the hill where the St Jurij's church stands, a prehistoric stone artifact was found arbitrarily (Stare 1975a, 186). While digging a ditch in the vicinity of Sv. Vid near Planina a stone axe was uncovered (Bolta 1975c, 285). Stone axes and hammers were also reported from Ajdovska jama below Resevna (Leben 1975, 293). Supposedly Neolithic stone tools were also discovered at Breze (Bolta 1975b, 279), as well as two stone axes at Št. Janž above Štore (Bolta 1975f, 294) and somewhere in the vicinity of Žusem (Bolta 1975g, 297). The stone axe, which is attributed to Log in *Arheološka najdišča Slovenije* (check Bolta 1975d, 288), in fact originates from Stara njiva near Podvrh.[17]

[17] Source: S. Ciglenečki 1978, ARKAS 164003.01, IZA ZRC SAZU.

s, Pod. 30) in višinska naselbina na Sv. Ani nad Vrhpečjo (Dular et al. 1991, 76 ss), ki je na skrajnem južnem robu naravnogeografske enote (*sl. 2.5*). Zdi se, da to ni posledica slabše raziskanosti območja, temveč se na takšen način potrjuje teza, da so na Dolenjskem podolju višinske naselbine značilen neolitski-eneolitski naselbinski tip. Vsaj tako kažejo raziskave ob izgradnji avtoceste. V nižini niso naleteli na nobeno neolitsko-eneolitsko naselbino, pač pa na poselitvene ostanke iz bronaste dobe pri Podsmreki (Dular 1999a, tab. 1) in v Selah pri Dobu (Teržan 1999, 108). Že dalj časa so tudi znani rimskodobni ostanki v okolici Trebnjega, kjer je odkrita trasa državne ceste (Šašel 1972, 139) ter naselbina z nekropolo (Breščak 1989, 220 s; Slabe 1993 in tam navedena literatura).

Sv. Ana nad Vrhpečjo

Naselbina leži na vrhu kopastega hriba sv. Ane (407 m). Ob južnem vznožju hriba je jama Zijalo, kjer priteče drugič na dan potok Temenica.

V naselbini so raziskovali sodelavci Inštituta za arheologijo ZRC SAZU. Na njenem vzhodnem delu so zastavili manjšo sondo, v kateri so naleteli na najdbe iz eneolitika, kulture žarnih grobišč, starejše in mlajše železne dobe ter pozne antike (Dular et al. 1991, 78 ss).

## **2.2.5** DOLENJSKO PODOLJE

Between the Ljubljana and Krško basins, the shortest route from the northwest to the southeast was easily traversed. Only the Peščenik pass (440 m) near Višnja Gora presented a slight hurdle. Consequently, it is relatively surprising that the only representatives of the Neolithic and Eneolithic periods known from the region are the two chronologically barely classifiable stone axes from Selo pri Sv. Pavlu (Ložar 1933, 45 p) and the upland settlement at Sv. Ana nad Vrhpečjo (Dular et al. 1991, 76 pp), which is at the far southern edge of this geographic unit (*fig. 2.5*). It seems that this is not so much the result of a poor stance of investigations, but rather a confirmation of the postulation that upland settlements are a characteristic Neolithic-Eneolithic settlement type throughout the Dolenjsko podolje. This is certainly demonstrated by investigations carried out in the framework of the construction of the highway system. No traces of Neolithic-Eneolithic settlement have been discovered yet in the lowlands, except the Bronze Age settlement remains at Podsmreka (Dular 1999a, Table 1) and at Sela pri Dobu (Teržan 1999, 108). The Roman period remains in the vicinity of Trebnje are long known already; the course of the main road was discovered here (Šašel 1972, 139) as well as the settlement and its respective necropolis (Breščak 1989, 220 p; Slabe 1993 and the literature there cited).

Sv. Ana nad Vrhpečjo

The settlement lies atop the cumulous hill of St Ana (407 m). The Zijalo cave is at the southern foot of the hill, where the Temenica stream bubbles up a second time.

A team from the Institute of Archaeology at the SRC SASA researched the settlement. Having set up a small trench along it eastern part, finds dating to the Eneolithic, the Urnfield Cemetery culture, the Early and Late Iron Ages as well as the Late Roman period were discovered (Dular et al. 1991, 78 pp).

# 3 HOČEVARICA: TERENSKE RAZISKAVE, PREDSTAVITEV NAJDB IN NARAVOSLOVNE ANALIZE

# 3 HOČEVARICA: FIELD RESEARCH, A PRESENTATION OF THE MATERIAL FINDS AND THE SCIENTIFIC ANALYSES

## **3.1** TERENSKE RAZISKAVE, STRATIGRAFIJA IN NAJDBE

## **3.1** FIELD RESEARCH, STRATIGRAPHY AND THE MATERIAL FINDS

ANTON VELUŠČEK

*Izvleček*

*Predstavljamo stratigrafske podatke in najdbe s Hočevarice s sondiranja v letu 1998 ter slučajne najdbe iz bližnje reke Ljubljanice.*

*Na Hočevarici smo dokumentirali dve naselbinski fazi. Med številnimi najdbami izstopajo skoraj v celoti ohranjen lok, kamniti obročki za ogrlice, odlomek kosti morske ribe in predmeti, ki dokazujejo domačo metalurgijo bakra.*

*Abstract*

*Presented are the stratigraphic data and material finds from Hočevarica from the probe excavations in 1998 as well as the chance finds from the nearby Ljubljanica river.*

*Two settlement phases were documented at Hočevarica. From among the numerous finds, particularly exceptional are the almost entirely preserved bow, stone ringlets for a necklace, a fragment of the bone of a sea fish and objects attesting to existence of local copper metallurgy.*

### **3.1.1** LEGA NAJDIŠČA

**Koda najdišča:**[1] 084303.02

**Lega:** Koliščarska naselbina leži na desnem bregu Ljubljanice ob ustju Hočevarice na Ljubljanskem barju (*sl. 3.1.1*).

**Koordinate po karti 1 : 5000:** x = 5 448 475; y = 5 091 100; nadmorska višina 290 m.

[1] Najdišče je katalogizirano po programu ARKAS (glej Tecco Hvala 1992; Modrijan 1994).

### **3.1.1** POSITION OF THE SITE

**Site code:**[1] 084303.02

**Position:** The pile dwelling settlement lies along the right bank of the Ljubljanica, by the outlet of the Hočevarica in the Ljubljansko barje (*fig. 3.1.1*).

**Map coordinates, scale 1 : 5000**: x = 5 448 475; y = 5 091 100; 290 m above sea level.

[1] The site is categorized according to the ARKAS program (check Tecco Hvala 1992; Modrijan 1994).

*Sl. 3.1.1:* Pogled na Hočevarico z jugovzhoda. Foto: M. Turk.
*Fig. 3.1.1:* Hočevarica. A view from the southeast. Photo: M. Turk.

**3.1.2** DOSEDANJA RAZISKOVANJA

Maja 1992 so najdišče odkrili sodelavci Narodnega muzeja Slovenije iz Ljubljane (Velušček 1997b, 205 s). Leta 1995 je ekipa Inštituta za arheologijo ZRC SAZU na območju jarka izvedla dokumentiranje in vzorčenje arheološkega lesa za dendrokronološke raziskave (Čufar et al. 1997, 39 ss; Velušček 1997a, 26 ss; Čufar, Levanič, Velušček 1998, 75 ss). Podobno akcijo smo opravili tudi avgusta 1998, in sicer v sklopu priprav na sondiranje, ki je potekalo od začetka septembra do sredine oktobra 1998.

**3.1.3** SONDIRANJE

3.1.3.1 Lega sonde

Na najdišču, ki obsega najmanj 1 hektar površine, smo lego sonde določili na podlagi opazovanj zahodne stene jarka in z mrežo poskusnih vrtin, ki smo jih zastavili na njivi zahodno od jarka (*sl. 3.1.2*).

Sonda je tako bila postavljena približno 2 m zahodno od Hočevarice in približno 50 m južno od Ljubljanice. 2 m široko in 4 m dolgo saondo smo razdelili na 8 mikrokvadratov po 1 × 1 m (*sl. 3.1.3*).

Merski sistem je bil postavljen tako, da je stala izho-

**3.1.2** CURRENT STANCE OF INVESTIGATIONS

Members of the National Museum of Slovenia in Ljubljana discovered the site in May 1992 (Velušček 1997b, 205 p). In 1995, a team from the Institute of Archaeology at the SRC SASA documented and collected archaeological wood samples for dendrochronological research purposes from the region of the ditch (Čufar et al. 1997, 39 pp; Velušček 1997a, 26 pp; Čufar, Levanič, Velušček 1998, 75 pp). A similar operation was carried out again in August 1998 in preparation for the probe excavations that followed from the beginning of September to mid October 1998.

**3.1.3** PROBE EXCAVATIONS

3.1.3.1 Positioning of the trench

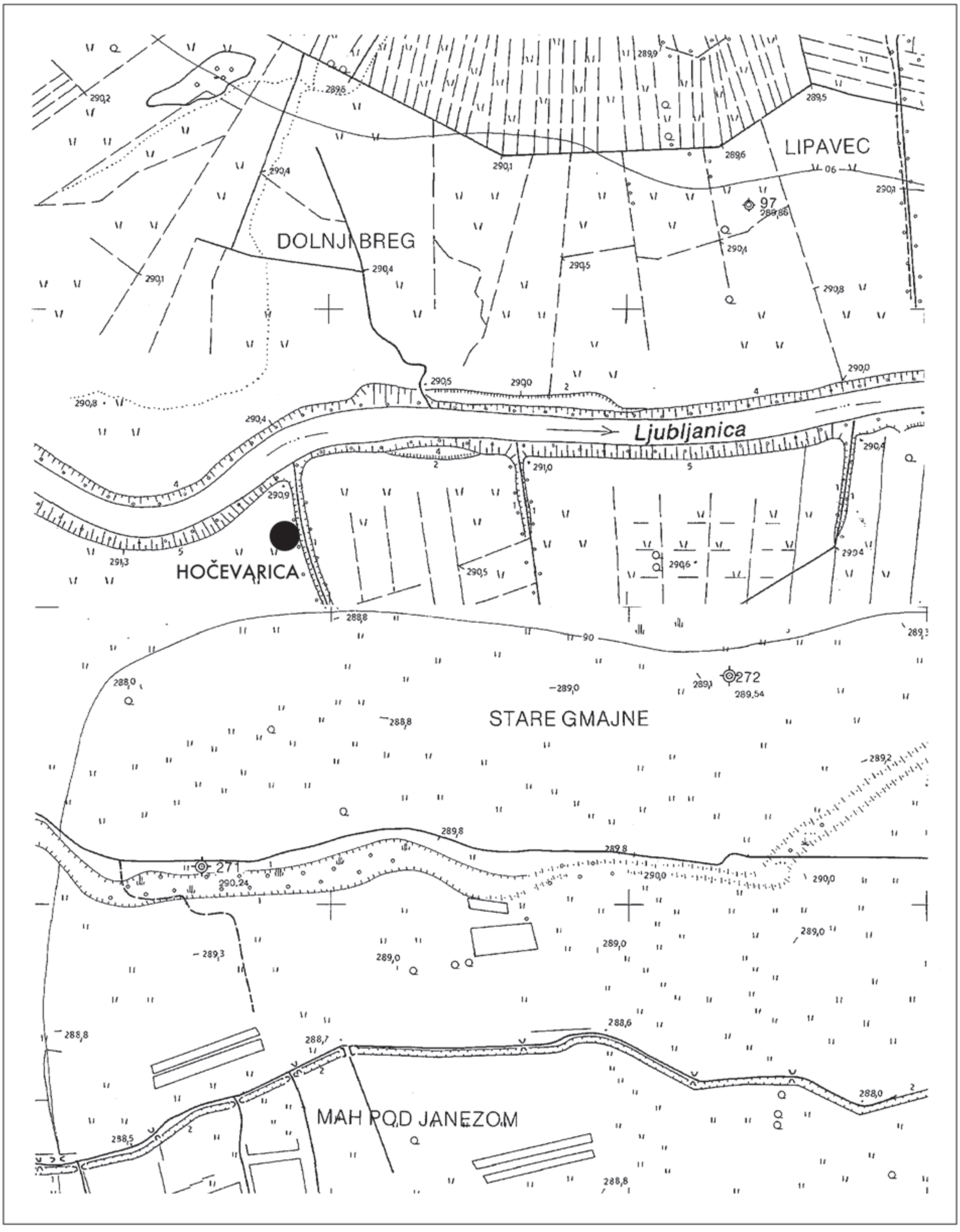
The positioning of the trench at the site, which covers a surface of at least 1 hectare, was determined on the basis of observing the western wall of the ditch and a network of sample boreholes that covered the field just west of the ditch (*fig. 3.1.2*).

The trench was thus set up approximately 2 m west of Hočevarica and about 50 m south of the Ljubljanica.

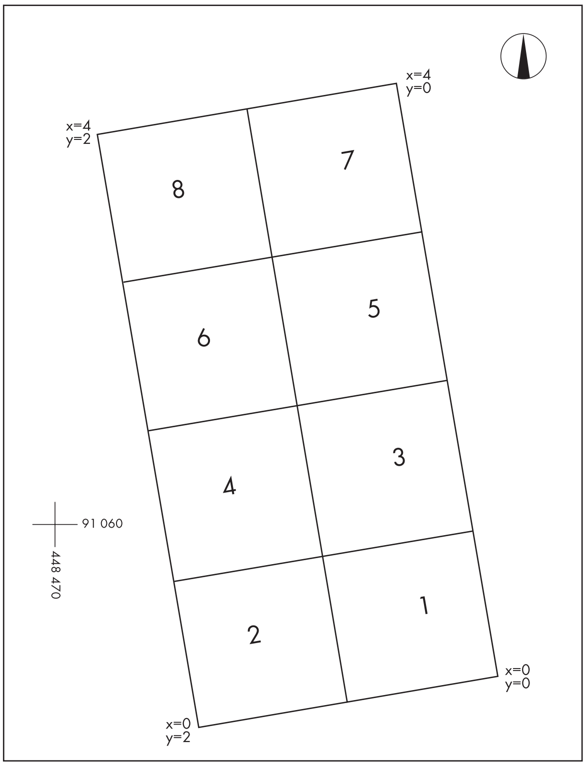
diščna točka x = 0; y = 0 v bližini jarka. Vrednosti x so naraščale proti severozahodu in y proti jugozahodu. Na vzhodnem delu sonde pri vrednosti y = 0 so bili razporejeni mikrokvadrati 1, 3, 5 in 7, na zahodnem delu pri vrednosti y = 2 pa mikrokvadrati 2, 4, 6 in 8. Vse višine

It was 2 m wide and 4 m long. The trench was divided into 8 micro-quadrants of 1 × 1 m (*fig. 3.1.3*).

The measuring unit system was set such that the starting-point x = 0; y = 0 was positioned near the ditch. The x values increased towards the northwest and the y




*Sl. 3.1.2:* Pozicija sonde na Hočevarici na TTN 1 : 5000 št. Vrhnika 28 in 38.
*Fig. 3.1.2:* The position of the trench at Hočevarica, scale of the map = 1 : 5000; map number Vrhnika 28 and 38.




*Sl. 3.1.3:* Hočevarica. Mreža mikrokvadratov v sondi.
*Fig. 3.1.3:* Hočevarica. The grid of micro-quadrants in the trench.

na sondi so bile merjene od iste osnove, ki je imela izmerjeno absolutno višino 290,31 m.

### 3.1.3.2 Tehnika izkopavanja

Najprej smo odstranili vrhnje plasti humusa in sterilne gline do nivoja kulturne plasti. Ko smo slednjo dosegli, smo rob sonde obdali z deskami, ga tako utrdili, in postavili težko leseno ploščad s kovinskim ogrodjem. Ploščad, ki je sestavljena iz jeklenih cevi in desk, omogoča izkope v globini 0,3 do 2,70 m (*sl. 3.1.4*), hkrati pa smo z njeno uporabo preprečili nekontroliran poseg v kulturno plast.

Sediment kulturne plasti iz mikrokvadratov 1, 4, 5 in 8 smo sprali z vodo skozi kovinska sita z odprtinami: 3 mm, 1 mm in 0,5 mm. V sitih zajete vzorce smo posušili in pripravili za nadaljnjo obdelavo na Inštitutu za arheologijo in na Biološkem inštitutu Jovana Hadžija ZRC SAZU. Sediment iz ostalih mikrokvadratov pa smo samo razgrnili, kolikor je bilo mogoče skrbno pregledali in dokumentirali arheološke najdbe.

Zaradi spuščanja ploščadi smo kole krajšali. Da bi

*Sl. 3.1.4:* Hočevarica. Ploščad. Foto: A. Velušček.
*Fig. 3.1.4:* Hočevarica. The platform. Photo: A. Velušček.



values towards the southwest. To the eastern part of the trench the micro-quadrants 1, 3, 5 and 7 were partitioned at the y = 0 value, and to the western part the micro-quadrants 2, 4, 6 and 8 at the y = 2 value. All heights in the trench were measured from the same source, which had an absolute height of 290.31 m.

### 3.1.3.2 Excavation technique

To begin, the upper layers of turf and sterile clay were removed down to the level of the cultural layer. Upon reaching the latter, the edge of the trench was planked and thus fortified. A heavy wooden platform with a metal frame was placed atop. The platform, comprised of steel pipes and plank boards, enabled excavation from a depth of 0.3 to 2.70 m (*fig. 3.1.4*), while at the same time it served to prevent uncontrolled access into the cultural layer.

The sediment from the cultural layer in micro-quadrants 1, 4, 5 and 8 was wet-sieved through metal sieves with perforations measuring 3.0 mm, 1.0 mm and ultimately 0.5 mm. The collected sieve samples were dried and prepared for further analysis at the Institute of Archaeology and at the Jovan Hadži Institute of Biology at the SRC SASA. The sediment from the remaining micro-quadrants was only spread out and carefully checked and documented for archaeological finds.

The piles had to be cut so as to enable the platform to be lowered. Each pile was marked with a consecutive identification number immediately upon discovery, so as to avoid future confusion. A sample was taken from

se izognili zmešnjavi, smo vsak kol takoj ob odkritju označili z zaporedno identifikacijsko številko. Od vsakega kola smo vzeli vzorec za dendrokronološke raziskave, ki so jih izvedli v Dendrokronološkem laboratoriju Oddelka za lesarstvo Biotehniške fakultete Univerze v Ljubljani.

Pri sondiranju je sodelovala palinologinja M. Jeraj z Biološkega inštituta J. Hadžija ZRC SAZU, ki je zbirala oglje in ostanke semen. Iz severnega profila sonde je vzela vzorce za pelodne analize, na območju najdišča pa je po končanem sondiranju izvrtala tudi nekaj palinoloških vrtin.

V severnem profilu sonde so bili odvzeti vzorci za ugotavljanje vsebnosti fosfatov v sedimentu. Ustrezno analizo so opravili v laboratoriju Centra za pedologijo in varstvo okolja na Oddelku za agronomijo Biotehniške fakultete.

Dokumentacijo o sondiranju hrani Inštitut za arheologijo ZRC SAZU. Arheološke najdbe (keramika, kosti, lesene in kamnite najdbe) in rastlinske makroostanke hrani Mestni muzej v Ljubljani pod inv. št. A116. Dendrokronološki vzorci so na Oddelku za lesarstvo Biotehniške fakultete.

### 3.1.3.3 Stratigrafski prikaz

Za ponazoritev stratigrafije na najdišču Hočevarica služi severni profil sonde (*sl. 3.1.5*). Na dnu izkopa je peščenoilovnata do ilovnata **plast 10** sive barve, v katero so prodrle redke arheološke najdbe. To plast po celotni površini sonde prekrije 2 do 4 cm debela črno obarvana organska **plast 9** – gre za mah iz družine Drepanocladaceae (glej *poglavje 3.2*).

each pile for dendrochronological research purposes, which were carried out by the Dendrochronological Laboratory at the Department of Wood Science and Technology at the Biotechnical Faculty, University of Ljubljana.

Palynologist M. Jeraj from the Institute of Biology collaborated in the probe excavations; she gathered samples of charcoal and seed remains. She collected samples for palynological analyses from the northern profile of the trench and took a few palynological borehole samples from the area of the site after the probe excavations were finished.

Samples were taken from the northern profile for determination of the value of phosphates in the sediment. The laboratory at the Center for Pedology and Protection of the Environment, Department of Agronomy at the Biotechnical Faculty carried out the appropriate analysis.

The documentation from the probe excavation is preserved at the Institute of Archaeology at the SRC SASA. The archaeological finds (pottery, bones, wood and stone artifacts) and vegetal macro-remains are preserved at the City Museum of Ljubljana under the inventory no. A116. The dendrochronological samples are at the Department of Wood Science and Technology at the Biotechnical Faculty.

### 3.1.3.3 Stratigraphy

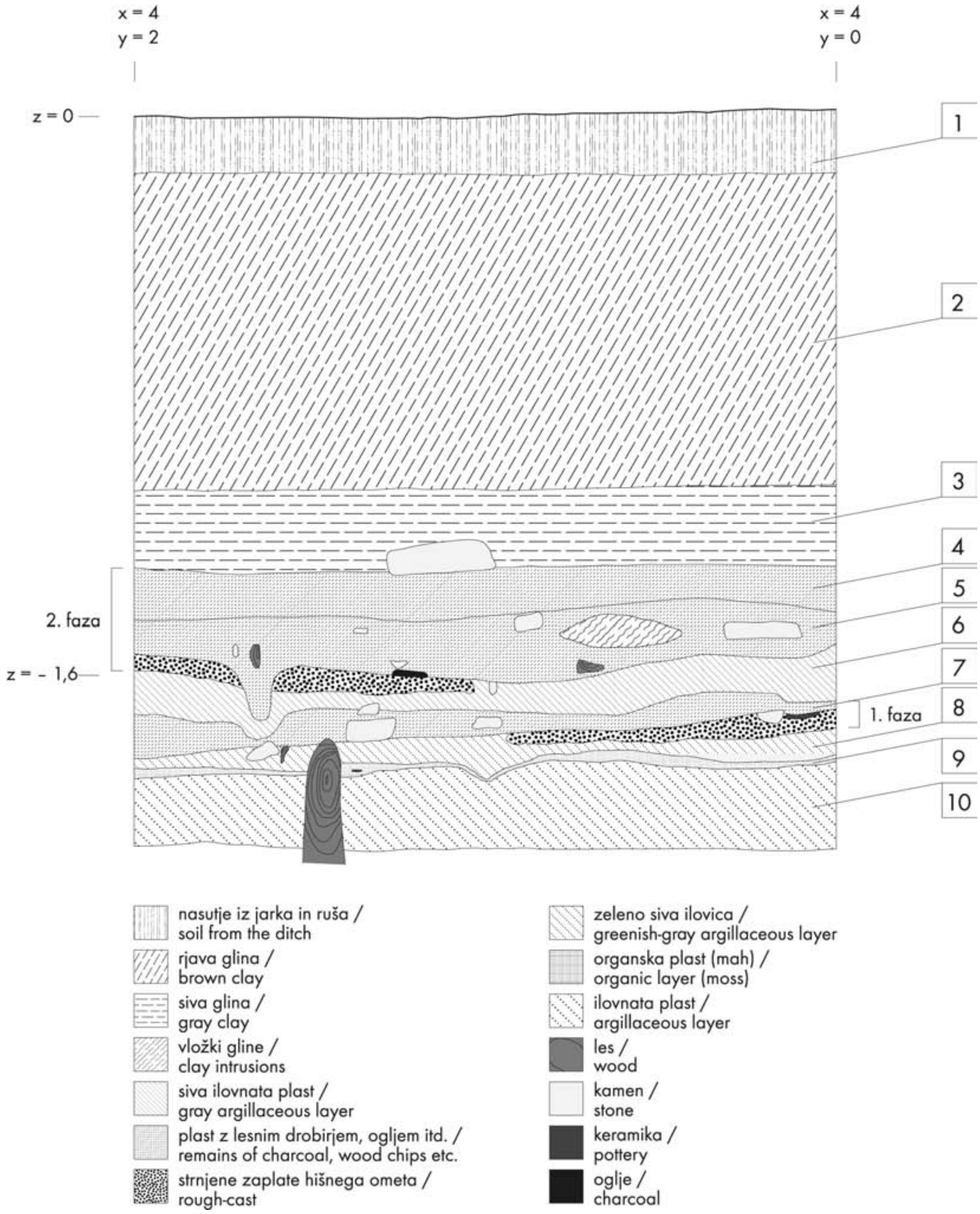
The northern profile of the trench serves well to illustrate the stratigraphy at Hočevarica (*fig. 3.1.5*). At the bottom of the trench is a sandy-argillaceous to argillaceous, gray **layer 10**, into which the rare archaeologi-

| **Gl. v cm / Deep in cm** | **$P_2O_5$ mg/100 g** | **Pesek skup. / Sand total %** | **Melj grobi / Roug silt %** | **Melj fini / Fine silt %** | **Melj skup. / Silt total %** | **Glina / Clay %** | **Teksturni razred / Texture class** |
|---|---|---|---|---|---|---|---|
| **24–80** | 1,5 | 4,8 | 21,3 | 37,5 | 58,8 | 36,4 | MGI |
| **80–90** | 1,2 | 2,0 | 14,4 | 38,2 | 52,6 | 45,4 | MG |
| **90–105** | 1,4 | 1,6 | 8,0 | 36,4 | 44,4 | 54,0 | MG |
| **105–134** | 10,2 | 2,6 | 15,5 | 26,6 | 42,1 | 55,3 | MG |
| **134–144** | 193,0 | 39,6 | 21,3 | 17,1 | 38,4 | 22,0 | I |
| **144–166** | 450,0 | 41,0 | 22,0 | 13,8 | 35,8 | 23,2 | I |
| **166–179** | 193,0 | 32,4 | 20,6 | 21,1 | 41,7 | 25,9 | GI–I |
| **179–187** | 511,0 | 42,2 | 21,1 | 15,0 | 36,1 | 21,7 | I |
| **187–192** | 384,0 | 50,7 | 21,6 | 10,9 | 32,5 | 16,8 | PI–I |

*Tab. 3.1.1:* Analitski podatki vzorcev sedimenta iz severnega profila sonde.*
*Table 3.1.1:* Analytic data of the sediment samples from the northern cross-section of the trench.*

* Tabela iz Poročila o opravljenih analizah v laboratoriju Centra za pedologijo in varstvo okolja na Oddelku za agronomijo Biotehniške fakultete Univerze v Ljubljani, ki ga vodi A. Hodnik; iz A. Velušček, Elaborat Hočevarica št. 390/34-1, Inštitut za arheologijo ZRC SAZU.

* Analitic data were perfromed by A. Hodnik's group from the Biotehnical faculty of the University of Ljubljana.



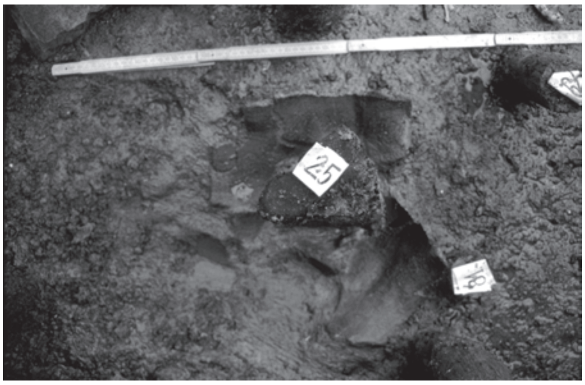

*Sl. 3.1.5:* Hočevarica. Severni profil sonde.
*Fig. 3.1.5:* Hočevarica. The northern cross-section of the trench.

Nad črno organsko plastjo leži zelenkastosiva ilovnata **plast 8**, ki je debela do 15 cm. V mikrokvadratih 5 in 7 so v zgornjem delu plasti najdeni strnjeni ostanki glinastega ometa, kamni in keramika. Večina keramičnih fragmentov, ki so bili najdeni na tem mestu, je bila zapičena v ruševinsko plast.

V mikrokvadratu 6 smo naleteli na več fragmentov lonca (*t. 4.1.3:* 2), ki so obdajali hrastov kol št. 25. Iz položaja fragmentov in kola je razvidno, da je kol z zabi-

cal find penetrated. A 2 to 4 cm thick black organic **layer 9** – with a moss from the family Drepanocladaceae (check *chapter 3.2.*) – covers this layer over the entire surface of the trench. A greenish-gray argillaceous **layer 8**, measuring up to 15 cm thick covers the black organic layer. In the micro-quadrants 5 and 7 condensed remains of clay roughcasting, stone and pottery were found in the upper part of this layer. The majority of pottery fragments found here was thrust in the ruinate layer.

Numerous fragments of a pot (*pl. 4.1.3:* 2) were



*Sl. 3.1.6:* Hočevarica. Lonec in kol št. 25. Foto: A. Velušček.
*Fig. 3.1.6:* Hočevarica. Pot and pile no. 25. Photo: A. Velušček.

janjem predrl ostenje na tleh ležeče že razbite posode (*sl. 3.1.6*).

V plasti 8 je koncentracija fosfatov zelo visoka in doseže vrednost 511,0 mg/100 g. Pelodni diagram severnega profila kaže, da se tu vrednosti peloda trav (NAP) strmo dvignejo na račun upada krivulje drevesnega peloda (AP) (glej pelodni diagram v *poglavju 3.2*).

V globini okoli –1,74 m se pojavi temnorjava do črna, glinastoilovnata do ilovnata **plast 7** z ostanki oglja, lesnega drobirja, kamni in številnimi arheološkimi najdbami. Debelina **plasti 7** niha med 5 in 15 cm. Koncentracija fosfatov se zmanjša na vrednost 193,0 mg/ 100 g.

Okoli globine –1,65 m se pojavlja svetlejša siva ilovnata **plast 6**, ki jo je bilo zelo težko razlikovati od plasti nad njo. Plast je dobro vidna v profilu in v celoti prekriva plast 7. Njena debelina niha med 10 in 15 cm. Iz pelodnega diagrama je razvidno, da se vrednosti peloda trav (NAP) zmanjšajo na račun porasta vrednosti drevesnega peloda (AP).

Na **plasti 6** leži v mikrokvadratu 8 strnjena zaplata glinastega ometa oziroma ožgane gline, ki je prekrita s približno 25 cm debelo temnorjavo do črno plastjo v kateri so ostanki oglja, lesni drobir in kamni (**plasti 5** in **4**). V **plasteh 5** in **4** je tudi veliko arheoloških najdb, ki se pojavljajo še v globini okoli –1,30 m, višje pa ne. Podobna situacija je tudi v mikrokvadratih 3 in 1. Tu strnjeno plast glinastega ometa in kamnov prekriva plast z lesnim drobirjem, ogljem, itd. V njej so vložki mivke in svetle gline, ki smo jih zaznali v mikrokvadratih 1–4.

V **plasti 5** koncentracija fosfatov ponovno močno naraste na vrednosti 450,0 mg/100 g. Podobno se zgodi s pelodi trav, posebno peloda **cerealia**, ki dosegajo visoke vrednosti.

V zgornjem delu plasti **plasti 4** je opazno upadanje koncentracije fosfatov na vrednost 193,0 mg/100 g. Nekoliko višje v globini –1,34 do –1,05 m pa celo na vrednost 10,2 mg/100 g. Enako se dogaja z vrednostmi NAP na račun zviševanja vrednosti AP.

Zgornji rob **plasti 4** predstavlja mejo prekinitve

found in micro-quadrant 6; they were surrounding the oak pile no. 25. The positioning of the fragments and the pile prove that when the pile was driven into the ground it broke the wall of the already fragmented vessel lying beneath (*fig. 3.1.6*).

The concentration of phosphates in **layer 8** is very high, reaching a value of 511.0 mg/100 g. The pollen diagram from the northern profile shows that the values of grass pollen (NAP) rise acutely on account of the decrease in the curve of tree pollen (AP) (check the pollen diagram in *chapter 3.2*).

**Layer 7** begins approximately at a depth of –1.74 m; it is a dark brown, almost black clay-loam layer containing remains of charcoal, wood chips, stones and numerous archaeological finds. The thickness of **layer 7** varies between 5 and 15 cm. The concentration of phosphates decreases to the value of 193.0 mg/100 g.

A lighter gray argillaceous **layer 6** begins at a depth of –1.65 m; this layer was difficult to differentiate from the one beneath it. The layer is more discernible in the profile and it covers layer 7 entirely. Its thickness varies between 10 and 15 cm. The pollen diagram shows that the pollen values of grasses (NAP) decrease on account of the increase in tree pollens (AP).

A condensed patch of clay roughcasting, or burned clay, lies atop **layer 6** in micro-quadrant 8. Covering it is a 25 cm thick layer of dark brown to black soil with remains of charcoal, wood chips and stones (**layers 5** and **4**). There are also many archaeological finds in **layers 5** and **4**; the finds are documented up to the depth of about –1.30 m, although not higher than this. A similar situation is also in micro-quadrants 3 and 1. Here the condensed patches of burned clay in stones are covered with a layer of wood chips, charcoal, etc., which incorporates patches of very fine sand and light colored clay; these were also documented in micro-quadrant 1–4.

The concentration of phosphates in **layer 5** increases again to a value of 450.0 mg/100 g. A similar pattern occurs with the grass pollen, especially that of **cerealia**, which attain a very high value. The concentration of phosphates decreases to a value of 193.0 mg/ 100 g in the upper part of **layer 4**; and at the depth of between –1.34 and –1.05 m it even falls to the value of 10.2 mg/100 g. The same occurs to the value of NAP on account of the increase in the value of AP.

The upper edge of **layer 4** represents the interruption of anthropogenic activity in this region, and it continued through to the beginning of the new era of cultivating the land.

Covering **layer 4** are layers, whose origins may be associated with the period after the end of the settlement; that is, with the activity of the Ljubljanica and other waterways, as well as humankind. The latter holds true especially for the highest **layer 1**.

From the depth of approximately –1.30 m to the surface are first the silty-clay gray **layer 3** and a similar antropogenega delovanja na tem območju, ki je trajalo do začetka novodobnega kmetijskega obdelovanja površin.

**Plast 4** prekrivajo plasti, katerih nastanek lahko povežemo s časom po koncu naselbine, torej z delovanjem Ljubljanice, drugih vodotokov ter tudi človeka. Slednje velja predvsem za najvišjo **plast 1**.

Tako si od globine okoli –1,30 m do površja sledijo meljasto glinasta siva **plast 3** ter podobna višja rjavkasta **plast 2**. Na njej leži **plast 1** – to je nasutje iz jarka, ki ga prekriva travnata ruša. V teh plasteh nismo naleteli na arheološke ostaline *in situ*. Iz bližnjega jarka tako izhaja tudi fragment lonca (*t. 4.1.11:* 14), ki se tipološko ujema z ostalo keramiko na Hočevarici.

V plasti koncentracija fosfatov upade na normalen nivo, to je okoli 1,2 mg/100 g. Pelodni diagram kaže na ponoven porast gozda od globine okoli –1,40 m navzgor. Okoli globine –1,05 m pa zasledimo sledove pedogeneze, saj je to območje že dolgo v kmetijski obdelavi (Jeraj 2000, 109).

## **3.1.4** ARHEOLOŠKE NAJDBE IZ SONDE

Na Hočevarici količinsko prevladuje keramično posodje (glej *poglavje 4.1*). Številne so tudi najdbe, ki kažejo na gospodarsko aktivnost koliščarjev. Gre za predmete iz lesa, kosti, kamna ter za najdbe, ki jih lahko povežemo z metalurgijo bakra. Najdemo še nakitne predmete in človeške zobe.

V nadaljevanju predstavljamo nekeramične najdbe iz sonde ter podobne najdbe iz jarka Hočevarice in iz Ljubljanice ob ustju Hočevarice.

### 3.1.4.1 Razporeditev skupkov z najdbami

*Faza 1:* skupki 23 do 18 v plasteh 10 do 7.
*Prekinitev v poselitvi (mešanje najdb iz obeh naselbinskih faz – faza 1/2):* skupka 17 in 14 v plasti 6.
*Faza 2:* skupki 16, 15, 13 do 4 v plasteh 5 in 4.
*Nasutje:* skupek 1 v plasti 1.

### 3.1.4.2 Najdbe iz lesa

Med lesenimi najdbami je največ prevrtanih jagod za ogrlice (*sl. 3.1.7*). Zelo pomembna najdba je skoraj v celoti ohranjen lok (*sl. 3.1.9; 3.1.10*). Potrebno je omeniti tudi dve rahlo ukrivljeni leseni šili – morda gre za mikalnikov ali glavnikov zob (*sl. 3.1.13*).

Lesene jagode

Grobo izdelane lesene bikonične jagode s premerom okoli 1,5 cm (*sl. 3.1.7*) se običajno povezuje z nakitom (npr. Korošec 1963, 25). Na Ljubljanskem barju jih

brown **layer 2** above it. Above this is **layer 1**, which is the soil from the ditch and covered by grass. No archaeological finds were discovered *in situ* in these layers. As such, a fragment of a vessel (*pl. 4.1.11:* 14) from a nearby ditch typologically correlates with the pottery from Hočevarica.

The concentration of phosphates in this layer falls to a normal level, which is approximately 1.2 mg/100 g. The pollen diagram shows a regeneration of forestland from the depth of about –1.40 m upwards. Traces of pedogenesis are discerned at the depth of about –1.05 m; this is a region that endured an extended period of cultivation (Jeraj 2000, 109).

## **3.1.4** ARCHAEOLOGICAL FINDS FROM THE TRENCH

Pottery vessels certainly represent the large majority of finds at Hočevarica (check *chapter 4.1*). There are also many objects evidencing the economic activity of the pile dwellers. These objects are those made of wood and stone, as well as those, which correlate with the metallurgy of copper. Jewelry and human teeth were also found.

The continuation presents the non-pottery finds from the trench, equipped with a commentary and catalogue, as well as the analogous finds from the Hočevarica trench and from the Ljubljanica, the section by the outlet of the Hočevarica.

### 3.1.4.1 Distribution of sub-phases with archaeological finds

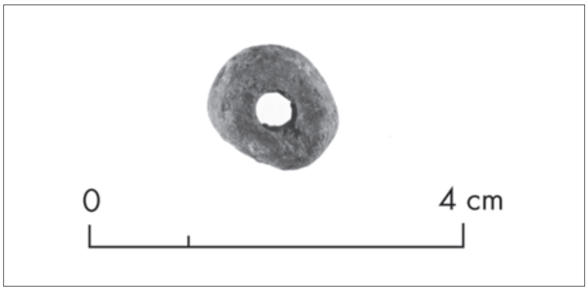
*Phase 1:* sub-phases 23 to 18 in layers 10 and 7.
*Interruption in occupation (mixture of finds from both settlement phases – phase 1/2):* sub-phases 17 and 14 in layer 6.
*Phase 2:* sub-phases 16, 15, 13 to 4 in layers 5 and 4.
*Fill:* sub-phase 1 in layer 1.

### 3.1.4.2 Wooden finds

The majority of the wooden finds are wooden beads from necklaces (*fig. 3.1.7*; *3.1.8*). An exceptional find is that of an entirely preserved bow (*fig. 3.1.9*; *3.1.10*). Also noteworthy are two slightly bent wooden awls, or perhaps they are just teeth from a hackle or comb (*fig. 3.1.13*).

Wooden beads

Roughly made wooden bi-conical beads with a diameter of about 1.5 cm (*fig. 3.1.7*) are usually linked with necklaces (e.g. Korošec 1963, 25). Such beads are known




*Sl. 3.1.7:* Hočevarica. Lesena jagoda. Foto: M. Zaplatil.
*Fig. 3.1.7:* Hočevarica. Wooden bead. Photo: M. Zaplatil.

poznamo npr. z Maharskega prekopa (Bregant 1975, t. 8: 18), Notranjih Goric (Harej 1980, t. 1: 9), Blatne Brezovice (Korošec 1963, t. 13: 4,5) in Starih gmajn (Velušček 1997b, 207 ss).

Določena je samo jagoda s Starih gmajn. Izdelana je iz lesne skorje, najverjetneje hrastove ali jelševe. A. Šercelj, ki jo je determiniral, zaradi tega domneva, da bi se lahko uporabljala kot okrasna jagoda za ogrlico ali kot člen v nizu plovcev za ribiške potrebe.[2, 3]

Prebivalci s Hočevarice so jagode za ogrlice izdelovali tudi z vrtanjem in brušenjem koščic (*sl. 3.1.8*). To je dokaz več, da je prazgodovinski človek koristno uporabil vse razpoložljive vire. Identične najdbe poznamo z

*Sl. 3.1.9:* Hočevarica. Lok. Foto: K. Čufar.
*Fig. 3.1.9:* Hočevarica. A bow. Photo: K. Čufar.

[2] Ustna informacija A. Šercelj.

[3] Zaradi številnih ribjih kosti, ki smo jih odkrili na Hočevarici (glej *poglavje 3.8*), se zdi teza, da gre za plovce, povsem mogoča.
Manj argumentov zanjo je v arheoloških virih, čeprav je ribolov na trnek s plovcem znan vsaj od mezolitika dalje. Prazgodovinski ribiči so za ribolov uporabljali polelipsoidne plovce velikosti gosjega jajca. Našli so jih v Skandinaviji (Mertens 2000, 23 s; glej še Stratouli 1996, 14). Še nedavno pa so tudi sibirska ljudstva, kot so Ostjaki, za lov na ščuke in ostriže uporabljala trnke z velikim plovcem. Za vabo jim je služila manjša riba (Brinkhuizen 1983, 14 s).

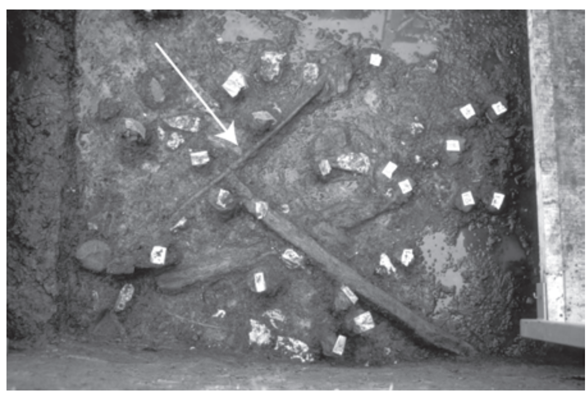


from the Ljubljansko barje from Maharski prekop (Bregant 1975, Pl. 8: 18), Notranje Gorice (Harej 1980, Pl. 1: 9), Blatna Brezovica (Korošec 1963, Pl. 13: 4,5) and Stare gmajne (Velušček 1997b, 207 pp).

Only the bead from Stare gmajne is determined as of yet. It is made of bark, most probably oak or alder. A. Šercelj, who assessed the bead, consequently presumes that this bead might have functioned as a decorative necklace bead or as one of the links in a series of fishing buoys.[2, 3]

The inhabitants of Hočevarica made necklace beads also by drilling and sanding pits (*Prunus spinosa*) (*fig. 3.1.8*). This is just another element of proof that prehistoric man made good use of all available resources. Identical finds are also known from Neolithic settlements in

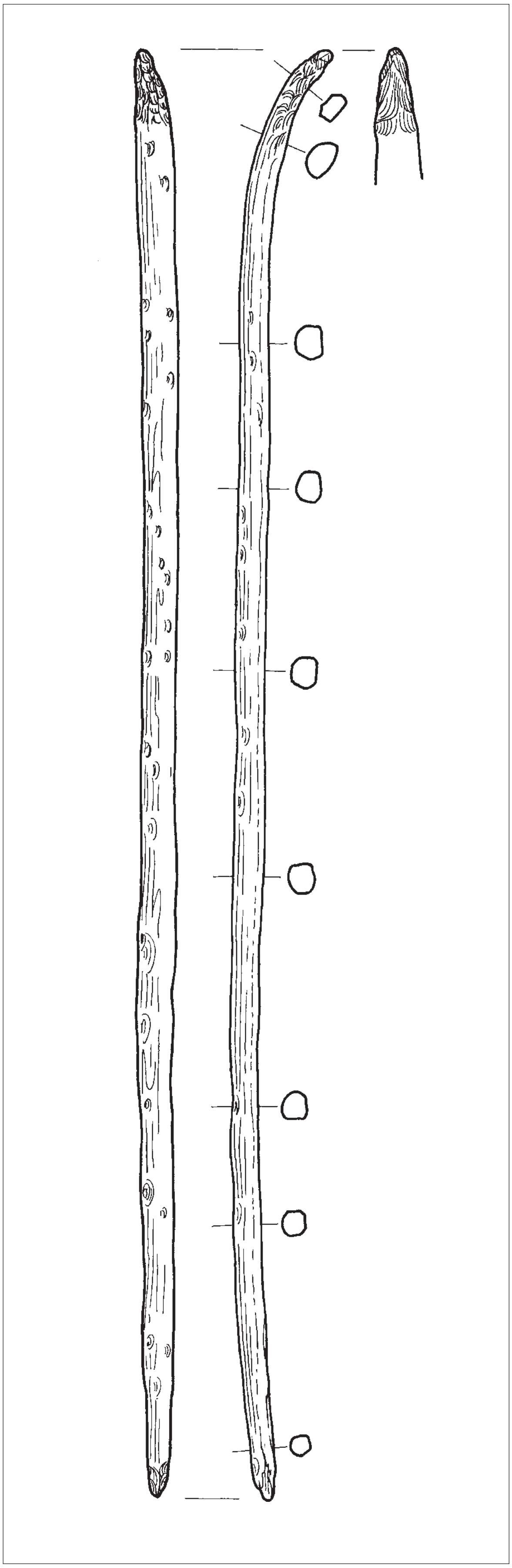
*Sl. 3.1.8:* Hočevarica. Jagoda iz koščice. Foto: M. Zaplatil.
*Fig. 3.1.8:* Hočevarica. A bead from the pit. Photo: M. Zaplatil.



*Sl. 3.1.11:* Hočevarica. Lok v sondi. Foto: A. Velušček.
*Fig. 3.1.11:* Hočevarica. A bow in the trench. Photo: A. Velušček.

[2] By word of mouth: A. Šercelj.

[3] Due to the large numbers of fish bones discovered at Hočevarica (check *chapter 3.8*), the idea of it functioning as a buoy seems perfectly plausible.
There are few supportings in archaeological sources, despite that fishing by hook and buoy is known of from at least the Mesolithic onwards. Prehistoric fishermen used semi-ellipsoid buoys as large as goose eggs for their fishing. Such buoys were found in Scandinavia (Mertens 2000, 23 p; check also Stratouli 1996, 14). Not so long ago some Siberian tribes were fishing for pike and bass with hooks that had large buoys. They used smaller fish as bait (Brinkhuizen 1983, 14 p).



*Sl. 3.1.10:* Hočevarica. Lok. M. = 1 : 4. Risba: D. Knific Lunder.
*Fig. 3.1.10:* Hočevarivca. A bow. Scale = 1 : 4. Drawing: D. Knific Lunder.

Germany as well as Switzerland (Schlichtherle 1988, 199 pp; Leuzinger 2002a, fig. 98; 2002b, 104, fig. 127,128).

Bow

The Hočevarica bow made of yew wood certainly represents the most prominent wooden find (*fig. 3.1.9*).[4] It lay diagonally in the cultural layer between sub-phases 15 and 6 (*fig. 3.1.11*). The bow is 122.3 cm long; the string must have been a few centimeters shorter. The handle part of the bow, which is not particularly emphasized,[5] is 2.7 cm wide and 2.3 cm thick. One end is curved and traces of the workmanship are very discernible (*fig. 3.1.9*; *3.1.10*; *3.1.12*); the indentation for the string is barely visible (*fig. 3.1.12*)[6] and the opposite end is slightly damaged.[7]

This bow is the first such find in Slovenia. Many prehistoric bows are known from sites on wet ground throughout Central, Western and Northern Europe (Clark 1963, 50 pp; Rausing 1967; Eckhardt 1996; Junkmanns 1999a, 1 pp). Bows made of yew wood predominate.[8] Bows are only rarely made from other types of wood, usually when yew wood was not available in the general area (Clark 1963, 51).[9] The reasons for using yew wood are most likely that it is hard and solid, tough and elastic.[10]

4 K. Čufar (Department of Wood Science and Technology at the Biotechnical Faculty in Ljubljana) determined the type of wood.

5 Thin bows with an emphasized handle area are characteristic for the Neolithic period in the Alpine region (Stodiek, Paulsen 1996, 43; Mertens 2000, 9).

6 The workmanship of the ends of the bow is not determinative for the classification of bows – there is a variety of terminals: pointed with no indentation, narrowed and spoon-shaped (Clark 1963, 67, fig. 10; Stodiek, Paulsen 1996, 43, Table 46).

7 According to wood anatomists, regarding the branch that was used to make the bow, probably only a few centimeters of the bow is missing (by word of mouth: K. Čufar).

8 All the Neolithic bows from the area of Zürich are, for instance, made of yew wood (Junkmanns 1999a, 1), which was the predominant wood type for making bows in the Alpine world (Stodiek, Paulsen 1996, 43) and throughout Europe (Junkmanns 1999b, 163).

9 U. Stodiek and H. Paulsen believe that Neolithic bows from northern Germany and southern Scandinavia can be differentiated from Mesolithic ones based on the type of wood used; that is, yew wood was regularly used during the Neolithic (1996, 43).

10 Yew (*Taxus baccata* L.); Taxaceae is an evergreen coniferous tree native to central Europe. Its form is either arboreal or shrubby. This tree usually grows slowly, rarely more than 15 m high. It can reach a very old age, although not more than 600 years. It thrives in a mixed forest, usually where beech, pine,

neolitskih naselbin tako v Nemčiji kot v Švici (Schlichtherle 1988, 199 ss; Leuzinger 2002a, sl. 98; 2002b, 104, sl. 127,128).

Lok

Najimpozantnejša lesena najdba na Hočevarici je gotovo lok iz lesa tise (*sl. 3.1.9*).[4] Ležal je poševno v kulturni plasti med skupkoma 15 in 6 (*sl. 3.1.11*). Dolžina loka znaša 122,3 cm, tetiva pa je morala biti nekaj centimetrov krajša. Lok je na prijemalnem delu, ki ni posebej poudarjen,[5] širok 2,7 cm ter debel 2,3 cm. En konec je ukrivljen, zelo dobro so vidni sledovi obdelave (*sl. 3.1.9; 3.1.10; 3.1.12*), utor za tetivo je komaj opazen (*sl. 3.1.12*),[6] nasprotni konec je rahlo poškodovan.[7]

Gre za prvo najdbo take vrste v Sloveniji. Veliko prazgodovinskih lokov poznamo z najdišč na mokrih tleh po srednji, zahodni ter severni Evropi (Clark 1963, 50 ss; Rausing 1967; Eckhardt 1996; Junkmanns 1999a, 1 ss). Prevladujejo loki iz tise.[8] Iz drugih vrst lesa so narejeni le redko, predvsem takrat in v tistih okoljih, kadar tise ni bilo na voljo (Clark 1963, 51).[9] Razloge moramo iskati v značilnosti lesa tise, ki je trd, trden, žilav in elastičen.[10]

4 Vrsto lesa je določila K. Čufar (Oddelek za lesarstvo Biotehniške fakultete v Ljubljani).

5 V neolitiku so za alpsko območje značilni tanki loki z nepoudarjenim oprijemalnim delom (Stodiek, Paulsen 1996, 43; Mertens 2000, 9).

6 Pri določevanju loka dodelava koncev ni bistvena, saj se lahko različno zaključijo: koničasto brez utora, z zožitvijo in žličasto (Clark 1963, 67, sl. 10; Stodiek, Paulsen 1996, 43, tab. 46).

7 Po predvidevanjih lesnih anatomov manjka, glede na vejo iz katere je izdelan, samo nekaj centimetrov loka (ustna informacija K. Čufar).

8 Vsi neolitski loki iz okolice Züricha so tudi narejeni iz lesa tise (Junkmanns 1999a, 1), ki je v neolitiku sicer prevladujoča lesna vrsta za izdelavo lokov tako v alpskem svetu (Stodiek, Paulsen 1996, 43) kot po Evropi (Junkmanns 1999b, 163).

9 U. Stodiek in H. Paulsen menita, da lahko neolitske loke iz severne Nemčije in južne Skandinavije od mezolitskih ločimo predvsem po izbiri lesa, ki je v neolitiku praviloma iz tise (1996, 43).

10 Tisa (*Taxus baccata* L.) je zimzelen iglavec, doma v srednji Evropi. Lahko je drevesaste ali grmovne oblike. Navadno raste počasi, zato drevo redko zraste v višino več kot 15 m. Dočaka visoko starost, ki praviloma ne presega 600 let.
Uspeva v mešanih gozdovih, navadno tam, kjer rastejo bukev, smreka, jelka, kot tudi javor, jesen, brest itd. Med temi vrstami se praviloma pojavlja posamično ali v skupinah. Ustreza ji oceansko podnebje. Uspeva tudi ob pomanjkanju svetlobe. Čeprav so razen mesa plodov skoraj vsi deli drevesa (skorja, iglice, seme) strupeni, je v gozdu presenetljivo ogrožena tudi zaradi objiranja divjadi.
V gozdarstvu nima gospodarskega pomena. Včasih je bila v mešanih gozdovih bolj pogosta kot danes, v preteklih stoletjih pa so jo zaradi porabe velikih količin lesa za loke in samostrele skoraj iztrebili.Tisi kot gozdni drevesni vrsti grozi izumrtje, zato je zaščitena.
V zadnjem času se vse bolj uveljavlja kot okrasna vrsta, zato je pogosta v parkovnih nasadih. Vrtnarji jo cenijo, ker ne potrebuje veliko svetlobe ker se po obrezovanju zelo hitro obnavlja. Trd in težak les tise je eden naših najtrših in najgostejših iglav-


*Sl. 3.1.12:* Hočevarica. Zaključek loka. Foto: M. Zaplatil.
*Fig. 3.1.12:* Hočevarica. The terminal of the bow. Photo: M. Zaplatil.

Bows are known of as hunting weapons[11] already by the end of the Paleolithic (McEwen, Miller, Bergman 1991, 76; Stodiek, Paulsen 1996, 37 pp). Although more bows are known from the Mesolithic (Clark 1963, 63 p; Mertens 2000, 5 pp), as well as the Neolithic and Eneolithic periods (e.g. Clark 1963; Rausing 1967; Junkmanns 1999a).

and fir trees grow, as well as maple, ash, elm, etc. The yew tree usually grows independently or in a group among these other types. It thrives on an oceanic climate. The yew tree is extremely tolerant of the lack of light. Aside from the pulp of its fruit almost all the other parts of the tree (bark, needles, seeds) are poisonous; nevertheless, its existence is quite threatened in the forest, even due to being nibbled away by deer.
Yew trees were more frequent in mixed forests in the past than they are today. Massively exploited in past centuries for making bows and crossbows, it is almost extinct. The yew tree has no particular economic significance in terms of forestry. Facing extinction as a type of forest tree, it is now protected.
In recent years, yew trees are increasingly popular as a decorative type and they are often seen in parks and public gardens. Gardeners appreciate it for its tolerance regarding a lack of light as well as for its exceptional regenerative abilities following lopping.
Yew wood is hard and solid and it is one of the most compact and dense coniferous types (density $r_0$ 610...640–740 kg/$m^3$). It contracts minimally, it is stable, hard, solid, tough and elastic, and it is resistant to the atmospheric effects. The wood from the core is naturally enduring. The dust from this wood causes dermatitis; it irritates the mucous membrane and causes headaches.
This type of wood dries quickly and well. It is easily worked, well planed and well carved. This type of wood can be smoothed exceptionally well. The surface of the wood can be worked well; it takes well to steeping and varnishing.
In general, different types of wood were used to make bows in different geographic regions. Nonetheless, they all share the common factors of having high densities, high E-modules, flexible firmness, solidity and good workable characteristics. This type of wood is usually very decorative. These all are the characteristics of yew wood (rearranged according to Velušček, Čufar 2001, 48 p).

11 Bows are paramountly used as hunting weapons all through to the transition to the Metal Ages; only later do they become a comprising part of fighting equipment (Eckhardt 1996, 109).

Lok se kot lovsko orožje[11] pojavi vsaj že ob koncu paleolitika (McEwen, Miller, Bergman 1991, 76; Stodiek, Paulsen 1996, 37 ss). Bolje so poznani mezolitski (Clark 1963, 63 s; Mertens 2000, 5 ss), neolitski in eneolitski loki (npr. Clark 1963; Rausing 1967; Junkmanns 1999a).

J. Junkmanns je loke iz okolice Züricha razvrstil v več skupin, ki jih je določil glede na starost lokostrelca in s tem povezano fizično moč: lok za odraslega, lok za mladostnika ter lok za otroka (Junkmanns 1999a, 1 ss; prim. Mertens 2000, 9 s). Gre za delitev, ki spominja na navade pri Inuitih (Park 1998, 269 ss) in domorodcih na Irian Jayi (Pétrequin, Pétrequin 1990, 484 ss). Razlika se odraža v dolžini, izbiri najprimernejšega lesa in izdelavi. Lok za odraslega je običajno dolg od 145 do 170 cm, narejen iz najprimernejšega stebla in zelo skrbno izdelan. Lok, namenjen mladostniku, naj bi v dolžino meril med 120 in 140 cm, medtem ko so loki za otroke krajši – dolgi tudi manj kot 60 cm – in slabše izdelani. Namenjeni so igri.

Po G. Rausingu spada lok s Hočevarice v skupino t. i. navadnih dolgih lokov (*simple longbow*) (Rausing 1967, 35 ss) in ima veliko analogij na sorodnih najdiščih 5. do 3. tisočletja pr. Kr. po Evropi (npr. Clark 1963, 62 ss; Rausing 1967, 35 ss; Junkmanns 1999a, 1 ss). Po Junkmannsovi klasifikaciji bi ga lahko uvrstili v skupino lokov za mladostnike.

Ukrivljeno leseno šilo – mikalnikov zob?

Na Hočevarici smo našli tudi dve rahlo ukrivljeni leseni šili (npr. *sl. 3.1.13*), za kateri ni mogoče z gotovostjo dognati, čemu sta služili. Enako lahko trdimo tudi za podoben predmet z vidnimi sledovi uporabe, ki so ga že pred leti našli na Maharskem prekopu (Bregant 1975, t. 13: 9).

Morda so polizdelki, vsekakor pa spominjajo na mikalnikov zob (Eberli 1998-1999, sl. 4). To je orodje, ki je pogost inventar arheoloških najdišč na vlažnih tleh. Sestavljeno je iz lesenih ali koščenih konic in se je uporabljalo za mikanje prediva (Deschler-Erb, Marti-Grädel, Schibler 2002, 294 s; sl. 404; t. 509: 14,15).

cev (gostota $r_0$ 610...640–740 kg/m$^3$). Malo se krči, je stabilen, trd, trden, žilav in elastičen ter odporen na atmosferilije. Les jedrovine je naravno trajen, lesni prah pa draži sluznico, povzroča dermatitis in glavobol.
Suši se hitro in dobro. Mogoče ga je dobro in gladko obdelati, stružiti, rezljati, lužiti in lakirati.
Za loke v različnih geografskih regijah uporabljajo različne vrste lesa, vendar je vsem skupna visoka gostota, visok E-modul in upogibna trdnost, žilavost, dobre obdelovalne lastnosti, praviloma pa tudi dekorativnost. In vse te lastnosti ima tisovina (prirejeno po Veluščk, Čufar 2001, 48 s).

[11] Do prehoda v kovinska obdobja se lok prvenstveno uporablja kot lovsko orožje, šele kasneje postane del bojne opreme (Eckhardt 1996, 109).



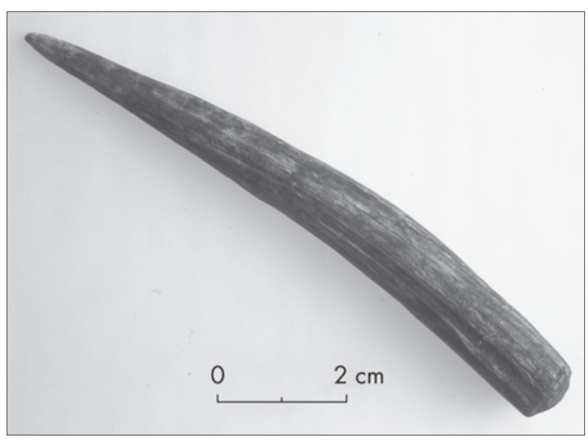
J. Junkmanns classified the bows from the Zürich surroundings into a number of groups based upon the age of the bowman and the corresponding physical strength of the bowman: bows for adults, bows for adolescents, and bows for children (Junkmanns 1999a, 1 pp; cf. Mertens 2000, 9 p). This division is reminiscent of Inuit customs (Park 1998, 269 pp) and natives of Irian Jaya (Pétrequin, Pétrequin 1990, 484 pp). Differences are reflected in the length of the bow, the selection of the most suitable stem and careful workmanship. An adult bow usually measures between 145 and 170 cm, is made on a very good stem and displays excellent workmanship. An adolescent's bow will measure between 120 and 140 cm in length, while children's bows are even shorter – sometimes less than 60 cm long – and poorly made. Such bows are intended for play.

According to G. Rausing, the Hočevarica bow belongs to the group of so-called »simple longbows« (Rausing 1967, 35 pp). It has numerous analogies at similar sites from the 5$^{th}$ to 3$^{rd}$ millennium B.C. throughout Europe (e.g. Clark 1963, 62 pp; Rausing 1967, 35 pp; Junkmanns 1999a, 1 pp). Junkmanns would classify this same bow to the group of bows for adolescents.

Bent, wooden awl (or a tooth from a hackle)

Two slightly bent wooden awls (*fig. 3.1.13*) were also found at Hočevarica, although it is not clear as to the function they served. The same can be said of a similar object bearing visible traces of usage, found years ago at Maharski prekop (Bregant 1975, Pl. 13: 9).

Perhaps these are semi-products but they do by all means reminisce of a hackle's tooth (Eberli 1998-1999, fig. 4). A hackle is a tool that was frequent inventory at archaeological sites upon wet ground. They constitute wooden or bone teeth and are used for dressing textile fiber (Deschler-Erb, Marti-Grädel, Schibler 2002, 294 p; fig. 404; Pl. 509: 14,15).



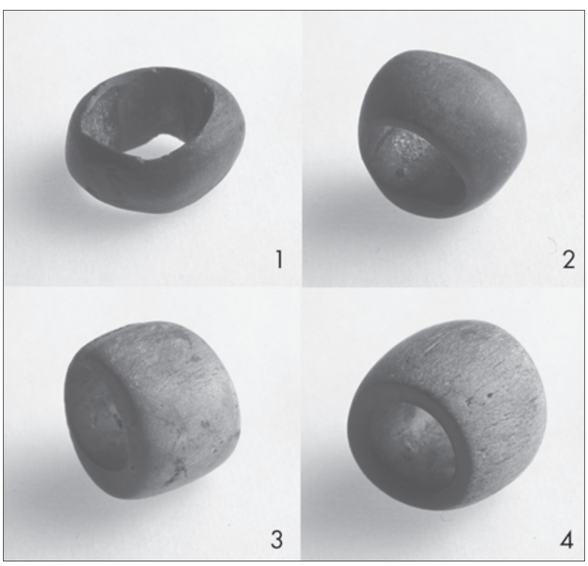

*Sl. 3.1.13:* Hočevarica. Mikalnikov zob? Foto: M. Paternoster.
*Fig. 3.1.13:* Hočevarica. Hackle's tooth? Photo: M. Paternoster.

**Katalog lesenih najdb**

1. Fragmentarno ohranjena prevrtana jagoda iz drevesne skorje; obesek za ogrlico; lega: skupek 21.
2. Frag. prevrtane jagode iz drevesne skorje; obesek za ogrlico; lega: skupek 19.
3. Prevrtana jagoda iz drevesne skorje; obesek za ogrlico; lega: skupek 14.
4. Prevrtana jagoda iz drevesne skorje; obesek za ogrlico; lega: skupek 14.
5. Frag. prevrtane jagode iz drevesne skorje; obesek za ogrlico; lega: skupek 14.
6. Frag. prevrtane jagode iz drevesne skorje; obesek za ogrlico; lega: skupek 12.
7. Frag. prevrtane jagode iz drevesne skorje; obesek za ogrlico; lega: skupek 12.
8. Prevrtana jagoda iz drevesne skorje; obesek za ogrlico; lega: skupek 8; *sl. 3.1.7*.
9. Prevrtana jagoda iz drevesne skorje; obesek za ogrlico; lega: skupek 5.
10 Prevrtana jagoda iz drevesne skorje; obesek za ogrlico; lega: skupek 5.
11. Frag. prevrtane jagode iz drevesne skorje; obesek za ogrlico; lega: skupek 5.
12. Frag. prevrtane jagode iz drevesne skorje; obesek za ogrlico; lega: skupek 5.
13. Frag. prevrtane jagode iz drevesne skorje; obesek za ogrlico; lega: skupek 4.
14. Prevrtana jagoda iz koščice; obesek za ogrlico; lega: skupek 23.
15. Frag. prevrtane jagode iz koščice; obesek za ogrlico; največji pr. 0,6 cm; lega: skupek 21; *sl. 3.1.8*.
16. Prevrtana jagoda iz koščice; obesek za ogrlico; lega: skupek 21.
17. Prevrtana jagoda iz koščice; obesek za ogrlico; lega: skupek 19.
18. Prevrtana jagoda iz koščice; obesek za ogrlico; lega: skupek 14.
19. Prevrtana jagoda iz koščice; obesek za ogrlico; lega: skupek 14.
20. Prevrtana jagoda iz koščice; obesek za ogrlico; lega: skupek 8.
21. Prevrtana jagoda iz koščice; obesek za ogrlico; lega: skupek 5.
22. Prevrtana jagoda iz koščice; obesek za ogrlico; lega: skupek 5.
23. Lok iz tisovine; dl. 122,3 cm; lega: med skupkoma 15 in 6; *sl. 3.1.9; 3.1.10*.
24. Ukrivljeno leseno šilo; dl. pribl. 10 cm po konzervaciji; lega: skupek 17; *sl. 3.1.13*.
25. Ukrivljeno leseno šilo; lega: skupek 5.

3.1.4.3 Najdbe iz kosti, roževine in zobovine

V naselbinah na vlažnih tleh po Evropi (Schlichtherle, Wahlster 1986, 76 s, 80 ss) in tako tudi na Ljubljanskem barju (npr. Korošec 1963, t. 16; 17: 1–12;



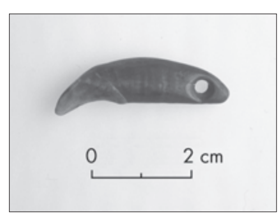

*Sl. 3.1.14:* Hočevarica. Jagode iz roževine. Foto: M. Paternoster.
*Fig. 3.1.14:* Hočevarica. Beads made of horn. Photo: M. Paternoster.

3.1.4.3 Material finds of bone, horn and teeth

Artifacts made of bone, horn and teeth are frequent finds at settlements upon wet ground throughout Europe (Schlichtherle, Wahlster 1986, 76 p, 80 pp), and thus also upon the Ljubljansko barje (e.g. Korošec 1963, Pl. 16; 17: 1–12; Korošec, Korošec 1969, e.g. Pl. 86; 87: 2–8,12–42; 93 etc.), including Hočevarica.

Perforated conical beads for necklaces are known from Hočevarica; they are made of horn and are predominantly found in the lower part of the cultural layer, the first settlement phase (*fig. 3.1.14:* 1–4). Also known are perforated pendants made from animal teeth (*fig. 3.1.15*).

The fragment of a jagged ray bone is perhaps also a piece of jewelry; it was found in sub-phase 5 (check *chapter 3.9*).




*Sl. 3.1.15:* Hočevarica. Perforiran živalski zob. Foto: M. Paternoster.
*Fig. 3.1.15:* Hočevarica. Perforated animal tooth. Photo: M. Paternoster.

Korošec, Korošec 1969, npr. t. 86; 87: 2–8,12–42; 93 itd.) so artefakti iz kosti, roževine in zobovine pogosti.

S Hočevarice poznamo prevrtane konične jagode za ogrlice iz roževine, ki prevladujejo v spodnjem delu kulturne plasti oziroma v prvi naselbinski fazi (*sl. 3.1.14:* 1–4), in prevrtane obeske iz živalskih zob (*sl. 3.1.15*).

Morda sodi k nakitu tudi fragment nazobčane skatove kosti, ki je bil najden v skupku 5 (glej *poglavje 3.9*).

Veliko je koščenih šil, v nekaterih primerih gre lahko za konice (prim. Winiger 1992, 65 ss). Pojavljajo se skoraj v vseh skupkih obeh naselbinskih faz (*sl. 3.1.16; 3.1.17*). Na nekaterih šilih so dobro vidni vrezi, ki so nastali pri izdelavi in uporabi (*sl. 3.1.16; 3.1.17*).

Najdena sta tudi koščen nož ali dvostransko rezilo (*sl. 3.1.18*)[12] in zelo fragmentaren, a obdelan kos jelenovega roga. Zaradi slabe ohranjenosti je predmetu težko določiti funkcijo. Najbrž gre za tulasti nastavek, ki so ga uporabljali za nasajanje koščenega ali kamnitega orodja (glej npr. Billamboz, Schlichtherle 1999, 41 ss; Leuzinger 2002b, 99 ss; Deschler-Erb, Marti-Grädel, Schibler 2002, 331 ss).


*Sl. 3.1.17:* Hočevarica. Koščeno šilo. Foto: M. Zaplatil.
*Fig. 3.1.17:* Hočevarica. Bone awl. Photo: M. Zaplatil.

[12] Predmet je podoben »malemu gladilu« z Dežmanovih kolišč (Korošec, Korošec 1969, t. 82: 9).



A large number of wooden awls were discovered; some of these are perhaps points (cf. Winiger 1992, 65 pp). These awls were found in all sub-phases in both settlement phases (*fig. 3.1.16*; *3.1.17*). Some awls bear clearly discernible incisions that occurred while being made or used (*fig. 3.1.16*; *3.1.17*).


*Sl. 3.1.16:* Hočevarica. Koščeno šilo. Foto: M. Zaplatil.
*Fig. 3.1.16:* Hočevarica. Bone awl. Photo: M. Zaplatil.

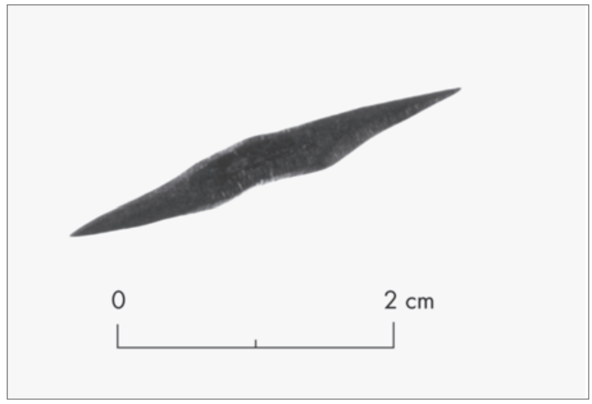
A bone knife or double-sided blade (*fig. 3.1.18*)[12] was also discovered, as well as a very fragmented but carved piece of antler. Due to the poor stance of preservation of the object, its function is difficult to assess. It probably served as a socketed extension for attaching a bone or stone tool (check e.g. Billamboz, Schlichtherle 1999, 41 pp; Leuzinger 2002b, 99 pp; Deschler-Erb, Marti-Grädel, Schibler 2002, 331 pp).

One bone object is beautifully preserved; it is classified among the type of so-called »straight hooks« (*fig. 3.1.19*).[13] It is a short, double-sided point made of bone, and it narrows, or has an indentation towards its middle

[12] The object is similar to the »small polisher« from Dežman's pile dwelling (Korošec, Korošec 1969, Pl. 82: 9).

[13] T. Greif, who cites the straight hook from the Ljubljansko barje, refers to it as a »transverse hook«, as a literal translation of the German word »querangel« (Greif 1997, 35).
Basic information concerning straight hooks will be found in Brinkhuizen 1983, 11 p; Hüster-Plogmann, Leuzinger 1995, 111 pp, fig. 11: 6–12; Stratouli 1996, 16, fig. 2: 7.


*Sl. 3.1.18:* Hočevarica. Koščen nož. Foto: M. Zaplatil.
*Fig. 3.1.18:* Hočevarica. Bone knife. Photo: M. Zaplatil.




*Sl. 3.1.19:* Hočevarica. Ravni trnek. Foto: M. Zaplatil.
*Fig. 3.1.19:* Hočevarica. A straight hook. Photo: M. Zaplatil.

Čudovito je ohranjen koščen predmet, ki sodi k tipu t. i. ravnih trnkov (*sl. 3.1.19*).[13] Gre za krajšo dvostransko konico iz kosti, ki je na sredini lahko zožena ali ima zajedo (Brinkhuizen 1983, 11, sl. 4). Trnek tega tipa so uporabljali za ribolov na večje ribe, kot so ščuke, in tudi za lov na ptiče ter sesalce (Brinkhuizen 1983, 12; Torke 1993, 52 ss; Hüster-Plogmann, Leuzinger 1995, 111; Stratouli 1996, 16). Tako ne preseneča, da jih tudi na Ljubljanskem barju poznamo z več najdišč (lep primerek najdemo pri Korošec, Korošec 1969, t. 85: 14).[14]

Človeški zobje

Med vsekakor zanimive najdbe, ki pač niso artefakti, moramo uvrstiti neobdelane človeške zobe. Našli smo jih 7: tri v skupku 19, enega v skupku 14, dva v skupku 8 in enega v skupku 5. V glavnem so se ohranili brez korenine. Nekaj smo jih določili in zdi se, da so mlečni (glej *poglavje 3.6*).

(Brinkhuizen 1983, 11, fig. 4). This type of hook was used for fishing larger sized fish, such as pike, as well as for hunting birds and mammalia (Brinkhuizen 1983, 12; Torke 1993, 52 pp; Hüster-Plogmann, Leuzinger 1995, 111; Stratouli 1996, 16). So it comes as no surprise that such hooks are known from many sites throughout the Ljubljansko barje (a good example is shown in Korošec, Korošec 1969, Pl. 85: 14).[14]

Human teeth

Although not exactly artifacts, unaltered human teeth also present an interesting find. Seven teeth were discovered. Three were in sub-phase 19, one in sub-phase 14, two in sub-phase 8 and one in sub-phase 5. For the most part they were preserved without the roots. A few were determined as being decidous teeth (check *chapter 3.6*).

**Katalog najdb iz kosti, roževine in zobovine**

26. Prevrtana jagoda iz roževine; obesek za ogrlico; lega: skupek 23; *sl. 3.1.14:* 1.
27. Prevrtana jagoda iz roževine; obesek za ogrlico; lega: skupek 23.
28. Prevrtana jagoda iz roževine; obesek za ogrlico; lega: skupek 21; *sl. 3.1.14:* 2.
29. Prevrtana jagoda iz roževine; obesek za ogrlico; lega: skupek 21; *sl. 3.1.14:* 3.
30. Prevrtana jagoda iz roževine; obesek za ogrlico; lega: skupek 21.
31. Prevrtana jagoda iz roževine; obesek za ogrlico; lega: skupek 21.
32. Prevrtana jagoda iz roževine; obesek za ogrlico; lega: skupek 19.
33. Prevrtana jagoda iz roževine; obesek za ogrlico; lega: skupek 19.

[13] T. Greif, ki navaja ravni trnek z Barja, ga imenuje **prečni trnek**, po dobesednem prevodu nemške besede **Querangel** (Greif 1997, 35).
Osnovne informacije za ravne trnke dobimo pri Brinkhuizen 1983, 11 s; Hüster-Plogmann, Leuzinger 1995, 111 ss, sl. 11: 6–12; Stratouli 1996, 16, sl. 2: 7.

[14] T. Greif med ravne trnke uvrsti tudi dvojno konico z uvitim koncem z Dežmanovih kolišč (1997, 35, sl. 24a). Po analogijah sodeč je to verjetneje harpuna in ne trnek (glej Winiger 1992, 65 ss).

[14] T. Greif also attributes the double-point with curved tip from Dežman's pile dwelling among the straight hooks (1997, 35, fig. 24a). Analogies indicate that this example is more likely a harpoon than a hook (check Winiger 1992, 65 pp).

34. Prevrtana jagoda iz roževine; obesek za ogrlico; lega: skupek 19.
35. Prevrtana jagoda iz roževine; obesek za ogrlico; lega: skupek 19; *sl. 3.1.14:* 4.
36. Prevrtana jagoda iz roževine; obesek za ogrlico; lega: skupek 19.
37. Prevrtana jagoda iz roževine; obesek za ogrlico; lega: skupek 19.
38. Prevrtana jagoda iz roževine; obesek za ogrlico; lega: skupek 19.
39. Prevrtana jagoda iz roževine; obesek za ogrlico; lega: skupek 19.
40. Prevrtana jagoda iz roževine; obesek za ogrlico; lega: skupek 19.
41. Prevrtana jagoda iz roževine; obesek za ogrlico; lega: skupek 19.
42. Frag. prevrtane jagode iz roževine; obesek za ogrlico; lega skupek 17.
43. Prevrtana jagoda iz roževine; obesek za ogrlico; lega: skupek 14.
44. Prevrtan živalski zob; obesek za ogrlico; lega: skupek 19.
45. Prevrtan živalski zob; obesek za ogrlico; lega: skupek 14.
46. Prevrtan živalski zob; obesek za ogrlico; lega: skupek 5; *sl. 3.1.15*.
47. Prevrtan živalski zob; obesek za ogrlico; lega: skupek 5.
48. Prevrtan živalski zob; obesek za ogrlico; lega: skupek 5.
49. Frag. prevrtane korenine živalskega zoba; obesek za ogrlico; lega : skupek 5.
50. Fragmentarno ohranjena skatova kost; lega: skupek 5; determinacija: glej *poglavje 3.9*.
51. Šilo iz kosti; lega: skupek 23.
52. Šilo iz kosti; lega: skupek 22.
53. Šilo iz kosti; lega: skupek 21.
54. Šilo iz kosti; lega: skupek 19.
55. Šilo iz kosti; lega: skupek 19.
56. Šilo iz kosti; lega: skupek 19.
57. Šilo iz kosti; lega: skupek 14; *sl. 3.1.16*.
58. Šilo iz kosti; lega: skupek 14.
59. Šilo iz kosti; lega: skupek 14; *sl. 3.1.17*.
60. Šilo iz kosti; lega: skupek 14.
61. Šilo iz kosti; lega: skupek 14.
62. Šilo iz kosti; lega: skupek 12.
63. Šilo iz kosti; lega: skupek 12.
64. Šilo iz kosti; lega: skupek 12.
65. Šilo iz kosti; lega: skupek 8.
66. Šilo iz kosti; lega: skupek 8.
67. Šilo iz kosti; lega: skupek 8.
68. Dvostransko rezilo/nož iz kosti; lega: skupek 14; *sl. 3.1.18*.
69. Frag. obroča iz jelenovega roga; lega: skupek 14.
70. Trnek iz kosti; dl. 2,9 cm; lega: skupek: 19; *sl. 3.1.19*.
71. Človeški zob; lega: skupek 19.
72. Človeški zob; lega: skupek 19.
73. Človeški zob; mlečni; lega: skupek 19.
74. Človeški zob; lega: skupek 14.
75. Frag. človeškega zoba; mlečni; lega: skupek 8.
76. Frag. človeškega zoba; mlečni; lega: skupek 8.
77. Človeški zob; lega: skupek 5.

#### 3.1.4.4 Kamnite najdbe

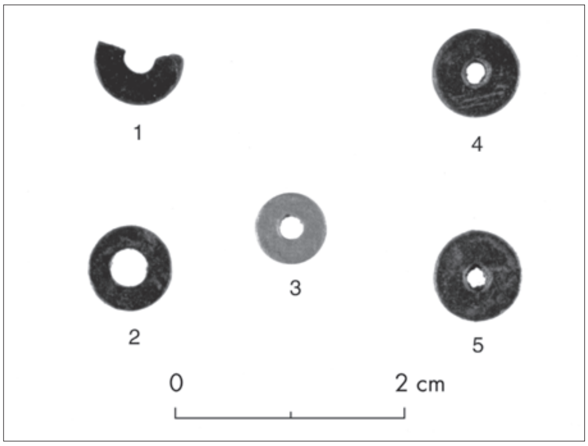
Na Hočevarici je zelo veliko kamnitih najdb. Lahko jih razdelimo na nakit in uporabne predmete.

K nakitu spadajo od 0,29 do 5 mm veliki in večinoma tanki kamniti obročki za ogrlice (*sl. 3.1.20:* 1–5). Največ, 14, jih izvira iz skupkov druge naselbinske faze, 9 iz skupkov 17 in 14, iz prve naselbinske faze pa sta le dva. Prevladujejo obročki temnosive barve. Za dva, ki sta bila analizirana, se je ugotovilo, da sta narejena iz

#### 3.1.4.4 Stone finds

There are many stone finds from Hočevarica. They can be divided into jewelry and useful objects.

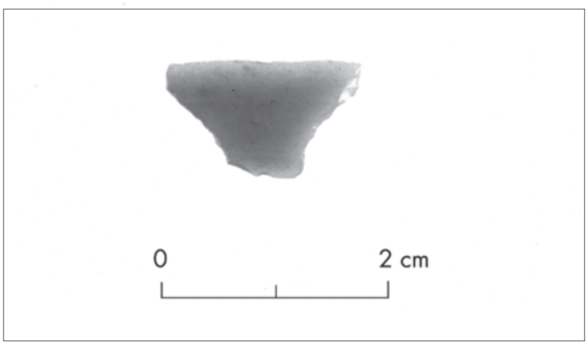
The jewelry includes thin stone ringlets for necklaces, which measure 0.29 to 5 mm in size (*fig. 3.1.20:* 1–5). The most, 14, originate from sub-phases of the second settlement phase – nine form sub-phases 17 and 14, and only two from the first settlement phase. Dark gray colored ringlets are predominant. Two examples, metamorfne kamnine (npr. *sl. 3.1.20:* 1) (glej *poglavje 3.3*).




*Sl. 3.1.20:* Hočevarica. Kamniti obročki. Foto: M. Zaplatil.
*Fig. 3.1.20:* Hočevarica. Stone rings. Photo: M. Zaplatil.

V skupku 23 je najdena tudi prevrtana bela jagoda (*sl. 3.1.21*), najbrž kalcitna, saj je podobna analiziranim kalcitnim jagodam z Maharskega prekopa (glej Bregant 1974b, t. 4: 11; 1975, t. 8: 15–17,19; 12: 1; Strmole 1974, 72).

Tudi uporabne predmete iz kamna lahko ločimo na več skupin: puščične osti, orodja iz kremena, sekira in žrmlje.

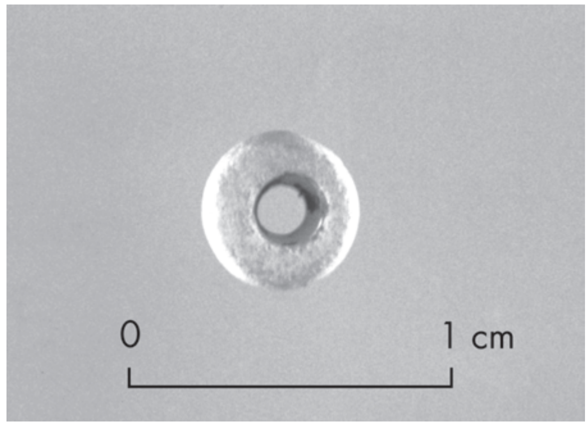



*Sl. 3.1.22:* Hočevarica. Trapezna puščična ost. Foto: M. Zaplatil.
*Fig. 3.1.22:* Hočevarica. Trapezoid arrowhead. Photo: M. Zaplatil

Poleg loka dokazujeta lokostrelstvo tudi dva tipa puščičnih osti, ki se pojavljata na Hočevarici: trapezna puščična ost (*sl. 3.1.22*) in trikotna puščična ost s krilci (*sl. 3.1.23*). Z eksperimentiranjem se je pokazalo, da so puščice s trapezno konico podobno učinkovite kot s trikotno oziroma obojestransko retuširano konico (Lund, Schürmann 1994, 145 ss). Na Hočevarici se oba tipa pojavljata skupaj, v severni Evropi pa naj bi bile trapezne konice praviloma starejše, saj se trikotne pogosteje



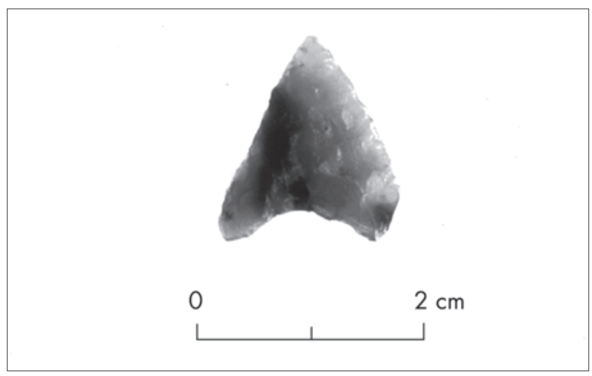
which were analyzed, proved to be made of metamorphic rock (e.g. *fig. 3.1.20:* 1) (check *chapter 3.3*).




*Sl. 3.1.21:* Hočevarica. Kalcitna jagoda. Foto: M. Zaplatil.
*Fig. 3.1.21:* Hočevarica. Calcite bead. Photo: M. Zaplatil.

A perforated white bead was found in sub-phase 23 (*fig. 3.1.21*). This example is probably made of calcite; it seems very similar to the analyzed calcite beads from Maharski prekop (check Bregant 1974b, Pl. 4: 11; 1975, Pl. 8: 15–17,19; 12: 1; Strmole 1974, 72).

Useful stone objects can also be divided into groups: arrowheads, tools made of flint, axes and querns.



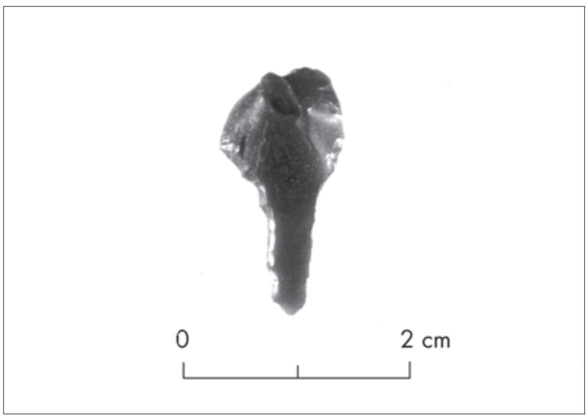

*Sl. 3.1.23:* Hočevarica. Trikotna puščična ost. Foto: M. Zaplatil.
*Fig. 3.1.23:* Hočevarica. Triangular arrowhead. Photo: M. Zaplatil.

Two types of arrowheads known from Hočevarica further confirm the existence of archery, in addition to bows: the trapezoid arrowhead (*fig. 3.1.22*) and the triangular barbed arrowhead (*fig. 3.1.23*). Experiments have evidenced that the trapezoid arrowheads are equally efficient as the triangular arrowheads or the double-sided retouched points (Lund, Schürmann 1994, 145 pp). Both types occur simultaneously at Hočevarica, while in northern Europe trapezoid arrowheads are supposedly pojavljajo šele v poznem neolitiku (Stodiek, Paulsen 1996, 43).

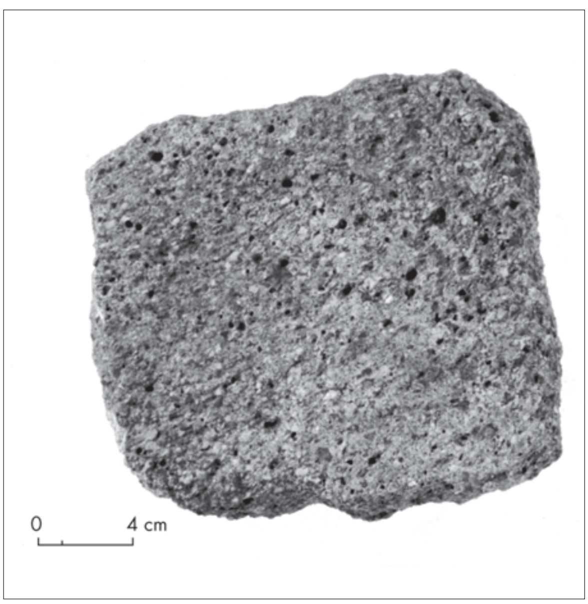
Orodja iz kremena so maloštevilna. Izstopa zelo lepo izdelan sveder (*sl. 3.1.24*) in nekaj neretuširanih dolgih klin, na katerih ni opaznih sledov uporabe. Fragmentarno ohranjeni gomolji iz kremena, ki so najdeni v sondi, dokazujejo, da so kamnita orodja izdelovali tudi v naselbini.

Na Hočevarici poznamo ploščato sekiro iz zelenosive kamnine s topim rezilom (*sl. 3.1.25*).

Številni so fragmenti žrmelj. Pojavljajo se v obeh naselbinskih fazah, kar priča o živahni poljedelski dejavnosti koliščarjev (*sl. 3.1.26*). To dokazujejo tudi zoglene-li ostanki žit, ki jih v *poglavju 3.2* podrobneje predstavlja M. Jeraj.




*Sl. 3.1.24:* Hočevarica. Sveder. Foto: M. Zaplatil.
*Fig. 3.1.24:* Hočevarica. An auger. Photo: M. Zaplatil.




*Sl. 3.1.26:* Hočevarica. Žrmlje. Foto: M. Zaplatil.
*Fig. 3.1.26:* Hočevarica. A quern. Photo: M. Zaplatil.



an earlier form, as triangular arrowheads are known only from the Late Neolithic (Stodiek, Paulsen 1996, 43).

Tools made of flint are few. A beautifully made auger is particularly noteworthy (*fig. 3.1.24*) as well as a few unretouched long blade bearing traces of usage. Partially preserved source pieces of flint-stone, found in the trench, are evidence that stone tools were also manufactured in the settlement.

A flat axe made of greenish-gray stone and with a blunt blade is also known from Hočevarica (*fig. 3.1.25*), as well as numerous fragments of querns. The latter are present in both settlement phases, thus indicating the assiduous cultivating activity of the pile dwellers (*fig. 3.1.26*). This is further confirmed by the charred remains of grain, which M. Jeraj presents in greater detail in *chapter 3.2*.


*Sl. 3.1.25:* Hočevarica. Kamnita sekira. Foto: M. Zaplatil.
*Fig. 3.1.25:* Hočevarica. Stone axe. Photo: M. Zaplatil.

**Katalog kamnitih predmetov**

78. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,32 cm; lega: skupek 23.
79. Kamnit obroček; obesek za ogrlico; barva: siva; pr. 0,32 cm; lega: skupek 19; *sl. 3.1.20:* 3.
80. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,39 cm; lega: skupek 17.
81. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,5 cm; lega: skupek 14.
82. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,45 cm; lega: skupek 14.
83. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,45 cm; lega: skupek 14.
84. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,36 cm; lega skupek 14.
85. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,38 cm; lega: skupek 14.
86. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,38 cm; lega: skupek 14.
87. Kamnit obroček; obesek za ogrlico; barva: siva; pr. 0,5 cm; lega: skupek 14.
88. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,42 cm; lega: skupek 14.
89. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,32 cm; lega: skupek 8.
90. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,33 cm; lega: skupek 8.
91. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,3 cm; lega: skupek: 8.
92. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,39 cm; lega: skupek 8; *sl. 3.1.20:* 5.
93. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,38 cm; lega: skupek 8; *sl. 3.1.20:* 4.
94. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,3 cm; lega skupek 8.
95. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,4 cm; lega: skupek 8.
96. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,31 cm; lega: skupek 8.
97. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,38 cm; lega: skupek 7; *sl. 3.1.20:* 2.
98. Frag. obročka iz metamorfne kamnine; obesek za ogrlico; barva: temnosiva; pr. 0,4 cm; lega: skupek 7; *sl. 3.1.20:* 1; analiza: glej *poglavje 3.3*.
99. Kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,5 cm; lega: skupek 5.
100. Obroček iz metamorfne kamnine; obesek za ogrlico; barva: temnosiva; pr. 0,32 cm; lega: skupek 5; analiza: glej *poglavje 3.3*.
101. Kamnit obroček; obesek za ogrlico; barva: temnosiva; največji pr. 0,39 cm; lega: skupek 5.
102. Rahlo poškodovan kamnit obroček; obesek za ogrlico; barva: temnosiva; pr. 0,29 cm; lega: skupek 4.
103. Kalcitna jagoda; obesek za ogrlico; barva: bela; pr. 0,45 cm; lega: skupek 23; *sl. 3.1.21*.
104. Puščična ost trapezne oblike iz kremena; barva: svetlorjava; lega: skupek 14; *sl. 3.1.22*.
105. Puščična ost trikotne oblike s krilci iz kremena; barva: svetlosiva; dl. 1,8 cm; lega: skupek 4; *sl. 3.1.23*.
106. Sveder iz kremena; barva: siva; dl. 2,2 cm; lega: skupek: 19; *sl. 3.1.24*.
107. Klina iz kremena; barva: sivorjava; dl. 3,8 cm; lega: skupek 21.
108. Klina iz kremena; barva: rjavosiva; dl. 4,8 cm; lega: skupek 8.
109. Klina iz kremena; barva: rjava; dl. 5,7 cm; lega: skupek 5.
110. Kamnita ploščata sekira; barva: zelenosiva; dl. 10,6 cm; lega: skupek 4; *sl. 3.1.25*.
111. Frag. žrmlje; kamen; lega: skupek 23.
112. Frag. žrmlje; kamen; lega: skupek 19.
113. Frag. žrmlje; lega: skupek 14.
114. Frag. žrmlje; kamen; lega: skupek 8.
115. Frag. žrmlje; kamen; lega: skupek 7.
116. Frag. žrmlje; kamen; lega: skupek 7.
117. Frag. žrmlje; kamen; lega: skupek 4.
118. Frag. žrmlje; kamen; lega: skupek 4.
119. Frag. žrmlje; kamen; lega: skupek 1; *sl. 3.1.26*.

3.1.4.5 Najdbe povezane z metalurgijo bakra

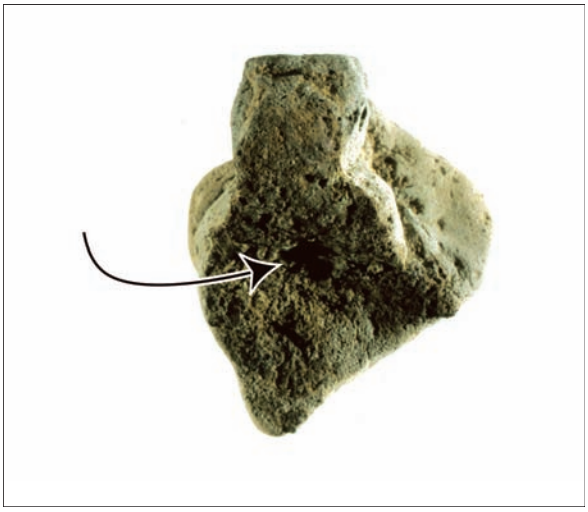
Livarska posoda

Na Hočevarici je v skupku 11 v okviru druge naselbinske faze najden skoraj brezobličen fragment posode debelih sten (*t. 4.1.8:* 11). Podoben, toda manjši fragment smo našli tudi v skupku 14. Ker sta bila oba kosa najdena v mikrokvadratu 3, domnevamo, da gre za dela iste posode.

3.1.4.5 Finds corresponding to the metallurgy of copper

Founder's vessel

Hočevarica's sub-phase 11 from the second settlement phase comprises an almost amorphous fragment of a vessel with thick walls (*pl. 4.1.8:* 11). A similar, although smaller fragment was also discovered in sub-phase 14. As the two fragments were both found in micro-



*Sl. 3.1.27:* Hočevarica. Fragment livarske posode s sledovi bakra. Foto: M. Zaplatil.
*Fig. 3.1.27:* Hočevarica. Fragment of a founder's vessel with traces of copper. Photo: M. Zaplatil.

Na prvi pogled je opaziti, da je bila posoda podvržena zelo visokim temperaturam. Na steni v notranjosti se je ohranila usedlina oziroma plast rjave in zelene barve (*sl. 3.1.27*), za katero so laboratorijske analiz pokazale, da je baker (glej *poglavje 3.4*).

Kovinska kaplja – ostanek pri izdelovanju bakrenih predmetov

Pri podrobnem pregledu sit z vsebino iz skupka 15 druge naselbinske faze smo naleteli na kapljici podoben predmet, ki je spominjal na kovino (*sl. 3.1.28*). Da bi preverili sestavo, smo ga poslali v analizo na Inštitut Jožef Stefan in tudi v Narodni muzej Slovenije iz Ljubljane. Pokazalo se je, da gre za košček čistega bakra, najverjetneje za odpadek pri izdelovanju bakrenih predmetov (glej *poglavje 3.4*).

quadrant 3, they are presumably fragments of the same vessel.

At first glance it seems that the vessel underwent very high temperatures. A brown and green deposit or layer is preserved on the inner wall (*fig. 3.1.27*); laboratory analyses determined it to be copper (check *chapter 3.4*).

Metal droplet – refuse from the manufacture of copper objects

A detailed inspection of material from sub-phase 15 of the second settlement phase during sieving revealed a droplet shaped object resembling metal (*fig. 3.1.28*). The droplet was sent to the Jozef Stefan Institute in Ljubljana and the National Museum of Slovenia for analyses of its composition. The results established that the metal object was pure copper, probably refuse from manufacturing copper objects (check *chapter 3.4*).


*Sl. 3.1.28:* Hočevarica. Bakrena kapljica. Foto: M. Zaplatil.
*Fig. 3.1.28:* Hočevarica. Copper droplet. Photo: M. Zaplatil.

**Katalog najdb povezanih z metalurgijo bakra**

120. Dva fragmenta iste livarske posode:

120a. Frag. livarske posode; nežgana glina s sledovi bakra; dl. 2,2 cm; db. 1,2 cm; lega: mk 3, skupek 14.

120b. Frag. livarske posode; nežgana glina s sledovi bakra; dl. 5,3 cm; db. 2,1 cm; lega: mk 3, skupek 11; *sl. 3.1.27*; *t. 4.1.8:* 11; analiza: glej *poglavje 3.4*.

121. Odlomek bakra; dl. 1,2 cm; lega: 15; *sl. 3.1.28*; analiza: glej *poglavje 3.4*.

## **3.1.5** NAJDBE IZ JARKA HOČEVARICA

V času, ko je na Hočevarici potekalo sondiranje, smo v jarku nedaleč od sonde našli zanimivo arheološko najdbo: kamniti bat. Orodje je na proksimalnem in distalnem delu od uporabe obtolčeno (*sl. 3.1.29*), kar kaže, da je bilo nasajeno. Dodatni dokaz za to je črn premaz, ki se je ohranil na trupu. Najverjetneje je to katranska smola, morda iz brezovega lubja (prim. Orel, Hadži 1978, 101 s), ki se je uporabljala za nasajanje orod-

## **3.1.5** FINDS FROM THE HOČEVARICA DITCH

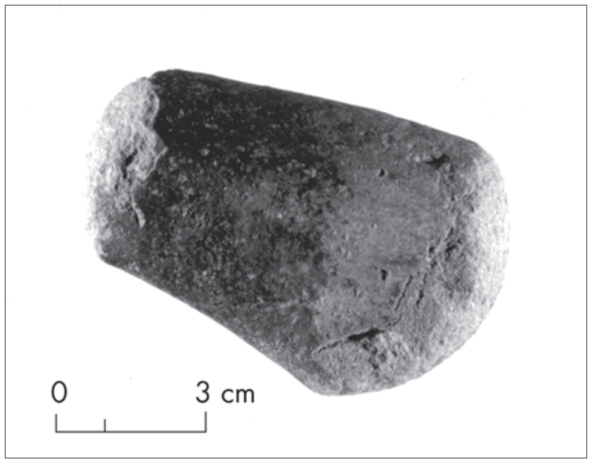
An interesting archaeological find was discovered during the time of sample trenching at Hočevarica in a ditch not far away: a stone mallet. The proximal and distal ends of the tool are worn (*fig. 3.1.29*), thus indicating that it was helved. Traces of a black coating preserved on the body of the tool are further confirmation of this. This coating is most likely tar pitch, perhaps from birch bark (cf. Orel, Hadži 1978, 101 p), which was used ja in orožja (Bregant 1975, t. 12: 3; prim. Junkmanns 1999b, 167 s; Mertens 2000, 17 ss).

**Katalog najdb iz jarka Hočevarica**

122. Kamnit bat z ostanki smole; dl. 9,6 cm; lega: v jarku Hočevarica; *sl. 3.1.29*.



to helve tools and weapons (Bregant 1975, Pl. 12: 3; cf. Junkmanns 1999b, 167 p; Martens 2000, 17 pp).



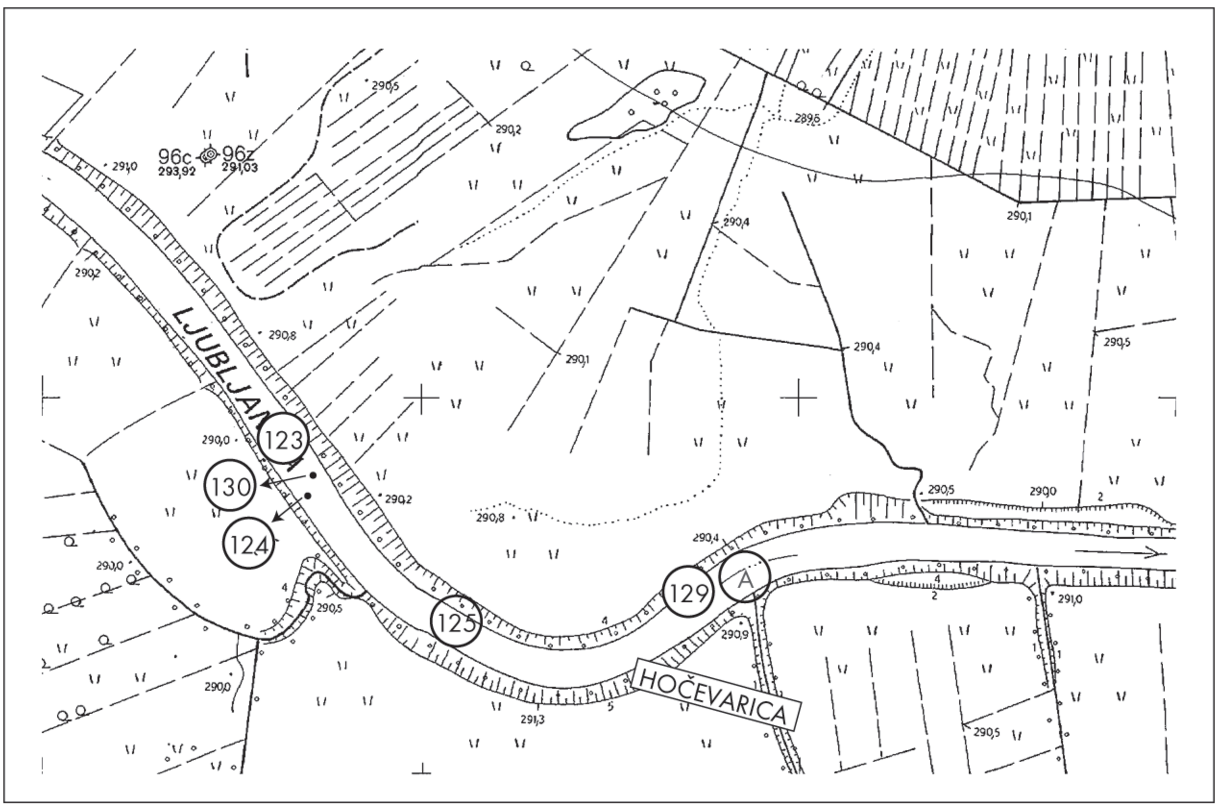

*Sl. 3.1.29:* Hočevarica. Kamnit bat s smolo. Foto: M. Zaplatil.
*Fig. 3.1.29:* Hočevarica. Stone mallet with traces of pitch. Photo: M. Zaplatil.

## **3.1.6** NAJDBE Z OBMOČJA OKOLI HOČEVARICE

Arheološko najdišče Hočevarico so odkrili potapljači, ki se v Ljubljanici ob izlivu Hočevarice tudi še dandanes potapljajo. Eden izmed njih, ki želi ostati neimenovan, nam je leta 1998 pokazal zbirko več kot 12 celih in 7 fragmentarno ohranjenih kamnitih ploščatih sekir, 3 cele in 4 fragmentarno ohranjene kamnite kladivaste

## **3.1.6** FINDS FROM THE LJUBLJANICA IN THE AREA PROXIMATE TO HOČEVARICA

Hočevarica was discovered by divers who continue to frequent the Ljubljanica at the Hočevarica outflow. In 1998, one anonymous diver showed us a collection of more than 12 whole and 7 fragmentarily preserved flat axes, 3 whole and 4 fragmentarily preserved stone hammer-form axes with a hole, numerous whetstones, a




*Sl. 3.1.30:* Pozicije najdb v Ljubljanici v bližini Hočevarice.
*Fig. 3.1.30:* Locations of archaeological finds in the Ljubljanica river in the vicinity of Hočevarica.

sekire z luknjo, več brusov, kamnito ploskovno retuširano bodalo z držajem, več puščičnih osti, kline in keramiko. Najdbe povečini izvirajo iz Ljubljanice, z odseka med Ljubijo in Bistro, nekaj pa jih je tudi iz jarka Hočevarica.

stone flatly retouched dagger with a handle, several arrowheads, blades and pottery. The majority of finds originates from the Ljubljanica, from the segment between Ljubija and Bistra, and the remainder are from the Hočevarica ditch.

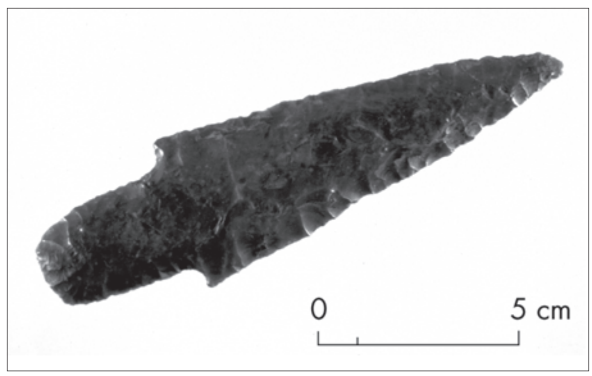
**Katalog izbora najdb z območja okoli Hočevarice**

123. Kamnita kladivasta sekira z luknjo; dl. 9,9 cm; največja š. 3,2 cm; *sl. 3.1.31*.
124. Kamnito ploskovno retuširano bodalo z držajem; dl. 13,9 cm; največja š. 3,9 cm; *sl. 3.1.32*.
125. Kamnita puščična ost trikotne oblike; dl. 2,5 cm; največja š. 2,3 cm; *sl. 3.1.33:* 1.
126. Kamnita puščična ost s pecljem; dl. 2,9 cm; največja š. 2,0 cm; *sl. 3.1.33:* 2; lega: lokacija A na *sl. 3.1.30*.
127. Kamnita puščična ost s krilci; dl. 2,4 cm; največja š. 2,3 cm; *sl. 3.1.33:* 3; lega: lokacija A na *sl. 3.1.30*.
128. Kamnit srp; orodje na klini; vidni sledovi od uporabe; dl. 9,3 cm; *sl. 3.1.34*; lega: lokacija A na *sl. 3.1.30*.

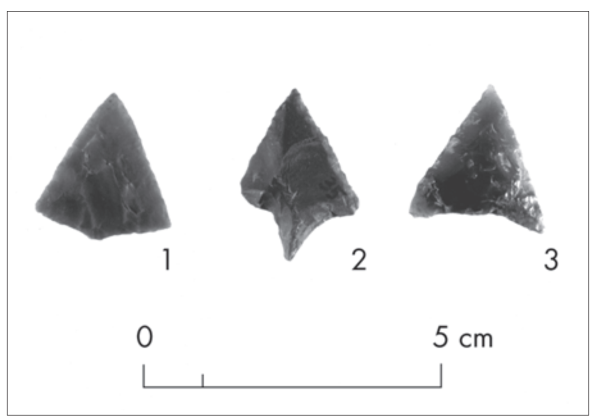
Iz iste zbirke sta tudi dve bakreni sekiri, prav tako najdeni v Ljubljanici na odseku med Ljubijo in Hočevarico (lega: *sl. 3.1.30*).[15]

129. Bakrena ploščata sekira trapezne oblike. Teme je ravno. Proti rezilu se enakomerno razširi. Rezilo je zaobljeno. dl. = 8,7 cm; š.1 = 2,5 cm; š.2 = 3,4 cm; *sl. 3.1.35*; *3.5.1*; analiza: glej *poglavje 3.5*.
130. Bakrena ploščata sekira trapezne oblike. Teme je ravno. Proti rezilu se rahlo pahljačasto razširi. Rezilo je zaobljeno. dl. = 7,8 cm; š.1 = 2,6 cm; š.2 = 3,9 cm; *sl. 3.1.36*; *3.5.3*; analiza: glej *poglavje 3.5*.


*Sl. 3.1.31:* Ljubljanica. Kamnita sekira z luknjo. Foto: M. Zaplatil.
*Fig. 3.1.31:* Ljubljanica. Perforated stone axe. Photo: M. Zaplatil.

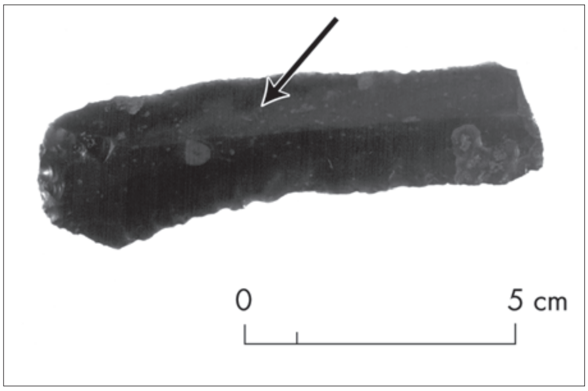



*Sl. 3.1.32:* Ljubljanica. Kamnito bodalo. Foto: M. Zaplatil.
*Fig. 3.1.32:* Ljubljanica. Stone dagger. Photo: M. Zaplatil.

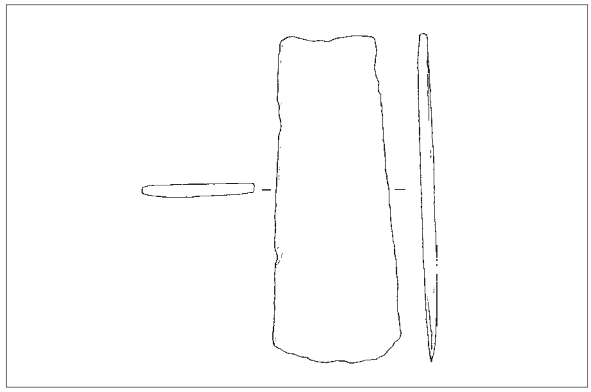



*Sl. 3.1.33:* Ljubljanica. Kamnite puščične osti: 1. št. 125; 2. št. 126; 3. št. 127. Foto: M. Zaplatil.
*Fig. 3.1.33:* Ljubljanica. Stone arrowheads: 1. no. 125; 2. no. 126; 3. no. 127. Photo: M. Zaplatil.

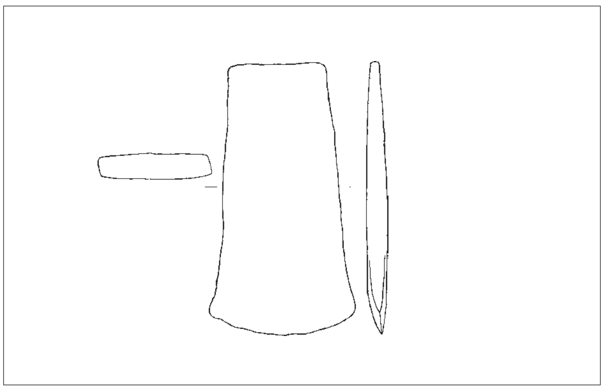
[15] O bakrenih sekirah (*št. 129*: v evidenci NM Slovenije pod oznako ZN 141/1 Verd; *št. 130*: v evidenci NM Slovenije pod oznako ZN 140/1 Verd) in njunih najdiščnih lokacijah smo prvič slišali že leta 1998, ko jih je v razgovoru omenjal najditelj. O tem sta bila napravljena celo zapisnika v ARKAS s št. 084303.02 in 084314. Na najdbi smo nato pozabili. Šele leta 2002 nas je nanje ponovno opozoril P. Turk iz Narodnega muzeja Slovenije, ki nam jih je pokazal ter hvaležno prepustil v strokovno obdelavo.




*Sl. 3.1.34:* Ljubljanica. Kamnito rezilo z leskom. Foto: M. Zaplatil.
*Fig. 3.1.34:* Ljubljanica. Stone blade with gloss. Photo: M. Zaplatil.



*Sl. 3.1.35:* Ljubljanica. Bakrena sekira št. 129. M. = 1 : 2. Risba: I. Murgelj.
*Fig. 3.1.35:* Ljubljanica. Copper axe no. 129. Scale = 1 : 2. Drawing: I. Murgelj.



*Sl. 3.1.36:* Ljubljanica. Bakrena sekira št. 130. M. = 1 : 2. Risba: I. Murgelj.
*Fig. 3.1.36:* Ljubljanica. Copper axe no. 130. Scale = 1 : 2. Drawing: I. Murgelj.

# **3.2** PALEOBOTANIČNE RAZISKAVE NA KOLIŠČU HOČEVARICA

# **3.2** PALAEOBOTANICAL ANALYSES OF THE HOČEVARICA PILE DWELLING

MARJETA JERAJ

*Izvleček*

*Paleobotanične raziskave s kolišča Hočevarica zajemajo analize rastlinskih makroostankov iz kulturne plasti in pelodne analize sedimentov iz arheološkega profila. Rezultati analiz semen in plodov kažejo, da so koliščarji nabirali divje rastline in sadeže, kot so drnulje, lešniki, želodi, maline, jagode, grozdje in plodovi vodnega oreška, in da so gojili ječmen in pšenico. Poleg številnih semen lobodnic ter predvsem ožganih žitnih zrn, ki sodijo med najstarejše arheobotanične najdbe z Ljubljanskega barja, poljedelstvo na Hočevarici dokazujejo visoke vrednosti peloda žit. Človekov vpliv na pokrajino, še posebej izsekavanje gozdov in obdelovanje zemlje, je jasno razviden v pelodnem zapisu, ki prikazuje razvoj okoliške vegetacije v času naselbine. Determinacija makroskopskega oglja z najdišča kaže, da je bil za kurjavo najpogosteje uporabljen les leske, jelše in jesena. Radiokarbonski datumi organskega sedimenta, žitnih zrn in grozdnih pešk iz kulturne plasti kažejo na obdobje med 3670 in 3380 cal BC (2 sigma).*

*Abstract*

*Paleobotanical investigations of the Hočevarica pile dwelling comprise of analyses of the plant macro-remains from the cultural layer and pollen from the archaeological profile. The remains of seeds and fruits suggest that dwellers were collecting fruits such as acorns, stones of cornelian cherry, hazelnuts, grapes, raspberries, strawberries and the fruits of water chestnut, but they were also cultivating barley and wheat. Beside numerous orach seeds and charred cereal grains, which represent one of the oldest archaeobotanical finds from the Ljubljansko barje, agriculture was further documented by a large amount of cereal pollen. The entire pollen record from the cultural layer reflects the vegetation development during the settlement period. It shows a significant human impact on the surrounding landscape, especially the reduction of nearby forest and usage of the cleared land for farming. The remains of macroscopic charcoal indicate that hazel, alder and ash wood was most often used as fuel. Radiocarbon dates of organic sediment and seeds from the cultural layer indicate the period between 3670 and 3380 cal BC (2 sigma).*

## **3.2.1** ANALIZE RASTLINSKIH MAKROOSTANKOV IN PELODA

V okviru paleobotaničnih raziskav na najdišču Hočevarica, ki so bile opravljene v sklopu arheološkega izkopavanja v letu 1998, smo analizirali rastlinske makroostanke iz kulturne plasti ter opravili pelodne analize sedimentov iz profila arheološkega izkopa.

### 3.2.1.1 Metode

Vzorce za arheobotanične raziskave smo dobili pri arheološkem izkopavanju dva metra globoke sonde s površino $2 \times 4$ m$^2$. Vzorčili smo v mikrokvadratih 1, 4, 5

## **3.2.1** ANALYSES OF PLANT MACRO-REMAINS AND POLLEN

Paleobotanical investigations, which accompanied the archaeological excavations at Hočevarica in 1998, comprised of the analyses of plant macro-remains from the cultural layer and the analyses of pollen from the archaeological profile.

### 3.2.1.1 Sampling and methods

The samples for archaeobotanical analyses were taken from different layers and depths of the 2 m deep excavation trench with a surface of $2 \times 4$ m$^2$. The trench in 8, v različnih plasteh in režnjih na globini med 190 in 125 cm, ki v celoti pripada kulturni plasti. Že na terenu smo sediment sprali in ga presejali skozi sita z velikostmi odprtin 3 mm, 1 mm in 0,5 mm (*sl. 3.2.1*). Iz presejanega in posušenega materiala smo poleg arheoloških najdb in živalskih kosti izločili tudi rastlinske makroostanke.

Opravili smo analize semen, plodov in makroskopskega oglja iz kulturne plasti. Semena, plodove in njihove fragmente smo določevali s stereolupo pri 5- do 50-kratni povečavi. Za taksonomsko identifikacijo smo uporabljali zbirko recentnih semen in plodov ter ključe in priročnike za določevanje. Lesno oglje smo preiskovali s stereolupo (do 50-kratna povečava) in s stereomikroskopom v odbojni svetlobi (100-kratna, 250-kratna in 400-kratna povečava). Pri vsakem vzorcu smo pregledovali sveže prelomne ploskve v transverzalni, radialni in tangencialni ravnini. Glede na anatomske značilnosti oglja v posameznih prelomih smo določili, kateri lesni vrsti, rodu ali družini pripada posamezni kos. Za identifikacijo oglja smo uporabljali ključe za določevanje lesa in preparate svežega lesa.

was divided into eight 1 $m^2$ large sections (microquadrants). Sampling was performed in sections 1, 4, 5 and 8, at a depth ranging between 190 and 125 cm, corresponding to the cultural layer. The sediment was washed and wet-sieved through three different sieves with aperture sizes measuring 3 mm, 1 mm and 0.5 mm (*fig. 3.2.1*). After the sediment was dried up, plant remains, animal remains and archaeological artifacts were picked out.

The analyses of seeds, fruits and macroscopic charcoal from the cultural layer were also carried out. Seeds, fruits and their remains were examined using a stereoscope with 5x to 50x magnification. The remains were identified by comparison to modern reference collections of seeds and fruits, and by using different identification keys and manuals. Macroscopic charcoal was determined using a stereoscope (up to 50x magnification) as well as a compound stereomicroscope with reflective light and 100x to 400x magnification. Transversal, radial and tangential sections of manually broken pieces were inspected for each sample. Their anatomical features determined the particular family, genus or species of wood. Charcoal fragments were also compared with the slides of fresh cut wood and with the keys for wood identification.

The sediment samples for pollen analyses were obtained from the northern profile of the archaeological excavation. They were taken from 2 to 5 cm thick layers with different sediment structures. In the labora-

*Sl. 3.2.1:* Priprava za sejanje (v ozadju) in vreče sedimenta iz kulturne plasti na Hočevarici. Foto: M. Jeraj.
*Fig. 3.2.1:* Equipment for sieving (in the background) and bags with sediment from the cultural layer at Hočevarica. Photo: M. Jeraj.

Vzorce za pelodne analize smo vzeli iz severnega profila arheološkega izkopa. Vzorčili smo od 2 do 5 cm debele plasti, ki so se razlikovale glede na sedimentološko sestavo. Laboratorijski del analiz je vključeval ekstrakcijo peloda iz sedimenta, kvalitativen in kvantitativen mikroskopski pregled pelodnih preparatov ter izdelavo in interpretacijo pelodnih diagramov. Pelodne vzorce smo analizirali po prirejenem standardnem postopku, ki sta ga opisala Faegri in Iversen (1989). Preparate smo pregledovali s svetlobnim mikroskopom pri 100-kratni, 200-kratni in 450-kratni povečavi. Za določevanje peloda smo uporabljali različne ključe in priročnike ter referenčno zbirko trajnih preparatov.

Organski sediment iz globine 142,5 cm ter grozdne peške in žitna zrna iz kulturne plasti so bili radiokarbonsko datirani v laboratorijih Beta Analytic Inc., Miami, FL, ZDA in University of Arizona, Tucson, AZ, ZDA.

3.2.1.2 Rastlinski makroostanki

Pri arheološkem izkopavanju smo v globini med 130 in 190 cm našli ostanke semen, plodov, mahu in alg, kose oglja ter kole. Rezultati karpoloških in antrakotomskih raziskav so prikazani v nadaljevanju.

3.2.1.2.1 Semena in plodovi

V kulturni plasti smo v vzorčnih mikrokvadratih našli več kot 30000 semen in plodov. V glavnem so bili zelo dobro ohranjeni in razen žitnih zrn nezogleneli. Večinoma smo našli cele in nepoškodovane, od nekaterih pa so se ohranili le posamezni deli. Prevladovala so semena lobodnic (Chenopodiaceae), ostanki želodov (*Quercus* sp.), peške vinske trte (*Vitis vinifera*), koščice rumenega in rdečega drena (*Cornus mas* in *C. sanguinea*), oreški maline (*Rubus fruticosus*), roglji plodov vod-

tory, pollen was then extracted from the sediment following an adapted procedure based on the method described by Faegri and Iversen (1989). Pollen samples were qualitatively and quantitatively examined under a light microscope with 100x, 200x and 450x magnification. Different keys and images from several manuals were used for the identification, as well as a comparison with a reference collection of modern pollen. Ultimately pollen diagrams were made and interpreted.

The sample of organic sediment from the depth of 142.5 cm, grape seeds and charred cereal grains were AMS radiocarbon dated at Beta Analytic Inc. (Miami, FL, USA) and the University of Arizona (Tucson, AZ, USA).

3.2.1.2 Plant macro-remains

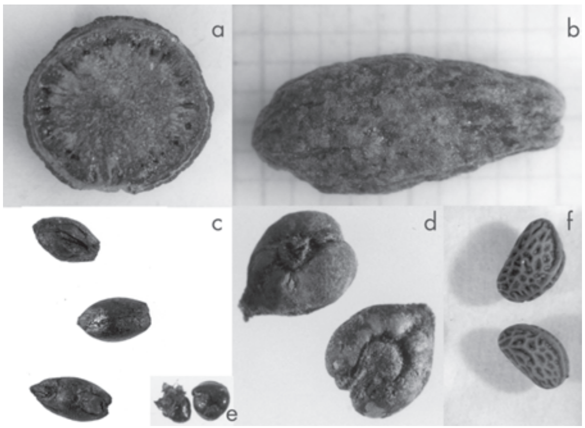
The remains of seeds, fruits, moss and algae, as well as fragments of charcoal and wooden piles were recovered from the archaeological excavation at Hočevarica at the depth of between 130 and 190 cm. The results of carpological and anthracotomic analyses are presented below.

3.2.1.2.1 Seeds and fruits

The cultural layer in the sampled micro-quadrants revealed more than 30,000 seeds, fruits and their fragments, larger than 3 mm, and even more seeds, smaller than 3 mm (*tables 3.2.1* and *3.2.2*). In general they were well preserved, and with the exception of cereal grains almost completely non-carbonized. Their preservation varied from whole and undamaged to broken and hardly recognizable seeds. The most frequent were seeds of Chenopodiaceae, acorn fragments (*Quercus* sp.), grape seeds (*Vitis vinifera*), fruit stones of dogwood (*Cornus mas*, *C. sanguinea*) and nutlets of red raspberry (*Rubus*

| **Takson** | **%** | **Takson** | **%** |
|---|---|---|---|
| ***Quercus sp.*** | 31,4 | ***Prunus spinosa*** | 0,67 |
| ***Vitis vinifera*** | 27,4 | **Cyperaceae** | 0,26 |
| ***Cornus mas*** | 13,4 | **Apiaceae** | 0,15 |
| ***Rubus fruticosus*** | 13,2 | ***Sambucus ebulus*** | 0,13 |
| **Cerealia** | 5,2 | ***Nuphar luteum*** | 0,13 |
| ***Corylus avellana*** | 4,4 | ***Tilia sp.*** | 0,08 |
| ***Cornus sanguinea*** | 2,7 | ***Potamogeton natans*** | 0,02 |
| ***Trapa natans*** | 1,0 | | |

*Tab. 3.2.1:* Deleži semen in plodov večjih od 3 mm v kulturni plasti na Hočevarici.
*Table 3.2.1:* Proportions of seeds and fruits larger than 3 mm, from the cultural layer at Hočevarica.




*Sl. 3.2.2:* Najpogostejši ostanki semen in plodov s Hočevarice: ostanek želoda (*Quercus* sp.) (a), drnulja (*Cornus mas*) (b), ožgana žitna zrna (Cerealia) (c), peška vinske trte (*Vitis vinifera*) (d), seme lobodnice (*Chenopodium*) (e) in orešek maline (*Rubus fruticosus*) (f). Foto: M. Jeraj.
*Fig. 3.2.2:* The most common remains of seeds and fruits from Hočevarica: fragment of acorn (a), stone fruit of cornelian cherry (*Cornus mas*) (b), charred cereal grains (Cerealia), grape seed (*Vitis vinifera*) (d), orach seed (*Chenopodium*) and (e) raspberry nutlet (*Rubus fruticosus*) (f). Photo: M. Jeraj.

nega oreška (*Trapa natans*), makova semena (*Papaver somniferum*), oreški jagodnjaka (*Fragaria vesca*), ožgana zrna ječmena (*Hordeum vulgare*) in pšenice (*Triticum monococcum, T. turgidum* ssp. *dicoccum*) ter zdrobljene lupine lešnikov (*Corylus avellana*) (*tab. 3.2.1* in *3.2.2*; *sl. 3.2.2*). Od semen in plodov večjih od 3 mm so bili med manj pogostimi najdbami koščice črnega trna (*Prunus spinosa*), plodovi ostričevk (Cyperaceae), lipe (*Tilia* sp.), plodiči kobulnic (Apiaceae) in plavajočega dristavca (*Potamogeton natans*) ter semena rumenega blatnika (*Nuphar luteum*) in divjega bezga (*Sambucus ebulus*) (*tab. 3.2.1*). Med semeni in plodovi manjšimi od 3 mm pa smo poleg že nekaterih omenjenih našli še oreške koprive (*Urtica* sp.), rožke nebinovk (Asteraceae) in semena klinčnic (Caryophyllaceae) (*tab. 3.2.2*).

Pri analizi plodov in semen, večjih od 3 mm, smo ugotovili, da so bili ti v mikrokvadratih 1, 4, 5 in 8 razporejeni različno. Največ, tj. 3400, smo jih našli v mikrokvadratu 4 na globini med 179 in 167 cm. Na splošno jih je bilo v mikrokvadratih 1 in 4 bistveno več kot v 5 in 8. V vseh so bile najštevilčnejši ostanki želodov, grozdne peške, koščice drnulj in oreški maline.

Grozdne peške in ožgana žitna zrna so bila tudi radiokarbonsko datirana. Starost pešk iz plasti med 159 in 142 cm je 4780 ± 40 BP (3640–3520 cal BC (1 sigma) oziroma 3650–3380 cal BC (2 sigma)); starost žitnih zrn iz plasti med 190 in 181 cm pa je 4810 ± 40 BP (3650–3530 cal BC (1 sigma) oziroma 3670–3380 cal BC (2 sigma)).

| Takson | % |
|---|---|
| **Chenopodiaceae** | 71,0 |
| ***Papaver somniferum*** | 11,2 |
| ***Fragaria sp.*** | 8,9 |
| ***Rubus fructicosus*** | 2,3 |
| ***Urtica sp.*** | 2,3 |
| **Asteraceae** | 1,5 |
| ***Sambucus ebulus*** | 1,0 |
| ***Scirpus sp.*** | 0,8 |
| **Caryophyllaceae** | 0,7 |
| ***Potamogeton sp.*** | 0,2 |

*Tab. 3.2.2:* Deleži semen in plodov manjših od 3 mm v kulturni plasti na Hočevarici.
*Table 3.2.2:* Proportions of seeds and fruits smaller than 3 mm, from the cultural layer at Hočevarica.

*fruticosus*) (*fig. 3.2.2*). Poppy seeds (*Papaver somniferum*), achenes of strawberry (*Fragaria vesca*), spines of water chestnut fruits (*Trapa natans*), charred grains of barley (*Hordeum vulgare*) and wheat (*Triticum monococcum, T. turgidum* ssp. *dicoccum*), and broken hazelnut shells (*Corylus avellana*) were also quite common. Among the less abundant remains of seeds and fruits larger than 3 mm, there were fruit stones of blackthorn (*Prunus spinosa*), achenes of Cyperaceae and floating-leaved pondweed (*Potamogeton natans*), fruits of linden (*Tilia* sp.) and Apiaceae, seeds of yellow water lily (*Nuphar luteum*) and seeds of red elderberry (*Sambucus ebulus*) (*table 3.2.1*). Achenes of nettle (*Urtica* sp.) and Asteraceae, and seeds of Caryophyllaceae, were also recovered among the fragments smaller than 3 mm (*table 3.2.2*).

The analyses of seeds and fruits larger than 3 mm show that their distribution varied among the examined sections. The largest amount, 3400 seeds/fruits, was found in section 4 at a depth of between 167 and 179 cm. Generally, there were more remains found in sections 1 and 4 than in sections 5 and 8. However, acorn fragments, grape seeds, fruit stones of cornelian cherry and nutlets of raspberry were the most common remains in all of them.

Grape seeds and charred cereal grains were also AMS radiocarbon dated. The radiocarbon date of the grape seeds, found at a depth of between 159 and 142 cm, is 4780 ± 40 BP (3640–3520 cal BC (1 sigma), 3650–3380 cal BC (2 sigma)). The cereal grains, found in the layer between 190 and 181 cm, were dated to 4810 ± 40 BP (3650–3530 cal BC (1 sigma), 3670–3380 cal BC (2 sigma)).

3.2.1.2.2 Oglje

Pregledali smo okrog 580 od 0,5 do 5 cm velikih kosov oglja iz različnih mikrokvadratov, plasti in režnjev. Ohranjenost anatomskih značilnosti je med vzorci variirala, tako da je bila v nekaterih primerih identifikacija rastlinskega taksona mogoča le do družine. Največ kosov oglja je pripadalo leski (*Corylus avellana*), črni jelši (*Alnus glutinosa*) in jesenu (*Fraxinus ornus/excelsior*). Od ostalih lesnih vrst, rodov ali družin smo določili oglje javorja (*Acer pseudoplatanus/platanoides/campestre*), oglje dreves in grmov rožnic (Rosaceae) iz poddružine Prunoideae (*Prunus* sp.) in poddružine Maloidae, kot so jerebika (*Sorbus* sp.), hruška/jablana (*Pyrus/Malus*) in glog (*Crataegus* sp.), oglje bukve (*Fagus sylvatica*), hrasta (*Quercus* sp.), breze (*Betula* sp.), topola (*Populus* sp.), vrbe (*Salix* sp.), brogovite (*Viburnum* sp.), krhlike (*Frangula alnus*), trdoleske (*Euonymus* sp.), drena (*Cornus* sp.), belega gabra (*Carpinus betulus*) in oreha (*Juglans regia*). Oglja iglavcev je bilo malo in je pripadalo jelki (*Abies alba*), brinu (*Juniperus communis*), tisi (*Taxus baccata*) in boru (*Pinus* sp.) (*tab. 3.2.3*).

3.2.1.2.2 Charcoal

About 580 charcoal fragments, sampled from the different micro-quadrants were analysed (*table 3.2.3*). The fragments measured between 0.5 and 5 cm. The preservation of their anatomical features varied, thus identification of the species or genus level was not always possible. The majority of charcoal sampled was hazel (*Coryllus avellana*), alder (*Alnus glutinosa*) and ash (*Fraxinus ornus, F. excelsior*). The rest was identified as maple (*Acer campestre, A. platanoides, A. pseudoplatanus*), trees and shrubs from the Rosaceae family, including mountain ash (*Sorbus* sp.), pear/apple (*Pyrus/Malus*), hawthorn (*Crataegus* sp.) and *Prunus* sp., beech (*Fagus sylvatica*), oak (*Quercus* sp.), poplar (*Populus* sp.), birch (*Betula* sp.), willow (*Salix* sp.), buckthorn (*Frangula alnus*), walnut (*Juglans regia*), cranberry bush (*Viburnum* sp.), spindle tree (*Euonymus* sp.), dogwood (*Cornus* sp.) and hornbeam (*Carpinus betulus*). The charcoal of conifers was relatively rare and it belonged to fir (*Abies alba*), juniper (*Juniperus communis)*, yew (*Taxus baccata*) and pine (*Pinus* sp.).

| Vrsta/species | oglje/charc. (%) | Vrsta/species | oglje/charc. (%) |
|---|---|---|---|
| ***Corylus avellana*** | 25,5 | ***Populus sp.*** | 1,2 |
| ***Alnus glutinosa*** | 25,0 | ***Betula sp.*** | 1,0 |
| ***Fraxinus excelsior*** | 11,1 | ***Crataegus sp.*** | 0,9 |
| ***Fraxinus ornus*** | 5,2 | ***Salix sp.*** | 0,5 |
| ***Fagus sylvatica*** | 5,0 | ***Frangula alnus*** | 0,3 |
| ***Quercus sp.*** | 4,0 | ***Juglans regia*** | 0,3 |
| ***Acer campestre*** | 3,6 | ***Viburnum opulus*** | 0,2 |
| ***Sorbus sp.*** | 3,6 | ***Euonymus europaea*** | 0,2 |
| ***Pyrus/Malus*** | 3,5 | ***Cornus sanguinea*** | 0,2 |
| ***Prunus sp.*** | 2,8 | ***Carpinus betulus*** | 0,2 |
| ***Acer platanoides*** | 2,3 | ***Juniperus communis*** | 0,2 |
| ***Abies alba*** | 1,6 | ***Taxus baccata*** | 0,2 |
| ***Acer pseudoplatanus*** | 1,2 | ***Pinus sylvestris*** | 0,2 |

*Tab. 3.2.3:* Deleži oglja vseh determiniranih drevesnih vrst v kulturni plasti na Hočevarici.
*Table 3.2.3:* Proportions of charcoal from all the determined tree types in the cultural layer at Hočevarica.

3.2.1.2.3 Ostali rastlinski ostanki

V kulturni plasti z najdišča Hočevarica so bili med rastlinskimi makroostanki še koli, koščki lesa, brsti, rastlinske maligne tvorbe, ostanki mahu vrste *Neckera crispa* (Neckeraceae), oogoniji alg iz družine Characeae

3.2.1.2.3 Other plant macro-remains

Among the plant macro-remains in the cultural layer at Hočevarica, there were also wooden piles, fragments of wood, buds, tumor structures, the remains of moss *Neckera crispa* (Neckeraceae), oogoniums from the al-

(najverjetneje iz rodu *Chara* sp.) (*sl. 3.2.3a*) in šiške. V večjih količinah smo v globini med 190 in 178 cm v mikrokvadratih 1, 4 in 5 našli ostanke mahu iz družine Drepanocladaceae (*sl. 3.2.3b*).

### 3.2.1.3 Palinološki profil

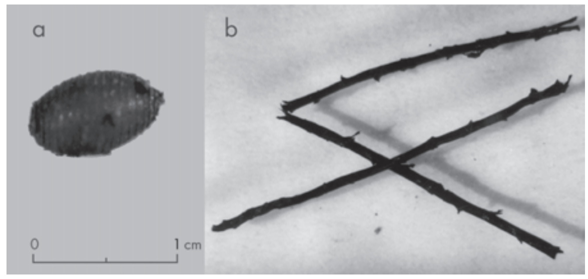
Zgornji meter profila v arheološkem izkopu zaradi pedogeneze in kontaminacije ni bil primeren za pelodne raziskave. Vzorčili smo v globini med 190 in 105 cm in opravili pelodne analize 26 vzorcev, pri čemer je bil pelod v vseh vzorcih dobro ohranjen. V vzorcih iz globine med 130 in 105 cm je bila pelodna vsebina skromna in ni prikazana v pelodnem diagramu. Prevladovale so monoletne spore praprotnic. Pelodna vsebina ostalih pregledanih vzorcev v globini med 190 in 130 cm v celoti sovpada s kulturno plastjo. Prikazana je v pelodnem diagramu, ki smo ga razdelili na pet odsekov. Pelodni diagram izbranih taksonov iz arheološkega profila na Hočevarici z opisi posameznih odsekov je bil že predstavljen (Jeraj 2000). Tokrat je prikazan pelodni zapis iz profila ter interpretacija celotnega diagrama (*sl. 3.2.4*):

Spodnji odsek (A) pelodnega diagrama, v katerem prevladuje drevesna vegetacija (AP), kaže, da je v okolici Hočevarice tik pred naselitvijo ali pa na samem začetku poselitve uspeval mešan listnati gozd. V njem so prevladovali jelša (*Alnus)*, leska (*Corylus*), bukev *(Fagus*), hrast (*Quercus*) in lipa (*Tilia*). Med nedrevesno vegetacijo (NAP) so ugotovljene nizke pelodne vrednosti žit (Cerealia), lobodnic (Chenopodiaceae), trav (Poaceae) in zelišč iz družin križnic (Brassicaceae) in kobulnic (Apiaceae), ki nakazujejo človekovo prisotnost in dejavnost v bližini najdišča.

Na začetku odseka B je razviden oster prehod od drevesne k zeliščni vegetaciji, ki pomeni odprte površine v bližnji okolici. Te so koliščarji uporabljali predvsem za poljedelstvo, kar je razvidno iz visokih pelodnih vrednosti žit in lobodnic, pa tudi za pašništvo, na kar kažejo visoke vrednosti leske. Redčenje okoliškega gozda se kaže v upadanju pelodnih vrednosti drevesnih vrst, kot so bukev, hrast in lipa. Poleg žit in lobodnic na prisotnost človeka kažejo tudi povečane pelodne vrednosti trav, kobulnic in nebinovk (Asteraceae).

Upad pelodne krivulje žit med odsekoma B in C ter sočasen dvig krivulj lobodnic in trav verjetno pomeni začasno opustitev okoliških kultiviranih površin. Opustitev je kratkotrajna, saj se že na začetku odseka C pojavi izrazit dvig pelodnih vrednosti žit, ki znotraj odseka precej nihajo. Minimum krivulje žit sovpada z viški krivulj lobodnic in trav, kar bi lahko pomenilo menjavanje kultiviranih in opuščenih površin oziroma poljedelstvo na stopnji kolobarjenja. Pelod bukve, lipe in hrasta je prisoten le še v sledovih, kar kaže na močan antropogeni vpliv oziroma na izsekane gozdne površine v bližnji in verjetno tudi v daljnji okolici.






*Sl. 3.2.3:* Oogonij alge (a) iz družine Characeae (0,8 × 0,5 mm) in ostanki mahu (b) iz družine Drepanocladaceae (dolžina 5 mm) – velike količine mahu smo našli predvsem v globini med 190 in 178 cm. Foto: M. Jeraj.
*Fig. 3.2.3:* Oogonium (a) from the algae family Characaceae (0.8 × 0.5 mm) and moss remains (b) from the family Drepanocladaceae. Photo: M. Jeraj.

gae family Characaceae (most likely *Chara* sp.) (*fig. 3.2.3a*) and galls. Also, at a depth between 190 and 178 cm a larger quantity of the remains of moss from the family Drepanocladaceae (*fig. 3.2.3b*) was found as well.

### 3.2.1.3 Palynological profile

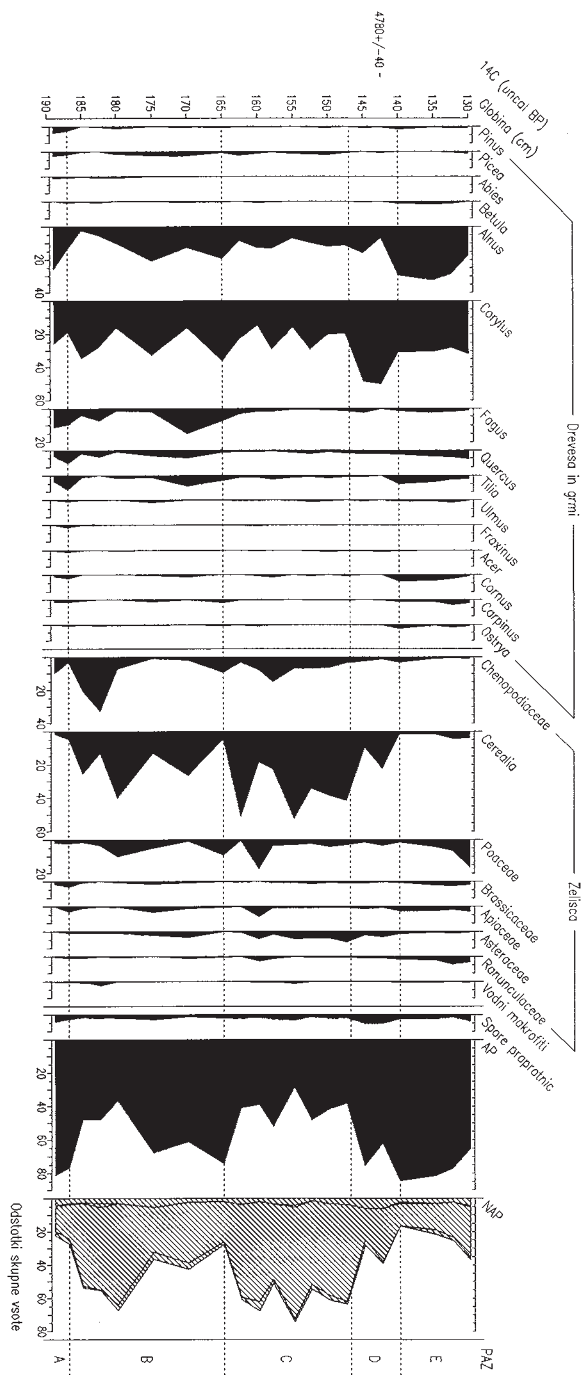
The first meter below the surface of the examined archaeological profile was not suitable for pollen analyses, primarily due to pedogenesis and contamination. Therefore the sampling was performed at a depth of between 190 and 105 cm. The pollen grains and spores were well preserved in all samples. Only a small amount of pollen was found in the layer between 130 and 105 cm, and it is not presented in the pollen diagram. Monolete spores prevailed. The pollen content of the sediments from between 190 and 130 cm is classified into five pollen zones. The pollen diagram from the archaeological profile at Hočevarica has already been presented and described (Jeraj 2000). Its summary and interpretation are presented in the following (*fig. 3.2.4*).

Arboreal vegetation (AP), mostly composed of alder (*Alnus*), hazel (*Corylus*), beech (*Fagus*), oak (*Quercus*) and linden (*Tilia*), prevail in the pollen zone A. It indicates the vicinity of a mixed-deciduous forest just prior to or in the beginning of the settlement period. Determined among herbaceous vegetation (NAP) was a small amount of the pollen of cereals (Cerealia), orachs (Chenopodiaceae), grasses (Poaceae), crucifers (Brassicaceae) and umbellifers (Apiaceae). It is suggestive of possible human presence and activity close to the site. However, this part of the diagram most likely refers to the period before or at the very beginning of the settlement at Hočevarica since the traces of humans are not very distinctive.

A significant transition from arboreal to non-arboreal vegetation is noticed in the beginning of the zone

Naraščanje vrednosti drevesnega peloda in sočasen upad vrednosti zeliščnega peloda v odseku D najverjetneje pomeni, da so koliščarji začeli opuščati naselbino in okoliška polja. Prevladuje leska, ki se je začela razraščati tudi na opuščenih površinah. Radiokarbonski datum organskega sedimenta v globini med 145 in 140 cm je 4780 ± 40 BP (3640–3520 cal BC (1 sigma) oziroma 3650–3380 cal BC (2 sigma)).

V odseku E pelodna krivulja žit popolnoma upade, obenem pa narastejo pelodne vrednosti listavcev, predvsem hrasta, lipe, drena (*Cornus*), belega gabra (*Carpinus*), črnega gabra (*Ostrya*), vrbe (*Salix*) in breze (*Betu-*






B. It reflects the appearance of open landscape, which was used for agriculture and pasturing. This is further documented by high pollen values of cereals and Chenopodiaceae, and by the consistent presence of *Corylus*. The reduction of the surrounding forest is also shown by the decrease in pollen values of trees like beech, oak and linden. Additionally, the increase in pollen values of other anthropogenic indicators such as grasses, umbellifers and composites (Asteraceae) represents further evidence of habitation at Hočevarica.

The decrease of the cereal pollen curve between zones B and C, and the concurrent increase in the grass and orach curves, probably suggest that dwellers from Hočevarica temporarily abandoned the cultivated fields. However, another significant increase, and continued oscillation in the cereal curve reappears in the beginning of zone C. Its minimum values match the maximum values of the pollen curves of orachs and grasses, which may indicate the alternation of cultivated and abandoned land, or farming at the level of crop rotation. The pollen of beech, linden and oak, which only appears sporadically, shows the reduction of nearby and probably also distant forests.

The increased values of arboreal pollen and the concurrent decreased values of herbaceous pollen in zone D most likely suggest the abandonment of the settlement and fields around Hočevarica. Hazel, which also overgrew the abandoned land, dominates. The radiocarbon date of the organic sediment from a depth of between 145 and 140 cm is 4780 ± 40 BP (3640–3520 cal BC (1 sigma), 3650–3380 cal BC (2 sigma)).

The cereal curve drops completely in zone E, while the arboreal pollen, including oak, linden, dogwood (*Cornus*), hornbeam (*Carpinus*), hophornbeam (*Ostrya*) and birch (*Betula*), increase again. This is indicative of the regeneration of forestland and the abandonment of agricultural and residential areas. Nevertheless, the pollen of plants, closely associated with humans, and another increase in the cereal pollen curve towards the end of the zone, still suggest the presence of humans in the close vicinity.

## 3.2.2 DISCUSSION AND CONCLUSIONS

The paleobotanical studies from Hočevarica show that the pile dwellers were gatherers and farmers, and that their activities had a significant influence on the

*Sl. 3.2.4:* Pelodni diagram iz arheološkega profila na Hočevarici.

*Fig. 3.2.4:* Pollen diagram from the archaeological profile at Hočevarica.

*la*). To kaže na ponovno zaraščanje gozda ter opustitev kmetijskih in bivalnih površin. Kljub vsemu pelod zelišč iz družin, ki so v tesni povezavi s človekovo dejavnostjo (križnice, kobulnice, zlatičnice), ter dvig krivulje žit proti koncu odseka še vedno nakazujejo človekovo prisotnost v bližnji okolici.

### 3.2.2 Razprava in zaključki

Paleobotanične raziskave z najdišča Hočevarica kažejo, da so bili koliščarji tako nabiralci kot poljedelci, ki so s svojo dejavnostjo v veliki meri vplivali na razvoj vegetacije in oblikovanje paleokrajine v času naselbine. Glede na večje padce krivulje drevesnega peloda v pelodnem zapisu iz arheološkega profila sklepamo, da so začeli izsekavati okoliške bukovo-jelove in mešane hrastove gozdove, najdbe kolov in makroskopskega oglja pa dokazujejo, da so les uporabljali za gradnjo bivališč in za kurjavo. Velika količina peloda žit in lobodnic, ostanki kultiviranih žit ter številna semena lobodnic iz kulturne plasti so dokaz, da so na izsekanih površinah obdelovali polja ali, kot kažejo tudi najdbe kosti domačih živali (glej *poglavje 3.7*), so jih spremenili v pašnike. Pridelovali so ječmen in pšenico, kar dokazujejo številna ožgana zrna ječmena (*Hordeum vulgare*) in pšenice (*Triticum monococcum, T. turgidum* ssp. *dicoccum*) (Jeraj 2002). Njihova starost je 4800 ± 40 BP (3650–3530 cal BC (1 sigma) oziroma 3670–3380 cal BC (2 sigma)) in so ena najstarejših arheobotaničnih najdb z Ljubljanskega barja.

Ostanki plodov in semen kažejo, da so prebivalci Hočevarice nabirali sadeže in plodove dreves in grmov (*Corylus, Quercus, Cornus, Rubus, Fragaria, Prunus, Sambucus*), ter zelišča (Chenopodiaceae, Papaveraceae, *Urtica*) iz bližnje okolice ter plodove vodnih rastlin (*Trapa, Nuphar*). Zanimiva najdba s Hočevarice so grozdne peške (*Vitis vinifera*), ki so najstarejši ostanki vinske trte v Sloveniji (starost: 4780 ± 40 BP (3640–3520 cal BC (1 sigma) oziroma 3650–3380 cal BC (2 sigma)). Večina ohranjenih semen, plodov in njihovih fragmentov je najverjetneje zaloga ali ostanek hrane tedanjih prebivalcev in njihovih domačih živali. Ožgana zrna pšenice (*Triticum* sp.) in ječmena (*Hordeum* sp.), koščice drnulje (*Cornus mas*) in robide (*Rubus* sp.), peške vinske trte (*Vitis vinifera* ssp. *sylvestris*) ter zdrobljene lupine lešnikov (*Corylus avellana*) poznamo tudi z drugih najdišč na Ljubljanskem barju (npr. Šercelj 1975; Šercelj, Culiberg 1980; Culiberg, Šercelj 1980b).

Iz antrakotomskih raziskav je razvidno, da so največ kurili z leskovim (*Corylus*), jelševim (*Alnus*) in jesenovim (*Fraxinus*) lesom, uporabljali pa so tudi les javorja (*Acer*), jerebike (*Sorbus aucuparia*), sadnega drevja (*Pyrus/Malus*), bukve (*Fagus*), hrasta (*Quercus*), breze (*Betula*), topola (*Populus*) in še nekaterih drugih, v glavnem listnatih dreves. Ogenj jim verjetno ni služil le za ogrevanje in pripravo hrane, pač pa tudi za osvetljevan-

surrounding vegetation and landscape. Large decreases of arboreal pollen during the settlement period evidence the cutting of surrounding beech-fir and mixed oak forests. Moreover, the recovered wooden piles and macroscopic charcoal from the cultural layer suggest that a variety of wood was used for construction and as fuel. A large amount of cereal (Cerealia) and orach (Chenopodiaceae) pollen, numerous grains of barley (*Hordeum vulgare*) and wheat (*Triticum monococcum, T. turgidum* ssp. *dicoccum*), and abundant seeds of Chenopodiaceae, indicate cultivation on cleared surfaces (Jeraj 2002). Furthermore, the pollen of hazel (*Corylus*) and the discovered bones of domestic animals (see *chapter 3.7*) are all evidence of pastureland.

The remains of fruits and seeds suggest that the dwellers from Hočevarica were collecting hazelnuts (*Corylus*), acorns (*Quercus*), cornelian cherries (*Cornus*), grapes (*Vitis*), raspberries (*Rubus*), strawberries (*Fragaria*), blackthorn (*Prunus*), elder (*Sambucus*), as well as some herbs (Chenopodiaceae, Papaveraceae, *Urtica*) and aquatic plants (*Trapa, Nuphar*). On the other hand, the remains of cultivated cereals show that they were also farmers. Charred grains of cultivated barley and wheat are dated to 4810 ± 40 BP (3650–3530 cal BC (1 sigma), 3670–3380 cal BC (2 sigma)), and present one of the oldest archaeobotanical finds from the Ljubljansko barje. Another noteworthy botanical remain from Hočevarica are grape seeds (*Vitis vinifera)*, which were also radiocarbon dated to 4780 ± 40 BP (3640–3520 cal BC (1 sigma), 3650–3380 cal BC (2 sigma)).

The majority of preserved seeds, fruits and their fragments most likely represent the stores or leavings of humans and domestic animals. A larger concentration of remains at a particular place within the site may indicate the location of storage, a fireplace, refuse dump or cattle shed. On the other hand, scarce finds were more likely deposited by rivers or creeks.

Anthracotomic analyses indicate that fire was most often made using the wood of hazel (*Corylus*), alder (*Alnus*) and ash (*Fraxinus*); although the wood of other trees and shrubs like maple (*Acer*), mountain ash (*Sorbus*), pear/apple (*Pyrus/Malus*), beech (*Fagus*), oak (*Quercus*), birch (*Betula*), and poplar (*Populus*), was used as well. However, fire was not used only for heating and cooking, rather also for making pottery, for defense purposes and in rituals, as known from other Neolithic and Eneolithic populations throughout Europe (Gregg 1988). No systematical anthracotomic investigations have yet been carried out on the Ljubljansko barje, however xylothomical analyses of wooden piles regularly accompanied archaeological excavations (Culiberg, Šercelj 1991). Wooden piles from Hočevarica were analyzed in the context of dendrochronological studies and therefore the results are presented separately (see *chapter 6.1*).

In contrast to plant macro-remains, which provide information regarding the nutrition of the pile dwellers je, izdelavo lončenine, v obrambi in pri ritualnih obredih, kot je splošno znano za neolitske in eneolitske populacije v Evropi (Gregg 1988). Do sedaj na Ljubljanskem barju ni bilo sistematičnih antrakotomskih raziskav, zato pa so bile opravljene številne ksilotomske analize kolov (Culiberg, Šercelj 1991). Koli s Hočevarice so bili analizirani v sklopu dendrokronoloških raziskav in so zato obravnavani ločeno od ostalih paleobotaničnih najdb (glej *poglavje 6.1*).

Poleg rastlinskih makroostankov, ki posredujejo predvsem informacijo o prehrani koliščarjev in njihovi selektivni uporabi rastlin, smo analizirali tudi pelod iz kulturne plasti. Pelodni zapis iz arheološkega profila zajema prostorsko širšo sliko ter prikazuje spremembe v razvoju vegetacije in pokrajine v obdobju, ko je bila na Hočevarici koliščarska naselbina. Na podlagi radiokarbonskega datuma organskega sedimenta v globini med 145 in 140 cm, ki je 4780 ± 40 BP (3640–3520 cal BC (1 sigma) oziroma 3650–3380 cal BC (2 sigma)), ter slike razvoja vegetacije uvrščamo zapis v obdobje subboreala.

Opazna značilnost pelodnega diagrama je krivulja peloda žit (Cerealia), ki prevladuje v večjem delu z vrednostmi do 50 % in dokazuje dobro razvito poljedelstvo na Hočevarici. Od ostalih antropogenih indikatorjev (Behre 1981) se pojavlja še pelod lobodnic (Chenopodiaceae), trav (Poaceae), kobulnic (Apiaceae) in nebinovk (Asteraceae). Upadanje vrednosti drevesnega peloda (AP), predvsem bukve (*Fagus*), hrasta (*Quercus*) in lipe (*Tilia*), kaže na sočasno izsekavanje okoliških gozdov. Redčenje gozdnih površin na račun pašništva nakazujejo tudi visoke vrednosti peloda leske (*Corylus*), medtem ko je stalna in pogosta prisotnost jelše (*Alnus*) indikator za močvirno okolje. Sekundarno spremenjena vegetacija in človekov vpliv na naravno okolje sta razvidna tudi v ostalih pelodnih zapisih na arheoloških najdiščih ali v njihovi bližini na Ljubljanskem barju (Šercelj 1955; 1975; 1976; Culiberg, Šercelj 1978; 1980b; Gardner 1999b). Za razliko od Hočevarice je bil pelod žit v kulturnih plasteh na Maharskem prekopu, na Partih in v Notranjih Goricah ugotovljen v manjših količinah (Šercelj 1975; Culiberg, Šercelj 1978; 1980a; Gardner 1999b).

Radiokarbonski datumi sedimenta in semen iz kulturne plasti kažejo, da sega kolišče na Hočevarici v sredino četrtega tisočletja pr. Kr. (glej *poglavje 6.5*). V pelodnem zapisu sta opazni dve zaporedni obdobji pridelovanja žit, ki bi lahko pomenili dve zaporedni naselbinski fazi. Iz sočasnih dvigov krivulje žit in padcev krivulje lobodnic, ki so pleveli opuščenih kultiviranih površin (Bakels 1991), sklepamo, da so koliščarji menjavali poljedelske površine. Zadnji padec krivulje žit je zabeležen po 4780 ± 40 BP (3640–3520 cal BC (1 sigma) oziroma 3650–3380 cal BC (2 sigma)), kjer se krivulja drevesnega peloda (AP) ponovno dvigne. To bi lahko pomenilo opustitev poljedelskih in pašniških površin in morebiten konec naselbine na Hočevarici.

and their selective use of available plants, the pollen record from the cultural layer at Hočevarica has a much broader spatial and temporal resolution. It indicates changes in the surrounding vegetation and landscape during the 4th millennium B.C., and probably extends from the short period before or from the very beginning of habitation to the period when the settlement was abandoned. According to the obtained vegetation development and to the radiocarbon date of the organic sediment from the depth of between 145 and 140 cm, which is 4780 ± 40 BP (3640–3520 cal BC (1 sigma), 3650–3380 cal BC (2 sigma)), the record belongs to the Subboreal period.

The pollen diagram from the archaeological profile is characterized by a high amount of cereal pollen, which dominates with values of up to 50 % and suggests a well-developed agricultural level at and around Hočevarica. Furthermore, pollen of other anthropogenic indicators (Behre 1981) like Chenopodiaceae, grasses (Poaceae), umbellifers (Apiaceae) and composites (Asteraceae) is also present. The decrease of arboreal pollen (AP), especially the pollen of beech (*Fagus*), oak (*Quercus*) and linden (*Tilia*), indicates clearing of the surrounding forests. Additionally, the thinning of woods on account of using the cleared land for pasturelands are documented by the high pollen values of hazel (*Corylus*). The constant presence of alder (*Alnus*) is indicative of a marshy environment. Secondary modified vegetation and human influence on the environment are also evident from other pollen diagrams from the Ljubljansko barje, including the archaeological profiles and nearby cores (Šercelj 1955; 1975; 1976; Culiberg, Šercelj 1978; 1980b; Gardner 1999b). In contrast to Hočevarica, cereal pollen from the cultural layers at Maharski prekop, Parte and Notranje Gorice appeared in small quantities (Šercelj 1975; Culiberg, Šercelj 1978; 1980a; Gardner 1999b).

The radiocarbon dates of the sediment and seeds from the cultural layer suggest that the pile dwelling at Hočevarica existed around the mid 4th millennium B.C. (see *chapter 6.5*). Two successive periods of cultivation, which may suggest two successive stages of the settlement at Hočevarica, can be detected from the pollen diagram. Furthermore, concurrent increases in the cereal pollen curves and decreases in the Chenopodiaceae curves are observed. This may suggest the alternation of cultivated fields since Chenopodiaceae evidence the abandonment of fields (Bakels 1991). The last decrease of cereal pollen is observed at 4780 ± 40 BP (3640–3520 cal BC (1 sigma), 3650–3380 cal BC (2 sigma)), when the arboreal pollen increases again. This date may indicate the end of the settlement and also the abandonment of cultivated and pastured lands in the surroundings of Hočevarica.

Translation: Marjeta Jeraj

# 3.3 OPREDELITEV MATERIALA OGRLIČNEGA OBROČKA S HOČEVARICE

DRAGOMIR SKABERNE & ANA MLADENOVIČ

*Izvleček*

*Majhni okrasni obročki so narejeni iz temnosive zelo drobnozrnate skrilave metamorfne kamnine, sericitno-kremenovega skrilavca. Najbližje izvorno območje takih kamnin je iskati v severnih Karavankah in na Pohorju.*


*Sl. 3.3.1:* Hočevarica (Ljubljansko barje), Karavanke, Pohorje in Kozjak.
*Fig. 3.3.1:* Hočevarica (Ljubljansko barje), Karavanke, Pohorje and Kozjak.

## **3.3.1** UVOD

Med arheološkim izkopavanjem na prazgodovinskem naselju Hočevarica na Ljubljanskem barju je bilo med drugim najdenih več lepo izdelanih ogrličnih obročkov s premerom do 5 mm in debeline do 1,9 mm. Izdelani so skrbno iz temnosivega, skoraj črnega, zelo drobnozrnatega materiala, ki ga je potrebno podrobneje opredeliti.



# 3.3 DETERMINATION OF NECKLACE RINGLETS MATERIAL FROM HOČEVARICA

*Abstract*

*The small decorative ringlets are made of dark gray very fine-grained slate, a sericite-quartz slate. The closest source areas for such rocks are in the northern Karavanke and the Pohorje.*

## **3.3.1** INTRODUCTION

A number of beautifully made necklace ringlets were among the many finds from the archaeological excavations of the prehistoric settlement Hočevarica on the Ljubljansko barje. The ringlets are up to 5 mm in diameters and up to 1.9 mm thick. They are carefully made of dark gray, almost black, very fine-grained material, which requires further determination.

## **3.3.2** METHODS OF INVESTIGATION

The necklace ringlet from sub-phase 5 and from the context of the second settlement phase (*fig. 3.3.2*) was first inspected under a stereomicroscope, and then in greater detail with a low vacuum scanning electronic microscope (LV-SEM) with an energy dispersive spectrometer (EDS). From a second ringlet, found in subphase 7 and also from the second settlement phase, a polished thin section was made that was then examined with an optic microscope in transmitted and reflective polarized light.

## **3.3.3.** RESULTS

The necklace ringlet measures 3.17 mm in diameter and is 1.67 mm thick; it has a hole in the middle that measures 1.1 mm in diameter (*fig. 3.3.2*). Macroscopi-

### **3.3.2** RAZISKOVALNE METODE

Ogrlični obroček iz skupka 5 v okviru druge naselbinske faze (*sl. 3.3.2*) smo najprej pregledali pod stereo mikroskopom, nato pa podrobneje z nizko vakuumskim vrstičnim elektronskim mikroskopom (LV-SEM) z energijsko disperzijskim spektrometrom (EDS). Iz drugega obročka, najdenega v skupku 7 prav tako iz druge naselbinske faze, pa je bil izdelan polirani zbrusek, ki smo ga preiskali z optičnim mikroskopom v presevni in odsevni polarizirani svetlobi.

### **3.3.3** REZULTATI

Ogrlični obroček je velik v premeru 3,17 mm, debel 1,67 mm in ima v sredini luknjo s premerom 1,1 mm (*sl. 3.3.2*). Po makroskopskem videzu je natančno izdelan iz temnosivega, skoraj črnega, zelo drobnozrnatega materiala. Zrna so velika od 1 do 50 µm, povprečno približno 15 µm in so izometrična, ploščasta ali lističasta in grade usmerjeno strukturo (*sl. 3.3.3*).

V polarizirani presevni svetlobi smo zaznali prozorna in neprozorna zrna. Med prozornimi zrni prevladuje kremen, slede lističi muskovita – sericita, glinencev, iglice rutila, ki se ponekod zraščajo v radialno zgrajene agregate ter posamezna zrna apatira in cirkona (*sl. 3.3.4*; *3.3.5*). Po oblikah nekaterih por sklepamo, da so bila lahko prisotna tudi posamezna zrna karbonatov, ki pa so izlužena. Neprozorna zrna sestavljajo železovi oksidi in hidroksidi, titanovi in železo-titanovi oksidi ter organska snov (*sl. 3.3.4*; *3.3.5*). Železovi hidroksidi so nastali verjetno z oksidacijo pirita. Pri posameznih zrnih je še ohranjena njihova prvotna framboidalna struktura.

Vse naštete optično mikroskopsko določene sestavne komponente smo dokazali tudi z vrstičnim elektronskim mikroskopom (SEM) in EDS, s katerim smo naredili kvalitativno elementno analizo. SEM-slike so posnete z detektorjem odbitih elektronov (*backscattered electrons*). Pri njihovi upodobitvi so zrna, sestavljena iz težjih elementov, svetlejša, zrna, sestavljena iz lažjih elementov, pa temnejša.

Pod SEM se je, predvsem v prečnem preseku, razkrila podrobnejša struktura materiala. Med večjimi bolj izometričnimi zrni so vzporedno orientirani lističi sericita, ki so vsaj deloma avtigeni in nakazujejo skrilavo teksturo – foliacijo (*sl. 3.3.6*). Ob nekaterih kremenovih zrnih je v sencah pritiskov opazna rast avtigenega vlaknatega kremena, ki se deloma preranšča z lističi sericita (*sl. 3.3.7*).

Na podlagi optično in elektronsko mikroskopskih preiskav lahko zaključimo, da je ogrlični obroček narejen iz zelo drobnozrnate skrilave metamorfne kamnine, sericitno-kremenovega skrilavca.

cally, it looks carefully made of dark gray, almost black, very fine-grained material. The grains size range between 1 and 50 µm, 15 µm on average. The grains are isometric, platy or bladed and form an oriented texture (*fig. 3.3.3*). Transparent and opaque grains were discerned in the polarized transmitted light. The transparent grains comprise mainly of quartz, traces of muscovite – sericite, feldspars, needles of rutile, which occasionally grow into radial aggregates, as well as individual grains of apatite and zircon (*fig. 3.3.4*; *3.3.5*). The shapes of some of the pores indicate that individual grains of carbonates, which were leached had been also present. The opaque grains are comprised of iron oxides and hydroxides, titanium and iron-titanium oxides as well as organic matter (*fig. 3.3.4*; *3.3.5*). The iron hydroxides are the oxidation products, most probably of the pyrites. The original framboidal texture of the individual grains is still preserved.

All the above-mentioned optic microscopic determined comprising components were also confirmed with the scanning electronic microscope (SEM) and EDS, with which qualitative analysis of chemical elements was made. The SEM images are backscattered electron images. On these images, the grains comprised of heavier elements are lighter and those comprised of lighter elements are darker.

The detailed texture of the material, especially in its transverse cross-section, was discerned using the SEM. Sericite, which is at least partly authigenic, is oriented parallel to the larger more isometric grains and form a slaty texture – foliation (*fig. 3.3.6*). Authigenic fibrous quartz, partly overgrown with sericite, can be detected of in the pressure shadows of some larger quartz grains (*fig. 3.3.7*).

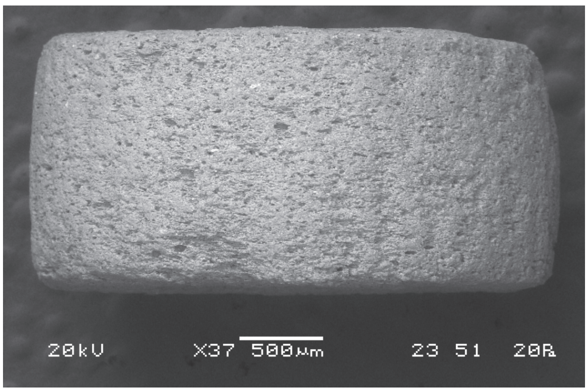
Based on the results from the optic and electronic microscopic examinations it is conclusive that the necklace ringlet is made of a very fine-grained slaty metamorphic rock, sericite-quartz slate.

### **3.3.4** DISCUSSION

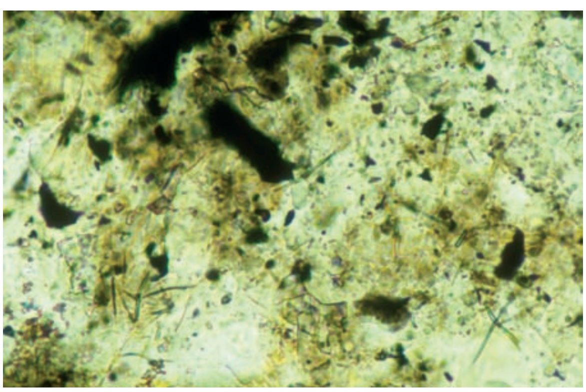
The necklace ringlet from Hočevarica on the Ljubljansko barje is made of a slaty metamorphic rock, sericite-quartz slate, which is not known from the nearby surroundings. The most similar metamorphic rocks are north of the Peradriatic lineaments in the Eastern Alps, which reach the Slovenian territory with the northern Karavanke, Pohorje and Kozjak. Other origins are also plausible, from the regions of Austria and Italy or even farther away. These facts all demonstrate that certain north-south and east-west routes of communication had to have already been established during the time of settlement at Hočevarica on the Ljubljansko barje.

### **3.3.4** RAZPRAVA

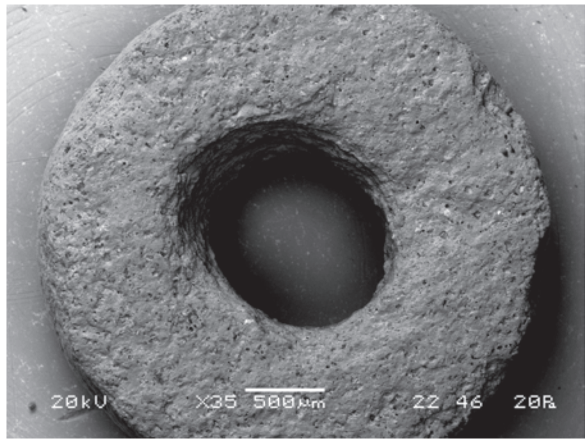
Ogrličin obroček z naselbine Hočevarica na Ljubljanskem barju je izdelan iz skrilave metamorfne kamnine, sericitno-kremenovega skrilavca, ki je v bližnji okolici ne poznamo. Podobne metamorfne kamnine bi lahko najbližje našli severno od Peradriatskega lineamenta na območju Vzhodnih Alp, ki segajo na slovensko ozemlje s Severnimi Karavankami, Pohorjem in Kozjakom. Možni so še drugi izvori iz območja Avstrije in Italije ali pa še iz bolj oddaljenih krajev. Vse to kaže, da so morale že v času poselitve Hočevarice na Ljubljanskem barju obstajati določene komunikacijske poti v smeri sever-jug in vzhod-zahod.



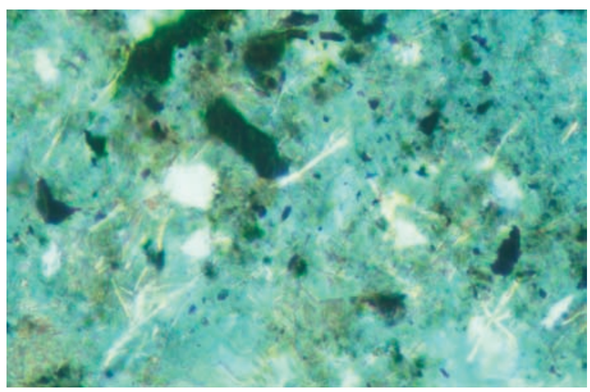

*Sl. 3.3.3:* Stranski pogled na ogrličin obroček, v katerem je vidna vzporedna orientacija podolgovatih in ploščatih zrn.
LV-SEM, odbiti elektroni.
*Fig. 3.3.3:* Side view of the necklace ringlet, in which the parallel orientation of the elongated and platy grains is visible.
LV-SEM, backscattered electrons.



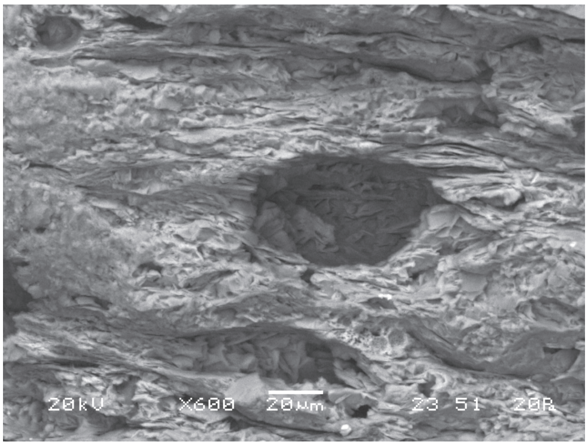
*Sl. 3.3.4:* Prozorna in neprozorna zrna. Med prozornimi, nekoliko motnimi zrni izstopajo igličasta zrna rutila z visokim reliefom, ki ponekod sestavljajo radialne agregate.
Presevna polarizirana svetloba, = N, dolžina dolgega roba slike 0,14 mm.
*Fig. 3.3.4:* Transparent and opaque grains. With their high relief, the needle-shaped grains of rutile, sometimes comprising radial aggregates, stand out among the transparent and slightly opaque grains.
Transmitted polarized light, = N, length of the long edge of the image is 0.14 mm.



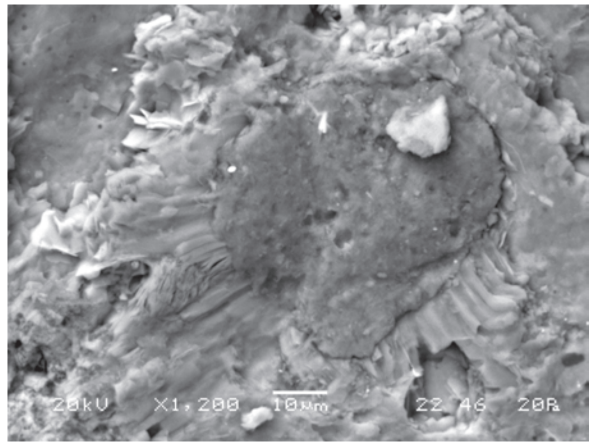

*Sl. 3.3.2:* Zgornja, sorazmerno gladka površina ogrličnega obročka, na kateri so vidna večja zrnca. Ob nekoliko poševnem levem robu luknje je opazna skrilava tekstura kamnine.
LV-SEM, odbiti elektroni, (oznake na vseh SEM-slikah od leve proti desni: 20 kV – pospeševalna napetost, ×35 – povečava, 22 mm – razdalja od vzorca do detektorja, 46 – širina vpadnega žarka, 20 Pa – tlak).
*Fig. 3.3.2:* The upper, relatively smooth surface of the necklace ringlet, upon which larger grains are discernible. The slaty texture of the rock is visible next to the somewhat slanted left edge of the hole.
LV-SEM, backscattered electrons (the designations on all the SEM images, from left to right: 20 kV – acceleration voltage, ×35 – magnification, 22 mm – distance from the sample to the detector, 46 – spot size, 20 Pa – pressure).



*Sl. 3.3.5:* Isto kot na *sl. 3.3.4*. Pod navzkrižnimi polarizatorji so lepo vidna večja kremenova zrna (belo). Sivo so drobna večinoma kremenova zrna, med katerimi so večja in manjša neprozorna zrna in podolgovati preseki iglic rutila in lističev sericita, ki imajo visoke interferenčne barve (rumenkasto).
Presevna polarizirana svetloba, + N, dolžina dolgega roba slike 0,14 mm.
*Fig. 3.3.5:* The same as for *fig. 3.3.4*. The larger quartz grains (white) are easily discernible under the crossed polarizers. The gray are fine, for the most part quartz grains, among which are larger and smaller opaque grains and long needles of rutile and flakes of sericite, which have high interferential colors (yellowish).
Transmitted polarized light, + N, length of the long edge of the image is 0.14 mm.




*Sl. 3.3.6:* Med večjimi bolj izometričnimi zrni so v prečnem preseku vidni vzporedno orientirani lističi sericita, ki nakazujejo skrilavo teksturo – foliacijo.
LV-SEM, odbiti elektroni.
*Fig. 3.3.6:* Sericite forming a slaty texture – foliation; can be seen in the cross-sections parallel to the larger more isometric grains.
LV-SEM, backscattered electrons.




*Sl. 3.3.7:* Ob večjem zrnu kremena je v sencah pritiska rasel vlaknati kremen, ki se ponekod prerašča z lističi sericita.
LV-SEM, odbiti elektroni.
*Fig. 3.3.7:* The growth of fibrous quartz, partly overgrown with sericite in the pressure shadows of a large grain of quartz.
LV-SEM, backscattered electrons.

# **3.4** PREISKAVA ENEOLITSKIH METALURŠKIH SLEDOV S HOČEVARICE Z METODO PIXE

# **3.4** INVESTIGATION OF COPPER METALLURGY AT HOČEVARICA USING THE PIXE METHOD

ŽIGA ŠMIT

*Izvleček*

*Z metodo protonsko vzbujenih rentgenskih žarkov (PIXE) sta pregledani površina glinene posode in kovinska kaplja s Hočevarice. Rezultati kažejo, da predmeta lahko povežemo z metalurgijo bakra.*

*Abstract*

*The method of proton-induced X-rays (PIXE) was applied for the investigation of the surface of a clay mould and a metal droplet from the Hočevarica site. The results indicate a close relationship of both objects with the metallurgy of copper.*

## **3.4.1** RAZPRAVA

Glavni prednosti metode protonsko vzbujenih rentgenskih žarkov (PIXE) sta velika občutljivost za sledne elemente in nedestruktiven merski postopek. Metoda se je zato izkazala kot učinkovito orodje za identifikacijo metalurške dejavnosti na glinastem lončku z najdišča Hočevarica in za določitev vrste kovine v drobni kovinski kaplji, ki izvira z istega najdišča.

Sestavo lončka (glej *poglavje 3.1.4.5*; *sl. 3.1.27*) smo določili na enak način kot pri keramičnih fragmentih z Maharskega prekopa (Šmit, Nečemer 1998, 55). Lonček smo obsevali s protonskim žarkom v zraku. Izhodna energija protonov je bila 2 MeV; po prehodu izstopnega okenca in 1,1 cm široke zračne reže so protoni zadeli tarčo s približno energijo 1,5 MeV. Normalizacijski postopek smo izvedli glede na argonov signal iz obdajajočega zraka. Geometrijske parametre smo določili z meritvami tarč iz čistih elementov in iz enostavnih kemičnih spojin. Lonček smo analizirali v treh točkah: dve smo izbrali na notranji površini, eno pa na zadnji strani lončka (*tab. 3.4.1*). Merski rezultati jasno kažejo z bakrom obogateno notranjo površino, kar lahko privzamemo kot zadosten dokaz, da je bil lonček vključen v metalurški proces.

Iz *tabele 3.4.1* lahko razberemo še dodatne tehnične podrobnosti: vsebnost železa v vseh treh točkah je približno konstantna, kar pomeni, da v lončku niso talili bakrovih železosulfidnih rud. Vendar je vsebnost žve-

## **3.4.1** DISCUSSION

The main advantages presented by the proton-induced X-rays (PIXE) method are good sensitivity regarding trace elements and its non-destructive character as a measuring procedure. This method consequently proved an appropriate tool for the identification of copper metallurgy on a small clay pot from the Hočevarica site, and for determining the type of metal of the small metal droplet from the same site.

The composition of the pot (*fig. 3.1.27*) was determined the same way as was the casting mould from Maharski prekop (see Šmit, Nečemer 1998). The pot was irradiated with an external proton beam of 2 MeV exit energy. After the proton slowing in the exit window and a 1.1 cm wide air gap, the actual bombarding energy measured about 1.5 MeV. The normalization was performed according to the argon signal from the surrounding air, and the geometrical quantities were calibrated with a set of elemental or simple chemical compound targets. The pot was analyzed at three points: two of them were selected from the inner surface and one from the backside (*table 3.4.1*). The results clearly indicate a copper-enriched inner surface, which may be regarded as sufficient proof that the pot was included in the metallurgical process.

Furthermore, *table 3.4.1* provides us with additional technical details: the iron content is approximately constant at all three points, which means that the pot pla na notranji strani nekoliko večja kot na zunanji, tako da taljenja sulfidnih rud ne moremo popolnoma izključiti.

Kovinsko kapljo (glej *sl. 3.1.28*) smo najprej analizirali v osnovni obliki, ko je bila že na videz močno patinirana, nato pa še po odstranitvi patine. Kot pri prvi meritvi smo tudi tu uporabili normalizacijo z argonom iz zraka, in tako določili, da kaplja vsebuje 4,3 % železa in 9,3 % bakra. Od nečistoč smo zaznali 0,6 % Zn, medtem ko so bile detekcijske meje za As 0,1 %, za Sn 3,5 % in za Sb 2 %. Doseg protonov z energijo 1,5 MeV v bakru je le 12 μ m, tako da je bila analiza dejansko omejena na patinirano plast. S tem tudi pojasnimo precejšno koncentracijo železa, ki zelo verjetno izvira iz zemlje, v kateri je bil vzorec zakopan.

Patino so v kasnejših postopkih odstranili, pri čemer se je pokazala rdeča porozna plast iz (verjetno) bakrovega oksida. Površina je bila električno neprevodna, vendar kapljica vsebuje prevodno kovinsko jedro, saj smo lahko v njej vzbudili zaznavne vrtinčne tokove. Druga meritev je bila predvsem posvečena določitvi nečistoč v bakru. Energijo protonov smo povečali na 3 MeV (kar pomeni vpadno energijo 2,8 MeV), intenzivno sevanje bakrovih žarkov pa smo nato zadušili z 0,3 mm debelim aluminijevim absorberjem. Pri takem načinu merjenja nismo mogli uporabiti argonove normalizacije, zato smo koncentracije nečistoč izračunali s privzetkom, da imamo opravka z matriko iz skoraj čistega bakra. Prepustnost aluminijevega absorberja smo preverili z meritvijo medeninastega standarda NBS C1107, ki vsebuje 1,04 % Sn. Koncentracije nečistoč, težjih od bakra, so podane v *tabeli 3.4.2*. Najobilnejši nečistoči sta arzen in srebro, s koncentracijama približno 0,07 %. Vsebnost srebra je primerljiva z vrednostmi, ki jih najdemo v predmetih iz bronaste dobe (Trampuž Orel 1996, 165). Koncentracija arzena je precej majhna in se ujema z najmanjšimi arzenovimi koncentracijami v teh predmetih.

Pri nečistočah moramo dopustiti možnost, da so njihove koncentracije na površini manjše zaradi kemič-

was not used for smelting the copper-iron-sulfide ores. However, the content of sulfur is slightly increased on the inner surface, so the smelting of sulfides cannot be completely ruled out.

The metal droplet (*fig. 3.1.28*) was first analyzed in its original form, when it still appeared heavily patinated, and then again after removing the patina. Argon normalization was used in the first measurement, yielding a 4.3 % value of iron and 9.3 % of copper. The impurities detected were 0.6 % Zn, while the detection limits for As, Sn and Sb were 0.1 %, 3.5 %, and 2 %, respectively. As the range of 1.5 MeV protons in copper is only 12 μ m, the analysis was actually limited to the patina layer. This also explains the quite large content of iron, which probably originated from the soil in which it was buried.

The patina was later removed, exposing a red and porous surface of (presumably) copper oxide. The surface was electrically nonconductive, though the droplet contains a conducting metal core, as proved by inducing detectable eddy currents in it. The second analysis was then concentrated on the determination of impurities in copper. The proton energy was increased to 3 MeV (which meant 2.8 MeV impact energy), and the intense production of copper X-rays was suppressed by a 0.3 mm thick aluminum absorber. It was not possible to apply the argon normalization for this type of measurement, so the concentrations were calculated assuming a matrix of nearly pure copper. The transmission of the aluminum absorber was checked by the NBS naval brass C1107 standard, which contains 1.04 % Sn. *Table 3.4.2* presents the content of impurities heavier than copper. The two most abundant impurities are arsenic and silver, their concentrations being about 0.07 %. The silver content is comparable to the values found in the Bronze Age objects (Trampuž Orel 1996, 165). The arsenic content is quite low and matches the lowest concentrations of arsenic in these objects.

Considering the impurity concentrations in the analyzed layer, there is the possibility that they were

| | **Točka 1, znotraj / Point 1, inside** | **Točka 2, znotraj / Point 2, inside** | **Točka 3, zunaj / Point 3, outside** |
|---|---|---|---|
| **$SiO_2$** | 20 | 31 | 56 |
| **S** | 0,3 | 0,2 | 0,02 |
| **$K_2O$** | 0,35 | 0,55 | 1,0 |
| **CaO** | 1,8 | 3,8 | 1,3 |
| **Ti** | 0,2 | 0,3 | 0,7 |
| **V** | 0,02 | 0,02 | - |
| **Cr** | - | - | 0,02 |
| **Mn** | 0,01 | 0,02 | 0,05 |
| **Fe** | 6,0 | 4,1 | 4,6 |
| **Cu** | 17,6 | 4,2 | 0,004 |
| **Zn** | - | - | 0,026 |
| **As** | 0,04 | 0,03 | - |

*Tab. 3.4.1:* Koncentracije (v utežnih %) na površini lončka.
*Table 3.4.1:* Concetrations (in weight %) at the surface of the pot.

nega luženja med ležanjem v zemlji in pri kasnejšem čiščenju, kljub temu pa lahko s precejšno gotovostjo trdimo, da je kapljica iz skoraj čistega bakra. Detekcijska meja kositra v *tabeli 3.4.2* je dovolj nizka, da lahko izključimo vsakršno zlivanje s kositrom.

| | |
|---|---|
| **As** | 0,074 |
| **Se** | 0,013 |
| **Ag** | 0,073 |
| **Sn** | < 0,02 |
| **Sb** | < 0,03 |

*Tab. 3.4.2:* Koncentracije težkih primesi v kovinski kapljici.
*Table 3.4.2:* Concentrations of heavy impurities in the metal droplet.



partly reduced by chemical leaching during the burial period and subsequent cleaning. Nevertheless, the metal droplet was certainly made of quite pure copper. The detection limit of Sn in *table 3.4.2* is sufficiently low to assert that no alloying with tin was applied.

Translation: Žiga Šmit

# 3.5 ANALIZA SESTAVE DVEH SEKIR IZ LJUBLJANICE PRI HOČEVARICI

# 3.5 ANALYSIS OF THE COMPOSITION OF TWO AXES FROM THE LJUBLJANICA NEAR HOČEVARICA

ZORAN MILIĆ

*Izvleček*

*Analizirani sta bakreni sekiri iz Ljubljanice pri Hočevarici. Razlikujeta se v materialni sestavi po vsebnosti svinca in arzena, kar navaja k sklepu o njunem različnem izvoru.*

*Abstract*

*Presented is the analysis of two copper axes from the Ljubljanica river near Hočevarica. Their material compositions differ from each other as regards their contents of lead and arsenic; this is indicative of their having different origins.*

## 3.5.1 UVOD

Kovinski sekiri (*sl. 3.5.1* in *3.5.3*) iz Ljubljanice je pred nekaj leti našel amaterski potapljač in iskalec starin. Po njegovem pripovedovanju naj bi izvirali z območja v neposredni bližini arheološkega najdišča Hočevarica (glej *poglavje 3.1.6*; *sl. 3.1.30*).

## 3.5.2 METODA

Analize smo opravili v laboratoriju Narodnega muzeja Slovenije v Ljubljani z metodo EDS XRF. Pri tem smo uporabili napravo X-Ray Analyzer Model PEDUZO 01/Am/Sip-250, ki so jo za nas izdelali v Institutu Jožef Stefan iz Ljubljane.

Analizator je oblikovan za analizo kemičnih elementov različnih vzorcev. Kot vir žarčenja se uporablja 25 mCi Am-241 radioizotop. Rentgenski spektrometer bazira na Si pin detektorju z resolucijo 250 eV pri 5,9 keV. Spekter analizira 1024-kanalni analizator z diferencialno nelinearnostjo < 2 % in integralno nelinearnostjo < 1 %. Detektor je nameščen v vakuumu in ima 25 mikronov debelo Be-okno. Peltierov hladilnik je vgrajen v ojačevalni sistem in vzdržuje 235 °K na pin diodi. Vse nastavitve sistema so opravljene v tovarni tako, da je spektralno energijsko območje 3–30 keV z razpršitvijo približno 30 eV/kanal.

Analize smo opravili na vzorcih sekire 1 (št. 129)

## 3.5.1 INTRODUCTION

Two metal axes (*fig. 3.5.1* and *3.5.3*) were discovered in the Ljubljanica just a few years ago by an amateur diver and antiquarian. According to the diver, the axes were from the region in direct vicinity to the archaeological site of Hočevarica (check *chapter 3.1.6*; *fig. 3.1.30*).

## 3.5.2 METHOD

The analyses were carried out in the laboratory of the National Museum of Slovenia in Ljubljana using the EDS XRF method. Specially designed and made at the Jozef Stefan Institute in Ljubljana, an X-Ray Analyzer Model PEDUZO 01/Am/Sip-250 was used.

The analyzer was created to analyse the chemical elements of various samples. A 25 mCi Am-241 radioisotope served as the source of radiation. The x-ray spectrometer is based on a Si pin detector with a resolution of 250 eV at 5.9 keV. The spectrum is analyzed by a 1024-channel analyzer with a differential non-linearity of < 2 % and an integral non-linearity of < 1 %. The detector is set in a vacuum and has a Be-window measuring 25 microns thick. A Peltier refrigerator is built into the amplifying system and it maintains 235 °K per pin diode. The manufacturer sets all the default system settings, so the spectral energy region is 3–30 keV with a dispersion of approximately 30 eV/channel.

in sekire 2 (št. 130). Vzorec smo dobili z vrtanjem v sekiro z jeklenim svedrom (*sl. 3.5.2* in *3.5.4*). Opilke smo dali na tanko polietilensko gospodinjsko folijo, jih postavili na analizirno okno in zbirali energijo približno 20 ur. Za tako dolgo zbiranje energije smo se odločili zato, ker gre za čisti baker, ki ima majhne primesi nekaterih elementov in je za njihovo kvantitativno določitev potreben lepo oblikovan karakteristični energijski vrh. Isti opilki bodo analizirani še z ICP metodo na Kemijskem inštitutu.

The analyses were carried out on the axe samples 1 (no. 129) and 2 (no. 130). The sample was attained by drilling the axe with a steel drill (*fig. 3.5.2* and *3.5.4*). The steel chips were placed upon a thin layer of polyethylene foil and then in the analysis window where they collected energy for approximately 20 hours. This long energy collection window was estimated as appropriate for copper, which contains small alloys of elements that require a well formed characteristic energy climax for their quantitative determination. The same steel chips shall also be analyzed with the ICP method at the Chemistry Institute.

### **3.5.3** REZULTAT

### **3.5.3** RESULT

| **vzorec / sample** | **Cu %** | **Pb %** | **As %** | **Ag %** | **Sn %** | **Sb %** |
|---|---|---|---|---|---|---|
| **sekira / axe 1** | 97,2 | 0,2 | 2,2 | 0,03 | 0,02 | 0,04 |
| **sekira / axe 2** | 98,7 | 0,8 | - | 0,05 | 0,03 | 0,01 |

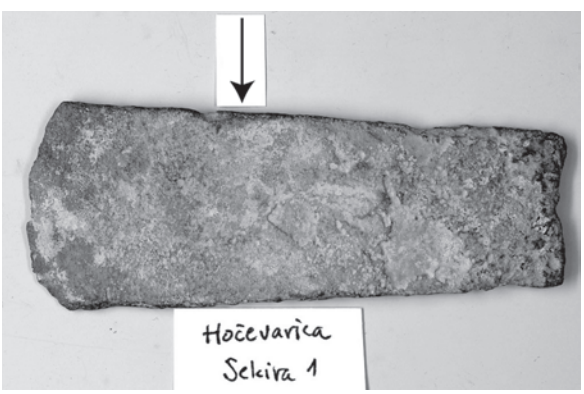
*Tab. 3.5.1:* Kvantitativna določitev elementov v prvi (št. 129) in drugi sekiri (št. 130) iz Ljubljanice.
*Table 3.5.1:* A quantitative determination of the elements in the first (no. 129) and second (no. 130) axe from the Ljubljanica river.

### **3.5.4** KOMENTAR

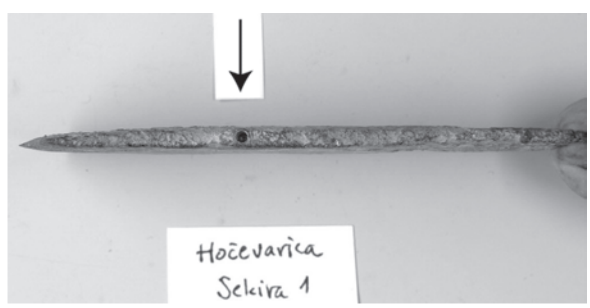
Obe sekiri sta izdelani iz bakra z manjšimi primesmi drugih tipičnih spremljajočih elementov. Predvsem gre za vsebnost svinca in arzena. Obe sekiri se razlikujeta v materialni sestavi ravno po vsebnosti svinca in arzena. Medtem ko ima sekira 1 (št. 129) relativno veliko arzena, ima sekira 2 (št. 130) več svinca. Torej lahko rečemo, da sestavo sekire 1 določa višja vsebnost arzena in sekiro 2 višja vsebnost svinca. V tem je razlika med njima, kar navaja k sklepu o njunem različnem izvoru.

### **3.5.4** COMMENTARY

Both axes are made of copper comprising smaller alloys and other typical admixture elements. The contents of lead and arsenic are predominant. The material compositions of the two axes differ from each other as regards their contents of lead and arsenic. While axe 1 (no. 129) has a high value of arsenic, axe 2 (no. 130) has a similar amount of lead. It follows that the high value of arsenic determines the composition of axe 1 (no. 129) and the high value of lead determines the composition of axe 2 (no. 130). Here lies the difference between the two axes, which further leads to the conclusion that they have different origins.




*Sl. 3.5.1:* Prva sekira (št. 129) z označenim mestom, kjer je bil odvzet vzorec za analizo. Foto: Z. Milić.
*Fig. 3.5.1:* The first axe (no. 129) – the area is designated where the sample was taken for analysis. Photo: Z. Milić.




*Sl. 3.5.2:* Prva sekira (št. 129) – mesto, kjer je bil odvzet vzorec za analizo. Foto: Z. Milić.
*Fig. 3.5.2:* The first axe (no. 129) – the area where the sample was taken for analysis. Photo: Z. Milić.


*Sl. 3.5.3:* Druga sekira (no. 130) z označenim mestom, kjer je bil odvzet vzorec za analizo. Foto: Z. Milić.
*Fig. 3.5.3:* The second axe (no. 130) – the area is designated where the sample was taken for analysis. Photo: Z. Milić.




*Sl. 3.5.4:* Druga sekira (št. 130) – mesto, kjer je bil odvzet vzorec za analizo. Foto: Z. Milić.
*Fig. 3.5.4:* The second axe (no. 130) – the area where the sample was taken for analysis. Photo: Z. Milić.

# 3.6 ANTROPOLOŠKA ANALIZA ZOB Z NAJDIŠČA HOČEVARICA

PETRA LEBEN-SELJAK

Med izkopavanjem na Hočevarici je bilo najdeno več človeških zob. Analizirani so bili trije, in sicer iz dveh različnih naselbinskih faz. Pri vseh treh je ohranjena samo zobna krona, medtem ko so zobne korenine uničene, predvidoma zaradi destruktivnega delovanja kisle barjanske zemlje.

Skupek 19, prva naselbinska faza

Ohranjena je nekoliko fragmentarna zobna krona drugega mlečnega kočnika oz. molarja. Abrazija okluzalne grizne ploskve je stopnje 4 po Smithovi kategorizaciji.

Skupek 8, druga naselbinska faza

Ohranjeni sta zobni kroni dveh zob. Ena krona, ki je fragmentarna, pripada mlečnemu sekalcu, verjetno gre za drugi zgornji inciziv. Druga zobna krona, od katere je ohranjena samo polovica, pripada mlečnemu drugemu kočniku oz. molarju. Okluzalna površina je že obrabljena, in je stopnje 4 po Smithovi kategorizaciji.

Ohranjeni kočniki pripadajo otroku, staremu od štiri do dvanajst let. Drugi mlečni kočnik namreč izraste pri dveh letih in izpade v starosti deset let ± 30 mesecev. Glede na to, da je grizna ploskev že precej obrabljena, ne more pripadati otroku, mlajšemu od štirih let. Intervala ne moremo zožiti, ker ne vemo, kakšne vrste je bila prehrana in z njo povezana stopnja abrazije v konkretnem primeru. Po današnjih standardih bi šlo za starejšega, devet do enajstletnega otroka.

Drugi zgornji mlečni inciziv izraste v prvem letu starosti in izpade pri sedmih letih (± 24 mesecev). Če pripada inciziv istemu otroku kot kočnik iz skupka 8, potem je bil otrok star štiri do devet let. Točnejša določitev starosti bi bila možna le v primeru, če bi bile ohranjene tudi zobne korenine.

# 3.6 ANTHROPOLOGICAL ANALYSIS OF TEETH FROM THE HOČEVARICA SITE

Numerous human teeth were discovered during the excavations at Hočevarica. Three teeth from two different settlement phases were analyzed. In all three cases only the crown of the tooth is preserved; the roots are all destroyed, presumably resulting from the acidity of the Ljubljansko barje soil.

Sub-phase 19, First settlement phase

The slightly fragmented tooth crown of a decidous second molar is preserved. The occlusal attrition rates a level 4 according to Smith's diagram of Murphy's system.

Sub-phase 8, Second settlement phase

The crowns of two teeth are preserved. One crown, fragmented, is that of a decidous incisor, probably a second upper incisor. The second crown, of which only a half is preserved, is that of decidous second molar. The occlusal attrition rates a level 4 according to Smith's categorization.

The preserved decidous molars are attributed to a child between the ages of 4 and 12 years. The decidous second molar erupt when a child is two years old and it falls out at the age of ten years ± 30 months. Regarding that the biting surface is already quite worn, this molar could not have been that of a child younger than four years. This interval cannot be narrowed further as nothing is known regarding the type of nutrition and the respective level of occlusal attrition in this particular case. In today's standards, such a tooth would be that of an older child, between the ages of nine and eleven.

The second upper decidous incisor grows in the first year of age and falls out in the seventh year (± 24 months). If this incisor is that of the same child as the molar from sub-phase 8, then this child was between the ages of four and nine years. A more precise determination of age would only be possible if the roots of the teeth were also preserved and analyzed.

# 3.7 HOČEVARICA – ANALIZA OSTANKOV MAKROFAVNE

# 3.7 HOČEVARICA – AN ANALYSIS OF MACROFAUNA REMAINS

BORUT TOŠKAN & JANEZ DIRJEC

*Izvleček*

*V okviru sondiranja eneolitskega najdišča Hočevarica je bilo izkopanih 2757 (576 določljivih) ostankov sesalcev, pripadajočih najmanj 14 vrstam. Najbolje zastopana taksona sta bila* Capreolus capreolus *(s 34,8 % NISP) in Sus sp. (32,5 % NISP), sicer pa je bil delež kosti in zob domačih in lovnih živali primerljiv. Med ostanki prašiča in drobnice prevladujejo ostanki subadultnih in mladih adultnih osebkov. Pretežni del prašičev je bil domnevno zaklan pozno jeseni in pozimi. Primerjava med naselbinskima fazama 1 in 2 je pokazala na odstopanja v deležu posameznih vrst, s tafonomskega aspekta pa bistvenih razlik med njima ni bilo opaziti.*

*Abstract*

*During sample trenching at the Eneolithic site at Hočevarica 2757 (576 determinable) mammal remains were excavated. They belonged to at least 14 species, the most frequent taxa were* Capreolus capreolus *(with 34.8 % NISP) and Sus sp. (32.5 % NISP). The proportion of bones and teeth of domestic and hunted animals was comparable. Among the remains of sheep, goats and pigs the remains of sub-adult and young adult individuals predominate. The majority of the pigs were presumably slaughtered in late autumn or winter. A comparison between settlement phases 1 and 2 showed deviations in the proportion of individual species, but no substantial differences between them were visible from the taphonomic aspect.*

## 3.7.1 UVOD

Ljubljansko barje nedvomno sodi med arheološko zanimiva območja pri nas. Prva sistematska izkopavanja so se pod vodstvom prirodoslovca D. Dežmana odvijala že v sedemdesetih letih devetnajstega stoletja (Deschmann 1878). Kasneje so jim sledila še mnoga druga, pri čemer so večjo ali manjšo pozornost namenjali tudi obdelavi živalskih ostankov. Pregled rezultatov podajajo Riedel (1948), Rakovec (1955), Drobne (1962; 1964; 1973; 1974a; 1974b; 1975) in Pohar (1984), podrobnejše študije posameznih živalskih taksonov pa so opravili Rakovec (1953; 1958), Rant (1961), Drobne (1961), Bartosiewicz (2002) idr. S sondiranjem kolišča ob Hočevarici, ki ga je leta 1998 opravila ekipa Inštituta za arheologijo ZRC SAZU pod vodstvom A. Veluščka, se je pričela nova serija arheoloških raziskav kolišč Ljubljanskega barja, ki tudi z izsledki osteološkh analiz prispeva k natančnejšemu poznavanju življenja koliščarjev in oceni njihove ekonomske osnove.

## 3.7.1 INTRODUCTION

The Ljubljansko barje is undoubtedly among the archaeologically most interesting regions within Slovenia. The first systematic excavations took place already during the 1870s under the supervision of the natural scientist Dragotin Dežman (Deschmann 1878). These were followed by many other excavations, at which lesser or greater attention was focused also to the study of animal remains. Reviews of the results were published by Riedel (1948), Rakovec (1955), Drobne (1962; 1964; 1973; 1974a; 1974b; 1975) and Pohar (1984). Detailed studies of individual animal taxa were pursued by Rakovec (1953; 1958), Rant (1961), Drobne (1961), Bartosiewicz (2002) and others. Sample trenching at Hočevarica conducted by the Institute of Archaeology at the Science Research Center of the Slovene Academy for Arts and Sciences in 1998 under the supervision of A. Veluščеk initiated a new series of archaeological research of the pile dwellings in the Ljubljansko barje. And with the added results of osteological analysis, it all contrib-

**3.7.2** GRADIVO IN METODE

Kolišče ob Hočevarici leži na jugozahodnem delu Ljubljanskega barja ob današnji strugi reke Ljubljanice na nadmorski višini približno 290 m. Sonda je obsegala površino osmih kvadratnih metrov (2 × 4 m); v globino je segala približno dva metra. Sondažno polje je bilo razdeljeno na osnovne enote – mikrokvadrate površine 1 x 1 m, pri čemer debelina režnjev ni bila konstantna. Posamezni vzorci so bili shranjeni ločeno in označeni s številko mikrokvadrata ter globino režnja. V celoti je bilo izkopanega približno 16 $m^3$ materiala, od tega slabih 5 $m^3$ iz plasti z arheološkimi najdbami. V okviru slednje sta bili ločeni dve fazi, poleg njiju pa še vmesni, 10 do 15 cm debeli reženj, kjer je bilo pričakovati mešanje najdb. Na podlagi dendrokronoloških in radiokarbonskih datacij sodi najdišče okvirno v drugo polovico 37. in prvo polovico 36. stoletje pred Kr. (glej *poglavje 6.5*). Material iz plasti z najdbami je bil spran in pregledan na sitih z velikostjo okenc 3 mm, 1 mm ter 0,5 mm. Subfosilni ostanki velikih sesalcev, ki so obravnavani v tem poglavju, so bili pobrani bodisi med samim izkopavanjem bodisi pri spiranju ali po spiranju iz sit z velikostjo okenc 3 mm. V analizo so vključeni vsi vzorci iz vseh osmih mikrokvadratov po plasteh, kot so navedene v tem zborniku.

Determinacija subfosilnih kostnih in zobnih elementov je temeljila na smernicah, povzetih iz literature (npr. Schmid 1972; Hillson 1986; 1992), ter na primerjalnem materialu, ki izvira pretežno iz Slovenije. Določali smo ostanke vseh skeletnih elementov z izjemo večine vretenc (determinirali smo le atlas in epistropheus) ter reber.

Pri kvantitativni obdelavi materiala sta bila uporabljena dva podatka: število določenih primerkov (NISP / *Number of Identified Specimens*) in najmanjše število živalskih enot (MAU / *Minimum Animal Unit*). Prvi velja za najbolj preprost kazalec gostote posameznih vrst pri arheoloških oziroma paleontoloških analizah in izraža skupno število kosti in zob oziroma kostnih in zobnih fragmentov v obravnavanem vzorcu, ki jih lahko z gotovostjo pripišemo posameznemu taksonu (Klein, Cruz-Uribe 1984). MAU je količnik med najmanjšim številom posameznih elementov (tj. MNE (Grayson 1984)) v vzorcu in pa skupnim številom istih elementov v skeletu živali dane vrste. Podatki, ki se nanašajo na TMAU (tj. skupen MAU / *Total MAU*) in ki so navedeni v *tabelah 3.7.1* in *3.7.2*, so izračunani kot skupen (vsota) MAU za posamezno vrsto in plast (prim. Rowley-Conwy 1996). Interspecifične kvantitativne primerjave temeljijo na odstotkih NISP (% NISP) ter TMAU (% TMAU).

Pri biometrični obdelavi materiala smo sledili navodilom, ki jih je objavila von den Driesch (1976). Dobljene rezultate smo primerjali z objavljenimi podatki s približno sočasnih najdišč Italije (Riedel 1976; 1977;

uted to our understanding of the life of pile dwellers and our assessment of their economic basis.

**3.7.2** MATERIALS AND METHODS

The pile dwelling at Hočevarica lies in the southwestern part of the Ljubljansko barje near the present course of the Ljubljanica river, at approximately 290 m above sea level. The sample trench covered an area of eight square meters (2 × 4 m); the depth measured about two meters. The sampling area was divided into basic units – micro-quadrants of 1 × 1 m, the thickness of the layers was not constant. Individual samples were stored separately and labeled with numbers for the micro-quadrant and for the depth of the layer. Altogether about 16 $m^3$ of material was excavated, near 5 $m^3$ of this from layers containing archaeological finds. The latter was divided into two phases with an intermediate 10 to 15 cm layer, where finds were presumably mixed. On the grounds of dendrochronological and radiocarbon dating the site was generally placed between the second half of the 37$^{th}$ and first half of the 36$^{th}$ centuries B.C. (check *chapter 6.5*). The material from the layers with finds was wet-sieved through sieves with a 3 mm, 1 mm and 0.5 mm mesh. The sub-fossil remains of large mammals discussed in this chapter were collected either during the excavation, through rinsing or after rinsing from the sieves with a 3 mm mesh. All the samples from all eight micro-quadrants were analyzed by the layers as explained in this volume.

Determination of sub-fossil bone and tooth elements was based on guidelines found in literature (e.g. Schmid 1972; Hillson 1986; 1992), and on comparative material originating mainly from Slovenia. We determined the remains of all skeletal elements with the exception of most vertebrae (of which we determined only the atlas and the epistropheus) and ribs.

Two data were used in the quantitative analysis of the material: Number of Identified Specimens (NISP) and Minimum Animal Unit (MAU). The first is considered to be the simplest indicator of the density of an individual species in archaeological and palaeontological analyses and expresses the total number of bones and teeth or bone and tooth fragments in the sample that we can reliably attribute to a particular taxon (Klein, Cruz-Uribe 1984). MAU is the quotient between the minimum number of individual elements (i.e. MNE (Grayson 1984)) in the sample and the total number of the same elements in the skeleton of an animal of a specific species. The data referring to the TMAU (i.e. *Total MAU*) listed in *tables 3.7.1* and *3.7.2*, are calculated as the sum of the MAU for an individual species and layer (cf. Rowley-Conwy 1996). Inter-specific quantitative comparisons are based on the NISP (% NISP) and TMAU (% TMAU) percentages.

1979), Avstrije (Pucher, Engl 1997) in Madžarske (Bökönyi 1974). Starost ob zakolu ali uplenitvi osebkov, katerih ostanki so bili zajeti v vzorcu s Hočevarice, smo poskušali oceniti z analizo obrabe zob ter z ugotavljanjem deleža kosti s še nezraščenima epi- in diafizo. Pozorni smo bili tudi na različne sledi delovanja ljudi (urezi, zasekanine in ožganost) oziroma živali (sledovi zverskih in glodalskih zob). Zaradi omejenega števila ostankov smo pri statistični obdelavi uporabili neparametrične metode: $\chi^2$ ter Mann-Whitney U-test. Pri slednjem gre za neparametrično alternativo t-testa za neodvisne vzorce, ki temelji na mediani in vsoti rangov. Statistične analize so bile opravljene s programskim paketom STATISTICA za Windows, verzija 6.[1]

3.7.2.1 Opis vzorca

V okviru sondiranja na najdišču Hočevarica smo skupno zbrali 4352 subfosilnih živalskih ostankov. Površina sonde je bila sicer omejena (8 m$^2$), vendar pa uporabljene tehnike izkopavanja, vključno z mokrim sejanjem, zagotavljajo, da je vzorec zajel večino ostankov kosti in zob iz izkopanega sedimenta. Prevladovanje fragmentarnih dolgih kosti kaže na značilen prazgodovinski vzorec. Sledovi zasekanin, urezov in ugrizov so prisotni, a redki. Nizek je tudi odstotek ožganih kosti. Ohranjenost kostne substance izkopanih fragmentov je relativno dobra.

*Tab. 3.7.1:* Absolutna in relativna pogostnost ostankov posameznih vrst velikih sesalcev. NISP – število določenih primerkov; TMAU – skupno najmanjše število živalskih enot.
*Table 3.7.1:* Absolute and relative frequencies of the remains of large mammal taxa. NISP – Number of Identified Specimens; TMAU – Total Minimum Animal Units.



In the biometric analysis of the material we followed the instructions published by von den Driesch (1976). The results were compared with the published data from approximately contemporary sites in Italy (Riedel 1976; 1977; 1979), Austria (Pucher, Engl 1997) and Hungary (Bökönyi 1974). By analysis of the teeth wear and by determining the proportion of bones with not yet fused epi- and diaphysis we tried to assess the age at death of the individuals whose remains were included in the Hočevarica sample. We were also attentive to the various traces of human (cuts, clefts, and burns) or animal (the traces of carnivore or rodent teeth) activity. Due to the limited number of remains, non-parametric methods were applied: $\chi^2$ and Mann-Whitney U-test in our statistic analysis. The latter is a non-parametric alternative of the t-test for independent samples, based on medians and the sum of ranks. The statistical analysis was carried out using the STATISTICA version 6 program package for Windows.[1]

3.7.2.1 Description of the sample

In the course of sample trenching at the Hočevarica site, 4352 sub-fossil animal remains were collected. The area of the trench was limited (8 m$^2$), however the excavation techniques used, including wet-sieving, ensure that the sample embraces most of the bone and tooth remains contained in the excavated sediment. The predomination of fragmented long bones indicate a typical prehistoric pattern. Traces of clefts, cuts and bites are present, but rare. The bone substance of the excavated fragments was relatively well preserved.

About a third of the discovered animal remains were fish (check *chapter 3.8*) and bird (check *chapter 3.10*) remains, the rest (63.4 %) were the remains of mammals. We attributed 2757 bone fragments and teeth to

| | NISP | % NISP | TMAU | % TMAU |
|---|---|---|---|---|
| *Capreolus capreolus* | 195 | 34,8 | 36,2 | 36,9 |
| *Cervus elaphus* | 38 | 6,8 | 8,8 | 9,0 |
| *Castor fiber* | 30 | 5,4 | 4,3 | 4,4 |
| *Vulpes vulpes* | 11 | 2,0 | 2,0 | 2,0 |
| *Meles meles* | 9 | 1,6 | 1,2 | 1,2 |
| *Ursus arctos* | 3 | 0,5 | 0,1 | 0,1 |
| *Lutra lutra* | 3 | 0,5 | 3,0 | 3,0 |
| *Felis sylvestris* | 2 | 0,4 | 1,5 | 1,5 |
| *Sus scrofa/domesticus* | 182 | 32,5 | 25,4 | 26,0 |
| *Ovis* s. *Capra* | 41 | 7,4 | 6,3 | 6,4 |
| *Canis familiaris* | 29 | 5,1 | 6,7 | 6,8 |
| *Bos taurus* | 17 | 3,0 | 2,7 | 2,7 |
| **SKUPAJ / TOTAL** | **560** | **100** | **98,2** | **100** |

[1] StatSoft, Inc. 2001, STATISTICA (data analysis software system), version 6. www.statsoft.com.

[1] StatSoft, Inc. 2001, STATISTICA (data analysis software system), version 6. www.statsoft.com.

Približno tretjina najdenih živalskih ostankov pripada ribam (glej *poglavje 3.8*) in pticam (glej *poglavje 3.10*), preostanek (63,4 %) pa sesalcem. Slednjim smo tako pripisali 2757 kostnih fragmentov in zob, od katerih smo jih vsaj do nivoja rodu določili 576 (tj. 20,4 %). Med skupno 16 zastopanimi vrstami so prevladovali veliki sesalci, prisotni pa so bili tudi ostanki polha (*Glis glis*, 15 spodnjih čeljustnic). Podrobni podatki o absolutni in relativni pogostnosti ostankov posameznih vrst so podani v *tabeli 3.7.1*. Zaradi razlik v skupnem številu posameznih elementov v skeletu živali različnih vrst smo za kvantitativne primerjave uporabili tako indeks NISP kot tudi TMAU.

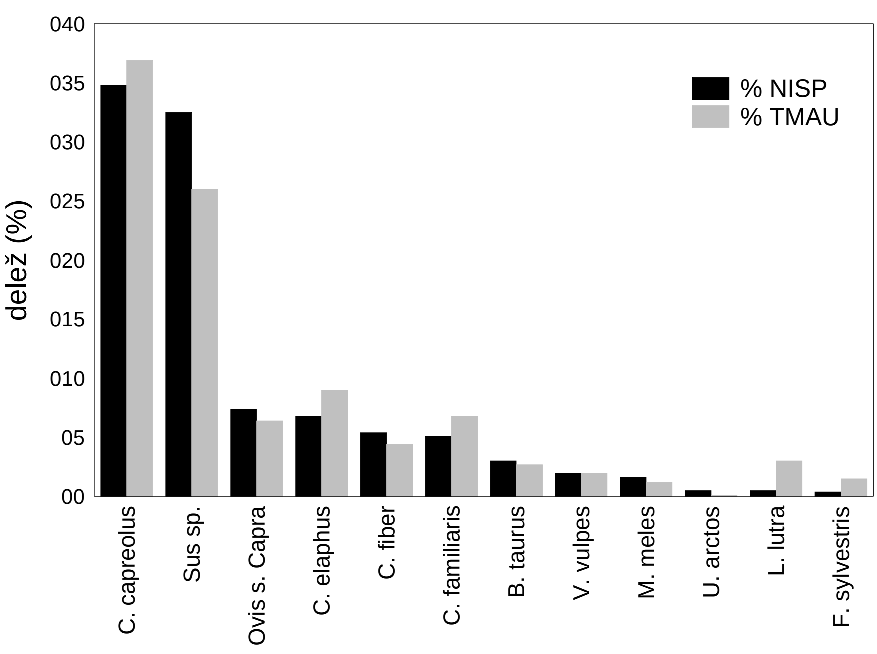
Ne glede na uporabljeni indeks je bila v vzorcu najbolje zastopana srna (*Capreolus capreolus*), katere ostanki predstavljajo dobro tretjino vseh kostnih fragmentov in zob. Bistvenih razlik med obema načinoma kvantifikacije (% NISP oziroma % TMAU) nismo opazili niti pri ostalih vrstah (*sl. 3.7.1*). Drugo mesto tako v obeh primerih zaseda prašič (*Sus* sp.), katerega ostanki predstavljajo tretjinski (% NISP) oziroma četrtinski (% TMAU) delež. Fragmenti kosti in zob ostalih vrst so bistveno manj pogosti. Pet odstotni delež namreč presegajo le še jelen (*Cervus elaphus*), bober (*Castor fiber*), pes (*Canis familiaris*) ter ostanki ovce ali koze (*Ovis* s. *Capra*), katerih determinacija do vrste pogosto ni bila mogoča (Bökönyi 1995).

Problematično je bilo tudi ločevanje med kostnimi fragmenti divjega (*Sus scrofa*) in domačega (*S. domesticus*) prašiča ter posledično ugotavljanje razmerja med lovnimi in domačimi živalmi v obravnavanem vzorcu. Zaradi pomanjkanja ustreznih primerjalnih podatkov, predvsem pa zavoljo majhnosti vzorca ($NISP_{Sus\ sp.}$ = 182), razmerja med *S. scrofa* in *S. domesticus* z uporabo bio-

the latter, of which at least 576 were determinable to the level of genera (i.e. 20.4 %). Large mammals were predominant, but there were also remains of dormouse (*Glis glis*, 15 mandibles). Detailed data on the absolute and relative frequency of the remains of individual species are shown in *table 3.7.1*. Because of the differences in the total number of individual elements in the skeletons of animals of various species we used the NISP as well as the TMAU indices for quantitative comparisons.

Regardless of which index was used, the most frequent species in the sample was the roe deer (*Capreolus capreolus*), the remains of which represent a good third of all the bone fragments and teeth. No substantial differences were noticed between the two quantification methods (% NISP and % TMAU) in the other species either (*fig. 3.7.1*). The second most frequent in both cases was the pig / wild boar (*Sus* sp.), the remains of which represented either one third (% NISP) or one fourth (% TMAU) proportion. The bone fragments and teeth of other species were less frequent. Only the red deer (*Cervus elaphus*), beaver (*Castor fiber*), dog (*Canis familiaris*) and remains of sheep and goats (*Ovis* s. *Capra*) exceeded a five % proportion; the determination of the latter to the species level was often not possible (Bökönyi 1995).

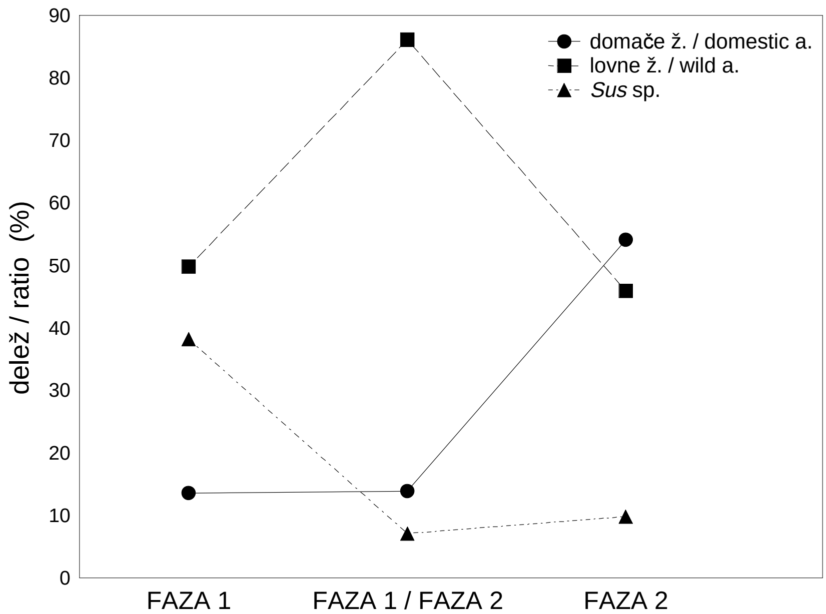
Distinguishing between the bone fragments of wild boar (*Sus scrofa*) and pig (*S. domesticus*), and subsequent determination of the ratio between hunted and domestic animals in the sample was also problematic. Because of the lack of corresponding comparative data, mainly due to the limited sample size ($NISP_{Sus\ sp.}$ = 182), the ratio between *S. scrofa* and *S. domesticus* could not be determined with the use of biometric analysis. We thus roughly estimated the proportion of both species indi-




*Sl. 3.7.1:* Relativna frekvenca pojavljanja ostankov posameznih vrst velikih sesalcev. NISP – število določenih primerkov; TMAU – skupno najmanjše število živalskih enot.
*Fig. 3.7.1:* Relative frequency of large mammal taxa. NISP – Number of Identified Specimens; TMAU – Total Minimum Animal Units.

metrijskih analiz namreč ni bilo mogoče ugotoviti. Tako smo grobo oceno deležev obeh vrst pridobili posredno z določevanjem starosti osebkov ob zakolu. Natančneje bomo izsledke omenjene analize podali v nadaljevanju. Na tem mestu le povzemamo domnevo, da naj bi pretežni del ostankov rodu *Sus* iz našega vzorca pripadal domačemu prašiču. Na podlagi navedenega se zdi tako upravičeno sklepati, da je bil v vzorcu s Hočevarice delež domačih in lovnih živali približno enak (*sl. 3.7.2*).

rectly by determining the age of the individuals at the time they were slaughtered. An explanation of the results of the aforementioned analysis follows. At this point we are only presenting the presumption that the majority of the remains of the genus *Sus* in our sample belong to the domestic pig. On the grounds of the above stated we find it justifiable to conclude that in the sample from Hočevarica the proportion of domestic and hunted animals was approximately equal (*fig. 3.7.2*).




*Sl. 3.7.2:* Delež ostankov lovnih in domačih živali ter prašiča (*Sus* sp.) v posamezni fazi. Pogostnost ostankov je bila ocenjena z NISP.
*Fig. 3.7.2:* Relative frequency of pig/wild boar (*Sus* sp.), wild and domestic animal remains in each phase. The NISP was used for quantification purposes.

Kot navaja Veluščček (glej *poglavji 3.1.3; 5.1*), je mogoče v okviru plasti z arheološkimi najdbami ločiti ostanke dveh poselitvenih faz, stratigrafsko pa izstopa še vmesni reženj, kjer lahko pričakujemo mešanje najdb. Podatki o absolutni in relativni pogostnosti ostankov velikih sesalcev so podani v *tabeli 3.7.2*. Primerjava deležev posameznih vrst med obema fazama pokaže na določne razlike, opazne predvsem med bolje zastopanimi vrstami. Tako smo v fazi 1 daleč največ ostankov pripisali *Sus scrofa/domesticus* (% NISP = 53,2 oziroma % TMAU = 38,2) pred *C. capreolus* in *C. elaphus*, medtem ko je v fazi 2 delež kosti in zob rodu *Sus* bistveno nižji (% NISP = 10,7 oziroma % TMAU = 9,8), najpogostejši pa so ostanki *C. capreolus* (pribl. enak odstotek kot v fazi 1). Pri interpretaciji navedenih razlik je vsekakor potrebno izpostaviti neenakost v številu fragmentov na posamezno plast ter s tem posredno tudi neenako geometrijsko gostoto najdenih kosti in zob (*tab. 3.7.3*). Prav tako se moramo zavedati relativno majhnega vzorca ($NISP_{det.}$ = 576) in pa omejene površine (tj. 8 m$^2$), s katere ta izhaja. Po ocenah Veluščka (glej *poglavje 3.1.3*) namreč površina celotnega najdišča presega 10.000 m$^2$. V luči navedenega se zdi smiselno postaviti vprašanje o reprezentativnosti našega vzorca, ki morda ne povzema znotrajnajdiščne variabilnosti v zadovoljivi meri (npr.

According to Veluščček (check *chapters 3.1.3*; *5.1*), it is possible to distinguish between the remains of two settlement phases, and stratigraphically one intermediate layer, in which we can expect a mixture of the finds. The data on the absolute and relative frequency of the remains of large mammals are shown in *table 3.7.2*. A comparison of the proportion of individual species in the two phases shows some differences, which are most discernible among the more frequently represented species. Consequently, the majority of remains in phase 1 are attributed to *Sus scrofa/domesticus* (% NISP = 53.2 and % TMAU = 38.2) before *C. capreolus* and *C. elaphus*, while the proportion of bones and teeth of the *Sus* genus in phase 2 is substantially lower (% NISP = 10.7 and % TMAU = 9.8); the most frequent are the remains of *C. capreolus* (approx. equal percentage as in phase 1). In the interpretation of these differences it is essential to point out the inconsistency in the number of fragments for each individual layer and consequently also the inconsistent geometric density of the discovered bones and teeth (*table 3.7.3*). Likewise, we must also take into account the relatively small sample ($NISP_{det.}$ = 576) and the limited area (i.e. 8 m$^2$) from which it was taken. By Veluščček's estimates (check *chapter 3.1.3*) the area of the entire site exceeds 10,000 m$^2$. In view of this

Drobne 1974b; Bartosiewicz 1984a). Glede na navedeno smo primerjavo med plastmi v relativni abundanci posameznih vrst omejili le na ugotavljanje razmerja med lovnimi živalmi na eni in domačimi na drugi strani.

*Tab. 3.7.2:* Absolutna in relativna pogostnost ostankov posameznih vrst velikih sesalcev za posamezno od obeh poselitvenih faz ter za vmesni reženj, kjer pričakujemo mešanje najdb. NISP – število določenih primerkov; TMAU – skupno najmanjše število živalskih enot.
*Table 3.7.2:* Absolute and relative frequencies of the remains of large mammal taxa within each of the two settlement phases as well as in the in-between layer, where a mixture of finds is anticipated. NISP – Number of Identified Specimens; TMAU – Total Minimum Animal Units.

it would be sensible to question the representativeness of our sample, which might possibly fail to sufficiently illustrate the variability within the site (e.g. Drobne 1974b; Bartosiewicz 1984a). Considering all this, we have limited the comparison of the relative abundance of individual species between the layers to determining the ratios between the hunted and the domestic animals. In view of the above mentioned assumption that the majority of the remains of the *Sus* genus can be attributed to *S. domesticus*, the quantity of the remains of domestic and hunted species in both phases was reckoned comparable (*fig. 3.7.2*).

Furthermore, the above mentioned hypothesis was statistically tested, by which the variability in the level of deposit and preservation of specific bone elements

| | NISP | % NISP | TMAU | % TMAU |
|---|---|---|---|---|
| **FAZA 1:** | | | | |
| *Capreolus capreolus* | 59 | 22,4 | 15,9 | 26,9 |
| *Cervus elaphus* | 24 | 9,1 | 7,2 | 12,2 |
| *Castor fiber* | 12 | 4,6 | 2,0 | 3,4 |
| *Vulpes vulpes* | 3 | 1,1 | 0,6 | 1,0 |
| *Meles meles* | 3 | 1,1 | 0,2 | 0,3 |
| *Ursus arctos* | 3 | 1,1 | 0,1 | 0,2 |
| *Lutra lutra* | 3 | 1,1 | 3 | 5,2 |
| *Sus scrofa/domesticus* | 141 | 53,2 | 22,6 | 38,2 |
| *Ovis* s. *Capra* | 7 | 2,5 | 3,7 | 6,2 |
| *Canis familiaris* | 6 | 2,3 | 1,6 | 2,7 |
| *Bos taurus* | 4 | 1,5 | 2,2 | 3,7 |
| **Σ FAZA 1** | **265** | **100** | **59,2** | **100** |
| **FAZA 1 / FAZA 2:** | | | | |
| *Capreolus capreolus* | 112 | 55,4 | 22,5 | 66,4 |
| *Castor fiber* | 18 | 8,9 | 2,5 | 7,4 |
| *Cervus elaphus* | 10 | 5,0 | 1,5 | 4,4 |
| *Vulpes vulpes* | 5 | 2,5 | 1,2 | 3,5 |
| *Felis sylvestris* | 2 | 1,0 | 1,5 | 4,4 |
| *Sus scrofa/domesticus* | 31 | 15,3 | 2,4 | 7,1 |
| *Ovis* s. *Capra* | 14 | 6,9 | 0,9 | 2,7 |
| *Canis familiaris* | 9 | 4,5 | 1,3 | 3,8 |
| *Bos taurus* | 1 | 0,5 | 0,1 | 0,3 |
| **Σ FAZA 1 / FAZA 2** | **202** | **100** | **33,9** | **100** |
| **FAZA 2:** | | | | |
| *Capreolus capreolus* | 24 | 25,8 | 6,7 | 36,6 |
| *Meles meles* | 6 | 6,5 | 1,2 | 6,6 |
| *Cervus elaphus* | 4 | 4,3 | 0,3 | 1,6 |
| *Vulpes vulpes* | 3 | 3,2 | 0,2 | 1,1 |
| *Ovis* s. *Capra* | 20 | 21,5 | 3,6 | 19,7 |
| *Canis familiaris* | 14 | 15,1 | 3,8 | 20,8 |
| *Bos taurus* | 12 | 12,9 | 0,7 | 3,8 |
| *Sus scrofa/domesticus* | 10 | 10,7 | 1,8 | 9,8 |
| **Σ FAZA 2** | **93** | **100** | **18,3** | **100** |

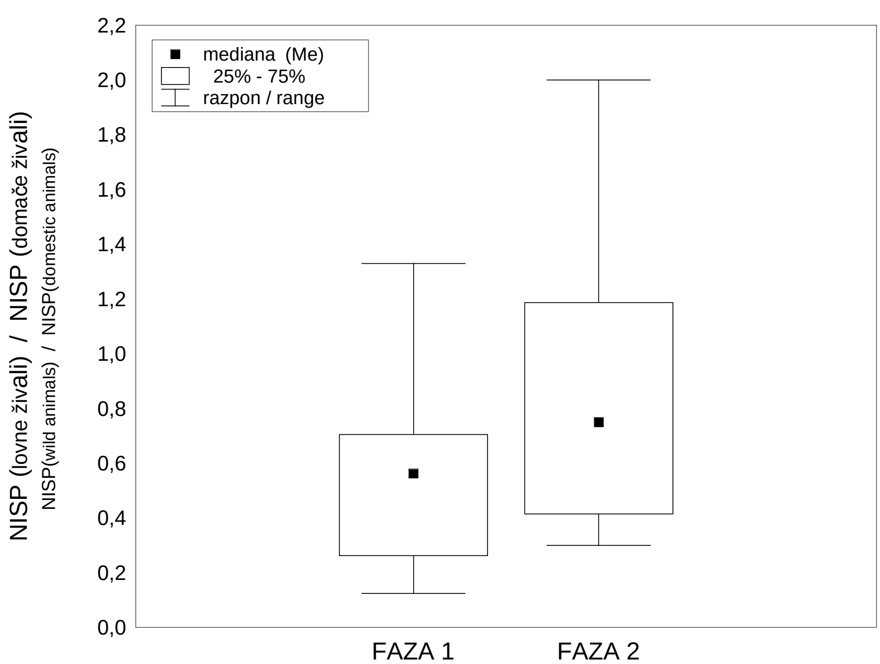
| | FAZA 1 | F. 1 / F. 2 | FAZA 2 | Σ |
|---|---|---|---|---|
| NISP | 1.101 | 1.129 | 527 | 2.757 |
| % določljivega<br>% identifiable | 25,1 | 18,1 | 18,0 | 20,4 |
| število taksonov<br>N taxa | 11 | 8 | 9 | 12 |
| skupna masa ostankov (g)<br>total weight (g) | 4.851 | 1.561 | 1.273 | 7.685 |
| povpr. masa fragmentov (g)<br>averige weight of fragment (g) | 4,4 | 1,4 | 2,4 | 2,8 |
| geom. gostota (NISP / $m^3$) | 688 | 1.129 | 220 | 551 |

*Tab. 3.7.3:* Frekvenca pojavljanja ostankov velikih sesalcev (NISP), njihova skupna in povprečna masa ter geometrijska gostota na naselbinsko fazo.
*Table 3.7.3:* Frequency of large mammal remains (NISP), their total and average weights and geometric density per settlement phase.

Upoštevajoč zgoraj omenjeno domnevo, da gre večino ostankov rodu *Sus* pripisati vrsti *S. domesticus*, se zdi številčnost ostankov domačih in lovnih vrst v obeh fazah primerljiva (*sl. 3.7.2*).

Navedeno hipotezo smo tudi statistično testirali, s čimer smo vsaj delno upoštevali variabilnost v stopnji odlaganja in ohranitve specifičnih kostnih elementov in pa vlogo številnih (79,6 %) nedoločljivih ostankov; slednji lahko namreč pripadajo tako domačim kot lovnim živalim. V ta namen smo uporabili statistični prijem, ki upošteva mero centralne tendence (mediana) in variabilnost vzorcev. Za vsak kostni element smo najprej izračunali razmerje med domačimi in lovnimi živalmi. Upoštevali smo le elemente, ki so bili znotraj obravnavanega vzorca zastopani tako pri domačih kot tudi pri lovnih živalih. V nadaljevanju smo z Mann-Whitney U-

and the significance of the numerous (79.6 %) undeterminable remains was at least partially taken into account; the latter can belong to either domestic or hunted animals. As such, a statistical approach, which takes into account a measure of the central tendency (median) and the variability of the samples, was applied. First the ratio between domestic and hunted animals for each bone element, including only those elements which were present in domestic and in hunted animals within the specific sample, was calculated. Then the Mann-Whitney U-test was applied to determine whether the ratio




*Sl. 3.7.3:* Kvocient med številom ostankov posameznega skeletnega elementa, pripadajočih lovnim živalim in pa številom ostankov istega elementa, ki so bili pripisani domačim živalim, izračunan za vsako od obeh faz. Upoštevali smo le tiste skeletne elemente (skupno 7; glej besedilo), ki so bili v obravnavani naselbinski fazi zastopani tako pri domačih kot tudi pri lovnih živalih. Med domače živali smo prišteli tudi vse ostanke rodu prašičev (*Sus* sp.).
*Fig. 3.7.3:* Quotient of the number of remains of a chosen skeletal element ascribed to wild animals, and the number of remains of the same element ascribed to domestic animals, calculated for each of the two phases. Only those skeletal elements (altogether 7; check text), which within the discussed settlement phase were reppresented by remains of both domestic and wild animals, were included in the analysis. *Sus* sp. remains were regarded as domestic animals.

testom ugotavljali, ali je razmerje med ostanki lovnih in domačih živali v obeh fazah statistično značilno različno. Rezultati (U = 23,00; Z = –0,945; p = 0,342) so pokazali, da temu ni bilo tako (*sl. 3.7.3*).

Med živalskimi ostanki s Hočevarice smo našli tudi nekaj koščenih orodij, ki pa v tem proglavju niso podrobneje obdelani.

between the remains of hunted and domestic animals in both phases is significativelly different from the statistical aspect. The results (U = 23.00; Z = –0.945; p = 0.342) showed that this was not so (*fig. 3.7.3*).

Some bone tools were also discovered among the animal remains from Hočevarica which are not discussed in detail in this volume.

3.7.2.2 Taksonomija

*Ovis* s. *Capra*

Ovci (*Ovis aries* Linnaeus, 1758) in kozi (*Capra hircus* Linnaeus, 1758) smo skupno pripisali 41 subfosilnih ostankov. V večini primerov (25 oziroma 61 %) gre za zobe, sicer pa prevladujejo dolge kosti. V vzorcu so prisotni tudi scapula, os maxillare ter phalanges (*tab. 3.7.4*). Z izjemo slednjih je ves kostni material fragmentiran. Sledov urezov, zasekanin ali ugrizov nismo opazili. Prav tako ni noben fragment ožgan.

3.7.2.2 Taxonomy

*Ovis* s. *Capra*

A total of 41 sub-fossil remains are attributed to sheep (*Ovis aries* Linnaeus, 1758) and goats (*Capra hircus* Linnaeus, 1758). In most cases (25 or 61 %) the remains were teeth, otherwise long bones are prevalent. The sample also contained scapula, maxilla and phalanges (*table 3.7.4*). With exception of the latter all the bones were fragmented. No traces of cut marks, chop marks or gnawing marks were found; nor were any of the fragments burnt.

| | FAZA 1 | FAZA 1 / FAZA 2 | FAZA 2 | Σ |
|---|---|---|---|---|
| *O. aries*: | | | | |
| scapula | 1 | -- | -- | 1 |
| femur (proks.) | 1 | -- | -- | 1 |
| *C. hircus*: | | | | |
| ulna | -- | -- | 1 | 1 |
| tibia (proks.) | 1 | -- | -- | 1 |
| phalanx I | 1 | -- | 1 | 2 |
| phalanx II | -- | -- | 2 | 2 |
| *Ovis* s. *Capra*: | | | | |
| os maxillare | 1 | -- | -- | 1 |
| dentes | 1 | 14 | 10 | 25 |
| radius (proks.) | -- | -- | 1 | 1 |
| radius (dist.) | -- | -- | 1 | 1 |
| femur (proks.) | -- | -- | 1 | 1 |
| femur (dist.) | 1 | -- | -- | 1 |
| tibia (dist.) | -- | -- | 1 | 1 |
| phalanx I | -- | -- | 2 | 2 |

*Tab. 3.7.4:* Frekvence zastopanosti posameznih skeletnih elementov ovce (*Ovis aries*) in/ali koze (*Capra hircus*) po naselbinskih fazah.
*Table 3.7.4:* Frequency of sheep (*Ovis aries*) and/or goat (*Capra hircus*) remains per settlement phase.

Ločevanje med kostnimi ostanki ovce in koze je pogosto problematično, saj so razlike med vrstama relativno majhne in omejene na le nekatere skeletne elemente. Na podlagi kriterijev, ki jih podajajo Prummel in Frisch (1986) ter Boessneck (1972), smo sicer v vzorcu lahko potrdili prisotnost tako ovce kot koze, vendar je bilo do nivoja vrste mogoče determinirati le manjši (19,5 %) del ostankov. Med slednjimi je višji delež pripadel kozi (6 oziroma 75 %), medtem ko smo ovci pripisali le dva fragmenta (*tab. 3.7.4*). Iz navedenega seveda ne gre sklepati

Distinguishing between the remains of sheep and goats is often problematic, because of the small differences between the species and because they are limited to only a few skeletal elements. Following the criteria presented by Prummel and Frisch (1986) and Boessneck (1972), the presence of sheep and goats in the sample could be confirmed, but only a smaller proportion (19.5 %) of the remains could be determined to the level of species. Of these the major part belonged to goats (6 or 75 %), while only two fragments were attributed to na dejansko vlogo ene in druge vrste v takratni živinoreji, še manj pa na oceno resničnega razmerja med ovcami in kozami. Skupno število ostankov je namreč za kaj takega premajhno. Prav tako ne vemo, kolikšnemu številu osebkov sta omenjena dva (ovca) fragmenta oziroma šest (koza) fragmentov sploh pripadali. Ocene razmerja med spoloma nismo opravili, saj material tega ni dopuščal.

Ovce in koze so bile, ob psu, med prvimi udomačenimi živalskimi vrstami. Prvi domestikati naj bi se že pred 10.000 leti pojavili na območju gorovja Zagros ter morda tudi v Anatoliji in na Kavkazu (O'Connor 2000). Divji prednik domače ovce je urial (*Ovis orientalis* Gmelin, 1774), medtem ko bezoarsko kozo (*Capra aegagrus* Erxleben 1777) razumemo kot poglavitnega, morda pa celo edinega prednika domače koze (Clutton-Brock 1999). Z domestikacijo in nadaljno rejo omenjenih vrst so se pri obeh pojavile tudi določene morfološke spremembe. Uveljavitev nekaterih med njimi, kot sta večja količina in pretežno bela barva runa pri ovcah, je favorizirala umetna selekcija, druge, npr. velikost osebkov, pa so predvsem odraz življenjskih razmer v posameznem obdobju in območju (Bökönyi 1974). Žal je lahko primerjava velikosti koz in ovc s Hočevarice (*priloga 3.7.1*) s tistimi na sočasnih najdiščih v okolici (Italija, Avstrija, Madžarska) zavajajoča. Vzrok gre iskati predvsem v omejeni velikosti vzorca, ki tako v nezadovoljivi meri povzema variabilnost osebkov znotraj proučevane populacije. Tak vzorec omogoča kvečjemu primerjavo dimenzij konkretnih izmerjenih kostnih elementov, ne pa celotne populacije, npr. ovc in koz, z nekega območja. Poleg tega v vzorcih, ki jih primerjamo, pogosto ne poznamo deleža ovčjih in kozjih kosti, prav tako pa tudi ne razmerja med spoloma (Higham 1968). V skladu z navedenim se bomo tako na tem mestu omejili le na omembo, da so se izmerjene dimenzije ostankov koz in ovc s Hočevarice ujemale s tistimi, ki se nanašajo na izkopane kosti z več sočasnih najdišč na Mondseeju v Avstriji (Pucher, Engl 1997) in nekaterih poznoneolitskih in pa zgodnje bronastodobnih najdiščih severne Italije (Riedel 1976; 1977; 1979).

V okviru zooarheoloških raziskav se tradicionalno posveča precejšnja vloga oceni starostne strukture živali ob smrti, tj. zakolu, ulovu, poginu. Tovrstni podatki so namreč lahko zelo pomembni pri ugotavljanju kulturne stopnje in samega načina življenja v proučevanih naselbinah. Tako kot to velja npr. za govedo, tudi ovce in koze niso bile zanimive le kot vir mesa in maščob, temveč tudi zaradi izrabe različnih sekundarnih produktov, kot so mleko, kri, kosti, koža, pri ovci tudi runo oziroma volna. Z oceno starostne strukture osebkov ob zakolu pa lahko laže ocenimo pomen posameznih zgoraj navedenih dobrin v okviru proučevane skupnosti.

Navadno se poskuša starost osebka oceniti na podlagi dosežene razvojne stopnje skeleta posameznega osebka, tj. izraščanja zob, obrabe grizalnih površin mel-

sheep (*table 3.7.4*). What could not be evaluated was the actual role of one species or another in the animal husbandry of the time, and even less the real ratio between sheep and goats. The total number of remains is too small for such an evaluation. Nor do we know to how many individuals these two (sheep) or six (goat) fragments belonged. No assessment of the ratio between the sexes was made since the material did not allow for that.

Sheep and goats were among the first domesticated animal species after the dog. The first domesticated animals supposedly existed 10,000 years ago in the regions of the Zagros Mountains and possibly in Anatolia and in the Caucasus (O'Connor 2000). The wild ancestor of the domestic sheep was the urial (*Ovis orientalis* Gmelin, 1774), while the bezoar goat (*Capra aegagrus* Erxleben 1777) is recognized as the principal or maybe only ancestor of the domestic goat (Clutton-Brock 1999). In both species some specific morphological changes occurred with domestication and further breeding. Some characteristics, for instance more and whiter wool in sheep, were established by artificial selection and other, e.g. size of the individuals are a reflection of the living conditions during individual periods and areas (Bökönyi 1974). Unfortunately a comparison of the size of the goats and sheep from Hočevarica (*appendix 3.7.1*) with those from nearby sites (Italy, Austria, Hungary) from the same period would be misleading. This is mainly due to the limitedness of the sample, which consequently insufficiently expresses the variability among individuals within the researched population. Such a sample can at best allow a comparison of the dimensions of actual measured bone elements and not an entire population of, e.g. the sheep or goats of a specific region. Moreover, the proportion of sheep or goat bones in the compared samples is seldom known, nor is the ratio between the sexes (Higham 1968). In view of this our discussion shall be limited to only pointing out that the measured dimension of the goat and sheep remains from Hočevarica correspond to the bones excavated at several contemporary sites at Mondsee in Austria (Pucher, Engl 1997) and at some late Neolithic and Early Bronze Age sites in northern Italy (Riedel 1976; 1977; 1979).

Zooarchaelogical research traditionally centers much attention on evaluating the age structure of animals at the time of their death, i.e. slaughter, capture or death by other causes. Such data can be invaluable in determining the cultural level of the inhabitants of the settlements in question and how they lived. And as is valid with cattle, sheep and goats were not only interesting for their meat and fat, but also for various secondary products, such as milk, blood, bones and skin, and in the case of sheep also fleece and wool. Evaluation of the age structure of individuals at the time they were slaughtered helps us to assay the importance of the above mentioned individual goods to the community in question.

jakov, zraščenosti epifiz z diafizami. Vendar pa rezultati številnih novejših raziskav opozarjajo, da so objavljeni podatki za določevanje starosti osebkov do neke mere nekonsistentni. Veliko je nejasnosti v povezavi s kastracijo in njenim vplivom na nadaljnji ontogenetski razvoj. Vprašljiva je tudi primernost razpoložljivih komparativnih osteoloških zbirk. Te so namreč, kar zadeva izvor materiala, pogosto preveč heterogene, da bi dopuščale oblikovanje ustreznih primerjalnih vzorcev (Cribb 1984; Moran, O'Connor 1994). Kljub navedenemu pa imajo lahko rezultati analiz vzorcev zakola (*kill-off pattern*) še vedno veliko izpovedno vrednost. Pri njihovi interpretaciji se je pač potrebno zavedati omejitev, povezanih z obravnavanim vzorcem, kot so nereprezentativnost, ekstremna fragmentarnost ostankov ipd. Pri tem vpliv navedenih in številnih drugih dejavnikov na razvoj skeleta pogosto ni dovolj poznan, njihovi sinergistični učinki pa še toliko manj. Dodatne nejasnosti vnašajo tudi neizogibne razlike med osteodontološkimi ostanki (sub)fosilnega vzorca na eni strani ter recentnim materialom, na katerem je bila metoda za določanje starosti razvita, na drugi.

| ZOB<br>TOOTH | PLAST<br>LAYER | STOPNJA OBRABE<br>WEAR STAGE | OCENA STAROSTI<br>ASSESSED AGE |
|---|---|---|---|
| $M_3$ | faza 1 | 0 | 1–2 leti / years |
| $dp_4$(*) | faza 1 / faza 2 | 16 L | 6–12 mesecev / months |
| $M_3$ | faza 1 / faza 2 | 6 G | 2–3 leta / years |
| $M_1$ | faza 1 / faza 2 | 9 A | 1–3 leta / years |
| $M_2$ | faza 1 / faza 2 | 8 A | 2–3 leta / years |
| $M_1$ | faza 2 | 1 A | 6–12 mesecev / months |
| $M_1$ | faza 2 | 5 A | 1–2 leti / years |
| $M_3$ | faza 2 | 12 G | 8–10 let / years |

*Tab. 3.7.5:* Ocena starosti živali ob zakolu glede na obrabo spodnjih (pred)meljakov pri ovcah/kozah (*Ovis aries* in/ali *Capra hircus*). Stopnja obrabe zob in ocena starosti sta povzeti po Payne (1973). Za identifikacijo simbolov stopnje obrabe glej Payne (1987). Z izjemo dp4 (*), ki pripada kozi, ločevanje med obema vrstama ni bilo mogoče.
*Table 3.7.5:* The assessment of age at slaughter according to tooth wear of the lower (pre)molars of sheep/goats (*Ovis aries* and/or *Capra hircus*). Stages of tooth wear and an estimate of the relative ages are summarized after Payne (1973). For identification of the symbols for the stages of wear, check Payne (1987). With the exception of dp4 (*), which was ascribed to a goat, distinguishing between the two species was not possible.

Ocena starostne strukture živali ob zakolu lahko, navedenim slabostim navkljub, vseeno predstavlja pomemben vir informacij. Žal vzorec s Hočevarice, zaradi skromnega števila najdb, česa podobnega ne omogoča. Skupno je bilo namreč v analizo mogoče vključiti samo osem zob in štirinajst kostnih fragmentov, za katere pa niti ne vemo, kolikšnim osebkom so sploh pripadali. Pri

In general the age of the individual is evaluated on the basis of the development level of the animal, i.e. tooth growth, the deterioration of the chewing surfaces of the molars and to what degree the epiphysis and diaphysis are fused. However, the results of recent research work caution that the published data for determining the age of individuals are to a certain extent inconsistent. The effect of castration on further ontogenetic development is to a great extent unclear. The relevancy of available comparative osteological collections is also questionable. Regarding the origin of the material, these are often too heterogeneous to allow the shaping of corresponding comparative patterns (Cribb 1984; Moran, O'Connor 1994). Nevertheless, the results of analysis of the patterns of slaughter (*kill-off pattern*) still have a considerable expressive value. In interpreting them we must keep in mind the limitations connected to the pattern itself, i.e. that they may not be representative, the extreme fragmentation of the remains, etc. The impact of the above listed and of many other factors on the development of the skeleton is unknown, and even less their synergetic effect. Additional ambiguities stem from inescapable differences between the osteodontological remains of the (sub)fossil sample on the one hand and the recent material on which the method for determining the age was developed on the other.

Despite the above mentioned shortcomings, an evaluation of the age structure of the animals at the time when they are slaughtered can act as an important source of information. Unfortunately, the sample from Hočevarica does not allow this, due to the small number of finds. A total of eight teeth and fourteen bone fragments can be included in the analysis, and even for these we do not know to how many individuals they belonged to. The age was determined on the basis of an analysis of the wear of teeth, published by Payne (1973; 1985). The results are shown in *table 3.7.5*. With the exception of one specimen (assessed age 8–10 years) all the teeth (7 or 87.5 %) belonged to animals that were slaughtered or died at an age between six and thirty-six months. Additional information was obtained by determining the proportion of bones with unfused epi- and diaphyses, with regard to the total number of remains of individual skeletal elements in the sample. This method is less reliable določanju starosti na podlagi analize obrabe zob smo sledili navodilom, ki jih je objavil Payne (1973; 1985). Rezultati so podani v *tabeli 3.7.5*. Z izjemo enega samega primerka (ocenjena starost 8–10 let) so vsi ostali zobje (7 oziroma 87,5 %) pripadali živalim, ki naj bi šle v zakol oziroma so poginile pri starosti med šest in 36 meseci. Dodatne informacije o starostni strukturi smo dobili z ugotavljanjem deleža kosti z nezraščenima in zaraščenima epi- in diafizo glede na skupno število ostankov posameznega skeletnega elementa v vzorcu. Omenjena metoda je sicer manj zanesljiva od tiste, ki temelji na obrabi zob (O'Connor 2000), vseeno pa lahko ponudi nekatere zanimive informacije. Analiza ostankov ovc in koz iz obravnavanega vzorca je tako pokazala, da so nezraščene tri od sedmih (43 %) kosti, pri katerih se sicer osifikacija zaključi v obdobju od enega do dveh let starosti, ter dve (50 %) od skupno štirih, pri katerih do tega pride v tretjem letu življenja (*tab. 3.7.6*). Seveda to nikakor ne pomeni, da je bilo 43 % koz ali ovc zaklanih pred zaključkom prvega ter 50 % pred dopolnitvijo tretjega leta življenja. Takšna sklepanja bi bila namreč tvegana tudi pri precej obsežnejših vzorcih od našega. Se pa zdi ob upoštevanju rezultatov obeh analiz, obraba zob in zraščanje epifiz, vendarle upravičeno domnevati, da je bil pomemben delež koz in ovc iz našega vzorca zaklan med prvim in četrtim letom starosti, pri čemer so nekateri osebki dočakali tudi precej višjo starost (npr. 8–10 let).

than the one based on the wear of teeth (O'Connor 2000), but it can still bear some interesting information. The analysis of the sheep and goat remains from the sample in question thus revealed that three of seven (43 %) bones, in which ossification is complete at an age of one to two years, and two (50 %) of four, in which this occurs in the third year of life, are not yet fused (*table 3.7.6*). Of course this does not mean that 43 % of the goats or sheep were slaughtered before they were one year old and 50 % before they were three. Such conclusions would be questionable even with a considerably larger sample than ours. But it does appear that, taking into account both the analyses, the wear of teeth and the closing of epiphyses, we can justifiably assume that a significant proportion of the goats and sheep from our sample were slaughtered between the ages of one to four years of age, although some of the individuals reached a much older age (e.g. 8–10 years).

*Tab. 3.7.6:* Število ostankov drobnice (*Ovis* s. *Capra*) z (ne)zraščenima epi- in diafizo po starostnih skupinah. Posamezno skupino sestavljajo skeletni elementi, ki popolnoma osificirajo v istem starostnem obdobju (t. j. v prvem, drugem ali tretjem letu življenja). Podatki o obdobju zraščanja epi- in diafiz so povzeti po Moran in O'Connor (1994).
*Table 3.7.6:* Number of un-fused diaphyses among sheep/goat remains. Skeletal elements are grouped in classes according to the age at which fusion of the epi- and diaphyses is completed (i.e. in the first, second or third year of life). The sequence of fusion is summarized from Moran and O'Connor (1994).

| STAROSTNO OBDOBJE (v letih) AGE CLASS (in years) | EPIFIZA ZRAŠČENA FUSED | EPIFIZA NI ZRAŠČENA UNFUSED |
|---|---|---|
| 0–1 | 1 | 0 |
| 1–2 | 4 | 3 |
| 2–3 | 2 | 2 |
| nad / over 3 | 1 | 1 |
| **SKUPAJ / TOTAL** | **8** | **6** |

*Bos taurus* Linnaeus, 1758

Ostanki domačega goveda so bili redki (NISP = 17), saj so predstavljali le tri odstotke vseh najdb (*tab. 3.7.1* in *3.7.7*). Prevladovali so seveda zobje (10 oziroma 59 %), kosti pa so bile pričakovano praviloma fragmentirane. Na spodnji čeljustnici iz faze 1 smo opazili sledi urezov. Zasekanin in ugrizov nismo zasledili, prav tako ne ožganih kosti.

Domače govedo velja za najpomembnejšo domačo žival evropske prazgodovine. Domnevno izhaja iz tura (*Bos primigenius* Bojanus, 1827), katerega areal se je v začetku holocena razprostiral čez celotno Evrazijo. Poznamo ga kot primarno gozdno vrsto, ki pa je uspešno naseljevala tudi bolj odprta grmičasta območja. Od neolitika dalje je njegova številčnost precej nihala (lov, izguba habitata), dokler ni v 17. stoletju končno izumrl. Do prvih uspešnih poskusov udomačitve naj bi prišlo pred približno 8000 leti v severni Afriki in/ali na Bližnjem Vzhodu (Clutton-Brock 1999; O'Connor 2000). Z do-

*Bos taurus* Linnaeus, 1758

Remains of domestic cattle were rare (NISP = 17) and presented only three % of all the finds (*tables 3.7.1* and *3.7.7*). Teeth were predominant in the sample (10 or 59 %), while the bones were generally fragmented. Traces of cuts were discerned on a mandible from phase 1. No chop marks and gnawing marks were found, nor were there any burnt bones.

The cattle is considered to be one of the most important domestic animal in prehistoric Europe. Presumably it originated from the aurochs (*Bos primigenius* Bojanus, 1827) who lived throughout the entire area of Eurasia in the beginning of the Holocene period. They are known as the primary woodland species, but which could also successfully populate open shrubby land.

| | FAZA 1 | FAZA 1 / FAZA 2 | FAZA 2 | Σ |
|---|---|---|---|---|
| dentes | -- | 1 | 9 | 10 |
| mandibula | 2 | -- | -- | 2 |
| ossa carpalia | -- | -- | 1 | 1 |
| astragalus | 1 | -- | -- | 1 |
| phalanx I | 1 | -- | -- | 1 |
| phalanx II | -- | -- | 2 | 2 |

*Tab.3.7.7:* Frekvence zastopanosti posameznih skeletnih elementov domačega goveda (*Bos taurus*) po naselbinskih fazah.
*Table 3.7.7:* Frequency of individual skeletal remains of domestic cattle (*Bos taurus*) per settlement phase.

mestikacijo pa so se pojavile tudi nekatere morfološke spremembe, kot npr. drugačna oblika lobanje in rogov, ki lahko tudi manjkajo, manjša strukturna gostota kosti, spremembe v barvi osebkov ter povečanje količine pridelanega mleka na samico. Med najopaznejše spremembe pa nedvomno sodi tudi očitno zmanjšanje velikosti živali. Gre za trend, ki ga lahko, z izjemo kratkega intervala v rimski dobi, neprekinjeno spremljamo vse od neolitika dalje. Človeku je tako šele z modernimi pasmami in živinorejskimi prijemi uspelo doseči, da današnja goveda po velikosti presegajo tista iz obdobja prvih domestikacij (Bökönyi 1974).

Od obravnavanih ostankov s Hočevarice je bilo mogoče biometrijsko analizirati le dva: astragalus in phalanx II (*priloga 3.7.2*). Njihove dimenzije so primerljive z objavljenimi podatki z eneolitskega najdišča Colombare di Negar v severni Italiji (Riedel 1977) ter že omenjenih kolišč na Mondseeju v Avstriji (Pucher, Engl 1997), hkrati pa komaj ali pa sploh ne dosegajo tistih z bakrenodobnih najdišč Madžarske (Bökönyi 1974). Ponovno poudarjamo, da gre pri tem izključno za primerjavo dimenzij analiziranih kostnih fragmentov, ne pa povprečne velikosti osebkov tistega obdobja.

Govedo je bilo in je še danes veliko več kot le vir mesa in maščobe. Tu so namreč še mleko, koža, rogovi in kosti, kostni mozeg, iztrebki (gnoj, kurivo), ne nazadnje pa tudi sama moč živali, ki so jih zato uporabljali kot vlečno silo. Ugotoviti, katere od navedenih dobrin je taka skupnost uporabljala in katere od teh so bile pomembnejše, lahko veliko povejo o gospodarski stopnji nekdanjih ljudi, a je kaj takega za primer Hočevarice (še) nemogoče storiti. Zdi se sicer upravičeno domnevati, da je govedo imelo pomembnejše mesto, kot bi lahko sodili izključno na podlagi izjemne skromnosti njegovih ostankov. V to smer kažejo tudi raziskave nekaterih drugih neolitskih-eneolitskih najdišč Ljubljanskega barja (Rakovec 1955; Drobne 1973; 1974a; 1974b; 1975). Vendar maloštevilni ostanki v našem vzorcu resnejše analize onemogočajo. Navsezadnje nam je nepoznana tudi starostna struktura živali ob zakolu. Edini tovrstni podatek nudi spodnja čeljustnica iz faze 1 z ohranjenim skoraj celotnim zobnim nizom ($P_3$–$M_3$). Glede na to, da

Since the Neolithic its population fluctuated (hunting, loss of habitat), until it finally became extinct in the 17th century. The first successful attempts of domestication occurred about 8,000 years ago in North Africa and/or the Near East (Clutton-Brock 1999; O'Connor 2000). Domestication also engendered some morphological changes, as for instance, an altered shape of the skull and horns – the latter is in some cases missing altogether, lower structural density of the bones, changes in the color of the individuals and larger quantities of milk produced per female. The most notable change is undoubtedly a visible reduction in the animal's size. This is a trend that can be followed, with the exception of a short interval during the Roman period, since the Neolithic. It was only with modern breeds and breeding techniques that humans achieved that today's cattle is larger than that from the period of first domestication (Bökönyi 1974).

Only two of the remains from Hočevarica could be biometrically analyzed: an astragalus and a phalanx II (*appendix 3.7.2*). Their dimensions are comparable with the published data from the Eneolithic site Colombare di Negar in northern Italy (Riedel 1977) and the aforementioned pile dwellings at Mondsee in Austria (Pucher, Engl 1997), but they do not or can hardly equate with those from the Copper Age sites in Hungary (Bökönyi 1974). Let it be emphasized that this is strictly a matter of comparison of the dimensions of the analyzed bone fragments, and not of the average size of individuals of the time.

Cattle were and still are much more than a source of meat and fat. They produce milk, hide, horn and bones, bone marrow, excrements (manure, fuel); and of course there is also strength of the animals themselves, which can be used as locomotive power. Determining which of these attributes a particular community used and which was more important to them can give us considerable insight into the economic level of the population, but in the case of Hočevarica it is impossible as of yet. It appears justifiably presumable that cattle played a more important role than the scarcity of their remains would suggest. Research results of some of the other Neolithic-Eneolithic sites in the Ljubljansko barje (Rakovec 1955; Drobne 1973; 1974a; 1974b; 1975) point in this direction. However, the few remains in our sample do not allow serious analysis. After all, even the age structure of the slaughtered animals is unknown. The only such data comes from a mandible from phase 1 with an almost complete row of preserved cheek teeth ($P_3$–$M_3$).

stalni tretji spodnji meljak izrašča med 24. in 30. mesecem starosti (Silver 1972) ter upoštevajoč dejstvo, da so zobje kazali očitne znake obrabljenosti, je starost osebka ob zakolu domnevno presegala 45/50 mesecev. To je sicer že starost, pri kateri se najhitrejša rast živali zaključi in je zato napor, vložen v nadaljnjo rejo zaradi pridobivanja (dodatnih količin) kvalitetnega mesa, nesmiseln (Jarman 1975). Je torej zakol živali pri starosti, ki je nudila največji izkoristek mesa glede na vloženi napor, znak, da so rejo govedi podredili predvsem pridobivanju omenjene dobrine? S skupno le 17 ostanki goveda v vzorcu je seveda za odgovor še prezgodaj.

*Sus scrofa/domesticus*

Ostanki rodu *Sus* so skupaj s srninimi najpogostejši v vzorcu. Predstavljajo približno tretjino vseh najdb (*tab. 3.7.1* in *3.7.8*), pri čemer jih je kar 77 odstotkov iz faze 1. Delež zob v vzorcu je sicer velik (38 %), vendar pa, za razliko od večine ostalih vrst, ne tudi prevladujoč. Sledi urezov, zasekanin in ugrizov so izjemno redke, ožgan pa je le en zob (*tab. 3.7.9*).

Divji prašič, edini prednik domačega, je v preteklosti poseljeval stepska in gozdnata območja Evrazije in severne Afrike, od Britanskega otočja na zahodu do

Considering the fact that the third lower molar erupts between the ages of 24 and 30 months (Silver 1972), and taking into account that the teeth show visible signs of wear, the age of the animal at the time of slaughter probably exceeded 45/50 months. This is an age by which the intensive growth of the animal ends and investing further effort into feeding it only to produce (additional quantities) of good quality meat would be unprofitable (Jarman 1975). Does this mean that slaughtering an animal at an age at which it provided the greatest profit in relation to the invested effort is a sign that animal husbandry of the time was directed primarily at producing this single product? With a total of 17 remains in the sample it is yet too early to come to any conclusions.

*Sus scrofa/domesticus*

The remains of the *Sus* genus are, besides those of roe deer, the most frequent in the sample. They encompass about one third of all the finds (*tables 3.7.1* and *3.7.8*). Seventy-seven % of them are from phase 1. The proportion of teeth in the sample is large (38 %), but unlike most of the other species, not predominant. Traces of chop marks and gnawing marks are extremely rare, and only one tooth shows burns. (*table 3.7.9*).

| | FAZA 1 | FAZA 1 / FAZA 2 | FAZA 2 | Σ |
|---|---|---|---|---|
| cranium | 4 | -- | -- | 4 |
| os maxillare | 7 | -- | -- | 7 |
| mandibula | 6 | 3 | -- | 9 |
| dentes | 45 | 19 | 5 | 69 |
| scapula | -- | -- | 2 | 2 |
| humerus (proks.) | 3 | -- | -- | 3 |
| humerus (dist.) | 3 | -- | -- | 3 |
| radius (proks.) | 3 | -- | -- | 3 |
| radius (dist.) | 1 | -- | -- | 1 |
| ulna | 1 | -- | -- | 1 |
| ossa carpalia | 7 | 1 | -- | 8 |
| ossa metacarpalia (p) | 2 | 1 | -- | 3 |
| phalanx I | 9 | 1 | 1 | 11 |
| phalanx II | 11 | -- | -- | 11 |
| phalanx III | 6 | 3 | -- | 9 |
| ossa coxae | 1 | -- | -- | 1 |
| femur (dist.) | 5 | -- | -- | 5 |
| patella | 3 | -- | -- | 3 |
| fibula | 1 | -- | -- | 1 |
| tibia (proks.) | -- | -- | 1 | 1 |
| tibia (dist.) | 2 | -- | 1 | 3 |
| calcaneus | 2 | -- | -- | 2 |
| ossa tarsalia | 5 | -- | -- | 5 |
| ossa metatarsalia (p) | 5 | 1 | -- | 6 |
| metapodia (indef.) | 9 | 2 | -- | 11 |

*Tab. 3.7.8:* Frekvence zastopanosti posameznih skeletnih elementov prašiča (*Sus* sp.) po naselbinskih fazah.
*Table 3.7.8:* Frequency of individual skeletal remains of pig (*Sus domesticus*) and wild boar (*S. scrofa*) per settlement phase.

| | KOST / ZOB BONE / TOOTH |
|---|---|
| sledi ureza / cut marks | humerus (dist.) – 2x |
| sledi zasekanin / chop marks | humerus (dist.) |
| sledi ugriza / gnawing marks | metapodia |
| ožgan element / burned | dentes |

*Tab. 3.7.9:* Izkopani ostanki prašiča (*Sus* sp.), na katerih so bili opaženi sledovi urezov ali zasekanin oz. je bila kost/zob obgrizen(a) ali ožgan(a).
*Table 3.7.9:* Number of pig/wild boar remains showing cut, chop or gnawing marks and the number of burnt bones.

Japonske na vzhodu. Danes je v mnogih predelih iztrebljen, nekdaj sklenjeno območje razširjenosti pa je večinoma razdrobljeno na majhne izolirane populacije. V Sloveniji divji prašič poseljuje listnate in mešane gozdove, ustrezajo pa mu tudi obsežnejša močvirja (Kryštufek 1991). Na Kitajskem naj bi ga udomačili pred približno 7500 leti, nekoliko kasneje že tudi na Bližnjem Vzhodu, pred približno 6000 leti pa morda tudi v severni Evropi (Clutton-Brock 1999; O'Connor 2000).

Pri domačem prašiču so se postopno razvijale nekatere morfološke posebnosti, ki so ga ločile od divjega. Mednje lahko prištevamo spremembe v morfologiji lobanje in spodnje čeljustnice, pojav spiralasto zavitega repa in povešenih uhljev, spremembe v kvaliteti in barvi dlake ter seveda tudi zmanjšanje velikosti osebkov. Slednja je sicer v času bolj nihala, kot to velja za govedo, ovco ali kozo, so pa velikosti neolitskih živali tudi v tem primeru presegli šele domači prašiči modernih pasem (Bökönyi 1974).

Kot prvi korak k oceni vloge domačega prašiča v takratni živinoreji smo poskušali ugotoviti okvirno razmerje med ostanki divjega (*Sus scrofa* Linnaeus 1758) in domačega prašiča (*Sus domesticus* Erxleben, 1777) v obravnavanem vzorcu. Žal je ločevanje med obema vrstama le na podlagi kostnih ostankov zelo težavno (Herre 1972). Razlike v morfologiji posameznih skeletnih elementov med divjim in domačim prašičem so namreč maloštevilne in omejene na elemente, ki so v arheoloških vzorcih največkrat bodisi redki (npr. podočniki) bodisi zelo fragmentarni (tj. lobanja; Bökönyi 1974). Ugotavljanje prisotnosti in/ali ocene vsaj približnega deleža ene in druge vrste v nekem vzorcu tako največkrat temelji na biometriji. Pri tem je priporočljiva primerjava ostankov domnevno domačih in domnevno divjih živali, ki izhajajo z istega najdišča. Na ta način lahko namreč neposredno primerjamo populaciji iz natanko istega območja in obdobja ter tako izključimo potencialno zelo moteč vpliv neenakega okolja ali genetskih razlik na nivoju podvrste (Bökönyi 1995).

Druga šibka točka razlikovanja med domačim in divjim prašičem na podlagi biometričnih analiz je povezana z velikostjo vzorca (*priloga 3.7.3*). Četudi v hipotetičnem (mešanem) vzorcu med obema vrstama dejansko obstaja statistično značilna razlika v določeni dimenziji, je lahko uporaba te za oceno deleža ostankov ene in druge vrste vseeno neučinkovita. Če namreč razlika v povprečni vrednosti merjene dimenzije med obema vrstama znotraj vzorca ne presega dveh standardnih devi-

Wild boar, the only ancestor of the domestic pig, used to inhabit the steppes and wooded areas of Eurasia and northern Africa, from the British Isles in the west to Japan in the east. Today already exterminated in many of these areas, the formerly unified living area is now divided into small isolated populations. In Slovenia the wild pig lives in deciduous and mixed forests, and also likes larger marshes (Kryštufek 1991). In China it had ostensibly been domesticated about 7500 years ago, a little later also in the Middle East and about 6000 years ago possibly also in northern Europe (Clutton-Brock 1999; O'Connor 2000).

Gradually some morphological properties developed in the domestic pig that rendered it different from its wild ancestor. Among them are changes of the morphology of the skull and mandibles, the development of the spiraled tail and pendulant ears, a change in the quality and color of its bristles and a reduction in its size. The latter fluctuated through time more than that of cattle, sheep and goats, nevertheless the size of the Neolithic pig was not surpassed until the development of modern breeds (Bökönyi 1974).

The first step in trying to assess the importance of the domestic pig in the animal husbandry of the time was to determine the general ratio between the wild boar (*Sus scrofa* Linnaeus 1758) and domestic pig (*Sus domesticus* Erxleben, 1777) in our sample. Unfortunately, distinguishing between the two species solely on the basis of bone remains is problematic (Herre 1972). The morphological differences of individual skeletal elements of the wild boar and domestic pig are few, and they are limited to elements that are in archaeological samples either rare (e.g. canines) or very fragmented (i.e. skull; Bökönyi 1974). Determining the presence and/or assessments of at least an approximate proportion of one species and the other is thus in most cases based on biometrics. The recommended method is to compare the presumably domestic and presumably wild animals from the same site. In this way we can directly compare the two populations from exactly the same area and time and evade the potentially misleading influence of different environments or genetic difference on the level of sub-species. (Bökönyi 1995).

Another weak point in distinguishing between the domestic and wild pig on the basis of biometric analysis relates to the size of the sample. Although in a hypothetical (mixed) sample statistically characteristic differences between the two species definitely exist, using acij (SD), se bosta obe distribuciji zlili v eno samo. Bimodalnost začne postajati opazna šele pri povprečjih, ki se razlikujejo za tri standardne deviacije in komaj razlike, ki presegajo štiri do pet standardnih deviacij, omogočajo determinacijo večine kosti in zob iz (hipotetičnega) vzorca (Payne, Bull 1988). Za kaj takega so potrebni obsežni vzorci, ki povzemajo zadovoljiv delež intraspecifične (npr. spolni dimorfizem, razlike, povezane s starostjo) variabilnosti in s tem omogočajo oceno obsega prekrivanja med populacijama obeh vrst (Herre 1972; Bökönyi 1974; 1995; Rowley-Conwy 1995).

Uporaba biometrije za ločevanje med divjim in domačim prašičem za primer Hočevarice torej ni bila mogoča. Oceno razmerja med kostnimi in zobnimi ostanki obeh vrst smo tako dobili posredno, z ugotavljanjem starosti živali ob zakolu ali uplenitvi. Ob prevladovanju ostankov divjih prašičev gre namreč pričakovati večji razpon med najmlajšimi in najstarejšimi osebki in tudi sicer naj bi bile posamezne starostne kategorije v takem primeru enakomerneje zastopane. Nasprotno pa pri vzorcih, ki jih sestavljajo pretežno ostanki domačega prašiča, pričakujemo prevlado mlajših, do tri leta starih osebkov. Pri tej starosti (1,5–3 leta, pač odvisno od pogojev reje) so namreč živali dovolj rejene, da zagotavljajo zadostno količino mesa, hkrati pa še vedno dovolj mlade, da je kvaliteta mesa zadovoljiva (Albarella, Serjeantson 2002).

Starost živali smo ocenjevali na podlagi obrabljenosti grizalne površine meljakov spodnje čeljustnice in v skladu z navodili, ki sta jih objavila Rolett in Chiu (1994). Metoda temelji na domnevi, da je bil tempo izraščanja zob in njihove obrabe pri prazgodovinskih domačih prašičih še najpodobnejši tistemu, ki ga danes lahko spremljamo pri divjih prašičih in pri relativno počasi razvijajočih se pasmah domačih prašičev. Upra-

this for evaluating the proportions of the remains of one species or the other is still ineffective. If the difference in the average value of the measured dimension between the two species within one sample does not exceed two standard deviations (SD), both the distributions will merge into a single one. Biomodality only starts becoming visible in averages that differentiate by three standard deviations; and only differences that exceed four to five standard deviations will enable determination of the majority of the bones and teeth from the (hypothetical) sample (Payne, Bull 1988). This process requires extensive samples which encompass a sufficient proportion of intra-specific (e.g. sexual dimorphism, age related differences) variability and with it allow an evaluation of the extent of overlapping of the populations of both species (Herre 1972; Bökönyi 1974; 1995; Rowley-Conwy 1995).

The application of biometrics for distinguishing between the wild boar and domestic pig was therefore not possible in the case of Hočevarica. Consequently, an evaluation of the ratio between bone and tooth remains of both species was obtained indirectly by determining the age of the animal at the time of killing. Where the remains of wild boars are predominant, a greater span is anticipated between the youngest and the oldest individuals, and also the in-between age categories would in this case be more equally distributed. Whereas in samples consisting of mainly the remains of domestic pigs, an increased number of young – up to three years old – pigs are expected. At this age (1.5–3 years, depending on the breeding conditions) the animals have reached a size at which they provide a sufficient amount of meat, but are still young enough for the meat to be of satisfactory quality (Albarella, Serjeantson 2002).

The age of the animals was estimated on the basis of the deterioration of the chewing surface of the lower molars in accordance with instructions published by Rolett and Chiu (1994). The method is based on the presumption that the rate of growth and wear on the teeth of prehistoric domestic pigs was similar to what is today discernible in wild boars and relatively slow growing breeds of domestic pigs. The justification of this presumption does not seem questionable and has already been expressed by other authors (e.g. Bull, Payne 1982). It is much more difficult by this and similar methods to

*Tab. 3.7.10:* Ocena starosti živali ob smrti glede na obrabo spodnjih meljakov pri prašiču (*Sus* sp.). Analiza temelji na navodilih, ki sta jih objavila Rolett in Chiu (1994).
*Table 3.7.10:* The assessments of age at death according to the tooth wear of the lower molars of pig/wild boar (*Sus* sp.). The analysis is based on the instructions published by Rolett and Chiu (1994).

| ZOB TOOTH | STOPNJA OBRABE WEAR STAGE | STAROSTNA SKUPINA AGE GROUP | OCENJENA STAROST ASSESSED AGE |
|---|---|---|---|
| $M_1$ | B | subadultni / subadult | 5/8–10/14 mesecev / months |
| $M_1$ | E | mlad adultni / young adult | 10/14–18/26 mesecev / month. |
| $M_2$ | B/C | mlad adultni / young adult | 10/14–18/26 mesecev / month. |
| $M_2$ | D | mlad adultni / young adult | 10/14–18/26 mesecev / month. |
| $M_2$ | F/G | zrel adultni / young adult | nad / over 18/26 mes. / month. |
| $M_2$ | E | zrel adultni / mature adult | nad / over 18/26 mes. / month. |
| $M_3$ | zasnova / germ | mlad adultni / young adult | 10/14–18/26 mesecev / month. |

vičenost omenjene domneve se ne zdi vprašljiva in so jo predhodno izrazili že tudi nekateri drugi avtorji (npr. Bull, Payne 1982). Veliko težje je pri tej metodi in sorodnih metodah oceniti vlogo, ki so jo pri obrabi zob imele razlike v prehranjevalnih navadah in kvaliteti same hrane ter neenake abrazivne lastnosti prsti na prehranjevalnem območju različnih populacij.



assess the role that differences in feeding habits and the quality of food, and the disparate abrasive properties of the soil in the area of various populations, would have on the wear of teeth.

Although the number of lower molars in our sample is limited, and disregarding the shortcomings of the above mentioned methods, the predominant proportion

| ZOB<br>TOOTH | STAROST OB IZRAŠČANJU<br>ERRUPTION AGE | OBRABA<br>WEAR |
|---|---|---|
| $P^3$ | 12–16 mesecev / months | + |
| $P^4$ | 12–16 mesecev / months | + |
| $P^4$ | 12–16 mesecev / months | 0 (v izraščanju / erupting) |
| $M^1/M^2$ | 4–6 / 10–13 mesecev / months | + + + + + |
| $M^2$ | 8–13 mesecev / months | + + |
| $M^2$ | 8–13 mesecev /months | + + |
| $M^2$ | 8–13 mesecev / months | + + + + + |
| $M^3$ | 16–30 mesecev / months | 0 (v izraščanju / erupting) |
| $M^3$ | 26–33 mesecev / months | 0 (v izraščanju / erupting) |
| $M^3$ | 26–33 mesecev / months | + + + + + |
| $dp_1$ | - - | + + + |
| $dp_3$ | - - | + + + |
| $I_2$ | 17–20 mesecev / months | 0 |
| $P_2$ | 12–16 mesecev / months | 0 |
| $P_2$ | 12–16 mesecev / months | 0 |
| $P_4$ | 12–16 mesecev / months | + + |

*Tab. 3.7.11:* Ocena obrabljenosti izkopanih spodnjih predmeljakov in zgornjih (pred)meljakov prašiča (*Sus* sp.). Podatki o starosti živali ob izraščanju posameznih zob so povzeti po Bull in Payne (1982). Legenda: 0 – zob ne kaže sledov obrabe, + + + + + – ekstremno obrabljen zob.

*Table 3.7.11:* The assessments of age at death according to the tooth wear of the lower premolars and upper (pre)molars of pig/ wild boar (*Sus* sp.). The sequence of eruption is summarized after Bull and Payne (1982). Legend: 0 – unworn tooth, + + + + + – extremely worn tooth.

Kljub sicer skromnemu številu spodnjih meljakov v našem vzorcu in že omenjenim slabostim uporabljene metode se zdi prevladujoč delež zob relativno mladih živali vendarle dovolj močan argument, da pretežni del ostankov rodu *Sus* v vzorcu pripišemo prav domačemu prašiču (*tab. 3.7.10*). V prid omenjeni hipotezi govori tudi analiza obrabe ostalih zob, ki jih zgoraj uporabljena metoda sicer ne zajema (tj. spodnji predmeljaki in zgornji (pred)meljaki; *tab. 3.7.11*). Tudi v tem primeru so namreč prevladovali zobje juvenilnih-subadultnih osebkov, in to kljub dejstvu, da je število zob pri teh na osebek manjše, kot to velja za adultne in senilne živali. Slednje so bile v vzorcu zastopane z manjšim številom zelo obrabljenih zob, ki bi jih tako lahko prisodili morda tudi divjemu prašiču. Prisotnost divjega prašiča v vzorcu namreč potrjujejo najdbe štirih podočnikov ter fragment neurocraniuma in mandibule, ki brez dvoma pripadajo prav *S. scrofa* (*sl. 3.7.4*).

Starost živali ob zakolu smo poskušali oceniti tudi z ugotavljanjem deleža kosti s (še) nezraščenima epi- in diafizo (*tab. 3.7.12*). Dobljene rezultate je sicer potreb-

of teeth of relatively young animals provides a substantiative argument for the attribution of the majority of the *Sus* genus remains in our sample to the domestic pig (*table 3.7.10*). The analysis of the wear on the remaining teeth (i.e. lower and upper (pre)molars; *table 3.7.11*), which are not included in the method applied, further supports this hypothesis. Also in this case, the teeth of juvenile/sub-adult individuals were predominant despite the fact that these individuals have fewer teeth than adult and senile animals. In the sample the latter were present with a lower number of very worn teeth, which could possibly be attributed to the wild boar. The presence of the latter in the sample is evident from four canines and a fragment of the neurocranium and mandible, all undoubtedly belonging to *S. scrofa* (*fig. 3.7.4*).

We also tried to assess the age of the animal at the time of slaughter by determining the proportion of bones with (yet) unfused epi- and diaphysis (*table 3.7.12*). The results thus obtained must be regarded with a good measure of caution, considering that this method is less reliable than those based on the analysis of the teeth (Ro-


*Sl. 3.7.4:* Ostanki divjega prašiča *Sus scrofa*: zgornji (a) in spodnji (b) podočnik (naravna velikost) ter nuhalni del neurocraniuma – *Norma lateralis* (pomanjšano; c). Foto: M. Zaplatil.
*Fig. 3.7.4:* Wild boar (*Sus scrofa*) remains: (a) upper and (b) lower canine (natural size), (c) nuchal part of the neurocranium – *Norma lateralis* (reduced). Photo: M. Zaplatil.

no upoštevati s precejšnjo mero previdnosti, saj velja omenjena metoda za manj zanesljivo od tistih, ki temeljijo na analizi obrabe zob (Rolett, Chiu 1994; Albarella, Serjeantson 2002). Kljub temu se zdi, da skoraj 50 % delež kosti s še nezraščenima epi- in diafizo potrjuje prevlado ostankov relativno mladih živali v vzorcu, s tem pa tudi domnevo, da so med pregledanimi številčnejši ostanki domačega prašiča.

Izmerjene dimenzije praščijih ostankov so podane v *prilogi 3.7.3*. Ker na nivoju posameznih biometrijsko obdelanih fragmentov nismo bili sposobni ločevati med divjim in domačim prašičem, se navedene meritve nanašajo kar na *S. scrofa/domesticus.* To se odraža tudi v ustrezno večji variacijski širini. Primerjava omenjenih vrednosti z nekaterimi objavljenimi podatki s približno sočasnih najdišč sosednjih pokrajin je pokazala, da so bili osebki iz našega vzorca domnevno nekoliko večji od tistih, izkopanih na območju Mondseeja v Avstriji (Puc-

lett, Chiu 1994; Albarella, Serjeantson 2002). Nevertheless, the almost 50 % proportion of bones with yet unfused epi- and diaphysis supports the theory of a predominant number of remains of relatively young animals in the sample, and with it the presumption that among the inspected remains the majority belonged to the domestic pig.

The measured dimensions of pig remains are presented in the *appendix 3.7.3.* Since we could not distinguish between the domestic pig and wild boar on the level of individual biometrically studied fragments, these measurements relate directly to (mixed) *S. scrofa/domesticus.* This is also reflected in the correspondingly larger variation range. Comparison of the above explained values with some of the published data from approximately contemporary sites in neighboring countries showed that the individuals from our sample were larger than those excavated in the Mondsee area in Austria (Puch-

| STAROSTNO OBDOBJE (v letih) AGE CLASS (in years) | EPIFIZA ZRAŠČENA FUSED | EPIFIZA NI ZRAŠČENA UNFUSED |
|---|---|---|
| 0–1 | 14 | 6 |
| 1–2 | 8 | 6 |
| 2–3 | 0 | 1 |
| nad / over 3 | 3 | 6 |
| **SKUPAJ / TOTAL** | **25** | **19** |

*Tab. 3.7.12:* Število ostankov prašiča (*Sus* sp.) z (ne)zraščenima epi- in diafizo po starostnih skupinah. Posamezno skupino sestavljajo skeletni elementi, ki popolnoma osificirajo v istem starostnem obdobju (t. j. v prvem, drugem ali tretjem letu življenja). Podatki o obdobju zraščanja epi- in diafiz so povzeti po Silver (1972).
*Table 3.7.12:* Number of un-fused diaphyses among pig/wild boar remains. Skeletal elements are grouped in classes according to the age at which fusion of epi- and diaphyses is completed (i.e. in the first, second or third year of life). The sequence of fusion is summarized from Silver (1972).

her, Engl 1997) ter z madžarskih najdišč Tarnabod in Tiszaszőlős-Csákányszeg (Bökönyi 1974). Odstopanja so bila še večja ob primerjavi s sicer maloštevilnimi ostanki italijanskega eneolitskega najdišča Colombare di Negar (Riedel 1977) na severu države. Pri tem ne gre spregledati, da izmerjeni fragmenti s Hočevarice pripadajo tako domačemu kot tudi (večjemu) divjemu prašiču, uporabljeni podatki z najdišč sosednjih pokrajin pa se nanašajo izključno na domačega prašiča.

*Canis familiaris* Linnaeus, 1758

Psu smo pripisali skupno 29 subfosilnih ostankov, med njimi 17 (tj. 59 %) zob (*tab. 3.7.1* in *3.7.13*). Kosti so praviloma fragmentarne, pri čemer edino izjemo predstavlja relativno dobro ohranjena lobanja iz faze 1 (*sl. 3.7.6*; Toškan 2002). Majhen delež (5,1 % NISP oziroma 6,8 % TMAU) pasjih ostankov ne preseneča, saj je imel pes v takratni skupnosti med vsemi domačimi in številnimi lovnimi živalmi najmanjši neposredni ekonomski pomen (Bartosiewicz 2002). Podobno nizek delež pasjih ostankov je namreč značilen tudi za vzorce s številnih drugih neolitskih-eneolitskih koliščarskih naselbin, vključno s tistimi z Ljubljanskega barja. Tako je bil psu pripisan slab odstotek določenih kostnih ostankov z Iga oziroma z Ižanskih kolišč (Drobne 1973), 11 odstotkov z Maharskega prekopa (Drobne 1974a; 1974b; 1975), štirje odstotki z najdišča Notranje Gorice (Drobne 1973) in le 2 odstotka s Part (Bartosiewicz 2002). V okviru izkopavanj na Resnikovem prekopu pasjih ostankov niso odkrili (Drobne 1962). Na prisotnost in številnost psov v prazgodovinskih skupnostih sicer kažejo tudi sledovi ugrizov na izkopanih kosteh. Pri tem velja pripomniti, da je delež takih kosti v vzorcu s Hočevarice majhen, veliko manjši kot v številnih drugih neolitskih-eneolitskih najdiščih po Evropi (npr. Albarella, Serjeantson 2002). Sicer pa na pasjih kosteh s Hočevarice nismo zasledili nikakršnih sledov urezov ali zasekanin, prav tako pa tudi ne ožganih kosti.

Proces udomačitve volka, edinega prednika domačega psa, se je domnevno pričel že pred približno

er, Engl 1997) and in the Hungarian sites at Tarnabod and Tiszaszőlős-Csákányszeg (Bökönyi 1974). The deviations were even greater in comparisons with the north Italian site at Colombare di Negar (Riedel 1977). We must here point out that the measured fragments from Hočevarica belong to the domestic pig as well as to the (bigger) wild boar, while the data from the sites in neighboring regions refer exclusively to domestic pigs.

*Canis familiaris* Linnaeus, 1758

We attributed altogether 29 sub-fossil remains to the dog. Among them 17 (i.e. 59 %) were teeth (*tables 3.7.1* and *3.7.13*). The bones were in most part fragmented, with the exception of a very well preserved cranium from phase 1 (*fig. 3.7.6*; Toškan 2002). The small proportion (5.1 % NISP and 6.8 % TMAU) of the dog remains is not surprising, since among all the domestic and hunting animals the dog had the lowest direct economic importance to the community of that time (Bartosiewicz 2002). A similarly low proportion of dog remains was also characteristic for the samples in many other Neolithic-Eneolithic pile dwellings, including those from the Ljubljansko barje. The proportion of dog remains in the sample from the Ig pile dwellings was 1 % (Drobne 1973), from Maharski prekop 11 % (Drobne 1974a; 1974b; 1975), 4 % from the Notranje Gorice site (Drobne 1973) and only 2 % from Parte (Bartosiewicz 2002). No dog remains were discovered during excavation at Resnikov prekop (Drobne 1962). The presence and quotient of dogs in the prehistoric community are also visible from the gnawing marks on excavated bones. The proportion of such bones in the sample from Hočevarica was small, much smaller than in many other Neolithic-Eneolithic sites in Europe (e.g. Albarella, Serjeantson 2002). In any case, no traces of cuts or chop marks or burns were discerned on the dog bones.

The onset of the domestication of the wolf, the only ancestor of the domestic dog, presumably dates to about 15,000 years ago (Clutton-Brock 1999), but the decisive change in the relationship between the »ancient dog«

| | FAZA 1 | FAZA 1 / FAZA 2 | FAZA 2 | Σ |
|---|---|---|---|---|
| cranium | 1 | -- | -- | 1 |
| os maxillare | -- | -- | 1 | 1 |
| mandibula | -- | -- | 1 | 1 |
| dentes | 2 | 6 | 9 | 17 |
| humerus (proks.) | 1 | 1 | -- | 2 |
| radius (proks.) | 1 | 1 | -- | 2 |
| radius (dist.) | -- | 1 | -- | 1 |
| femur (dist.) | 1 | -- | 1 | 2 |
| astragalus | 1 | -- | 1 | 2 |

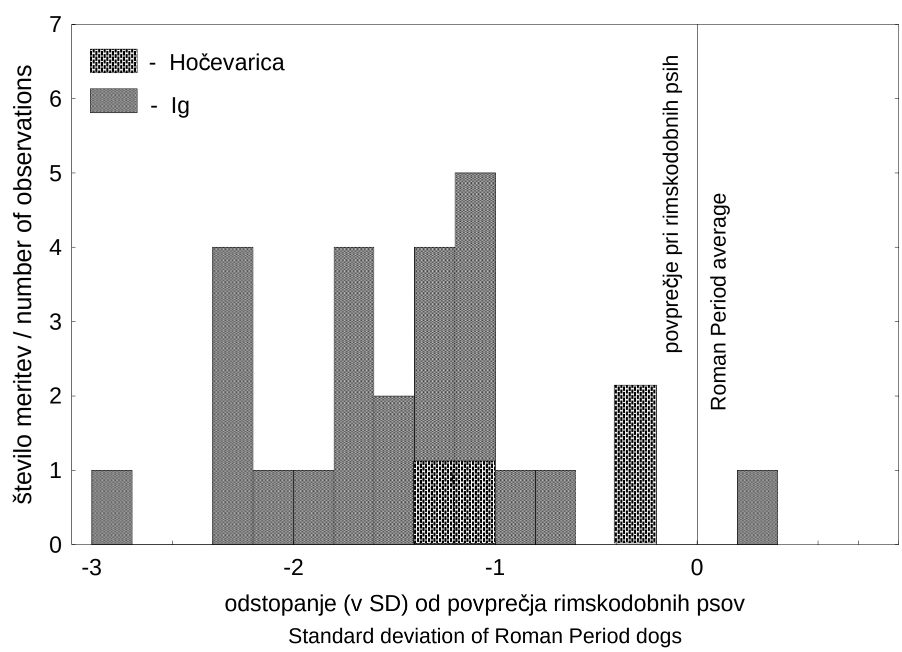
*Tab. 3.7.13:* Frekvence zastopanosti posameznih skeletnih elementov domačega psa (*Canis familiaris*) po naselbinskih fazah.
*Table 3.7.13:* Frequency of individual skeletal remains of domestic dog (*Canis familiaris*) per settlement phase.

15000 leti (Clutton-Brock 1999), vendar je do odločilne spremembe v odnosu med »prapsom« in človekom verjetno prišlo šele ob koncu pleistocena. Pri tem so imele pomembno vlogo podobnosti v načinu komunikacije med obema vrstama, zaradi katerih so vedenja, ki izražajo agresivnost, strah, podrejenost, veselje ipd. medsebojno razumljiva. Sicer pa sta imeli od same domestikacije korist obe strani: človek je pridobil pomembno pomoč pri lovu in zagotavljanju večje varnosti, pes pa stalen vir hrane v obliki odpadnih kosov mesa in kosti (Uerpmann 1996).

Z domestikacijo so se pri psu pričele relativno kmalu pojavljati tudi določene morfološke spremembe,

and man probably occurred no sooner than at the end of the Pleistocene. The similarities in the manner of communication of the two species, due to which the behavior that expresses aggressiveness, fear, subordination, joy, etc. were mutually understandable, played an important role in this relationship. Moreover, both profited from the domestication: man gained assistance in hunting and ensuring his safety, while the dog acquired a reliable source of food in the form of meat and bone waste (Uerpmann 1996).

The domestication of the dog relatively soon resulted in morphological changes, such as shortened mandibles and consequent crowding of the lower cheek




*Sl. 3.7.5:* Porazdelitev nekaterih izmerjenih dimenzij lobanje eneolitskih psov iz kolišč na Igu in Hočevarici (modificirano po Bartosiewicz (2002, 82)). Povprečje rimskodobnih psov se nanaša na vzorec iz madžarskega najdišča Tác-Gorsium. Legenda: SD – standardna deviacija.
*Fig. 3.7.5:* The distribution of cranial measurements in Eneolithic dogs (*Canis familiaris*) from the Ig and Hočevarica pile dwellings (modified after Bartosiewicz (2002, 82)). The average of Roman Period dog skulls relates to the sample from the Hungarian site of Tác-Gorsium. Legend: SD – Standard Deviation.

kot npr. skrajšanje dolžine spodnje čeljustnice s posledičnim gnetenjem spodnjega niza zob in pa opazno (tudi do 30 %) zmanjšanje velikosti možganov (Bökönyi 1974). Med omenjenimi in številnimi drugimi spremembami pa je nedvomno ena najopaznejših razlik med volkom in psom povezana s samo velikostjo živali, ki so postale z udomačitvijo očitno manjše. Po podatkih, ki jih navaja Bökönyi (1974), so tako npr. zgodnjeneolitski psi le izjemoma dosegali polovično velikost takratnih volkov.

Na podlagi subfosilnih ostankov z različnih srednjeevropskih najdišč se zdi, da bi lahko večino neolitskih-eneolitskih psov uvrstili v isto velikostno skupino, ki so jo tvorili majhni, današnjim špicem podobni psi. Rütimeyer (1862; prim. Bökönyi 1974) jih je na podlagi najdb iz različnih švicarskih neolitskih najdišč opisal kot *Canis familiaris palustris* (t.i. barjanski ali mostiščarski pes). Zanje je bila značilna razmeroma majhna, kratka lobanja z dokaj izbočenim profilom nosu in čela ter z razmeroma visoko postavljeno nosnico. Ostanki psov tipa *palustris* so poznani tudi z različnih eneolitskih najdišč Ljubljanskega barja, kot so Maharski prekop (Drobne 1974a; 1974b; 1975), Ig (Rant 1961) in Parte (Bartosiewicz 2002).

Ob sicer prevladujočem barjanskem psu so se relativno zgodaj na območju Madžarske (Körös kultura) začeli pojavljati tudi nekoliko večji predstavniki omenjene vrste. Ti, sicer srednje veliki psi, so se od *palustris* tipa razlikovali tudi po obliki lobanje. Ta ni bila le večja in daljša, ampak je bil zanjo značilen tudi bolj slok profil nosu in čela ter ne tako zelo obokan neurocranium. Poglavitne razlike v primerjavi z lobanjo barjanskega psa so bili bolj izražen zunanji puščični greben (*crista sagitalis externa*) in obe senčni črti (*lineae temporalis*). Take lobanje so podobne lobanjam današnjih ovčarjev (Rant 1961; Bökönyi 1974).

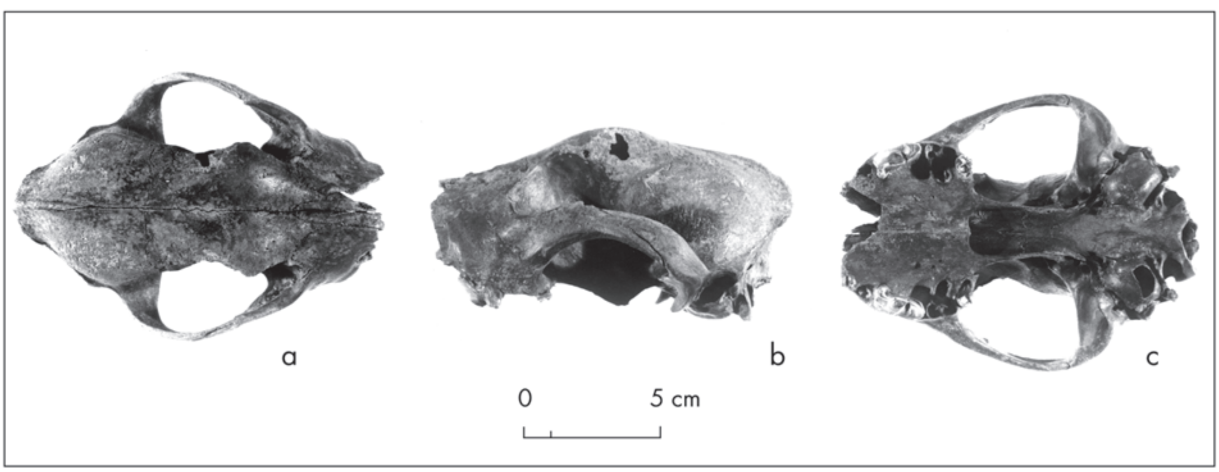
Pasja lobanja iz našega vzorca je po svojih dimenzijah znotraj variacijske širine osmih pasjih lobanj z eneo-

teeth, as well as a visible (up to 30 %) reduction in brain size (Bökönyi 1974). Among numerous other differences between the dog and the wolf, the most notable was undoubtedly the size of the animal itself, which became visibly smaller with domestication. According to data published by Bökönyi (1974), the early Neolithic dog rarely reached half the size of the wolves of that period.

Sub-fossil remains from various Central European sites indicate that most of the Neolithic-Eneolithic dogs could be ranked in the same size group as small, spitz type dogs of today. On the basis of finds from various Neolithic sites in Switzerland Rütimeyer (1862; comp. Bökönyi 1974) described them as *Canis familiaris palustris* (in Slovenia they are called the »barjanski« or »mostiščarski pes« (i.e. pile dwellers' dog)). Characteristically they had a small and short cranium with a fairly projecting nose and forehead profile, and highly positioned nostrils. Remains of the *palustris* type dog are known from various Eneolithic sites throughout the Ljubljansko barje, such as Maharski prekop (Drobne 1974a; 1974b; 1975), Ig (Rant 1961) and Parte (Bartosiewicz 2002).

Along with the predominant »barjanski pes«, somewhat bigger animals of the same species began appearing relatively soon in the Hungarian region (Körös culture). These mid-sized dogs differed from the *palustris* type in the shape of their skull. It was not only larger and longer, but also acquired a characteristic slender profile of the nose and forehead and a more mildly arched neurocranium. The main difference as compared to the »barjanski pes« was the more expressed sagittal suture (*crista sagitalis externa*) and both the temple lines (*lineae temporalis*). Such skulls resemble today's shepherd dogs (Rant 1961; Bökönyi 1974).

The dimensions of the dog skull from our sample place it within the variation range of eight dog skulls from the Eneolithic sites at Ig (*fig. 3.7.5*). While analyzing the latter, Bartosiewicz (2002) concluded that by




*Sl. 3.7.6:* Lobanja psa iz Hočevarice: *Norma dorsalis* (a), *Norma lateralis* (b) in *Norma ventralis* (c). Foto: M. Zaplatil.
*Fig. 3.7.6:* Dog's skull from Hočevarica: (a) *Norma dorsalis*, (b) *Norma lateralis* and (c) *Norma ventralis*. Photo: M. Zaplatil.

litskih najdišč pri Igu (*sl. 3.7.5*). Bartosiewicz (2002) je ob analizi slednjih zaključil, da so po velikosti (lobanje) podobni današnjim manjšim pasmam ovčarjev (npr. madžarskemu *puli*ju). Primerjava iških ostankov s tistimi z rimskodobnega najdišča Tác-Gorsium (Madžarska; Bökönyi 1984) je pokazala, da se prvi ujemajo z manjšimi do srednje velikimi rimskodobnimi psi. Navedena podobnost se nanaša tako na dimenzije postkranialnega skeleta kot tudi samih lobanj (*sl. 3.7.6*; Rant 1961; Bartosiewicz 2002). Od povprečne velikosti rimskodobnih psov s Tác-Gorsiuma je manjša tudi lobanja s Hočevarice. Res je sicer, da se ta v nekaterih dimenzijah ujema z lobanjo z madžarskega najdišča Röszke-Ludvár, ki domnevno pripada večji od obeh oblik neolitskih-eneolitskih psov (*tab. 3.7.14*; Bökönyi 1974). Prav tako je res, da imata obe lobanji skupne tudi nekatere morfološke lastnosti (npr. relativno slok profil čela). Je pa, gledano v celoti, morfološka in dimenzijska podobnost med lobanjami barjanskih psov in pa primerkom s Hočevarice vendarle takšna, da smo slednjo le pripisali *palustris* tipu psa.

Sama velikost neolitskih-eneolitskih psov lahko posredno kaže tudi na njihovo vlogo in način življenja v prazgodovinskih skupnostih. Z osteološkega vidika se namreč takšni fenotipi, kot jih poznamo tudi z najdišč Ljubljanskega barja, lokalno pojavljajo še danes (npr. turški *pariah* psi). Dobimo jih v okoljih, kjer je naravna selekcija bolj poudarjena od umetne (npr. potepuški mestni psi). Tak naj bi bil slučaj tudi v koliščarskih skupnostih, kjer človek ni neposredno nadzoroval in usmerjal njihovega razmnoževanja. Takraten, domnevno nespecializiran človekov način uporabe psov česa podob-

the size of their craniums they resemble today's smaller shepherd breeds (e.g. Hungarian *puli*). A comparison of the remains from Ig with those from the Roman site Tác-Gorsium (Hungary; Bökönyi 1984) showed that the former correspond to smaller- to medium-sized dogs of the Roman period. This similarity relates to the dimensions of the post-cranial skeleton and the cranium itself (*fig. 3.7.6*; Rant 1961; Bartosiewicz 2002). The skull from Hočevarica is also smaller than the average Roman period dog from Tác-Gorsium. Nevertheless, in some dimensions it corresponds to the skull from the Hungarian site at Röszke-Ludvár, which presumably belongs to the larger of the two forms of Neolithic-Eneolithic dogs (*table 3.7.14*; Bökönyi 1974). Moreover, both the skulls have additional more common morphological similarities (e.g. a relatively slender profile of the forehead). But on the whole, the morphological and dimensional similarity between the skulls of the »barjanski pes« and the specimen from Hočevarica is such that we categorized the latter as a *palustris* type dog.

The size of the Neolithic-Eneolithic dogs also directly reflects their role and way of life in the prehistoric communities. From an osteological aspect such phenotypes as found at sites in the Ljubljansko barje still locally appear nowadays (e.g. the Turkish *pariah* dogs). They are found in environments where natural selection is more expressed than artificial selection (e.g. stray city dogs). Such is also the case in pile dwelling communities, where humans did not directly control and guide their reproduction. Their presumably unspecialized use of the dogs far from required that at the time. On the contrary, smaller dogs were easier to control and were

| *Canis familiaris* | **Hočevarica** vrednost / value (n) | **Röszke-Ludvár** n = 1 |
|---|---|---|
| **Cranium:** | | |
| 1. širina med *processus mastoideum*-a (Ot – Ot) | 61 (1*) | 60 |
| 2. največja širina *neurocranium*-a (Eu – Eu) | 56 (1*) | 60 |
| 3. največja širina čela (Ect – Ect) | 45 (1*) | 45 |
| 4. višina zatilja (A – B) | 46 (1*) | -- |
| 5. najmanjša širina med očnicama (Ent – Ent) | 34 (1*) | -- |
| 6. zigomatična širina (Zy – Zy) | 98 (1*) | -- |
| **$P^4$ (četrti zgornji predmeljak):** | | |
| 1. dolžina (L) | 17 (1) | -- |
| 2. največja širina (GL) | 9 (1) | -- |
| **Radius** | | |
| 1. (največja) širina proksimalnega konca (Bp) | 16,5 (2) | -- |

*Tab. 3.7.14:* Dimenzije ostankov domačega psa (*Canis familiaris*) iz kolišča na Hočevarici in pa lobanje iz najdišča Röszke-Ludvár (Bökönyi 1974). Podana sta izmerjena vrednost in število meritev (v oklepaju). Meritve označene z zvezdico (*) se nanašajo na juvenilne osebke. Predstavljene dimenzije so povzete po von den Driesch (1976). Vse meritve so izražene v mm.
*Table 3.7.14:* Measurements of domestic dog (*Canis familiaris*) remains from the Hočevarica pile dwelling and of the skull from the Röszke-Ludvár site (Bökönyi 1974). The measured values and number of measurements (in parentheses) are also given. An asterisk (*) marks those measurements taken of juvenile animals' remains. The measurements, in mm, were taken according to von den Driesch (1976).

nega niti ni zahteval. Celo nasprotno: manjše pse je laže nadzoroval in so bili zato tudi potencialno manj nevarni (Bartosiewicz 2002). Prav v tem kontekstu je primerjava velikosti barjanskih ostankov s tistimi z rimskega najdišča Tác-Gorsium (*sl. 3.7.5*) še posebno zanimiva. Ravno v rimskem času naj bi se namreč v Evropi prvič pojavila načrtna vzreja psov in oblikovanje prvih (tudi večjih) pasem (Bartosiewicz 2002).

*Capreolus capreolus* (Linnaeus, 1758)

Srni pripada največji, približno tretjinski delež subfosilnih živalskih ostankov s Hočevarice (*tab. 3.7.1*). Omenjeni vrsti smo namreč pripisali 195 fragmentov (*tab. 3.7.15*), od tega je 41 (21 %) zob. Za razliko od ostankov drugega najbolje zastopanega taksona (tj. *Sus* sp.), katerega kosti so bile večinoma koncentrirane v fazi 1 (*tab. 3.7.2*), so bili pri srni ti veliko enakomerneje porazdeljeni. Sicer pa tudi za ostanke srninih kosti velja, da so praviloma fragmentarni ter da so sledovi zasekanin, urezov (metatarsus iz faze 2) in ugrizov (metacar-

thus less dangerous (Bartosiewicz 2002). In this context the comparison between the sizes of the »barjanski pes« with those from the Roman site at Tác-Gorsium (*fig. 3.7.5*) is particularly noteworthy, since it was during the Roman period that planned breeding of dogs and the formation of the first (also bigger) breeds appeared in Europe (Bartosiewicz 2002).

*Capreolus capreolus* (Linnaeus, 1758)

The roe deer constitutes the greatest part, i.e. approximately one third of the sub-fossil animal remains at Hočevarica (*table 3.7.1*). A total of 195 fragments have been attributed to this species (*table 3.7.15*). Of these, 41 (21 %) are teeth. Unlike the remains of the second most frequent taxon (i.e. *Sus* sp.), the bones of which were mostly concentrated in phase 1 (*table 3.7.2*), those of the roe deer were much more evenly distributed. In general, the remains of roe deer bones are fragmented and traces of chop marks, cuts (metatarsus from phase 2) and gnawing marks (metacarpus from phase 1 and

| | FAZA 1 | FAZA 1 / FAZA 2 | FAZA 2 | Σ |
|---|---|---|---|---|
| rog / antler | 1 | 2 | -- | 3 |
| cranium | -- | 2 | -- | 2 |
| os maxillare | -- | 2 | 1 | 3 |
| mandibula | 1 | 8 | 1 | 10 |
| dentes | 7 | 27 | 7 | 41 |
| epistropheus | -- | -- | 1 | 1 |
| scapula | 4 | 2 | -- | 6 |
| humerus (proks.) | 2 | 1 | -- | 3 |
| humerus (dist.) | 1 | 3 | 1 | 5 |
| radius (proks.) | 1 | -- | -- | 1 |
| radius (dist.) | -- | 1 | -- | 1 |
| ulna | 1 | 4 | -- | 5 |
| ossa carpalia | -- | 3 | -- | 3 |
| ossa metacarpalia (p) | 4 | 5 | 1 | 10 |
| ossa metacarp. (diaf) | 1 | 3 | 1 | 5 |
| ossa metacarpalia (d) | 2 | -- | -- | 2 |
| phalanx I | 5 | 8 | 5 | 18 |
| phalanx II | 3 | 9 | 2 | 14 |
| phalanx III | 3 | 4 | -- | 7 |
| ossa coxae | 2 | 1 | -- | 3 |
| femur (proks.) | -- | -- | 1 | 1 |
| patella | 1 | -- | -- | 1 |
| tibia (proks.) | -- | 1 | -- | 1 |
| tibia (dist.) | 2 | 1 | -- | 3 |
| calcaneus | -- | 2 | 1 | 3 |
| ossa tarsalia | 1 | 1 | -- | 2 |
| ossa metatarsalia (p) | -- | 5 | -- | 5 |
| ossa metatar.(diaf.) | 8 | 9 | -- | 17 |
| metapodia indef. | 9 | 8 | 2 | 19 |

*Tab. 3.7.15:* Frekvence zastopanosti posameznih skeletnih elementov srne (*Capreolus capreolus.*) po naselbinskih fazah.
*Table 3.7.15:* Frequency of individual skeletal remains of roe deer (*Capreolus capreolus*) per settlement phase.

pus iz faze 1 ter calcaneus iz faze 2) izjemno redki. Ožganih kosti nismo zasledili.

Srna je majhna jelenja vrsta, ki danes poseljuje pas mešanih in listnatih gozdov od zahodne Evrope do jugovzhodne Sibirije, zahodne Kitajske in vzhodnega Tibeta (Kryštufek 1991). V Evropi so najstarejše fosilne najdbe srn poznane iz srednjega pleistocena (günz) in pripadajo podvrsti *C. capreolus suessenbornensis* Kahlke, 1956, katere osebki so bili nekoliko večji od recentnih evropskih srn(jakov). Fosilni ostanki slednjih so sicer pogosti v številnih najdiščih poznega pleistocena (Kurtén 1968; Guérin, Patou-Mathis 1996). Recentne srne v križu (kjer so višje kot v plečih) merijo med 63 in 67 cm. Največja teža srnjakov naj bi bila 35 kg, srn pa 30 kg (Kryštufek 1991).

Med različnimi habitati so srnjadi najljubši gozdovi z gosto podrastjo in grmišča. Gre namreč za žival, ki se v takem okolju spretno giblje pa tudi pred nevarnostjo se praviloma rešuje z nekaj kratkimi skoki v goščavo. V splošnem ji najbolj ustreza mozaičen preplet travnikov, pašnikov in njiv z majhnimi gozdički. V prejšnjem stoletju se je srnjad prilagodila tudi življenju na odprtih poljih (Kryštufek 1991).

Starostno strukturo srn, katerih ostanke smo izkopali na najdišču Hočevarica, smo ocenili s pomočjo ugotavljanja frekvence kosti s še nezraščenima epi- in diafizo ter z analiziranjem stopnje obrabe (pred)meljakov.

calcaneus from phase 2) are exceptionally rare. No burnt bones were discovered.

The roe deer is a small deer species which today inhabits the zone of mixed and deciduous forests of western Europe to south-eastern Siberia, western China and eastern Tibet (Kryštufek 1991). In Europe the oldest known fossil finds of the roe deer are from the Middle Pleistocene (Günz) and belong to the sub-species *C. capreolus suessenbornensis* Kahlke, 1956, which was somewhat larger than the recent European roe deer (buck). However, the fossil remains of the latter are frequent at many sites dating to the Late Pleistocene (Kurtén 1968; Guérin, Patou-Mathis 1996). Recent roe deer measure between 63 and 67 cm at their croup (where they are higher than at their withers). The maximum weight of the roebuck is 35 kg, and of the roe deer 30 kg (Kryštufek 1991).

Of all the various habitats, the roe deer prefers forests with dense undergrowth and shrubs. This animal is agile in such an environment and generally saves itself from danger with a few short leaps into the thicket. In general it finds a mosaic landscape of meadows, pastures and fields with small woods the most suitable. During the last century the roe deer has also adapted to life in open fields (Kryštufek 1991).

The age structure of the roe deer from Hočevarica site was estimated by determining the frequency of the

| SKELETNI ELEMENT<br>SKELETAL ELEMENT | ŠT. ZRAŠČENIH PRIMERKOV<br>N FUSED | ŠT. NEZRAŠČ. PRIMERKOV<br>N UNFUSED |
|---|---|---|
| scapula | 6 | – |
| humerus (proks.) | 1 | – |
| humerus (dist.) | 6 | – |
| radius (proks.) | 1 | – |
| radius (dist.) | 2 | – |
| ulna | 4 | 1 |
| ossa metacarpalia (proks.) | 8 | – |
| ossa metacarpalia (dist.) | 7 | 1 |
| phalanx I | 15 | 3 |
| phalanx II | 14 | – |
| phalanx III | 3 | – |
| ossa coxae | 2 | – |
| femur (proks.) | 1 | – |
| tibia (proks.) | – | 1 |
| tibia (dist.) | 3 | – |
| calcaneus | 3 | – |
| ossa tarsalia | 2 | – |
| ossa metatarsalia (proks.) | 5 | – |
| ossa metatarsalia (dist.) | 8 | 1 |
| **SKUPAJ / TOTAL** | **95** | **7 ( 6,8 % )** |

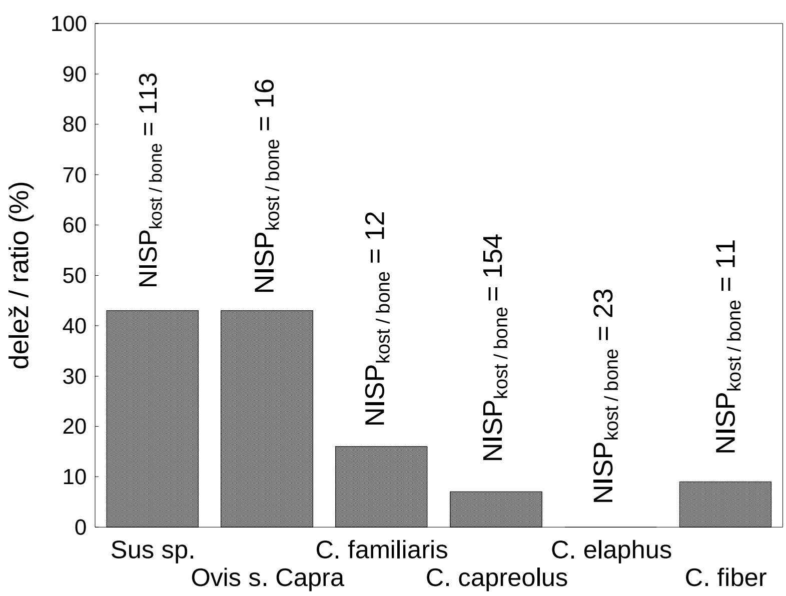
*Tab. 3.7.16:* Pogostnost ostankov z zraščenima ter tistih s (še) nezraščenima epi- in diafizo med izkopanimi kostmi srne (*Capreolus capreolus*).
*Table 3.7.16:* Number of remains with fused diaphyses, and those with (still) un-fused epi- and diaphyses among the excavated remains of roe deer (*Capreolus capreolus*).

Delež nezraščenih kosti je bil zelo nizek (pribl. 7 %; *tab. 3.7.16*), kar je sicer značilno tudi za druge lovne živali z istega najdišča (*sl. 3.7.7*). Povsem drugačno sliko pa kažejo ostanki domačih živali (domači prašič, ovce in koze), kjer je delež nezraščenih kosti kar 43 %. Zdi se torej, da pripadajo kosti in zobje prašičev, ovc in koz pretežno mladim osebkom, medtem ko je starostna struktura uplenjenih živali veliko enakomerneje porazdeljena preko celotnega življenjskega obdobja posamezne vrste. Dejstvo namreč je, da je starost živali ob zakolu praviloma izbiral človek sam, medtem ko je bila starost uplenjenih živali odvisna predvsem od lovskih spretnosti takratnih ljudi, delno pa tudi od naključja in sreče (Payne 1985; O'Connor 2000). Pri tem velja omeniti domnevo, da naj bi bila živinoreja v takratni skupnosti usmerjena predvsem v pridobivanje mesa (Bökönyi 1974), medtem ko pomen mleka in ovčjega runa (še) ni povsem poznan. Če torej upoštevamo, da je bilo pri domačih živalih razmerje med količino iztrženega (kvalitetnega) mesa in pa v (vz)rejo vloženega napora najugodneje ravno ob zaključku juvenilnega ali subadultnega obdobja, ne preseneča, da so večino prašičev, ovc in koz zaklali prav v tem starostnem obdobju. Od tod izhaja tudi zgoraj omenjeni razkorak v starostni strukturi domačih in lovnih živali.

Pri določanju starostne strukture srn z analizo obrabe zob smo se naslonili na komparativni material poznane starosti. Gre za postopek, ki se je v preteklosti že izkazal za relativno zanesljivega (Lowe 1967). Žal je precejšnja fragmentarnost ostankov iz našega vzorca onemogočala kaj več kot le uvrščanje posameznih najdb v zelo široko definirana starostna obdobja. Je pa po drugi strani tudi res, da smo ravno z ohlapnejšim določevanjem starosti zmanjšali moteč vpliv, ki bi ga na stopnjo obrabe zob (in s tem na oceno starosti) lahko imeli neenaka kvaliteta oziroma količina hrane ter različna

bones with yet unfused epi- and diaphyses and by analyzing the level of deterioration of the (pre)molars. The proportion of unfused bones was very low (approx. 7 %; *table 3.7.16*), which is also characteristic for other game animals from the same site (*fig. 3.7.7*). The remains of domestic animals (domestic pig, sheep and goats) present a completely different picture, where the proportion of unfused bones is 43 %. It appears therefore that the bones and teeth of the pigs, sheep and goats belong to mostly younger individuals, while the age structure of the hunted animals is more evenly distributed across the entire life span of the individual species. The point is that man chose at what age to slaughter his domestic animal, while the age of the hunted animal depended on his hunting abilities and partly also on chance and luck (Payne 1985; O'Connor 2000). Presumably the animal husbandry of the time was focused primarily on producing meat (Bökönyi 1974), while the importance of milk and sheep fleece is not (yet) well known. If taken into account that with domestic animals the ratio between the quantity of good quality meat and the effort in feeding them is most suitable at the end of the animal's juvenile or sub-adult period, it comes as no surprise that most of the pigs, sheep or goats were slaughtered at that age. This is also the reason for the difference in the age structure of domestic and game animals.

In determining the age structure of the roe deer by analyzing the teeth wear comparative material of known age was used. This procedure proved a relatively reliable one already in past research (Lowe 1967). Unfortunately the fragmentation level of our sample did not allow more than the categorizing of individual finds into broadly defined ages. On the other hand, this loose age determination reduces the effect that the quality and quantity of food, as well as the various intensities of mineralization of tooth enamel, would have on the level




*Sl. 3.7.7:* Delež kosti s še nezraščenima epi- in diafizo med vsemi izkopanimi kostmi tistih vrst, katerih število določenih kostnih fragmentov ($NISP_{kost}$) v vzorcu presega 10.

*Fig. 3.7.7:* Relative frequency of bones with un-fused epi- and diaphyses. Only taxa whose number of identified bone fragments ($NISP_{bone}$) exceeds 10 are included in the analysis.

intenzivnost mineralizacije zobne sklenine (Kierdorf, Becher 1997). Dobljeni rezultati so bili v splošnem skladni s sliko, ki jo je pokazala analiza pogostnosti še ne popolnoma osificiranih kosti v vzorcu. Ugotovili smo namreč razmeroma enakomerno zastopanost osebkov posameznih starostnih kategorij, z minimalno prevlado dvo- do štiriletnih osebkov. Sicer je bilo mogoče od vseh 195 srninih kostnih oziroma zobnih fragmentov iz vzorca natančn(ejš)o starost določiti le dvem: rogu iz faze 1, ki je domnevno pripadal enoletnemu srnjaku, ter spodnji čeljustnici z ohranjenim celotnim nizom meljakov iz faze 2. Slednja je pripadala živali, katere starost smo (na podlagi komaj izraščajočega $M_3$) določili na 10 do 11 mesecev (Habermehl 1961).

Vrednosti meritev srninih kosti in zob s Hočevarice so podani v *prilogi 3.7.4*. Primerjava sicer maloštevilnih (!) ostankov iz našega vzorca z ostanki s sočasnih avstrijskih najdišč z območja Mondseeja (Pucher in Engl 1997) ter z več eneolitskih in bronastodobnih najdišč na severu Italije (Riedel 1976; 1977; 1979) kaže na očitno podobnost v velikosti. Dimenzije fragmentov s Hočevarice so tudi znotraj variacijske širine recentnih srn s tega območja (Riedel 1976).

*Cervus elaphus* Linnaeus, 1758

Navadnemu (gozdnemu) jelenu smo skupno pripisali 38 (6,8 %) subfosilnih ostankov, od tega je 15 (39 %) zob. Celoten seznam najdenih fragmentov je podan v *tabeli 3.7.17*. Do neke mere preseneča dejstvo, da sta od dolgih kosti prisotna le po en fragment radiusa in tibie (skupaj torej samo osem odstotkov vseh kostnih najdb). Pri ostalih petih taksonih z NISP>30 pomenijo namreč fragmenti dolgih kosti od 15 (*C. capreolus*) pa tja do kar 63 (*C. fiber*) odstotkov kostnih ostankov (povpr. 40,9 %). V zvezi s tem je vendarle potrebno poudariti, da je majhno število jelenjih dolgih kosti v našem vzorcu lahko povsem naključno. Kosti v vzorcu so praviloma fragmentarne. Sledov urezov, zasekanin ali ugrizov nismo našli.

Navadni jelen je razširjen po listnatih in mešanih gozdovih palearktične Evrazije od Anglije do Daljnega vzhoda. Na jugu seže v severno Afriko, Malo Azijo in Kavkaz. Živi tudi v Severni Ameriki. Današnja razširjenost ni sklenjena, saj ga je človek na mnogih območjih iztrebil (Kryštufek 1991). Njegovi fosilni ostanki so v Evropi poznani že iz srednjega pleistocena, pogostejši pa postanejo v poznem pleistocenu (Guérin, Patou-Mathis 1996). Jelena najdemo predvsem v gozdovih, od nižin do gozdne meje. Najbolj mu ustrezajo stičišča gozdov in odprtih (obdelovalnih) površin. V Sloveniji živi največ jelenov v dinarskih bukovo-jelovih gozdovih in njihovih spremenjenih, zlasti zasmrečenih sestojih, v nižinskem vzhodnem delu države pa tudi v poplavnih gozdovih (Kryštufek 1991).

Recentne oblike *C. elaphus* kažejo veliko variabilnost v velikosti osebkov in moči rogovja. Jeleni so v Slo-

of teeth wear (and subsequently age determination) (Kierdorf, Becher 1997). The results correspond with the general picture attained from the analysis on the frequency of yet incompletely ossified bones in the sample. Determined was a relatively even presence of individuals of various age categories, with a minimal predomination of two- to four-year-old animals. However, from among all the 195 roe deer bones and tooth fragments from the sample a more accurate age evaluation could be established for only two: a horn from phase 1, which belonged to a year old roebuck, and a mandible with a full row of molars from phase 2. The latter belonged to an animal estimated to have been - on the basis of a freshly outgrown $M_3$ - 10 to 11 months old (Habermehl 1961).

The values of the measurements of roe deer bones and teeth from Hočevarica are shown in *appendix 3.7.4*. A comparison of the few (!) remains from our sample with the remains from sites in the Mondsee area (Pucher and Engl 1997) and several Eneolithic and Bronze Age sites in northern Italy (Riedel 1976; 1977; 1979) indicate evident similarities in sizes. The dimensions of the Hočevarica fragments are within the variation range of recent roe deer from this area (Riedel 1976).

*Cervus elaphus* Linnaeus, 1758

We attributed 38 (6.8%) of the sub-fossil remains to the red deer; 15 (39 %) of these are teeth. The entire list of fragments is shown in *table 3.7.17*. To some extent, the fact that of the long bones only one fragment of a radius and one of a tibia (altogether 8 % of all the bone finds) were present is somewhat surprising. In the other five taxa with a NISP >30 the long bone fragments constitute between 15 (*C. capreolus*) and up to 63 (*C. fiber*) % of the bone fragments (av. 40.9 %). It is of course also possible, that the low number of red deer long bones in our sample is coincidental. The bones in the sample are in general fragmented. There were no traces of cut marks, chop marks or gnawing marks.

The red deer inhabits deciduous and mixed forests of Palearctic Eurasia, from Britain to the Far East. Southwards its habitat extends to North Africa, Asia Minor and the Caucasus. It also lives in North America. Nowadays its habitat is intermittent, as mankind has exterminated it in many regions (Kryštufek 1991). Its fossil remains in Europe are known from the Middle Pleistocene; however, they become more frequent in the Late Pleistocene (Guérin, Patou-Mathis 1996). Red deer will be found mainly in forests, from the lowlands to the timber line. It prefers the borderline between the forest and open (cultivated) areas. In Slovenia red deer is most frequent in the Dinaric beech-fir forests and the changed, mainly spruce stands. In the lowlands in the eastern part of the country it lives in flooded forests (Kryštufek 1991).

Recent forms of *C. elaphus* show great variability in size and the strength of their horns. The red deer in

| | FAZA 1 | FAZA 1 / FAZA 2 | FAZA 2 | Σ |
|---|---|---|---|---|
| rog / antler | -- | 1 | -- | 1 |
| mandibula | 3 | 1 | -- | 4 |
| dentes | 9 | 3 | 3 | 15 |
| epistropheus | 1 | -- | -- | 1 |
| scapula | 1 | -- | -- | 1 |
| radius (dist.) | 1 | -- | -- | 1 |
| phalanx I | 1 | -- | -- | 1 |
| phalanx II | 2 | -- | 1 | 3 |
| phalanx III | 1 | 1 | -- | 2 |
| os coxae | 1 | -- | -- | 1 |
| tibia (proks.) | 1 | -- | -- | 1 |
| astragalus | -- | 1 | -- | 1 |
| ossa tarsalia | 1 | -- | -- | 1 |
| ossa metatarsalia (d.) | 1 | -- | -- | 1 |
| metapodia (indef.) | 1 | 3 | -- | 4 |

*Tab. 3.7.17:* Frekvence zastopanosti posameznih skeletnih elementov jelena (*Cervus elaphus*) po naselbinskih fazah.
*Table 3.7.17:* Frequency of individual skeletal remains of red deer (*Cervus elaphus*) per settlement phase.

veniji v plečih visoki do slab poldrugi meter, tehtajo pa do 250 kg (samci) oziroma 150 kg (samice) ter jih tako kot srednje velike do velike osebke pripisujemo k podvrsti *C. elaphus hippelaphus* Erxleben, 1777 (Kryštufek 1991). Dimenzije kostnih ostankov s Hočevarice so podane v *prilogi 3.7.5*. V splošnem se ujemajo z dimenzijami izkopanih jelenjih ostankov s približno sočasnih najdišč severne Italije (Riedel 1976; 1977; 1979) ter z območja Mondseeja v Avstriji (Pucher, Engl 1997).

Starostna struktura osebkov, katerih ostanki so zajeti v obravnavanem vzorcu s Hočevarice, je dokaj podobna tisti, opisani pri srni. Med skupno 23 kostnimi fragmenti ni bilo nobenega, ki bi še ne imel zraščene epi- in diafize, kar kaže na prevlado odraslih osebkov. Na obrabi zob temelječo oceno starosti smo dobili s primerjanjem subfosilnega materiala na eni strani z recentnim materialom poznane starosti na drugi strani. Gre za pogosto uporabljeno metodo, ki se je izkazala za dovolj zanesljivo (Lowe 1967). Kljub sicer majhnemu številu primernih ostankov (n = 10), nobena starostna skupina ni bila očitno bolje ali slabše zastopana (*tab. 3.7.18*). Za kontrolo smo uporabili metodo ugotavljanja starosti na podlagi višine krone $M_1$ po navodilih Kleina in sodelavcev (1981), vendar se omenjeni pristop v na-

*Tab. 3.7.18:* Ocena obrabljenosti izkopanih (pred)meljakov jelena (*Cervus elaphus*). Legenda: 0 – zob brez sledi obrabe, + + + + + – ekstremno obrabljen zob.
*Table 3.7.18:* Assessed stage of wear of excavated red deer (*Cervus elaphus*) (pre)molars. Legend: 0 – unworn tooth, + + + + + – extremely worn tooth.

Slovenia reach up to one-and-a-half meters at the withers and weigh up to 250 kg (males) and 150 kg (females), thus being classified as the sub-species *C. elaphus hippelaphus* Erxleben, 1777 (Kryštufek 1991). The dimensions of the bone remains from Hočevarica are shown in the *appendix 3.7.5*. In general they correspond to the excavated remains from approximately same period sites in northern Italy (Riedel 1976; 1977; 1979) and in the Mondsee area in Austria (Pucher, Engl 1997).

The age structure of the individuals whose remains are included in the Hočevarica sample is very similar to that described for the roe deer. Of the total number of 23 bone fragments none were without a fully fused epi- and diaphysis, which indicates a majority of adult individuals. An evaluation of the age at death was made, based on tooth wear, by comparing the sub-fossil material with recent material of known age. This is a frequently used method and it proved adequately reliable (Lowe 1967). Despite the low number of suitable remains (n = 10), none of the age groups was visibly more or less represented (*table 3.7.18*). Following instructions from Klein and colleagues (1981), the method of age determination according to the height of the $M_1$ was used as

| ZOB TOOTH | STOPNJA OBRABE WEAR STAGE |
|---|---|
| $P^3$ | + + |
| $P^3$ | + + + + |
| $P^4$ | + + + + + |
| $M^2$ | + + |
| $M^2$ | + + + + + |
| $M^2$ | + + + + + |
| $M^3$ | + + |
| $P_4$ | + |
| $P_4$ | + + + |
| $P_4$ – $M_3$ | + + + |

šem primeru ni izkazal za zanesljivega. Vzroki domnevno tičijo tako v pomanjkanju podatkov o višini (m, SD) še neobrabljenega $M_1$ eneolitskih jelenov iz osrednje Slovenije kot tudi v skromnosti vzorca s Hočevarice, zaradi česar je lahko specifičnost posameznega osebka preveč izražena.

*Castor fiber* Linnaeus 1758

Evropski bober je bil v vzorcu s Hočevarice zastopan s skupno 30 (5,4 %) ostanki, med katerimi je bilo kar 19 (63 %) zob. Navedene kosti in zobje so omejeni na fazo 1 ter na plast, kjer je material obeh faz premešan, medtem ko jih v fazi 2 nismo našli (*tab. 3.7.19*). Sledov urezov, zasekanin ali ugrizov nismo opazili. Fragmentarnost kosti je nekoliko manj izrazita, saj sta v vzorcu vključena tudi nepoškodovana clavicula (?) in metatarsus.

a control; but in our case this approach proved unreliable. The reasons for this probably lie in the lack of data on the height (m, SD) of the yet unworn $M_1$ of Eneolithic red deer from central Slovenia, as well as the too limited sample from Hočevarica, which could lead to specific features of one individual being overly expressed.

*Castor fiber* Linnaeus 1758

The European beaver in the Hočevarica sample was represented with a total of 30 (5.4 %) remains, of which 19 (63 %) were teeth. These bones and teeth are limited to phase 1 and the layer in which the material from both the phases is mixed. No such remains were found in phase 2 (*table 3.7.19*); nor were there any traces of cut marks, chop marks or gnawing marks. Fragmentation of the bones is somewhat lower. The sample includes an undamaged clavicle and metatarsus.

| | **FAZA 1** | **FAZA 1 / FAZA 2** | **FAZA 2** | **Σ** |
|---|---|---|---|---|
| dentes | 7 | 12 | -- | 19 |
| clavicula (?) | -- | 1 | -- | 1 |
| radius (dist.) | -- | 1 | -- | 1 |
| os coxae | 1 | -- | -- | 1 |
| femur (proks.) | 1 | -- | -- | 1 |
| tibia (dist.) | -- | 4 | -- | 4 |
| calcaneus | 1 | -- | -- | 1 |
| ossa metatarsalia | 2 | -- | -- | 2 |

*Tab. 3.7.19:* Frekvence zastopanosti posameznih skeletnih elementov bobra (*Castor fiber*) po naselbinskih fazah.
*Table 3.7.19:* Frequency of individual skeletal remains of beaver (*Castor fiber*) per settlement phase.

Prvotno je bober živel v gozdnatih območjih celotne palearktične Evrazije, njegov današnji areal razširjenosti pa je, zaradi obsežnega lova ter človekovih posegov v prostor, zelo skrčen. Avtohtone populacije so prisotne le še v nekaterih predelih Skandinavije (še posebej Norveške), vzdolž Rhône in Elbe, ponekod v vzhodni Evropi ter preko Sibirije do Mongolije. V tem stoletju so ga marsikje ponovno uspešno naselili (npr. Švica, Nemčija, nekdanja Češkoslovaška, Poljska idr.). Za razliko od ostalih glodalcev so fosilni ostanki bobra pogosti, kar povezujemo z njegovim načinom življenja in pa samo velikostjo. Najstarejši bobrovi ostanki izhajajo iz oligocena, prisotni in relativno pogosti pa so skozi celoten pleistocen. Vse pleistocenske ostanke rodu *Castor* iz Evrope gre pripisati recentni vrsti *C. fiber* (Kurtén 1968; Kryštufek 1991).

Bobre najdemo samo ob vodah, ki so gosto obrasle z vrbami, topoli, jelšami in brezami. Hranijo se z lubjem, poganjki, vejicami, koreninami in listjem teh drevesnih vrst. Poznano je, da v potokih gradijo jezove ter s tem vzdržujejo želeno višino vodne gladine nastalih jezer(c). Ta morajo biti dovolj globoka, da voda pozimi ne zmrzne do dna, saj imajo bobri tam zalogo vej. Domovanje (bobrišče), ki je narejeno iz vej, je blizu jezu,

The beaver originally lived in the forested areas throughout the entire Palearctic Eurasia. Nowadays its habitat is considerably smaller, due to extensive hunting and the human impact on the environment. Autochthonous populations are present only in Scandinavia (especially Norway), along the Rhine and Elbe rivers, in select locations in Eastern Europe and further to the East from Siberia to Mongolia. During the past century some success was achieved in repopulating the beaver (e.g. Switzerland, Germany, former Czechoslovakia, Poland, and some others). Unlike other rodents, the beaver's fossil remains are relatively frequent, which we attribute to its lifestyle and its size. The oldest beaver remains originate from the Oligocene and they are present and relatively frequent through the entire period of the Pleistocene. All the Pleistocene remains of the *Castor* genus from Europe are attributed to the recent species *C. fiber* (Kurtén 1968; Kryštufek 1991).

Beavers are found only near waters densely overgrown with willow, poplar, alder and birch. They feed on the bark, shoots, twigs, roots and leaves of these tree species. It is well known that they build dams to maintain the desired water level of thus created little lakes. These lakes must be deep enough that during winter the na kakem otoku ali pa na bregu. Včasih izkopljejo rov v rečni breg (Whitfield 1996).

*Castor fiber* je največji evropski glodalec. Dolžina telesa z glavo znaša približno 80 cm, rep meri dodatnih 32 cm. Masa živali lahko doseže tudi 30 kg (Kurtén 1968). Dimenzije kostnih ostankov s Hočevarice (*priloga 3.7.6*) so znotraj variacijske širine za bobre s poznoeneolitskih najdišč pri Igu na Ljubljanskem barju (Rakovec 1958), hkrati pa znatno prekašajo subfosilne (ter tudi recentne) primerke iz Nemčije (Wiesel 1929 po Rakovec 1958).

Čeprav sledov urezov na fragmentih s Hočevarice nismo zasledili, domnevamo, da so bobre lovili predvsem zaradi kožuha in da je imelo meso šele drugoten pomen. Tako hipotezo so na podlagi analize (lokacija in pogostnost) sledov urezov na bobrovih kosteh postavili za prazgodovinske skupnosti več neolitskih najdišč (npr. Swifterbant in Hazendok na Nizozemskem; Zeiler 1987). Tudi starostna struktura osebkov, katerih ostanki so zajeti v našem vzorcu, bi lahko kazala na tovrstno vlogo bobrov. Večji del kostnih fragmentov s Hočevarice ima namreč zraščene epi- in diafize, kar govori o prevladi adultnih osebkov. Edino izjemo predstavlja nezraščen distalni del radiusa, kjer pa se osifikacija zaključi šele po dopolnitvi tretjega leta življenja (Iregen, Stenflo 1982). Podobno starostno strukturo kažejo tudi številni bobrovi ostanki z zgoraj omenjenega neolitskega najdišča Swifterbant (pribl. 3300–3200 pr. Kr.), kjer so prav tako prevladovali osebki nad poldrugim letom starosti (Zeiler 1987).

*Vulpes vulpes* (Linnaeus, 1758)

Lisici smo pripisali 11 (2 %) najdb (*tab. 3.7.1* in *3.7.20*), zob je bilo 6 (54 %). Vse kosti so imele zraščene epi- in diafize, kar kaže na prevlado adultnih osebkov. Sledov zasekanin, urezov ali ugrizov nismo zasledili. Prav tako ni noben fragment ožgan. Izmerjene dimenzije so podane v *prilogi 3.7.7*.

Lisica je zelo prilagodljiva vrsta, ki je razširjena v večjem delu Evrazije in Severne Amerike (do 30 ° SGŠ). Človek jo je naselil tudi v Avstralijo. Poseljuje tako gozdove kot tudi obdelovalne površine in suburbano okolje,

*Tab. 3.7.20:* Frekvence zastopanosti posameznih skeletnih elementov lisice (*Vulpes vulpes*) po naselbinskih fazah.
*Table 3.7.20:* Frequency of individual skeletal remains of fox (*Vulpes vulpes*) per settlement phase.

water does not freeze to the bottom, where the beaver keeps his stock of branches. Its dwelling (beaver lodge), is constructed of branches, and located near the dam, on an island or by the shore. They sometimes dig out a tunnel into the riverbank (Whitfield 1996).

*Castor fiber* is the largest European rodent. Its length, including the head, is about 80 cm and the tail measures another 32 cm. It can reach a weight of up to 30 kg (Kurtén 1968). The dimensions of the bone remains from Hočevarica (*appendix 3.7.6*) are within the variation range for beavers from late Eneolithic sites at Ig in the Ljubljansko barje (Rakovec 1958), and considerably larger than sub-fossil (and also recent) specimens from Germany (Wiesel 1929; cf. Rakovec 1958).

Although no cuts were found on the fragments from Hočevarica, we presume that the beaver was hunted mainly for its fur and that its meat was of secondary importance. This hypothesis is based on an analysis (location and frequency) of cut marks on beaver bones from prehistoric communities from several Neolithic sites (e.g. Swifterbant and Hazendok in Holland; Zeiler 1987). The age structure of the beavers whose remains are included in our sample also substantiates this type of role. The majority of the bone fragments from Hočevarica have fused epi- and diaphyses, which indicates a predominance of adult individuals. The only exception is not yet fused distal part of a radius, where ossification is not complete until the animal's third year of age (Iregen, Stenflo 1982). A similar age structure was attained from the many beaver remains from the above mentioned Neolithic site at Swifterbant (approx. 3300–3200 B.C.), where over a year-and-a-half-old individuals predominated (Zeiler 1987).

*Vulpes vulpes* (Linnaeus, 1758)

Fox remains consisted of 11 (2 %) finds (*tables 3.7.1* and *3.7.20*), of which 6 (54 %) were teeth. All the bones had fused epi- and diaphyses, which indicates a predominance of adult individuals. No chop marks or gnawing marks were discerned. None of the fragments were burnt. The measured dimensions are presented in the *appendix 3.7.7*.

The fox is a very adaptable species, widespread in most of Eurasia and North America (up to 30 ° northern latitude). Mankind also spread fox to Australia. It inhabits forests, cultivated areas and the suburban environment, and prefers a mosaic landscape of woods and open terrain (Kryštufek 1991). The oldest fossil finds in

| | FAZA 1 | FAZA 1 / FAZA 2 | FAZA 2 | Σ |
|---|---|---|---|---|
| dentes | 2 | 2 | 2 | 6 |
| ulna | -- | 2 | -- | 2 |
| phalanx I | -- | 1 | -- | 1 |
| tibia (dist.) | 1 | -- | -- | 1 |
| metapodia (indef.) | -- | -- | 1 | 1 |

najbolj pa ji ustreza mozaičen preplet gozdičev in odprtega terena (Kryštufek 1991). Najstarejše fosilne najdbe v Evropi izvirajo iz interglaciala mindel-riss (Kurtén 1968).

*Meles meles* (Linnaeus, 1758)

Jazbec je bil v vzorcu zastopan z osmimi ostanki kosti in enim zobom (tj. skupaj 1,6 % NISP). Zanimivo je, da sta bila oba primerka dolgih kosti (tj. radius in tibia), kljub njuni relativni majhnosti, fragmentarna (*tab. 3.7.21*). Odsotnost nezraščenih kosti kaže na prevlado adultnih osebkov. Sledov urezov, zasekanin in ugrizov nismo našli.

| | FAZA 1 | FAZA 1 / FAZA 2 | FAZA 2 | Σ |
|---|---|---|---|---|
| dentes | -- | -- | 1 | 1 |
| radius (dist.) | -- | -- | 1 | 1 |
| ossa metacarpalia | 1 | -- | -- | 1 |
| phalanx I | 1 | -- | 3 | 4 |
| phalanx II | 1 | -- | -- | 1 |
| tibia (proks.) | -- | -- | 1 | 1 |

*Tab. 3.7.21:* Frekvence zastopanosti posameznih skeletnih elementov jazbeca (*Meles meles*) po naselbinskih fazah.
*Table 3.7.21:* Frequency of individual skeletal remains of badger (*Meles meles*) per settlement phase.

Jazbec je naša največja kuna, ki poseljuje gozdnata in stepska območja celotne palearktične Evrazije. Na izbiro habitata vplivata pokrovnost terena in kvaliteta zemlje. Potrebuje suho, odcejeno zemljo, v katero si lahko skoplje podzemno domovanje. Najpogosteje ga srečamo v mešanih gozdovih. V Sloveniji mu ustrezajo suhi in topli gozdovi preddinarskega sveta, medtem ko ga v grmiščih in na odprtih predelih srečamo redkeje (Kryštufek 1991). Fosilni ostanki so v Evropi poznani iz začetka srednjega pleistocena (Kurtén 1968).

*Ursus arctos* Linnaeus, 1758

Rjavemu medvedu smo pripisali metacarpus, phalanx I in pa vertebrus (indef.) iz faze 1. Vse tri najdbe so bile ohranjene v celoti. Nekatere dimenzije metacarpusa so podane v *prilogi 3.7.8*. Opazili nismo nikakršnih sledov urezov, zasekanin ali ugrizov.

Rjavi medved je največja evropska zver. Prvotno je poseljeval celotno Evropo, Malo Azijo, gozdnata območja Azije ter tudi velik del Severne Amerike in gorovje Atlas v severni Afriki. Danes je človek medveda v precejšnjem delu areala iztrebil. Sicer pa poseljuje listnate, iglaste in mešane gozdove v nižinah in v gorah. Proti severu seže celo v tundro (Kryštufek 1991). Najstarejši fosilni ostanki so poznani iz Kitajske, in sicer iz mindla (Kurtén 1968).

*Lutra lutra* (Linnaeus, 1758)

Vidra je bila v vzorcu s Hočevarice zastopana s tremi najdbami: mandibula, atlas in epistropheus (vsi faza



Europe are from the Mindel-Riss interglacial (Kurtén 1968).

*Meles meles* (Linnaeus, 1758)

The badger was represented with eight bones and one tooth (i.e. total 1.6 % NISP). Interestingly, both the long bone specimens (i.e. radius and tibia) were fragmented despite their relatively small size (*table 3.7.21*). The absence of unfused epiphysis indicates a prevalence of older individuals. No traces of cuts, chop marks or gnawing marks were discerned.

The badger inhabits forested and stepped areas of the entire Palearctic Eurasia. Its choice of habitat is influenced by the configuration of the terrain and the quality of the soil. The badger needs dry and drained land into which it can dig its underground dwelling. Most often it lives in mixed forests. In Slovenia it prefers the dry and warm forests of the pre-Dinaric regions, and is seldom found in shrubs or open areas (Kryštufek 1991). Its fossil remains in Europe are known from the beginning of the Middle Pleistocene (Kurtén 1968).

*Ursus arctos* Linnaeus, 1758

One metacarpus, one phalanx I and a vertebra (indef.) from phase1 were all attributed to the brown bear. All the three finds were fully preserved. Some of the dimensions of the metacarpus are presented in *appendix 3.7.8*. No traces of cuts, cut marks or gnawing marks were found.

The brown bear is Europe's largest carnivore. Originally it inhabited all of Europe, Asia Minor, the forested areas of Asia and also a large part of North America and the Atlas mountains of northern Africa. Today it holds true that humans have exterminated the bear throughout a large part of his living area. Bears inhabit deciduous, coniferous and mixed forests in the lowlands and in the mountains. To the north its habitat extends to the tundra zone (Kryštufek 1991). The oldest fossil remains were found in China, dating to the Mindel (Kurtén 1968).

*Lutra lutra* (Linnaeus, 1758)

The Hočevarica sample comprised of three finds

1). Meritve so podane v *prilogi 3.7.9*. Prisotnost $M_1$ in obraba niza $P_3$–$M_1$ kaže, da je mandibula pripadala vsaj dvoletnemu osebku (Zeiler 1988). Tako kot to velja za bobre, so tudi vidre verjetno primarno lovili zaradi krzna (Zeiler 1987).

Vidra poseljuje celotno palearktično območje razen sibirske tundre in Arabskega polotoka. V Evropi, kjer je bila splošno razširjena, jo je človek marsikje lokalno iztrebil. Vidre živijo v rekah, potokih in jezerih (Kryštufek 1991).

*Felis sylvestris* Schreber, 1777

Divji mački smo pripisali dva fragmenta (os maxillare in scapula). Ločevanje med divjo in domačo mačko *Felis catus* Linnaeus, 1758, je načeloma zelo težavno, vendar je v našem primeru determinacijo omogočalo dejstvo, da domače mačke v eneolitiku še niso poznali (Bökönyi 1974). Nekatere dimenzije, nanašajoče se na scapulo, so podane v *prilogi 3.7.10*. V okviru zgornje čeljustnice so bili prisotni tudi $C^1$ ter $P^3$–$P^4$, ki niso kazali očitnih znakov obrabe. Zdi se torej, da žival ni bila (pretirano) stara.

Divjo mačko najdemo v mešanih gozdovih, savanah in stepah od zahodne Evrope do Kitajske. Živi tudi v večjem delu Afrike. V Sloveniji je najpogostejša v gozdovih na zakraselih tleh s številnimi razpokami in votlinami, v katerih se lahko skriva. Drugod poseljuje tudi



of the Eurasian otter: a mandible, an atlas and an epistropheus (all from phase 1). Measurements are presented in *appendix 3.7.9*. The presence of an $M_1$ and the deterioration of the row $P_3$–$M_1$ indicate that the mandible belonged to a two-year-old individual (Zeiler 1988). As in the case of the beaver, the otter was also probably hunted primarily for its fur (Zeiler 1987).

The otter inhabits the entire Palearctic area except the Siberian tundra and the Arabian Peninsula. In Europe, where it was generally widespread, mankind has exterminated it in many areas. Otters live in rivers, streams and lakes (Kryštufek 1991).

*Felis sylvestris* Schreber, 1777

Two fragments (a maxilla and a scapula) are attributed to the wildcat. Distinguishing between the wildcat and domestic cat *Felis catus* Linnaeus, 1758, is generally very difficult; but in our case this determination was alleviated, because the domestic cat was yet unknown during the Eneolithic (Bökönyi 1974). Some of the dimensions referring to the scapula are presented in *appendix 3.7.10*. The $C^1$ and $P^3$–$P^4$ were present in the maxilla and no notable signs of wear were discerned. It appears that the animal was not (very) old.

The wildcat lives in the deciduous forests, savannas and steppes ranging from Western Europe to China. It also lives throughout a major part of Africa. In

| *indet. species* | FAZA 1 | FAZA 1 / FAZA 2 | FAZA 2 | Σ |
|---|---|---|---|---|
| cranium | 39 | 33 | 13 | 85 |
| os maxillare | 2 | 1 | -- | 3 |
| mandibula | 6 | 13 | 2 | 21 |
| dentes | 6 | 24 | 3 | 33 |
| vertebrae | 55 | 19 | -- | 74 |
| scapula | 6 | 3 | 1 | 10 |
| costae | 68 | 96 | 12 | 176 |
| radius | 1 | 2 | -- | 3 |
| ulna | 1 | 1 | 1 | 3 |
| ossa carpalia | 2 | -- | 2 | 4 |
| ossa metacarpalia | -- | 1 | -- | 1 |
| phalanx I – III | 5 | 1 | 1 | 7 |
| ossa sesamoidea | 1 | -- | 1 | 2 |
| ossa coxae | 3 | 1 | -- | 4 |
| femur | 3 | -- | 2 | 5 |
| tibia | 3 | -- | -- | 3 |
| fibula | -- | 1 | -- | 1 |
| ossa tarsalia | 1 | -- | -- | 1 |
| astragalus | 1 | -- | -- | 1 |
| calcaneus | 2 | -- | -- | 2 |
| metapodia | 9 | 8 | 4 | 21 |
| indet. fragment | 604 | 164 | 352 | 1.120 |
| **SKUPAJ / TOTAL** | **818** | **368** | **394** | **1580** |

*Tab. 3.7.22:* Frekvence zastopanosti posameznih skeletnih elementov, ki jih (vsaj) do nivoja rodu ni bilo mogoče določiti.
*Table 3.7.22:* Frequency of individual skeletal remains of undetermined (at least to the level of genus) large mammals.

| ELEMENT | SLEDI UGRIZOV GNAWING MARKS | SLEDI UREZOV CUT MARKS | ZASEKANINE CHOP MARKS | OŽGANI FRAGM. BURNED |
|---|---|---|---|---|
| cranium | – | – | – | 1 |
| dentes | – | – | – | 2 |
| vertebrae | – | 1 | – | – |
| costae | – | – | – | 1 |
| radius (dist) | – | 1 | – | – |
| ossa metacar. (diaf.) | 1 | – | – | – |
| tibia | – | – | – | 3 |
| calcaneus | 1 | – | – | – |
| metapodia (dist.) | 1 | – | – | – |
| indet. fragment | 33 | 4 | 3 | 160 |
| **SKUPAJ / TOTAL** | **35** | **6** | **3** | **167** |

*Tab. 3.7.23:* Nedoločljivi izkopani ostanki, na katerih so bili opaženi sledovi urezov ali zasekanin oz. je bil(a) kost/zob obgrizen(a) ali ožgan(a).
*Table 3.7.23:* Number of unidentified excavated remains showing cut, chop or gnawing marks and number of burned bones.

stare sestoje ob velikih nižinskih rekah ali pa gozdne stepe (Kryštufek 1991).

indet. species

Izmed vseh izkopanih subfosilnih živalskih ostankov sesalcev jih 2181 (tj. 79,6 %) nismo uspeli določiti niti do nivoja rodu. Seznam najdb s pripadajočimi frekvencami pojavljanj je podan v *tabeli 3.7.22*. V skladu s pričakovanji pripada največji delež ostankov tistim skeletnim elementom, ki jih bodisi nismo niti poskušali determinirati (rebra in vretenca) bodisi njihova določitev zaradi ekstremne fragmentarnosti navadno ni bila mogoča (tj. lobanja). Deleži ostalih skeletnih elementov so med seboj primerljivi. Frekvence pojavljanj sicer redkih sledov urezov, zasekanin in ugrizov so podane v *tabeli 3.7.23*. Veliko več je ožganih kosti (skupaj 167), med katerimi smo našli tudi kalcinirane primerke. Velikost ožganih fragmentov je praviloma majhna; kalcinirani primerki le izjemoma presegajo 1,5 cm. Pri približno petih odstotkih (tj. 109) kostnih fragmentov epi- in diafize niso zraščene.

### **3.7.3** RAZPRAVA

Paleontološki vzorci, pri katerih bi razmerje v številu posameznih skeletnih elementov vsaj približno ustrezalo anatomskim pričakovanjem, so izjemno redki. Na kostni material namreč deluje množina (a)biotskih predin poodložitvenih dejavnikov, kot so npr. fizikalno in kemično razpadanje, selektivni transport, človekovo klanje in kosanje živali, aktivnost psov in drugih zveri idr. Opredelitev vloge posameznega dejavnika izmed navedenih je zelo pomembna, a hkrati tudi dokaj problematična komponenta vsake tafonomske analize, saj se pri tem srečujemo s posledicami delovanja velikega števila prepletajočih se dejavnikov (Klein 1989).

Slovenia it is most frequent in forests on karstic soil, where there are numerous crevices and caves in which it can hide. Elsewhere it also inhabits old stands along major lowland rivers or forest steppes. (Kryštufek 1991).

indet. species

A total of 2181 (i.e. 79.6 %) of all the sub-fossil animal remains of mammals were not determinable, not even to the level of genus. A list of finds with their corresponding frequencies is presented in *table 3.7.22*. As expected, most of the finds belong to those skeletal elements which were either excluded from the determination process altogether (ribs and vertebrae), or their determination was impossible due to their excessive fragmentation (i.e. skulls). The proportions of the remaining skeletal elements were comparable. The frequencies of otherwise rare traces of cuts, chop marks or gnawing marks are presented in *table 3.7.23*. There were many more burnt bones (a total of 167), among which we also found calcined specimens. The burnt fragments are generally small in size; calcined specimens only exceptionally exceed 1.5 cm. Approximately five % (i.e. 109) of the bone fragments have epi- and diaphyses that are not yet fused.

### **3.7.3** DISCUSSION

Palaeontological samples in which the ratio in the number of individual skeletal elements would at least approximately correspond to anatomical expectations are extremely rare. A host of (a)biotic pre- and post-depositional factors, for example physical and chemical degradation, selective transport, human slaughtering and chopping of the animal, activities of dogs and other beasts, etc. affect the bone material. Determining the role of each individual factor is a very important, but also a fairly problematic component of any taphonomic analysis, since we

Pri vzorcu s Hočevarice so se omenjenim, splošno prisotnim težavam pridružile še omejitve, povezane s skromnim številom najdb. (Pre)majhen vzorec namreč do neke mere zmanjša zanesljivost uporabljenih statističnih metod. Poleg tega velja ponoviti, da površina sondažnega polja ne predstavlja niti 0,1 odstotek domnevne površine celotnega najdišča. V luči navedenega se velja tako pri interpretaciji rezultatov vsekakor zavedati njihove vsaj do neke mere vprašljive reprezentativnosti.

Za nekdanjega človeka posamezni telesni deli uplenjene živali seveda niso imeli enake vrednosti, kar je bila posledica razlik v kvaliteti, predvsem pa količini pripadajočega mesa. Pri analizi *post mortem* dejavnikov, ki so (so)oblikovali obravnavani vzorec, smo tako najprej ugotavljali relativno frekvenco različnih skeletnih elementov oziroma telesnih delov. Slednje smo opredelili na naslednji način: rog, glava (vključuje cranium, os maksillare in mandibulo), okolčje (ossa coxae), zgornji del prednjih nog (scapula, humerus, radius, ulna), spodnji del prednjih nog (ossa carpalia, ossa metacarpalia), zgornji del zadnjih nog (femur, patella, tibia, fibula), spodnji del zadnjih nog (astragalus, calcaneus, ossa metatarsalia) ter stopala in prsti (phalanges I–III). V literaturi sicer pogosto omenjena predela vratu (os hyoides, atlas, epistropheus, vertebrae cervicales) in hrbta (vertebrae thoracicae in lumbales ter costae) v našo analizo nismo vključili. Z izjemo atlasa in epistropheusa namreč navedenih skeletnih elementov sploh nismo določevali, zaradi česar bi bila deleža obeh omenjenih telesnih delov (tj. vrat in hrbet) seveda močno podcenjena.

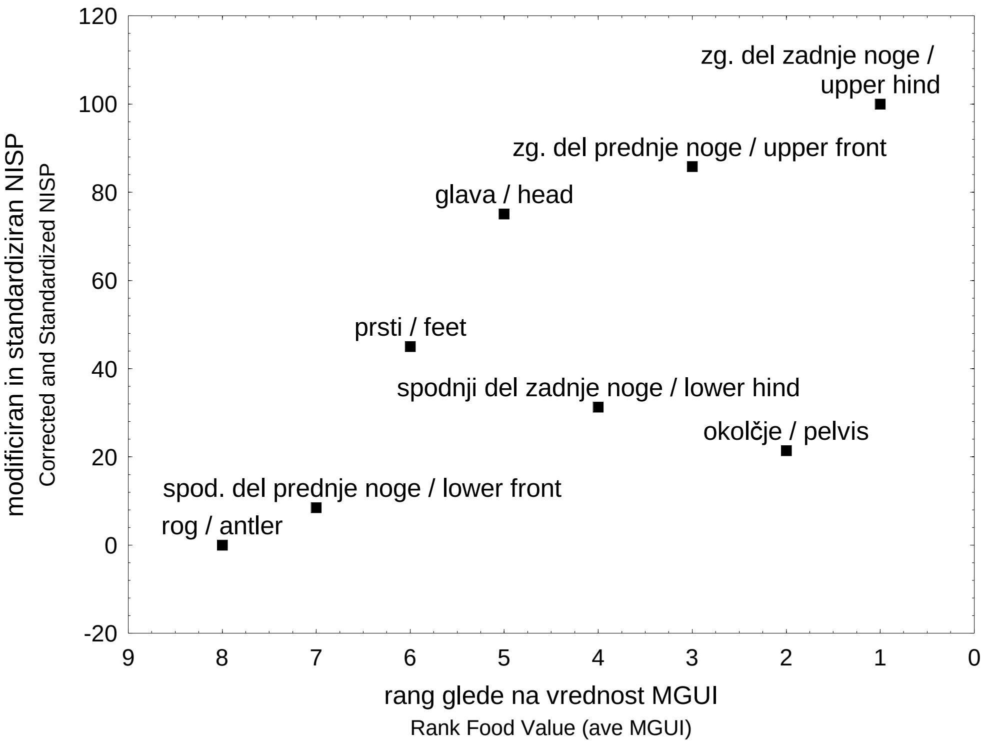
Pri analizi relativne frekvence različnih zgoraj opredeljenih telesnih delov smo se osredotočili predvsem na kvantitativne razlike med njimi. V ta namen smo uporabili nekoliko modificiran Binfordov MGUI-indeks, kot ga predstavlja Miracle (2002). Omenjeni indeks ima sicer nekaj očitnih šibkih točk (Chase 1985). Te so v veliki meri vezane na dejstvo, da je njegov avtor za posamezno človeško skupnost specifične spremenljivke (kot npr. pomen mesa, kostnega mozga ali kože posamezne živali za izbrano skupnost) obravnaval kot konstante – eno samo vrednost, dobljeno ob proučevanju Nunamiut Eskimov. Da bi se omenjenim slabostim vsaj delno ognili, v okviru naše analize nismo uporabili MGUI-vrednosti neposredno, temveč smo na njihovi podlagi le rangirali posamezne telesne dele. Tako smo npr. zgornjem delu zadnje noge, ki ima največjo povprečno MGUI-vrednost, dodelili rang ena, predelu okolčja z drugo največjo povprečno MGUI-vrednostjo rang dva itd. Odnos med rangi povprečnih MGUI-vrednosti posameznih delov živalskega telesa na eni strani in njihovo relativno frekvenco v vzorcu (upoštevajoč z MAU-indeksom ocenjeno pogostnost ostankov ustreznih skeletnih elementov) na drugi strani je prikazan na *slikah 3.7.8* in *3.7.9*. Očitno je, da oba grafična prikaza do neke mere nakazujeta

are confronted with the consequences of the effect of a myriad of interacting factors (Klein 1989).

In addition to the above mentioned range of general difficulties encountered upon with the Hočevarica sample were also the limitations presented by such a small number of finds. To some extent a (too) small sample lowers the reliability of the employed statistical methods. Furthermore, the trench area does not cover even 0.1 percent of the suspected area of the entire site. In light of this, it cannot be underemphasized that the representativeness of the sample is, at least to some extent, questionable as concerns the interpretation of results.

Because of the differences in quality, and even more so in the quantity of accompanying meat, individual body parts of the captured animals did not have an equal value to ancient man. In the analysis of *post mortem* factors, which contributed in shaping the sample in question, we therefore first determined the relative frequency of the various skeletal elements or body parts. The latter were categorized as follows: horn, head (which includes the cranium, maxilla and mandible), hipbones (ossa coxae), upper part of the front legs (scapula, humerus, radius, ulna), lower part of the front legs (ossa carpalia, ossa metacarpalia), upper part of the hind legs (femur, patella, tibia, fibula), lower part of the hind legs (astragalus, calcaneus, ossa metatarsalia) and fingers (phalanges I–III). The neck parts (os hyoides, atlas, epistropheus, vertebrae cervicales) and back (vertebrae thoracicae, lumbales and costae) are often cited in the literature, however they were not included in our analysis. With the exception of the atlas and epistropheus, the aforementioned skeletal elements were not determined, which would result in an underestimation of the proportions of both body parts (i.e. neck and back).

The quantitative differences were the primary focus in the analysis of the frequency of the various above categorized body parts. As such, a somewhat modified Binford MGUI-index, as provided by Miracle (2002), was applied. This index has some evident weaknesses (Chase 1985). For the most part they are linked to the fact that the author treated variables for individual human communities (e.g. importance of the meat, marrow or skin of specific animal for the community in question) as constants – one single value obtained while studying Nunamiut Eskimos. In order to at least partially avoid these weaknesses the MGUI-value was not used in our analysis directly; rather, the individual body parts were ranked on their basis. Thus, for example, we categorized the upper part of the hind leg, which has the largest average MGUI-value, as rank one, the hipbones with the second largest average MGUI-value as rank two, etc. *figures 3.7.8* and *3.7.9* present the relation between the ranks of average MGUI-values of individual body parts on one side, and their relative frequency in the sample (taking into account the frequency of the remains of corresponding skeletal elements estimated by the



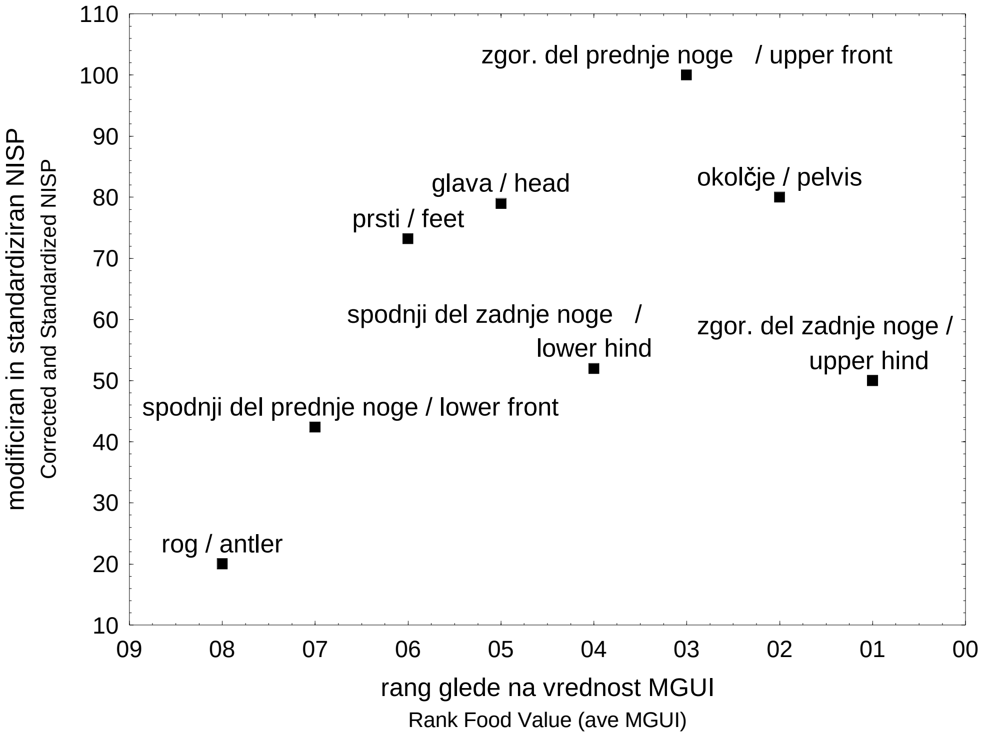

*Sl. 3.7.8:* Grafični prikaz odnosa med pogostnostjo posameznega telesnega dela v vzorcu in pa njegovim (domnevnim) pomenom z vidika takratnega človeka (= rang glede na vrednost MGUI) za ovco (*Ovis aries*), kozo (*Capra hircus*) in prašiča (*Sus* sp.). Korelacija ni statistično značilna (Spearman r = –0,69; p = 0,057). Za identifikacijo posameznih telesnih elementov glej besedilo.
*Fig. 3.7.8:* Graphical representation of the relationship between the frequency of different body-parts and their (presumable) utility from the viewpoint of the pile dweller (= rank according to the MGUI value) for sheep (*Ovis aries*), goat (*Capra hircus*) and pig/wild boar (*Sus* sp.). The correlation is not statistically significant (Spearman r = –0.69; p = 0.057). Check the text for identification of individual body-parts.

povezavo med »mesnatostjo« posameznega telesnega dela in njegovo predvideno pogostnostjo v vzorcu. Vendar korelacija v nobenem od obeh primerov ni statistično značilna (a = 0,05; *sl. 3.7.8* in *3.7.9*). Do neke mere je to gotovo odraz skromnosti vzorca glede na skupno število ostankov, morda pa tudi zgoraj navedene slabosti MGUI-indeksa. V splošnem se zdi vendarle smiselno zaključiti, da vzorec s Hočevarice bolj odraža človekovo selektivnost do s količino mesa bolj obdarjenih telesnih delov kot pa selektivni transport (npr. učinek vleke oziroma *schlepp effect*). To je navsezadnje razvidno tudi iz precejšnje podobnosti med *slikama 3.7.8* in *3.7.9*, ki kažeta korelacijo med »mesnatostjo« in pogostnostjo posameznega telesnega dela pri lovnih (s sicer prevladujočim deležem telesno relativno majhne srne) in domačih živalih. Pri slednjih je namreč dejavnik transporta zanemarljiv, saj so bili ostanki večjih živali (govedo) izjemno redki, samo klanje pa je verjetno potekalo v neposredni bližini naselbine.

Na sestavo paleontološkega vzorca pomembno vplivajo tudi številni poodložitveni dejavniki. Tako se pogosto zgodi, da so v obravnavanem vzorcu fragmenti kosti z večjo strukturno gostoto pogostejši od onih z

MAU-index) on the other. Both graphic presentations evidently indicate a connection between the »fleshiness« of an individual body part and its anticipated frequency in the sample. However, the correlation is not statistically characteristic in either of the two cases (a = 0.05; *fig. 3.7.8* and *3.7.9*). To some extent this is surely a reflection of the limitedness of the sample, regarding the total number of remains, and possibly also of the above mentioned weaknesses in the MGUI-index. In general, it seems rational to conclude that the sample from Hočevarica reflects man's selectivity towards body parts richer in flesh as opposed to selective transport (e.g. the effect of dragging, or the *schlepp effect*). This is also evident in the similarity between *figures 3.7.8* and *3.7.9* or, in other words, in the relation of »fleshiness« versus the frequency of an individual body part in hunted animals (with a predominant proportion of the relatively small roe deer) compared to that of domestic animals. The transport factor is negligible with the latter, considering that the remains of large animals (cattle) are exceptionally rare, and that they were probably slaughtered in the direct vicinity of the settlement.

Numerous post-depositional effects also have a sig-




*Sl. 3.7.9:* Grafični prikaz odnosa med pogostnostjo posameznega telesnega dela v vzorcu in pa njegovim (domnevnim) pomenom z vidika takratnega človeka (= rang glede na vrednost MGUI) za srno (*Capreolus capreolus*) in jelena (*Cervus elaphus*). Korelacija ni statistično značilna (Spearman r = –0,55; p = 0,233). Za identifikacijo posameznih telesnih elementov glej besedilo.
*Fig. 3.7.9:* Graphical representation of the relationship between the frequency of different body-parts in the sample and their (presumable) utility from the viewpoint of the pile dweller (= rank according to the MGUI value) for roe deer (*Capreolus capreolus*) and red deer (*Cervus elaphus*). The correlation is not statistically significant (Spearman r = –0.55; p = 0.233). Check the text for identification of body-parts.

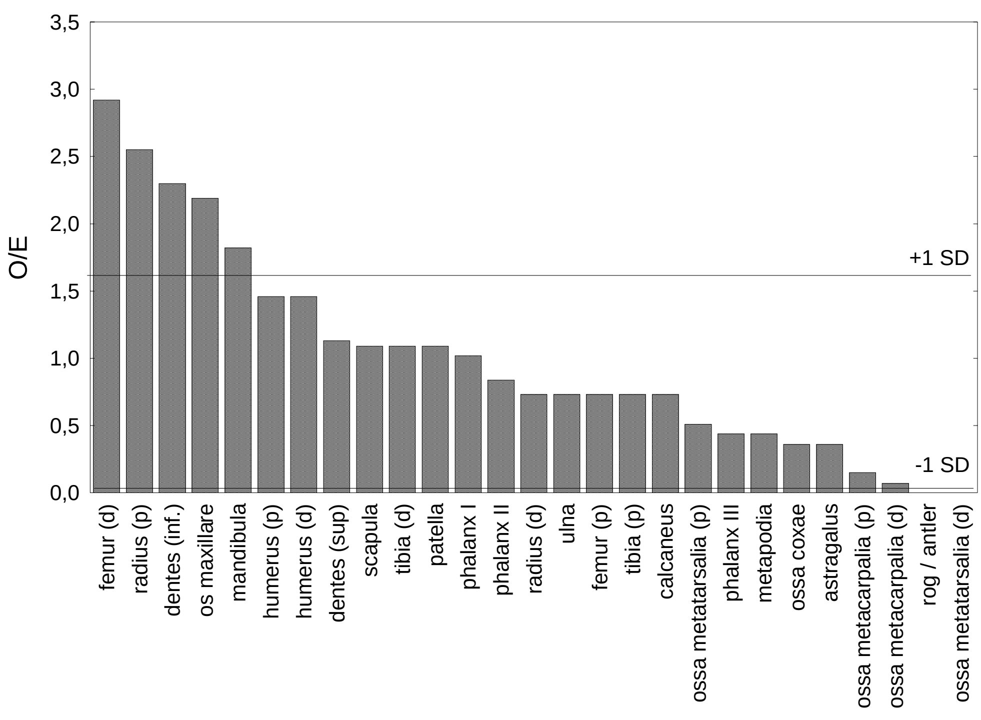
manjšo, saj so slednji manj obstojni. Glede na sedimentno okolje (hidromorfna tla) z minimalnim preperevanjem (o čemer priča odsotnost kostnega drobirja in izluženih fragmentov) pa česa podobnega za primer Hočevarice ne gre pričakovati. Domnevo smo potrdili s statistično analizo soodvisnosti med pogostnostjo posameznih skeletnih elementov (distalnih oziroma proksimalnih delov) v vzorcu in podatki o njihovi strukturni gostoti, kot jih navaja Lyman (1999). Spearmanov r-test je namreč pokazal samo šibko soodvisnost, ki pa ni bila statistično značilna (a = 0,05) niti pri domačih (*Sus* sp., *Capra* s. *Ovis*) niti pri lovnih živalih (*C. capreolus* in *C. elaphus*). Zastopanost posameznih skeletnih elementov med izkopanimi ostanki (*sl. 3.7.10* in *3.7.11*) tako domnevno bolj odraža selektivno destrukcijo posameznih kostnih elementov kot posledica kosanja živali (Klein 1989), skromno število najdb v vzorcu ter možnosti, da so določene fragmente uporabljali kot surovino za izdelovanje orodja ali da so selekcionirali transport posameznih telesnih delov. Prav v tej zvezi bi morda lahko (delno) obrazložili relativno visoko frekvenco proksimalnih delov radiusa med ostanki domačih živali, čeprav se proksimalna epifiza z diafizo pri ovci, kozi in prašiču

nificant effect on the composition of the palaeontological sample. It often occurs that fragments of bones with greater structural density in the sample are more frequent than those with lesser density, since the latter are less resistant. Considering the sedimentary environment (hydromorphic soil) with minimum decomposition (as indicated by the absence of small bone particles and leached fragments) this cannot be expected in the case of Hočevarica. This presumption was further confirmed by a statistical analysis of the inter-dependence between the frequency of individual skeletal elements (distal and proximal parts) in the sample and data on their structural density as presented by Lyman (1999). Spearman's r-test showed only slight inter-dependence, which was not statistically characteristic (a = 0.05) neither in domestic (*Sus* sp., *Capra* s. *Ovis*) nor in hunting animals (*C. capreolus* and *C. elaphus*). Thus the frequency of individual skeletal elements among the excavated remains (*figs. 3.7.10* and *3.7.11*) presumably reflects selective destruction of individual bone elements as resulting from cutting up the animal (Klein 1989), the small amount of finds in the sample, the possibility that specific fragments were used as raw material for manufacturing tools zrašča šele v četrtem letu življenja (Silver 1972). Podobno je lahko selektivni transport (morda tudi destrukcija) soodgovoren za relativno majhno število proksimalnih delov metapodijev v istem vzorcu (*sl. 3.7.10*), čeprav so ti pri omenjenih treh vrstah zraščeni že ob skotitvi (Silver 1972).

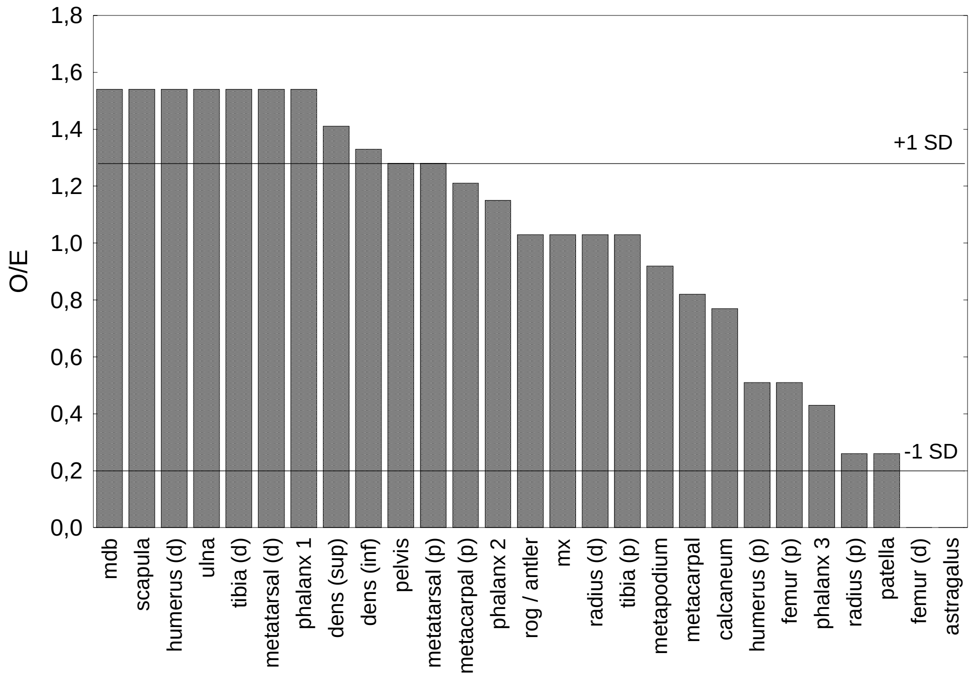
Kot nekoliko drugačno obliko modifikacij kostnih akumulacij lahko razumemo tudi prisotnost sledov urezov in zasekanin ter morebitno ožganost ostankov. Z analizo pogostnosti njihovega pojavljanja na posameznih skeletnih elementih v vzorcu lahko veliko izvemo o vlogi različnih domačih in lovnih živali v preteklih skupnostih ter načinu njihove *post mortem* obdelave (kosanje, ekstrakcija kostnega mozga, priprava za uživanje oziroma hrambo ipd.). Žal pa je v vzorcu s Hočevarice delež kostnih fragmentov, ki bi bili bodisi ožgani bodisi bi na njih opazili sledi zasekanin (*sl. 3.7.12* in *3.7.14*) in urezov (*sl. 3.7.13* in *3.7.14*), izjemno nizek (pod deset odstotkov; *tab. 3.7.23*). Presenečenje je še večje, če upoštevamo, da so bila kolišča domnevno postavljena na mokrih, verjetno celo (vsaj del leta) poplavljenih tleh (Greif 1997). V

and the selective transport of individual body parts. Perhaps it is in this context that we could (partially) explain the relatively high frequency of proximal parts of the radius among the remains of domestic animals, although the proximal epiphysis and diaphysis in sheep, goats and pigs fuse as late as in the fourth year of life (Silver 1972). Similarly, selective transport (and maybe also destruction) could be co-responsible for the relatively low number of proximal parts of the metapodes in the same sample (*fig. 3.7.10*), although these are fused already at the time of birth in these three species (Silver 1972).

The presence of cut and chop marks as well as burnt remains could be understood as a somewhat different form of modification of bone accumulations. By analyzing the frequency of their occurrence on individual skeletal elements in the sample, we can learn a great deal about the role of various domestic and hunting animals in the communities and the manner of their *post mortem* treatment (chopping, extraction of the marrow, preparation for eating or storing, etc.). Unfortunately the




*Sl. 3.7.10:* Razlike v zastopanosti posameznih kostnih elementov med izkopanimi ostanki domačih živali, vključno s prašičem (*Sus* sp.). Korelacija med pogostnostjo posameznih fragmentov (izraženo s kvocientom O/E) in pa njihovo strukturno gostoto ni statistično značilna (Spearman r = –0,52; p = 0,15). Podatki o strukturni gostoti skeletnih elementov so povzeti po Lyman (1999). Legenda: SD – standardna deviacija, O/E – razmerje med dejansko pogostnostjo posameznega fragmenta v vzorcu (deljeno s številom omenjenega elementa v celotnem skeletu; O / *observed*) in pa pričakovano (E / *expected*) pogostnostjo istega fragmenta v primeru, da bi bila zastopanost vseh ostankov v vzorcu enaka (prim. O'Connor 2000, 72).
*Fig. 3.7.10:* Quantitative representation of individual skeletal elements among the excavated remains of domestic animals (including *Sus* sp.). The correlation between the frequency of each fragment (expressed as O/E) and the respective structural bone density is not statistically significant (Spearman r = –0.52; p = 0.15). Structural bone density data are summarized after Lyman (1999). Legend: SD – Standard Deviation, O/E – observed frequency of each skeletal element (divided by the number of times that element occurs in one individual; O / *observed*) and the expected (E) frequency of the same element, if the remains were distributed evenly in the sample (cf. O'Connor 2000, 72).




*Sl. 3.7.11:* Razlike v zastopanosti posameznih kostnih elementov med izkopanimi ostanki srne (*Capreolus capreolus*) in jelena (*Cervus elaphus*). Korelacija med pogostnostjo posameznih fragmentov (izraženo s kvocientom O/E) in pa njihovo strukturno gostoto ni statistično značilna (Spearman r = –0,38; p = 0,076). Podatki o strukturni gostoti skeletnih elementov so povzeti po Lyman (1999). Legenda: SD – standardna deviacija, O/E – razmerje med dejansko pogostnostjo posameznega fragmenta v vzorcu (deljeno s številom omenjenega elementa v celotnem skeletu; O / *observed*) in pa pričakovano (E / *expected*) pogostnostjo istega fragmenta v primeru, da bi bila zastopanost vseh ostankov v vzorcu enaka (prim. O'Connor 2000, 72).
*Fig. 3.7.11:* Quantitative representation of individual skeletal elements among the excavated remains of roe deer (*Capreolus capreolus*) and red deer (*Cervus elaphus*). The correlation between the frequency of each fragment (expressed as O/E) and the respective structural bone density is not statistically significant (Spearman r = –0.38; p = 0.076). Structural bone density data are summarized after Lyman (1999). Legend: SD – Standard Deviation, O/E – observed frequency of each skeletal element (divided by the number of times that element occurs in one individual; O / *observed*) and the expected (E) frequency of the same element, if the remains were distributed evenly in the sample (cf. O'Connor 2000, 72).

takem okolju (sedimentu) se verjetnost ohranitve omenjenih sledi le še poveča (Gamble, Clark 1984).

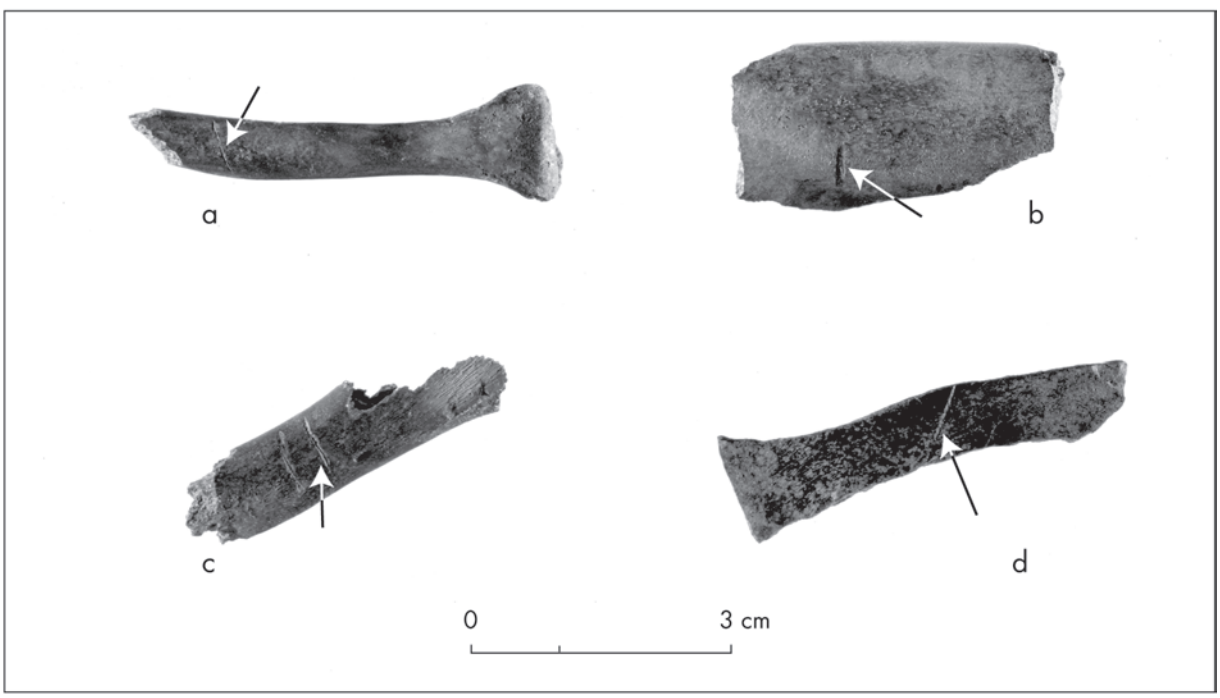
Analiza ohranjenosti osteodontoloških ostankov iz našega vzorca to tudi potrjuje. Na površini kosti, ki je neposredno izpostavljena spreminjajočim se klimatskim pogojem, lahko razmeroma hitro opazimo določene spremembe. Njihov pojav v veliki meri pripisujemo različnim, z (mikro)klimo povezanim fizikalnim stresom, ki delujejo na površino kosti (npr. nihanje temperature in vlage). Tako se lahko večje vzdolžne razpoke na dolgih kosteh pojavijo že v nekaj dneh po poginu ali zakolu živali oziroma po tem, ko je bila kost izpostavljena delovanju klimatskih dejavnikov. Seveda je hitrost napredovanja omenjenih sprememb odvisna tudi od debeline in strukturne gostote kosti, v glavnem pa odraža intenzivnost klimatskih sprememb ter trajanje izpostavljenosti. V splošnem velja, da bo kost v bolj konstantnem (mikro)okolju razpadala počasneje. Med takšna sodijo gost gozd ali močvirje, kjer senca in/ali visoka (relativno konstantna) vlaga blažita dnevna in sezonska klimatska nihanja makrookolja (Behrensmeyer 1978). Glede

proportion of burnt bone fragments or such with chop marks (*figs. 3.7.12* and *3.7.14*) and cut marks (*figs. 3.7.13* and *3.7.14*) was extremely low (below 10 %; *table 3.7.23*) in the Hočevarica sample. This is even more surprising if we take into account that the pile dwellings were presumably built on wet or even more probably (at least part of the year) flooded land (Greif 1997). In such an environment (sediment) the probability of preservation of these traces increases (Gamble, Clark 1984).

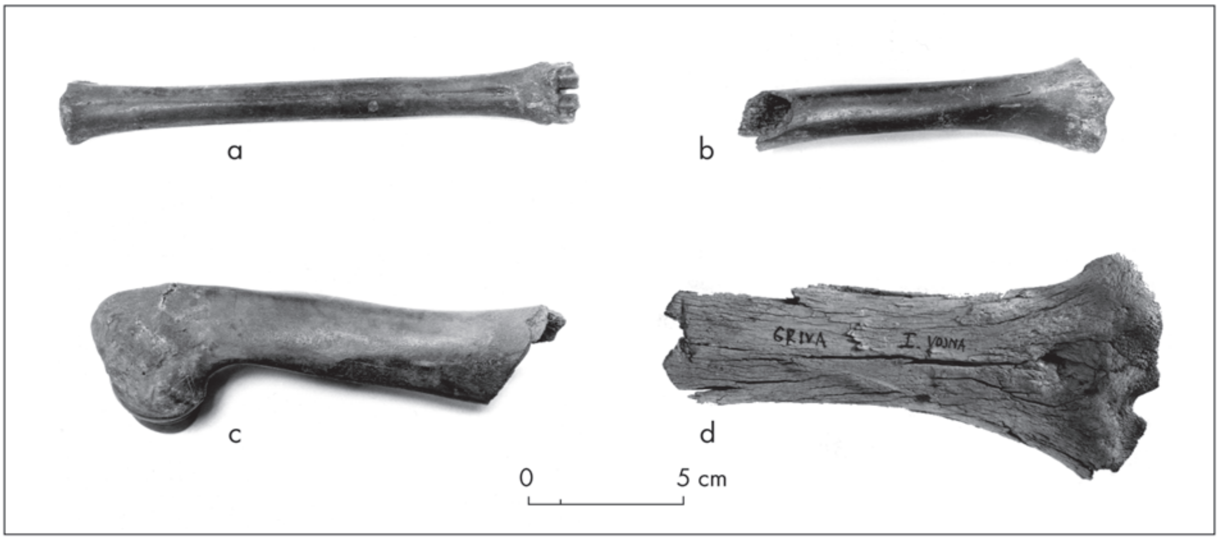
Analysis of the level of preservation of the osteodontological remains from our sample supports this. Specific changes are relatively easily noticeable on the surfaces of bones that were exposed to changing climatic conditions. Their occurrence can in large part be attributed to various (micro)climate induced physical stresses which affect the bone surface (e.g. temperature and humidity variation). Thus larger longitudinal cracks on the long bones can appear already a few days after the animal died or was slaughtered, or after the bone was exposed to the effect of climatic factors. The progress of these changes of course depends also on the thick-na navedeno tako ne preseneča, da je ohranjenost kostne substance fragmentov s Hočevarice, ki so bili domnevno odloženi na vsaj zamočvirjena, če ne celo na poplavljena tla (jezero?), relativno dobra (*sl. 3.7.14*). Večji del izkopanih ostankov namreč ne kaže opaznejših površinskih razpok ali luščenja površinskih slojev, ki bi bili posledica izpostavljenosti nihajočim klimatskim dejavnikom. Če so razpoke vendarle prisotne, so te navadno neizrazite ter potekajo (pri dolgih kosteh) pretežno v longitudinalni smeri, torej vzporedno s haversovimi kanali. Na podlagi kriterijev, ki jih je za kvantifikacijo opisanih površinskih sprememb na kosti predstavila

ness and structural density of the bone, but it mainly reflects the climatic changes and the duration of exposure. The general rule is that bones in a more consistent (micro)climate will take longer to disintegrate. Such microclimates occur in dense forests or marshes where the shade and/or high (relatively constant) humidity moderate the daily and seasonal climatic oscillation of the macro-environment (Behrensmeyer 1978). In view of all this, it comes as no surprise that the level of preservation of the bone substance of the fragments from Hočevarica, which were deposited on marshy if not flooded ground (lake?), is relatively high (*fig. 3.7.14*).


*Sl. 3.7.12:* Primera izkopanih kosti z vidnimi sledovi zasekanin. Foto: M. Zaplatil.
*Fig. 3.7.12:* Two examples of excavated bones showing chop marks. Photo: M. Zaplatil.




*Sl. 3.7.13:* Primeri izkopanih kosti z vidnimi sledovi urezov. Foto: M. Zaplatil.
*Fig. 3.7.13:* Excavated bones showing cut marks. Photo: M. Zaplatil.




*Sl. 3.7.14:* Na površini izkopanih kosti s Hočevarice ni opaziti znakov razpadanja zaradi delovanja (mikro)klime (a–c). Za primerjavo podajamo na površini pobran proksimalni del govejega radiusa iz prve svetovne vojne (d) z značilnim vzorcem razpok, nastalih zaradi izpostavljenosti spreminjajočim se vremenskim pojavom. Foto: M. Zaplatil.
*Fig. 3.7.14:* The surfaces of the excavated bones from the Hočevarica pile dwelling are well preserved, showing only minimal signs of weathering (a–c). For comparison a proximal part of a cattle radius from World War I, found on the surface (i. e. unburried) is given recently: (d) showing patterns of cracks typical of sub-aerial weathering. Photo: M. Zaplatil.

Behrensmeyer-jeva (1978), bi lahko tako pretežni del kostnih ostankov s Hočevarice uvrstili v stopnjo nič ali ena.

V luči navedenega torej vzrokov za izjemno nizek delež kosti s sledovi zasekanin in urezov ne gre iskati v slabi ohranjenosti kostne substance ostankov. Pogostnost omenjenih sledi na kosteh je sicer do neke mere odvisna tudi od uporabljenih orodij in tehnik pri obdelavi mesa (odiranje, kosanje plena ipd.) ter same spretnosti posameznika (Gamble, Clark 1984; Maltby 1985). Optimalna kombinacija navedenih dejavnikov lahko rezultira v rezih in zasekaninah, ki na kosteh ne puščajo nikakršnih sledi. Rezilo se lahko namreč pri npr. poševnem rezu, ki ga opravi izkušen posameznik, kosti sploh ne dotakne. Na vzorec kosanja so lahko vplivali tudi prepovedi in pravila, povezane z religijo, tabuji ipd. (npr. zapovedana prepoved poškodovanja kosti plena). Poleg tega je potrebno pri tovrstnih analizah upoštevati tudi čas, ki je potekel med zakolom ali uplenitvijo živali in njenim razkosanjem. Pomembno je, ali je ločevanje mesa od kosti sledilo neposredno osnovnemu kosanju, prav tako pa tudi sama starost živali. Če med zakolom in kasnejšo obdelavo ni preteklo veliko časa (torej *rigor mortis* še ni nastopil), lahko pričakujemo manj sledov zasekanin in urezov na kosteh. Enako velja, če ločevanje mesa od kosti sledi ustrezni predhodni pripravi (kuhanje, pečenje), upoštevati pa je potrebno tudi od starosti živali odvisno strukturno gostoto kosti (Gamble, Clark 1984). Kljub vsem naštetim dejavnikom, ki sicer vplivajo na pogostnost sledi zasekanin ali urezov v vzorcu, pa ob izjem-

The major portion of the remains does not show visible surface cracks or peeling of surface layers, which would be the result of exposure to fluctuating climatic factors. If cracks are nevertheless present, they are usually barely discernible and run (on long bones) mostly longitudinally, i.e. parallel to the Haversian canals. According to the criteria for quantification of the described surface changes presented by Behrensmeyer (1978), the major part of the remains from Hočevarica could be ranked in the levels zero or one.

In light of the above mentioned the reasons for the exceptionally low proportion of bones with traces of chop and cut marks do not lie in the poor preservation of the bone substance of the remains. To some extent the frequency of these traces also depends on the tools and techniques used for preparing the flesh (skinning, chopping of the game, etc.) and the dexterity of the individual (Gamble, Clark 1984; Maltby 1985). An optimal combination of all the factors can result in cuts and clefts which do not leave any traces on the bones. In an angular cut performed by an experienced individual, the blade does not even touch the bone. Limitation due to religion, taboos, etc. (e.g. commanded restriction of damaging the bone of the prey) could also affect the chopping pattern. Moreover, in such an analysis one should also consider the time elapsed between the death of the animal and its dissection. Other significant factors are whether the meat was removed from the bone directly after the basic cuttings, and the age of the animal. If the slaughtering and the further processing were no nizkem deležu tako zaznamovanih fragmentov med ostanki s Hočevarice ne gre povsem zanemariti niti možnosti napak med samo analizo obravnavanega materiala.

Upoštevajoč naselbinski fazi, v okviru katerih so se posamezni ostanki akumulirali, lahko osteodontološki material s Hočevarice razdelimo v dva podvzorca. V nadaljevanju se tako posvečamo analizi podobnosti in razlik med njima (tj. med fazo 1 in 2). Že uvodoma smo opozorili na očiten razkorak v geometrijski gostoti najdb znotraj sedimenta, odloženega v času vsake od obeh faz (*tab. 3.7.3*). Tako smo v režnjih iz zgodnje naselbinske faze našli več kot 3-krat toliko ostankov velikih sesalcev na prostorninsko enoto sedimenta kot v okviru režnjev, akumuliranih med fazo 2. Razlika je bila očitna tudi v povprečni masi fragmentov. Da bi dobili nekoliko boljši vpogled v ta segment tafonomske analize, smo najdbe iz najbogatejšega mikrokvadrata 5 porazdelili v štiri velikostne razrede: do 1 cm, 1 do 5 cm, 5 do 10 cm in 10 do 15 cm. Daleč najštevilčnejši so se pokazali fragmenti velikosti od ena do pet centimetrov, ki predstavljajo 79,4 (faza 1) oziroma 89,8 (faza 2) odstotkov vseh najdb (*tab. 3.7.24*). Razlike med fazama so opazne predvsem v povprečni masi (in torej velikosti) ostankov navedenega velikostnega razreda pa tudi v številčnosti fragmentov, katerih velikost presega pet centimetrov. Prav slednjemu gre v veliki meri pripisati tudi razliko med obema fazama v povprečni masi vseh ostankov iz mikrokvadrata 5 (1,81 g/fragment za fazo 1 proti le 0,46 g/fragment za fazo 2). Poskus interpretacije navedenih razlik je težaven in, upoštevajoč velikost vzorca, tvegan. Bistvenih odstopanj med fazama v številčnosti ožganih in kalciniranih fragmentov nismo ugotovili, tako da neenaka povprečna masa (velikost) fragmentov domnevno ne odraža različne intenzivnosti kurjenja koščenih drobcev. Dejavnik, ki bi lahko soprispeval k neenakim vzorcem lomljenja kosti med obema fazama, bi tako lahko bil povezan s količino razpoložljive hrane. V obdobjih (skupnostih), kjer razpoložljiva hrana ni (ali pa je komaj) zadovoljevala potrebe, lahko namreč pričakujemo zelo intenzivno izkoriščanje njenega hranljivega potenciala. Tako »varčevanje« je zagotovo vključevalo tudi redno drobljenje kosti na razmeroma majhne fragmente, ki so bili nato podlaga za kuhanje nekakšne juhe (Rowley-Conwy 1996). V nasprotju s tem so si s hrano bolje preskrbljene skupnosti lahko privoščile večjo »potratnost« in so kosti večkrat razbile le toliko, da so lahko izločile glavnino v njej vsebovane maščobe (kostni mozeg). To se je nato odražalo v razmeroma velikih odpadnih kostnih fragmentih. Vendar je potrebno pri tem upoštevati tudi nujno heterogenost znotraj kateregakoli najdišča. Temu pogoju pa vzorec s Hočevarice verjetno ne zadosti. Na osem mikrokvadratov razdeljeno sondažno polje namreč znotraj iste faze kaže (pre)velike razlike v številu najdb na posamezen mikrokvadrat (variacijska širina faze 1: 130–365 fragmentov/mikrokvadrat; faza 2: 0–225 frag-

carried out within a short time (e.g. before the occurrence of *rigor mortis*), fewer traces of clefts and cuts may be expected. Equally so, whether the separation of the flesh from the bone was done after prior preparation (cooking, roasting), and the structural density of the bone – which depends on the animal's age, are also factors to be considered (Gamble, Clark 1984). Regardless of all the above listed factors that affect the frequency of traces of cut and chop marks in the sample, considering the exceptionally low proportion of thus marked fragments among the remains from Hočevarica we should not forget the possibility of inaccuracies resulting during the analysis of the material.

Regarding the settlement phases during which the individual remains accumulated, the osteodontological material from Hočevarica can be divided into two subsamples. We will therefore divert our attention to the analysis of the similarities and differences between them (i.e. phase 1 and phase 2). Already in the beginning the notable inconsistency in the geometric density of the finds within the sediment deposited during each of the two phases (*table 3.7.3*) was pointed out. In the layers of the early settlement phase more than three times the number of remains of large mammals per volume unit of the sediment was found than in the layers accumulated during phase 2. The difference was evident also in the average weight of the fragments. In order to attain better insight into this part of the taphonomic analysis, the finds from the richest micro-quadrant (5) were distributed into four size categories: up to 1 cm, 1 to 5 cm, 5 to 10 cm and 10 to 15 cm. The fragments measuring 1 to 5 cm were by far the most numerous and represented 79.4 (phase 1) and 89.8 % (phase 2) of all the finds (*table 3.7.24*). The differences between the phases are visible mainly in the average weight (and thus size) of the remains of the aforementioned size category, but also in the number of the fragments, which exceed five centimeters. The difference between the two phases in the average weight of all the remains from micro-quadrant 5 (1.81 g/fragment for phase 1 versus only 0.46 g/fragment for phase 2) should in large part be attributed to the latter. The attempt to interpret these differences is problematic and, taking into consideration the size of the sample, risky. There were no substantial deviations in the number of burnt and calcined fragments between the two phases, which means that the unequal average weight (size) of the fragments presumably is not a reflection of different intensities in the burning of bone pieces. A factor which could contribute to the uneven pattern of bone fracturing between the two phases could also be the quantity of available food. An intensified usage of the nutritional value of food during periods when (or in communities where) the available food does not satisfy (or barely satisfies) the needs can be anticipated. Such »rationalization« could also involve regular crushing of the bones into relatively small fragments,

| FAZA: (volumen v $m^3$ / volume in $m^3$) | | velikost fragm. size of fragments – 1 cm | velikost fragm. size of fragments 1 – 5 cm | velikost fragm. size of fragments 5 – 10 cm | velikost fragm. size of fragments 10 – 15 cm |
|---|---|---|---|---|---|
| **1** **(0,178)** | NISP / $m^3$ | 39,3 | 651,7 | 101,1 | 5,6 |
| | povpr. masa fragmentov averige weight of fragments | 0,16 g | 1,00 g | 6,23 g | 10,7 g |
| | delež glede na vse fragm. % of all fragments | 4,8 % | 79,4 % | 15,1 % | 0,7 % |
| | delež glede na skup. maso % of total weight | 0,4 % | 43,8 % | 51,7 % | 6,5 % |
| **1/2** **(0,030)** | NISP / $m^3$ | 766,7 | 6466,7 | 466,7 | 33 |
| | povpr. masa fragmentov averige weight of fragments | 0,08 g | 0,64 g | 3,60 g | 15,5 g |
| | delež glede na vse fragm. % of all fragments | 10,0 % | 83,6 % | 6 % | 0,4 % |
| | delež glede na skup. maso % of total weight | 1,0 % | 64,8 % | 26,2 % | 8,0 % |
| **2** **(0,097)** | NISP / $m^3$ | 113,4 | 1000,0 | 0 | 0 |
| | povpr. masa fragmentov averige weight of fragments | 0,04 g | 0,52 g | -- | -- |
| | delež glede na vse fragm. % of all fragments | 10,2 % | 89,8 % | -- | -- |
| | delež glede na skup. maso % of total weight | 1,0 % | 99,0 % | -- | -- |

*Tab. 3.7.24:* Geometrijska gostota in povprečna masa fragmentov posamezne velikostne skupine za fazi 1 in 2 ter za vmesni pas (t.j. 1/2), kjer je prišlo do mešanja najdb. Podatki se nanašajo izključno na kvadrat 5, iz katerega je bilo pobrano največje število ostankov.
*Table 3.7.24:* Geometric density and average weight of fragments from variously sized groups per settlement phase (e.g. phases 1, 2 and the intermediary 1/2). The data refers to quadrant 5 exclusively, from which the greatest number of remains were collected.

mentov/mikrokvadrat), da bi lahko sklepali na reprezentativnost razpoložljivega vzorca.

V okviru primerjave obeh faz smo že v uvodnem delu prispevka omenili, da razlike v deležih lovnih in domačih živali med njima niso bile statistično značilne (a = 0,05; *sl. 3.7.3*). Sicer pa se obsežnejša analiza razlik med obema fazama v pogostnosti ostankov posameznih vrst ne zdi primerna, saj je NISP vzorca za kaj takega (pre)majhen. V okviru primerjave med obema fazama smo tako raje testirali homogenost porazdelitve mesa različnih (treh) kvalitetnih kategorij (*tab. 3.7.25*). Enako primerjavo smo opravili tudi med ostanki lovnih in domačih živali znotraj posamezne od obeh faz (*tab. 3.7.26*). V obeh primerih smo uporabili $\chi^2$-test. Posamezne kategorije mesa smo povzeli po Bartosiewiczu (1984b) in so opredeljene na naslednji način: kategorija A – najkvalitetnejše meso (vključuje naslednje skeletne elemente: atlas, epistrofeus, vertebrae, scapula, humerus, ossa coxae, femur); kategorija B – meso vmesne

which would then serve as material for cooking some sort of broth (bone grease; Rowley-Conwy 1996). On the other hand, better supplied communities could afford more »squandering« and would break the bones only enough to extract the main body of the fat (marrow) in it. This would then be reflected by relatively large bone fragments in the kitchen refuse. However, the required degree of heterogeneity within a particular site should also be considered. The Hočevarica sample probably does not meet this condition. The eight micro-quadrants from the sample trench demonstrate too significant differences in the number of finds per individual micro-quadrant within the same phase (variation range phase 1: 130–365 fragments/micro-quadrant; phase 2: 0–225 fragments/micro-quadrant) to allow conclusions regarding the representativeness of the available sample.

Concerning the comparison of the two phases, it was already stated in the introductory part of this volume that the differences in the proportions of hunting and domestic animals were not statistically significant (a = 0.05; *fig. 3.7.3*). Extensive analysis of the differences between the two phases regarding the frequency of the remains of individual species does not appear relevant, since the NISP of the sample is too low. Consequently, we chose to test the homogeneity of the distribution of the meat of various (three) quality categories (*table 3.7.25*). The same comparison between the remains of hunting and domestic animals within each of the phases (*table 3.7.26*) was also carried out. The $\chi^2$-test was applied in both cases. The meat categories were defined according to Bartosiewicz (1984b) in the fol-kvalitete (cranium, mandibula, costae, radius, ulna, tibia, fibula) in kategorija C – meso nizke kvalitete (os maxillare, dentes, ossa carpalia, ossa metacarpalia, phalanges, astragalus, calcaneus ter ossa metatarsalia). Za kvantifikacijo posameznih skeletnih elementov smo uporabili indeks NISP.

Razlike v deležu kosti in zob, grupiranih na podlagi zgoraj definiranih kategorij (A, B in C), niso bile statistično značilne (a = 0,05) v nobenem od treh obravnavanih primerov (*tab. 3.7.25* in *3.7.26*). Tako se za vsako od obeh faz zdi (*tab. 3.7.25*), da lahko kategoriji A (najkvalitetnejše meso) pripišemo dobrih 15 odstotkov ostankov, kategoriji B (meso vmesne kvalitete) slabih 20, preostanek (tj. približno 65 odstotkov) pa kategoriji C (najmanjša količina in najnižja kvaliteta mesa). Podobna razmerja med tremi kategorijami (tj. približno A : B : C = 1 : 1 : 3,5) so pokazali tudi ostanki lovnih in domačih živali znotraj vsake od obeh faz, kjer razlike prav tako niso bile statistično značilne (*tab. 3.7.26*). Pogostnost ostankov posamezne kategorije je torej primerljiva tako med fazo 1 in 2 kot tudi med lovnimi in domačimi živalmi znotraj vsake od obeh plasti. Je pa potrebno pri tem opozoriti, da je delež kategorije B sistematično podcenjen. Reber in vretenc (z izjemo atlasa in epistropheusa) namreč sploh nismo determinirali. Po drugi strani lahko pričakujemo, da je zaradi relativno enostavnega prepoznavanja in navadno razmeroma dobro ohranjenih skeletnih elementov, kot so npr. ossa (meta)carpalia ali pa ossa (meta)tarsalia, delež skupine C verjetno nekoliko precenjen. Ker pa omenjeni napaki prizadeneta obravnavane vrste v približno enaki meri, je njun vpliv na rezultate $\chi^2$-testa domnevno zanemarljiv.

V okviru primerjav med fazama ena in dva smo testirali tudi statistično značilnost razlik med njima v deležu izkopanih ostankov (1) lobanje s spodnjo čeljustnico, (2) zgornjega in spodnjega niza zob, (3) vratu, (4) okolčja, (5) zgornjih in (6) spodnjih delov prednjih oziroma (7 in 8) zadnjih okončin ter (9) prstov. Absolutno gledano so bili znotraj vsake od obeh faz najštevilčnejši (NISP) ostanki prstnic in pa zobje (*sl. 3.7.15*). Ugotovitev je pričakovana, saj je število prstnic in zob na posamezen osebek večje, kot to velja za večino ostalih ske-

lowing manner: category A – highest quality meat (includes the following skeletal elements: atlas, epistrofeus, vertebrae, scapula, humerus, ossa coxae, femur); category B – medium quality meat (cranium, mandible, costae, radius, ulna, tibia, fibula) and category C – low quality meat (os maxillare, dentes, ossa carpalia, ossa metacarpalia, phalanges, astragalus, calcaneus and ossa metatarsalia). NISP was used to quantify the individual skeletal elements.

The differences in the proportion of bones and teeth, ranked into groups on the basis of the above defined categories (A, B and C), were not statistically significant (a = 0.05) in any of the three cases (*tables 3.7.25* and *3.7.26*). It thus appears that for each of the two phases (*table 3.7.25*), category A (highest quality meat) covers a good 15 % of the remains, category B (medium quality meat) covers nearly 20 %, and the rest (i.e. approximately 65 %) is covered by category C (the lowest quantity and quality of meat). The remains of hunting and domestic animals within each of the two phases, where the differences – again – were not statistically significant (*table 3.7.26*), showed similar proportions among the three categories (i.e. approximately A : B : C = 1 : 1 : 3.5). The frequency of the remains of individual categories is therefore comparable between phases 1 and 2, as well as between hunting and domestic animals within each phase. Yet it should be noted that the proportion of category B is systematically underestimated. The ribs and vertebrae (with the exception of the atlas and the epistropheus) were not determined. On the other hand, it may also be expected that, due to relatively easy identification and usually well preserved skeletal elements such as e.g. ossa (meta)carpalia or ossa (meta)tarsalia, the proportion of category C was overestimated. But since these inaccuracies are approximately equal for all of the species, their effect on the results of the $\chi^2$-test is considered to be negligible.

Concerning the comparisons between phases 1 and 2, we also tested the statistical significance of the difference between them in the proportion of excavated remains of the (1) skull with mandible, (2) the upper and lower rows of teeth, (3) the neck, (4) the hipbones, (5)

| $\chi^2$ = 0,15 d.f. = 5 p = 0,999 | | A | B | C | Σ |
|---|---|---|---|---|---|
| **FAZA 1** | ugotovljene γ / ascertained γ | 33 | 34 | 118 | **185** |
| | pričakovane γ / expected γ | 32,6 | 35,0 | 117,4 | |
| **FAZA 2** | ugotovljene γ / ascertained γ | 8 | 10 | 30 | **48** |
| | pričakovane γ / expected γ | 8,4 | 9,1 | 30,5 | |
| **SKUPAJ / TOTAL** | | **41** | **44** | **148** | **233** |

*Tab. 3.7.25:* Test homogenosti porazdelitve mesa različnih kvalitetnih kategorij (A, B, C) med obema naselbinskima fazama. Homogenost porazdelitve je bila testirana s $\chi^2$ testom. Kvantifikacija ostankov temelji na indeksu NISP. Za identifikacijo posameznih kvalitetnih kategorij glej besedilo.

*Table 3.7.25:* Test of homogeneity in the distribution of various meat value categories (A, B, C) per settlement phase. The homogeneity of the distribution was tested using the $\chi^2$ test. The quantification of remains is based upon the NISP index. Check text for definitions of the various meat value categories.

| **FAZA 1** $\chi^2 = 1{,}74$ d.f. = 5 p = 0,883 | | **A** | **B** | **C** | **SKUPAJ TOTAL** |
|---|---|---|---|---|---|
| **DOMAČE ŽIVALI** | ugotovljene $\gamma$ /ascertained $\gamma$ | 16 | 22 | 68 | **106** |
| | pričakovane $\gamma$ / expected $\gamma$ | 18,8 | 19,6 | 67,6 | |
| **LOVNE ŽIVALI** | ugotovljene $\gamma$ /ascertained $\gamma$ | 17 | 12 | 50 | **79** |
| | pričakovane $\gamma$ / expected $\gamma$ | 14,1 | 14,5 | 50,4 | |
| **SKUPAJ / TOTAL** | | **33** | **34** | **118** | **185** |

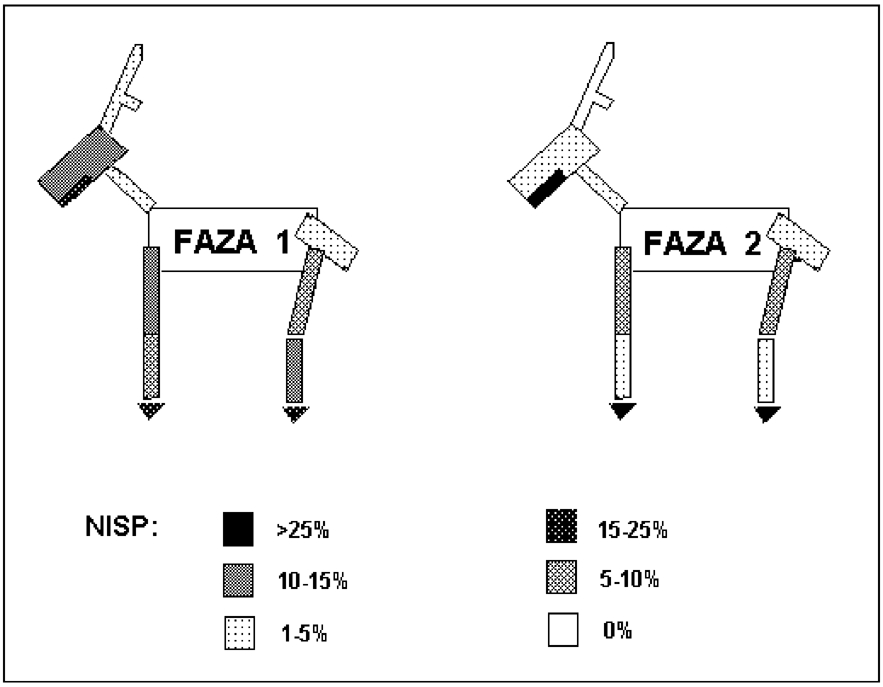
| **FAZA 2** $\chi^2 = 3{,}33$ d.f. = 5 p = 0,649 | | **A** | **B** | **C** | **SKUPAJ TOTAL** |
|---|---|---|---|---|---|
| **DOMAČE ŽIVALI** | ugotovljene $\gamma$ /ascertained $\gamma$ | 5 | 7 | 12 | **24** |
| | pričakovane $\gamma$ / expected $\gamma$ | 4,0 | 4,9 | 15,1 | |
| **LOVNE ŽIVALI** | ugotovljene $\gamma$ /ascertained $\gamma$ | 3 | 3 | 18 | **24** |
| | pričakovane $\gamma$ / expected $\gamma$ | 4,0 | 4,9 | 15,1 | |
| **SKUPAJ / TOTAL** | | **8** | **10** | **30** | **48** |

*Tab. 3.7.26:* Test homogenosti porazdelitve mesa različnih kvalitetnih kategorij (A, B, C) med lovnimi in domačimi živalmi (vključno z ostanki rodu *Sus*) za vsako od obeh naselbinskih faz. Homogenost porazdelitve je bila testirana s $\chi^2$ testom. Kvantifikacija ostankov temelji na indeksu NISP. Legenda: $\gamma$ – frekvenca. Za identifikacijo posameznih kvalitetnih kategorij glej besedilo.
*Table 3.7.26:* Test of homogeneity in the distribution of various meat value categories (A, B, C) for wild and domestic animals (including *Sus* sp. remains) per settlement phase. The homogeneity of the distribution was tested using the $\chi^2$ test. The quantification of remains is based upon the NISP index. Legend: $\gamma$ – frequency, domače živali – domestic animals, lovne živali – wild animals. Check text for definitions of the various meat value categories.

letnih elementov. Poleg tega njihova majhnost, relativna trdnost ter odsotnost omembe vrednih količin kostnega mozga povečujejo verjetnost, da se bodo v času ohranili relativno nepoškodovani, kar olajša determinacijo. Po drugi strani lahko nizko frekvenco pojavljanja skeletnih elementov vratu, okolčja pa tudi samih rogov vsaj delno razložimo z njihovo maloštevilnostjo v okviru živalskega skeleta (npr. rogov) in z dejstvom, da so bili ti iskana surovina za orodja. Tako npr. okolčje (v skladu z v tem prispevku uporabljeno opredelitvijo) obsega samo ossa coxae, rogovje je prisotno le pri nekaterih vrstah in navadno le pri samcih, sicer številnih vretenc pa (z izjemo atlasa in epistropheusa) sploh nismo določevali. Številčnost posameznih skeletnih elementov v vzorcu navadno do neke mere odraža tudi človekovo preferenco do kvalitetnejših, bolj »mesnatih« predelov živali (npr. zgornji deli prvih in zadnjih okončin), kar je razvidno tudi v našem primeru. Sicer pa se v splošnem zdi, da so na sestavo proučevanega vzorca v obdobju prve in druge naselbinske faze verjetno delovali kvalitativno in kvantitativno primerljivi (pred- in poodložitveni) dejavniki. Kot je namreč razvidno iz *tabele 3.7.27*, razlike med fazama v deležu posameznega skeletnega elementa niso bile statistično značilne (Mann-Whitney U-test; a = 0,05). Tudi če smo celoten vzorec subfosilnih ostankov razdelili na lovne (tj. fam. Cervidae) in domače (brez psa) živali, so razlike med fazama ostale pod nivojem statistične značilnosti, in to ne glede na uporabljen indeks za kvantifikacijo fragmentov (NISP ali MAU).

Pomen, ki sta ga za obravnavani skupnosti (tj. faza

the upper and (6) lower parts of front and (7 and 8) hind legs and (9) the fingers. Seen absolutely, the remains (NISP) of fingers and teeth were the most numerous within each of the two phases (*fig. 3.7.15*). This result was anticipated as the number of fingers and teeth per individual is greater than that of most other skeletal elements. Moreover, their small size, relative firmness and absence of marrow increase the possibility that they will remain relatively undamaged through time, which makes determination easier. On the other hand, the low frequency of skeletal elements of the neck, hipbones and also the horns may be clarified by their low number in the skeletons (e.g. horns) and additionally by the fact that they were a preferred raw material for tools. So hipbones, for instance (and in accordance with the categorization used in this volume), comprise only the ossa coxae; horns are present only in some species and even then often only on males, while the otherwise numerous vertebrae were not determined (with the exception of the atlas and the epistropheus). Generally, the number of individual skeletal elements in the sample, at least up to a certain extent, reflects also man's preference for better quality or more »fleshy« parts of an animal (e.g. upper parts of the front and hind legs); this is evident also in our case. It seems that – qualitatively and quantitatively – comparable pre- and post-depositional factors affected the structure of the sample during the period of the first and the second settlement phases. As shown in *table 3.7.27*, the differences in the proportion of individual skeletal elements between the phases were




*Sl. 3.7.15:* Pogostnost različnih skeletnih elementov znotraj posamezne od obeh naselbinskih faz. Kvantifikacija ostankov temelji na indeksu NISP. Za identifikacijo posameznih telesnih delov glej besedilo.
*Fig. 3.7.15:* Frequency of various skeletal body-parts within each of the two stratigraphic settlement phases. NISP is used for quantification purposes. Check the text for body-part identification.

1 in 2) s Hočevarice imela lov in živinoreja, je zelo težko oceniti, saj obstajajo dvomi o reprezentativnosti vzorca. Če bi predpostavili, da lov v zadovoljivi meri povzema sliko celotnega najdišča, bi vodilno vlogo o viru mesa in maščob dodelili živinoreji. Delež kosti in zob, ki smo jih pripisali lovnim in domačim živalim, je sicer v grobem enak (*tab. 3.7.1*; *sl. 3.7.2* in *3.7.3*), vendar pri tem ne gre

not statistically significant (Mann-Whitney U-test; a = 0,05). Even when the entire sample of sub-fossil remains was divided into hunting (i.e. fam. Cervidae) and domestic (not including dog) animals, the differences between the phases remained below the level of statistical significance, regardless of the index used for the quantification of fragments (NISP or MAU).

| | NISP | | | | | | MAU | |
|---|---|---|---|---|---|---|---|---|
| | Cervidae | | domače živ. (domestic an.) | | Σ | | Σ | |
| | F 1 | F 2 | F 1 | F 2 | F 1 | F 2 | F 1 | F 2 |
| rogovje / antler | 1 | 0 | 0 | 0 | 1 | 0 | 2,4 | 0 |
| glava / head | 4 | 2 | 20 | 0 | 24 | 2 | 1,5 | 17,4 |
| zgornji niz zob / upper teeth | 8 | 6 | 12 | 0 | 20 | 6 | } 24,3 | } 31,9 |
| spodnji niz zob / lower teeth | 6 | 4 | 20 | 13 | 26 | 17 | | |
| vrat / neck | 1 | 1 | 0 | 0 | 1 | 1 | 1,5 | 5,8 |
| okolčje / pelvis | 3 | 0 | 0 | 1 | 3 | 1 | 1,5 | 0 |
| zgornji del prednjih okončin / upper front | 12 | 1 | 12 | 4 | 24 | 5 | 16,1 | 11,6 |
| spodnji del prednjih okončin / lower front | 7 | 2 | 9 | 0 | 16 | 2 | 15,0 | 6,7 |
| zgornji del zadnjih okončin / upper hind | 4 | 1 | 13 | 4 | 17 | 5 | 15,3 | 8,7 |
| spodnji del zadnjih okončin / lower hind | 11 | 1 | 12 | 0 | 23 | 1 | 12,3 | 7,0 |
| prsti / feet | 12 | 8 | 27 | 6 | 35 | 14 | 10,0 | 10,9 |
| **Mann-Whitney U test** | z = 0,907<br>p = 0,364 | | z = 0,567<br>p = 0,570 | | z = 0,378<br>p = 0,705 | | z = 0,378<br>p = 0,705 | |

*Tab. 3.7.27:* Testiranje statistične značilnosti razlik med obema naselbinskima fazama (t. j. F1 in F2) v deležu subfosilnih ostankov. Uporabljen je bil neparametrični Mann-Whitney U test. Kvantifikacija ostankov temelji na indeksih NISP in MAU. Za identifikacijo posameznih telesnih delov glej besedilo.
*Table 3.7.27:* Testing for statistically significant differences between the two settlement phases (i. e. F1 and F2) in the proportions of sub-fossil remains. The nonparametric Mann-Whitney U test was applied for this. Check text for identification of the individual body-parts.

spregledati vrstne sestave obeh skupin živali. Pri domačih so to svinja, ovca, koza, govedo ter pes. Z izjemo slednjega, ki v takratni(h) skupnosti(h) domnevno vendarle ni bil predvsem vir mesa, so bile ostale tri vrste v tem smislu gotovo zelo pomembne. Bökönyi (1974) celo domneva, da naj bi bila živinoreja eneolitskih skupnosti srednje Evrope usmerjena predvsem v produkcijo čim večjih količin kvalitetnega mesa in maščob, medtem ko naj bi mleko (z izjemo kravjega) in ovčje runo še ne imela pomembnejše vloge. Za razliko od relativno majhnega števila vrst domačih živali, katerih ostanki so zajeti v našem vzorcu, je ugotovljena vrstna pestrost pri lovnih živalih precej večja. Pri slednjih je seveda širši tudi spekter velikosti osebkov, od najmanjših jazbecev in divjih mačk pa vse tja do medvedov. Nobenega dvoma ni, da so srne, jelene in divje prašiče lovili predvsem zaradi njihovega mesa (čeprav so seveda izkoriščali tudi produkte sekundarne ekonomije). Pri vseh treh gre namreč za živali z (že) zadovoljivo maso, ki so bile tudi relativno pogoste (gotovo pogostejše od zveri), lovce pa so ogrožale manj kot npr. medved. Nobenega dvoma sicer ni, da mesa ostalih, precej manjših živali niso zavrgli. Navsezadnje so v takratnem obdobju občasno uživali še tudi pse, kar je bilo v srednji Evropi opuščeno šele v bronasti dobi (Bartosiewicz 1999). Se pa gotovo ne zdi verjetno, da bi bil primarni namen lova na majhne zveri (jazbec, divja mačka, vidra, verjetno tudi lisica) in bobra ravno pridobivanje mesa. Takratnega lovca so namreč v omenjenih primerih verjetno bolj zanimali kožuhi uplenjenih živali (Vörös 1980; Zeiler 1987), kar se sklada tudi z zgornjo hipotezo o neizkoriščanju ovčjega runa (prim. Bökönyi 1974). Izbira plena torej ni bila vedno pogojena le z maso (in s tem količino mesa) posameznih živali. Tako naj bi šlo tudi pri lovu na medveda vsaj v določenih primerih v bistvu za obrambno dejanje (Bartosiewicz 1999), saj je ta ogrožal človeka in živino. Če ob tem upoštevamo tudi razlike v masi posameznih domačih in lovnih živali, se zdi hipoteza o vodilni vlogi živinoreje pri zadovoljevanju potreb po mesu in maščobah povsem upravičena.

Če vztrajamo pri predpostavki, da je obravnavani vzorec reprezentativen, bi lahko na podlagi izkopanih ostankov poskušali oceniti tudi vlogo posameznih domačih živali v takratni živinoreji. Kljub ugotovitvi, da gre del ostankov rodu *Sus* pripisati divjemu prašiču, ostajajo med vsemi domačimi živalmi v vzorcu (predvsem pa znotraj faze 1) kosti in zobje domačega prašiča daleč najštevilčnejši. Zaradi navedenega bi lahko sklepali, da je omenjena vrsta v takratni živinoreji zasedala zelo pomembno mesto. Domneva, če je pravilna, ne preseneča. Prispevek mesa pri prašičih, ovcah in kozah je sicer primerljiv (Bartosiewicz 1999). Večjih razlik med navedenimi vrstami ne gre pričakovati niti v zvezi s starostjo, v kateri je zakol zaradi pridobivanja mesa najprimernejši. Je pa prednost prašiča glede na ostale domače živali mogoče najti v njegovi reprodukcijski sposobnos-



It is very difficult to evaluate the importance of hunting versus animal husbandry for the Hočevarica communities (i.e. phases 1 and 2), due to doubts regarding the representativeness of the sample. Assuming that the obtained results adequately summarize the portrait of the entire community, the leading role as a source of meat and fat would be attributed to domestic animals. The proportion of bones and teeth attributed to hunting and to domestic animals is roughly equal (*table 3.7.1*; *figs. 3.7.2* and *3.7.3*), but we cannot ignore the structure of species of the two groups of animals. Domestic animals comprise of pig, sheep, goats, cattle and dog. Except for the latter, which presumably did not serve as a source of meat in those communities, the remaining three species undoubtedly did. Bökönyi (1974) presumes that animal husbandry in Eneolithic communities of Central Europe was directed primarily towards the production of maximum quantities of good quality meat and fat, while milk (except for cows') and sheep fleece did not play an important role. Unlike the relatively small number of domestic species whose remains were included in our sample, the hunting animal species are much more diverse. The range of the sizes of individuals of the latter is also much broader, ranging from the smallest, badgers and wildcats, to bears. There is no doubt that roe deer, red deer and wild pigs were hunted primarily for their meat (although of course their secondary products were also used). All three are animals of sufficient weight and they were also relatively frequent (much more so than carnivores); furthermore, they posed a much lesser threat to the hunter than, for instance a bear. It goes without saying that the meat of the other much smaller animals was certainly not discarded. In fact, in those times people also occasionally ate dog, a practice that was not abandoned in Central Europe until the Bronze Age (Bartosiewicz 1999). But it is not very likely that small carnivores (badger, wildcat, otter and probably also fox) and beaver were hunted primarily for their meat. In these cases the hunter was probably more interested in their fur (Vörös 1980; Zeiler 1987), which also corresponds with the above mentioned hypothesis regarding the lack of interest in sheep fleece (cf. Bökönyi 1974). The choice of the game therefore was not always conditioned by the weight (and subsequently the quantity of meat) of individual animals. Similarly, hunting bears was, at least to some extent, an act of defense (Bartosiewicz 1999), since it threatened man and his domestic animals. So if the differences in the weight of domestic and hunting animals are taken into account, the hypothesis of animal husbandry playing the leading role in satisfying the need for meat and fat seems perfectly plausible.

If faithful to the presumption that our sample from Hočevarica is representative, we could, on the basis of the excavated remains, also evaluate the role of individual domestic animals in the animal husbandry of the ti. Svinja ima namreč v povprečju precej več mladičev (do deset), kot to velja za koze, ovce ali krave, ki jih imajo le redko več kot tri (Higham 1967; Bartosiewicz 1998; Clutton-Brock 1999). V skladu z navedenim je bilo tako mogoče obseg čred prašičev v obdobjih pomanjkanja hrane (tj. konec jeseni do pomladi) drastično zmanjšati, ne da bi se to očitneje odražalo pri njihovi ponovni regeneraciji naslednjo pomlad. Seveda je prosperiteta populacije močno povezana tudi z okoljem, v katerem živi. To v nekoliko manjši meri velja tudi za domače živali (Bökönyi 1995; Bartosiewicz 1996). Prašiču ustrezajo listnati in mešani gozdovi pa tudi obsežnejša močvirja (Kryštufek 1991), medtem ko govedo in drobnica preferirajo bolj odprte habitate (Jarman 1975). Paleobotanične analize v okviru najdišča Hočevarica so potrdile obstoj mešanih gozdov, vključno s hrastom in bukvijo (Jeraj 2000; glej *poglavje 3.2*). Verjetna se zdi tudi prisotnost močvirnih (*Alnus*) in/ali vsaj občasno poplavljenih površin (npr. *Trapa natans*). V skladu z navedenim bi lahko dejansko sklepali na za rejo prašičev naklonjeno paleookolje, predvsem v obdobju naselbinske faze 1. Kasneje (faza 2) naj bi se namreč gozdne površine dodatno skrčile (Jeraj 2000; glej *poglavje 3.2*), kar bi se lahko odražalo tudi v za to fazo značilnem zmanjšanju relativne pogostnosti prašičjih ostankov (*tab. 3.7.2*). Po drugi strani je tudi res, da oblika živinoreje (npr. prašičereja, ovčereja ipd.) ni bila izključno odraz paleookolja (Bartosiewicz 1996). Temu naj bi bilo tako sploh v obdobjih, v katerih je lov še igral pomembno vlogo (Bartosiewicz 1999). Na podlagi zgoraj opisanega sovpadanja med pogostnostjo ostankov (domačega) prašiča v vzorcu s Hočevarice (faza 1) na eni strani ter domnevno sliko takratnega paleookolja na drugi strani, o prašiču lahko sicer razmišljamo kot o najštevilčnejši (najpomembnejši?) domači živali takratne skupnosti. Vendar ob tem ne gre pozabiti, da so imeli pri določanju sestave prazgodovinskih čred pomembno (morda celo odločilno) vlogo tudi različni kulturni dejavniki, kot so tradicija, tabuji, religija idr. (Bartosiewicz 1994; 1996; 1999).

Za prašičem smo največji, v fazi 2 pa celo prevladujoči delež ostankov domačih živali pripisali ovci in kozi. Kot že omenjeno je ločevanje med obema navedenima vrstama na podlagi fragmentarnih kosti težavno, zato smo lahko do nivoja vrste determinirali le osem od skupno 41 ostankov (*tab. 3.7.4*). Žal je navedena številka premajhna, da bi omogočala ocenjevanje dejanskega številčnega razmerja med obema vrstama. Težko se je tudi opredeliti do domneve, da v takratni(h) skupnosti(h) mleko in/ali ovčje runo še nista imela pomembnejše vloge (Bökönyi 1974). Res je sicer, da so ostanki koze številčnejši od ovčjih, kar bi načeloma lahko potrjevalo zanemarljivo vlogo runa. Res je tudi, da podatki iz *tabel 3.7.6* in *3.7.7* kažejo prevlado ostankov enoletnih do triletnih osebkov, kar je glede na pridelovanje mleka še prezgodnja starost za zakol (Jarman 1975). Vendar

time. Even if a part of the remains of the *Sus* genus is attributed to the wild boar, the bones and teeth of the pig among the remains of all the domestic animals in the sample are still by far the most numerous (especially within phase 1). These factors justify the conclusion that this species played a very important role in the animal husbandry of the time. This presumption, providing it is correct, is not surprising. The share of meat in pigs, sheep and goats is comparable (Bartosiewicz 1999), and major differences cannot be expected among the three species regarding the most suitable age to slaughter them for their meat. Nonetheless, the advantage of pig over other domestic animals is in its reproductive capacities. On average, a sow has many more (up to ten) young as compared to sheep, goats or cattle, which rarely have more than three (Higham 1967; Bartosiewicz 1998; Clutton-Brock 1999). It follows that the size of the pig herd could be drastically reduced during the period of a food shortage (i.e. from the end of autumn until spring) without seriously threatening its prospects of regeneration the following spring. Of course the prosperity of a population is strongly connected to the environment in which it lives. To a minor extent this also holds true for domestic animals (Bökönyi 1995; Bartosiewicz 1996). The pig prefers deciduous and mixed forests and large marshes (Kryštufek 1991), while cattle, sheep and goats prefer open habitats (Jarman 1975). Paleobotanical analyses at the Hočevarica site confirmed the existence of mixed forests, including oak and beech (Jeraj 2000; check *chapter 3.2*). The existence of marshlands (*Alnus*) and/or intermittent flooded areas (e.g. *Trapa natans*) is also very probable. These grounds lead to the conclusion that the paleo-environment was suitable for breeding pigs, especially during the period of settlement phase 1. Later (phase 2) the forest areas were supposedly reduced (Jeraj 2000; check *chapter 3.2*); this may have been reflected in a reduction in the relative frequency of pig remains characteristic for this phase (*table 3.7.2*). However, it is also true that the methods of animal husbandry at the time (e.g. pig, sheep breeding, etc.) were not exclusively a reflection of the paleo-environment (Bartosiewicz 1996). This was even more so in an age when hunting still played an important role (Bartosiewicz 1999). Correspondences between the frequency of the remains of the (domestic) pig in the Hočevarica sample (phase 1) and the probable portrait of the paleo-environment of the time substantiate that the pig was presumably the most numerous (and most important) domestic animal in the community. However, the influential (and perhaps even decisive) roles played by various cultural factors, such as tradition, taboos, religion, etc. in determining the structure of prehistoric herds should certainly not be overlooked (Bartosiewicz 1994; 1996; 1999).

Goat's and/or sheep's bones were the second most numerous in the whole sample, being in the same pre-absolutno preskromno število najdb onemogoča odgovor na vprašanje ali lahko v navedenih podatkih iščemo potrditev hipoteze o pretežno v produkcijo mesa orientirani reji drobnice, ali pa gre pri tem vendarle predvsem za naključja, ki ne odražajo realnega stanja najdišča.

Podobno kot za drobnico je tudi za domače govedo kakršna koli ocena njegovega pomena v takratni(h) skupnosti(h) še preuranjena. S precejšnjo verjetnostjo lahko trdimo le, da je bila omenjena vrsta verjetno pomembnejša od tistega, na kar kaže majhno število njej pripisanih ostankov v vzorcu (tj. le 17). Upoštevati moramo namreč veliko maso živali ter verjetnost, da je bilo v okviru govedoreje relativno pomembno tudi pridobivanje mleka (Bökönyi 1974). Ne nazadnje je človek ob zakolu enega samega odraslega goveda pridobil okrog 215 kg mesa in to upoštevajoč dejstvo, da so bile takratne domače živali manjše od današnjih (Jacomet, Schibler 1985). Sicer pa je bila prav masa goveda tista, ki je v veliki meri določala obseg čred. Poglavitni problem govedoreje je namreč bil zagotoviti zadovoljivo zimsko oskrbo živine s hrano, kar je za takratnega človeka ob domnevno nezadostnih pašniških površinah zagotovo predstavljalo velik zalogaj. Prav od sposobnosti premagovanja omenjene težave je bil odvisen obseg jesenskega zakola ter posledično velikost črede goved preko zime. V vsakem primeru je zimsko čredo sestavljalo dokaj omejeno število živali, kar se je nedvomno odražalo tudi na velikosti čred(e) naslednje poletje (Higham 1967; 1968).

Za boljše razumevanje takratnega načina živinoreje bi bilo zanimivo analizirati tudi sezonskost zakola. Zaradi majhnega števila razpoložljivih ostankov je bilo mogoče nihanje števila zaklanih živali v letu oceniti samo pri prašiču, pa še v tem primeru le zelo grobo. Starost ob smrti (zakolu) osebka smo ocenili z analizo obrabe zob. Pri tem smo pri spodnjih meljakih uporabili smernice, ki sta jih objavila Rolett in Chiu (1994), pri ostalih zobeh pa nekoliko manj zanesljiva navodila Highama (1967). Na tak način smo obdelali pretežni del razpoložljivih zob. Rezultati so pokazali, da naj bi bila večina prašičev, katerih zobje so bili vključeni v našem vzorcu, zaklanih v jesenskem času, in sicer pri domnevni starosti 17 do 22 mesecev oziroma (pri enem primeru) približno 30 do 34 mesecev (*sl. 3.7.16*). Preostali del analiziranih zob kaže na zimski oziroma zgodnjepomladni zakol (domnevna starost 22 do 27 mesecev). Rezultat nikakor ne preseneča. Dejstvo namreč je, da je bila prašičereja orientirana skoraj izključno v produkcijo mesa in maščobe. Živinorejske skupnosti so vsekakor morale upoštevati optimalni čas za zakol živali, da bi se tako izognile izgubam mesa, maščob in kostnega mozga. (Pozni) jesenski in zgodnji zimski zakol je omogočal prav to, saj je izkoriščal zmožnost prašičev, da med jesenskim hranjenjem v okoliških mešanih gozdovih občutno pridobijo na teži. Tudi starost osebkov ob zakolu (večinoma med 17 in 27 meseci) ne preseneča, saj je bil izko-



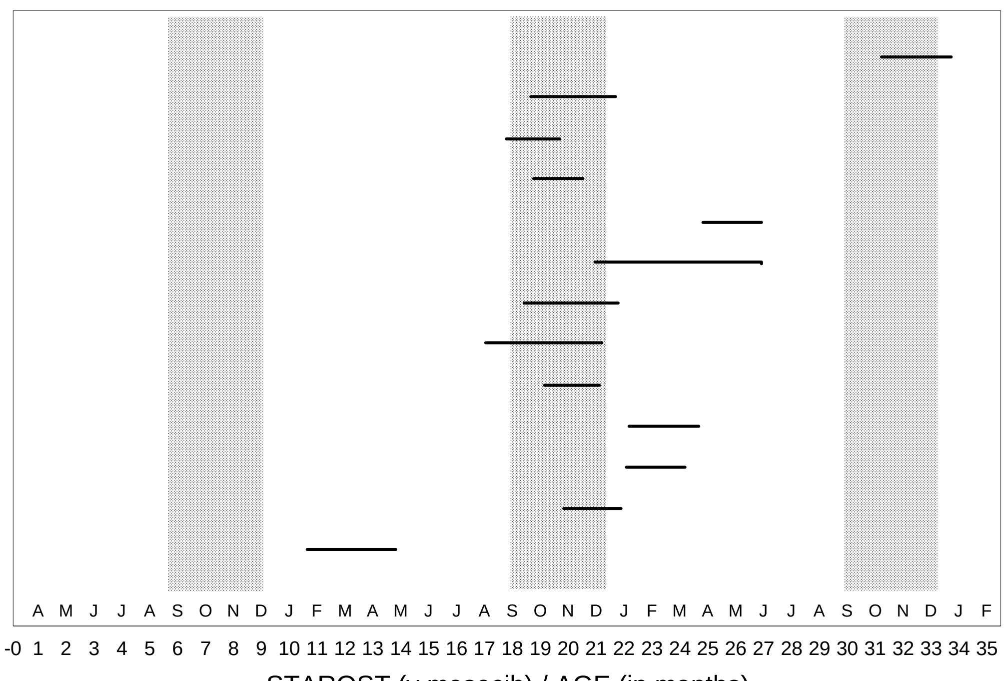
dominant in the phase II sub-sample alone. As already clarified, distinguishing between the two species on the basis of fragmented bones is difficult and so only eight of a total of 41 remains could be determined to the level of species (*table 3.7.4*). Unfortunately this number is too small to allow an evaluation of the actual numeric ratio between the two species. Furthermore, it is difficult to commit to the presumption that milk and sheep fleece did not play a significant role in the communities of the time (Bökönyi 1974). The fact that goat remains are more frequent than the remains of sheep could confirm the negligible role of fleece. Moreover, the data shown in *tables 3.7.6* and *3.7.7* evidences a predominant quantity of remains of one to three year old individuals, which is, in terms of milk production, too early for slaughter (Jarman 1975). However, the number of finds is absolutely too small to provide a reliable answer to the question of whether the data can confirm the hypothesis that sheep and goats were bred mainly for meat production, or whether these are only coincidences, which do not reflect the real conditions of the site.

Similarly as for sheep and goats any evaluation of the role of cattle in the communities of the time would be too premature. We can only reasonably say that the species was probably much more important than the scarcity of the remains (i.e. only 17) attributed to it would indicate. We must take into account the weight of the animal and the probability that it was used for milk production (Bökönyi 1974). After all, slaughtering a full grown cow would yield about 215 kg of meat, with regard to the fact that the cattle of the time were much smaller than today (Jacomet, Schibler 1985). The size of the cattle to a large extent also determined the size of the herd. The primary problem in breeding cattle was to ensure enough fodder for the winter, which must have been quite a difficult task for the people of the time, especially since the grazing grounds were probably limited. It was the capacity to overcome this difficulty that determined the kill-off and consequently the size of the cattle herd during winter. In any case, the winter herd must have been fairly limited, which would undoubtedly affect also the size of the herd the following summer (Higham 1967; 1968).

An analysis of the seasonal dependency of the slaughter would help to better understand the methods of animal farming at the time. Due to the low number of available remains, the fluctuation in the number of slaughtered animals through the year could be evaluated only for the pig and even that only roughly. The age of the individual at the time of death (slaughter) was evaluated by analyzing the teeth wear. The guidelines published by Rolett and Chiu (1994) were applied for the lower molars, and the somewhat less reliable instructions by Higham (1967) for the other cheek teeth. The majority of available teeth were thus analyzed. The results showed that the majority of the pigs whose teeth ristek mesa pri prašičih (glede na v (vz)rejo vložen napor) največji prav v obdobju med poldrugim in tretjim letom starosti (Jarman 1975; Albarella, Serjeantson 2002). Rezultati so torej pričakovani, previdnost pri njihovi interpretaciji pa vseeno ni odveč. Ne gre namreč pozabiti na številne slabosti, povezane tako z ocenjevanjem starosti osebkov na podlagi analize obrabe zob (predvsem zgornjih (pred)meljakov) kot tudi vprašljive reprezentativnosti tako majhnega vzorca.

Jesenski oziroma zgodnji zimski zakol je bil priporočljiv tudi za ovce, koze in krave, saj je po obilni pašni sezoni njihovo meso doseglo najvišjo stopnjo hranilnosti. Poleg tega pa so na ta način rešili tudi problem zimskega krmljenja goveda. Izjema v tem je bil bik, ki doseže najvišjo hranilno vrednost tik pred poletnim parjenjem in lahko do jeseni izgubi tudi do deset odstotkov telesne teže (Higham 1967; Greif 1997). Žal skromno število najdb onemogoča testiranje omenjene hipoteze na najdišču Hočevarica. Z zadovoljivo stopnjo zanesljivosti lahko omenimo le, da je bila srna iz faze 2, katere starost smo na podlagi spodnje čeljustnice ocenili na 10 do 11 mesecev, uplenjena zgodaj spomladi. Gre sicer za izoliran podatek, ki ima tudi temu primerno izpovedno vrednost. Velja omeniti, da je bil lov ob koncu zime in (zgodaj) pomladi domnevno res najintenzivnejši, saj so (je-

were included in the sample were slaughtered in autumn, at an assessed age of 17 to 22 months or (in one case) approximately 30 to 34 months (*fig. 3.7.16*). The remaining analyzed teeth indicate that the animals were slaughtered during winter or in early spring (probable age 22 to 27 months). The results are not surprising. The fact is that pig breeding was aimed primarily towards the production of meat and fat. A community dependent on animal husbandry had to observe the optimal time for slaughtering their animals to avoid the loss of meat, fat and marrow. (Late) autumn and early winter slaughtering provided just that, and also exploited the pig's capacity to accumulate weight during autumn feeding in the surrounding mixed forests. Nor does the age of the individuals at the time they were slaughtered (mainly at the age of 17 to 22 months) come as a surprise, since the ratio between the quantity of the meat and the effort invested in feeding the animal was best when the animal was one and a half to three years old (Jarman 1975; Albarella, Serjeantson 2002). Such results were anticipated, but one should still be cautious in interpreting them. The many shortcomings of age evaluation based on tooth wear (especially upper (pre)molars) and the questionable representativeness of the small sample should not be overlooked.

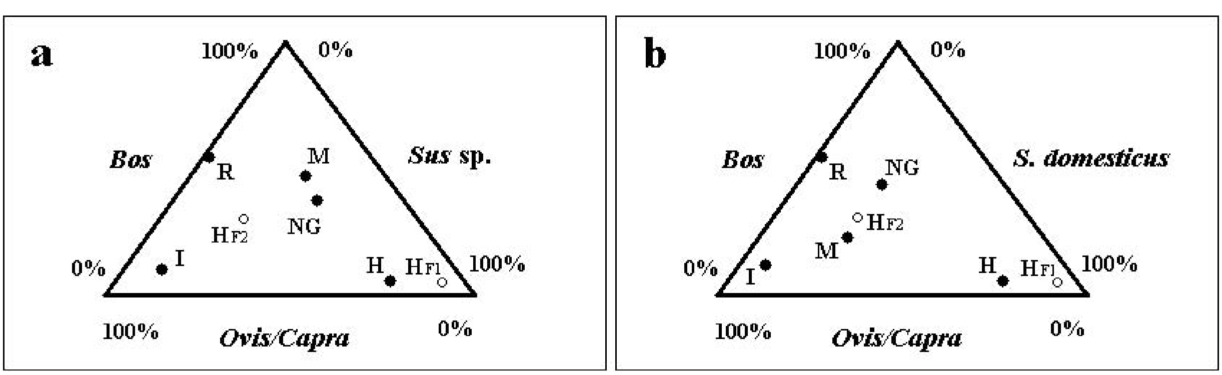



*Sl. 3.7.16:* Ocena sezone zakola/uplenitve prašičev (*Sus* sp.), katerih meljaki so bili zastopani v obravnavanem vzorcu. Vsak meljak, za katerega je bilo mogoče določiti (vsaj približno) starost, je predstavljen s črto, ki označuje najverjetnejšo sezono zakola/uplenitve in pa domnevno starost živali ob smrti. V primerih, ko je bilo v okviru iste čeljustnice ohranjenih več zob, je bil analiziran le po eden. Jesenski meseci so osenčeni.
*Fig. 3.7.16:* Diagram showing seasonality of pig (*Sus* sp.) slaughtering, corresponding to the molars represented in the discussed sample. Each molar for which the age could be determined (at least approximately) is marked by a line designating the most probable season of slaughter. In examples of mandibles with more than one preserved molar, only one was analysed. Autumn months are shaded.

senske) zaloge hrane že pohajale, pomladna regeneracija čred pa se je šele pričenjala (Vörös 1980; Bartosiewicz 1999).

Naj ob koncu podamo še kratko oceno paleookolja, ki izhaja iz razpoložljivega materiala. Dejstvo sicer je, da so mali sesalci boljši kazalec preteklih habitatov, kot to velja za velike (Andrews 1990), vendar je ostankov prvih v okviru obdelanega materiala zanemarljivo malo. Skupno je namreč vzorec obsegal le 15 spodnjih čeljusti navadnega polha *Glis glis* (Linnaeus, 1758), katerega ostanki nakazujejo prisotnost mešanih gozdov. Tako je polh odvisen od semen, plodov in podobne mehke ter hranljive hrane, zato ne more preživeti v čistih sestojih iglavcev (Kryštufek 1991). Ker pa je v času poletne prehranjevalne krize (zaradi odsotnosti žira) njegov obstoj vezan na druge prehrambene vire (npr. lesko), lahko prisotnost polha razumemo kot razmeroma zanesljiv dokaz obstoja listnatih, mešanih mozaičnih gozdov z odprtinami in zgodnjimi sukcesijskimi stadiji (Kryštufek 2001).

Ocenjevanje paleookolja na podlagi ostankov velikih sesalcev je, kot že omenjeno, manj zanesljivo, saj imajo ti širšo ekološko valenco in večjo zmožnost migracije. Ostanki jelena, medveda, divje mačke in jazbeca sicer nedvomno kažejo na prisotnost gozdov, ki so bili




*Sl. 3.7.17:* Relativna pogostnost ostankov drobnice, domačega goveda in pa bodisi divjega in domačega prašiča skupaj (a), bodisi izključno domačega prašiča (b) v okviru posameznih (e)neolitskih najdišč Ljubljanskega barja. Kvantifikacija ostankov temelji na indeksu NISP. Identifikacija simbolov: R – Resnikov prekop, M – Maharski prekop, H – Hočevarica, H F1 – Hočevarica (faza 1), H F2 – Hočevarica (faza 2), I – Ig ter NG – Notranje Gorice.

*Fig. 3.7.17:* Relative frequency of the remains of ovicaprines, cattle and either pigs and wild boar together (a), or just pigs (b) at (E)neolithic pile dwellings in the Ljubljansko barje. The NISP index is used for quantification purposes. Legend: R – Resnikov prekop, M – Maharski prekop, H – Hočevarica, H F1 – Hočevarica (phase 1), H F2 – Hočevarica (phase 2), I – Ig and NG – Notranje Gorice.

Autumn and early winter slaughter would be recommended also for sheep, goats and cattle, when after abundant summer grazing their meat would have the highest nutritional value. Such practice would also have solved the problem of winter feeding for cattle. The exception in this case would be the bull, which reaches its highest nutritional value just before the summer mating season and can lose up to 10 % of its body weight by autumn (Higham 1967; Greif 1997). Unfortunately the small sample does not provide enough information to test this hypothesis for the Hočevarica site. We can reliably say only that the roe deer from phase 2, whose determined age was 10 to 11 months on the basis of the mandible, was killed in early spring. This is an isolated piece of data, which also has a corresponding expressive value. Hunting was probably most intensive at the end of winter and in (early) spring when the autumn food stocks were diminishing and the spring regeneration of herds had only just begun (Vörös 1980; Bartosiewicz 1999).

In the end, let us present a short evaluation of the paleo-environment, that is, as much as can be deduced from the available material. It is a fact that small mammals are a much better indicator of past habitats than large mammals (Andrews 1990), but the amount of remains of the former in the analyzed material was negligible. The sample contained a total of 15 mandibles of the edible dormouse *Glis glis* (Linnaeus, 1758). Its remains indicate the presence of mixed forests. The dormouse depends on seeds, fruit and similar soft food and cannot survive in coniferous forests (Kryštufek 1991). During the summer food shortage (caused by the absence of masts) its existence depends on other food sources (i.e. hazel). The presence of the dormouse is reliable proof of the existence of deciduous, mixed mosaic forests with openings and early successional stages (Kryštufek 2001).

Assessing the paleo-environment on the grounds of the remains of large mammals is less reliable, since they have a broader ecological valence and a greater capacity for migration. The remains of red deer, bear, wildcat and badger undoubtedly indicate the presence of forests, which were most probably mixed forests. On the other hand the roe deer and fox are indicators of a po vsej verjetnosti mešani. Po drugi strani je mogoče srno in lisico razumeti kot indikatorja mozaičnega prepleta gozdičev in odprtih predelov (Kryštufek 1991). Vendar pa lahko (vsaj kar zadeva domače živali) domnevno najzanesljivejšo oceno paleookolja dobimo z analizo razmerja med prašičem na eni ter ovco in kozo na drugi strani (Bartosiewicz 1996). Prvi namreč kažejo na prisotnost mešanih ali listnatih gozdov, lahko tudi obsežnih močvirij, medtem ko drobnica preferira odprte in bolj suhe habitate. Kot že omenjeno (*tab. 3.7.2*; *sl. 3.7.17*), je pogostnost ostankov prašiča v starejši naselbinski fazi precej večja, kot to velja za ovco in kozo, medtem ko se v okviru faze 2 razmerje obrne v prid drobnice (*sl. 3.7.17*). Ob predpostavki o reprezentativnosti vzorca bi tako pričakovali, da je prišlo na območju Hočevarice v zgodnjem 36. stoletju pr. Kr. do dokaj očitnih paleookoljskih sprememb. Domnevno naj bi imel namreč med zgodnejšo naselbinsko fazo v okolici kolišča mešan gozd še razmeroma pomembno vlogo, kasneje pa naj bi se na njegov račun še dodatno povečal delež odprtih (pašniških in obdelovalnih) površin. Morda lahko s tem razložimo tudi nekoliko povečan delež kosti in zob srne ter goveda med ostanki iz faze 2 (*tab. 3.7.2*). Na podobne paleookoljske spremembe na prehodu med fazama 1 in 2 kažejo tudi rezultati paleobotaničnih analiz (Jeraj 2000; glej *poglavje 3.2*). Seveda obstaja tudi možnost, da so ugotovljena nihanja deležev posameznih vrst med obema fazama predvsem posledica majhnega vzorca in, kar zadeva dihotomijo prašič-drobnica, kulturnih dejavnikov (Bartosiewicz 1999).

Primerjava subfosilnih ostankov s Hočevarice s tistimi z drugih prazgodovinskih najdišč Ljubljanskega barja je dokaj težavna, saj so bile uporabljene zelo različne tehnike izkopavanja. Očitne so tudi razlike v sami velikosti posameznih vzorcev. Zaradi navedenega so vprašljive resnejše interpretacije razlik med posameznimi najdišči. Na tem mestu tako podajamo le kratek pregled. Ob primerjanju deleža lovnih in domačih živali se npr. pokaže, da so ostanki prvih praviloma številčnejši. Izjema je le eneolitsko najdišče Maharski prekop (Drobne 1974a; 1974b; 1975), kjer je bilo domačim živalim pripisanih 62 odstotkov kosti in zob. Med lovnimi vrstami je v veliki večini primerov daleč najbolje zastopan jelen, medtem ko na drugem mestu praviloma prevladujejo na gozd vezane vrste: los (Resnikov prekop, 5. tisočletje; Drobne 1964), divji prašič (Maharski prekop, 4. tisočletje) ali bober (Ig oziroma Ižanska kolišča, 3. tisočletje; Drobne 1973). Tudi v mezolitski postaji Breg (Pohar 1984) največji delež ostankov pripada prav jelenu (68 %) in divjemu prašiču. Nekakšno izjemo predstavlja le eneolitsko najdišče Notranje Gorice (Drobne 1973), kjer se jelenu na prvem mestu pridružuje divja svinja (vsak po pribl. 13 %), medtem ko je srna (s pribl. 8 % vseh ostankov) tretja. Glede tega je prav slika iz Notranjih Goric najbolj podobna tisti s Hočevarice, čeprav so razlike med navedenima najdiščema še vedno

mosaic landscape of woods and open terrain (Kryštufek 1991). However, we can (at least as far as domestic animals are concerned) get the best evaluation of the paleo-environment from an analysis of the ratio between pigs and sheep/goats (Bartosiewicz 1996). The former indicates the presence of mixed or deciduous forests, and possibly also large marshes, while sheep and goats prefer open and dryer habitats. As already pointed out (*table 3.7.2*; *fig. 3.7.17*), the frequency of pig remains in the older settlement phase is greater than that of sheep and goats, while in the second phase this ratio turns in favor of the latter (*fig. 3.7.17*). Assuming that the sample is representative, we could expect that in the early 36th century B.C. some visible paleo-environmental changes occurred in the Hočevarica region. Presumably the mixed forest played a relatively important role during the early settlement phase, while later the proportion of open (pastures and cultivated) land increased. This could explain the slightly increased proportion of bones and teeth belonging to the roe deer and cattle among the remains from phase 2 (*table 3.7.2*). Paleo-botanical analysis also indicates similar paleo-environmental changes between phase 1 and phase 2 (Jeraj 2000; check *chapter 3.2*). It is of course possible that the fluctuations in the proportions of individual species are a consequence of the limited sample and as concerns the pig-sheep/goats dichotomy, the result of cultural factors (Bartosiewicz 1999).

Comparison of the sub-fossil remains from Hočevarica with those from other prehistoric sites in the Ljubljansko barje is fairly difficult, due to the practice of different excavation techniques. The variance in the size of the samples is also evident. This means that serious interpretations of the differences between the sites would be questionable. At this point we can only present a short review. A comparison of the proportion of hunting and domestic animals shows that the remains of the former are generally more numerous. The only exception is the Eneolithic site at Maharski prekop (Drobne 1974a; 1974b; 1975), where 62 % of the bones and teeth were attributed to domestic animals. Among the hunting species the red deer is by far most frequent in the majority of cases, followed by other forest dependent species: elk (Resnikov prekop, 5th millennium B.C.; Drobne 1964), wild boar (Maharski prekop, 4th millennium) and beaver (Ig pile dwellings, 3rd millennium B.C.; Drobne 1973). At the Mesolithic site of Breg (Pohar 1984), the greatest proportions are also attributed to red deer (68 %) and wild boar. An exception is the Eneolithic site at Notranje Gorice (Drobne 1973), where wild boar shares first place with red deer (each about 13 %), and the roe deer (comprising about 8 % of all remains) takes third. In this way Notranje Gorice most resembles Hočevarica, although the distinctions between the two sites are still quite evident. One considerable difference is in the proportion of roe deer, which is the most frequent species represented in the Hočevarica sample (*table 3.7.1*).

zelo opazne. Predvsem velik je razkorak v deležu srne, saj je v vzorcu s Hočevarice najbolje zastopana vrsta (*tab. 3.7.1*). Na vprašanje, ali to odraža drugačno paleo-okolje, npr. več grmišč in sploh odprtih habitatov, ali gre morda le za artefakt majhnega vzorca, je pred nadaljnjimi izkopavanji težko reči.

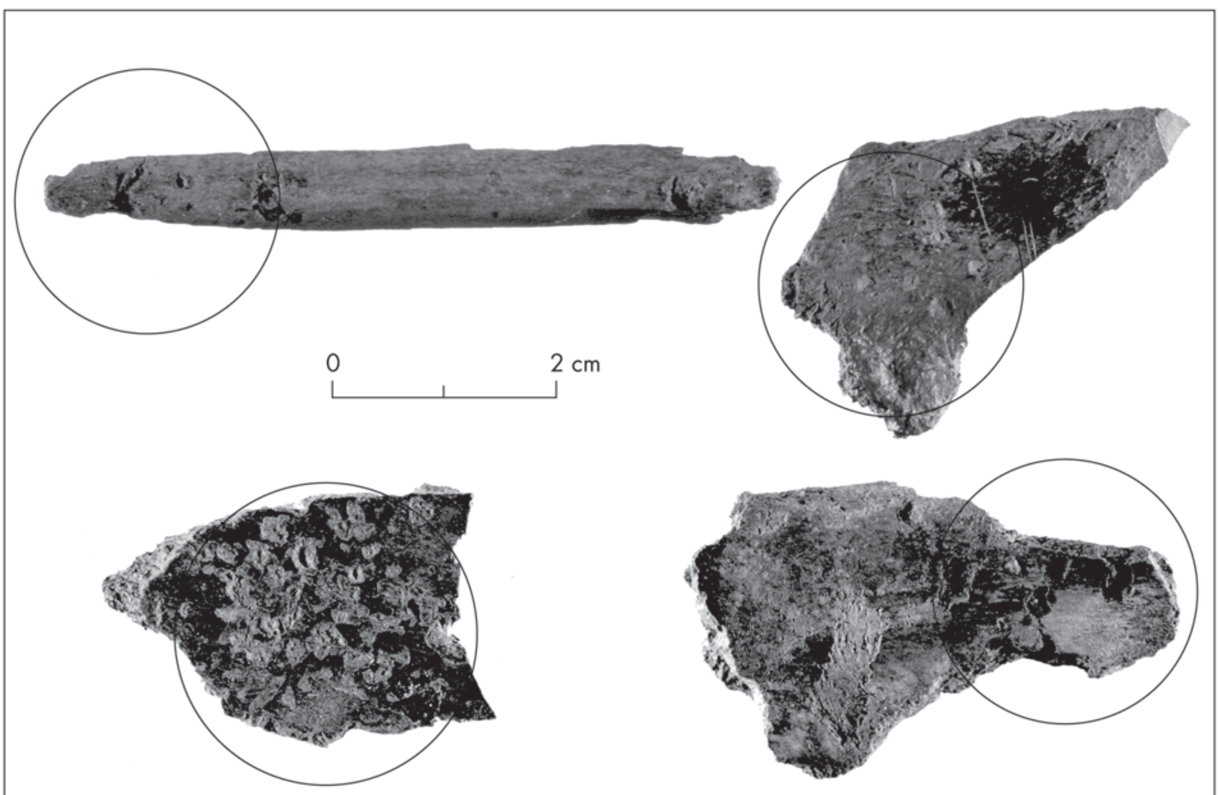
Sploh so neskladja med najdišči opazna tudi pri razmerjih med domačimi živalmi. Za razliko od Hočevarice, kjer je vodilno mesto zasedal prašič (*tab. 3.7.1*), so v preostalih najdiščih prevladovali bodisi ostanki ovce ali koze (Maharski prekop, Ig) bodisi domačega goveda (Resnikov prekop in Notranje Gorice). V vzorcih z navedenih štirih kolišč je domači prašič, če je bil sploh prisoten, zasedal šele tretje mesto (*sl. 3.7.17b*). Bartosiewicz (1999) sicer omenja možnost, da je delež domačih prašičev na najdiščih Ljubljanskega barja podcenjen, vendar tudi mednajdiščna primerjava pogostnosti ostankov ovce ali koze, goveda in obeh, tj. divjih in domačih prašičev skupaj, slike bistveno ne spremeni (*sl. 3.7.17a*). Zanimivo pri tem je, da je v okviru kolišča ob Hočevarici specifičen predvsem položaj ostankov iz faze 1, kar gre na rovaš daleč prevladujočega deleža prašiča. Slika,

*Sl. 3.7.18:* Primeri izkopanih kosti z vidnimi sledovi zverskih zob. Foto: M. Zaplatil.
*Fig. 3.7.18:* Excavated bones showing damage caused by animal teeth. Photo: M. Zaplatil.

The question of whether this reflects a different paleoenvironment, e.g. more shrubs and open habitats, or whether this is merely a case of a limited sample, cannot be answered until further excavation is undertaken.

The inconsistencies among the sites are evident also in the ratio between domestic animals. While the pig is prevalent (*table 3.7.1*) at Hočevarica, the predominant remains at other sites belong to sheep or goats (Maharski prekop, Ig), and cattle (Resnikov prekop and Notranje Gorice). In the samples from these four sites the pig, if at all present, ranked third (*fig. 3.7.17b*). Bartosiewicz (1999) pointed out the possibility that the proportion of domestic pig at the Ljubljansko barje sites was underestimated, however even a comparison among the sites of the frequency of remains of sheep or goats, cattle and both the wild boar and the domestic pig together, does not alter the image (*fig. 3.7.17a*). The interesting feature concerning the Hočevarica pile dwelling site is that the situation from phase 1 is specific on account of the predominant proportion of pig. The sub-fossil material from phase 2, with a predominant proportion of sheep and goats before domestic cattle, delineates a picture much more similar to that from Ig and Maharski prekop, the latter being in terms of time the closest to Hočevarica.

Some essential distinctions result if we stretch our comparison to the relative frequency of remains of individual species to the Eneolithic layers from the site at Podmol pri Kastelcu in the Kras (Turk et al. 1993); the



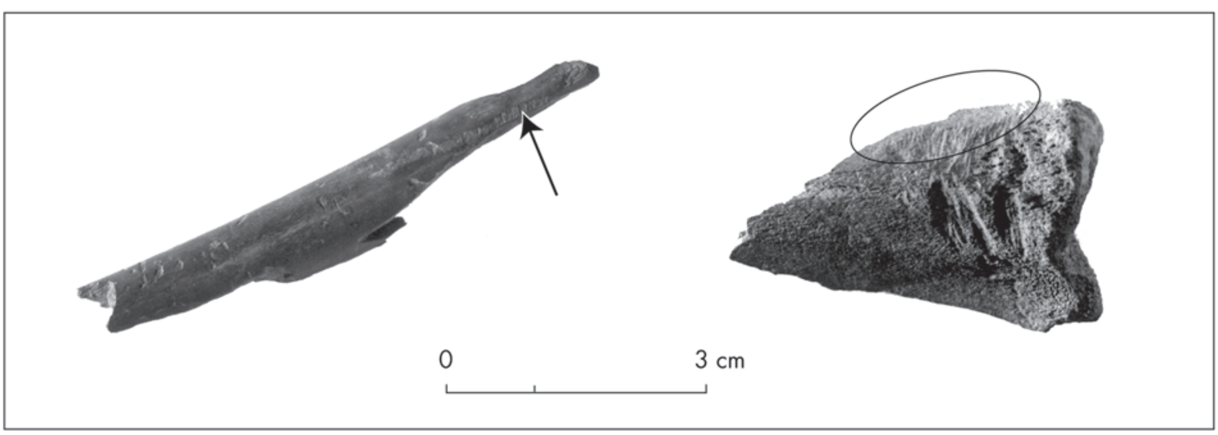
ki jo kaže subfosilni material iz faze 2 s prevladujočim deležem ovce ali koze pred domačim govedom, je namreč precej bolj podobna tistima z Iga in Hočevarici časovno najbližjega Maharskega prekopa.

Če primerjavo relativne pogostnosti ostankov posameznih vrst razširimo še na eneolitske plasti najdišča Podmol pri Kastelcu s Krasa (Turk et al. 1993), naletimo na nekatere bistvene razlike. Predvsem je drugačno razmerje med divjimi in domačimi živalmi. V Podmolu je delež kosti in zob divjih vrst le 12 odstotkov, na sočasnih najdiščih Ljubljanskega barja pa od 38 do 77 odstotkov vseh ostankov (Hočevarica: pribl. 52 %). Med lovnimi živalmi je tudi v Podmolu največ ostankov jelena, ki dosega kar 71 % delež, medtem ko se na Hočevarici absolutno najštevilčnejša srna pojavlja le sporadično. Med domačimi živalmi v vzorcu iz Podmola prevladuje drobnica (56 %), kar se sklada s podatki z navedenih najdišč na Ljubljanskem barju, vključno s fazo 2 na Hočevarici (*tab. 3.7.2*).

V zvezi z oceno paleookolja in diskusijami o takratni prisotnosti jezera na območju Ljubljanskega barja (prim. Melik 1946; Šifrer 1983; Pavšič 1989; Budja 1994) se zdi smiselno omeniti tudi najdene ostanke vidre in bobra. V obeh primerih gre namreč za na vodo vezani vrsti, ki dajeta potokom in manjšim rekam prednost pred stoječimi vodami kot je npr. jezero. Njuno prisotnost v vzorcu s Hočevarice torej ne gre razumeti kot neizpodbiten dokaz za obstoj jezera. Kljub temu analiza našega vzorca vendarle kaže, da bi lahko bila kolišča postavljena na vsaj del leta poplavljenih tleh. V to smer kaže npr. že omenjena odsotnost površinskih razpok in luščenj na površini izkopanih ostankov, po vsej verjetnosti pa tudi redkost (le 1 % NISP) obgrizenih kosti (*tab. 3.7.23*; *sl. 3.7.18*). Za osteološki material z različnih prazgodovinskih najdišč po Evropi je namreč značilno, da je delež obgrizenih ostankov dokaj visok in lahko presega 60 odstotkov (Albarella, Serjeantson 2002). Glede na to, da je prisotnost psov (pa tudi npr. lisice, divje mačke) v vzorcu s Hočevarice potrjena, bi lahko redkost obgrizenih kosti

prevailing distinction being a different ratio between wild and domestic animals. The proportion of the bones and teeth of wild species is 12 % at Podmol, while at contemporary sites in the Ljubljansko barje it measures 38 to 77 % of all the remains (Hočevarica: approx. 52 %). The majority of remains among hunting animals at Podmol also belong to the red deer, which reaches a 71 % proportion; while Hočevarica's absolutely most frequent species, the roe deer, is present only sporadically in Podmol. Among the domestic animals in the sample from Podmol, sheep and goats are predominant (56 %), which corresponds to the data from the above described sites in the Ljubljansko barje, including phase 2 at Hočevarica (*table 3.7.2*).

Concerning the assessment of the paleo-environment and the discussions regarding the presence of a lake in the Ljubljansko barje area (cf. Melik 1946; Šifrer 1983; Pavšič 1989; Budja 1994), the discovered remains of otter and beaver are particularly notable. Both species are closely tied to an aquatic environment, but prefer streams and small rivers before still waters, as e.g. lakes. Their presence at Hočevarica therefore cannot be understood as proof of the existence of a lake. Nevertheless, the analysis of our sample indicates that the pile dwellings would be on flooded ground at least a part of the year. The aforementioned absence of surface cracks and peeling on the surface of the excavated remains, and probably also the scarcity of gnawed bones (only 1 % of NISP), point in this direction (*table 3.7.23*; *fig. 3.7.18*). It is characteristic for osteological material from various prehistoric sites in Europe that the proportion of gnawed bone remains is fairly high and can sometimes exceed 60 % (Albarella, Serjeantson 2002). Considering that the presence of the dog (and also of the fox and wildcat) in the Hočevarica sample is confirmed, the scarcity of gnawed bones could be attributed at least partially to the possibility that kitchen refuse on the ground was not available to the animals. This would be the case if the buildings were built on marshes or on




*Sl. 3.7.19:* Primera izkopanih kosti z vidnimi sledovi glodalskih zob. Foto: M. Zaplatil.
*Fig. 3.7.19:* Excavated bones showing damage caused by rodent teeth. Photo: M. Zaplatil.

vsaj delno pripisali možnosti, da živilski odpadki na podlagi oziroma tleh živalim niso bili dostopni. Temu bi lahko bilo tako v primeru, če bi bile stavbe postavljene na zamočvirjenih oziroma poplavljenih tleh, tudi jezeru. Pri tem bi lahko vzroke, ki bi takratne ljudi pripravili do postavljanja kolišč na vodi, iskali v izkoriščanju dragocenih priobalnih površin za pašništvo in poljedelstvo (Gamble, Clark 1984), zagotavljanju večje varnosti ter morda tudi zaščiti zalog hrane pred glodalci. Prisotnost slednjih lahko v okviru Hočevarice brez dvoma potrdimo. Na nekaj izkopanih kostnih fragmentih (*sl. 3.7.19*) smo namreč opazili sledi, ki so jih pustili sekalci glodalcev.

## **3.7.4** ZAKLJUČEK

Arheozoološke analize lahko pridajo pomemben prispevek k poznavanju načina življenja v okviru prazgodovinskih in zgodovinskih skupnosti. Vendar pa je potrebno v želji po kar se da uporabnih rezultatih še pred samo analizo ugoditi tudi nekaterim zahtevam. Med njimi je brez dvoma najpomembnejša pridobiti reprezentativni vzorec živalskih ostankov. Le na ta način lahko namreč v zadovoljivi meri zaobjamemo intrapopulacijsko variabilnost posamezne vrste in heterogenost med različnimi deli obravnavanega najdišča (Maltby 1982; Bökönyi 1995). Žal primer Hočevarice s skromnim številom najdb in majhno površino, s katere najdbe izhajajo, ne dopuščata posploševanja posameznih ugotovitev na nivo celotnega najdišča. Potrditev oziroma zavrnitev nekaterih v prispevku postavljenih hipotez bo tako mogoča šele ob nadaljnjih izkopavanjih. V njihovo smiselnost in v luči številnih novih dognanj, zaobjetih v tej monografiji, nikakor ne gre dvomiti.

## ZAHVALA

Zahvaljujeva se dr. Antonu Velušču, ki nama je omogočil študij subfosilnega materiala. Za omogočen dostop do primerjalne osteološke zbirke Katedre za paleontologijo v okviru Naravoslovno tehniške fakultete gre najina zahvala prof. dr. Vidi Pohar. Dr. Ivanu Turku sva hvaležna za popravke in izboljšanja prvotne različice besedila.

flooded land, or even lake. Warranting why the inhabitants constructed their dwellings on water could be the exploitation of the valuable shore areas for grazing and cultivation (Gamble, Clark 1984), ensuring the inhabitants increased safety and possibly also protection of their food stock from rodents. The presence of the latter is reliably confirmed at Hočevarica, since traces of rodent incisors were discerned on some of the excavated bone fragments (*fig. 3.7.19*).

## **3.7.4** CONCLUSION

Archaeozoological analyses offer a significant contribution to understanding the lifestyle of prehistoric and historic communities. However, in the desire to obtain applicable results, some requirements must be met prior to analysis. The most import of them is undoubtedly to obtain a representative sample of the animal remains. This is the only way by which we can sufficiently comprehend the intra-population variability of individual species and the heterogeneity between the various segments of the site (Maltby 1982; Bökönyi 1995). Unfortunately the Hočevarica site, with its humble number of finds and limited area from which these finds originate, does not allow for generalization of individual conclusions to the level of the entire site. Confirmation or rejection of some of the hypotheses from this article will not be possible until further excavations are undertaken. In light of the numerous new events embraced in this monograph, there is no doubt in the rationality of such action.

## ACKNOWLEDGEMENTS

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# PRILOGE

| *Ovis s. Capra* | min – Me – max |
|---|---|
| **Scapula** | |
| 1. dolžina sklepne gladčine (LG) | 22 * (1) |
| 2. širina sklepna gladčine (BG) | 16,5 * (1) |
| 3. največja dolž. *processus articularis* (GLP) | 26,5 * (1) |
| **Ulna** | |
| 1. največja širina proks. sklepne gladčine (BPC) | 19 * (1) |
| 2. globina prek *processus anconaeus*-a (DPA) | 25 * (1) |
| 3. najmanjša globina *olecranon*-a (SDO) | 21 * (1) |
| **Femur** | |
| 1. (največja) širina proksimalnega konca (Bp) | 41 ** (1) |
| 2. (največja) globina *caput femuris*-a (DC) | 20 ** (1) |
| **Phalanx I** | |
| 1. (največja) širina proksimalnega konca (Bp) | 11,5 * (2) |
| 2. (največja) širina distalnega konca (Bd) | 10,5 * (2) |
| 3. največja dolžina (GL) | 38 – 39 * (2) |
| 4. najmanjša širina diafize (SD) | 8,5 – 9 * (2) |
| **Phalanx II** | |
| 1. (največja) širina proksimalnega konca (Bp) | 12,5 * (1) |
| 2. (največja) širina distalnega konca (Bd) | 9,5 * (1) |
| 3. največja dolžina (GL) | 26,5 * (1) |
| 4. najmanjša širina diafize (SD) | 10 * (1) |

*Priloga 3.7.1:* Dimenzije izkopanih ostankov koze (*) in ovce (**). Podani so mediana (Me), variacijska širina (min – max) ter število meritev (v oklepaju). Predstavljene dimenzije so povzete po von den Driesch (1976). Vse meritve so izražene v mm.
*App. 3.7.1:* Measurements of goat (*) and sheep (**) remains. Also given are the median (Me), range (min – max) and sample size (in parentheses). The measurements, in mm, were taken according to von den Driesch (1976).

| *Bos taurus* | vrednost (n) |
|---|---|
| **Astragalus** | |
| 1. največja dolžina lateralne polovice (GLl) | 63 (1) |
| 2. največja dolžina medialne polovice (GLm) | 59 (1) |
| 3. (največja) širina distalnega konca (Bd) | 38 (1) |
| 4. (največja) globina lateralne polovice (Dl) | 35 (1) |
| 5. (največja) globina medialne polovice (Dm) | 33 (1) |
| **Phalanx II** | |
| 1. (največja) širina proksimalnega konca (Bp) | 28,5 (1) |
| 2. (največja) širina distalnega konca (Bd) | 23,5 (1) |
| 3. največja dolžina (GL) | 40 (1) |
| 4. najmanjša širina diafize (SD) | 22 (1) |

*Priloga 3.7.2:* Dimenzije izkopanih ostankov domačega goveda (*Bos taurus*). Podani so izmerjena vrednost ter število meritev (v oklepaju). Predstavljene dimenzije so povzete po von den Driesch (1976). Vse meritve so izražene v mm.
*App. 3.7.2:* Measurements of cattle (*Bos taurus*) remains. The sample size is also given (in parentheses). The measurements, in mm, were taken according to von den Driesch (1976).

| ***Sus scrofa / domesticus*** | **min – Me – max (n)** |
|---|---|
| **$M_3$ (tretji spodnji meljak)** | |
| 1. dolžina $M_3$ (L) | 39 (1) |
| 2. širina $M_3$ (B) | 18 (1) |
| **Scapula** | |
| 1. širina sklepne gladčine (BG) | 25,5 (1) |
| **Humerus** | |
| 1. (največja) širina distalnega dela (Bd) | 50 – 53 (2) |
| 2. (največja) širina *trochlea*-e (BT) | 38 – 39 (2) |
| 3. najmanjša širina diafize (SD) | 21,5 (1) |
| **Radius** | |
| 1. (največja) širina proksimalnega konca (Bp) | 30,5 – 31,5 – 31,5 (3) |
| **Metacarpus III** | |
| 1. (največja) širina proksimalnega konca (Bp) | 19 – 22 (2) |
| **Pelvis** | |
| 1. dolžina *acetabulum*-a na obodu (LAR) | 32 (1) |
| **Femur** | |
| 1. (največja) širina distalnega dela (Bd) | 57 (1) |
| **Patella** | |
| 1. največja širina (GB) | 24 – 24 – 25 (3) |
| 2. največja dolžina (GL) | 26 – 26,5 – 27,5 (3) |
| **Metatarsus** | |
| 1. (največja) širina proksimalnega dela (Bp) | 17 (1) |
| **Phalanx I** | |
| 1. (največja) širina proksimalnega dela (Bp) | 19 (1) |
| **Phalanx II** | |
| 1. (največja) širina proksimalnega dela (Bp) | 19 – 20 – 22 (5) |
| 2. (največja) širina distalnega dela (Bd) | 15 – 17,5 – 19 (5) |
| 3. največja dolžina (GL) | 27,5 – 31 – 31,5 (5) |
| 4. najmanjša širina diafize (SD) | 14 – 16 – 18 (5) |
| **Phalanx III** | |
| 1. max diagonal. dolž. spodnje površine (DLS) | 34,5 – 39,5 – 42,5 (4) |
| 2. širina osred. dela spodnje površine (MBS) | 15,5 – 16,5 – 18,5 (4) |
| 3. dolžina dorzalne površine (Ld) | 36 – 38,5 – 39 (4) |

*Priloga 3.7.3:* Dimenzije izkopanih ostankov prašiča (*Sus* sp.). Podani so mediana (Me), variacijska širina (min – max) ter število meritev (v oklepaju). Predstavljene dimenzije so povzete po von den Driesch (1976). Vse meritve so izražene v mm.
*App. 3.7.3:* Measurements of pig/wild boar (*Sus* sp.) remains. Also given are the median (Me), range (min – max) and sample size (in parentheses). The measurements, in mm, were taken according to von den Driesch (1976).

| *Capreolus capreolus* | min – Me – max (n) |
|---|---|
| **Mandibula** | |
| 1. dolžina zobnega niza (7) | |
| 2. dolžina niza meljakov (8) | 69,5 (1) |
| 3. dolžina niza predmeljakov (9) | 40,5 (1) |
| 4. višina mandibule za $M_3$ | 29 (1) |
| 5. višina mandibule pred $M_1$ | 27 (1) |
| 6. višina mandibule pred $P_2$ | 16,5 (1) |
| **Scapula** | 15,5 (1) |
| 1. dolžina sklepne gladčine (LG) | |
| 2. širina sklepne gladčine (BG) | 20 – 22 – 24 (6) |
| 3. največja dolž. *processus articularis* (GLP) | 18,5 – 19,2 – 22 (6) |
| 4. najmanjša dolžina *collum scapulae* (SLC) | 24,5 – 28 – 29,5 (4) |
| **Humerus** | 19 (1) |
| 1. (največja) širina proksimalnega konca (Bp) | |
| 2. (največja) širina distalnega konca (Bd) | 33,5 (1) |
| 3. (največja) širina *trochlea*-e (BT) | 25,5 – 27 – 28,5 (3) |
| **Radius** | 24,5 – 25 (2) |
| 1. (največja) širina distalnega konca (Bd) | |
| **Ulna** | 24 (1) |
| 1. največja širina prox. sklepne gladčine (BPC) | |
| **Metacarpus** | 14 – 15 (2) |
| 1. (največja) širina proksimalnega konca (Bp) | |
| 2. (največja) širina distalnega konca (Bd) | 19,5 – 20,5 – 23 (6) |
| 3. njavečja dolžina (GL) | 21,5 (1) |
| 4. najmanjša širina diafize (SD) | 16,7 (1) |
| **Pelvis** | 12 – 13 (2) |
| 1. dolžina *acetabulum*-a (LA) | |
| 2. najmanjša širina vretena *ilium*-a (SB) | 27 (1) |
| **Tibia** | 8 (1) |
| 1. (največja) širina distalnega konca (Bd) | |
| 2. največja globina distalnega dela (Dd) | 21,5 – 27 – 27 (3) |
| 3. najmanjša širina diafize (SD) | 17,5 (1) |
| **Calcaneus** | 16,5 (1) |
| 1. največja dolžina (GL) | |
| 2. največja širina (GB) | 63 (1) |
| **Astragalus** | 18 (1) |
| 1. največja dolžina lateralne polovice (GLl) | |
| 2. največja dolžina medialne polovice (GLm) | 27 (1) |
| 3. (največja) širina distalnega konca (Bd) | 25 (1) |
| 4. (največja) globina lateralne polovice (Dl) | 16,5 (1) |
| 5. (največja) globina medialne polovice (Dm) | 14 (1) |
| **Metatarsus** | 18 (1) |
| 1. (največja) širina proksimalnega konca (Bp) | |
| **Phalanx I** | 20 (1) |
| 1. (največja) širina proksimalnega konca (Bp) | |
| 2. (največja) širina distalnega konca (Bd) | 9,5 – 11 – 11,5 (9) |
| 3. največja dolžina (GL) | 8 – 9,5 – 13 (13) |
| 4. najmanjša širina diafize (SD) | 32– 38,5 – 42 (10) |
| **Phalanx II** | 7 – 8 – 9 (12) |
| 1. (največja) širina proksimalnega konca (Bp) | |
| 2. (največja) širina distalnega konca (Bd) | 8 –10 –11 (10) |
| 3. največja dolžina (GL) | 6 – 7 – 7,5 (10) |
| 4. najmanjša širina diafize (SD) | 23,5 – 27 – 29,5 (11) |
| **Phalanx III** | 6 – 6,5 – 7,5 (11) |
| 1. max diagonal. dolž. spodnje površine (DLS) | |
| 2. širina osred. dela spodnje površine (MBS) | 22 – 25 – 25 (3) |
| 3. dolžina dorzalne površine (Ld) | 5 – 5,5 – 6 (3) |
| | 20 – 23,5 – 25,5 (3) |

*Priloga 3.7.4:* Dimenzije izkopanih ostankov srne (*Capreolus capreolus*). Podani so mediana (Me), variacijska širina (min – max) ter število meritev (v oklepaju). Predstavljene dimenzije so povzete po von den Driesch (1976). Vse meritve so izražene v mm.
*App. 3.7.4:* Measurements of roe deer (*Capreolus capreolus*) remains. Also given are the median (Me), range (min – max) and sample size (in parentheses). The measurements, in mm, were taken according to von den Driesch (1976).

| *Cervus elaphus* | min – Me – max (n) |
|---|---|
| **Scapula** | |
| 1. dolžina sklepne gladčine (LG) | 40 (1) |
| 2. širina sklepne gladčine (BG) | 36 (1) |
| **Radius** | |
| 1. (največja) širina distalnega konca (Bd) | 58 (1) |
| 2. širina *facies articularis distalis* (BFd) | 53 (1) |
| **Metatarsus** | |
| 1. (največja) širina distalnega konca (Bd) | 43 (1) |
| 2. (najmanjša) globina diafize (DD) | 21 (1) |
| **Astragalus** | |
| 1. največja dolžina lateralne polovice (GLl) | 57 (1) |
| 2. največja dolžina medialne polovice (GLm) | 52 (1) |
| 3. (največja) globina lateralne polovice (Dl) | 27,5 (1) |
| 4. (največja) globina medialne polovice (Dm) | 27 (1) |
| **Phalanx II** | |
| 1. (največja) širina proksimalnega konca (Bp) | 22 (1) |
| 2. (največja) širina distalnega konca (Bd) | 17 – 19 (2) |
| **Phalanx III** | |
| 1. širina osred. dela spodnje površine (MBS) | 11,5 (1) |

*Priloga 3.7.5:* Dimenzije izkopanih ostankov jelena (*Cervus elaphus*). Podani so mediana (Me), variacijska širina (min – max) ter število meritev (v oklepaju). Predstavljene dimenzije so povzete po von den Driesch (1976). Vse meritve so izražene v mm.
*App. 3.7.5:* Measurements of red deer (*Cervus elaphus*) remains. Also given are the median (Me), range (min – max) and sample size (in parentheses). The measurements, in mm, were taken according to von den Driesch (1976).

| *Castor fiber* | vrednost (n) |
|---|---|
| **Radius** | |
| 1. (največja) širina proksimalnega konca (Bp) | 11,5 (1) |
| **Tibia** | |
| 1. (največja) širina distalnega konca (Bd) | 19 (1) |
| **Calcaneus** | |
| 1. največja dolžina (GL) | 50 (1) |
| 2. največja širina (GB) | 16 (1) |
| **Metatarsus** | |
| 1. največja dolžina (GL) | 47,5 (1) |

*Priloga 3.7.6:* Dimenzije izkopanih ostankov bobra (*Castor fiber*). Podana sta izmerjena vrednost ter število meritev (v oklepaju). Predstavljene dimenzije so povzete po von den Driesch (1976). Vse meritve so izražene v mm.
*App. 3.7.6:* Measurements of beaver (*Castor fiber*) remains. The sample size is also given (in parentheses). The measurements, in mm, were taken according to von den Driesch (1976).

| *Vulpes vulpes* | vrednost (n) |
|---|---|
| **Ulna** | |
| 1. globina prek *processus anconaeus*-a (DPA) | 17 (1) |
| 2. najmanjša globina *olecranon*-a (SDO) | 15,5 (1) |
| **Tibia** | |
| 1. (največja) širina distalnega konca (Bd) | 15 (1) |
| 2. največja globina distalnega konca (Dd) | 12 (1) |

*Priloga 3.7.7:* Dimenzije izkopanih ostankov lisice (*Vulpes vulpes*). Podana sta izmerjena vrednost ter število meritev (v oklepaju). Predstavljene dimenzije so povzete po von den Driesch (1976). Vse meritve so izražene v mm.
*App. 3.7.7:* Measurements of fox (*Vulpes vulpes*) remains. The sample size is also given (in parentheses). The measurements, in mm, were taken according to von den Driesch (1976).

| *Ursus arctos* | vrednost (n) |
|---|---|
| **Metatarsus** | |
| 1. (največja) širina proksimalnega konca (Bp) | 13 (1) |
| 2. (največja) širina distalnega konca (Bd) | 16 (1) |
| 3. največja dolžina (GL) | 71,5 (1) |
| 4. največja širina (GB) | 10,5 (1) |

*Priloga 3.7.8:* Dimenzije izkopanih ostankov rjavega medveda (*Ursus arctos*). Podana sta izmerjena vrednost ter število meritev (v oklepaju). Predstavljene dimenzije so povzete po von den Driesch (1976). Vse meritve so izražene v mm.
*App. 3.7.8:* Measurements of brown bear (*Ursus arctos*) remains. The sample size is also given (in parentheses). The measurements, in mm, were taken according to von den Driesch (1976).

| *Lutra lutra* | vrednost (n) |
|---|---|
| **Atlas** | |
| 1. največja širina *facies articularis caudalis* (BFcr) | 22,5 (1) |
| 2. višina (H) | 18,5 (1) |
| 3. največja širina (GB) | 33 (1) |

*Priloga 3.7.9:* Dimenzije izkopanih ostankov vidre (*Lutra lutra*). Podana sta izmerjena vrednost in število meritev (v oklepaju). Predstavljene dimenzije so povzete po von den Driesch (1976). Vse meritve so izražene v mm.
*App. 3.7.9:* Measurements of otter (*Lutra lutra*) remains. The sample size is also given (in parentheses). The measurements, in mm, were taken according to von den Driesch (1976).

| *Felis sylvestris* | vrednost (n) |
|---|---|
| **Scapula** | |
| 1. dolžina sklepne gladčine (LG) | 16 (1) |
| 2. širina sklepna gladčine (BG) | 10,5 (1) |
| 3. največja dolž. *processus articularis* (GLP) | 16,5 (1) |

*Priloga 3.7.10:* Dimenzije izkopanih ostankov divje mačke (*Felis sylvestris*). Podana sta izmerjena vrednost in število meritev (v oklepaju). Predstavljene dimenzije so povzete po von den Driesch (1976). Vse meritve so izražene v mm.
*App. 3.7.10:* Measurements of wild cat (*Felis silvestris*) remains. The sample size is also given (in parentheses). The measurements, in mm, were taken according to von den Driesch (1976).

# **3.8** RIBE NA ARHEOLOŠKEM NAJDIŠČU HOČEVARICA

# **3.8** FISHES FROM THE ARCHAEOLOGICAL SITE AT HOČEVARICA

MARIJAN GOVEDIČ

*Izvleček*

*Na arheološkem najdišču Hočevarica so bili najdeni ostanki petih vrst rib (krapa, rdečeperke, ščuke, navadnega ostriža in rdečeoke). Glede na ekologijo najdenih vrst avtor razpravlja o takratnem habitatu, pomenu najdb in ribolovu koliščarjev.*

*Abstract*

*The remains of five species of fish (common carp, rudd, pike, perch and roach) were found at the archaeological site at Hočevarica. In view of the ecology of the found species the author discusses the habitat of the time, the significance of the finds and the fishing techniques of the pile dwellers.*

## **3.8.1** UVOD

Recentne in subfosilne vrste rib lahko skupaj s ptiči, dvoživkami in plazilci uvrščamo med najmanj raziskane skupine vretenčarjev na arheoloških najdiščih v Sloveniji. Tako je tudi poznavanje prisotnosti rib na arheoloških najdiščih v Sloveniji zelo pomanjkljivo. Verjetno je to posledica neustrezne izkopavalne metode, saj so bili ostanki rib sistematično pobrani šele pri izkopavanjih na koliščarskem najdišču Hočevarica v letu 1998, kljub temu da so bili prvi ostanki rib na Ljubljanskem barju najdeni že leta 1875.

Edini do sedaj znani podatki o prisotnosti rib na mlajših arheoloških najdiščih v Sloveniji so z ižanskih kolišč, na katerih je izkopaval D. Dežman[1] v letih 1875–1877 (Deschmann 1875a; Rakovec 1955; Drobne 1973; Greif 1997) oziroma W. Schmid v Notranjih Goricah v letih 1907–1908 (Rakovec 1955; Govedič, v pripravi[2]). Del takrat izkopanega materiala hrani Narodni muzej Slovenije (NMS) v Ljubljani, nekaj pa ga je tudi v muzejih v drugih državah (Rakovec 1955). Do sedaj so bili izkopani ostanki krapov (*Cyprinus carpio* Linnaeus, 1758), ščuk (*Esox lucius* Linnaeus, 1758) in somov (*Silurus glanis* Linnaeus, 1758). Na Ljubljanskem barju so

[11] D. Dežman (slo.) = K. Deschmann (nem.).

[2] M. Govedič, Krap na Ljubljanskem barju pred 5600 leti (v pripravi).

## **3.8.1** INTRODUCTION

Together with birds, amphibians and reptiles, recent and sub-fossil fish species rank among the least researched groups of vertebrates at archeological sites in Slovenia. The result is extremely incomplete knowledge of the presence of fish at archaeological sites. This is probably due to inappropriate excavation methods. Moreover, fish remains were never systematically collected until the excavation at the Hočevarica site in 1998, although the first fish remains in the Ljubljansko barje were excavated already in 1875.

So far the only data regarding the presence of fish in younger Slovenian archaeological sites originates from the Ig pile dwellings excavated by D. Dežman[1] between 1875 and 1877 (Deschmann 1875a; Rakovec 1955; Drobne 1973; Greif 1997) and W. Schmid in Notranje Gorice between 1907 and 1908 (Rakovec 1955; Govedič, in preparation[2]). A part of this material is preserved at the National Museum of Slovenia (NMS) in Ljubljana, while some of it is in museums in other countries (Rakovec 1955). Until now the excavated material included the remains of common carp (*Cyprinus carpio* Linnaeus, 1758), pike (*Esox lucius* Linnaeus, 1758) and wels (*Silu-*

[1] D. Dežman (Slo.) = K. Deschmann (Ger.).

[2] M. Govedič, Carp in the Ljubljansko barje 5600 years ago (in preparation).

izkopali tudi številne ostanke, iz katerih so sklepali, da so se že tudi koliščarji ukvarjali z ribolovom. Najdene so bile ribiške uteži za mreže, tulaste harpunaste osti ter ravni trnki (Greif 1997; glej še *poglavje 3.1.4*).

Prav tako kot v Sloveniji, so bile ribe zapostavljene tudi pri izkopavanjih na arheoloških najdiščih v tujini. Mnogo več so se raziskovalci posvečali najdbam, ki so dokazovale ribolov, kot pa vrstam, ki so jih lovili takratni prebivalci. V južni Nemčiji so bile ribe z arheoloških najdišč sistematično obdelane šele v zadnjih letih (npr. Torke 2000), med prvimi pa je raziskoval že E. Tröltsch (1902). Nekoliko bolje so poznane vrste rib, ki so bile odkrite v 70-ih letih prejšnjega stoletja na širšem območju Železnih vrat na meji med Jugoslavijo in Romunijo (Bökönyi 1970; Nalbant 1970; Boroneant 1973; Clason 1980; Prinz 1987; Dinan 1996). Zato lahko Dežmanove najdbe rib, podobno kot njegovo odkritje kolišč, štejemo med prve, če ne kar kot prvo omembo recentnih vrst rib z arheoloških najdišč v povodju reke Donave.

Danes v celinskih vodah Slovenije živi približno 90 vrst rib in piškurjev. Seznam se nenehno spreminja, saj je bilo kar nekaj vrst potrjenih ali na novo opisanih šele v zadnjih petnajstih letih (npr. Povž 1990; Povž, Mrakovčić, Kerovec 1997; Honsig-Erlenburg, Povž 1999; Kotlik et al. 2002), nekatere pa veljajo za izumrle (Povž 1996).

Večina vrst je domorodnih (avtohtonih), najmanj 14 vrst pa je bilo v Slovenijo zanesenih (Povž, Ocvirk 1990). Današnja razširjenost nekaterih vrst rib v Sloveniji je izključno posledica človekovih dejanj. Tudi sončni ostriž (*Lepomis gibbosus* (Linnaeus, 1758)), ki ga danes najdemo v številnih ribnikih, mrtvicah in jezerih ter amerikanka (šarenka) (*Onchorhynchus mykiss* (Walbaum, 1792)), ki jo najdemo v številnih potokih in zgornjih delih rek, spadata med zanesene vrste. Ribe so preseljevali tudi med posameznimi porečji. Zaradi naselitve potočne postrvi (*Salmo trutta trutta* m. *fario* Linnaeus, 1758) v porečje reke Soče so zaradi križanja do danes ostale le redke populacije soške postrvi (*Salmo trutta marmoratus* Cuvier, 1817), zaradi naselitve podusti (*Chondrostoma nasus* (Linnaeus, 1758)) iz donavskega v jadransko porečje pa je na ozemlju Slovenije izumrla primorska podust (*Chondrostoma genei* Bonaparte, 1841).

Namen raziskave je bil ugotoviti vrstno sestavo rib na arheološkem najdišču Hočevarica. Za določitev vrst rib so bile uporabljene le izbrane strukture, kvantitativna obdelava vzorca pa v prvo fazo obdelave še ni bila vključena. Popolna obdelava sicer številnih ribjih ostankov bo opravljena v prihodnje.

*rus glanis* Linnaeus, 1758). Moreover, numerous remains were excavated in the Ljubljansko barje, from which it was concluded that the pile dwellers engaged in fishing. The discoveries included weights for fishing nets, socketed harpoon points and straight hooks (Greif 1997; check *chapter 3.1.4*).

Fish were also neglected at excavations in archaeological sites in other countries. Researchers paid more attention to finds which proved that the inhabitants of the time fished, than the fish species they caught. In southern Germany fish from archaeological sites were not systematically studied until recent years (e.g. Torke 2000); although E. Tröltsch, one of the first, studied fish already in 1902. The fish species discovered in the 1970s in the area of the Iron Gate on the Yugoslav – Rumanian border were somewhat better known (Bökönyi 1970; Nalbant 1970; Boroneant 1973; Clason 1980; Prinz 1987; Dinan 1996). We can therefore consider Dežman's finds of fish, similarly as his finds of pile dwellings, as one of the first, if not the first, mention of recent fish species from archaeological sites in the Danube river basin.

Today there are about 90 fish and lamprey species in the inland waters of Slovenia. The list is constantly changing, since some species were identified or newly described during the last fifteen years (e.g. Povž 1990; Povž, Mrakovčić, Kerovec 1997; Honsig-Erlenburg, Povž 1999; Kotlik et al. 2002), and several species are considered extinct (Povž 1996).

Most of the species are autochthonous, but at least 14 species were brought to Slovenia from elsewhere (Povž, Ocvirk 1990). The current populations of some fish species are explicitly the result of human endeavor. The pumpkinseed (*Lepomis gibbosus* (Linnaeus, 1758)), today to be found in ponds, backwaters and lakes, and the rainbow trout (*Onchorhynchus mykiss* (Walbaum, 1792)), which can be found in many streams and headwaters, were also imported from abroad. Fish were also transferred between various river basins. The introduction of the brown trout (*Salmo trutta trutta* m. *fario* Linnaeus, 1758) in the Soča river basin and subsequent cross-breeding decimated the marble trout population (*Salmo trutta marmoratus* Cuvier, 1817); and the introduction of the nase (*Chondrostoma nasus* (Linnaeus, 1758)) from the Danube to the Adriatic basin caused the extinction of the lasca nase (*Chondrostoma genei* Bonaparte, 1841) in Slovenia.

The aim of the research was to determine the structure of fish species at the Hočevarica archaeological site. Only selected structures were used for identifying the species; the quantitative treatment of the sample was not included in the first phase of the research. A full analysis of the numerous fish remains will be carried out in the future.

### **3.8.2** METODE

Arheološko najdišče Hočevarica, ki datira v čas okoli 3600 let pr. Kr., leži pri Verdu na JZ robu Ljubljanskega barja. Material, ki je bil izkopan 1998 leta pod vodstvom A. Veluščka z Inštituta za arheologijo ZRC SAZU, hrani ljubljanski Mestni muzej.

Iz sortirane frakcije, v kateri so bili samo živalski ostanki, smo odbrali goltne kosti in goltne zobe, luske, spodnje čeljustnice in preoperkulume oziroma strukture, po katerih smo s pomočjo lastne primerjalne zbirke in literature določali vrste rib (Gasowskiej 1962; Maitland 1972; Povž, Sket 1990). Rib nismo določevali po vretencih, ki so vrstno specifična (Mehner 1990), nekaterih tudi vrstno specifičnih struktur (ralniki, otoliti, basoocipitalne kosti) pa v vzorcu sploh nismo našli. Nomenklaturo rib smo povzeli po M. Povž (1999a).

Goltna kost (*os pharyngeum inferius*) je osificiran peti škržni lok pri družinah krapovcev (Cyprinidae) in činkljah (Cobitidae). Na goltni kosti so goltni zobje, s katerimi ribe drobijo hrano. Krapovci in činklje tudi nimajo nobenih drugih zob. Oblika goltne kosti in oblika, število ter razporejenost goltnih zob (zobna formula) v eno, dve ali tri vrste so vrstno specifični. Številne vrste lahko ločimo tudi samo po goltnih zobeh. Notranja vrsta ima vedno največje število zob in največje goltne zobe. Goltni zobje v isti vrsti niso nujno enake oblike ali enako obrabljeni. Tudi simetričnost števila goltnih zob ni nujna. Struktura goltnih zob ustreza strukturi pravih zob, ki so običajno v čeljustih pri drugih skupinah rib. Nadomeščanje goltnih zob je povezano z njihovo obrabo in je različno pogosto (Harder 1975).

Lobanjska basioccipittalna kost je ena izmed kosti, po kateri lahko zelo enostavno določimo vrste krapovcev. Na njenem goltnem izrastku (*processus pharyngealis*) leži vrstno specifična roževinasta žvečilna ploščica, ob katero goltni zobje tarejo hrano (Harder 1975).

Luske so epidermalni derivat kože in so vrstno specifične. Sestavljene so iz zunanje koščene plasti in notranje plasti vezivnega tkiva. Večina sladkovodnih rib ima cikloidne luske, z gladkim zunanjim robom ali ktenoidne luske z nazobčanim zunanjim rob.

Otoliti ali statoliti so parne strukture notranjega ušesa večine rib kostnic. Lapilus je v utrikulusu (*utriculus*), sagita v sakulusu (*saculus*) in asteriskus v lageni (*lagena*). Kemijsko so sestavljeni iz aragonita (kalcijev karbonat) in 0,2–10 % organske snovi proteina otolina. Praviloma je sagita največji otolit, razen pri krapovcih, kjer je največji asteriskus. Oblika in velikost otolitov je vrstno specifična (Werner 1928; Harder 1975; Bond 1979; Härkönen 1986).

Ralnik je koščena vrstno specifična struktura družine lososov (Salmonidae). Leži na nebu ustne votline. Razporejenost in število zobcev na ralniku je vrstno specifično.



### **3.8.2** METHODS

The Hočevarica archaeological site, which dates back to about 3600 years B.C., lies near Verd on the SW edge of the Ljubljansko barje. The material excavated in 1998 under the supervision of A. Velušček from the Institute of Archaeology at the SRC SASA is kept at the City Museum of Ljubljana.

The pharyngeal bone and teeth, the scales, the mandibles, the preopercula and structures from which we could determine the fish species, from our own comparative collections and from literature (Gasowskiej 1962; Maitland 1972; Povž, Sket 1990), were selected from the sorted fraction of animal remains. The fish were not determined by the vertebrae, which are species specific (Mehner 1990); and some species specific structures (septa, otoliths, basioccipital bones) were not even found in the samples. The fish nomenclature was taken after M. Povž (1999a).

The pharyngeal bone (*os pharyngeum inferius*) is an ossified fifth gill arch of cyprinids (Cyprinidae) and loaches (Cobitidae). The pharyngeal bone holds the pharyngeal teeth with which the fish crush their food. Cyprinids and loaches have no other teeth. The pharyngeal bones and the shape, number and distribution of the teeth (tooth formula) into one, two or thee rows are species specific. Many species can also be identified only by their pharyngeal teeth. The inner row always has the largest number of teeth and the biggest teeth. The pharyngeal teeth in one row are not necessarily of the same shape and equally worn, nor is a symmetry of the number of teeth imperative. The structure of the pharyngeal teeth corresponds to the structure of normal teeth usually found in the jaws of other fish groups. The replacement of pharyngeal teeth depends on how worn they are and can occur in varied frequency (Harder 1975).

The cranial basioccipital bone is one of the bones by which we can easily identify any cyprinid species. A species specific cartilaginous chewing plate against which the pharyngeal teeth crush the food lies on its pharyngeal process (*processus pharyngealis*) (Harder 1975).

The scales are an epidermal derivative of the skin and are specific for each species. They are composed of an external bone plate and an internal connective tissue. Most freshwater fish have cycloid scales with a smooth outer edge or ctenoid scales with a serrated outer edge.

The otoliths or statoliths are pairs of structures in the inner ear of most bony fishes. The lapilus are in the utricle (*utriculus*), the sagitta are in the saculus and the asteriscus are in the lagena. Chemically they are made of aragonite (calcium carbonate) and 0.2–10 % of organic matter of the protein otolin. Generally the sagitta is the largest otolith, except for the cyprinids species where

### **3.8.3** REZULTATI IN DISKUSIJA

V analiziranem vzorcu so med ribjimi strukturami prevladovala vretenca, ki so bila v primerjavi z drugimi ostanki najmanj poškodovana. Med strukturami, po katerih smo določali ribe, smo našli največ goltnih zob. Zelo malo smo našli lusk, goltnih kosti, spodnjih čeljustnic in preoperkulumov. Nismo pa našli otolitov, ralnikov lososov ter basoocipitalnih kosti krapovcev. Otoliti, ki jih pogosto uporabljajo pri določevanju rib iz morskih sedimentov (Pavšič 2002), so bili verjetno pri sortiranju materiala spregledani ali zdrobljeni.

Prevladovanje vretenc je bilo pričakovano, saj ima posamezna riba, odvisno od vrste, več deset vretenc (Harder 1975). Majhno število lusk v vzorcu je verjetno posledica njihove krhkosti in je bila zato večina lusk najverjetneje zdrobljena pri sejanju materiala ob izkopavanju. Le redko so bile najdene trše ktenoidne luske pravih ostrižev (Percidae). Tudi v materialu, ki ga je izkopal Dežman, prevladujejo vretenca, luske pa so redke (Govedič, v pripravi).

V vzorcu so bili ostanki 5 vrst rib: krap, rdečeperka (*Scardinius erythrophthalmus* Linneaus, 1758), rdečeoka (*Rutilus rutilus* (Linnaeus,1758)), ščuka in navadni ostriž (*Perca fluviatilis* Linnaeus, 1758). Krapa in ščuko navaja tudi Dežman (1875), za ostale vrste pa so to najstarejše potrjene navedbe tako za Ljubljansko barje kot za Slovenijo. Poleg krapa in ščuke je bil na barju že najden tudi som (Deschmann 1875a; Šubic 1886; Rakovec 1955; Drobne 1973). Podatkov I. Geistra (1995) o najdbah lososa nismo mogli preveriti.

Vse najdbe rib s Hočevarice so najstarejši potrjeni podatki prisotnosti teh, še danes živečih vrst rib na ozemlju Slovenije, saj sta Dežman in Schmid kopala v mlajših plasteh (Rakovec 1955). Lokacija najdb ribjih ostankov, ki jih hranijo v NMS, in s tem njihova starost, pa ni natančno poznana. Najverjetneje so bili najdeni ob prvem izkopavanju leta 1875 na zahodni strani Ižanske ceste (Rakovec 1955; Drobne 1973). Vrste, ki so med Dežmanovim materialom, se ujemajo z vrstami, ki jih je objavil že v letu izkopavanj (Deschmann 1875a). Ostanke rib, ki jih je izkopal leta 1877, pa je poslal na Dunaj v določitev (Deschmann 1878). Vendar je usoda teh ribjih kosti neznana, saj Drobne (1963) tam ni našla ribjih kosti med kostnim materialom, na drugih kosteh pa je zapisana letnica 1877 (Drobne 1973).

#### 3.8.3.1 Sistematski pregled vrst in njihova ekologija

Krap (*Cyprinus carpio* Linnaeus, 1758)

V vzorcu smo našli številne goltne zobe krapa in samo en fragment goltne kosti z zobmi (*sl. 3.8.1*). Glede na velikost goltnih zob so bili v vzorcu prisotni ostanki do nekaj kilogramov težkih osebkov.

the asteriscus is biggest. The shape and size of otoliths is also species specific (Werner 1928; Harder 1975; Bond 1979; Härkönen 1986).

The vomer bone is a bony species specific structure of the salmonid family (Salmonidae) which lies on the palate. The distribution and number of teeth in the septum is specific for each species.

### **3.8.3** RESULTS AND DISCUSSION

The vertebrae were predominant and less damaged than other remains of the fish structure from the analyzed sample. Among the structures by which we determined the fish, the pharyngeal teeth were prevalent in our finds. Very few scales, pharyngeal bones, mandibles and pre-operculums were found. Nor were any otoliths, vomer bones of salmon and basooccipital bones of cyprinids found. The otoliths that are often used for determining fish from sea sediments (Pavšič 2002) were probably overlooked or crushed during sorting of the material.

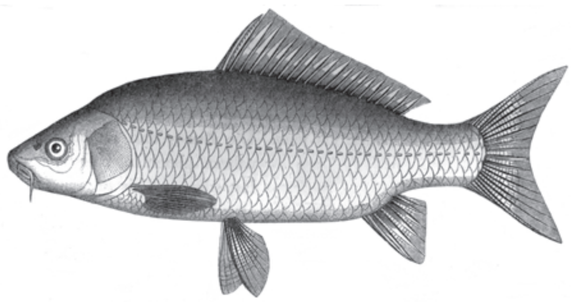
A majority of vertebrae was expected since a single fish has several ten vertebrae, depending on the species (Harder 1975). The low number of scales in the sample is probably due to their fragileness, and most of the scales were probably crushed while sieving the material during excavation. There were some rare finds of harder ctenoid scales of perch (Percidae). In Dežman's excavated material the vertebrae were also most frequent and the scales scarce (Govedič, in preparation).

The sample contained the remains of five fish species: common carp, rudd (*Scardinius erythrophthalmus* Linneaus, 1758), roach (*Rutilus rutilus* (Linnaeus,1758)), pike and perch (*Perca fluviatilis* Linnaeus, 1758). Dežman (1875) had also mentioned common carp and pike. As regards the other species, these are the oldest confirmed references for the Ljubljansko barje, and also for the rest of Slovenia. In addition to common carp and pike, the wels was also found in the Ljubljansko barje (Deschmann 1875a; Šubic 1886; Rakovec 1955; Drobne 1973). The data presented by I. Geister (1995) concerning finds of salmon could not be confirmed.

All the fish finds from Hočevarica are the oldest certified data verifying the presence of these, still existing fish in Slovenian territory, inasmuch as Dežman and Schmid excavated in younger layers (Rakovec 1955). The location and age of the fish remains kept at the NMS are not precisely known. They were most probably discovered during the first excavations in 1875 on the western side of the road from Ljubljana to Ig (Rakovec 1955; Drobne 1973). The species found among Dežman's material correspond to the species that he described already in the year of the excavations (Deschmann 1875a). He sent the fish remains excavated in 1877 to Vienna for identification (Deschmann 1878), but the

*Sl. 3.8.1:* Goltna kost krapa (*Cyprinus carpio*). Vzorec št. A116V00447. Desno najdba s Hočevarice, levo detajl goltne kosti krapa luskinarja iz reke Drave ulovljenega leta 2001. Foto: M. Jakopič.
*Fig.3.8.1:* The pharyngeal bone of a common carp (*Cyprinus carpio*). Sample no. A116V00447. The right find is from Hočevarica and the left detail is of a pharyngeal bone of a scaled carp from the Drava river, caught in 2001. Photo: M. Jakopič.

*Sl. 3.8.2:* Goltni zobje krapa (*Cyprinus carpio*). Foto: M. Govedič.
*Fig.3.8.2:* Pharyngeal teeth of a common carp (*Cyprinus carpio*). Photo: M. Govedič.



*Sl. 3.8.3:* Krap (*Cyprinus carpio*) (po Heckel, Kner 1858).
*Fig.3.8.3:* Common carp (*Cyprinus carpio*) (according to Heckel, Kner 1858).

Ostanke krapov so našli tudi na večini drugih najdišč ob reki Donavi (*tab. 3.8.1*; *sl. 3.8.7*). Na Ljubljanskem barju sta ostanke krapov izkopala že Dežman in Schmid (Deschmann 1875a; Govedič, v pripravi). Vendar so bile, za razliko od materiala s Hočevarice, med Dežmanovim materialom tudi nepoškodovane goltne kosti. Kljub temu da nismo prešteli kosti v vzorcu, ocenjujemo, da so ostanki krapa v vzorcu najštevilčnejši. Podobna je tudi ocena Dežmanovega materiala v NMS (Govedič, v pripravi).

Današnji krap se je najverjetneje razvil iz prednika, ki je živel v Kaspijskem morju. Ta se je nato razširil v Črno in Aralsko morje ter njune pritoke. Danes sta poznani dve podvrsti divjega krapa, evropski divji krap *Cyprinus carpio carpio* Linnaeus, 1758 in azijski divji krap *Cyprinus carpio haematopterus* (Temmick & Schlegel, 1846). Naravna razširjenost evropske podvrste je na območju reke Donave, azijske podvrste pa proti vzhodu vse do reke Amur. Evropski divji krap se pojavlja v povodju reke Donave zadnjih 10.000–8000 let, zanesljivih dokazov o pojavljanju pred koncem zadnje ledene dobe še ni. V zadnjem času evropski divji krap na območju reke Donave izginja zaradi številnih regulacij in predvsem izgube drstitvenega habitata. Malo verjetno je naravno pojavljanje krapa v vodah srednje in zahodne Evrope zunaj Donavskega povodja v obdobju pr. Kr. Danes je krap razširjen po vsem svetu, vendar je bil v večino voda naseljen (Balon 1995a).

Ekologija evropskega divjega krapa je slabo znana, za razliko od poznavanja ekologije gojenih oblik krapov. Eno redkih raziskav v Evropi je izvedel E. K. Balon (1995a), ki je imel priložnost proučevati drst evropskih divjih krapov v reki Donavi na Slovaškem. Krapi so z drstjo pričeli pri temperaturi vode okrog 18 °C, vendar so jo prekinili, če je temperatura vode padla pod 17 °C. Drstili so se v dveh ali treh 10–14 dnevnih intervalih. Na začetku drsti so velike jate krapov zaplavale na sveže poplavljena območja. Največ se jih je zbralo na poplavljenih travnikih, kjer je bila globina vode 25–50 cm. Večina rib je bila večja od 50 cm in mase 3–5 kg. Samice so ikre pritrdile na rastlinska stebla in liste. Na mes-



fate of these fish bones is unknown; and Drobne (1963) could not find any fish bones among other osseous material, although those bones are labeled 1877 (Drobne 1973).

3.8.3.1 A systemic review of the species and their ecology

Common carp (*Cyprinus carpio* Linnaeus, 1758)

Numerous pharyngeal teeth were discerned in the sample, but only one fragment of a pharyngeal bone with teeth (*fig. 3.8.1*). Judging from the size of the teeth, the sample contained the remains of several kilos heavy individuals.

Carp remains were also found at most other sites along the Danube (*table 3.8.1*; *fig. 3.8.7*). Carp remains were excavated already by Dežman and Schmid in the Ljubljansko barje (Deschmann 1875a; Govedič, in preparation). However, unlike the material from Hočevarica, Dežman's material also contained undamaged pharyngeal bones. Although not all the bones were counted in the sample, it was estimated that carp remains were the most abundant. Estimations of Dežman's material kept at the NMS are similar (Govedič, in preparation).

Present day carp probably developed from an ancestor that lived in the Caspian Sea. The latter then spread to the Black and Aral Seas and their tributaries. Two subspecies of wild carp are known today: the European wild carp *Cyprinus carpio carpio* Linnaeus, 1758 and the Asian wild carp *Cyprinus carpio haematopterus* (Temmick & Schlegel, 1846). The natural population of the European subspecies is in the Danube area, while the Asian subspecies lives east, all the way to the Amur river. The European carp has been present in the Danube river basin for the past 10,000–8000 years; however there is no reliable data about its existence prior to the end of the Ice Age. The European carp from the Danube basin is gradually disappearing, partly due to river regulations and mostly because of the destruction of his spawning habitat. The natural presence of carp in the waters of Central and Western Europe, outside of the Danube basin, during the era before Christ is not very likely. Today carp has spread throughout the world, mainly relocated by humans (Balon 1995a).

The ecology of the European wild carp is not as well known as the ecology of domestic carp. E. K. Balon (1995a), who had the opportunity to study the spawning of European wild carp in the Danube river in Slovakia, conducted one of the rare researches in Europe. The carp started spawning when the water temperature reached 18 °C, but stopped if the temperature dropped below 17 °C. It spawned in two to three 10–14 day intervals. Large groups of fish moved to freshly flooded areas at the beginning of the spawning season. Most amassed on flooded grasslands where the water depth meatih drstitve divjih krapov se nikdar niso drstile gojene oblike krapov, kljub temu, da so živeli na istem območju. V podobnem habitatu in pri podobni temperaturi se drstijo tudi azijski divji krapi v reki Volgi in reki Amur (Balon 1995a).

Krapi so vsejedi, vendar so primarno specializirani na prehrano z nevretenčarji, ki živijo v sedimentu. Po izvalitvi se zarod krapa najprej prehranjuje s planktonom (kotačniki, kopepodni raki in alge). Nato se prehranjujejo predvsem z ličinkami trzač in mladoletnic ter z mehkužci. Večji osebki se prehranjujejo z žuželkami, raki, mehkužci, ikrami in ostanki rib ter rastlinami. Živijo v vodi s temperaturnim razponom 3–35 °C (Balon 1995a; Baruš, Peňáz, Kohlmann 2001). Preživetje zime jim omogočajo dovolj velika območja globokih vod z zadostno stopnjo nasičenosti s kisikom in mehkim dnom, saj zimo preživijo zariti v blato (po Wunder 1963 v Johal, Novák, Oliva 1984).

Rdečeperka (*Scardinius erythrophthalmus* (Linnaeus, 1758))

Ostanki rdečeperke so bili drugi najpogostejši ribji ostanki v vzorcu. Našli smo številne goltne zobe in nekaj fragmentov goltnih kosti. Dežman (1875) rdečeperke ne navaja, prav tako pa njenih goltnih zob ali goltnih kosti ni bilo najdenih med njegovim materialom v NMS (Govedič, v pripravi). Rdečeperko pa so našli tudi na drugih arheoloških najdiščih po Evropi (*tab. 3.8.1*).

*Sl. 3.8.4:* a. Goltni zobje rdečeperke (*Scardinius erythrophthalmus*);
b. fragment goltne kosti rdečeperke (*Scardinius erythrophthalmus*). Vzorec št. A116V00447.
Foto: M. Govedič.
*Fig.3.8.4:* a. Pharyngeal teeth of a rudd (*Scardinius erythrophthalmus*);
b. Fragment of a pharyngeal bone of a rudd (*Scardinius erythrophthalmus*). Sample no. A116V00447.
Photo: M. Govedič.

sured 25–50 cm. The majority of the fish was larger than 50 cm and weighed 3–5 kg. The females fixed their eggs to plant stems and leaves. Domestic forms of carp never spawned in the same spawning places as wild carp, although they lived in the same area. The Asian wild carp spawn in a similar habitat and at a similar temperature in the Volga and Amur rivers (Balon 1995a).

Carp are omnivores, yet primarily specialized in feeding on invertebrates living in the sediment. After hatching, the carp fry first feeds on plankton (rotatoria, copepods and algae). Later they mostly feed on the larvae of trichopterans and on mollusks. Larger individuals feed on insects, crustaceans, mollusks, fish eggs, fish remains and plants. They live in water with a temperature range of 3–35 °C (Balon 1995a; Baruš, Peňáz, Kohlmann 2001). To survive the winters they need large areas of deep water, well saturated with oxygen and with a soft bottom, where they bury themselves in the mud (Wunder 1963 according to Johal, Novák, Oliva 1984).

Rudd (*Scardinius erythrophthalmus* (Linnaeus, 1758))

Rudd remains were the second most frequent fish remains in the sample. We found only pharyngeal teeth. Dežman (1875) does not mention rudd, nor were its pharyngeal teeth or pharyngeal bones found among his material at the NMS (Govedič, in preparation). However, rudd was found at other archaeological sites in Europe (compare *table 3.8.1*).

Rudd is a typical phytophilic fish species. It spawns exclusively in areas rich with submerged vegetation (*Myriophyllum* spp., *Ceratophyllum* spp., *Potamogeton* spp.). Usually it will spawn in shallow water between the end of April and the beginning of June at water temperatures ranging between 18–21 °C. The females attach their eggs to water plants. Up to the size of 4–7 cm the fry feed on zoo- and phytoplankton, and later on phytoplankton, algae, vascular plants and aquatic invertebrates. They live up to 15 years and grow up to 50 cm and 1.5 kg (Holčík 1967b; Prokeš, Řebíčková 1987; Povž, Sket 1990).

Today the rudd in Slovenia lives mainly in stan-

Rdečeperka je tipična fitofilna ribja vrsta. Drsti se izključno na predelih, ki so pokriti s submerzno vegetacijo (*Myriophyllum* spp., *Ceratophyllum* spp., *Potamogeton* spp.). Najpogosteje se drsti v plitvi vodi od konca aprila do začetka junija pri temperaturi vode 18–21 °C. Ikre samice prilepijo na vodne rastline. Do velikosti 4–7 cm se zarod prehranjuje z zoo- in fitoplanktonom, nato pa se prehranjujejo s fitoplanktonom, algami, višjimi rastlinami in vodnimi nevretenčarji. Živijo do 15 let in zrastejo do 50 cm oziroma 1,5 kg (Holčík 1967b; Prokeš, Řebíčková 1987; Povž, Sket 1990).

Rdečeperka danes živi v Sloveniji predvsem v stoječih vodah (ribniki, gramoznice, jezera in mrtvi rokavi) in spodnjih delih večjih rek. Številna je v Cerkniškem jezeru kamor so jo naselili ribiči leta 1969 (Vovk 1978; Povž 2003). Prav tako živi v Blejskem jezeru (Žerdin 1988; Povž 1989).

Navadni ostriž (*Perca fluviatilis* Linnaeus, 1758)

Ostankov navadnega ostriža smo našli malo, le nekaj lusk in preoperkularnih kosti (*sl. 3.8.5*). Navadnega ostriža Dežman (1875) sicer ne omenja, vendar smo našli njegove luske med nedoločenim Dežmanovim materialom v NMS (Govedič, v pripravi). Navadnega ostriža so prav tako našli tudi na drugih arheoloških najdiščih po Evropi (*tab. 3.8.1*).

Navadni ostriž se drsti v mirnejših vodah od februarja do julija, ko temperatura vode doseže 10–13 °C (Prokeš 1985), izjemoma pri 8 °C (Stehlík 1968). Največ iker samice odložijo ob bregovih do 1 m globine, kjer jih v obliki trakov prilepijo na različne lesne ostanke v vodi, lahko pa tudi na kamne ali vodno rastlinje (Stehlík 1968).

Navadni ostriž je plenilec. V življenjskem ciklu se najprej prehranjuje s planktonom, največ z raki (Žerdin 1992), nato z bentoškimi makroinvertebrati. Pri treh letih se prehranjuje z ribami (Simonović, Nikolić 1997). Naseljenost navadnega ostriža v jezerih lahko preseže tudi 100 kg/ha (Švátora, Sanjose 1993). Navadni ostriži živijo do 20 let (Kirka 1964) in zrastejo do 50 cm (Povž,

*Sl. 3.8.5:* Fragment preoperculuma navadnega ostriža (*Perca fluviatilis*). Vzorec št. A116V00463. Foto: M. Govedič.
*Fig.3.8.5:* Fragment of a preoperculum of a perch (*Perca fluviatilis*). Sample no. A116V00463. Photo: M. Govedič.

ding still water (fishponds, gravel pits, lakes and backwaters) and in the lower parts of rivers. It is abundant in the Cerkniško jezero (the Cerknica Lake) where fishermen populated it in 1969 (Vovk 1978; Povž 2003). It also lives in the Blejsko jezero (Lake of Bled) (Žerdin 1988; Povž 1989).

Perch (*Perca fluviatilis* Linnaeus, 1758)

Only a few remains of perch were found, a few scales and a few preoperculum bones (*fig. 3.8.5*). Dežman (1875) did not mention the perch, but we found perch scales among Dežman's unclassified material at the NMS (Govedič, in preparation). Perch was also found at other archaeological sites in Europe (*table 3.8.1*).

The perch spawns in standing waters between February and July, when the water temperature reaches 10–13 °C (Prokeš 1985), and exceptionally at 8 °C (Stehlík 1968). The females usually lay their eggs near the banks, up to 1 m deep, where they glue them in the shape of strips onto various wooden remains in the water, and occasionally onto rocks or aquatic plants (Stehlík 1968).

The perch is a predator. During its life cycle it first feeds on plankton, mostly crustaceans (Žerdin 1992), and later on benthic macroinvertebrates. After three years it starts feeding on fish (Simonović, Nikolić 1997). The population of the perch in lakes can exceed 100 kg/ha (Švátora, Sanjose 1993). Perch lives up to 20 years (Kirka 1964) and grows up to 50 cm (Povž, Sket 1990). Minor individuals swim in schools, but the larger ones prefer to be alone (Povž, Sket 1990).

Today the perch is generally widespread throughout Slovenia. It can be found in clean flowing water with a hard riverbed or in lakes, backwaters, gravel pits and ponds. It lives in the Blejsko jezero (Povž 1989) and during recent years also in the Cerkniško jezero (Povž 2003).

Pike (*Esox lucius* Linnaeus, 1758)

Only individual fragments of the mandible were identified of the pike remains. Dežman (1875) excavated remains of large pikes, but some were found also at other sites (*table 3.8.1*).

The pike lives in standing or flowing waters with rich vegetation. It lays its eggs onto the plants to which the fry sticks. Grown fish hide in the vegetation from where they ambush their prey. They spawn from the end of February to the end of May at water temperatures of 8–10 °C. The optimum temperature for its development is in the range of 10–20 °C. Spawning takes place in shallow, calm waters with rich vegetation along the banks. It can also spawn on flooded grassland. The most suitable substrata for laying eggs are the leaves and stems of aquatic plants (Šumer 1991; Vovk 1978).

The fry of pike feed on plankton, and at a size of 4–7 cm they already hunt other fish (Holčík 1968; Kip-

Sket 1990). Manjši osebki živijo v jatah, večji pa posamič (Povž, Sket 1990).

Navadni ostriž je danes splošno razširjena vrsta v Sloveniji. Najdemo ga tako v čistih tekočih vodah s trdim dnom kot v številnih jezerih, mrtvicah, gramoznicah in ribnikih. Živi tudi v Blejskem (Povž 1989) in v zadnjih letih v Cerkniškem jezeru (Povž 2003).

Ščuka (*Esox lucius* Linnaeus, 1758)

Od ostankov ščuke smo prepoznali le posamezne fragmente čeljusti. Ostanke velikih ščuk je izkopal Dežman (1875), našli pa so jih tudi na večini drugih najdišč (*tab. 3.8.1*).

Ščuka naseljuje z rastlinami zaraščene predele stoječih in tekočih voda. Na rastline odlaga ikre, nanje se prileplja zarod, odrasle pa se skrivajo med rastlinjem, kjer prežijo na plen. Drsti se od konca februarja do konca maja pri temperaturi vode 8–10 °C. Optimalno se razvija v vodi s temperaturnim razponom 10–20 °C. Drst poteka v v priobalnem pasu plitvih, mirnejših in z rastlinjem zaraščenih voda. Drsti se lahko tudi na poplavljenih travnikih. Najprimernejši substrat za odlaganje iker so listi in stebla vodnih rastlin (Šumer 1991; Vovk 1978).

Zarod ščuke se prehranjuje s planktonom, pri velikosti 4–7 cm pa ščuke že plenijo druge ribe (Holčík 1968; Kipling 1983; Povž, Sket 1990; Šumer 1991; Prokeš 1993). Poleg rib se hrani tudi s ptiči, dvoživkami in sesalci. Običajno največje zrastejo do 1,5 m, obstajajo pa tudi zapisi o 2 m dolgih in 36 kg težkih ščukah (Povž 1999b).

V Sloveniji danes ščuka naseljuje vse večje reke v donavskem in jadranskem porečju. Reko Dravo in Muro naseljuje v celotni dolžini, reko Savo pa od Kranja dolvodno ter številne njihove pritoke. Naseljuje tudi številne ribnike in gramoznice, v katere je bila povečini zanesena. Najdemo jo tudi v Blejskem in Cerkniškem jezeru (Šumer 1991); v slednjem je zelo pogosta (Vovk 1978; Povž 2003).

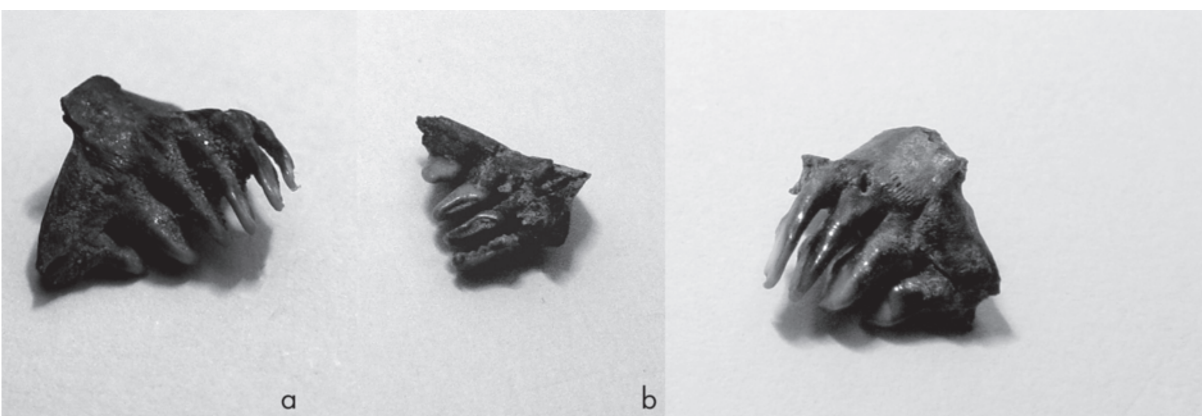
ling 1983; Povž, Sket 1990; Šumer 1991; Prokeš 1993). In addition to fish, pike also hunts birds, amphibians and mammals. Usually the largest grow up to 1.5 m but there are also records of 2 m long and 36 kg heavy pike (Povž 1999b).

Today pike in Slovenia live in all the larger rivers in the Danube and Adriatic catchment basins. They live in the Drava and Mura rivers along their entire lengths, and in the Sava river from Kranj downstream, as well as in the tributaries of these rivers. They also live in many fishponds and gravel pits, to which they were usually introduced. They can be found in the Blejsko jezero and in the Cerkniško jezero (Šumer 1991); pike is abundant in the latter (Vovk 1978; Povž 2003).

Roach (*Rutilus rutilus* (Linnaeus, 1758))

The roach's presence was reliably confirmed by only one pharyngeal bone with teeth. Dežman (1875) does not mention the roach, but it was found at several other sites (*table 3.8.1*).

Most roach mature in their 2nd year (Holčík 1967a; Povž, Sket 1990). They spawn from April to June when the water temperature reaches 10 °C (Povž, Sket 1990), but most often they spawn at water temperatures between 14–16 °C (Libosvárský, Saeed, Němcova 1985). The female usually sticks its eggs to rocks or plants in shallow water up to 20 cm deep, and only occasionally at a depth up to 1.5 m (Holčík 1967a; Povž, Sket 1990). Roach feed on animal and plant food. During their first two years they feed on plankton. As they grow up they begin feeding on vascular plants or on animals attached to them and on the benthos (mollusks, insect larvae, oligochaetes) (Holčík 1967a; Wielgosz, Szczyglińska, Tadajewska 1995). In Slovenia the roach is a widespread species that lives in still and slow-flowing waters, but can also be found in very polluted water.




*Sl. 3.8.6:* a. Goltna kost rdečeoke (*Rutilus rutilus*). Vzorec št. A116V00454;
b. fragment goltne kosti rdečeoke (*Rutilus rutilus*). Vzorec št. A116V00463.
Foto: M. Govedič.
*Fig.3.8.6:* a. The pharyngeal bone of a roach (*Rutilus rutilus*). Sample no. A116V00454;
b. Fragment of a pharyngeal bone of a roach (*Rutilus rutilus*). Sample no. A116V00463.
Photo: M. Govedič.

Rdečeoka (*Rutilus rutilus* (Linnaeus, 1758))

*Sl. 3.8.6:*

Za zanesljivo potrditev rdečeoke smo našli le eno nepoškodovano goltno kost skupaj z zobmi. Dežman (1875) rdečeoke ne navaja, njeni ostanki pa so bili izkopani na številnih drugih najdiščih (*tab. 3.8.1*).

Večina rdečeok spolno dozori v 2. letu (Holčík 1967a; Povž, Sket 1990). Drsti se od aprila do junija, ko temperatura vode doseže 10 °C (Povž, Sket 1990), največ pa se jih drsti pri temperaturi vode 14–16 °C (Libosvárský, Saeed, Němcova 1985). Najpogosteje samica prilepi ikre na kamne ali rastline v plitvejši vodi do 20 cm globine, le redko do 1,5 m globine (Holčík 1967a; Povž, Sket 1990). Rdečeoke se prehranjujejo s hrano živalskega in rastlinskega izvora. Do drugega leta se prehranjujejo s planktonom, starejše pa se prehranjujejo predvsem z višjimi rastlinami in na njih pritrjenimi živalmi ter bentosom (mehkužci, ličinkami žuželk, maloščetinci) (Holčík 1967a; Wielgosz, Szczyglińska, Tadajewska 1995). V Sloveniji je rdečeoka splošno razširjena vrsta. Živi tako v stoječih kot v počasi tekočih vodah, najdemo pa jo lahko tudi v zelo onesnaženih vodah.



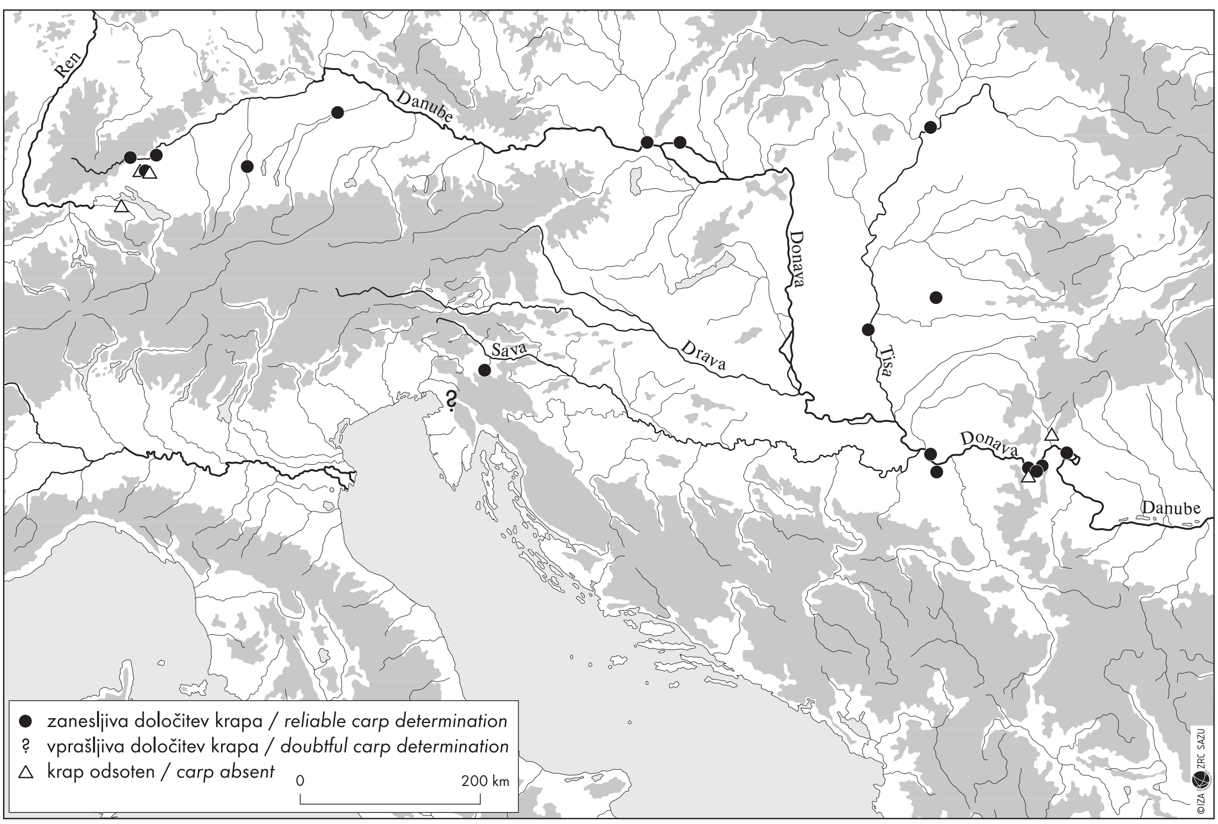
3.8.3.2 Significance of the finds

The most important finds are the common carp remains, which are the oldest material evidence of autochthonous carp in Slovenia. The list of discovered species enables a reconstruction of the habitat of the time, the diet of the inhabitants, and from a biological viewpoint also a comparison of the upstream migration of the fish following the last Ice Age period.

3.8.3.2.1 Comparison with other sites

All the fish species from the prehistoric era in the Ljubljansko barje are already known from most other archaeological sites in the area of the Danube river basin (Bökönyi 1970; Nalbant 1970; Boroneant 1973; Clason 1980; Prinz 1987; Dinan 1996; *table 3.8.1*). All except the common carp were also found beyond the Danube basin at sites around the Lake Constance (Hüster-Plogmann, Leuzinger 1995; Torke 2000). Although these archaeological sites (check *fig. 3.8.7*; Torke 2000) and the Ljubljansko barje are only several ten kilometers away from the North Sea and Adriatic basins, there is no proof of carp living outside the Danube basin before the arrival of the Romans (cf. Torke 2000, 354).

The data on the fish species from the Hočevarica




*Sl. 3.8.7:* Lokacije arheoloških najdišč z ostanki rib, ki jih obravnavamo v *tabeli 3.8.1* in besedilu.
*Fig.3.8.7:* Location of archaeological sites with fish remains that are discussed in the *table 3.8.1* and in the text.

3.8.3.2 Pomen najdb

Najpomembnejša najdba so ostanki krapa, saj so najstarejši materialni dokaz o avtohtonosti krapa v Sloveniji. Iz seznama najdenih vrst lahko sklepamo o takratnem habitatu teh vrst, prehrani takratnih prebivalcev in z biološkega stališča primerjamo gorvodne selitve rib po zadnji ledeni dobi.

3.8.3.2.1 Primerjava z drugimi najdišči

Vse vrste rib z Ljubljanskega barja iz prazgodovinskega obdobja so bile že najdene na večini drugih arheoloških najdiščih na območju Donavskega povodja (Bökönyi 1970; Nalbant 1970; Boroneant 1973; Clason 1980; Prinz 1987; Dinan 1996; *tab. 3.8.1*). Vse razen krapa so bile najdene tudi zunaj Donavskega povodja na najdiščih okrog Bodenskega jezera (Hüster-Plogmann, Leuzinger 1995; Torke 2000). Kljub temu da ležijo navedena arheološka najdišča (glej *sl. 3.8.7*; Torke 2000) in Ljubljansko barje samo nekaj deset kilometrov od Severnomorskega oziroma Jadranskega povodja, dokazov o prisotnosti krapa zunaj porečja Donave v času pred Rimljani še ni (prim. Torke 2000, 354). Najdbe krapa na Tržaškem krasu in v Grčiji (Cremonesi et al. 1984; Stratouli 1996) pa je potrebno preveriti in jih trenutno smatramo kot nezanesljive (*sl. 3.8.7*).

Podatki o vrstah rib z najdišča Hočevarica so za Dežmanovo objavo (1875) drugi originalni podatki za Ljubljansko barje in celotno porečje reke Save, saj Schmid najdb ni objavil. Najpomembnejša je najdba krapa, saj je bil krap prvič najden tako daleč zunaj reke Donave (*tab. 3.8.1*; *sl. 3.8.7*).

3.8.3.2.2 Krap in Rimljani

Najdba krapa na Ljubljanskem barju je pomembna tudi za proučevanje rimske kulture. Ker najdbe ostankov krapov na Apeninskem polotoku sovpadajo z obdobjem rimskega cesarstva, pripisujejo naselitev krapov na Apeninski polotok prav Rimljanom. Krapi naj bi izvirali z območja reke Donave na Slovaškem. Zaradi mejnega območja rimskega cesarstva so bile tam pomembne rimske naselbine in v Brigetiu so našli ostanke krapov in posode, ki bi lahko bile primerne za njihov transport. Krap je tudi ena redkih ribjih vrst, ki bi takšno potovanje preživela (Balon 1995a), ob čemer velja poudariti, da so Rimljani takrat selili divjega krapa, saj so bile gojene oblike krapov selekcionirane pozneje.

Nepričakovana najdba krapa z Ljubljanskega barja spodbuja še drugačne hipoteze (H1–H2) o izvoru krapa na Apeninskem polotoku od dosedanjih:

Prva hipoteza (H1): Če so bili krapi v času Rimljanov še vedno prisotni na območju Ljubljanskega barja,

site is the second piece of original data for the Ljubljansko barje and the entire Sava catchment following Dežman's publication (1875), since Schmid did not publish his finds. The most important is the finding of the carp; it is the first such find at such a distance from the Danube (*table 3.8.1*; *fig. 3.8.7*). Without a repeated investigation the remains of the carp from the Trieste Karst and Greece seem to us doubtful (Cremonesi et al. 1984; Stratouli 1996).

3.8.3.2.2 The carp and the Romans

The discovery of the common carp in the Ljubljansko barje is also important in studying Roman culture. The finds of carp remains along the Apennine peninsula coincide with the period of the Roman Empire; consequently transportation of carp to the peninsula was attributed to the Romans. Carp presumably originated from the Danube in Slovakia, which was a border zone of the Roman Empire and populated with important Roman settlements. In Brigetio carp remains were found together with vessels suitable for their transportation. Carp is also one of the rare fish that could survive such a journey (Balon 1995a). The Romans of course imported wild carp, since domestic carp were selected much later.

However, the unexpected discovery of a carp from the Ljubljansko barje spurs some new hypotheses (H1–H2) regarding the origin of carp on the Apennine peninsula:

First hypothesis (H1): If, in the Roman period, carp still existed in the Ljubljansko barje area on the threshold of Emona, which was situated along a Roman road, the transportation distance to the Apennine peninsula would be much shorter and the probability of successful transport much greater.

Second hypothesis (H2): Carp were present also in the bigger rivers of the Danube basin (Sava, Drava, Mura), which the Roman road crossed, through Emona and Poetoviona towards the border of the Pannonian province. In this case the distance for carp transport to the Apennines would also be substantially shorter.

The hypotheses are similar to Balon's (1995a). They are both based on the presumption that the Romans transported carp to the Apennine peninsula (Balon 1995a; 1995b). The differences are only in the speculation as to the origin of the carp and the distance of its transportation. Since this important Roman road, which linked Rome with the northern border of the Roman Empire in the Danube region where the carp lived, ran across modern day Slovenia, it seems very probable that the Romans transported the carp also across Slovenia, regardless of where these carp were caught. Both Emona and Poetoviona were large Roman towns whose inhabitants needed regular supplies of food, similarly also tj. na pragu tedanje Emone, preko katere je vodila rimska cesta, je razdalja za transport krapov na Apeninski polotok mnogo krajša in s tem verjetnost za uspešen transport večja.

Druga hipoteza (H2): Krapi so bili prisotni tudi v večjih rekah Donavskega povodja (Savi, Dravi, Muri), ki jih je prečkala rimska cesta preko Emone in Poetovione proti mejam takratne panonske province. Tudi po tej hipotezi je razdalja za transport krapov na Apeninski polotok mnogo krajša.

Hipotezi sta podobni Balonovi (1995a) hipotezi. Temeljita na predpostavki, da so krapa na Apenski polotok prinesli Rimljani (Balon 1995a; 1995b). Razlikujeta se le v predpostavki o izvoru krapov oziroma o razdalji za njihov transport. Ker je cesta, ki je povezovala Rim z mejo na Donavi, v kateri so živeli krapi, potekala preko ozemlja današnje Slovenije, se zdi verjetno, da so Rimljani transportirali krape tudi preko ozemlja današnje Slovenije, ne glede na to, kje so jih ujeli. Tako Emona kot Poetoviona sta bili veliki rimski mesti, katerih prebivalci so, podobno kot na mejah Panonije, potrebovali stalen vir hrane (Balon 1995a). Krapi so bili lahko pomemben vir prehrane. Po mnenju Balona (1995b) so bili vsaj del leta najpogostejša in zelo lahko ulovljiva riba. Na ozemlju Ljubljanskega barja ostanki krapov iz antike še niso bili najdeni (Rakovec 1955), našli pa so jih ob reki Savi pri Ribnici – izkopavanja na trasi bodoče avtoceste pri Ribnici na Dolenjskem, ki jih vodi D. Breščak (Govedič, v pripravi). Pričakovani so na drugih najdiščih ob večjih rekah in jezerih, saj si odsotnost rib v izkopaninah z arheoloških najdišč lahko razložimo bolj z neustrezno izkopavalno metodo, kot pa z dejansko odsotnostjo rib, kajti ribjih ostankov niso nikjer sistematično pobirali.

Ne glede na potrditev naših hipotez lahko ob predpostavki, da so Rimljani transportirali krape čez naše kraje, predvidevamo, da so Rimljani del krapov hote ali nehote izpustili na ozemlju današnje Slovenije.

Kaj se je dejansko zgodilo na Ljubljanskem barju, bo potrebno še ugotoviti. Vse hipoteze, ki smo jih navedli, so preverljive. Še najhitreje bi lahko izvor krapov na Apeninskem polotoku in njihovo sorodnost s krapi na Ljubljanskem barju in drugih najdiščih preverili z genetskimi metodami.

#### 3.8.3.2.3 Krap v Sloveniji

Danes krapa v Sloveniji uvrščamo med avtohtone vrste (Povž, Sket 1990), saj naj bi bil na ozemlju Slovenije prisoten najmanj 1000 let (Povž 1999c). Divji krap je kot ogrožena vrsta uvrščen tudi na Rdeči seznam (Povž 1992; Pravilnik 2002). Kot kaže, ti avtorji za svoje sklepanje niso imeli trdnih dokazov oziroma niso poznali Dežmanovih najdb. Kljub temu da se je J. Franke (1892) o avtohtonosti krapa v Blejskem jezeru motil, saj krap

along the Pannonian borders (Balon 1995a). Carp could have been an important food source; according to Balon (1995b) they were the most abundant and easily caught fish, at least through a good part of the year. Carp remains from the Roman period have not been found in the Ljubljansko barje area (Rakovec 1955), but they were found near the Sava river at Ribnica na Dolenjskem – excavations on the future highway Ljubljana–Obrežje conducted by D. Breščak (Govedič, in preparation). Finds are also expected at other sites along major rivers and lakes. Inappropriate excavation methods could be an explanation for the absence of fish at archaeological sites, rather than the actual absence of the fish, especially since fish remains were not systematically collected at any of the sites.

Regardless of whether these hypotheses can be confirmed or not, presuming that Romans transported carp through this region, it would follow that they left some carp in these territories either on purpose or inadvertently.

What actually occurred in the Ljubljansko barje has yet to be established. All the above listed hypotheses can be verified. Genetic research methods would provide the most expedient way to ascertain the origin of carp along the Apennine peninsula and their relationship to the carp in the Ljubljansko barje and other sites.

#### 3.8.3.2.3 Carp in Slovenia

Today the common carp in Slovenia is considered an autochthonous species (Povž, Sket 1990), on the grounds that carp was present in Slovenian territories for at least 1000 years (Povž 1999c). Wild carp was also put on the Red List as an endangered species (Povž 1992; Pravilnik 2002). It appears that these authors did not have reliable evidence for their conclusions and were not acquainted with Dežman's finds. J. Franke (1892) was probably erroneous about the carp being autochthonous in the Blejsko jezero, since carp had no way of reaching this destination by a natural path (Povž 1989; Žerdin 1988). Nevertheless, it still holds that Franke probably considered carp autochthonous throughout the entire Sava basin.

A chronological review of ichthyology and archaeology will reveal why the autochthony of carp in Slovenia was unknown to biologists for so long. The authors (Freyer 1842; Heckel, Kner 1858) of the first descriptions of the fish fauna in Slovenia did not study the origins of the species. Even Dežman, in some of his later publications (e.g. Deschmann 1888), mentions only pike and wels and not carp. Could it be that at the time this discovery seemed so improbable that nobody cared to believe it? And that adversaries did not bother to verify the evidence or perhaps did not know about it? After the reports on fish finds in the Ljubljansko barje (De-tja ni mogel priti po naravni poti (Povž 1989; Žerdin 1988), pa lahko zaključimo, da je Franke najbrž menil, da je krap avtohton v celotnem porečju reke Save.

Kronološki pregled objav s področja ihtiologije in arheologije nam lahko razkrije, zakaj je bil dokaz o avtohotonosti krapa v Sloveniji biologom tako dolgo neznan. Avtorji (Freyer 1842; Heckel, Kner 1858) prvih pregledov ribje favne v Sloveniji se z izvorom vrst niso ukvarjali. Tudi Dežman je v nekaterih svojih poznejših objavah (npr. Deschmann 1888) omenjal le ščuko in soma, krapa pa ne. Ali je bilo to za tisti čas tako neverjetno odkritje, da mu preprosto niso verjeli, nasprotniki pa dokazov niso preverjali oziroma poznali? Po objavi najdb rib na Ljubljanskem barju (Deschmann 1875a) Franke (1892) in A. Munda (1926) kot prva naša ihtiologa, Dežmana nista omenjala. Ravno na ti dve deli (Franke 1892; Munda 1926) pa se je opirala večina mlajših avtorjev, ki so se ukvarjali z ribami Slovenije. Prav nasprotno pa se je dogajalo v arheološki in paleontološki literaturi, kjer so krapa, ščuko in soma pogosto postavljali na Ljubljansko barje v času koliščarjev (npr. Rakovec 1955; Drobne 1973; Greif 1997).

Da je bila najdba krapa malo verjetna, so verjetno presodili tudi nekateri mlajši avtorji, ki so poznali paleontološko dediščino. Eden redkih, ki se je ukvarjal z biološko tematiko in tudi citiral paleontologe, je bil Geister (1995). Vendar je navedel le soma in ščuko, krapa pa je izpustil. Tudi M. Svetina et al. (1982) in B. Skalin (1984), ki sicer omenjajo najdbe različnih ostankov, povezanih z ribolovom koliščarjev, najdenih vrst ne navajajo.

V Sloveniji je gojeni krap danes splošno razširjena vrsta, tako da ga najdemo v večini večjih rek in stoječih voda. Divjega krapa, ki je redek in ogrožen, pa v Sloveniji ujamejo le še v reki Muri (Povž 1999c). Najbolj ga ogroža izguba habitata za drst (Balon 1995a). Tudi Franke (1892) je opazil, da je po regulaciji Ljubljanice v letu 1858, ko so jo poglobili za 1 meter, krap za nekaj let izginil.

Krap je ena izmed živalskih vrst, ki jo je človek v procesu domestikacije močno spremenil. Razlike so tako morfološke kot fiziološke; gojeni krapi zrastejo mnogo večji kot divji. Domestikacijo krapa pripisujejo Rimljanom, vendar je neodvisno od rimske potekala tudi na Kitajskem (Balon 1995a; Baruš, Peňáz, Kohlmann 2001). Tudi v Sloveniji danes najdemo štiri pasme gojenih krapov, saj so z novejšimi raziskavami našli par alelov, ki določata prisotonost in raporejenost lusk (Baruš, Peňáz, Kohlmann 2001). Slovenska terminologija za pasme krapov ni usklajena z najnovejšimi odkritji, neskladnost je obstajala tudi v preteklosti, saj so nekateri avtorji za posamezna imena pasem podajali različne opise (Svetina, Verce 1969; Svetina et al. 1982; Skalin 1984). Morfološko se gojene pasme med seboj najlaže ločijo po številu in razporeditvi lusk:

1. »Krap luskinar« je najbolj podoben divjemu krapu, s katerim ga mnogi zamenjujejo. Luske ima pravilno razporejene po celem telesu. Poleg drugih mor-



schmann 1875a), Franke (1892) and A. Munda (1926) were the first ichthyologists, although they did not mention Dežman. It was on these two works (Franke 1892; Munda 1926) that most of the younger authors who studied in Slovenia based their theories on. Quite the opposite was happening in archaeological and palaeontological literature, where carp, pike and wels were often set in the Ljubljansko barje during the time of pile dwellers (e.g. Rakovec 1955; Drobne 1973; Greif 1997).

Some younger authors, who were informed of the palaeontological heritage probably also concluded that finding carp was highly unlikely. One of the rare researchers who studied biological themes and also cited palaeontologists was Geister (1995). However, he also mentioned only pike and wels and omitted carp. Likewise, M. Svetina et al. (1982) and B. Skalin (1984), who described finds of various remains connected to pile dwellers' fishing, did not list the discovered species.

In Slovenia, domestic carp is today a generally widespread variety that can be found in most major rivers and standing waters. Wild carp however, is rare and endangered and can be caught only in the Mura river (Povž 1999c). It is primarily threatened by the loss of a suitable spawning habitat (Balon 1995a). Franke (1892) also noticed that after the regulation of the Ljubljanica river in 1858, when the river was deepened by 1 m, carp disappeared for several years.

Carp is an animal species considerably changed in the domestication process. The differences are morphological and physiological; domestic carp grow much larger than their wild counterparts. Domestication of carp is attributed to the Romans; but independently of that, it also came about in China (Balon 1995a; Baruš, Peňáz, Kohlmann 2001). Four forms of domestic carp are known in Slovenia today. This was established by recent research of a discovered pair of alleles, which determine the presence and distribution of the scales (Baruš, Peňáz, Kohlmann 2001). Slovenian terminology for carp breeds does not correspond with the most recent discoveries, a discrepancy that already existed in the past when some authors cited discordant descriptions for individual breeds (Svetina, Verce 1969; Svetina et al. 1982; Skalin 1984). Morphologically, domestic forms can best be distinguished by the number and distribution of their scales:

1. »Scaled carp« is the most similar to wild carp and is often mistaken for it. Its scales are evenly distributed over the entire body. Apart from other morphological and physiological variations the most noticeable is the transition between the head and body, which in wild carp runs in a smooth line without the clearly visible cavity characteristic for all domestic forms.
2. »Line carp« has only one row of large scales along its lateral line from head to tail, and occasionally some individual large scales elsewhere on its body.

foloških in fizioloških razlik je najočitnejša razlika v prehodu glave v trup, ki se pri divjem krapu nadaljuje v gladki liniji in je brez jasne vdolbine, tipične za vse gojene pasme.
2. »Črtasti krap« ima eno samo vrsto velikih lusk po sredini boka oziroma ob pobočnici od glave do repa; le redko ima posamezne velike luske tudi drugje po telesu.
3. »Krap zrcalar« ima običajno eno ali več linij velikih lusk od glave do repa. Ostali del je lahko gol, pogosto pa ima nekaj posameznih velikih lusk pred repno plavutjo ter za poklopcem.
   3a. »Krap veleluskinar« ima tri linije lusk; pogosto je vsaj ena na hrbtu.
   3b. »Krap maloluskinar« ima prekinjeno linijo lusk ob pobočnici ter posamezne luske ali skupine lusk drugje po telesu.
   3c. »Krap golič« ima le nekaj nepravilno razporejenih lusk po telesu.
4. »Krap usnjar« je brez lusk.

3.8.3.2.4 Ribolov koliščarjev

Ostanki rib na najdišču Hočevarica so bili izkopani v koliščarskem naselju in so najverjetneje ostanki zaužitih rib. Koliščarji so lovili tako z mrežami kot z bolj selektivnimi metodami (trnki, vrše, sulice). V mreže, uteži zanje so že našli na Ljubljanskem barju (Greif 1997), so verjetno ujeli največ rdečeoke, rdečeperke in manjše navadne ostriže. Vse tri vrste živijo v jatah, le večji osebki navadnih ostrižev živijo samostojno (Povž, Sket 1990). Navadni ostriži povprečno zrastejo 15–30 cm, rdečeperke 20–25 cm in rdečeoke 20–35 cm (Povž, Sket 1990). Največ zrastejo do 45 cm (rdečeperka, rdečeoka) oziroma 50 cm (navadni ostriž) in le redko presežejo 1 kg. Največja selektivnost mreže je v načinu in mestu njene postavitve ter velikosti posamezne odprtine v mreži. Ker smo v vzorcu našli mnogo večji delež rdečeperke kot rdečeoke, domnevamo, da je to posledica razmerja vrst v habitatu in manj posledica selektivnosti oziroma načina lova koliščarjev. Izključujemo tudi napako metode, saj smo vrsti določali po enaki metodi.

Najdeni veliki ravni trnki in tulaste harpunaste osti pričajo o tem, da so koliščarji lovili tudi velike ribe (Greif 1997). V skupino večjih rib lahko štejemo krapa, ščuko in soma. Som zraste do 300 kg (Povž 1999b), ščuka do 30 kg, divji krap pa do nekaj kilogramov, za razliko od gojenih, ki lahko zrastejo do 50 kg. Z ravnimi trnki, na katere naj bi kot vabe natikali druge ribe, so lovili plenilske ribe (Greif 1997). Tako so lahko lovili some, ščuke in večje navadne ostriže. Če pa so na trnke natikali drugačne vabe, so lahko ulovili tudi večje osebke drugih vrst rib. Pri lovu s trnkom je selektivnost lova odvisna od velikosti trnka, vabe in debeline vrvice. Za lov velikih rib so morali imeti dovolj močno, a ne predebelo vrv. S



3. »Mirror carp« has one or more lines of large scales from head to tail. The rest might be bare, but it often has individual large scales before the caudal fin and behind the operculum.
   3a. »Scaled mirror carp« has three lines of scales; often at least one dorsal.
   3b. »Line mirror carp« has an interrupted line of scales along lateral line and isolated or small groups of scales elsewhere on the body.
   3c. »Scattered mirror carp« has only a few unevenly distributed scales on the body.
4. »Leather carp« has no scales.

3.8.3.2.4 Fishing of the pile dwellers

The fish remains from the Hočevarica site were excavated at the pile dwelling settlement and are probably the remains of fish eaten by the inhabitants. The pile dwellers fished with nets, but also used more selective techniques (hooks, fish-traps, spears). Weights for nets were found within them at the Ljubljansko barje (Greif 1997); presumably they were primarily used for catching roach, rudd and smaller perch. All three species swim in schools, except that larger individuals of perch live alone (Povž, Sket 1990). Perch grow to an average of 15–30 cm, rudd up to 20–25 cm and roach up to 20–35 cm (Povž, Sket 1990). Their maximum sizes reach 45 cm (rudd and roach) or 50 cm (perch), and they rarely exceed 1 kg. The selectivity of nets depends on the method and place where they are set and on the size of the openings in the net. As the sample comprised a larger share of rudd than roach, this is presumably the result of the ratio between the species in the habitat; and not the result of selectivity or fishing techniques used by the pile dwellers. We also exclude the possibility of a flaw in our method, since the same method was used for both species.

The discovery of large straight hooks and socketed harpoon-points indicates that the pile dwellers also fished larger fish (Greif 1997). The group of larger fish would include the carp, the pike and the wels. A wels can grow up to 300 kg (Povž 1999b), a pike up to 30 kg, and a wild carp up to a few kilograms, as opposed to the domestic carp which can grow up to 50 kg. The straight hooks onto which they fixed smaller fish were used for catching predators (Greif 1997). Only wels, pike and larger perch could be caught using this method. Although by using different bait they could also catch larger individuals of other fish species. In fishing with hooks the selectivity depended on the size of the hook, the bait and the thickness of the line. For catching large fish they had to have a sufficiently strong and not too thick line. Our knowledge of the ecology of the discovered species allows further explaination regarding the possible fishing methods used by the pile dwellers. The sopoznavanjem ekologije najdenih vrst lahko dodatno pojasnimo morebitni način ribolova koliščarjev. Posamična drst somov (Povž, Sket 1990) in masovna drst krapov (Balon 1995a) v plitvi vodi ob bregu ali na poplavljenih travnikih je verjetno omogočila ribolov s harpunami, kjer je pomembno vidno zaznavanje plena, ki pri ribolovu s trnkom ali mrežami ni potrebno. Podobno se v plitvi a hladnejši vodi drstijo ščuke. Masovna drst krapov je verjetno omogočila tudi najenostavnejše lovljenje rib z roko, pobijanje s koli, kamni ali drugimi enostavnimi pripomočki. Ker se somi po drstitvi vrnejo v večje globine (Povž, Sket 1990), jih je bilo zato v drstnem času verjetno najlaže uloviti. V drstnem času imajo ribe tudi največjo energijsko vrednost. V tem času se masa samic nekaterih vrst rib zaradi iker lahko poveča do 30 % (Libosvárský, Saeed, Němcova 1985; Prokeš, Baruš 1995; Lorenzoni et al. 1993). Energijska vrednost iker je v primerjavi z mesom do 2 krat večja na enoto mokre teže (Lusk, Zdražílek 1969). Za primerjavo: 1 g sveže mase postrvi ima energijsko vrednost 4,76 kJ (1136 cal), 1 g svežih iker postrvi pa 10,07 kJ (2405 cal).

Sicer pričakovani ribolov z vršo na Ljubljanskem barju v času koliščarjev še ni dokazan (Greif 1997). Pri takšnem lovu je velikost plena odvisna od velikosti odprtine vrše, od mesta potopa vrše pa je odvisna vrsta plena. Izmed najdenih vrst bi se v vrše, potopljene na dnu, najpogosteje ulovili krapi, ki iščejo hrano po dnu.

Pomen rib v prehrani koliščarjev na Ljubljanskem barju še ni bil ovrednoten (Greif 1997). Zdi se, da so potrebo po mesu v glavnem zadovoljevali z velikimi rastlinojedi (glej *poglavje 3.7*). Zaradi natančne metode izkopavanj bo v prihodnje iz velikosti posameznih ribjih kosti mogoče oceniti velikost rib in s tem njihovo maso. S pregledom prerezov kosti pa je mogoče ugotoviti, v katerem delu sezone so bile ribe ujete in s tem preveriti domneve o lovu v času drstenja.

3.8.3.2.5 Takratni habitat

Vse do sedaj znane vrste rib iz časa koliščarjev na Ljubljanskem barju živijo danes v spodnjih tokovih večjih rek in v stoječih vodah, kot so jezera, ribniki, gramoznice in rokavi rek (Povž, Sket 1990). Do sedaj še niso bili najdeni ostanki nobenih izrazito rečnih vrst rib (npr. postrv *Salmo trutta*, lipan *Thymallus thymallus*, sulec *Hucho hucho*, podust *Chondrostoma nasus*, platnica *Rutilus pigus virgo*).

Dno takratnega habitata je bilo verjetno mehko, saj ga večina najdenih ribjih vrst preferira ali vsaj tolerira. Nobena do sedaj najdena vrsta v nobeni življenjski fazi ni vezana na prodnato ali kamnito dno. Krapi po mehkem dnu iščejo hrano in se v njega zarinejo, da preživijo zimo. Za prezimitev pa mora biti tudi voda dovolj globoka, podobno kot za some, ki preživijo večino življenja v globoki vodi (Povž 1999b).

litary spawning of the wels (Povž, Sket 1990) and the mass spawning of the carp (Balon 1995a) in the shallow waters by the shore or on flooded grassland made fishing with harpoons, where seeing the prey is more important, easier. This is not necessary for fishing with hooks and nets. Similarly, pike also spawn in shallow and cold water. The mass spawning of carp probably even made it possible to fish by the simplest methods: by hand, sticks, stones or other simple tools. Since wels move into deeper water after spawning (Povž, Sket 1990), it was probably best to catch them during spawning season. Moreover, fish have the highest nutritional value during the spawning season. During this time the weight of female fish can increase up to 30 %, due to the spawn they are carrying (Libosvárský, Saeed, Němcova 1985; Prokeš, Baruš 1995; Lorenzoni et al. 1993). Compared to fish, the energy value of the eggs is twice as high per unit of fresh weight (Lusk, Zdražílek 1969). For comparison: 1 g of fresh weight of trout has an energy value of 4.76 kJ (1136 cal), while 1 g of fresh trout eggs has a value of 10.07 kJ (2405 cal).

Fishing with traps in the Ljubljansko barje at the time of the pile dwellers has not yet been proven (Greif 1997). By this method the size of the fish would depend on the size of the hole in the trap, and the species of prey would depend on the location where the trap is set. From among the found fish species carp, who feed on the bottom would most probably be the first candidates for fishing with traps sunken to the bottom.

The importance of fish in the diet of the pile dwellers of the Ljubljansko barje has yet to be evaluated (Greif 1997). It appears that pile dwellers most satisfied their need for meat from large herbivores (check *chapter 3.7*). Precise excavation methods will enable future assessment of the size of the fish and their weights from the size of individual bones. Inspection of the cross-sections of the bones will also enable the deduction of which part of the season the fish were caught, and consequently the verification of the theory that the pile dwellers fished during the spawning season.

3.8.3.2.5 The habitat

All the hitherto known fish species from the time of the pile dwellers in the Ljubljansko barje today live in the lower regions of the major rivers and in standing water, such as lakes, ponds, gravel pits and backwaters (Povž, Sket 1990). So far, remains of explicitly river fish species have not been found (e.g. trout *Salmo trutta*, grayling *Thymallus thymallus*, huchen *Hucho hucho*, nase *Chondrostoma nasus*, Danubian roach *Rutilus pigus virgo*).

The bottom of the habitat was at that time probably soft, which the majority of the discovered fish species prefers, or at least tolerates. None of the fish spe-

Večina do sedaj najdenih ribjih vrst tolerira tudi širok temperaturni razpon. Za uspešno drst je najpomembnejša temperatura vode, ki se je morala segreti do 18 °C, saj se pri tej temperaturi drstijo somi in krapi. Ostale najdene vrste se drstijo že pri nižjih temperaturah.

Vodna ali obvodna vegetacija je za večino do sedaj najdenih vrst pomembna vsaj v eni fazi razvoja. Ščuke in krapi odlagajo ikre na obrežno rastlinje oziroma na rastline na poplavljenih površinah. Tudi rdečeperka preferira stoječe vode z večjo gostoto rastlinja. Ščuka se rada skriva med rastlinjem, kjer preži na svoj plen. Tudi som živi v stoječih ali počasi tekočih zaraslih vodah, kjer se skriva pod potopljenimi debli, izpodjedenimi brežinami ali koreninami obvodnega drevja, kjer mirno preži na svoj plen (Povž 1999b). Od maja do junija se drsti med rastlinjem, kjer samec iz rastlin zgradi preprosto gnezdo, samica pa vanj prilepi ikre. Med poplavami se drstijo tudi na poplavljenih travnikih (Povž 1999b).

Zarod krapa, rdečeoke, ščuke in navadnega ostriža se v prvi fazi življenja prehranjuje s planktonom, ki se masovno razvije v stoječih vodah, kjer je stalno prisoten. Razvije se tudi v rekah s počasnim pretokom in v rečnih mrtvicah. Plankton sestavljajo vsi prosto plavajoči vodni organizmi, katerih pasivno premikanje je predvsem odvisno od vodnih tokov (Tarman 1992). V celinskih vodah sestavljajo fitoplankton številne vrste alg, zooplankton pa v glavnem praživali (Protozoa), vodne bolhe (Cladocera) in ceponožni raki (Copepoda) in njihove ličinke, kotačniki (Rotatoria) ter nekatere skupine dvokrilcev (Diptera).

V takratnem habitatu je bila vzpostavljena popolna prehranjevalna veriga, saj so bili najdeni ostanki vrst iz različnih delov prehranjevalne verige, kot tudi različnih vrst plenilcev rib. Rdečeperka, rdečeoka in krap so kot odrasle ribe vsejede, som, ščuka in navadni ostriž pa plenilske. Rdečeoka je pomemben vir hrane ščuki (Prokeš, Horáková 1988). Navadni ostriž pleni druge manjše ribe, izrazit pa je tudi kanibalizem (Žerdin 1992). Glavna hrana somov so ribe, hranijo pa se tudi s ptiči, sesalci in dvoživkami (Povž 1999b). Rdečeperka v primerjavi z rdečeoko ne prenese organskega onesnaženja in je v negativni korelaciji z gostoto navadnega ostriža ali rdečeoke (Holčík 1967b), ki sta tudi v kompeticiji. Delež navadnega ostriža je obratno sorazmeren s stopnjo evtrofikacije, delež rdečeoke pa premosorazmeren.

Ne glede na selektivnost metode lova takratnih koliščarjev in metode določevanja zaključujemo, da je bil krap v tistem času najpogostejša vrsta na območju, kjer so lovili koliščarji z Ljubljanskega barja, sledila pa mu je rdečeperka. Ker slednja ne prenese organskega onesnaženja, je bila voda verjetno precej čista, kar kaže tudi majhen delež rdečeoke. Delež navadnega ostriža je bil verjetno večji kot kažejo najdeni ostanki, podobno velja za drugi plenilski vrsti, soma in ščuko. Večja prosojnost vode pa omogoča lov s harpunami, pri katerih je

cies found so far need a gravel or rock aquatic bed in any phase of their lives. The common carp seek food in the soft bottom and dig into it during winter. To survive the winter the water depth must be sufficient; similarly also for wels, which spend most of their life in deep water (Povž 1999b).

Most of the fish species discovered so far tolerate a broad temperature range. The water temperature is mainly important during spawning, when it must reach 18 °C; both carp and wels spawn at this temperature. Other species can spawn at lower temperatures.

The water and littoral vegetation is important for all the species found so far, at least in one phase of their development. Pike and carp lay their eggs in the vegetation close to the shore or on flooded areas. The rudd also prefers standing water with dense vegetation. The pike likes to hide in the vegetation where it lurks on its prey. The wels lives in standing or slowly flowing water, where it hides under sunken tree-trunks, eroded banks or the roots of trees, and quietly waits for its catch (Povž 1999b). Between May and June it spawns between the plants, where the male builds a simple nest in which the female glues its eggs. During floods they also spawn on flooded fields (Povž 1999b).

In the first phase of their lives the fry of common carp, roach, pike and perch feed on plankton, which abounds in standing water, where it is always present. It also grows in slow flowing rivers and backwaters. Plankton is composed of all the freely floating water organisms whose passive movement depends mainly on water currents (Tarman 1992). In inland waters the phytoplankton consists of a variety of algae and the zooplankton mainly of protozoa, water fleas (Cladocera), copepod crustaceans (Copepoda) and their larvae, rotatoria (Rotatoria) and some groups of dipterous insects (Diptera).

As the remains of species of various segments of the food chain and of various species of predator fish indicate, a very comprehensive food chain was established in the habitat of that time. Grown up rudd, roach and carp are all omnivorous, while the wels, pike and perch are predators. The roach is an important food source for pike (Prokeš, Horáková 1988). The perch hunts other smaller fish and cannibalism is nothing uncommon (Žerdin 1992). The main food of the wels is other fish, but they also eat birds, mammals and amphibians (Povž 1999b). Unlike the roach, the rudd does not tolerate organic pollution and is in negative correlation with the population of the perch and the roach (Holčík 1967b), which also compete with one another. The population of perch is in invert proportion with the level of eutrophication, while the population of roach is in direct proportion.

Regardless of the selectivity of the pile dwellers' fishing methods and the methods of determination, it is surmisable that carp was at the time the most frequent species in the area in which the pile dwellers of the Ljupotrebno vidno zaznavanje plena. Tako po številnih ribjih ostankih kot po ostankih ribojedih ptic in ribojede vidre (glej *poglavji 3.7* in *3.10*; Rakovec 1955; Greif 1997) predvidevamo, da so bile ribe v takratnem habitatu številne.

### 3.8.4 ZAKLJUČEK

Vse vrste rib, ki so bile do sedaj najdene na območju Ljubljanskega barja iz časa koliščarjev, danes živijo v spodnjih delih večjih rek in v večjih stoječih vodah. Do sedaj najdene vrste rib se ujemajo z drugimi najdbami v Donavskem povodju. V vzorcu s Hočevarice sta med ribami prevladovala krap in rdečeperka. Obe vrsti se drstita pri višjih temperaturah in za drst nujno potrebujeta rastlinje, na katerega prilepita ikre. Ščuka in navadni ostriž se drstita pri nižjih temperaturah. Nobena izmed najdenih vrst, vključno s somom, katerega ostanke je izkopal Dežman, ni izrazito rečna vrsta. Najpomebnejša najdba je vsekakor krap, ki je bil verjetno tudi najpogostejša vrsta v takratnem habitatu. Ker ne morebljansko barje fished, followed by the rudd. Considering that the latter does not tolerate polluted water, the water was probably relatively clean, which is also evident from the low proportion of the roach. The share of perch was probably higher than the discovered remains indicate. The same holds true also for the other two predator species – wels and pike. Better translucency of the water enabled fishing with harpoons, where it is important to see the prey. The quantities of fish remains and the remains of fish eating birds and otter (check *chapters 3.7* and *3.10*; Rakovec 1955; Greif 1997) indicate an abundance of the fish population at the time.

### 3.8.4 CONCLUSION

All the fish species from the time of the pile dwellers discovered so far in the area of the Ljubljansko barje today live in the lower reaches of major rivers and in larger standing waters. The fish species found until now correspond to other finds in the Danube river basin. The carp and the rudd are predominant in the samples

| VRSTE RIB | ARHEOLOŠKO OBDOBJE | NAJDIŠČE | POVODJE | VIR |
|---|---|---|---|---|
| **klen, som, ščuka, navadni ostriž, krap** | mezolitik | Cuina Turcului | črnomorsko | Nalbant 1970 |
| **krap, bolen** | mezolitik | Pestera Hotilor | črnomorsko | Dinan 1996 |
| **krap, som, ploščič, klen, smuč** | mezolitik | Ostrovul Banului | črnomorsko | Boroneant 1973 |
| **krap, ščuka, som** | mezolitik | Vlasac | črnomorsko | Prinz 1987 |
| **som** | mezolitik | Padina | črnomorsko | Clason 1980 |
| **krap, som** | neolitik | Padina | črnomorsko | Clason 1980 |
| **som** | neolitik | Lepenski Vir | črnomorsko | Bökönyi 1970 |
| **mrena, podust, krap** | mezolitik | Burghöhle | črnomorsko | Torke 2000 |
| **ščuka, navadni ostriž, rdečeoka, rdečeperka, androga** | neolitik | Hartöschle | črnomorsko | Torke 2000 |
| **ščuka, rdečeoka, rdečeperka, navadni ostriž** | neolitik | Arbon-Bleiche 3 | severno-morsko | Hüster-Plogmann, Leuzinger 1995 |
| **navadni ostriž, ščuka, som, rdečeoka, rdečeperka, zelenika, androga** | neolitik | Henauhof I | črnomorsko | Torke 2000 |
| **krap, rdečeoka, okun, androga, ploščič** | neolitik | Lautereck | črnomorsko | Torke 2000 |
| **ščuka, som, rdečeoka, rdečeperka, krap, zelenika, okun, ploščič** | bronasta doba | Forschner | črnomorsko | Torke 2000 |

*Tab. 3.8.1:* Vrste rib z nekaterih arheoloških najdišč črno- in severnomorskega povodja.*

* Med vrstami niso navedene vse vrste, ki so jih našli na prazgodovinskih najdiščih, temveč samo tiste, ki so že znane in v bodoče pričakovane vrste na Ljubljanskem barju.

mo vedeti, kje natančno so koliščarji ulovili ribe, ki so bile izkopane ob kolišču, in s kakšno metodo, trenutno še ne moremo dati končnih zaključkov o takratnem habitatu. Vendar je morala biti voda vsaj na delu območja dovolj globoka, da so lahko ribe v njej preživele zimo. Večji del dna, v katerem so krapi iskali hrano in se vanj zarili čez zimo, je moral biti muljast. Prav tako je moral biti omogočen razvoj planktona, saj so krap, navadni ostriž, ščuka in rdečeoka v prvi fazi razvoja vezani nanj. V vodi je moralo biti tudi dovolj makrofitov, ki so dajali skrivališče ščuki, prehrano rdečeperki in mesta za odlaganje iker ščuk in krapov, ali pa so bila v bližini območja, kjer se je voda razlila po travnikih. Voda se je morala dovolj segreti, da sta se lahko drstila krap in som. Tako so vse omenjene vrste skoraj zanesljivo živele na območju današnjega Ljubljanskega barja v stoječi ali počasi tekoči vodi, vsaj na nekaterih predelih polni makrofitov, z zadostnimi globinami in muljastim dnom.

from Hočevarica. Both the species spawn at high temperatures and necessarily need vegetation unto which they fix their spawn. The pike and the perch spawn at lower temperatures. None of the discovered species, including the wels Dežman excavated, are explicitly river fish. The most important find is the carp, which was probably also the most common species in the habitat of the time. As the precise location of where the pile dwellers fished for the fish found at the pile dwelling cannot be known, nor which techniques they used, no definite conclusions may be made regarding the habitat they lived in. However, the water must have been deep enough in some parts of the area for the fish to survive the winter. The larger part of the bottom, in which the carp sought their food and in which they buried themselves during winter, must have been of silt. Abundant growth of plankton must have also been possible, considering that in the first phase of their lives carp, perch, pike and roach strongly depended on it. Certainly there were enough macrophytes in the water for the pike to hide in, to feed the rudd and to provide convenient spots for pike and carp to lay their spawns; otherwise they had to be close to areas

| FISH SPECIES | ARCHAEOLOGICAL PERIOD | SITE | CATCHMENT AREA | SOURCE |
|---|---|---|---|---|
| **chub, wels, pike, perch, common carp** | Mesolithic | Cuina Turcului | Black Sea | Nalbant 1970 |
| **common carp, asp** | Mesolithic | Pestera Hotilor | Black Sea | Dinan 1996 |
| **common carp, wels, brama, chub, pikeperch** | Mesolithic | Ostrovul Banului | Black Sea | Boroneant 1973 |
| **common carp, pike, wels** | Mesolithic | Vlasac | Black Sea | Prinz 1987 |
| **wels** | Mesolithic | Padina | Black Sea | Clason 1980 |
| **common carp, wels** | Neolithic | Padina | Black Sea | Clason 1980 |
| **wels** | Neolithic | Lepenski Vir | Black Sea | Bökönyi 1970 |
| **barbel, nase, common carp** | Mesolithic | Burghöhle | Black Sea | Torke 2000 |
| **pike, perch, roach, rudd, white bream** | Neolithic | Hartöschle | Black Sea | Torke 2000 |
| **pike, roach, rudd, perch** | Neolithic | Arbon-Bleiche 3 | North Sea | Hüster-Plogmann, Leuzinger 1995 |
| **perch, pike, wels, roach, rudd, bleak, white bream** | Neolithic | Henauhof I | Black Sea | Torke 2000 |
| **common carp, roach, ruffe, white bream, brama** | Neolithic | Lautereck | Black Sea | Torke 2000 |
| **pike, wels, roach, rudd, common carp, bleak, ruffe, brama** | Bronze Age | Forschner | Black Sea | Torke 2000 |

*Table 3.8.1:* Fish species from some archaeological sites in the Black Sea and North Sea catchments.*

* The list of species does not include all the found species on other prehistoric sites, but only those which correspond and those which are expected in the Ljubljansko barje in the future.

*Tab. 3.8.2:* Ribje vrste s Hočevarice (HO) in ostalih eneolitskih najdišč na Ljubljanskem barju (ELB) v primerjavi z današnjim stanjem v Ljubljanici ter njenih pritokih (Budihna et al. 1994; Povž 1999d): 1. Ljubljanica: Retovje (Budihna et al. 1994), 2. Ljubljanica: pri Ribiškem domu RD Vrhnika (Budihna et al. 1994), 3. Ljubljanica: Kamin (Budihna et al. 1994), 4. Ljubljanica: od Vevč do izliva (Povž 1999d), 5. Ljubija (Budihna et al. 1994) in 6. Bistra (Budihna et al. 1994).
*Table 3.8.2:* Fish species from Hočevarica (HO) and other Eneolithic sites in the Ljubljansko barje (ELB) compared to the current stance in the Ljubljanica river and its tributaries (Budihna et al. 1994; Povž 1999d): 1. Ljubljanica: Retovje (Budihna et al. 1994), 2. Ljubljanica: Ribiški dom RD Vrhnika (Budihna et al. 1994), 3. Ljubljanica: Kamin (Budihna et al. 1994), 4. Ljubljanica: from Vevče to its mouth (Povž 1999d), 5. Ljubija (Budihna et al. 1994) and 6. Bistra (Budihna et al. 1994).

where water flooded the fields. The water was presumably warm enough for the carp and the wels to spawn. All the listed species lived only in the area of today's Ljubljansko barje, in standing or slow flowing water, abundant with macrophytes at least in some areas, with sufficient depths and a silt bottom.

| | HO | ELB | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| **Salmonidae** | | | | | | | | |
| *Salmo trutta trutta* m. *fario* | | | x | | x | x | x | x |
| *Hucho hucho* | | | x | | | x | | |
| *Oncorhynchus mykiss* | | | | | | x | x | |
| *Thymallus thymallus* | | | x | | x | x | x | x |
| **Cyprinidae** | | | | | | | | |
| *Abramis brama* | | | | | | x | | |
| *Alburnoides bipunctatus* | | | | x | x | x | x | |
| *Alburnus alburnus* | | | | x | | x | | |
| *Barbus barbus* | | | | x | | x | | |
| *Barbus meridionalis petenyi* | | | x | | | x | | |
| *Carassius carassius* | | | | | | x | | |
| *Chondrostoma nasus* | | | x | x | | x | x | x |
| *Cyprinus carpio* (divji / wild) | x | x | | | | | | |
| *Cyprinus carpio* (gojeni / reared) | | | | x | | x | | |
| *Gobio gobio* | | | x | | | x | | |
| *Leuciscus cephalus* | | | x | x | x | x | x | x |
| *Leuciscus soufia agassizi* | | | x | | | | | |
| *Phoxinus phoxinus* | | | | | | x | | |
| *Rutilus pigus virgo* | | | | x | | x | | |
| *Rutilus rutilus* | x | | | x | | x | | |
| *Scardinius erythrophthalmus* | x | | | | | x | | |
| *Tinca tinca* | | | | x | | x | | |
| *Vimba vimba* | | | | | | x | | |
| **Cobitidae** | | | | | | | | |
| *Sabanejewia aurata* | | | | | | x | | |
| **Balitoridae** | | | | | | | | |
| *Noemacheilus barbatulus* | | | | | x | | x | |
| **Siluridae** | | | | | | | | |
| *Silurus glanis* | | x | | | | x | | |
| **Esocidae** | | | | | | | | |
| *Esox lucius* | x | x | | x | | x | | |
| **Percidae** | | | | | | | | |
| *Perca fluviatilis* | x | | | x | | x | | |
| *Stizostedion lucioperca* | | | | | | x | | |
| **Cottidae** | | | | | | | | |
| *Cottus gobio* | | | x | | | x | x | x |
| **Gadidae** | | | | | | | | |
| *Lota lota* | | | | | | x | | |

# **3.9** MORSKI SKAT NA LJUBLJANSKEM BARJU

# **3.9** SEA RAY IN THE LJUBLJANSKO BARJE

JERNEJ PAVŠIČ & JANEZ DIRJEC

*Izvleček*

*Avtorja razpravljata o nekaj cm dolgi repni bodici s Hočevarice, ki naj bi pripadala morskemu golobu (*Myliobatis*).*

*Abstract*

*The authors discuss a few centimeters long caudal spine from Hočevarica, presumably belonging to an eagle ray (*Myliobatis*).*

## **3.9.1** UVOD

Pri arheološkem sondiranju na prazgodovinskem naselju Hočevarica pri Verdu na Ljubljanskem barju leta 1998, so odkrili tudi nekaj cm dolgo repno bodico verjetno morskega goloba (*Myliobatis*). Kateri vrsti morskega skata pripada bodica, je težko reči, ker za to ni ustrezne literature niti primerjalnega gradiva.

## **3.9.2** OPIS NAJDBE

Najdena bodica je dolga okrog 30 mm in široka okrog 7 mm. Ohranjen je samo osrednji del bodice, ki je bil naknadno prelomljen. Telo bodice je rjavkaste barve in je proti vrhu rahlo zašiljeno. Proksimalni ali hrbti del bodice je rahlo izbočen in po njem potekajo plitvi žlebički (*sl. 3.9.1*). V prečnem prerezu je bodica v spodnjem delu na proksimalni strani sprva bolj ali manj sploščena v osrednjem delu, ki je širok 4 mm, nato se stopničasto spusti do stranskega roba, kjer so nameščeni zobje. Proti vrhu postaja osrednji del vse bolj izbočen in meri v najvišjem ohranjenem delu 2,5 mm.

Distalni ali trebušni del bodice je gladek in ima po sredini izrazit, okrog 0,5 mm širok žleb, ki se proti vrhu bodice zoži (*sl. 3.9.2*). Žleb se približno 5 mm pred odlomljenim vrhom konča. Žleb deli telo bodice na dva enaka dela, ki sta v prečnem prerezu močno izbočena in enakomerno padata do stranskega robu z zobmi.

Na vsaki strani telesa bodice so na robu v vrsti raz-

## **3.9.1** INTRODUCTION

A few cm long caudal spine, presumably belonging to an eagle ray (*Myliobatis*) was found during archaeological sample trenching conducted in 1998 at the prehistoric settlement Hočevarica near Verd in the Ljubljansko barje. It is difficult to ascertain to which species of sea ray the spine belongs, since there is no accurate literature or comparative material.

## **3.9.2** DESCRIPTION OF THE FIND

The spine was about 30 mm long and 7 mm wide. Only the broken middle part of the spine was found. The body of the spine is of a brownish color and tapered towards the end. The proximal or dorsal side of the spine is slightly protruding, with shallow grooves running along it (*fig. 3.9.1*). In its cross-section the proximal side of the lower part of the spine is at first slightly flat in its central part, which is 4 mm wide, and then graded in steps towards the side edge, where it is toothed. Towards the top the central part is increasingly protruding and measures 2.5 mm at the highest preserved part.

The distal or ventral side of the spine is smooth and has a distinctive, about 0.5 mm wide groove down the middle, which tapers towards the end (*fig. 3.9.2*). The groove ends about 5 mm before the broken top. The groove divides the body of the spine in two equal pieces, which are strongly protruding in the cross-secporejeni zobje. Na vsaki strani je 20 bolj ali manj jasno razvitih zob in nastavkov za zobe, ki so precej različno oblikovani. Vsi kažejo težnjo ukrivljanja proti bazalnemu delu, tako da je splošni izgled bodice harpunast. Zobje so od baze proti vrhu prevlečeni s sklenino. Nekateri so odlomljeni. Višina zob je od 1 do 1,5 mm.

### **3.9.3** RAZPRAVA

V Sredozemskem morju živita dve družini morskih skatov (Batoidea), ki imata hrbtno plavut preoblikovano v eno ali dve strupeni repni bodici (Turk 1996), družina Dasyatidae (Trygonidae) in družina Myliobatidae. Nekatere vrste iz teh družin dosežejo velikost preko 4 m in težo okrog 350 kg (Herald 1968). Skati imajo hrustančast nemineraliziran skelet, ki se fosilno ne ohrani. Edino, kar se ohrani od skatov, so ploščati durofagni zobje, ki služijo za drobljenje trše hrane, npr. morskih mehkužcev, in repna bodica. Zobne plošče odraslih osebkov, ki so sestavljene iz številnih zobnih elementov, so dovolj različne, da lahko ločimo posamezne vrste, medtem ko to ne velja za repne bodice. Možno pa je tudi, da jim raziskovalci niso namenili dovolj pozornosti, ker se le redkeje ohranijo kot fosilni ostanki. Znani so od spodnje krede dalje (Müller 1966; Carroll 1993).

V prvo družino Dasyatidae uvrščamo morske biče s številnimi vrstami, od katerih so štiri tudi v Jadranskem morju (Riedl 1983). Imajo značilno sploščeno telo in dolg močno gibljiv bičast rep, ki lahko tudi preseže telesno dolžino ribe. Dolgi so največ okrog 130 cm. Na korenu repa imajo nekatere vrste eno ali redkeje dve strupni repni bodici. Strupna žleza je nameščena v dvojnem ali enojnem kanalu na distalni strani koščene bodice. Strup je zelo močan in je lahko za človeka tudi smrten.

Druga družina Myliobatidae združuje morske golobe s številnimi vrstami. Dve vrsti živita tudi v Jadranskem morju (Riedl 1983). Od prve družine se ločijo po bolj izraziti glavi, ki je pomaknjena na sprednji rob, bičastem repu na korenu katerega je nameščena ena repna strupna bodica in daljšimi izrazitejšimi stranskimi krili telesa, ki mu dajeta splošno rombično obliko. Dosežejo tudi 140 cm telesne dolžine. Po oblikovanosti repne bodice in njeni velikosti meniva, da pripada najdena bodica rodu *Myliobatis*, ki je razmeroma pogost v Jadranskem morju.

Med kulturnimi in kostnimi ostanki na kolišču na Ljubljanskem barju se je znašla bodica morske ribe. Postavlja se vprašanje kako to? Glede na izkušnje današnjih ljudstev na indonezijskih otokih, ki uporabljajo bodice teh morskih rib za konice harpun in puščic (Herald 1968), lahko sklepamo, da so jih za isti namen uporabljali tudi prebivalci kolišč na Ljubljanskem barju. Dobili so jih verjetno na isti način kakor kremenično

tion and evenly drop towards the side edge with the dentations.

The dentations are distributed in rows along each side of the body of the spine. There are 20 more or less clearly developed and variously shaped teeth and tooth roots on each side. They all show a tendency of curving towards the basal part, giving the spine a harpoon-like semblance. Towards the top the teeth are enamel coated. Some are broken off. The height of the teeth ranges from 1 to 1.5 mm.

### **3.9.3** DISCUSSION

Two families of sea rays (Batoidea) with dorsal fins developed into one or two caudal spines live in the Mediterranean (Turk 1996): the family of Dasyatidae (Trygonidae) and the family of Myliobatidae. Some species from these families reach a size of up to 4 m and a weight of about 350 kg (Herald 1968). The rays have a cartilaginous, non-mineralized skeleton, which does not fossilize well. The only preserved parts of rays are the flat durophagous teeth, which serve for crunching hard food (e.g. mollusks) and the caudal spine. The dental plates of grown animals, consisting of a number of dental elements, are sufficiently distinctive for identifying the individual species, which does not hold true for the caudal spines. It is also possible that researchers were not as attentive towards them, since they are rarely preserved as fossil remains. They are known from the lower Cretaceous onwards (Müller 1966; Carroll 1993).

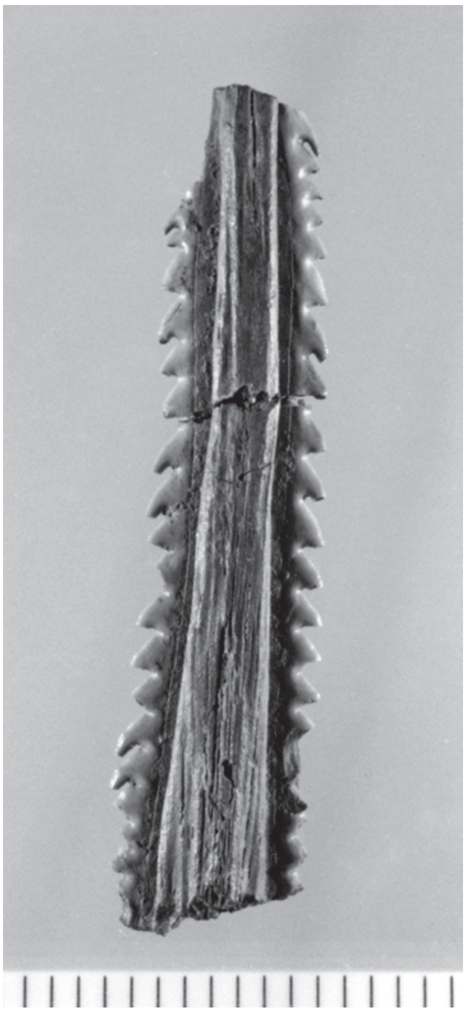
The first family, Dasyatidae*,* comprises of sting rays and all its numerous species, of which four species live in the Adriatic (Riedl 1983). They have a characteristically flattened body and a long supple whip-like tail which can sometimes exceed the length of the body. They reach a maximum length of 130 cm. Some species have one, and less frequently two, poisonous caudal spines at the root of the tail. The poisonous gland is located in a single or double groove on the distal side of the osseous spine. The poison is very potent and can be lethal to humans.

The second family, Myliobatidae*,* consists of eagle rays and its numerous species. Two of these species live in the Adriatic (Riedl 1983). They can be distinguished from the first family by their more expressed head, pushed further towards the front edge, and a whip-like tail at the root of which there is one poisonous caudal spine, and longer and more expressed side wings of the body giving them a rhomboid shape. They reach up to 140 cm in length. Judging from the shape of the caudal spine and its size, we surmise that the found spine belongs to the genus *Myliobatis*, which is relatively frequent in the Adriatic Sea.

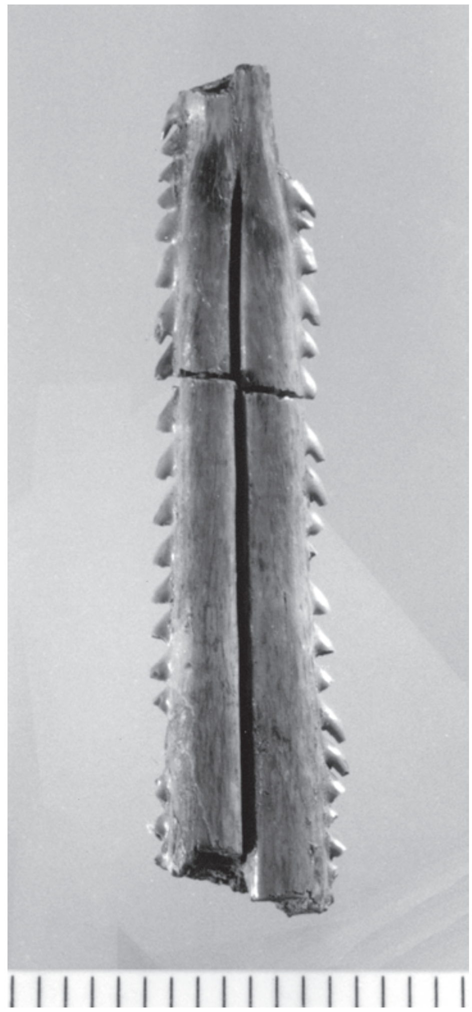
A spine of a sea fish was discovered among the cultural and osseous remains at a pile dwelling in the gradivo za kamena orodja preko trgovskih poti, ki so prepletala ta del evropskega prostora.



Ljubljansko barje. The question is, how so? Judging from present day experience with people living on Indonesian islands, who use the spines of these sea fish as arrow and harpoon points (Herald 1968), presumably the dwellers of the Ljubljansko barje pile dwellings used them for the same purpose. They probably got them the same way they got flint material for stone tools – via trade routes which at the time crisscrossed this part of Europe.



*Sl. 3.9.1:* Proksimalni ali hrbtni del bodice iz rodu *Myliobatis*. Foto: M. Grm.
*Fig. 3.9.1:* Proximal or dorsal part of the spine of the genus *Myliobatis*. Photo: M. Grm.



*Sl. 3.9.2:* Distalni ali trebušni del bodice iz rodu *Myliobatis*. Foto: M. Grm.
*Fig. 3.9.2:* Distal or ventral part of the spine of the genus *Myliobatis*. Photo: M. Grm.

# **3.10** PTIČI (AVES) NA ENEOLITSKEM KOLIŠČU HOČEVARICA

# **3.10** BIRDS (AVES) AT THE ENEOLITHIC PILE DWELLING AT HOČEVARICA

FRANC JANŽEKOVIČ & VESNA MALEZ

*Izvleček*

*Na eneolitskem kolišču Hočevarica na Ljubljanskem barju (Slovenija) je bilo najdenih 515 ptičjih kosti, med katerimi je bilo anatomsko in taksonomsko prepoznanih 295 kosti. Skupno je bilo določenih najmanj 143 osebkov ptic, ki so pripadali 16 vrstam:* Botaurus stellaris, Ardea purpurea, Anser fabalis, Anas platyrhynchos, A. acuta, A. querquedula, A. clypeata, Aythya ferina, A. nyroca, A. fuligula, Mergus albellus, M. serrator, M. merganser, Gallinago gallinago, Larus *cf.* cachinnans *in* Corvus frugilegus. *Domnevamo, da gre za kostno akumulacijo kuhinjskih ostankov naseljencev.*

*Iz vrstne sestave avifavne sklepamo o preferenci naseljencev do posamezne vrste plena. Zato je rekonstrukcija paleookolja omejena na lovni habitat eneolitskih lovcev. Iz današnjega poznavanja ekoloških zahtev ptic sklepamo, da je bil v bližini kolišča obsežen habitat s stoječo vodo in z jasno izraženim pelaškim in litoralnim območjem. Na najglobljih mestih je bila voda globoka več metrov. Obsežni litoralni vodni habitat je sestavljalo več pasov: območje s plitvo vodo in z bujno potopljeno in plavajočo makrofitsko vegetacijo; obsežne plitvine in brežine, pretežno zaraščene s trstiko, rogozom in šaši; zamočvirjeni travniki z nizko vegetacijo. Na kopnem sklepamo na odprto (negozdnato) in mozaično strukturirano pokrajino s travišči in obdelovalnimi površinami z večjimi in manjšimi otoki gozdov.*

*Abstract*

*A total of 515 bird bones were found at the Hočevarica Eneolithic pile dwelling in the Ljubljansko barje, of which 295 were anatomically and taxonomically identified. At least 143 specimens of the following 16 species were identified:* Botaurus stellaris, Ardea purpurea, Anser fabalis, Anas platyrhynchos, A. acuta, A. querquedula, A. clypeata, Aythya ferina, A. nyroca, A. fuligula, Mergus albellus, M. serrator, M. merganser, Gallinago gallinago, Larus *cf.* cachinnans *and* Corvus frugilegus. *We presume that these were cooking remains of the dwellers.*

*From the combination of the avifauna we can deduct the dwellers' preferences regarding individual species of game. For this reason the reconstruction of the palaeo-environment was limited to the hunting habitat of the Eneolithic hunters. Present knowledge of the ecological requirements of these birds reveals that the vicinity of the pile dwellings was a spacious habitat of still water with clearly definable pelagic and littoral areas. In its deepest parts the water was several meters deep. The littoral water habitat consisted of several strips: shallow water area with lush submerged and buoyant macrophyte vegetation; large shallows mostly overgrown by reed, cat's tail and sedge; and marshy meadows with low growing vegetation. On land we can expect an open (unforested) mosaic structured landscape with meadows and tillable land interspersed with larger or smaller islands of woods.*

## **3.10.1** UVOD

Prisotnost določene avifavne in razmerja med vrstami so dober kazalec sedanjih in preteklih habitatov. Najdbe s kolišča Hočevarica nudijo izjemno priložnost rekonstrukcije takratnega okolja. Za rekonstrukcijo paleookolja so posebej pomembne specializirane vrste z ozkimi ekološkimi nišami (steneke vrste), ki izbirajo

## **3.10.1** INTRODUCTION

The presence of a specific avifauna and the ratio between individual species are a reliable indicator of present and past habitats. The finds at the Hočevarica pile dwelling provide a unique opportunity for creating a reconstruction of the area. Specialized species that occupy narrow ecological niches (stenotopic species) samo specifične habitate. Na podlagi njihove prisotnosti utemeljeno sklepamo o prisotnosti takega habitata. Take so npr. race potapljavke, rod *Aythya*, reglja, raca žličarica, velika bobnarica, rjava čaplja in kozica. Nespecializirane vrste s širokimi ekološkimi nišami (evrieke vrste) zaradi širokega izbora habitatov malo prispevajo k vpogledu v preteklo okolje; primera takih vrst sta raca mlakarica in rumenonogi galeb.

Prve podatke o pticah v arheološkem (neolitskem in eneolitskem) materialu v Sloveniji je podal D. Dežman (Deschmann 1875b; 1876; 1878). Njegov seznam sta povzeli K. Drobne (1973) in T. Greif (1997); obsega okrog trinajst vrst (v narekovajih so navedeni sinonimi, kot jih navajata avtorici): »severni slapnik« – polarni slapnik (*Gavia arctica*), kormoran (*Phalacrocorax carbo*), pelikan (*Pelecanus* sp.), »nočna čaplja« – kvakač (*Nycticorax nycticorax*), siva čaplja (*Ardea cinerea*), štorklja (*Ciconia* sp.), »nemi labod« – mali labod (*Cygnus columbianus*), »divja gos« – gos (*Anser* sp.), »močvirska raca« – potapljavka (*Aythya* sp.), »žlabrovka« – konopnica (*Anas strepera*), »dolgorepka« – dolgorepa raca (*Anas acuta*), orel (*Aquila* sp.) in žerjav (*Grus grus*). Drobnetova v nadaljevanju navaja, da sta za Resnikov prekop znani mlakarica (*Anas platyrhynchos*) in »velika divja raca«, ki pa je sinonim za mlakarico. Prav tako je v Greifovi navedbi »dolgorepke« mišljena sinica dolgorepka, kar je razvidno iz pripisanega habitata (gozdovi, travniki), dejansko pa gre za raco.

Pri izkopavanju na eneolitskem kolišču Hočevarica na Ljubljanskem barju so med drugim našli precej ptičjih kostnih ostankov. V tem prispevku so predstavljeni rezultati zooarheološke raziskave avifavne. Na podlagi ekoloških značilnosti ptic je narejena rekonstrukcija paleookolja.

Po radiokarbonskem datiranju in dendrokronoloških raziskavah je bilo kolišče poseljeno v okvirno drugi polovici 37. in prvi polovici 36. stoletja pr. Kr. (glej *poglavja 6.2*, *6.3* in *6.5*).

### **3.10.2** METODE

Kolišče Hočevarica leži na jugozahodnem delu Ljubljanskega barja (Slovenija), na nadmorski višini 290 m ob današnji strugi Ljubljanice.

Izkopavanja so opravili sodelavci Inštituta za arheologijo ZRC SAZU. Sonda je bila pravokotne oblike v izmeri 2 × 4 m, pri izkopavanju je bila osnovna enota kvadrat površine 1 × 1 m. Izkopanih je bilo cca. 5 m$^3$ plasti z arheološkim materialom. Jasno sta se ločili starejša (1. naselbinska faza: skupki 23 do 18) in mlajša faza (2. naselbinska faza: skupki 16, 15, 13 do 4). Material, ki izhaja iz plasti med fazama, smo vključili v fazo 1/2 (skupka 17 in 14). Približno polovica volumna kulturne plasti je bila izprana in pregledana na sitih z velikostjo okenc 3, 1 in 0,5 mm. Ostanki ptic so bili pobrani

and choose only specific habitats are especially useful in reconstructing the palaeo-environment. We can therefore justifiably presume the existence of such habitats on the basis of the presence of these species. Such are for example the ring-necked duck, the *Aythya* genus, garganey, northern shoveler, bittern, purple heron and common snipe. The non-specialized species with wide ecological niches (eurytopic species) do not contribute much in the sense of reconstructing the historic environment due to their broad choice of habitats; examples of such species are the mallard and yellow-legged gull.

The first data on archaeological (Neolithic and Eneolithic) material in Slovenia was published by D. Dežman (Deschmann 1875b; 1876; 1878). His list was quoted by K. Drobne (1973) and T. Greif (1997); it encompasses about thirteen species: black-throated diver (*Gavia arctica*), cormorant (*Phalacrocorax carbo*), pelican (*Pelecanus* sp.), black-crowned night-heron (*Nycticorax nycticorax*), common heron (*Ardea cinerea*), stork (*Ciconia* sp.), tundra swan (*Cygnus columbianus*), domestic goose (*Anser* sp.), common duck (*Aythya* sp.), gadwall (*Anas strepera*), pintail (*Anas acuta*), eagle (*Aquila* sp.) and common crane (*Grus grus*). Drobne also lists the mallard (*Anas platyrhynchos*) and the »big wild duck«, which is a synonym for the mallard, as common species living at Resnikov prekop. When Greif refers to »pintail« she speaks of the titmouse, as we can conclude from the habitat (forests, meadows), while in truth it should be the duck.

An abundance of bird bone remains were found during excavations at the Eneolithic Hočevarica pile dwelling in the Ljubljansko barje. This article will present the results of the zooarchaelogical research of the avifauna. A palaeo-environmental reconstruction was made, based on the ecological characteristics of birds.

Radiocarbon dating and dendrochronological research indicated that the pile dwelling was populated during the second half of the 37$^{th}$ and first half of the 36$^{th}$ centuries B.C. (check *chapters 6.2*, *6.3* and *6.5*).

### **3.10.2** METHODS

The Hočevarica pile dwelling lies in the southwest part of the Ljubljansko barje, at 290 m above sea level near the current course of the Ljubljanica river.

The excavations were carried out by colleagues from the Institute of Archaeology at the SRC SASA. The sample trench was quadrangular, 2 × 4 m; the basic unit during excavation was a 1 × 1 m square. About 5 m$^3$ of layers with archaeological material were excavated. The older (1$^{st}$ settlement phase, sub-phases 23 to 18) and the younger phase (2$^{nd}$ settlement phase, sub-phases 16, 15, 13 to 4) were clearly distinguishable. The material from the layers between these phases was categorized as phase 1/2 (sub-phases 17 and 14). About a half of the volume of the cultural layer was wet-sieved using mesh sizes 3.0, 1.0 and med izkopavanjem ter pri spiranju skozi sito z velikostjo okenc 3 mm. Kosti ptic smo determinirali s pomočjo literature (Baumel 1979) in s primerjalnim materialom osteološke zbirke recentnih ptic Zavoda za paleontologijo in geologijo kvartara HAZU v Zagrebu (determinirala V. Malez). Določili smo število primerkov – ŠDP (number of identified specimens – NISP; posebej podajamo število celih in poškodovanih kosti). ŠDP izraža skupno število kosti ali njihovih fragmentov v vzorcu, ki jih z gotovostjo pripišemo posameznemu taksonu. Velja za najpreprostejši kazalec gostote posameznih vrst pri arheoloških analizah. Najmanjše število osebkov – NŠO (minimum number of individuals – MNI) smo določili na podlagi količnika med najmanjšim številom posameznih elementov v vzorcu in številom enakih delov skeleta obravnavane vrste (Reitz, Wing 1999).

Na podlagi današnjega poznavanja ekoloških zahtev posameznih vrst in njihove izbire življenjskega okolja (Gregori, Krečič 1979; Cramp 1994) je bila izvedena rekonstrukcija paleookolja eneolitskega obdobja kolišča Hočevarica.

### **3.10.3** REZULTATI

Na kolišču Hočevarica je bilo izkopanih 515 ptičjih kosti ali njihovih fragmentov. Anatomsko in taksonomsko je bilo prepoznanih 295 primerkov (kosti), celih je bilo samo 42 kosti. 220 fragmentov je bilo neopredeljenih. Skupno je bilo prepoznanih najmanj 143 osebkov ptic, ki so pripadali 16 vrstam (*tab. 3.10.1* in *3.10.2*).

#### 3.10.3.1 Sistematski pregled vrst (po Kryštufek, Janžekovič 1999), ekološke značilnosti vrst, ter podatki o telesni velikosti in prehrani ptic

Pri vsaki vrsti so navedeni recentni podatki o telesni masi, habitatu, statusu (recentni status v Sloveniji: celoletna vrsta – gnezdilka, poletna vrsta – gnezdilka, preletnik, zimski gost) in prehrani, ki nam pomagajo razumeti ekološke potrebe vrst, na podlagi katerih rekonstruiramo paleookolje.

Razred: **Ptiči** (Aves)
Red: **Močvirniki** (Ciconiiformes)
Družina: **Čaplje** (Ardeidae)

**Velika bobnarica** *Botaurus stellaris* (Linnaeus, 1758)

Velika bobnarica je bila zastopana z enim humerusom v vzorcu 1 (faza)/19 (skupek).

Poletna vrsta – zelo redka gnezdilka v obsežnih trstiščih; M: 0,8–1,2 kg. Življenjsko okolje so velike površine zarasle s trstiko, rogozom in ločjem, v stoječi ali počasi tekoči vodi. Prehranjuje se predvsem z ribami

0.5 mm. The bird remains were collected during the excavations and washed through a sieve with a 3.0 mm mesh. The bird bones were identified with the help of literature (Baumel 1979) and with comparative material from osteological collections of recent birds at the Paleontology and Quaternary Geology Institute HAZU in Zagreb (identified by V. Malez). We determined the number of identified specimens – NISP; and added the number of whole and damaged bones. The NISP indicates the total number of bones or their fragments in a sample that can be reliably attributed to a specific taxon. This is the simplest indicator of the density of individual species in archaeological analysis. The minimum number of individuals – MNI was determined on the basis of the quotient between the smallest number of individual elements in the sample and the number of the same parts of the skeleton of the particular species (Reitz, Wing 1999).

A reconstruction of the palaeo-environment and the Eneolithic period of the Hočevarica pile dwelling was made on the basis of present knowledge of the ecological demands of individual species and their choice of their living environment (Gregori, Krečič 1979; Cramp 1994).

### **3.10.3** RESULTS

515 bird bones or fragments were excavated at the Hočevarica pile dwelling. 295 specimens (bones) were anatomically and taxonomically recognized, of these only 42 bones were whole. 220 fragments remained unidentified. Altogether at least 143 bird specimens of 16 species were identified (*tables 3.10.1* and *3.10.2*).

#### 3.10.3.1 Systematic examination of the species (by Kryštufek, Janžekovič 1999), ecological characteristics of the species and data on the birds' size and nutrition

Recent data on the body weight, habitat, status (recent status in Slovenia: year round species – nesting birds and summer species – nesting birds, migrating birds, winter guests) and nutrition is given for each species, which helps us to understand the ecological needs of the species on the basis of which the palaeo-environment is then reconstructed.

Class: **Birds** (Aves)
Order: **Wading birds** (Ciconiiformes)
Family: **Herons** (Ardeidae)

**Bittern** *Botaurus stellaris* (Linnaeus, 1758)

The bittern is represented by one humerus in sample: 1 (phase)/19 (sub-phase).

The summer species – a very rare nesting bird in spacious reed covered areas; weight: 0.8–1.2 kg. Its li-

(Pisces) in dvoživkami (Amphibia), v manjšem obsegu pa tudi z vsemi drugimi vrstami malih vretenčarjev, z vodnimi členonožci (Arthropoda), kolobarniki (Annelida) in mehkužci (Mollusca).

**Rjava čaplja** *Ardea purpurea* Linnaeus, 1766

Rjava čaplja je bila zastopana z enim tibiotarzusom v vzorcu 1/19.

Redek gost zunaj gnezditvenega obdobja; M: 0,7–1,2 kg. Življenjsko okolje so močvirja in gosta močvirska vegetacija s trstičjem, grmovjem ipd. Prehranjuje se z ribami in vodnimi žuželkami (Insecta), v manjšem obsegu pa tudi z drugimi malimi vretenčarji in nekaterimi raki (Crustacea).

Red: **Plojkokljuni** (Anseriformes)
Družina: **Plovci** (Anatidae)

**Njivska gos** *Anser fabalis* (Latham, 1787)

Njivska gos je zastopana z enim metacarpusom v vzorcu 1/21.

Redek preletnik, občasno prezimuje; M: 2–4 kg. Življenjsko okolje so močvirja in barja v kombinaciji z velikimi travišči in resavami. Prehranjujejo se na različnih tipih odprte pokrajine, predvsem na traviščih, zlasti s travami in zelišči ter njihovimi plodovi.

**Mlakarica** *Anas platyrhynchos* Linnaeus, 1758

Ostanki 12 mlakaric so obsegali vse telesne segmente, našli smo jih samo v starejši fazi v vzorcih: 1/23, 1/21 in 1/19.

Celoletna vrsta gnezdi in prezimuje ob vodah po vsej Sloveniji; M: 0,8–1,6 kg. Življenjsko okolje mlakaric je pestro in obsega večino obvodnih habitatov od rek in potokov do jezer in mlak. S prehranjevalnega stališča so omnivori in oportunisti: hranijo se v vodi, na obrežjih in na kopnem.



ving environments constitute large reed, cat's-tail and rush covered areas, in still or slow flowing water. It feeds mainly on fish (Pisces) and amphibians (Amphibia), and to a lesser degree on other species of small vertebrates, water-dwelling arthropods (Arthropoda), worms (Annelida) and mollusks (Mollusca).

**Purple heron** *Ardea purpurea* Linnaeus, 1766

The purple heron is represented by one tibiotarsus in sample: 1/19.

A rare guest outside the nesting season; weight: 0.7–1.2 kg. Its living environments constitute of swamps and dense swamp vegetation with reeds, shrubs, etc. It feeds on fish and water insects (Insecta), and to a lesser degree also on other small vertebrates and some species of crustaceans (Crustacea).

Order: **Waterfowl** (Anseriformes)
Family: **Swimmers** (Anatidae)

**Bean goose** *Anser fabalis* (Latham, 1787)

The bean goose is represented by one metacarpus in sample: 1/21.

A rare migrant which occasionally winters; weight: 2–4 kg. Its living environment constitutes of swamps and moors in combination with large grasslands and heath. It feeds in various types of open landscapes, primarily with grass, herbs and their fruit.

**Mallard** *Anas platyrhynchos* Linnaeus, 1758

The remains of 12 mallards included all body segments, found only in the older phase in samples: 1/23, 1/21 and 1/19.

The year-round species nests and winters in waters throughout Slovenia; weight: 0.8–1.6 kg. The living environment of the mallard is very diverse and includes most


*Sl. 3.10.1:* Nadlahtnica in krokarnica dolgorepe race (*Anas acuta*), Hočevarica faza 1, skupek 21. Foto: M. Grm.
*Fig. 3.10.1:* The humerus and coracoid of a Pintail (*Anas acuta*), Hočevarica phase 1, subphase 21. Photo: M. Grm.

Kakor je pestra izbira prehranjevalnih habitatov, je pestra tudi hrana, tj. od različne rastlinske (zelišča in plodove v vodi in na kopnem) do živalske hrane (vodni in kopenski mehkužci, členonožci in kolobarniki).

**Dolgorepa raca** *Anas acuta* Linnaeus, 1758

Ostanke ramenskega obroča in peruti treh dolgorepih rac smo našli samo v starejši fazi v vzorcih: 1/23 in 1/21 (*sl. 3.10.1*).

Preletnik, posamezne prezimujejo; M: 0,4–1,3 kg. Življenjsko okolje so stoječe vode, ponavadi sredi odprte (negozdnate) pokrajine. Prehranjuje se z rastlinskim in živalskim materialom, ponavadi ga pobira v vodi globine 10 do 31 cm, včasih pa tudi na kopnem. Rastlinsko hrano sestavljajo različne vodne ali močvirske rastline, živalski del prehrane pa vodne žuželke, vse skupine planktonskih in bentoških rakov, mehkužci in kolobarniki.

**Reglja** *Anas querquedula* Linnaeus, 1758

Ostanke ramenskega obroča, peruti in en tibiotarzus petih regelj smo našli v vzorcih: 1/21, 1/19 in 2 (faza)/ 8 (skupek).

Preletnik, posamezni pari tudi gnezdijo; M: 0,3–0,6 kg. Življenjsko okolje so predvsem stoječe ali počasi tekoče vode z bogato plavajočo in podvodno vegetacijo. Večji delež prehrano tvori živalski material, manjši del pa rastlinski. Hrano pobira z vodne površine ali pod njo do globine, ki jo doseže z iztegovanjem. Živalsko hrano sestavljajo vodne žuželke, mehkužci, manjše vrste planktonskih in bentoških rakov, mladice rib in paglavci žab, rastlinsko komponento pa različne vodne rastline.

**Raca žličarica** *Anas clypeata* Linnaeus, 1758

Ostanke ramenskega obroča in peruti štirih rac žličaric smo našli v vzorcih: 1/21, 1/19, 2/8 in faza 1/2 (skupek 14) (*sl. 3.10.2*).

Preletnik, posamezni pari tudi gnezdijo; M: 0,3–1,0 kg. Življenjsko okolje so večje stoječe vode s plitvim dnom. Glede prehrane je omnivor, preferira pa planktonske rake, manjše mehkužce in žuželke, medtem ko tvorijo manjši delež prehrane vodne rastline.

**Raca** *Anas* sp.

Ostanke ramenskega obroča in peruti osmih rac rodu (*Anas*) nismo uspeli determinirati do vrste. Večina ostankov je iz starejše faze: 1/21 in 1/19, v kateri je bila večina vrst tega rodu, en primerek izhaja iz mlajše naselbinske faze; vzorec 2/5, v katerem pa ni bilo drugih vrst tega rodu.

**Sivka** *Aythya ferina* (Linnaeus, 1758)

Ostanki vseh telesnih segmentov 29 sivk smo našli v petih vzorcih: 1/23, 1/21, 1/19, 2/8 in faza 1/2 (skupek 14) (*sl. 3.10.3*).

Maloštevilna gnezdilka, zimski gost in preletnik; M: 0,6–1,3 kg. Življenjsko okolje so stoječe in počasi



waterside habitats, ranging from rivers and streams to lakes and ponds. They are omnivores and opportunists: they feed in water, on the banks or on dry land. Their diet is as diverse as their feeding habitats i.e. from various vegetables (herbs and fruit in water and on dry land) to animal food (water and dry land mollusks, arthropods and worms).

**Pintail** *Anas acuta* Linnaeus, 1758

The remains of a pectoral girdle and wings of three pintails were found only in the older phase in samples: 1/23 and 1/21 (*fig. 3.10.1*).

Generally a migrant that would occasionally winter; weight: 0.4–1.3 kg. Its living environment constitutes still waters, usually in open (unforested) landscapes. It feeds on vegetable and animal material, usually collected in water, at a depth of 10 to 31 cm, but sometimes also on shore. The vegetable food includes various water and swamp plants, the animal part of the food consists of water insects, all groups of planktonic and lake- or river-bed crustaceans, mollusks and worms.

**Garganey** *Anas querquedula* Linnaeus, 1758

The remains of a pectoral girdle, wings and one tibiotarsus from five garganey found in samples: 1 (phase)/21 (sub-phase), 1 (phase)/19 (sub-phase) and 2 (phase)/8 (sub-phase).

A migrant, individual couples sometimes nest; weight: 0.3–0.6 kg. Its living environment constitutes still and slow flowing waters with rich floating and submerged vegetation. The bulk of its food consists of animal material, the rest are plants. The food is collected on the water surface or below it to the depth it can reach by stretching. The animal food consists of insects, mollusks and smaller species of planktonic and aquatic-bed crustaceans, small fry and tadpoles, while the vegetable components are various water plants.

**Shoveler** *Anas clypeata* Linnaeus, 1758

The remains of a pectoral girdle and wings of four shovelers were found in samples 1 (phase)/21 (sub-phase), 1 (phase)/19 (sub-phase), 2 (phase)/8 (sub-phase) and in phase 1/2 (sub-phase 14) (*fig. 3.10.2*).

A migrant, some couples nest; weight: 0.3–1.0 kg. Its living environment constitutes larger still and shallow waters. They are omnivorous, but prefer small planktonic crustaceans, small mollusks and insects; a minor part of their food comprises of water plants.

**Duck** *Anas* sp.

The remains of a shoulder and the wings of eight ducks of the *Anas* genus could not be identified to the level of species. Most of the remains are from the older phase: 1/21 and 1/19, to which most of the species of this genus belonged. One specimen was from the younger settlement phase: sample 2/5, to which no other species of this genus were found.

tekoče vode, zarasle s plavajočo in potopljeno vegetacijo, brežine pa s trstiko ipd. Sivka je predominirana za podvodno nabiranje hrane po dnu, zato preferira vodo od 1 do 2,5 m globine. Prehranjuje se z rastlinskim in živalskim materialom. Med rastlinami prevladujejo podvodne in plavajoče vrste iz skupin: har (*Chara*), dristavcev (*Potamogeton*), rmancev (*Myriophyllum*), rogolistov (*Ceratophyllum*), šašev (*Carex*), sitcev (*Scirpus*), dresni (*Polygonum*) in trav. V živalski prehrani so zastopani predvsem mehkužci, ličinke žuželk, raki iz skupin postranic (Amphipoda) in enakonožcev (Isopoda), med kolobarniki pa tubifeksi (*Tubifex*).

**Kostanjevka** *Aythya nyroca* (Guldenstadt, 1770)

Ostanke ramenskega obroča, peruti in noge štirih kostanjevk smo našli v starejši (vzorec iz skupka 19) in fazi 1/2 (skupek 14) (*sl. 3.10.4*).

Maloštevilna gnezdilka, zimski gost in preletnik; M: 0,4–0,7 kg. Življenjsko okolje so večje vodne površine s stoječo vodo, bogato s podvodnim in plavajočim rastlinjem in bogato obraslo s trstičjem, vrbovjem ipd. Prehranjujejo se predvsem z vodnim rastlinjem. V manjši meri se hranijo tudi z drobnimi živalmi, ki jih pobirajo s površine ali pod vodo do globine, ki jo doseže jo z iztegovanjem. V manjši meri se potapljajo v globini od 20 do 70 cm. V rastlinskem deležu prehrane prevladujejo zeleni deli rastlin iz skupin: dristavcev, šašev, rogolistov, šejekov (*Hydrocharis*), dresni, srpic (*Bolboschoenus*), kostreb (*Echinochloa*), lokvanjev (*Nymphaea*), har in vodnih leč (*Lemna*), v živalskem deležu prehrane so zastopani: mladice rib, paglavci žab in ličinke repatih dvoživk, kolobarniki, mehkužci, manjši raki in različne vodne žuželke.

**Čopasta črnica** *Aythya fuligula* (Linnaeus, 1758)

Ostanki 58 čopastih črnic prevladujejo v eneolitski avifavni Hočevarice, kosti vseh telesnih segmentov so bile prisotne v vseh devetih vzorcih.

*Sl. 3.10.2:* Nadlahtnica race žličarice (*Anas clypeata*), Hočevarica faza 1/2, skupek 14. Foto: M. Grm.
*Fig. 3.10.2:* The humerus of a Shoveler (*Anas clypeata*), Hočevarica mixed phase 1/2, sub-phase 14. Photo: M. Grm.



**Common pochard** *Aythya ferina* (Linnaeus, 1758)

The remains of all segments of the bodies of 29 pochards were found in five samples: 1 (phase)/23 (sub-phase), 1 (phase)/21 (sub-phase), 1 (phase)/19 (sub-phase), 2 (phase)/8 (sub-phase) and phase 1/2 (sub-phase 14) (*fig. 3.10.3*).

Scarce nesting bird, winter guest, migrant; weight: 0.6–1.3 kg. Its living environment constitutes still and slow flowing waters overgrown with floating and submerged vegetation, reed banks, etc. The pochard collects food from the bottom and therefore prefers a 1 to 2.5 m deep aquatic environment. It feeds on vegetable and animal material. The predominant plants are submerged and floating species of: stonewarts (*Chara*), pondweed (*Potamogeton*), water milfoil (*Myriophyllum*), hornwort (*Ceratophyllum*), sedge (*Carex*), bulrush (*Scirpus*), knotweed (*Polygonum*) and grass. Its animal food consists mainly of mollusks, insect larvae, amphipods (Amphipoda) and isopods (Isopoda) crustaceans and from among annelids, the sludge worm (*Tubifex*).

**Ferruginous pochard** *Aythya nyroca* (Guldenstadt, 1770)

The remains of a pectoral girdle, wings and legs of four animals were found in the older settlement phase (sample from sub-phase 19) and phase 1/2 (sub-phase 14) (*fig. 3.10.4*).

Scarce nesting bird, winter guest and migrant; weight: 0.4–0.7 kg. Its living environment constitutes larger still water surfaces rich with submerged and floating vegetation and surrounded by lush reeds, willows, etc. They feed mainly on water plants and to a minor extent on small animals that they collect on the surface or underwater up to the depth they can reach by stretching. They sometimes dive to a depth of 20 to 70 cm. Their plant food consists mainly of pondweed, sedge, hornwort, frogbit *(Hydrocharis*), knotweed, creepingfern (*Bolboschoenus*), cockspur (*Echinochloa*), water lilies (*Nymphaea*), stonewarts and duckweed (*Lemna*), the animal part of its menu are fry, tadpoles, insect larvae, worms, mollusks, small crustaceans and various aquatic insects.

**Tufted duck** *Aythya fuligula* (Linnaeus, 1758)

The remains of 58 tufted ducks, the most numerous species in the Hočevarica Eneolithic avifauna were

Maloštevilen gnezdilec, zimski gost in preletnik; M: 0,7–1,4 kg. Življenjsko okolje so počasi tekoče in stoječe vode z zaraščenimi brežinami. Hrano nabirajo s potapljanjem v globini od 3 do 14 m (lahko še globlje), zato preferirajo vodo z malo potopljene ali plavajoče vegetacije ali brez nje, ki jih med potapljanjem ovira. Čopaste črnice se prehranjujejo predvsem z vodnimi členonožci (žuželke, raki iz skupin postranice in enakonožci) in mehkužci. Manjši delež prehrane obsega plodove in zelene dele vodnih rastlin predvsem iz skupin dristavcev in dresni.

**Potapljavka** *Aythya* sp.

Ostanke ramenskega obroča, peruti in noge šestih rac potapljavk smo našli v vzorcih: 1/19 in 2/5.

**Mali žagar** *Mergus albellus* Linnaeus, 1758

Krokarnice petih malih žagarjev smo našli v vzorcih: 1/21, 1/19, 2/8 in faza 1/2 (skupek 14).

Preletnik in zimski gost; M: 0,5–0,8 kg. Življenjsko okolje so stoječe vode (tudi morje) ali mirnejši odseki rek. Prehranjuje se pretežno z ribami povprečne velikosti 3–6 cm (izjemoma do 10 cm), lovi jih s potapljanjem ponavadi v globini 1–4 m. V manjši meri se prehranjuje z ličinkami in odraslimi osebki vodnih žuželk.

**Srednji žagar** *Mergus serrator* Linnaeus, 1758

Tibiotarzus srednjega žagarja smo našli v vzorcu iz faze 1/2 (skupek 14).

Preletnik in zimski gost; M: 0,9–1,4 kg. Življenjsko okolje so različni vodni habitati predvsem v notranjosti in z zaraščenimi bregovi. Prehranjuje se z ribami velikosti 8–10 cm. Dobro se potaplja, pretežno v globino

*Sl. 3.10.3:* Nadlahtnica in krokarnica sivke (*Aythya ferina*), Hočevarica faza 1, skupek 21. Foto: M. Grm.
*Fig. 3.10.3:* The humerus and coracoid of a Pochard (*Aythya ferina*), Hočevarica phase 1, sub-phase 21. Photo: M. Grm.

prevailing. The bones of all bodily segments were found in all the nine samples.

Scarce nesting bird, winter guest and migrant; weight: 0.7–1.4 kg. Its living environment constitutes slow flowing and still waters with overgrown banks. It collects its food by diving 3 to 14 m (and even deeper), and it consequently prefers water with little or no submerged or floating vegetation, since this would hamper the diving. The tufted duck mostly feeds on arthropods (insects, amphipod and isopod crustaceans) and mollusks. A minor part of its diet consists of fruit and the green parts of aquatic plants, mainly of the pondweed and knotweed species.

**Ring-necked duck** *Aythya* sp.

Remains of the pectoral girdle, wings and legs of six ducks were found in samples: 1 (phase)/19 (sub-phase) and 2 (phase)/5 (sub-phase).

**Smew** *Mergus albellus* Linnaeus, 1758

The coracoids of five smew were found in samples: 1 (phase) /21 (sub-phase), 1 (phase)/19 (sub-phase), 2 (phase) /8 (sub-phase) and phase 1/2 (sub-phase 14).

A migrant and winter guest; weight: 0.5–0.8 kg. Its living environment constitutes still water (also sea) or calmer parts of rivers. It mainly feeds on medium size fish 3–6 cm (exceptionally up to 10 cm); it hunts them by diving 1–4 m deep. To a minor extent it feeds on larvae and grown-up aquatic insects.

**Red-breasted merganser** *Mergus serrator* Linnaeus, 1758

The tibiotarsus a red-breasted merganser was found in a sample phase 1/2 (sub-phase 14).

A migrant and winter guest; weight: 0.9–1.4 kg. Its living environment constitutes various aquatic habitats, mainly inland, and richly overgrown banks. It feeds on 8–10 cm large fish. The red-breasted merganser is a good diver that dives to an average depth of 3.5 m, exceptionally up to 5 m. A minor share of its diet comprises of crustaceans, aquatic mollusks and arthropods.

do 3,5 m izjemoma tudi do 5m. Manjši del prehrane sestavljajo raki ter vodni mehkužci in členonožci.

**Veliki žagar** *Mergus merganser* Linnaeus, 1758

Humerus in tibiotarzus dveh velikih žagarjev smo našli v starejši fazi v vzorcih: 1/23 in 1/19.

Posamezni pari gnezdijo, preletnik in zimski gost; M: 0,9–2,2 kg. Življenjsko okolje so predvsem zgornji tokovi rek in jezera, kjer so bregovi zaraščeni z gozdom. Prehranjuje se z ribami do velikosti okrog 30 cm, lovi jih s potapljanjem tudi do globine 10 in več metrov.

Red: **Pobrežniki** (Charadriiformes)
Družina: **Kljunači** (Scolopacidae)

**Kozica** *Gallinago gallinago* (Linnaeus, 1758)

Humerus ene kozice smo našli v vzorcu 1/23.

Preletnik, zimski gost, posamezni pari tudi gnezdijo; M: 0,1–0,2 kg. Življenjsko okolje so močvirni habitati z nizko vegetacijo, barja in mokri travniki. Prehranjuje se na način, da zabada kljun v mehki substrat in tipa za plenom. Glavni delež prehrane sestavljajo nevretenčarji, ki živijo v mehkem močvirnem substratu. To so predvsem: ličinke in odrasle žuželke, kolobarniki (deževniki in pijavke), različne manjše vrste polžev, raki iz skupine postranic in enakonožcev. V prehrani so vedno zastopani delčki močvirskih rastlin.

Družina: **Galebi** Laridae

**Rumenonogi galeb** *Larus* cf. *cachinnans* Pallas, 1826 = (Syn.: *Larus argentatus michahellis* Nauman, 1840)

Tibiotarzus enega rumenonogega galeba smo našli v vzorcu 1/19.

Celoletna vrsta, gnezdi na morski obali; M: 0,8–1,5 kg. Življenjsko okolje so morja in morska obala, izlivi rek, zunaj gnezdenja pa zaidejo daleč v notranjost. Galeb je plenilec in mrhovinar, prehranjuje se predvsem z ribami, mehkužci, raki, žuželkami ipd.; loti se vseh vrst vretenčarjev, ki jih lahko upleni ali najde njihovo mrhovino.



**Common merganser** *Mergus merganser* Linnaeus, 1758

The humerus and tibiotarsus of two mergansers were found in the older phase in samples: 1/23 and 1/19.

Individual couples nest, otherwise a migrant and a winter guest; weight: 0.9–2.2 kg. Its living environment constitutes mainly the upper river-courses and lakes where the banks are overgrown with forests. It feeds on fish that can be up to 30 cm long, and hunts them by diving up to 10 m deep and more.

Order: **Shorebirds** (Charadriiformes)
Family: **Waders** (Scolopacidae)

**Common snipe** *Gallinago gallinago* (Linnaeus, 1758)

The humerus of one snipe was found in sample 1/23.

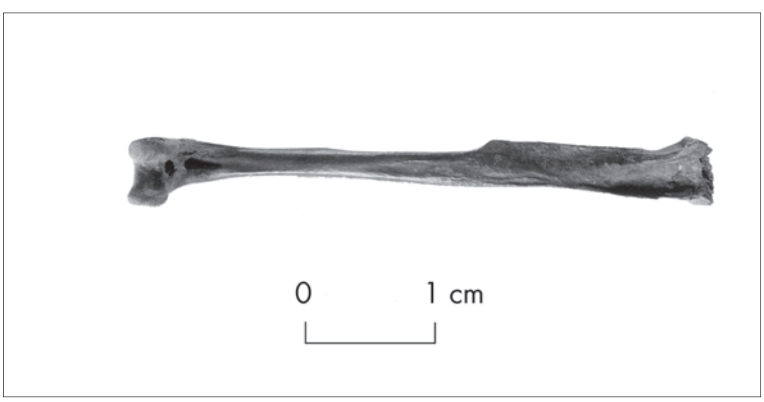
A migrant and winter guest; some couples nest; weight: 0.1–0.2 kg. Its living environment constitutes swampy habitats with low vegetation, moors and marshy meadows. It feeds by poking its beak into the soft substrate where it feels for its prey. The bulk of its diet comprises invertebrates that live in the soft substrate. These mainly consist of: larvae and adult insects, worms (earthworms and leeches), various species of small snails and amphipod and isopod crustaceans. Parts of marsh plants are always present in its food.

Family: **Gulls** Laridae

**Yellow-legged gull** *Larus* cf. *cachinnans* Pallas, 1826 = (Syn.: *Larus argentatus michahellis* Nauman, 1840)

The tibiotarsus of one gull was found in sample 1/19.

It is a year-round species, nests on the sea shores; weight: 0.8–1.5 kg. Its living environment constitutes the sea and sea shores, estuaries; when not nesting it often goes deep inland. The gull is a predator and scavenger. It feeds mainly on fish, mollusks, crustaceans, insects, etc.; it will grab any vertebrate it can or finds its carcass.




*Sl. 3.10.4:* Tibiotarzus kostanjevke (*Aythya nyroca*), Hočevarica faza 1, skupek 19. Foto: M. Grm.
*Fig. 3.10.4:* The tibiotarzus of a Ferruginous duck (*Aythya nyroca*), Hočevarica phase 1, subphase 19. Photo: M. Grm.

Red: **Pevci** Passeriformes
Družina: **Vrani** Corvidae

**Poljska vrana** *Corvus frugilegus* Linnaeus, 1758

Femur poljske vrane smo našli v vzorcu 1/19.

Gnezdilka – celoletna vrsta in zimski gost; M: 0,5 kg. Življenjsko okolje so gozdički ali gozdni otoki sredi večjih odprtih površin, npr. travnikov ali polj. Glavna sestavina prehrane so nevretenčarji predvsem žuželke in deževniki, od rastlin pa najrazličnejši plodovi in semena.

3.10.3.2 Ekološke značilnosti avifavne in poskus rekonstrukcije eneolitskega okolja

Domnevamo, da akumulacija ptičjih kosti v koliščarskem naselju Hočevarica predstavlja kuhinjske ostanke oziroma ostanke prehrane naseljencev. Tej hipotezi so v podporo vsaj štiri dejstva:

A). Kostni material je bil nabran znotraj koliščarskega naselja.
B). Vseh 515 kostnih ostankov je bilo najdenih na relativno majhni površini (8 $m^2$). Številčnost in pestra vrstna sestava ptic je mnogo verjetneje posledica odlaganja oziroma odmetavanja in kopičenja ostankov hrane kot naključnega kopičenja poginulih ptic.
C). Veliko število kosti je poškodovanih oziroma polomljenih (91,8 %), kar je najbrž posledica človeške manipulacije s kostmi po smrti živali. Pri poginu in razgradnji mehkih tkiv po naravni poti (dekompozicija) kosti ne bi bile v tolikšni meri mehansko poškodovane.
D). Nikjer nismo našli ostankov celotnega skeleta ali vsaj njegovega večjega dela (prevladujejo kosti le posameznih okončin) iz česar lahko sklepamo na človeško manipulacijo z organizmom po njegovi smrti.

Zgoraj navedena dejstva v podporo ostankov prehranjevanja koliščarjev pomenijo, da se v vrstni sestavi vzorca avifavne kaže preferenca eneolitskih lovcev do posameznega plena. Pri tem vzorec vrst ni odraz dejanske združbe avifavne tistega obdobja in okolja, ampak le specifični izbor vrst. V avifavni Hočevarice so zastopane vrste, ki živijo v vodnih in močvirskih življenjskih okoljih, z izjemo poljske vrane. Predvsem plojkokljuni (race), ki prevladujejo v vzorcu, izbirajo habitate s stoječo vodo. Zastopane so vrste pelaškega območja, ki nabirajo hrano v globini več metrov, kjer je malo potopljene in plavajoče vegetacije ali je ni (veliki žagar, čopasta črnica, Dežmanova najdba slapnika in kormorana). Druge vrste izbirajo vodo z globino 1–3 m (sivka, mali žagar, dolgorepa raca, Dežmanov pelikan), tretjo skupino pa tvorijo litoralne vrste, ki izbirajo plitvo vodo z bujno potopljeno in plavajočo makrofitsko vegetacijo (reglja, raca žličarica, kostanjevka). Obsežna



Order: **Songbirds** Passeriformes
Family: **Crows** Corvidae

**Rook** *Corvus frugilegus* Linnaeus, 1758

The femur of a rook was found in sample 1/19.

The entire species are nesting birds and winter guests; weight: 0.5 kg. Its living environment constitutes of small woods or wood islands on larger patches of open land, i.e. meadows or fields. Its food consists mainly of invertebrates, mostly insects and earthworms, various fruits and seeds.

3.10.3.2 The ecological characteristics of the avifauna and an attempt of reconstructing the Eneolithic environment

We presume that the accumulation of bird bones in the Hočevarica pile dwellings are the cooking remains i.e. the remains of the dwellers' food. Four facts support this hypothesis:

A). The bone material was found inside the pile dwellings.
B). All the 515 bone remains were found within a relatively small area (8 $m^2$). The numbers and diverse species of the birds are more probably the result of disposal and accumulation of food remains than of arbitrary accumulation of dead birds.
C). A great number of the bones are damaged and broken (91.8 %), which is probably the result of human manipulation with the bones after the birds' death. In the event of natural death and natural decomposition of the soft tissue the bones would not have been mechanically damaged to such a degree.
D). We have not found the remains of the entire skeleton or at least a large part of it (the bones were mainly those of individual extremities); this leads us to presume human manipulation with the organisms after their death.

The above stated facts in support of the theory that these are the remains of pile dwellers' food indicate that the selection of species in the avifauna samples point out the preferences of the Eneolithic hunters regarding individual types of prey. The pattern of species does not present the avifauna community of the time and the environment, rather the human selection of the species. The avifauna at Hočevarica represents species that live in aquatic or marshy living environments, with the exception of the rook. Most waterfowl (ducks), which dominate in the pattern, choose still water habitats. Some are pelagic species who collect their food in the depths (up to several meters), where there is little or no submerged or surface vegetation (merganser, tufted duck, Dežman's find of a black-throated diver and the cormorant). Other species choose 1–3 m deep water (com-nadvodna helofitna in amfifitna vegetacija v plitvinah in na brežinah, ki jo sestavljajo predvsem trstika, rogozi, šaši itd., je bivališče velike bobnarice in rjave čaplje. Njivska gos in kozica izbirata zamočvirjene travnike ali podobne habitate z nizko vegetacijo (podobne zahteve imajo kvakač, siva čaplja, štorklja in žerjav, ki jih navaja Greifova). Prehrana njivske gosi temelji na »paši« močvirne ali kopenske zeliščne vegetacije travnikov in obdelanih površin. Predstavnik kopenskih habitatov je poljska vrana (Dežman navaja še orla), ki živi v odprti (negozdnati) in mozaično strukturirani pokrajini s travišči in obdelovalnimi površinami z večjimi in manjšimi gozdnimi otoki. Predstavljene ekološke potrebe posameznih vrst ptic omogočajo delno rekonstrukcijo eneolitskega okolja v okolici kolišča Hočevarica. Okolje je obsegalo večjo stoječo vodo z izraženim pelaškim in litoralnim območjem. Globina vode v pelagijalu je bila do več metrov. Litoralno območje je obsegalo vse pasove makrofitske vegetacije: pas potopljene vegetacije, pas plavajoče vegetacije in pas nadvodne helofitne in amfifitne vegetacije.

Iz predstavljenih dejstev in z aplikacijo današnjih ekoloških značilnosti avifavne, lahko sklepamo o nekaterih značilnostih paleookolja in o lovnih habitatih eneolitskega lovca. Dejansko gre za dva pogleda na isto okolje, le da se pri rekonstrukciji paleookolja omejimo na del pokrajine. V vzorcu so zastopane predvsem vodne vrste ptic, zato je mogoče le sklepanje o vodnih in močvirnih habitatih, ki jih te vrste preferirajo. S stališča lovnega habitata eneolitskega lovca lahko sklepamo, da je bil ta uspešen lovec na stoječih vodah, tako globokih kot plitvih. To hipotezo utemeljujemo z zastopanostjo različnih vrst rac, od tistih, ki se zadržujejo na odprti globoki vodi v pelaškem območju, do onih, ki izbirajo plitve obrežne vode litoralnega območja. Prav tako pa je lovil vrste v gostem trstičju in drugi nadvodni vegetaciji. Način lova in lovni pripomočki niso znani, ugibamo lahko na mreže in zanke, vendar od slednjih skoraj ni materialnih ostankov. Najdba 29 mm dolgega ravnega trnka, na katerega so nataknili vabo in ga je žival pogoltnila skupaj z vabo, dopušča razmišljanja o nastavljanju vab za ptice. Lov ptic z ravnimi trnki je poznan še iz začetka 20. stoletja na Bodenskem jezeru (Torke 1993; Hüster-Plogman, Leuzinger 1995), uspešen pa je pri lovu ribojedih ptic ali mrhovinarjev. V našem primeru so to velika bobnarica, rjava čaplja, veliki in srednji žagar ter rumenonogi galeb. Pri racah, katerih prehrana temelji na rastlinah, členonožcih, mehkužcih in kolobarnikih je lov z ravnim trnkom zelo malo verjeten. Eneolitski lovci so lovili tudi z lokom in puščico (glej *poglavje 3.2*), vendar je glede na obnašanje današnjih rac moral biti vešč strelec, da je zadel na zelo veliki razdalji.

mon pochard, smew, pintail and Dežman's pelican), while the third group are littoral birds which prefer shallow water and lush submerged or floating macrophyte vegetation (garganey, shoveler, Ferruginous duck). The rich surface helophyte and amphiphyte vegetation in the shallow waters and on the banks, consisting mainly of reed, cat's tails, sedge etc., are the habitat of the bittern and the purple heron. The bean goose and the common snipe choose marshy meadows and similar habitats with low vegetation (the black-crowned night-heron, common heron and common crane listed by Greif, have similar preferences). The food of bean geese is based on »grazing« the marsh or dry land herb vegetation growing on meadows and cultivated fields. The representative of dry land habitats is the rook (Dežman also mentions the eagle), which lives in the open (unforested) mosaic structured landscape with grasslands and cultivated land, with larger or smaller islands of trees. The presented ecological demands of individual species of birds help to reconstruct the Eneolithic environment around the Hočevarica pile dwelling. The environment consisted of a major still water with expressed pelagic and littoral areas. The water depth in the pelagic zone was several meters. The littoral area covered all the zones of macrophyte vegetation: the zone of submerged vegetation, the zone of floating vegetation, and the zone of helophyte and amphiphyte vegetation.

From the above stated facts and the application of present ecological characteristics of the avifauna we can deduce some of the characteristics of the palaeo-environment and the hunting habitats of the Eneolithic hunter. In fact, there are two aspects of the same environment, but in reconstructing the palaeo-environment we have limited ourselves to only a part of the landscape. The samples feature mainly aquatic birds, limiting our deductions to the aquatic and marshy habitats that these species prefer. From the aspect of the hunting habitat of the Eneolithic hunter we can conclude that he was a successful hunter in still water, deep as well as shallow. We justify this hypothesis with the presence of various species of ducks, from those that live in the pelagic zones of the deep water to those that choose shallow littoral water. This hunter also hunted in dense reeds and in other marsh vegetation. The hunting methods and hunting tools are unknown, but we can presume he used nets and snares; however, there are almost no material remains of the latter. The discovery of a 29 mm long straight hook to which the fisher attached bait and waited for the animal to eat it (with the bait), would justify the notion that bait was also set for birds. Hunting birds with a straight hook is known also from the beginning of the 20th century at the Lake Constance (Torke 1993; Hüster-Plogman, Leuzinger 1995); it is successful for catching fish-eating birds and vultures. In our case these are the bittern, purple heron, red-breasted and common merganser and the yellow-legged gull. Ducks, which

3.10.3.3 Primerjava eneolitske in recentne avifavne

Recentna avifavna Ljubljanskega barja in okolice je dobro raziskana. Vse vrste iz eneolitskega obdobja poseljujejo širše območje tudi v recentnem času. Trontelj (1994) navaja za Ljubljansko barje 229 vrst ptic, od tega 110 gnezdilk. V primerjavi z eneolitskim seznamom avifavne so vse vrste razen treh vrst žagarjev prisotne tudi danes. Od 16 eneolitskih vrst s Hočevarice sta mlakarica in kozica edini recentni gnezdilki na barju,

mainly feed on plants, arthropods, mollusks and worms very probably were not caught with such hooks. The Eneolithic hunter also hunted with bows and arrows (check *chapter 3.2*), but considering the behavior of present day ducks he must have been a very good marksman to hit them from a considerable distance.

| **Vrste / Vzorci Species / Samples** | **1/23** | **1/21** | **1/19** | **1/2** | **2/12** | **2/8** | **2/7** | **2/5** | **2/4** | **Skupaj / Total** |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Botaurus stellaris*** | | | 0/1, 1 | | | | | | | 0/1, 1 |
| ***Ardea purpurea*** | | | 0/1, 1 | | | | | | | 0/1, 1 |
| ***Anser fabalis*** | | 0/1, 1 | | | | | | | | 0/1, 1 |
| ***Anas platyrhynchos*** | 0/9, 5 | 1/6, 3 | 1/6, 4 | | | | | | | 2/21, 12 |
| ***Anas acuta*** | 2/2, 2 | 2/0, 1 | | | | | | | | 4/2, 3 |
| ***Anas querquedula*** | | 0/1, 1 | 1/3, 3 | | | 0/2, 1 | | | | 1/6, 5 |
| ***Anas clypeata*** | | 1/1, 1 | 0/1, 1 | 1/0, 1 | | 1/1, 1 | | | | 3/3, 4 |
| ***Anas* sp.** | | 0/3, 2 | 0/5, 5 | | | | | 0/1, 1 | | 0/9, 8 |
| ***Aythya ferina*** | 1/5, 5 | 5/21, 11 | 3/14, 10 | 0/3, 1 | | 0/3, 1 | | | | 9/46, 28 |
| ***Aythya nyroca*** | | | 4/1, 4 | 0/2, 1 | | | | | | 4/3, 5 |
| ***Aythya fuligula*** | 3/24, 11 | 6/77, 18 | 7/18, 12 | 0/8, 7 | 0/3, 1 | 0/9, 4 | 0/1, 1 | 1/0, 1 | 0/3, 3 | 17/140, 58 |
| ***Aythya* sp.** | | | 0/7, 5 | | | | | 0/1, 1 | | 0/7, 6 |
| ***Mergus albellus*** | | 1/1, 2 | 1/0, 1 | 0/1, 1 | | 0/1, 1 | | | | 2/3, 5 |
| ***Mergus serrator*** | | | | 0/1, 1 | | | | | | 0/1, 1 |
| ***Mergus merganser*** | 0/1, 1 | | 0/1, 1 | | | | | | | 0/2, 2 |
| ***Gallinago gallinago*** | 0/1, 1 | | | | | | | | | 0/1, 1 |
| ***Larus* cf. *cachinnans*** | | | 0/1, 1 | | | | | | | 0/1, 1 |
| ***Corvus frugilegus*** | | | 0/1, 1 | | | | | | | 0/1, 1 |
| **Skupaj / Total** | 6/42, 25 | 16/111, 40 | 17/60, 50 | 1/24, 12 | 0/4, 1 | 1/17, 8 | 0/1, 1 | 1/2, 3 | 0/4, 3 | 42/265, 143 |
| **Št. nedoločenih fragmentov / Nr. of unidentified fragments** | 52 | 133 | 23 | 9 | 1 | 1 | 0 | 0 | 1 | 220 |

*Tab. 3.10.1:* Število skeletnih ostankov ptic po posameznih vzorcih (1/23 = faza 1, skupek 23; 1/21 = faza 1, skupek 21; 1/19 = faza 1, skupek 19; faza 1/2, skupek 14; 2/12 = faza 2, skupek 12; 2/8 = faza 2, skupek 8; 2/7 = faza 2, skupek 7; 2/5 = faza 2, skupek 5; 2/4 = faza 2, skupek 4) s Hočevarice; vrednosti v celicah: ŠDP – cele kosti/ŠDP – poškodovane kosti, NŠO (ŠDP – število določenih primerkov, NŠO – najmanjše število osebkov).
*Table 3.10.1:* Number of skeletal remains of birds according to the stratigraphy (1/23 = phase 1, sub-phase 23; 1/21 = phase 1, sub-phase 21; 1/19 = phase 1, sub-phase 19; phase 1/2, sub-phase 14; 2/12 = phase 2, sub-phase 12; 2/8 = phase 2, sub-phase 8; 2/7 = phase 2, sub-phase 7; 2/5 = phase 2, sub-phase 5; 2/4 = phase 2, sub-phase 4) of Hočevarica; values in the cell: ŠDP – a complete bone/ŠDP – a damaged bone, NŠO (ŠDP – no. of identified individuals, NŠO – the lowest no. of individuals).

ostale vrste so pomladanske in jesenske preletne ptice, oziroma so prisotne zunaj gnezditvenega obdobja. Gnezditveni status eneolitskih vrst nam ni znan, a vsaj za močvirnike in race iz rodov *Anas* in *Aythya* domnevamo, da so bile gnezdilke.

### **3.10.4** SKLEPI

Subfosilni material iz eneolitskega kolišča Hočevarica na Ljubljanskem barju obsega 515 ptičjih kosti. Skupno je bilo prepoznanih 143 osebkov ptic, ki so pripadali 16 vrstam.

Določili smo naslednje taksone: *Botaurus stellaris, Ardea purpurea, Anser fabalis, Anas platyrhynchos, Anas acuta, Anas querquedula, Anas clypeata, Anas* sp., *Aythya ferina, Aythya nyroca, Aythya fuligula, Aythya* sp., *Mergus albellus, Mergus serrator, Mergus merganser, Gallinago gallinago, Larus* cf. *cachinnans* in *Corvus frugilegus*.

Domnevamo, da je kostna akumulacija nastala s kopičenjem kuhinjskih ostankov oziroma ostankov prehrane naseljencev.

Domnevamo, da se v vrstni sestavi avifavne kaže

#### 3.10.3.3 Comparison of Eneolithic and recent avifauna

The recent avifauna of the Ljubljansko barje and its surroundings are well known. All the species of the Eneolithic period live in the area also in the present day. Trontelj (1994) lists 229 bird species in the Ljubljansko barje, 110 of them nesting birds. Compared to the list of Eneolithic avifauna all these species except the three species of mergansers are present also today. Of the 16 Eneolithic species from Hočevarica the mallard and the snipe are the only remaining nesting birds in the Ljubljansko barje today, all the rest are spring or autumn migrants, present only outside their nesting season. The nesting status of Eneolithic birds is unknown to us, but at least for wading birds and ducks of the genuses *Anas* and *Aythya* we can presume that they nested here.

### **3.10.4** CONCLUSIONS

Sub-fossil material from the Eneolithic Hočevarica pile dwelling on the Ljubljansko barje encompasses

| | Glava / Head | | Ramenski obroč in perut / Shoulder girdle and wing | | | | | | | Trup / Trunk | | Okolčje in noga / Pelvis and leg | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Vrste / Elementi Species / Elements** | **Cr** | **M** | **MC** | **H** | **Ra** | **U** | **Sc** | **C** | **Cl** | **St** | **Co** | **P** | **F** | **TT** | **TM** |
| **Botaurus stellaris** | | | | 1 | | | | | | | | | | | |
| ***Ardea purpurea*** | | | | | | | | | | | | | | 1 | |
| ***Anser fabalis*** | | | 1 | | | | | | | | | | | | |
| ***Anas platyrhynchos*** | 1 | 1 | 2 | 2 | 1 | | 3 | | | 2 | | | | 7 | 1 |
| ***Anas acuta*** | | | 1 | 2 | | | 1 | 2 | | | | | | | |
| ***Anas querquedula*** | | | 1 | 1 | | 2 | | 2 | | | | | | 1 | |
| ***Anas clypeata*** | | | | 3 | | 1 | | 2 | | | | | | | |
| ***Anas* sp.** | | | | 6 | 1 | | | 1 | 1 | | | | | | |
| ***Aythya ferina*** | | 1 | 5 | 9 | | 6 | | 14 | | | | | 2 | 18 | |
| ***Aythya nyroca*** | | | 1 | | 1 | | 1 | 1 | 1 | | | | | 2 | |
| ***Aythya fuligula*** | | 3 | 6 | 33 | 18 | 24 | 18 | 19 | 9 | 5 | 1 | 3 | 3 | 18 | |
| ***Aythya* sp.** | | | | | 3 | 2 | | 1 | | | | | | 2 | |
| ***Mergus albellus*** | | | | | | | | 5 | | | | | | | |
| ***Mergus serrator*** | | | | | | | | | | | | | | 1 | |
| ***Mergus merganser*** | | | | 1 | | | | | | | | | | 1 | |
| ***Gallinago gallinago*** | | | | 1 | | | | | | | | | | | |
| ***Larus* cf. *Cachinnans*** | | | | | | | | | | | | | | 1 | |
| ***Corvus frugilegus*** | | | | | | | | | | | | | 1 | | |
| **Skupaj / Total** | 1 | 5 | 17 | 59 | 24 | 35 | 23 | 47 | 11 | 7 | 1 | 3 | 6 | 52 | 1 |

*Tab. 3.10.2:* Število kostnih ostankov ptic s Hočevarice; C – coracoid, Cl – clavicula, Co – costae, Cr – cranium, F – femur, H – humerus, M – mandibula, MC – metacarpus, P – pelvis, Ra – radius, Sc – scapula, St – sternum, TM – tarsometatarsus, TT – tibiotarzus, U – ulna.

*Table 3.10.2:* Number of bird bones from Hočevarica; C – coracoid, Cl – clavicula, Co – costae, Cr – cranium, F – femur, H – humerus, M – mandibula, MC – metacarpus, P – pelvis, Ra – radius, Sc – scapula, St – sternum, TM – tarsometatarsus, TT – tibiotarzus, U – ulna.

preferenca eneolitskih lovcev do posameznega plena. Pri tem vzorec vrst ni odraz združbe avifavne tistega obdobja in okolja, ampak le specifični izbor vrst.

Zastopane so ptice s preferenco na stoječih vodah, ki naseljujejo litoralno in pelaško območje. Iz načina iskanja hrane sklepamo na različno globino vode: veliki žagar in čopasta črnica preferirata globino vode več metrov; globino vode 1–3 m preferirajo sivka, mali žagar in dolgorepa raca; reglja, raca žličarica in kostanjevka izbirajo plitvo vodo z bujno potopljeno in plavajočo makrofitsko vegetacijo; obsežna nadvodna vegetacija iz trstike, rogoza, šaša ipd. v plitvinah in brežinah je življenjski prostor velike bobnarice in rjave čaplje; njivska gos in kozica izbirata zamočvirjene travnike ali podobne močvirne življenjske prostore z nizko vegetacijo.

Na podlagi prisotnosti poljske vrane domnevamo na mozaično strukturirano kopno pokrajino s travišči in »obdelovalnimi površinami« ter z večjimi in manjšimi otoki gozdov.

Eneolitski koliščar je bil uspešen lovec na stoječih vodah, tako globokih kot plitvih. To hipotezo potrjuje zastopanost vseh vrst rac od tistih, ki se zadržujejo na odprti in globoki vodi, do onih, ki izbirajo plitve obrežne vode.

Način lova nam ni znan; na podlagi najdbe 29 mm dolgega ravnega trnka sklepamo na pasivni lov z vabo. Ostanki loka in puščičnih osti dokazujejo uporabo loka.

ZAHVALA

Prof. dr. Tonetu Novaku in Marijanu Govediču se zahvaljujeva za pregled rokopisa in koristne pripombe, dr. Antonu Veluščku in še enkrat Marijanu Govediču pa za ideje in debate o okolju v eneolitskem obdobju.



515 bird bones. Altogether 143 bird specimens from 16 species were identified.

These were the following taxons: *Botaurus stellaris, Ardea purpurea, Anser fabalis, Anas platyrhynchos, Anas acuta, Anas querquedula, Anas clypeata, Anas* sp., *Aythya ferina, Aythya nyroca, Aythya fuligula, Aythya* sp., *Mergus albellus, Mergus serrator, Mergus merganser, Gallinago gallinago, Larus* cf. *cachinnans* and *Corvus frugilegus*.

Presumably the bone accumulation is the result of discarded kitchen remains or the dwellers' food remains.

Furthermore, the selection of avifauna seems to evidence the preferences of the Eneolithic hunters regarding their prey. The selection of species is not a reflection of the avifauna community of that time and environment, but a specific selection of the species.

The birds that prefer still water and settle in littoral and pelagic areas were most frequently represented in the samples. The various water depths may be deduced from the ways they find their food. For instance, the common merganser and the tufted duck prefer several meters deep water, the common pochard, red-breasted merganser and pintail duck prefer depths of 1–3 m; the garganey, shoveler, duck and Ferruginous duck choose shallow water with lush submerged and floating macrophyte vegetation; extensive above water vegetation of reeds, cat's-tails, sedge etc. in the shallow waters and the banks are the preferred living environment of the bittern and the purple heron; the bean goose and the snipe choose waterlogged meadows or marshy habitats with low vegetation.

The presence of the rook suggests a mosaic structured landscape with meadows and cultivated land interspersed with larger or smaller islands of trees.

The Eneolithic pile dweller was a successful hunter in deep or shallow still waters. This hypothesis is confirmed by the presence of all duck species, from those that live in the open deep water to those that prefer the shallow banks.

The hunting methods are unknown to us; the unearthing of a 29 mm straight hook suggests passive hunting with bait. The remains of a bow and arrowheads indicate the use of bows.

ACKNOWLEDGEMENTS

I would like to extend my gratitude to Prof. Dr. Tone Novak and Marijan Govedič for their review of the manuscript and their helpful comments, and to Dr. Anton Velušček and once more Marijan Govedič for their ideas and discussions about the Eneolithic environment.

# 4 HOČEVARICA: KERAMIČNE NAJDBE

# 4 HOČEVARICA: POTTERY

ANTON VELUŠČEK

## **4.1** KATALOG KERAMIČNIH NAJDB IZ SONDE

## **4.1** CATALOGUE OF THE POTTERY FROM THE TRENCH

*Tabla 4.1.1*

1. Več frag. iste posode:
   Frag. ustja; sestava: drobnozrnata; ornament: navadni vrez in odtisi; pr. ustja 9 cm; lega: skupek 14.
   Frag. ostenja; sestava: drobnozrnata; ornament: navadni vrez, odtisi in kapljičasti vbodi; pr. naj. oboda 14 cm; lega: skupka 23 in 21.
2. Fotografija posode št. 1.

*Tabla 4.1.2*

1. Frag. ostenja; sestava: drobnozrnata; pr. naj. oboda 26 cm; lega: skupek 21.
2. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 17 cm; lega: skupek 21.
3. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 27 cm; lega: skupek 21.
4. Frag. ustja z ostenjem; sestava: grobozrnata; pr. ustja 42 cm; lega: skupek 21.
5. Kupa; sestava: drobnozrnata; pr. ustja 8 cm; lega: skupek 21.
6. Frag. ustja z ostenjem; sestava: drobnozrnata; držaj; pr. ustja 10 cm; lega: skupek 21.
7. Frag. ustja z ostenjem; sestava: grobozrnata; pr. ustja 22 cm; lega: skupek 21.
8. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 15 cm; lega: skupek 21.
9. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 17 cm; lega: skupek 21.

*Tabla 4.1.3*

1. Frag. ustja z ostenjem; sestava: grobozrnata; pr. ustja 25 cm; lega: skupek 20.
2. Frag. ustja z ostenjem; sestava: grobozrnata; držaj; pr. ustja 27 cm; lega: skupek 20.
3. Frag. ustja z ostenjem; sestava: grobozrnata; bradavica; pr. ustja 28 cm; lega: skupek 20.
4. Frag. ustja z ostenjem; sestava: grobozrnata; elipsoidna plastična nalepka; pr. ustja 43 cm; lega: skupek 20.

*Tabla 4.1.4*

1. Frag. ustja z ostenjem; sestava: drobnozrnata; držaj; pr. ustja 24 cm; lega: skupek 20.
2. Frag. ustja z ostenjem; sestava: grobozrnata; držaj; pr. ustja 20 cm; lega: skupek 20.
3. Frag. ustja z ostenjem; sestava: grobozrnata; bradavici; pr. ustja 20 cm; lega: skupek 20.
4. Frag. ustja z ostenjem; sestava: grobozrnata; bradavica; pr. ustja 24 cm; lega: skupek 19.
5. Frag. ustja z ostenjem; sestava: grobozrnata; pr. ustja 26 cm; lega: skupek 19.
6. Frag. ustja z ostenjem; sestava: grobozrnata; držaj; pr. ustja 20 cm; lega: skupek 19.

*Tabla 4.1.5*

1. Frag. ustja z ostenjem; sestava: grobozrnata; držaj; pr. ustja 25 cm; lega: skupek 19.
2. Frag. ustja z ostenjem; sestava: grobozrnata; pr. ustja 15 cm; lega: skupek 19.
3. Frag. ustja z ostenjem; sestava: grobozrnata; pr. ustja 15 cm; lega: skupek 19.
4. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 17 cm; lega: skupek 19.
5. Frag. ustja z ostenjem; sestava: drobnozrnata; nastavek za držaj; pr. ustja 14 cm; lega: skupek 19.
6. Frag. ustja z ostenjem; sestava: drobnozrnata; bradavici; pr. ustja 18 cm; lega: skupek 19.
7. Frag. ustja z ostenjem in dnom; sestava: drobnozrnata; pr. ustja 12,5 cm; lega: skupek 19.
8. Frag. ustja z ostenjem; sestava: drobnozrnata; držaj; pr. ustja 18 cm; lega: skupek 19.
9. Zajemalka; sestava: drobnozrnata; dl. 10 cm; lega: skupek 19.
10. Frag. vretenca; sestava: drobnozrnata; pr. 7,2 cm; lega: skupek 19.

11. Frag. ustja; sestava: drobnozrnata; ornament: navadni vrez; pr. ustja 19 cm; lega: skupek 17.
12. Frag. ostenja; sestava: drobnozrnata; ornament: brazdasti in navadni vrez; pr. naj. oboda 12 cm; lega: skupek 17.

*Tabla 4.1.6*

1. Frag. ustja z ostenjem; sestava: drobnozrnata; ornament: navadni vrez in kapljičasti vbodi; pr. ustja 17 cm; lega: skupek 17.
2. Frag. ustja z ostenjem; sestava: grobozrnata; pr. ustja 11 cm; lega: skupek 17.
3. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 8,5 cm; lega: skupek 17.
4. Frag. ustja z ostenjem; sestava: grobozrnata; nastavek za držaj; pr. ustja 32,5 cm; lega: skupek 14.
5. Frag. ustja z ostenjem; sestava: drobnozrnata; ornament: odtisi; pr. ustja 24 cm; lega: skupek 14.
6. Frag. ustja z ostenjem; sestava: drobnozrnata; lega: skupek 14.
7. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 20 cm; lega: skupek 14.
8. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 20 cm; lega: skupek 14.
9. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 13 cm; lega: skupek 14.
10. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 20 cm; lega: skupek 14.
11. Frag. vretenca; sestava: drobnozrnata; pr. 5,5 cm; lega: skupek: 14.

*Tabla 4.1.7*

1. Frag. ustja z ostenjem in dnom; sestava: drobnozrnata; pr. ustja 22 cm; lega: skupek 16.
2. Frag. ustja z ostenjem; sestava: drobnozrnata; nastavek za ročaj; pr. ustja 6,5 cm; lega: skupek 15.
3. Frag. posode na nizki nogi; sestava: drobnozrnata; pr. največjega oboda noge 8 cm; lega: skupek 15.
4. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 13 cm; lega: skupek 13.
5. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 20 cm; lega: skupek 13.
6. Frag. ustja z ostenjem; sestava: drobnozrnata; držaj in nastavek za držaj; pr. ustja 18 cm; lega: skupek 13.
7. Frag. ustja z ostenjem; sestava: drobnozrnata; držaj; pr. ustja 34 cm; lega: skupek 13.

*Tabla 4.1.8*

1. Frag. ustja z ostenjem; sestava: drobnozrnata; ročaj; pr. ustja 22 cm; lega: skupek 13.
2. Frag. ustja z ostenjem; sestava: drobnozrnata; držaj; pr. ustja 26 cm; lega: skupek 12.
3. Frag. ustja z ostenjem; sestava: drobnozrnata; držaj; pr. ustja 15 cm; lega: skupek 12.
4. Frag. livarske posode; prežgana glina s sledovi bakra; dl. frag. 5,3 cm; lega: skupek 11.
5. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 24 cm; lega: skupek 9.
6. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 30 cm; lega: skupek 8.

*Tabla 4.1.9*

1. Frag. ustja; sestava: drobnozrnata; ornament: odtisi; pr. ustja 21 cm; lega: skupek 8.
2. Frag. ustja z ostenjem; sestava: drobnozrnata; lega: skupek 8.
3. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 17 cm; lega: skupek 8.
4. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 14 cm; lega: skupek 8.
5. Frag. ustja z ostenjem; sestava: drobnozrnata; bradavici; pr. ustja 13 cm; lega: skupek 8.
6. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 4 cm; lega: skupek 8.
7. Frag. ustja z ostenjem; sestava: drobnozrnata; ornament: plitvi žlebovi; pr. ustja 5,5 cm; lega: skupek 8.
8. Frag. miniaturne posode; sestava: drobnozrnata; pr. ustja 5,5 cm; lega: skupek 8.
9. Frag. zajemalke; sestava: drobnozrnata; dl. frag. 4,6 cm; lega: skupek 8.
10. Frag. ostenja; sestava: drobnozrnata; okrogla plastična nalepka; pr. naj. oboda 32 cm; lega: skupek 8.
11. Frag. ustja z ostenjem; sestava: drobnozrnata; nastavek za držaj; pr. ustja 18 cm; lega: skupek 7.
12. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 15 cm; lega: skupek 7.

*Tabla 4.1.10*

1. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 18,5 cm; lega: skupek 6.
2. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 24 cm; lega: skupek 6.
3. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 28 cm; lega: skupek 6.
4. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 19 cm; lega: skupek 6.
5. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 15 cm; lega: skupek 5.
6. Frag. ustja z ostenjem; sestava: drobnozrnata; držaj; pr. ustja 19,5 cm; lega: skupek 5.
7. Frag. ustja z ostenjem; sestava: drobnozrnata; lega: skupek 5.
8. Frag. ustja z ostenjem; sestava: drobnozrnata; nastavek za držaj; pr. ustja 16 cm, lega: skupek 5.
9. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 18 cm; lega: skupek 5.
10. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 18 cm; lega: skupek 5.

*Tabla 4.1.11*

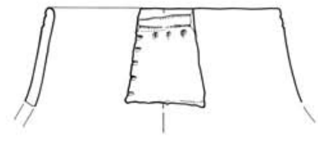
1. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 14 cm; lega: skupek 5.

2. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 14 cm; lega: skupek 5.
3. Vretence; sestava: grobozrnata; pr. 5,5 cm; lega: skupek 5.
4. Frag. ustja z ostenjem; sestava: drobnozrnata; ročaj; lega: skupek 5.
5. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 4 cm; lega: skupek 5.
6. Frag. ustja z ostenjem; sestava: drobnozrnata; ornament: odtisi; pr. ustja 10 cm; lega: skupka 8 in 5.
7. Zajemalka; sestava: drobnozrnata; dl. 6 cm; lega: skupek 5.
8. Frag. ustja z ostenjem; sestava: drobnozrnata; lega: skupek 4.
9. Frag. ustja z ostenjem; sestava: drobnozrnata; lega: skupek 4.
10. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 24 cm; lega: skupek 4.
11. Frag. ustja z ostenjem; sestava: drobnozrnata; pr. ustja 16 cm; lega: skupek 4.
12. Frag. ustja z ostenjem; sestava: drobnozrnata; lega: skupek 4.
13. Frag. ostenja; sestava: drobnozrnata; ornament: brazdasti vrez; lega: vodni zbiralnik oziroma izkop za vodo; mk 8; gl. med 150 in 130 cm.
14. Frag. ostenja; sestava: drobnozrnata; držaj; pr. naj. oboda 26 cm; lega: skupek 1.

*Tabla 4.1.12*

1. Frag. ostenja; sestava: drobnozrnata; ornament: navadni vrez in kapljičasti vbodi; lega: skupek 23.
2. Frag. ustja; sestava: drobnozrnata; ornament: brazdasti vrez in kapljičasti vbodi; lega: skupek 15.
3. Frag. ostenja; sestava: drobnozrnata; ornament: brazdasti vrez; lega: vodni zbiralnik oziroma izkop za vodo; mk 8; gl. med 150 in 130 cm.
4. Frag. ostenja; sestava: drobnozrnata; ornament: brazdasti vrez; lega: skupek 8.

14, 21, 23



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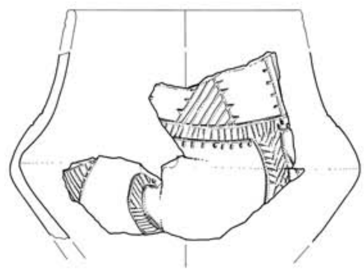
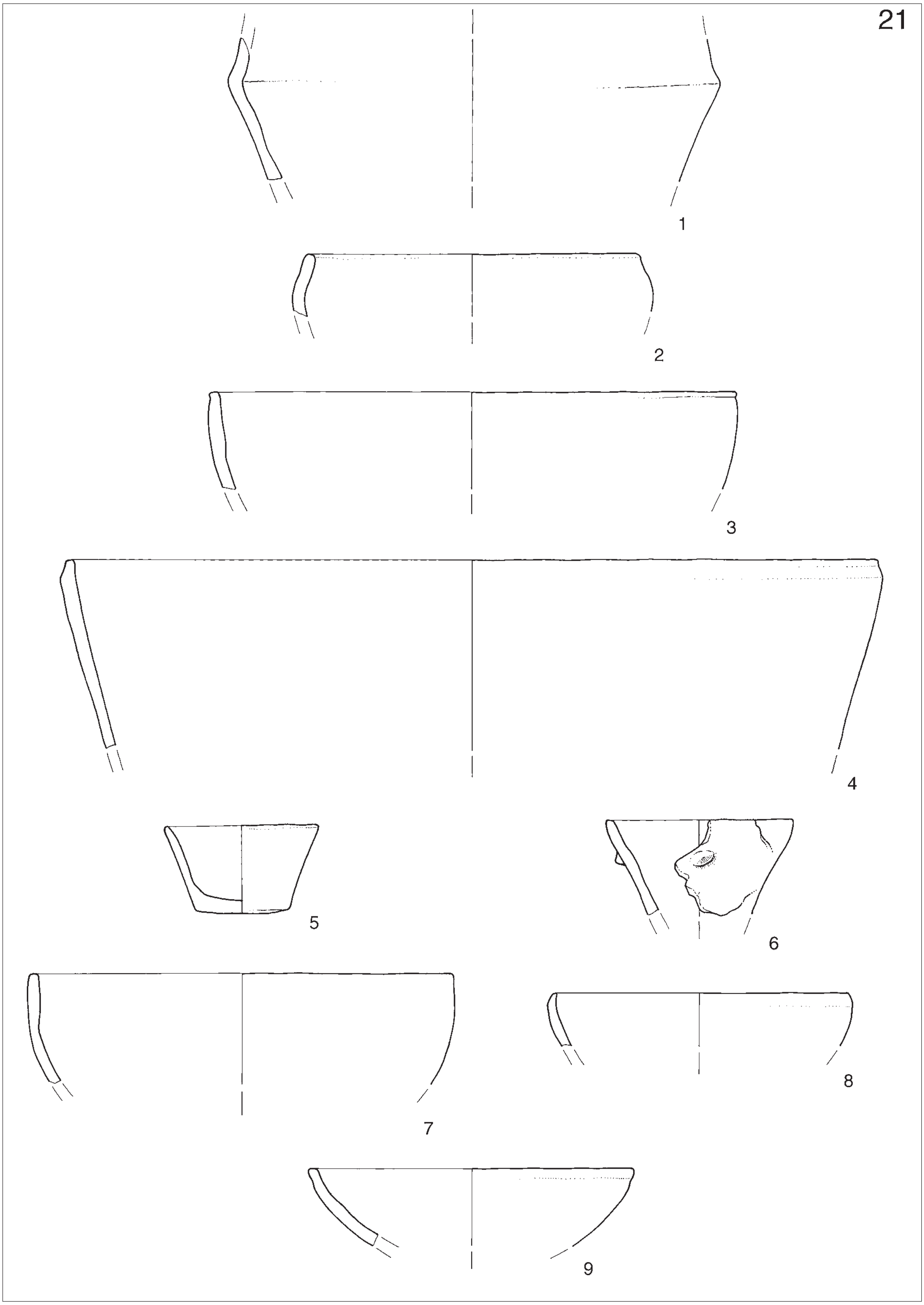
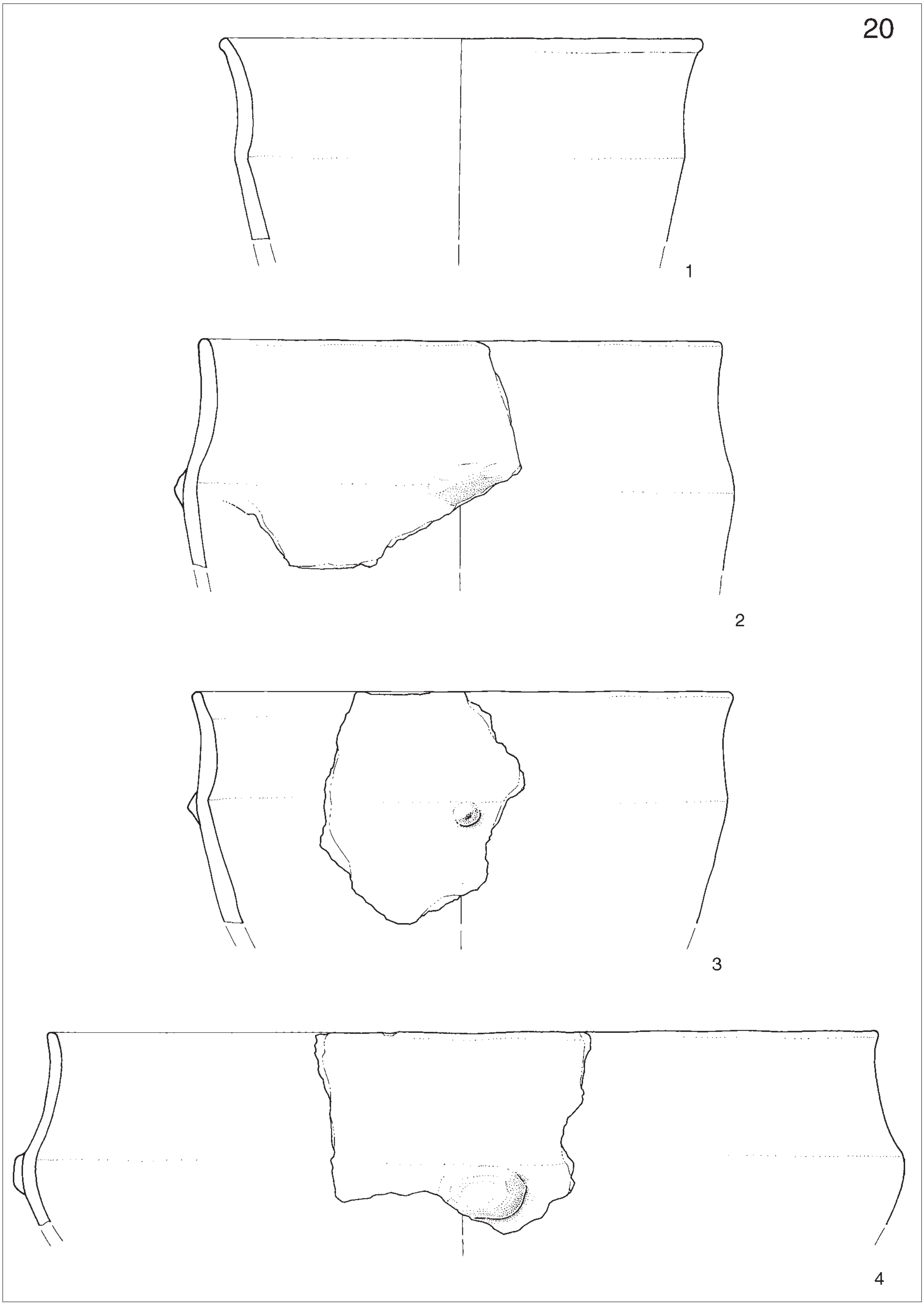


2

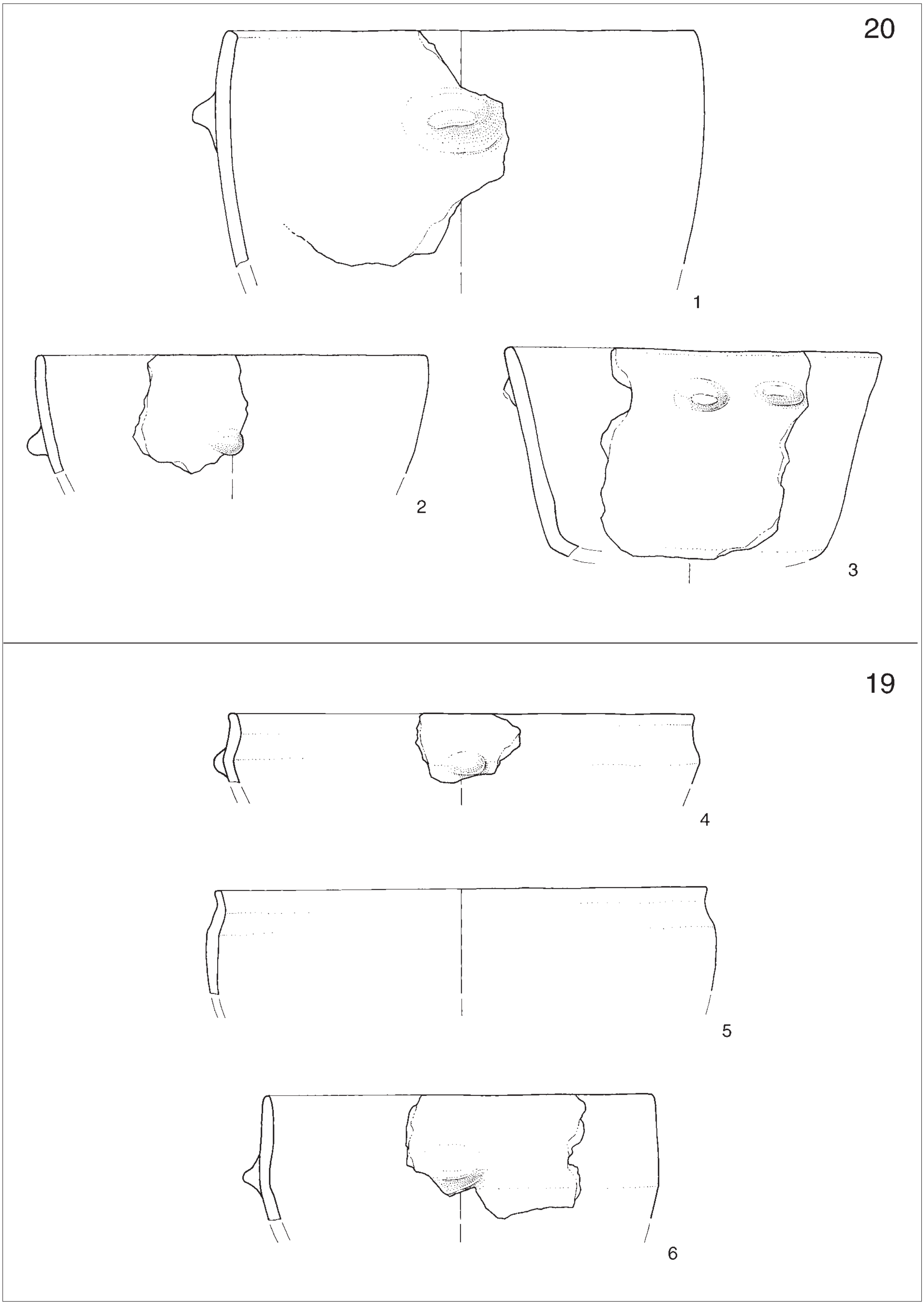
*T. 4.1.1:* Hočevarica. Vse keramika. 1 v merilu 1 : 3, 2 v merilu 1 : 1. Foto: M. Zaplatil.
*Pl. 4.1.1:* Hočevarica. All pottery. 1 on a scale of 1 : 3, 2 on a scale of 1 : 1. Photo: M. Zaplatil.



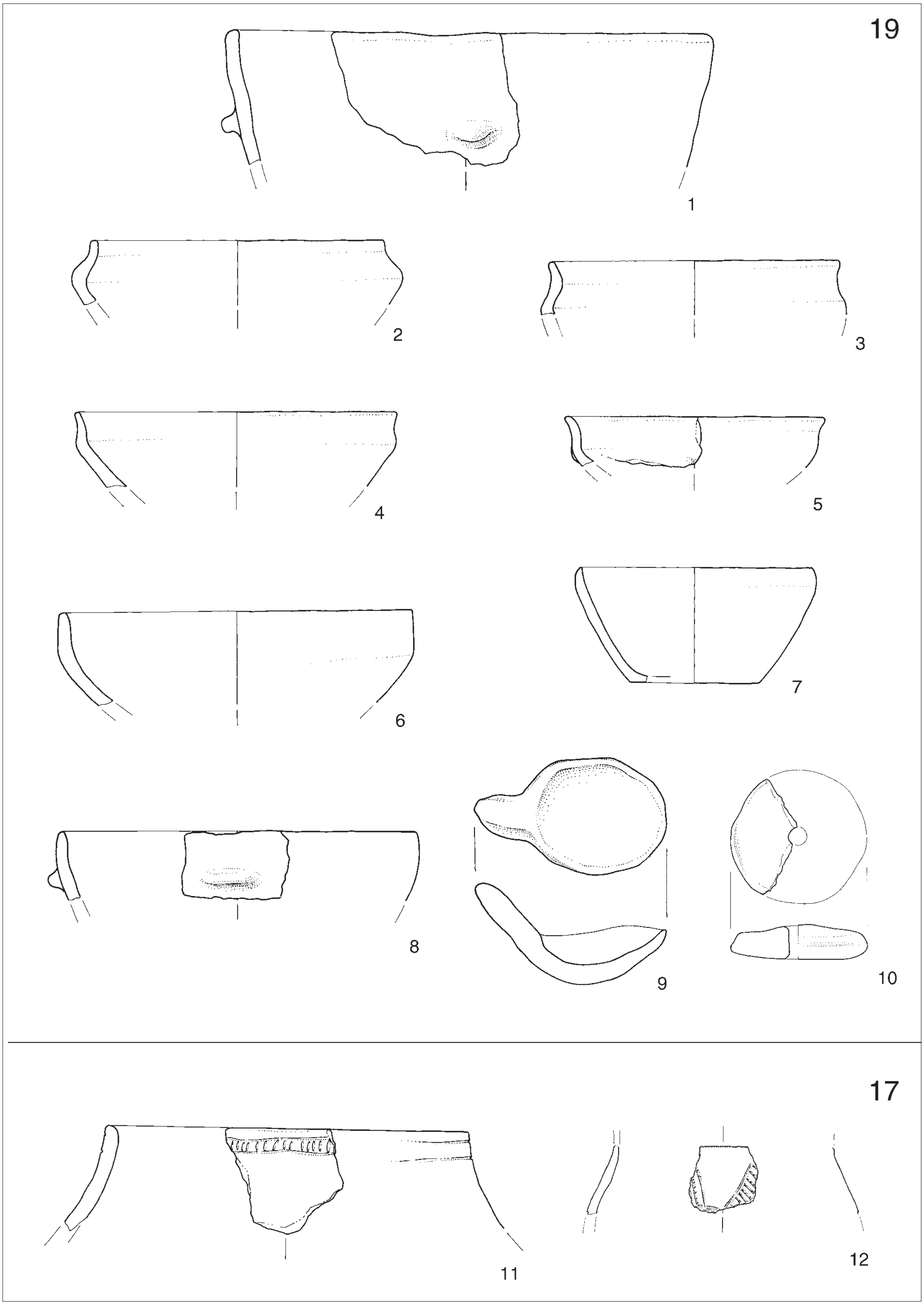

*T. 4.1.2:* Hočevarica. Vse keramika. M. = 1 : 3.
*Pl. 4.1.2:* Hočevarica. All pottery. Scale = 1 : 3.



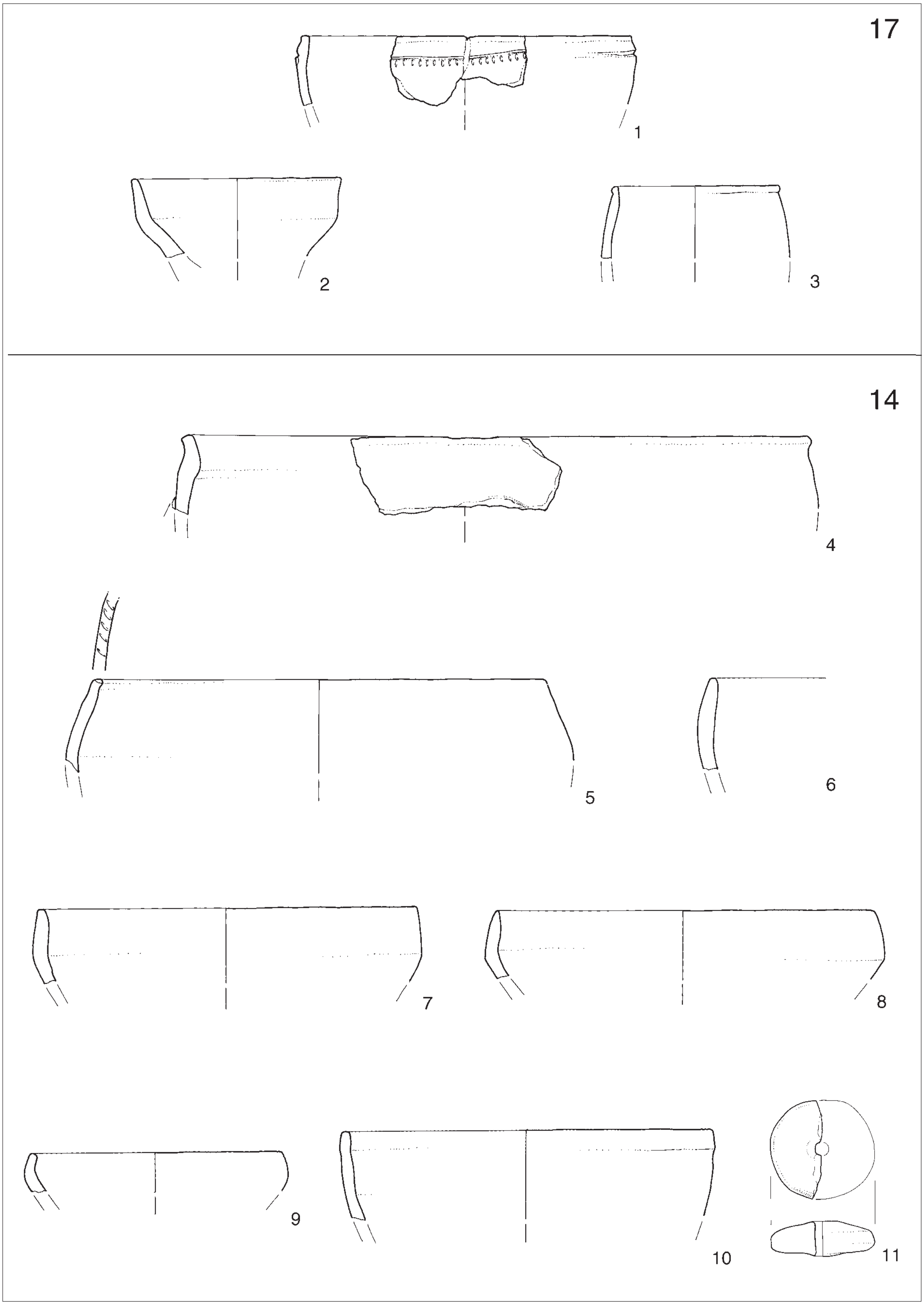

*T. 4.1.3:* Hočevarica. Vse keramika. M. = 1 : 3.
*Pl. 4.1.3:* Hočevarica. All pottery. Scale = 1 : 3.



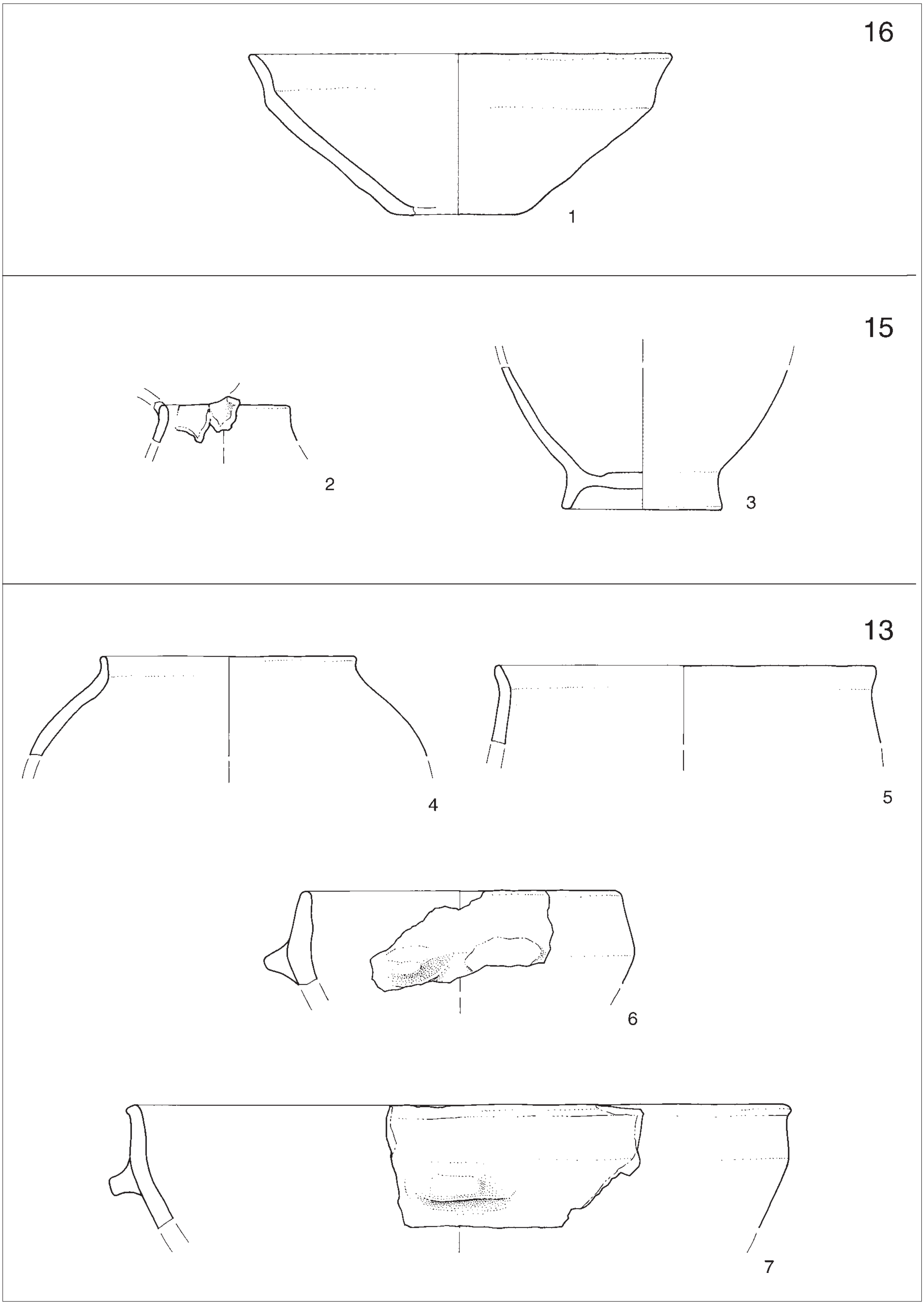

*T. 4.1.4:* Hočevarica. Vse keramika. M. = 1 : 3.
*Pl. 4.1.4:* Hočevarica. All pottery. Scale = 1 : 3.



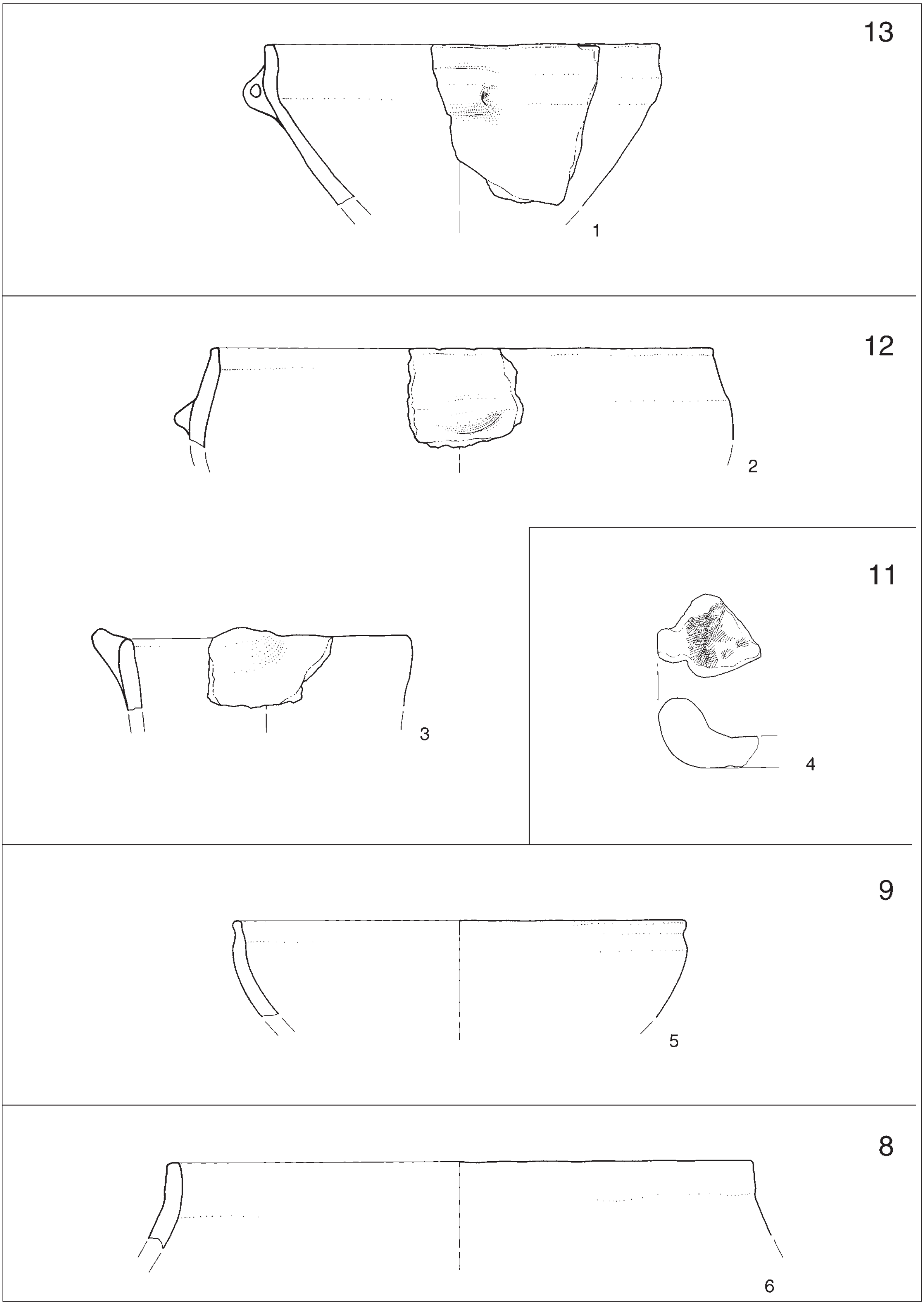

*T. 4.1.5:* Hočevarica. Vse keramika. M. = 1 : 3.
*Pl. 4.1.5:* Hočevarica. All pottery. Scale = 1 : 3.



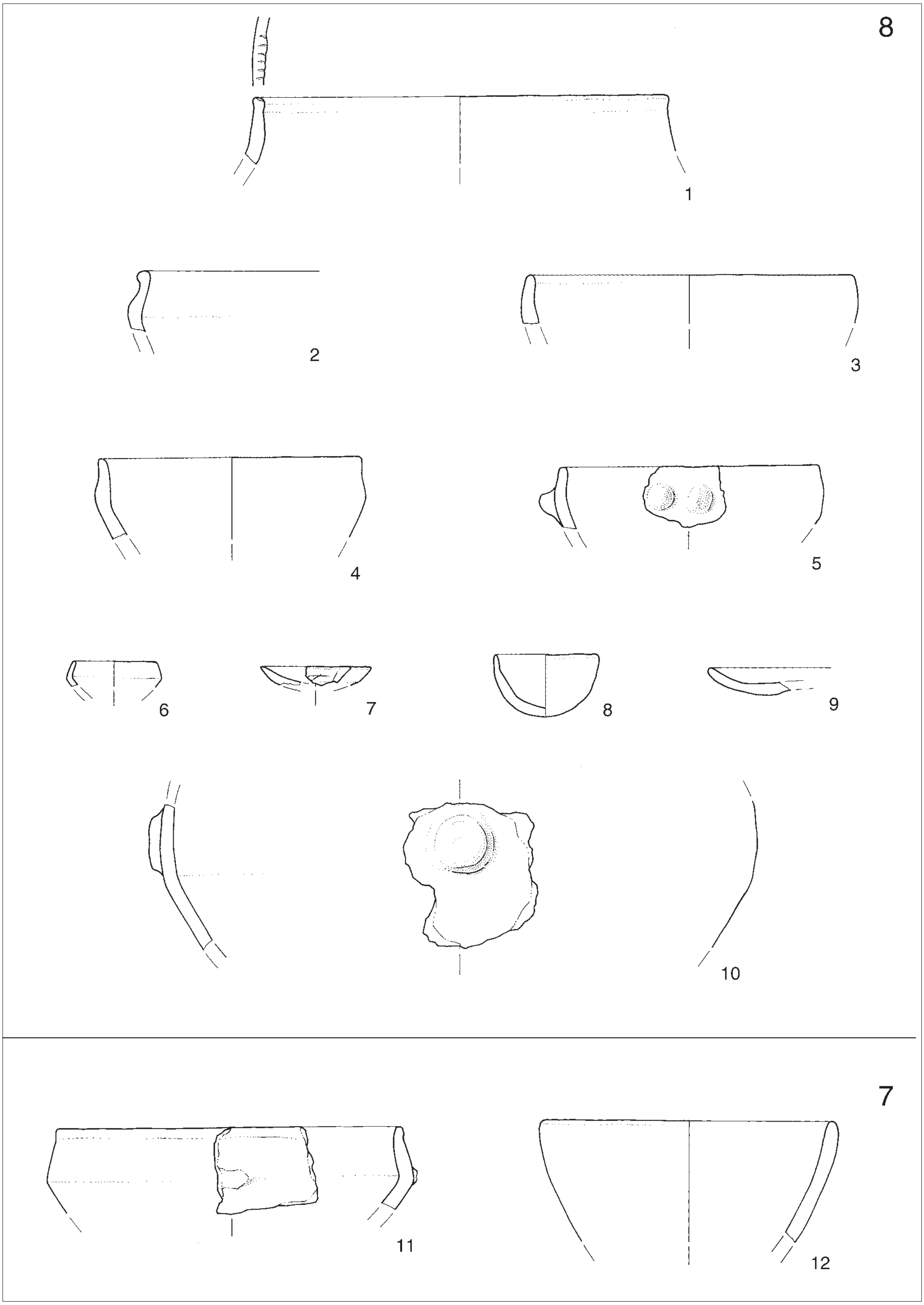

*T. 4.1.6:* Hočevarica. Vse keramika. M. = 1 : 3.
*Pl. 4.1.6:* Hočevarica. All pottery. Scale = 1 : 3.



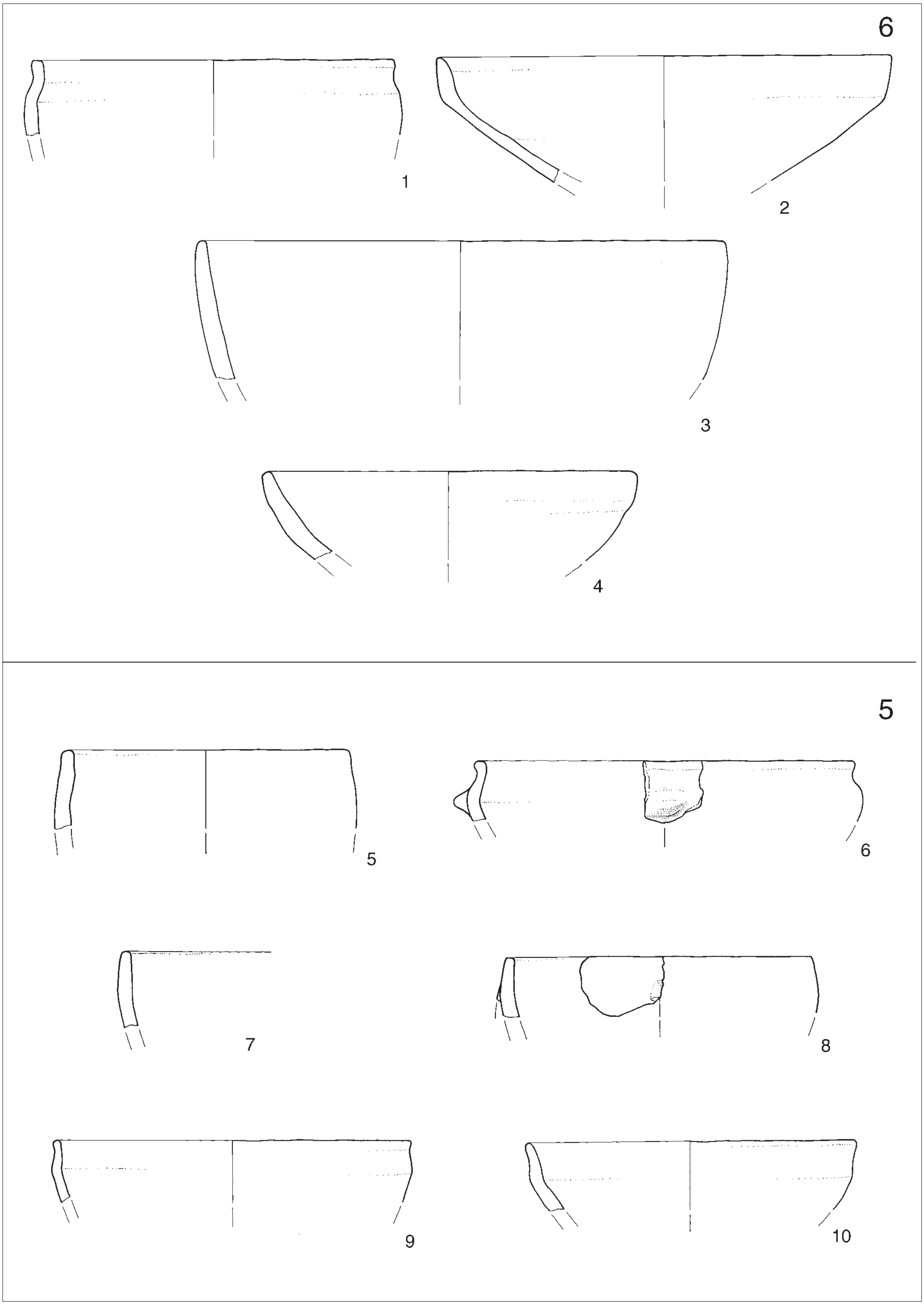

*T. 4.1.7:* Hočevarica. Vse keramika. M. = 1 : 3.
*Pl. 4.1.7:* Hočevarica. All pottery. Scale = 1 : 3.



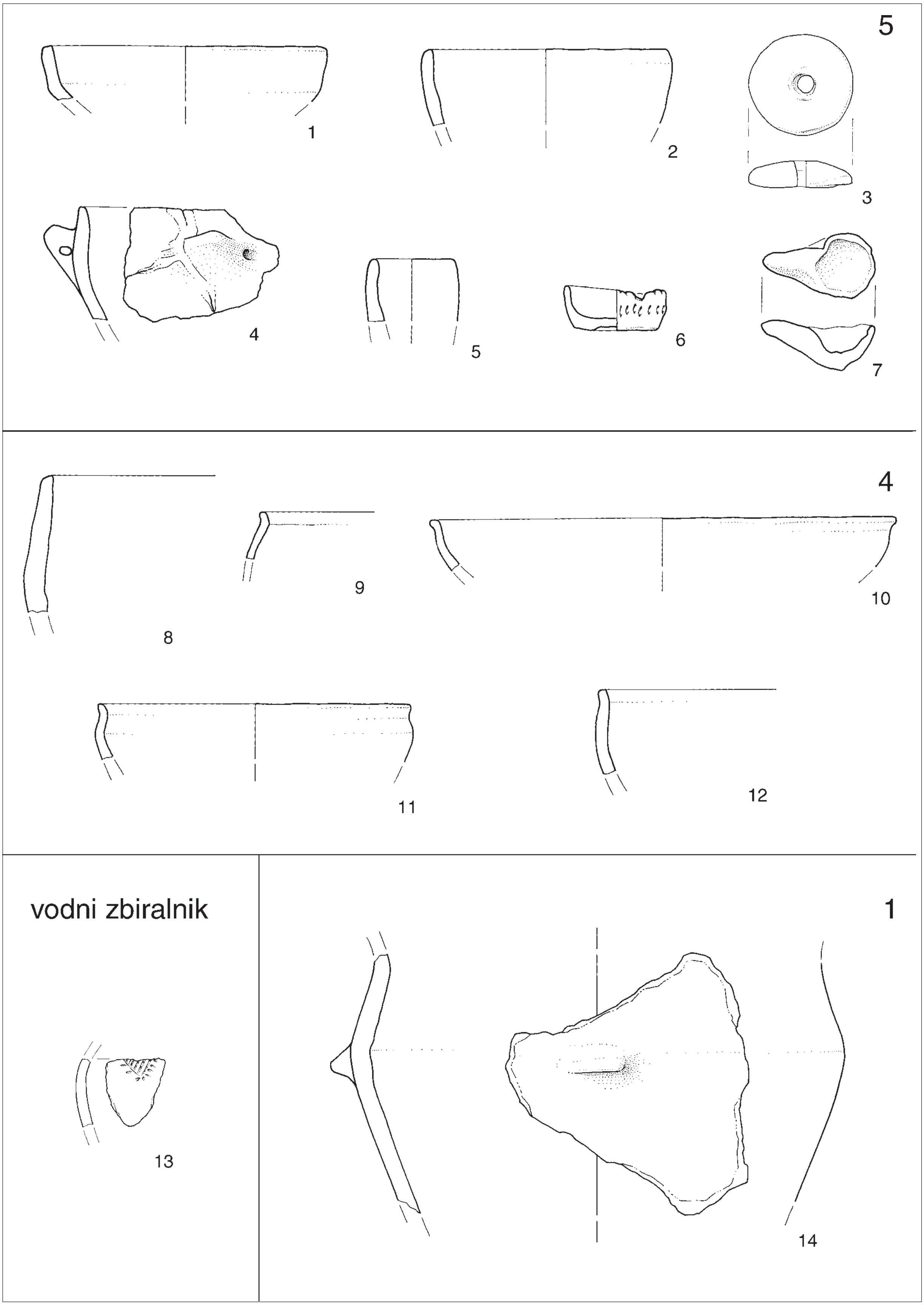

*T. 4.1.8:* Hočevarica. 1–3,5,6 keramika. 4 glina. M. = 1 : 3.
*Pl. 4.1.8:* Hočevarica. 1–3,5,6 pottery. 4 clay. Scale = 1 : 3.




*T. 4.1.9:* Hočevarica. Vse keramika. M. = 1 : 3.
*Pl. 4.1.9:* Hočevarica. All pottery. Scale = 1 : 3.




*T. 4.1.10:* Hočevarica. Vse keramika. M. = 1 : 3.
*Pl. 4.1.10:* Hočevarica. All pottery. Scale = 1 : 3.




*T. 4.1.11:* Hočevarica. Vse keramika. M. = 1 : 3.
*Pl. 4.1.11:* Hočevarica. All pottery. Scale = 1 : 3.


*T. 4.1.12:* Hočevarica. Vse keramika. Foto: M. Zaplatil.
*Pl. 4.1.12:* Hočevarica. All pottery. Photo: M. Zaplatil.

# **4.2** TIPOLOGIJA KERAMIČNEGA GRADIVA

*Izvleček*

*Predstavljamo tipologijo keramičnega posodja, ki je izdelana na podlagi najdb s Hočevarice in najdb s sorodnega najdišča Maharski prekop. Določili smo 31 tipov globokega, 21 tipov plitvega posodja, viseče in miniaturno posodje ter posebne oblike. Po tipološkem ključu so razvrščeni tudi ročaji, držaji in ornament.*

Za relativno kronologijo je najpomembnejše keramično posodje, saj je na arheoloških najdiščih med keramičnimi najdbami tudi najpogostejše.

V nadaljevanju bo predstavljena tipologija keramičnega posodja, ki je izdelana na podlagi najdb iz sonde na Hočevarici in z Maharskega prekopa. Najdbe z Maharskega prekopa smo v analizo vključili, ker je keramičnih najdb na Hočevarici za to opravilo premalo. Pri tem nas je vzpodbudila že na prvi pogled opažena sorodnost.

Maharski prekop sicer leži na jugovzhodnem delu Ljubljanskega barja, severovzhodno od Iga. Naselbina je bila odkrita leta 1953 (Jesse 1954, 95 ss). Med leti 1970 in 1977 so tu s presledki potekale terenske raziskave, ki jih je vodila T. Bregant (Bregant 1974a, 7 ss; 1974b, 39 ss; 1975, 7 ss; 1996, 22 ss). Raziskana je bila površina 1208 m$^2$.

## **4.2.1** OSNOVNE ZNAČILNOSTI KERAMIKE

Na Hočevarici in in Maharskem prekopu prevladuje keramika temnosivih, rjavih in črnih barvnih tonov. V glavnem gre za redukcijsko žgano keramiko. Značilno je tudi, da prevladuje keramika slabše kvalitete, ki je zelo podvržena mehanskemu razpadanju. Ornamentirana keramika je kvalitetnejša; največkrat je redukcijsko žgana in lahko tudi polirana. Oksidacijsko žgana keramika je maloštevilna. Med njo lahko najdemo tudi ornamentirane kose (*t. 4.1.12:* 1,2).

Na obeh najdiščih je keramika narejena iz prečišče-



# **4.2** TYPOLOGY OF POTTERY REMAINS

*Abstract*

*Presented is a typology of pottery vessels that was formed on the basis of pottery finds from Hočevarica and pottery finds from the analogous site of Maharski prekop. Classified were a total of 31 types of deep vessels, 21 types of shallow vessels, hanging vessels, miniature vessels and a selection of special forms. The typological key also includes a classification of handles, grips and ornamentations.*

Pottery vessels, often being the most frequent of material finds at archaeological sites, are the most important element for establishing a relative chronology.

The continuation will present a typology of pottery vessels, established on the basis of finds from the trenches at Hočevarica and Maharski prekop. The pottery finds from Maharski prekop are included in the analysis as there are otherwise too few from Hočevarica for such a task to be carried out reliably. And the similarities among the pottery finds from these two sites were noticed at first glance.

Maharski prekop is situated in the southeastern part of the Ljubljansko barje, just northeast of Ig. The settlement was discovered in 1953 (Jesse 1954, 95 pp). Field investigations were carried out here in intervals between the years 1970 and 1977, and led by T. Bregant (Bregant 1974a, 7 pp; 1974b, 39 pp; 1975, 7 pp; 1996, 22 pp). A surface of 1208 m$^2$ was investigated.

## **4.2.1** THE BASIC POTTERY CHARACTERISTICS

The pottery from Hočevarica and Maharski prekop is primarily of dark gray, brown and black color tones. For the most part the pottery vessels were fired in a reducing atmosphere. Also characteristic is the predominance of lesser quality pottery, very inclined to mechanical decomposition. The ornamentation on the pottery is of better quality; for the most part it is fired in a reducing atmosphere and sometimes even polished. Few pottery vessels were fired in an oxidized atmosphere.

ne ali neprečiščene gline. Za Maharski prekop vemo, da so jo našli na Ljubljanskem barju. Laboratorijske analize so namreč pokazale, da so za izdelavo posodja na Maharskem prekopu uporabljali med drugim tudi jezersko kredo oziroma polžarico, ki vsebuje veliko kalcita. Kalcit pa je glavna primes v keramiki (Osterc 1975, 127). Poleg kalcita se v keramiki pojavljajo tudi kremenova zrnca, sljuda in glineni minerali.

Na Maharskem prekopu so pri pripravljanju glinenih zmesi včasih uporabili tudi drobce keramike, o čemer pričajo njihovi ostanki v stenah posod. Pogosta je tudi keramika, ki je bila narejena iz glinene mase z organskimi primesmi, kar je razvidno v poroznosti površine, ki je nastala po izgorevanju organskih primesi (Osterc 1975, 123 ss).

Kremenčev pesek se kot pustilo pojavlja redko in še to samo na Maharskem prekopu. Prevladuje pri fragmentih, za katere najdemo analogije na Resnikovem prekopu (prim. s Korošec 1964, 25 ss; Harej 1975, 145 ss), v naselbini na Maharskem prekopu pa je tujek. Znano je namreč, da se na Maharskem prekopu pojavlja keramika iz različnih obdobij (Bregant 1974b, 52). Gre za posamezne fragmente, med katerimi večina spada v skupino loncev oziroma amfor (kot npr. Bregant 1975, t. 9: 3), ki so ornamentirani s topo vrezanimi linijami ter odtisi. Po Bregantovi so bili ti fragmenti v glavnem najdeni pod kulturno plastjo ali nad njo (Bregant 1974b, 52; 1975, 43 s). Ker so bili razpršeni po celotnem raziskanem območju, ni mogoče govoriti o nekem posebnem predelu naselbine, ki naj bi bil kronološko starejši kot predlaga M. Budja (Budja 1994, 170). Nasprotno, razpršenost teh fragmentov podpira domnevo, ki jo je izrazila že Bregantova, namreč, da so jih na Maharski prekop prinesle poplave bodisi z Resnikovega prekopa[1] ali s kakšnega še ne odkritega najdišča resniške starosti v bližini (Bregant 1974b, 52). Zato se zdi umestno, da teh najdb v analizi ne upoštevamo.

## **4.2.2** VRSTE POSODJA

Na Hočevarici in Maharskem prekopu prevladuje fragmentarno ohranjeno keramično posodje med katerim so tipološko najbolj izpovedna ustja, ki so podlaga za analizo. Tako smo posodje razdelili na globoko, plitvo, viseče, miniaturno ter na skupino posebnih oblik posod.

[1] Naselbina Resnikov prekop je oddaljena približno 600 m vzvodno (tj. v smeri proti jugovzhodu) od Maharskega prekopa.



Among these were also a few ornamented fragments (*pl. 4.1.12:* 1,2).

The pottery vessels from both sites were made of pure and impure clay. The clay for the vessels found at Maharski prekop originated from the Ljubljansko barje. Laboratory analyses have demonstrated that lake chalk, or snail-clay soil (»*Seekreide*« in German), which contains a lot of calcite, was also used for the manufacture of pottery vessels at Maharski prekop. Calcite is the main admixture in pottery (Osterc 1975, 127). In addition to calcite, grains of quartz, mica and clay materials are also found in pottery.

At Maharski prekop tiny bits of pottery were sometimes used in the preparation of the clay compound; the remains of such bits are in the walls of some pottery vessels. Pottery made of clay incorporating organic admixtures is also frequent; this is evidenced in the porous surface that results from its burning away (Osterc 1975, 123 pp).

Quartz sand is a rare remain, and even then evidenced only at Maharski prekop. It is common in fragments that have analogies with pottery vessels from Resnikov prekop (cf. Korošec 1964, 25 pp; Harej 1975, 145 pp), while it is quite foreign to Maharski prekop. It is known, for instance, that the pottery vessels from Maharski prekop date to various periods (Bregant 1974b, 52). This refers to individual fragments, among which the majority is attributed to a group of vessels or amphorae (e.g. Bregant 1975, Pl. 9: 3) that are ornamented with bluntly incised lines and impressions. According to Bregant, these fragments were found primarily beneath the cultural layer or just above it (Bregant 1974b, 52; 1975, 43 p). As these fragments were dispersed throughout the entire area investigated, it is not possible to speak of any particular part of the settlement being chronologically older, as proposed by M. Budja (Budja 1994, 170). Contrarily, the dispersion of these fragments supports the hypothesis expressed by Bregant, which is that they were brought to Maharski prekop by floods from either Resnikov prekop[1] or from some other yet undiscovered, nearby, concurrent with Resnikov prekop site (Bregant 1974b, 52). It seems to follow that these finds were not included in the analysis.

## **4.2.2** VESSEL TYPES

Fragmentarily preserved pottery vessels, among which the lips are typologically the most declaratory and serve as the basis for analysis, are predominant at Hočevarica and Maharski prekop. The vessels were divided into deep, shallow, hanging and miniature vessels, as well as a group of special forms.

[1] The Resnikov prekop settlement is situated approximately 600 m in the south-east of Maharski prekop.

4.2.2.1 Globoko posodje

V skupino globokih posod spadajo lonci in kupe – skupaj 31 tipov:

LONCI

Tip L1
Oblika: Bikoničen trup in prstanasto ustje (*sl. 4.2.1:* L1).
Ornament: Posode so praviloma neornamentirane.

Tip L2
Oblika: Usločen spodnji del, zaobljena ramena in uvihano ustje. Na najširšem obodu se pojavlja razčlenjen držaj (*sl. 4.2.1:* L2).
Ornament: Ornament najdemo na najširšem obodu, in to v obliki plastičnih aplikacij kot je razčlenjeno rebro.

Tip L3
Oblika: Trebušast trup in poudarjeno ustje. Prevladujejo lonci s premerom, večjim od 20 cm (*sl. 4.2.1:* L3).

Tip L4
Oblika: Trebušast trup prehaja v izvihano ustje. Držaji in druge plastične aplikacije so pogost pojav. Vedno se pojavljajo na trebuhu. (*sl. 4.2.1:* L4).
Ornament: Na teh posodah se pojavlja razčlenjeno rebro, ki je lahko vodoravno ali poševno. Poševno razčlenjeno rebro se pojavlja tudi na trebuhu.

Tip L5
Oblika: Glavna značilnost posode je trebušast trup, ki preide v poudarjen vrat in izvihano ustje. Bradavice so na zgornjem delu trebuha (*sl. 4.2.2:* L5).

Tip L6
Oblika: Trebušast trup, ki prehaja v zavihano in nepoudarjeno ustje. Razčlenjeni držaji so izključno na trebuhu (*sl. 4.2.2:* L6).
Ornament: Na zunanjem robu ustja je običajno ornament odtisov prsta, topega predmeta ali nohtov.

Tip L7
Oblika: Majhne, trebušasto oblikovane posode tankih sten z uvihanim ustjem. Držaji so na trupu (*sl. 4.2.2:* L7).

Tip L8
Oblika: Kroglast trup z nepoudarjenim ustjem (*sl. 4.2.2:* L8).

Tip L9
Oblika: Kroglaste posode s prstanastim ali izvihanim ustjem. Plastične aplikacije (držaji) se pojavljajo na zgornjem ali osrednjem delu trupa (*sl. 4.2.2:* L9).



4.2.2.1 Deep vessels

Deep vessels comprise of pots and tumblers – all together 31 types:

POTS

Type L1
Form: Bi-conical body and a plain rim (*fig. 4.2.1:* L1).
Ornament: As a rule, these vessels do not have ornamentation.

Type L2
Form: The lower body is inclined, the shoulder is rounded and the lip is curved inwards (*fig. 4.2.1:* L2). A grip with finger imprints is positioned at the maximum diameter.
Ornament: The ornamentation, an appliqué in the form of a cordon with finger imprints, is at the maximum diameter.

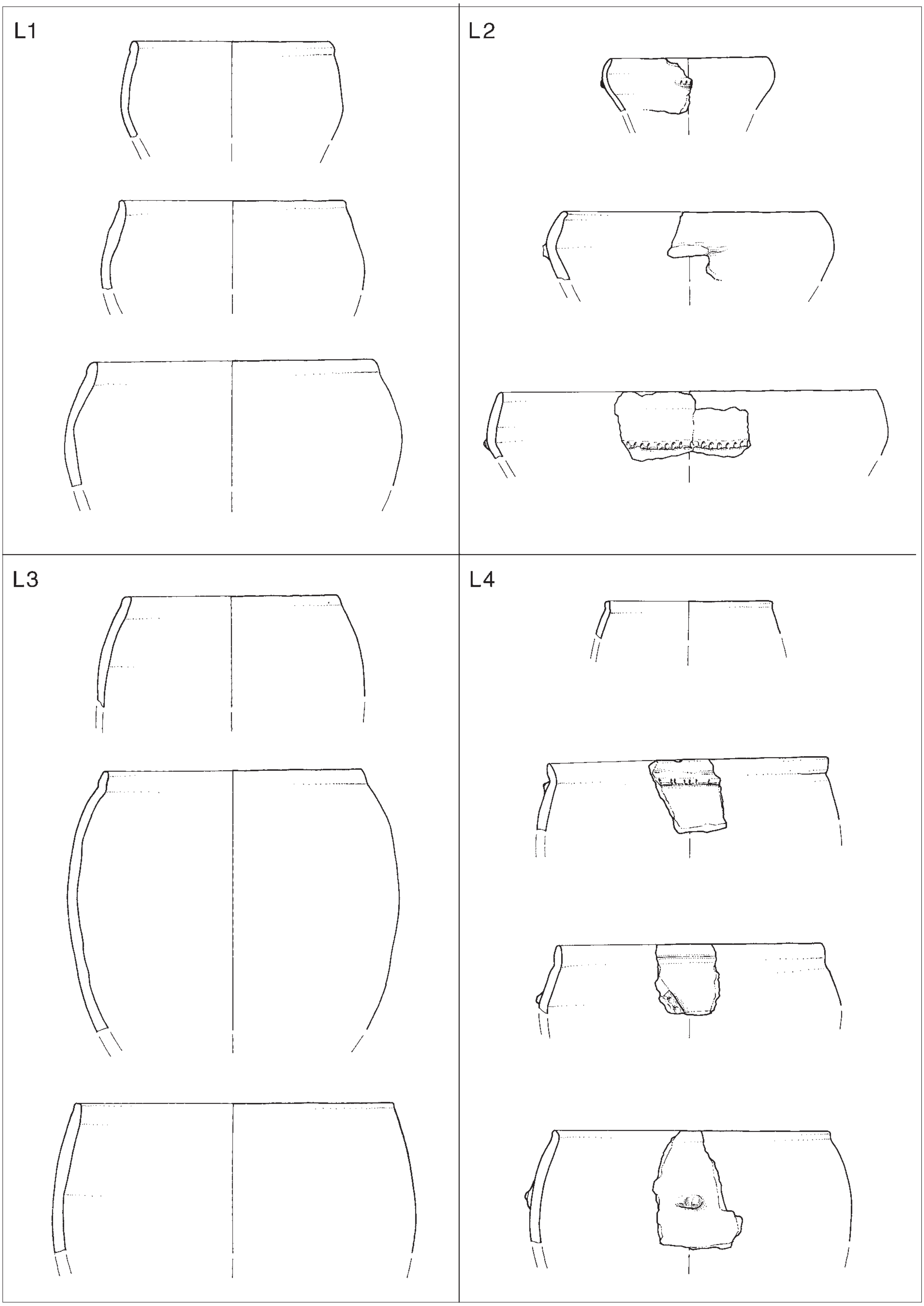
Type L3
Form: A globed body and an emphasized lip. Pots with circumferences larger than 20 cm are predominant (*fig. 4.2.1:* L3).

Type L4
Form: The globed body transforms into an everted lip. Grips and other appliqués are frequent; these are always positioned on the belly (*fig. 4.2.1:* L4).
Ornament: These pots have a cordon with finger imprints, which are either horizontal or slanted. The cordon with slanted finger imprints is also known to appear on the belly.

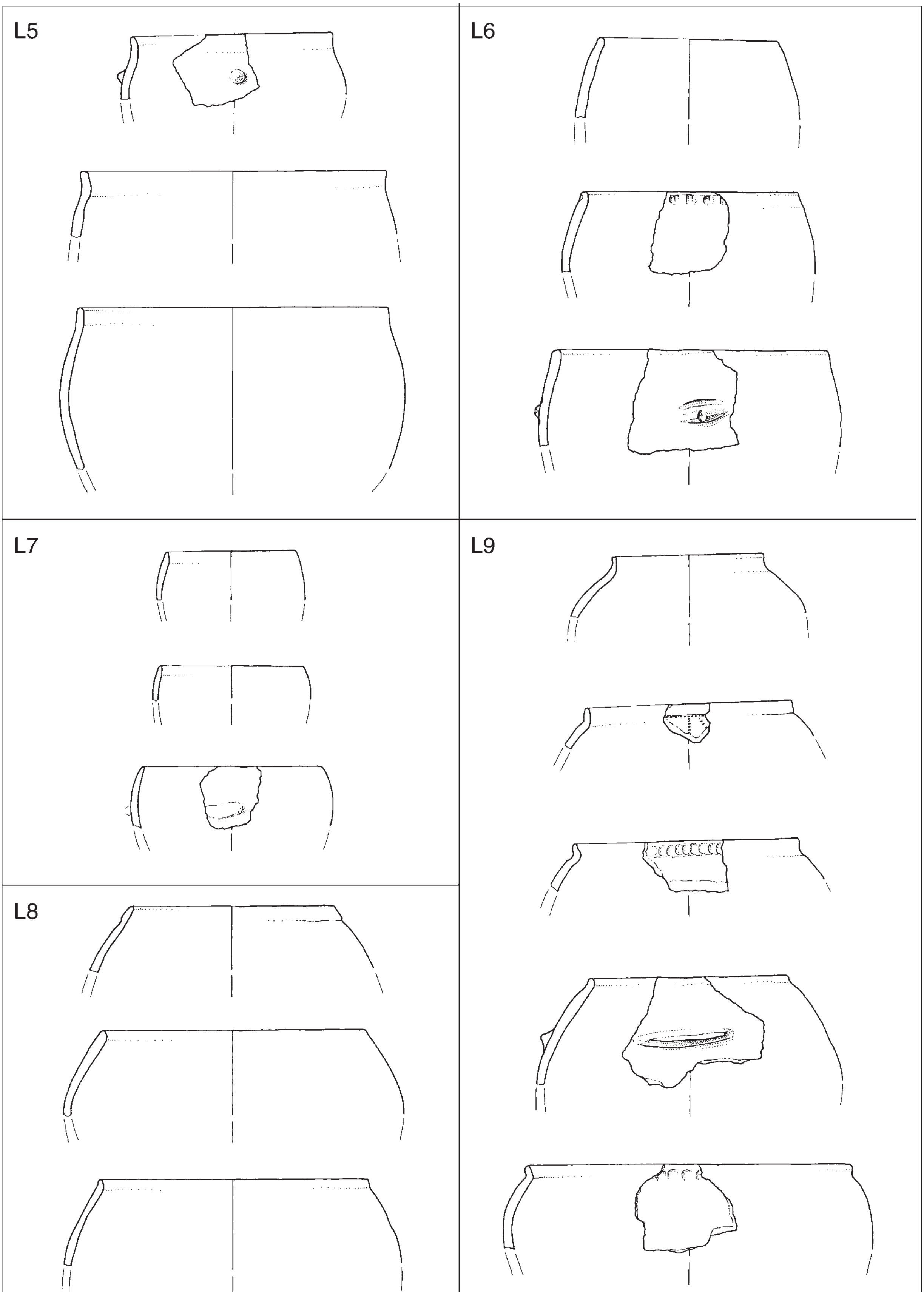
Type L5
Form: The main characteristic of this vessel is the globed body, which develops into an emphasized neck and an everted lip. Embossments are along the upper part of the belly (*fig. 4.2.2:* L5).

Type L6
Form: The globed body develops into a curved and plain lip. Grip with finger imprints are exclusively upon the belly (*fig. 4.2.2:* L6).
Ornament: The outer edge of the lip is commonly ornamented with impressions made with fingertip, a blunt object or fingernail.

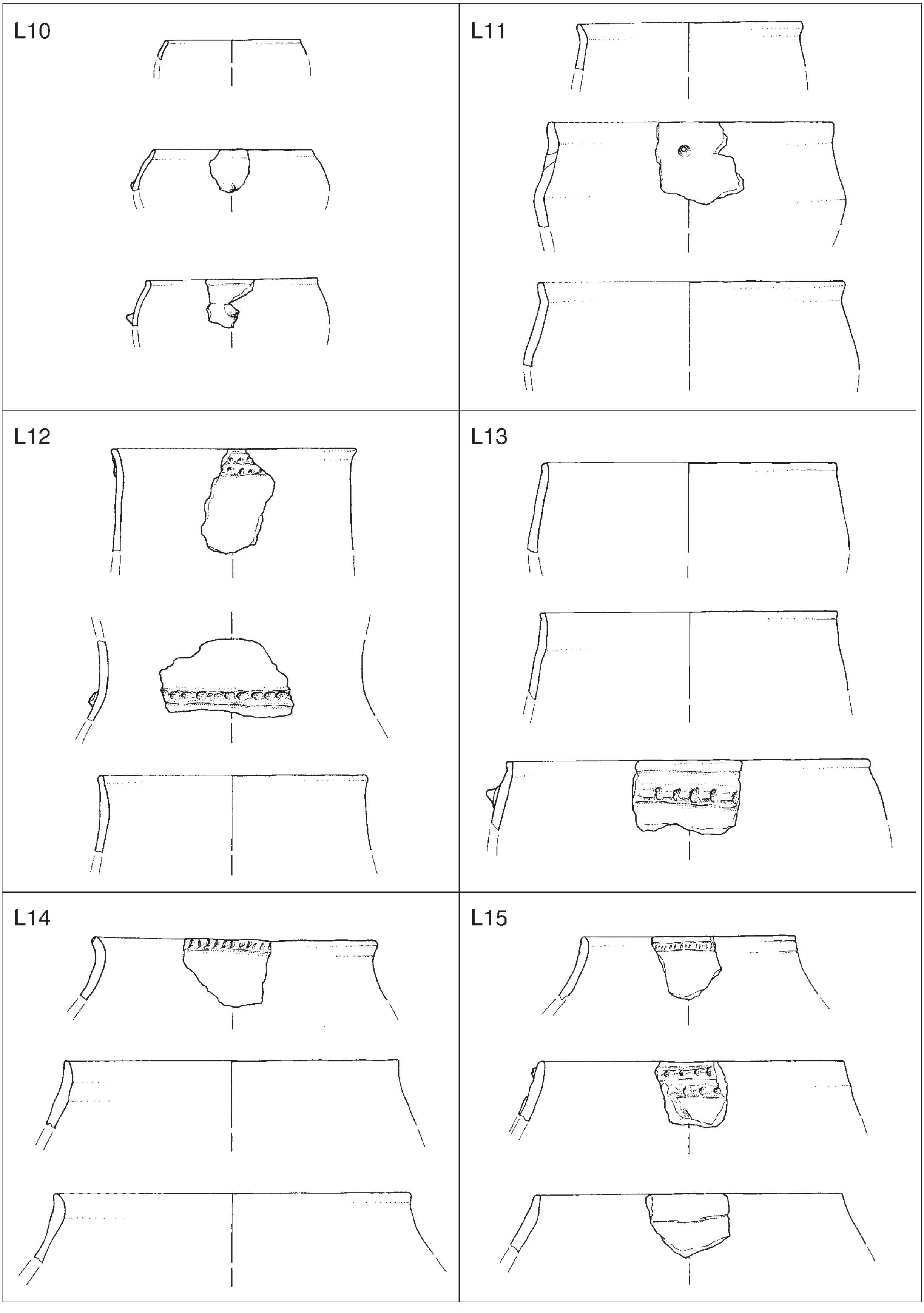
Type L7
Form: Small, globe-shaped vessels with thin walls and an inverted lip. Grips are positioned on the body (*fig. 4.2.2:* L7).




*Sl. 4.2.1:* Lonci tipa L1 do L4. M.= 1 : 5.
*Fig. 4.2.1:* Pots, type L1 to L4. Scale = 1 : 5.




*Sl. 4.2.2:* Lonci tipa L5 do L9. M. = 1 : 5.
*Fig. 4.2.2:* Pots, type L5 to L9. Scale = 1 : 5.




*Sl. 4.2.3:* Lonci tipa L10 do L15. M. = 1 : 5.
*Fig. 4.2.3:* Pots, type L10 to L15. Scale = 1 : 5.

Ornament: Ornamentirano je običajno mesto, kjer trup prehaja v ustje. Značilni so odtisi prsta ali topega predmeta. Na dveh fragmentih se na zgornjem delu kroglastega trupa pojavljajo majhni krožni odtisi, ki so razvrščeni v eno horizontalno in dve vertikalni liniji.

Tip L10
Oblika: Značilnost te skupine posod so tanke stene, kroglast trup in bradavica oziroma držaj, ki se pojavlja na trupu (*sl. 4.2.3:* L10).

Tip L11
Oblika: Zaobljen trup prehaja v široko rame in visok vrat, ki se zaključi v izvihanem ustju (*sl. 4.2.3:* L11).

Tip L12
Oblika: Visok cilindrično oblikovan vrat in izvihano ustje (*sl. 4.2.3:* L12).
Ornament: Pod ustjem zasledimo razčlenjena rebra, ki so lahko tudi na ramenu.

Tip L13
Oblika: Značilnost teh posod je visok vrat, ki se zaključi v odebeljenem ustju. Glede na prostornino so to velike posode (*sl. 4.2.3:* L13).
Ornament: Na vratu pod ustjem je lahko horizontalno razčlenjeno rebro.

Tip L14
Oblika: Glavna značilnost teh posod je nizek vrat, ki tekoče prehaja v izvihano ustje (*sl. 4.2.3:* L14).
Ornament: Največkrat je ornamentirano ustje z odtisi ostrega predmeta ali vrezi.

Tip L15
Oblika: V to skupino so uvrščene posode z nizkim vratom in nepoudarjenim ustjem (*sl. 4.2.3:* L15).
Ornament: Pri dveh je z vrezovanjem in vtiskovanjem narejen lestvičast motiv, ki je na zunanjem robu ustja. Posode z velikim premerom odprtine in debelimi stenami imajo lahko na vratu različno oblikovana razčlenjena in nerazčlenjena rebra.

Tip L16
Oblika: Ozek trup prehaja v klekasto oblikovano rame in visok usločen vrat, ki se zaključuje v izvihanem ustju. Držaji in bradavice se pojavljajo na kleku (*sl. 4.2.4:* L16).

Tip L17
Oblika: Ozek trup prehaja v široko in visoko postavljeno rame ter v ravno ali navznoter nagnjeno ustje. Prevladujejo veliki in srednji lonci. Na teh posodah so pogosti razčlenjeni in nerazčlenjeni držaji ter druge plastične aplikacije, ki se pojavljajo na trebuhu oziroma na zgornjem delu trupa (*sl. 4.2.4:* L17).



Type L8
Form: Spherical body with a plain rim (*fig. 4.2.2:* L8).

Type L9
Form: Spherical vessels with a plain or everted lip. Appliqués (grips) are positioned on the upper or central part of the body (*fig. 4.2.2:* L9).
Ornament: The ornamentation is usually positioned at the body-to-lip transition. Impressions made with fingertip or blunt objects are characteristic. Two fragments have small circular impressions along the upper part of the spherical body which are distributed in one horizontal and two vertical lines.

Type L10
Form: The characteristic traits of this group are thin walls, a spherical body and an embossment or grip on the body (*fig. 4.2.3:* L10).

Type L11
Form: The rounded body develops into a wide shoulder and high neck, which terminates with an everted lip (*fig. 4.2.3:* L11).

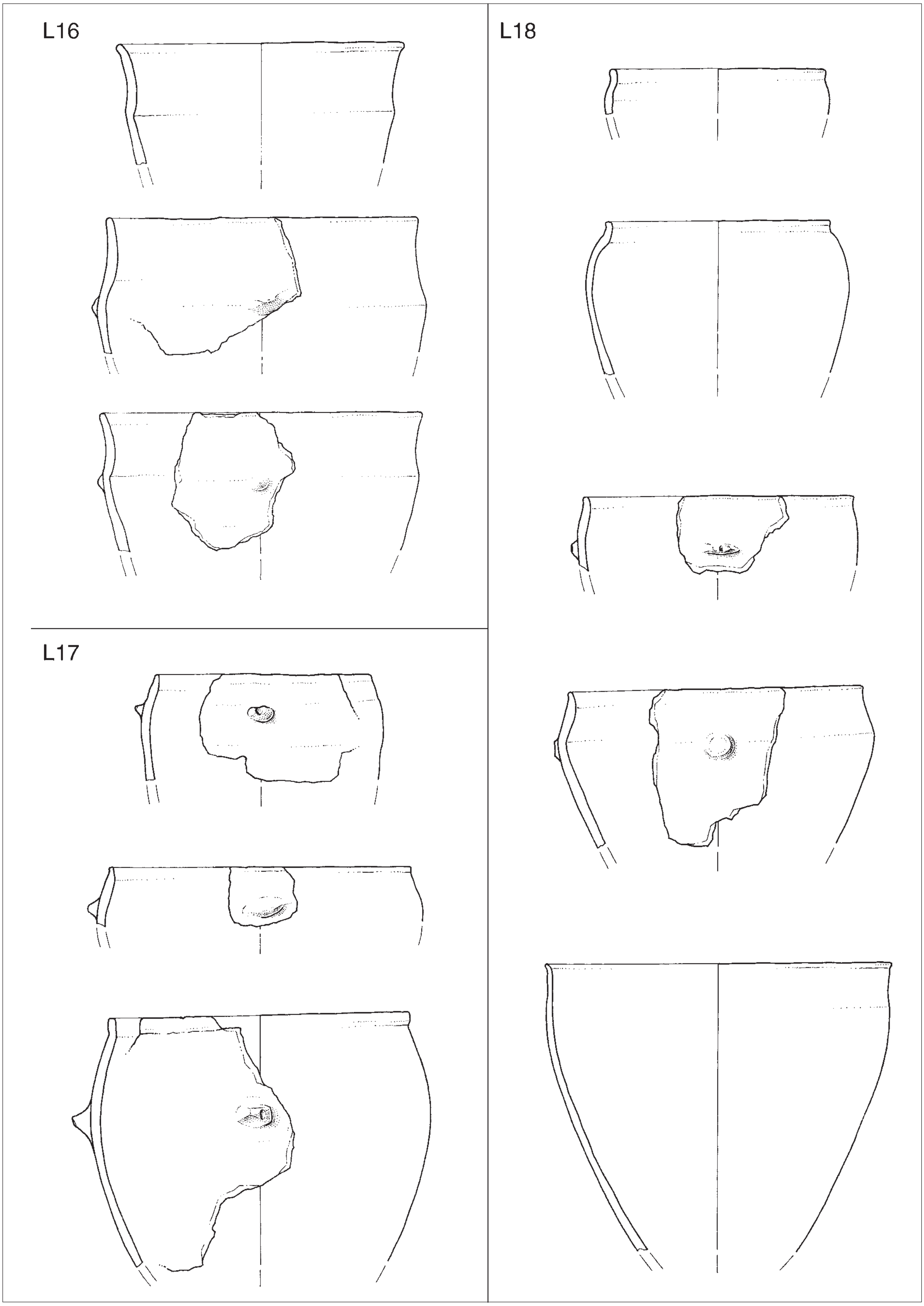
Type L12
Form: A vessel with a high cylindrical neck and an everted lip (*fig. 4.2.3:* L12).
Ornament: A cordon with finger imprints is positioned just below the neck or sometimes on the shoulder.

Type L13
Form: These vessels have a high neck that develops into a thickened lip. Based on their volume, these are large pots (*fig. 4.2.3:* L13).
Ornament: A cordon with finger imprints is sometimes positioned on the neck just below the lip.

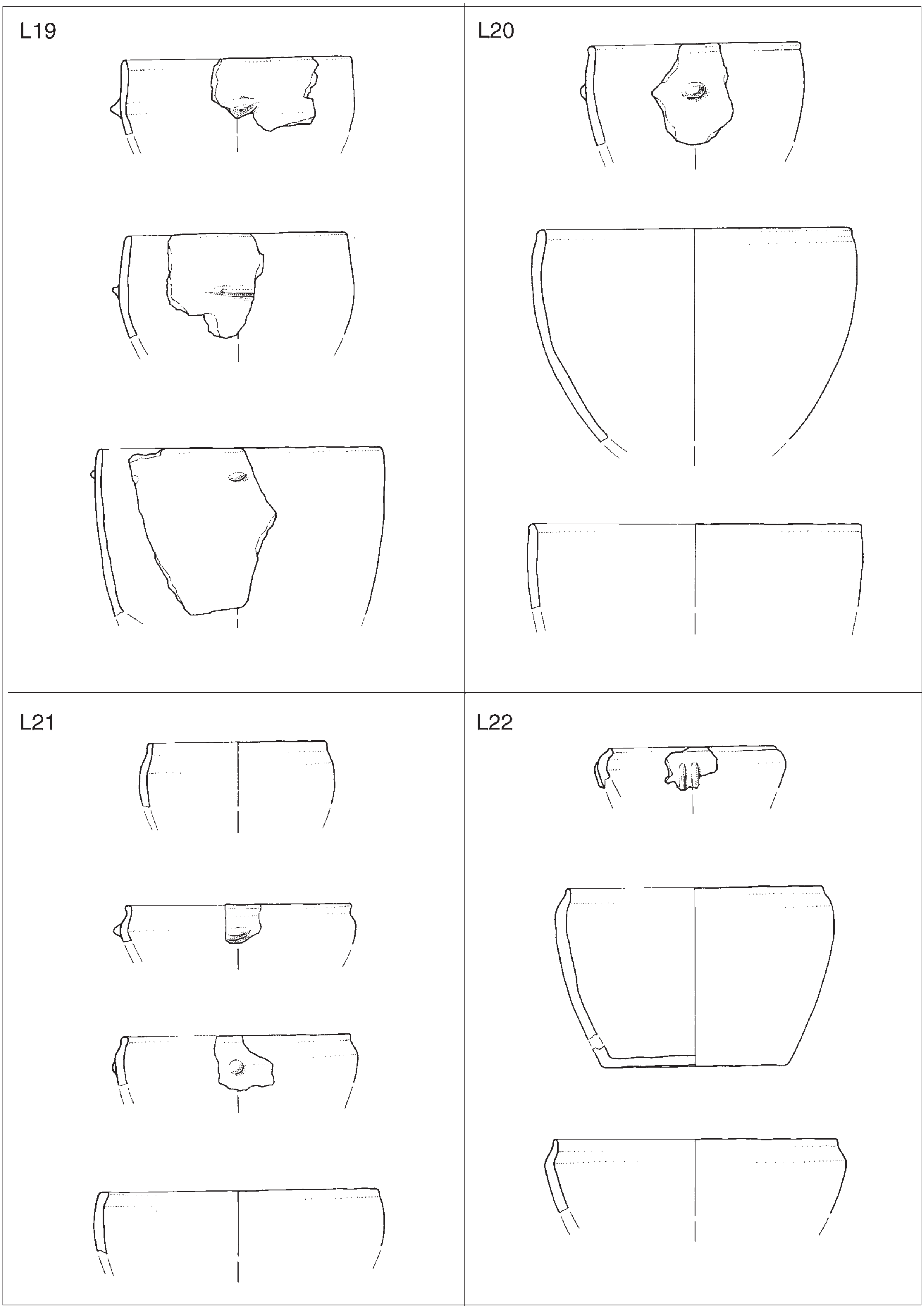
Type L14
Form: The main characteristic of this vessel type is the low neck, which develops into an everted lip (*fig. 4.2.3:* L14).
Ornament: The lip is frequently ornamented with imprints of a sharp object or with incisions.

Type L15
Form: Pots with a low neck and a plain rim (*fig. 4.2.3:* L15).
Ornament: Two examples have a ladder-shaped motif made with incisions and impressions and positioned along the outer edge of the lip. Vessels with a large opening and thick walls sometimes have variously shaped cordons, either with or without finger imprints, along the neck.

Type L16
Form: The narrow body of these pots transforms into a hooked shoulder with an inwardly slanted neck that con-




*Sl. 4.2.4:* Lonci tipa L16 do L18. M. = 1 : 5.
*Fig. 4.2.4:* Pots, type L16 to L18. Scale = 1 : 5.




*Sl. 4.2.5:* Lonci tipa L19 do L22. M. = 1 : 5.
*Fig. 4.2.5:* Pots, type L19 to L22. Scale = 1 : 5.

Tip L18
Oblika: Ozek trup prehaja v široko ter visoko postavljeno rame in poudarjen vrat z izvihanim ustjem. Razčlenjeni ali nerazčlenjeni držaji, okrogle plastične nalepke se pojavljajo na trebuhu in visoko na trupu pod trebuhom (*sl. 4.2.4:* L18).

Tip L19
Oblika: V spodnjem delu zaobljena posoda preide v cilindrično oblikovan vrat, ki se zaključi v nepoudarjenem ustju. Prevladujejo srednji in veliki lonci. Držaji in bradavice so na osrednjem delu trupa, so pa tudi pod ustjem (*sl. 4.2.5:* L19).

Tip L20
Oblika: Posoda z zaobljenim spodnjim in bolj ali manj ravnim zgornjim delom, ki se zaključi v odebeljenem ustju. Držaji ali bradavice se pojavljajo na zgornjem delu trupa (*sl. 4.2.5:* L20).

Tip L21
Oblika: Visoko postavljeno rame in kratek usločen vrat, ki se zaključi v odebeljenem ustju. Na zgornjem delu trupa so lahko plastične aplikacije (*sl. 4.2.5:* L21).

Tip L22
Oblika: Koničen trup, visoko postavljeno rame in ravno neodebeljeno ustje (*sl. 4.2.5:* L22).
Ornament: Pod ramenom so vertikalna plastična rebra, ki so v paru.

Tip L23
Oblika: Široko in visoko postavljeno zaobljeno rame prehaja v prstanast vrat. Razčlenjeni držaji so vedno na trebuhu (*sl. 4.2.6:* L23).

Tip L24
Oblika: Značilen je širok trup z visoko postavljenim zaobljenim ramenom, ki prehaja v navznoter zavihano ustje (*sl. 4.2.6:* L24).
Ornament: Zgornji rob ustja je lahko okrašen z odtisi ostrega predmeta.

Tip L25
Oblika: Posode druži značilen kratek prstanast vrat. Držaji ali bradavice so na zgornjem delu trupa pod ramenom (*sl. 4.2.6:* L25).
Ornament: Odtisi prsta so na vratu.

Tip L26
Oblika: Konično oblikovan spodnji del posode preide v valjast vrat. Običajno so to zelo velike posode s premerom odprtine, ki je večji od 24 cm. Razčlenjeni držaji se pojavljajo na mestu največjega premera posode (*sl. 4.2.6:* L26).



cludes with an everted lip. Grips and embossments are sometimes positioned at the hook of the shoulder (*fig. 4.2.4:* L16).

Type L17
Form: The narrow body develops into a wide and high-set shoulder with a straight or inwardly slanted lip. Large and middle sized pots are predominant. Grips with or without finger imprints are frequent on these vessels, as well as other appliqués that are positioned on the lower or the upper body (*fig. 4.2.4:* L17).

Type L18
Form: The narrow body develops into a wide and highly set shoulder and an emphasized neck with an everted lip. Grips with or without finger imprints and round appliqués appear on the belly and higher up on the lower body just beneath the maximum diameter (*fig. 4.2.4:* L18).

Type L19
Form: The lower part of the rounded vessel develops into a cylindrically shaped neck that concludes with a plain rim. Medium and large sized pots comprise the majority. Grips and embossments are positioned in the central part of the body, and occasionally also just below the lip (*fig. 4.2.5:* L19).

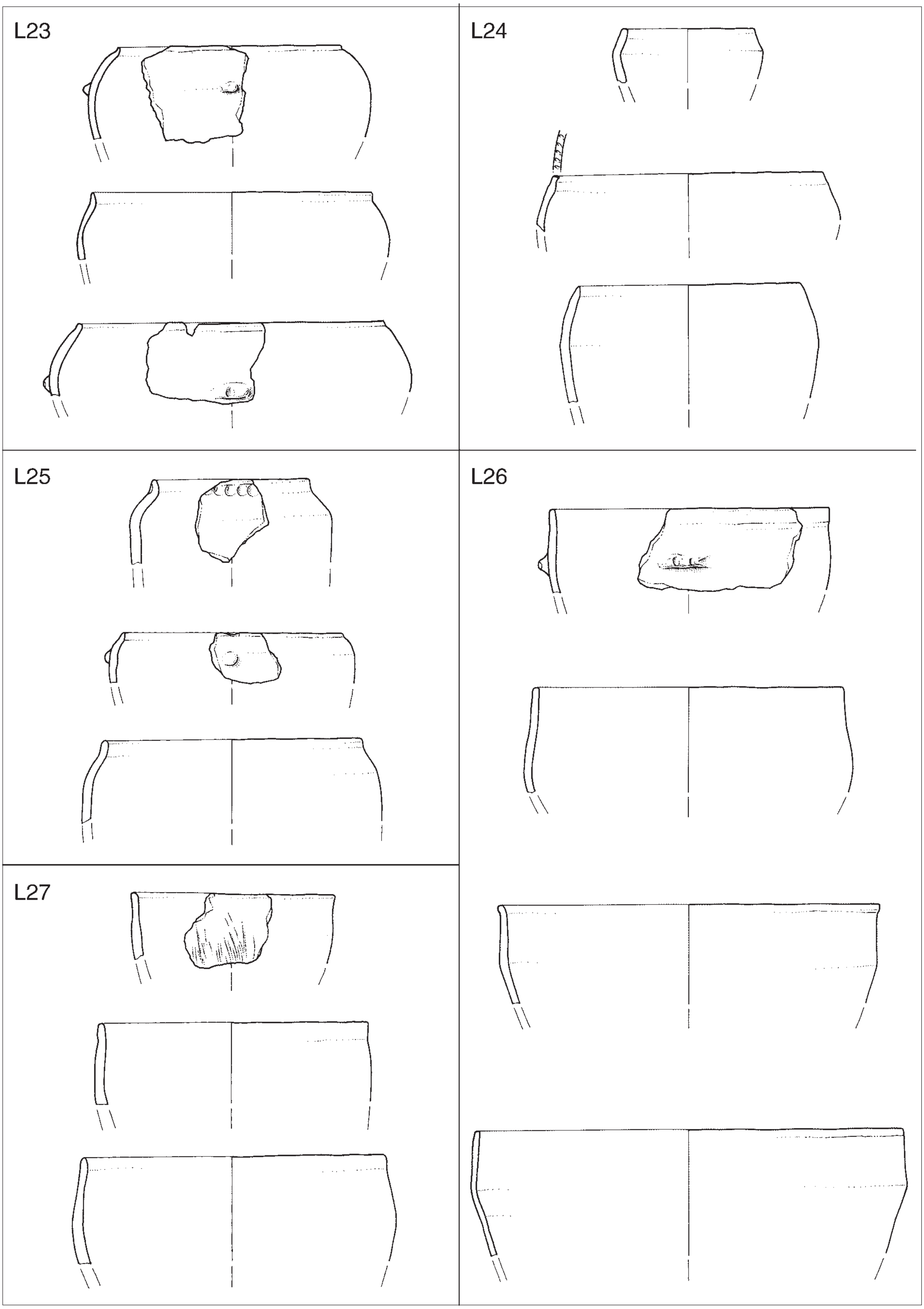
Type L20
Form: Pots with a rounded lower body and a more or less straight upper body that concludes with a thickened lip. Grips and embossments appear upon the upper part of the body (*fig. 4.2.5:* L20).

Type L21
Form: Pots with a highly set shoulder and a short, inwardly slanted neck that concludes with a thickened lip. Appliqués are upon the upper part of the body (*fig. 4.2.5:* L21).

Type L22
Form: Pots with a conical body, a highly set shoulder and a straight, plain lip (*fig. 4.2.5:* L22).
Ornament: An applied cordon, in vertical pairs, is just below the shoulder.

Type L23
Form: The wide and highly set, rounder shoulder on these pots develops into a plain neck. Grips with finger imprints are always positioned on the belly (*fig. 4.2.6:* L23).

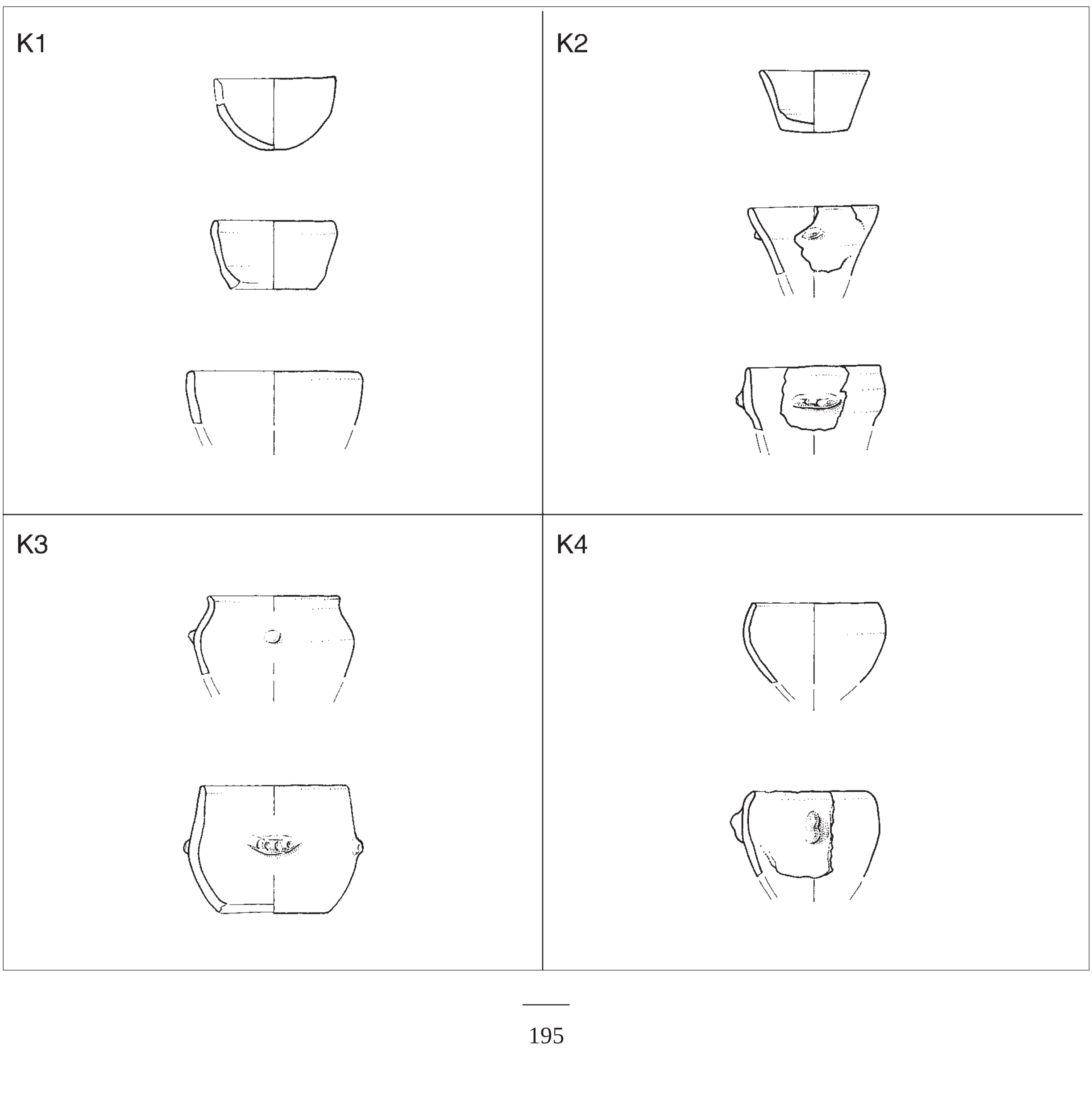
Type L24
Form: A wide body with a highly set, rounded shoulder that develops into an inwardly curved lip is characteristic for these pots (*fig. 4.2.6:* L24).




*Sl. 4.2.6:* Lonci tipa L23 do L27. M. = 1 : 5.
*Fig. 4.2.6:* Pots, type L23 to L27. Scale = 1 : 5.

Tip L27
Oblika: Rahlo zaobljen trup preide v raven oziroma zožen vrat ter se konča v rahlo odebeljenem ustju (*sl. 4.2.6:* L27).
Ornament: Trup je lahko ornamentiran z glavničenjem.

## KUPE




*Sl. 4.2.7:* Kupe tipa K1 do K4. M. = 1 : 5.
*Fig. 4.2.7:* Tumblers, type K1 to K4. Scale = 1 : 5.



Ornament: The upper rim of the lip may be ornamented with impressions made with a sharp object.

Type L25
Form: The common factor of these pots is a short, plain neck. Grips or embossments are positioned on the upper part of the body below the shoulder (*fig. 4.2.6:* L25).
Ornament: Finger impressions are positioned on the neck.

Type L26
Form: The conical lower part of the vessel develops into a cylindrical neck. These are commonly very large pots with an opening measuring at least 24 cm in diameter. Grips with finger imprints are positioned at the maximum diameter (*fig. 4.2.6:* L26).

Type L27
Form: The slightly rounded body develops into a straight or narrowed neck, which concludes with a slightly thickened lip (*fig. 4.2.6:* L27).
Ornament: The body may be ornamented with a combed ornamentation.

Tip K1
Oblika: Posode druži konični trup in ravno ustje (*sl. 4.2.7:* K1).

Tip K2
Oblika: Značilen je koničen lijakast trup, ki prehaja v nepoudarjeno ustje. Držaji ali bradavice so tik pod ustjem (*sl. 4.2.7:* K2).

Tip K3
Oblika: V to skupino so združene kupe z bikoničnim trupom in rahlo izvihanim ustjem. Razčlenjen držaj ali bradavica sta na trebuhu (*sl. 4.2.7:* K3).

Tip K4
Oblika: Zelo majhne posode s trebušastim trupom. Držaj ali bradavica je lahko pritrjen na najširšem obodu (*sl. 4.2.7:* K4).

4.2.2.2 Plitvo posodje

V skupino plitvih posod so uvrščene sklede – skupaj 21 tipov:

SKLEDE

Tip S1
Oblika: Koničen spodnji del posode prehaja v široko in visoko postavljeno kratko rame ter zavihano ustje. Plastične aplikacije se običajno pojavljajo na trebuhu in pod trebuhom (*sl. 4.2.8:* S1).
Ornament: Ornamentiran je samo zgornji del posode. Z odtisi prsta ali topega predmeta je ornamentiran zgornji ali zunanji rob ustja. Vrezana linija s kapljičastimi vbodi se pojavlja na najširšem obodu posode.

Tip S2
Oblika: Spodnji del posode tekoče preide v široko, zaobljeno rame in usločeno oblikovan vrat ter se zaključi v rahlo izvihanem ali odebeljenem ustju. Držaji in podobne plastične aplikacije so pogost pojav in so vedno na trebuhu (*sl. 4.2.8:* S2).
Ornament: Odtisi prsta se lahko pojavljajo na zunanjem robu ustja. Izjemo predstavlja posoda, ki ima trebuh ornamentiran s plitvimi žlebovi v motivu smrekove vejice. Ornament dopolnjuje z vbodi ornamentiran držaj.

Tip S3
Oblika: Ozek spodnji del posode tekoče preide v zaobljeno, široko in visoko postavljeno rame, ki se zaključuje v izvihanem ustju. Pogosti so nalepljeni držaji, bradavice ali rebra, tudi razčlenjena, ki se lahko pojavljajo na trebuhu ali na trupu pod trebuhom (*sl. 4.2.8:* S3).
Ornament: Ornament je redkost. Pri enem primeru je



TUMBLERS

Type K1
Form: These vessels have a conical body and a plain rim (*fig. 4.2.7:* K1).

Type K2
Form: These tumblers have a conical, funnel-shaped body that develops into a slightly everted lip. Grips with finger or embossments are just below the lip (*fig. 4.2.7:* K2).

Type K3
Form: This type comprises of tumblers with a biconical body and a slightly everted lip. A grip with finger imprints or an embossment is on the belly (*fig. 4.2.7:* K3).

Type K4
Form: This is a very small vessel with a globed body. A grip or embossment may be attached at the maximum diameter (*fig. 4.2.7:* K4).

4.2.2.2 Shallow vessels

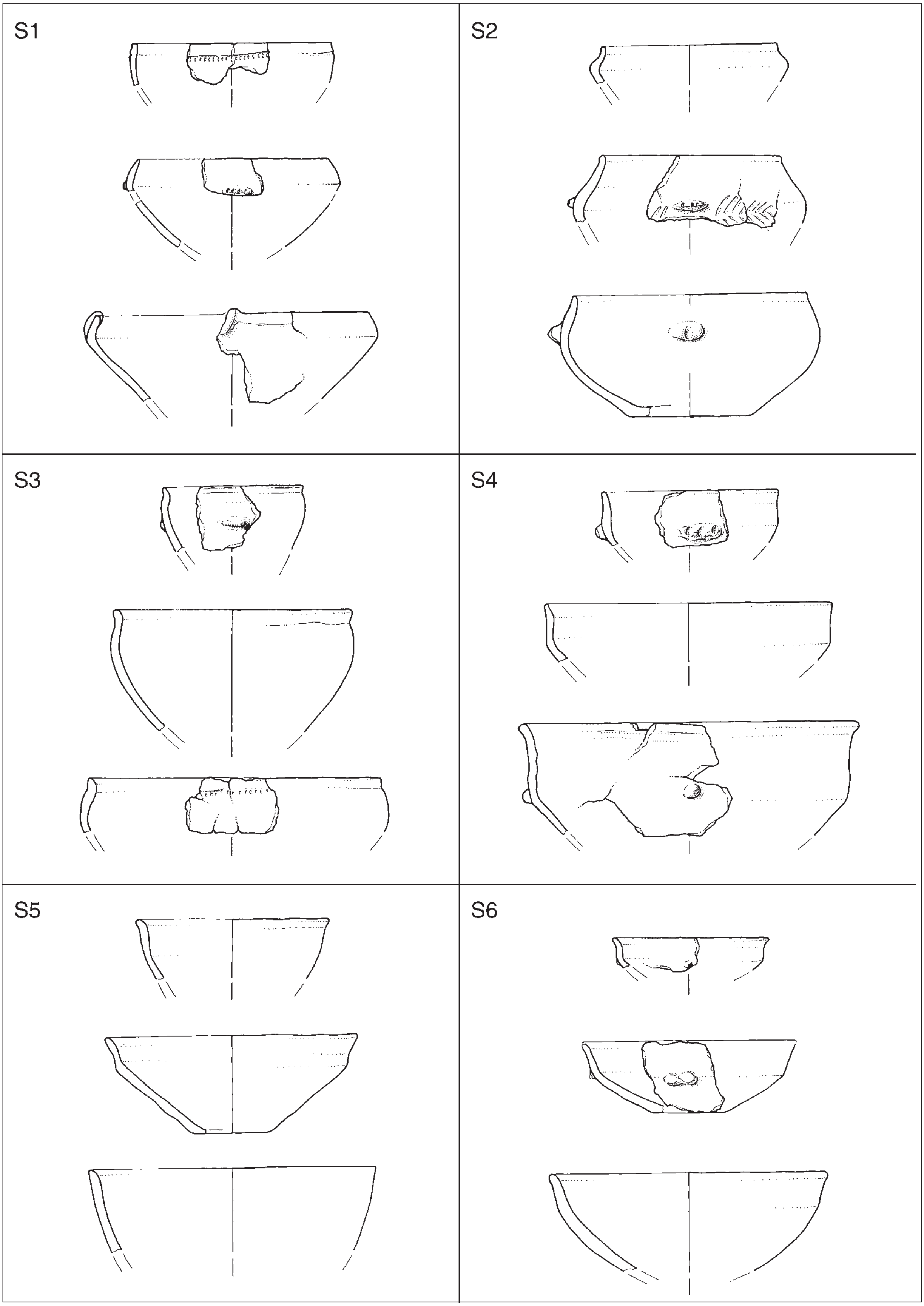
Shallow vessels comprise of dishes – all together 21 types:

DISHES

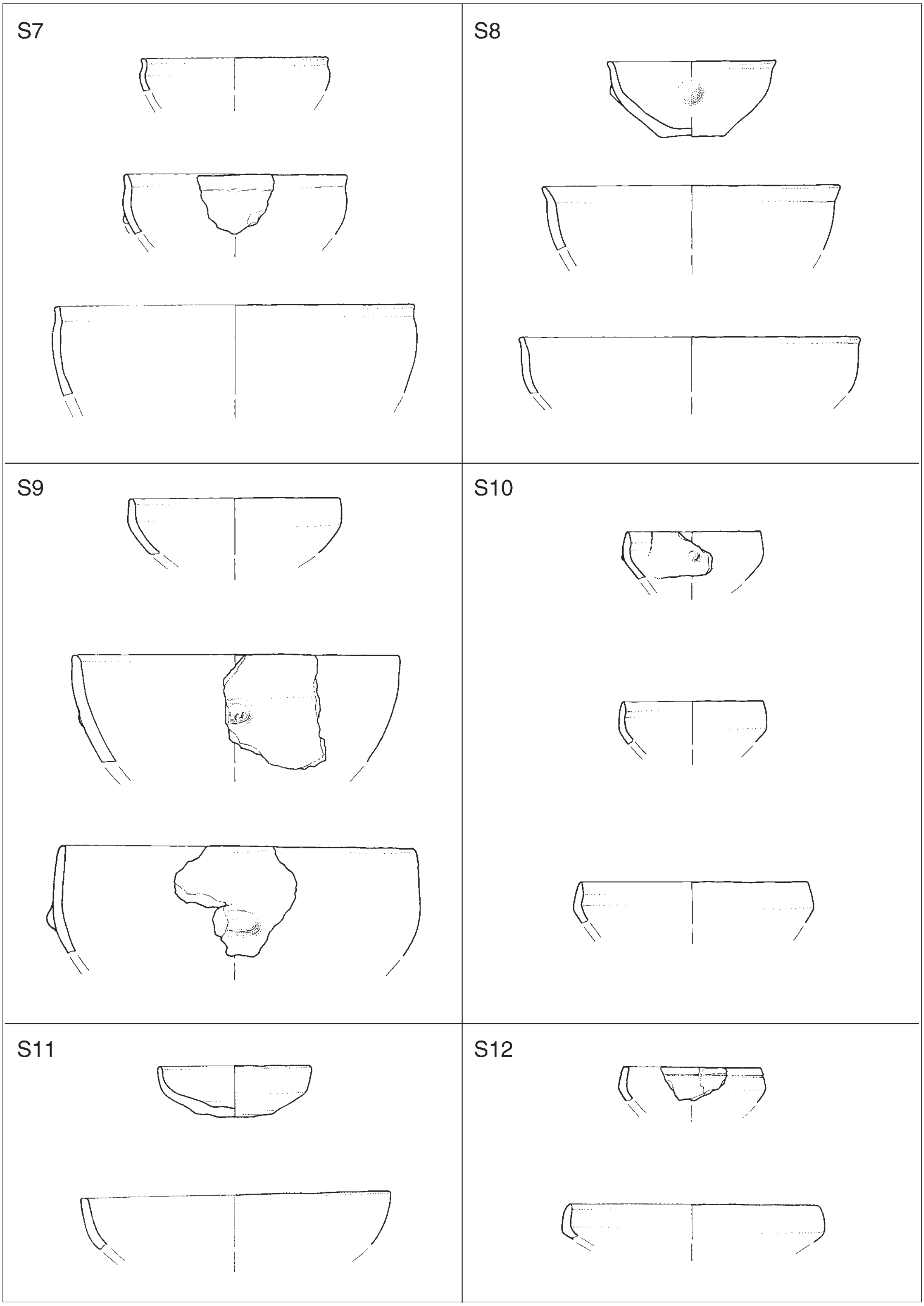
Type S1
Form: The conical lower part of the dish develops into a broad and highly set, short shoulder with a curved lip. Appliqués commonly appear on the belly and just below (*fig. 4.2.8:* S1).
Ornament: Only the upper part of the body is ornamented. Impressions made with a finger or a blunt object ornament the upper or outer rim of the lip. An incised line with droplet-shaped pricks is along the maximum diameter.

Type S2
Form: The lower body of these dishes develops into a broad, rounded shoulder with an inwardly slanted neck that concludes with a slightly everted or thickened lip. Grips and other similar applications are frequent, and they are always positioned on the belly (*fig. 4.2.8:* S2).
Ornament: Finger impressions are occasionally along the outer rim of the lip. One example, being an exception, has its belly ornamented with shallow grooves forming the motif of pine-tree branches, as well as a grip ornamented with pricks.

Type S3
Form: The narrow lower body of these dishes develops




*Sl. 4.2.8:* Sklede tipa S1 do S6. M. = 1 : 5.
*Fig. 4.2.8:* Dishes, type S1 to S6. Scale = 1 : 5.




*Sl. 4.2.9:* Sklede tipa S7 do S12. M. = 1 : 5.
*Fig. 4.2.9:* Dishes, type S7 to S12. Scale = 1 : 5.

na zgornjem delu posode pod ustjem ornament majhnih krožnih odtisov topega predmeta. Odtisi so razvrščeni v horizontalni liniji.

Tip S4
Oblika: Nizek, zaobljen spodnji del prehaja v klek in visok usločen vrat, ki se zaključuje v izvihanem ustju. Gre za razmeroma globoke sklede. Bradavice in držaji se pojavljajo na trebuhu (*sl. 4.2.8:* S4).

Tip S5
Oblika: Koničen spodnji del preide v visoko postavljen klek ter kratek usločen vrat, ki se zaključuje v izvihanem ustju (*sl. 4.2.8:* S5).

Tip S6
Oblika: Značilen je nizek spodnji del, ki prehaja v klek in izvihan vrat. Značilne so plastične aplikacije (držaji, dvojne bradavice), ki se pojavljajo izključno na nizko modeliranem trebuhu (*sl. 4.2.8:* S6).

Sl. 4.2.9
Tip S7
Oblika: Zaobljen spodnji del prehaja v visoko modelirano in rahlo poudarjeno rame, ki se zaključi v izvihanem ustju. Bradavice in držaji se pojavljajo izključno pod trebuhom (*sl. 4.2.9:* S7).

Tip S8
Oblika: Spodnji del tekoče preide v široko oblikovan in rahlo napet zgornji del, ki se zaključi v izvihanem ustju. Bradavice, lahko tudi po več kot dve na eni posodi, so na trebuhu in trupu (*sl. 4.2.9:* S8).

Tip S9
Oblika: Spodnji del posode tekoče prehaja v visoko postavljen klek in raven vrat. Držaji so lahko na kleku ali pa so na trupu pod klekom (*sl. 4.2.9:* S9).

Tip S10
Oblika: Za posode je značilno, da so majhne in imajo ravno oblikovan zgornji del, ki se zaključuje v zoženem ustju. Na trebuhu so pogoste bradavice (*sl. 4.2.9:* S10).

Tip S11
Oblika: Plitva posoda s klekom, ki prehaja v raven zgornji del in nepoudarjeno ustje (*sl. 4.2.9:* S11).

Tip S12
Oblika: Tip manjših in plitvih skled se od prejšnjega razlikuje po izoblikovanosti zgornjega dela posode, ki se zaključuje v uvihanem ustju (*sl. 4.2.9:* S12).

Tip S13
Oblika: Plitva skleda, katere spodnji del preide v široko



into a rounded, broad and highly set shoulder, which concludes with an everted lip. Appliquéd grips, embossments or cordons, sometimes with finger imprints, frequently appear on the belly or on the lower body just beneath the maximum diameter (*fig. 4.2.8:* S3).
Ornament: Ornamentation is rare. One example has an ornament of small circular impressions made with a blunt object on the upper part of the dish, below the lip. The impressions are distributed in a horizontal line.

Type S4
Form: The low, rounded lower body develops into a highly set hook and then a high, inwardly slanted neck that concludes with an everted lip. These are relatively deep dishes. Embossments or grips appear on the belly (*fig. 4.2.8:* S4).

Type S5
Form: The conical lower part of the body develops into a highly set hook and then a high and inwardly slanted neck that concludes with an everted lip (*fig. 4.2.8:* S5).

Type S6
Form: The lower body of these dishes is characteristically low, and it develops into a hook and an everted neck. Appliqués (grips, two embossments) are characteristic; they appear on the low, modeled belly exclusively (*fig. 4.2.8:* S6).

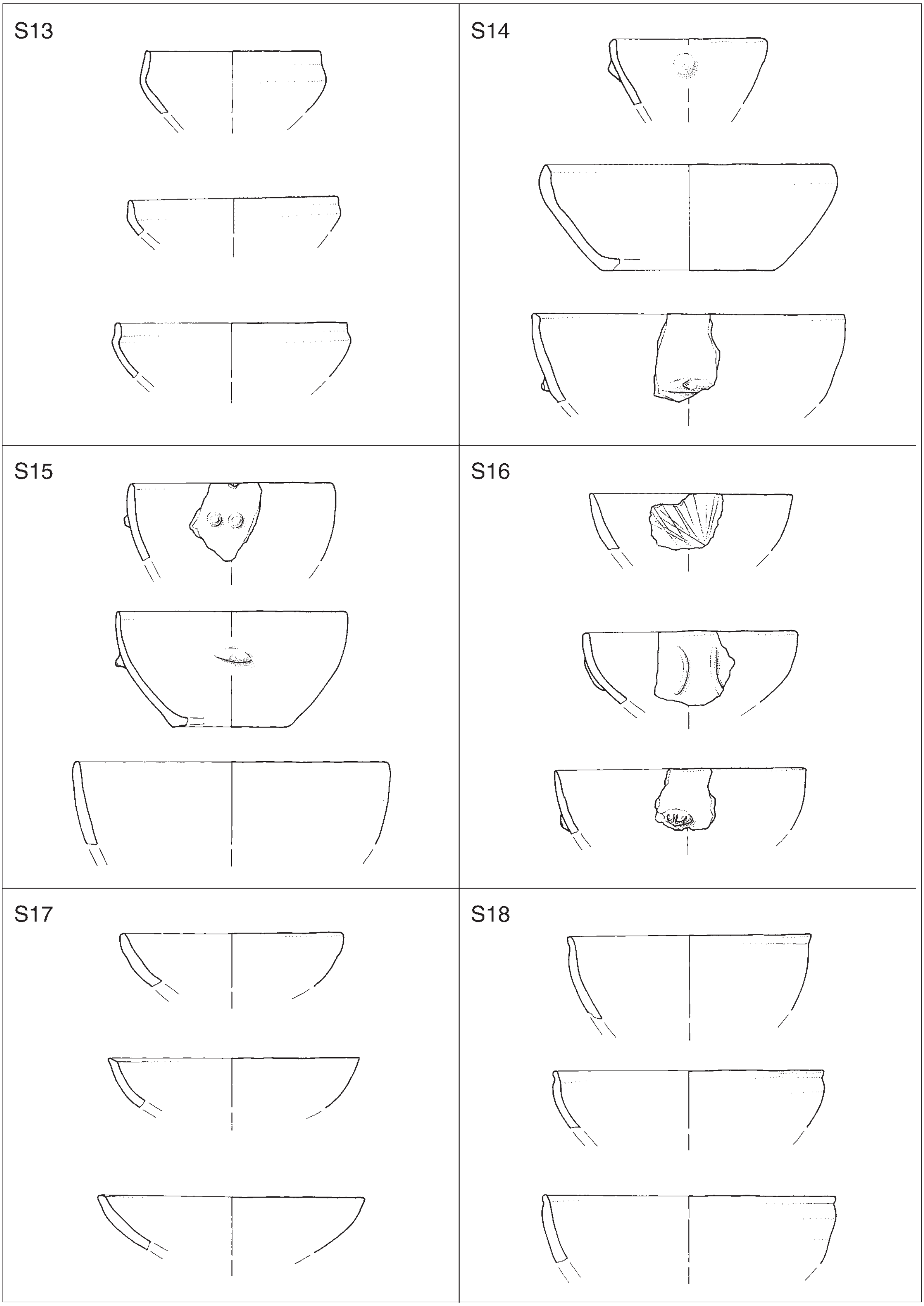
Type S7
Form: The rounded lower body develops into a high, modeled and slightly emphasized shoulder, which then concludes with an everted lip. Embossments and grips appear exclusively below the belly (*fig. 4.2.9:* S7).

Type S8
Form: The lower part of the body develops into a broad and slightly stretched upper part, which concludes with an everted lip. Embossments, sometimes more than two per vessel, appear on the belly or on the lower body (*fig. 4.2.9:* S8).

Type S9
Form: The lower part of the dish develops into a highly set hook with a straight neck. The grips are sometimes positioned on the hook or on the lower body just beneath (*fig. 4.2.9:* S9).

Type S10
Form: These dishes are characteristically small and with a straight upper body that concludes with a narrowed lip. Embossments are common on the belly (*fig. 4.2.9:* S10).

Type S11
Form: These dishes are shallow and with a hook that




*Sl. 4.2.10:* Sklede tipa S13 do S18. M. = 1 : 5.
*Fig. 4.2.10:* Dishes, type S13 to S18. Scale = 1 : 5.

oblikovano rame ter rahlo usločen vrat in ravno ustje (*sl. 4.2.10:* S13).

Tip S14
Oblika: Značilnost posod je ozek spodnji del, ki prehaja v visoko postavljeno, rahlo poudarjeno rame. Držaji in bradavice so lahko takoj pod trebuhom ali pa niže na sredini trupa (*sl. 4.2.10:* S14).

Tip S15
Oblika: Globoke sklede s polkroglasto oblikovanim trupom. Ustje je nepoudarjeno. Plastične aplikacije (držaji, bradavice, vertikalno rebro) se običajno pojavljajo na zgornjem delu trupa (*sl. 4.2.10:* S15).

Tip S16
Oblika: Plitve sklede s polkroglasto oblikovanim trupom. Pogosti so držaji in bradavice, pri eni tudi tri vertikalna plastična rebra, ki so na osrednjem delu trupa (*sl. 4.2.10:* S16).
Ornament: Običajno so te sklede neornamentirane. Na eni posodi zasledimo metličast ornament.

Tip S17
Oblika: Posode so zelo plitve in imajo zaobljeni trup (*sl. 4.2.10:* S17).

Tip S18
Oblika: Polkroglasto oblikovan trup preide v zoženo ustje. Glede na premer odprtine prevladujejo srednje sklede (*sl. 4.2.10:* S18).

Tip S19
Oblika: Globlje sklede s polkroglasto oblikovanim trupom in izvihanim ustjem. Različne plastične aplikacije se lahko pojavljajo na trupu (*sl. 4.2.11:* S19).

Tip S20
Oblika: Nizek trup zaobljeno prehaja v raven zgornji del posode. Držaji ali bradavice se pojavljajo tik nad prelomom ali na prelomu (*sl. 4.2.11:* S20).
Ornament: Običajno je z odtisi topega predmeta ornamentiran samo zunanji rob ustja.

Tip S21
Oblika: Koničen, lijakast trup in nepoudarjeno ustje. Bradavice se pojavljajo pod ustjem na zgornjem delu trupa (*sl. 4.2.11:* S21).



then develops into a straight upper body with an emphasized lip (*fig. 4.2.9:* S11).

Type S12
Form: This type is a smaller, shallow dish with a hook that then develops into a straight body with an inverted lip (*fig. 4.2.9:* S12).

Type S13
Form: This is a shallow dish, whose lower body develops into a broadly shaped shoulder with a slightly inwardly slanted neck and a plain rim (*fig. 4.2.10:* S13).

Type S14
Form: These dishes characteristically have a narrow lower body that develops into a highly set, slightly emphasized shoulder. Grips and embossments sometimes appear just below the belly or lower at mid-body (*fig. 4.2.10:* S14).

Type S15
Form: These deeper dishes have a semi-spherical body. The lip is plain. Appliqués (grips, embossments, vertical cordon) are usually upon the upper part of the body (*fig. 4.2.10:* S15).

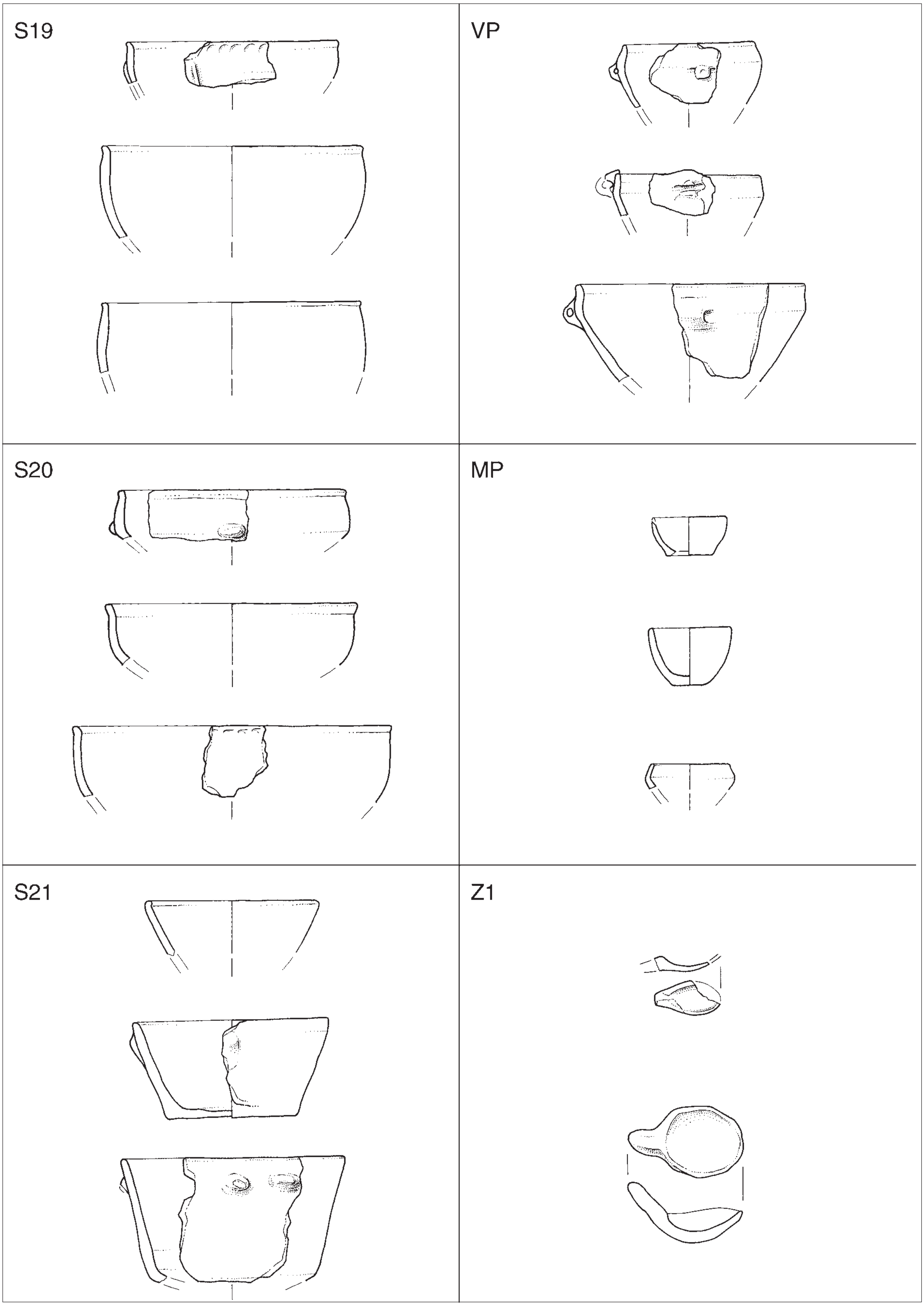
Type S16
Form: These are shallow dishes with a semi-spherical body. Grips and embossments are frequent; one example even demonstrates three vertical cordon appliqués on the central part of the body (*fig. 4.2.10:* S16).
Ornament: These dishes are usually unornamented. A combed ornamentation is known from one such dish.

Type S17
Form: These dishes are very shallow and they have a rounded body (*fig. 4.2.10:* S17).

Type S18
Form: The semi-spherical body develops into a narrowed lip. Medium sized dishes are predominant according to the diameter of the opening (*fig. 4.2.10:* S18).

Type S19
Form: These are deeper dishes with a semi-spherical body and an everted lip. Various appliqués appear on the body (*fig. 4.2.11:* S19).

Type S20
Form: The rounded, shallow body develops into a straight, upper body. Grips or embossments appear just above or on the crook (*fig. 4.2.11:* S20).
Ornament: Impressions made with a blunt object usually ornament only the outer rim of the lip.




*Sl. 4.2.11:* Sklede tipa S19 do S21. Viseče posode VP. Miniaturne posode MP. Zajemalka, tip Z1. M. = 1 : 5.
*Fig. 4.2.11:* Dishes, type S19 to S21. Hanging vessels VP. Miniature vessels MP. Ladle, type Z1. Scale = 1 : 5.

4.2.2.3 Viseče posodje

Gre za posode različnih oblik z značilno oblikovanimi ročaji, ki so horizontalno ali vertikalno prevrtani.

Značilnost teh posod je, da so bile obešene.[2] Običajno so manjših ali srednjih dimenzij (*sl. 4.2.11:* VP).

4.2.2.4 Miniaturno posodje

V to skupino smo uvrstili različno oblikovane posode, katerih skupna značilnost je premer odprtine, ki praviloma ne presega 8 cm (*sl. 4.2.11:* MP).

4.2.2.5 Posebne oblike

ZAJEMALKA S POLNIM DRŽAJEM

Tip Z1
Oblika: Žlici podoben manjši predmet s polnim držajem (*sl. 4.2.11:* Z1).

### **4.2.3** ROČAJI

Ročaje smo razvrstili v dve skupini. Za prvo skupino so značilni ročaji trakaste oblike, ki povezujejo ustje z ostenjem ali pa se pojavljajo na trebuhu (*sl. 4.2.12:* R1). Drugo skupino sestavljajo tunelasti ročaji. Nekateri imajo jezičast izrastek (*t. 4.1.11:* 4). Vedno jih najdemo na trebuhu. Pojavljajo pa se zelo redko (*sl. 4.2.12:* R2).

### **4.2.4** DRŽAJI

Razlikujemo sedem osnovnih oblik držajev. V prvo skupino (*sl. 4.2.12:* D1) spadajo jezičasti, rebrasti in stožčasti držaji, ki so lahko pritrjeni tudi na ustje (*t. 4.1.8:* 3). Običajno so na trebuhu (*t. 4.1.3:* 2; *4.1.4:* 1,2,4,6; *4.1.5:* 1,8; *4.1.8:* 2; *4.1.9:* 11; *4.1.10:* 6; *4.1.11:* 14).

Naslednja zelo pogosta skupina so razčlenjeni držaji (*sl. 4.2.12:* D2). Tudi dvojni polmesečasti držaji so lahko razčlenjeni, vendar se pojavljajo tudi nerazčlenjeni. Običajno so aplicirani vertikalno na steno posode (*sl. 4.2.13:* D3).

Posebno, maloštevilno skupino tvori vertikalen masivni držaj, ki je lahko ornamentiran z odtisi prsta ali pa tudi neornamentiran (*sl. 4.2.13:* D4).

Držaji z ušescem so razmeroma pogost tip. Vedno se pojavljajo na visečih posodah, kjer jih lahko najdemo

[2] Primerki visečih posod z ohranjeno vrvico za obešanje so npr. poznani z Mondseeja (Offenberger 1989, 131 ss; Antl-Weiser, Holzer 1995, sl. 4; 5).



Type S21
Form: These dishes have a conical, funnel-shaped body and a plain rim. Embossments appear just beneath the lip on the upper part of the body (*fig. 4.2.11:* S21).

4.2.2.3 Hanging vessels

These vessels comprise various forms equipped with characteristically shaped handles that are perforated either horizontally or vertically.

These vessels were characteristically for hanging.[2] These vessels are usually small or medium sized (*fig. 4.2.11:* VP).

4.2.2.4 Miniature vessels

This group constitutes various forms of vessels, whose common denominator is the diameter of the opening, which does not exceed 8 cm (*fig. 4.2.11:* MP).

4.2.2.5 Special forms

LADLE WITH A SOLID GRIP

Type Z1
Form: A small spoon-shaped ladle with a solid grip (*fig. 4.2.11:* Z1).

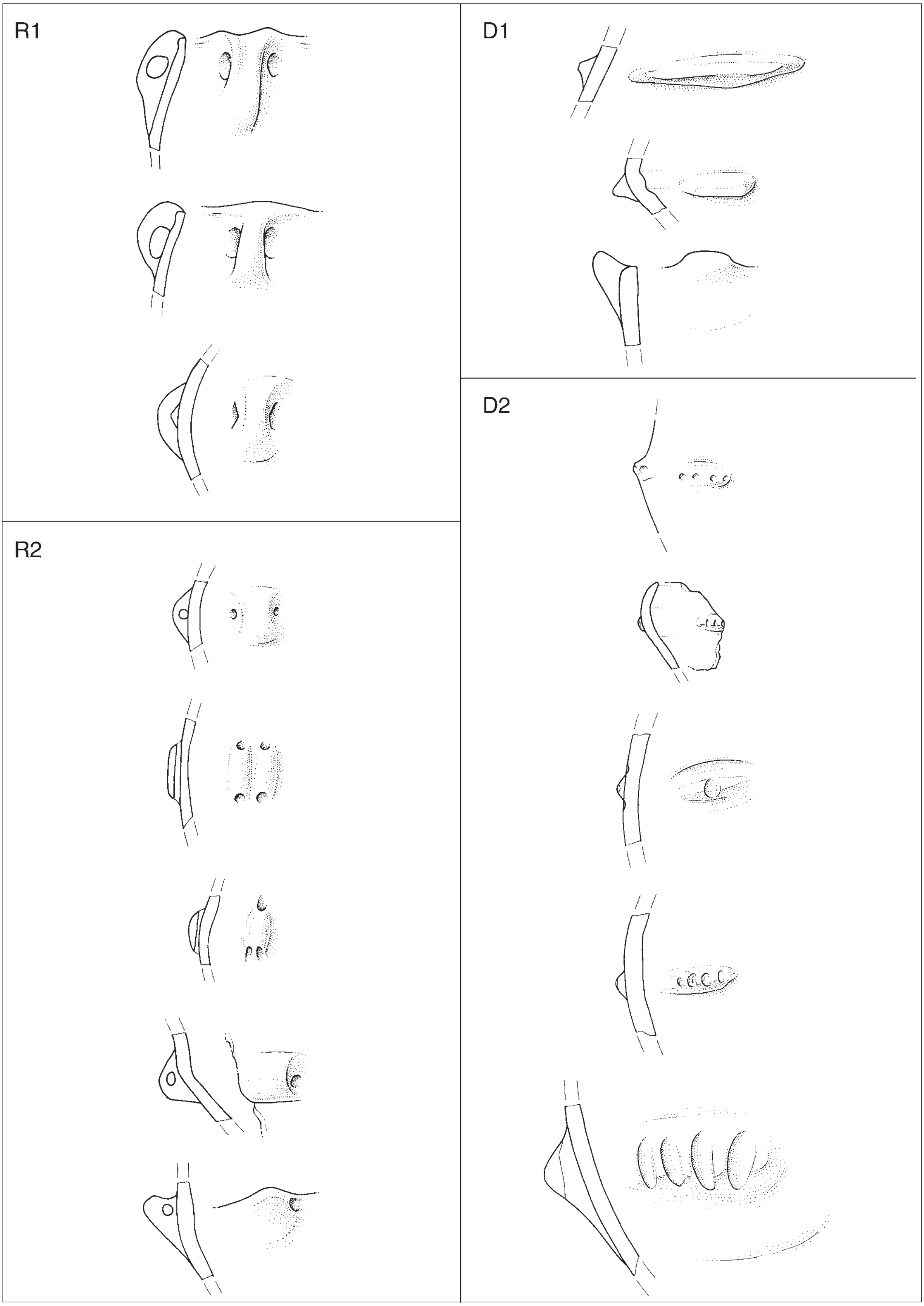
### **4.2.3** HANDLES

Handles are divided into two groups. The first group consists of handles in the form of a band, which connects the lip with the wall of the vessel or the belly (*fig. 4.2.12:* R1). The second group comprises of tunnel-shaped handles. Some have a flanged knob (*pl. 4.1.11:* 4). These are always positioned on the belly. Examples are quite rare (*fig. 4.2.12:* R2).

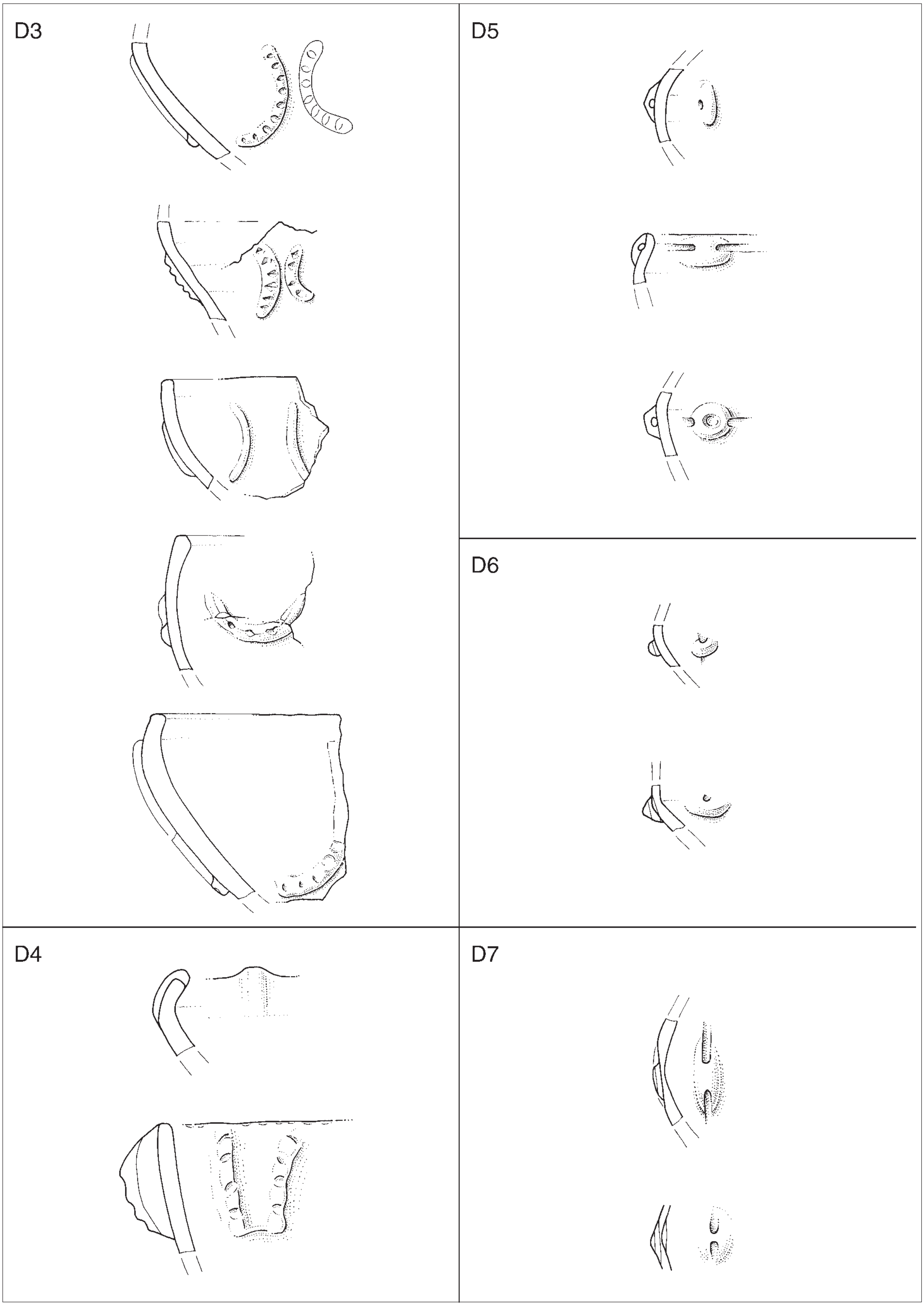
### **4.2.4** GRIPS

Seven basic forms of grips are classified. The first group (*fig. 4.2.12:* D1) includes grips with flanges, cordons or cone-shaped grips that may also be attached to the lip (*pl. 4.1.8:* 3). They are usually attached to the belly (*pl. 4.1.3:* 2; *4.1.4:* 1,2,4,6; *4.1.5:* 1,8; *4.1.8:* 2; *4.1.9:* 11; *4.1.10:* 6; *4.1.11:* 14).

[2] Examples of hanging vessels with the string for hanging still preserved are known from e.g. Mondsee (Offenberger 1989, 131 pp; Antl-Weiser, Holzer 1995, fig. 4; 5).




*Sl. 4.2.12:* Ročaji tipa R1 in R2. Držaji tipa D1 in D2. M. = 1 : 5.
*Fig. 4.2.12:* Handles, type R1 and R2. Grips, type D1 and D2. Scale = 1 : 5.




*Sl. 4.2.13:* Držaji tipa D3 do D7. M. = 1 : 5.
*Fig. 4.2.13:* Grips, type D3 to D7. Scale = 1 : 5.

na eni posodi po štiri. Lahko imajo vertikalno (*sl. 4.2.13:* D6) ali horizontalno luknjo (*sl. 4.2.13:* D5). Nekaj krat zasledimo tudi posode, ki imajo vertikalno prevrtan trebuh oziroma t. i. subkutani držaj (*sl. 4.2.13:* D7).

### **4.2.5** ORNAMENT

Na keramičnem posodju je zastopanih več vrst okrasa, ki ga glede na ornamentalne tehnike lahko ločimo na vrezovanje, žlebljenje, kaneliranje, metličenje, glavničenje, poliranje, premazovanje, vtiskovanje in plastično ornamentiranje.

Vrezovanje

Osnova ornamentalne tehnike je vrez. Glede na njegovo izvedbo ločimo dve varianti: navaden in brazdasti vrez. Pri obeh variantah vrezov velja, da so bile vrezane linije lahko belo inkrustirane.

Navadni vrez

Navadni vrez je lahko oster ali top. Pri ostrem vrezu ima vrezana linija značilen »V« presek (*sl. 4.2.14*: O1). Z uporabo topega predmeta pa nastane ozek vrez »U« preseka (*sl. 4.2.14*: O2).

Brazdasti vrez

Za brazdasti vrez je značilna brazdi podobna vrezana linija. Združuje dve osnovni tehniki – tehniko vrezovanja in vtiskovanja (*sl. 4.2.14*: O3) (Horvat 1999, 36).

Žlebljenje

V osnovi je žlebljenje podobno vrezovanju. Za to tehniko so značilni plitvi in široki žlebovi (*sl. 4.2.14:* O4).

Kaneliranje

Za to tehniko so značilne zelo široke kanelirane linije (*sl. 4.2.15:* O5).

Metličenje

Metličenje je tehnika, pri kateri se za okraševanje uporablja metlica. Na steni posode ostanejo neravne linije (*sl. 4.2.15:* O6).

Glavničenje

Glavničenje je tehnika, pri kateri se uporablja glavniku podobno orodje. Značilne so vzporedne linije (*sl. 4.2.15:* O7).

Poliranje

Za poliranje so značilne gladke zglajene površine. Ker so bile tako izdelane posode obdelane po vsej površini, ta tehnika nima izrazito ornamentalnega značaja (tip O8).



The second group is quite frequent and it comprises of grips with finger imprints (*fig. 4.2.12:* D2). Double crescent shaped grips may have finger imprints, although they also appear without finger imprints. These grips are usually appliquéd vertically upon the wall of the vessel (*fig. 4.2.13:* D3).

Ear-shaped grips are a relatively frequent type. They always appear on hanging vessels, where there are also known to be four per vessel. The perforation may be vertical (*fig. 4.2.13:* D6) or horizontal (*fig. 4.2.13:* D5). There are also a few examples of vessels with a vertical perforation through the maximum diameter; these are so-called subcutaneous grips (*fig. 4.2.13:* D7).

### **4.2.5** ORNAMENTATION

The pottery vessels demonstrate a variety of ornamentations, which can be classified according to their respective techniques: incised, grooved, fluted, brushed, combed, polished, slip type, impressed and appliquéd.

Incised ornamentation

The basic ornamental technique is incision. Two variants are classified – plain incised and furrowed incised ornamentation - on the basis of how they are done. The incised lines may have also had white encrustation in either of the variants.

Plain incised ornamentation

Plain incisions were made with either a blunt or a sharp object. A »V« cross-section is characteristic for the sharp incision (*fig. 4.2.14:* O1). The narrow »U« cross-section is the result of using a blunt object for making the incision (*fig. 4.2.14:* O2).

Furrowed incised ornamentation

The furrowed incision resembles a marked narrow depression forming a line. It combines two basic techniques – the technique of incising and that of impressing (*fig. 4.2.14:* O3) (Horvat 1999, 36).

Grooved ornamentation

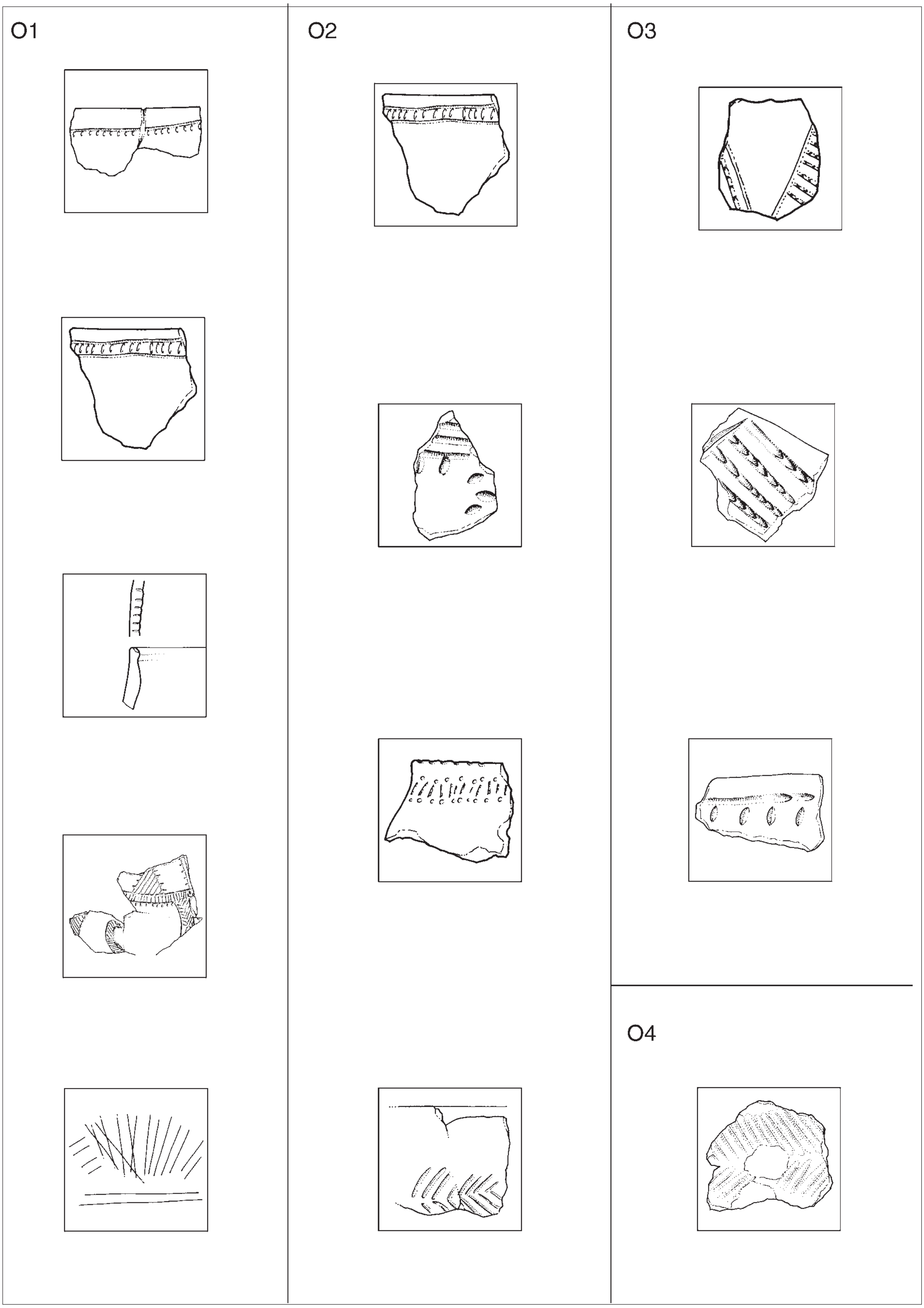
Grooved ornamentation is basically quite similar to incised. Broad, shallow grooves are characteristic (*fig. 4.2.14:* O4).

Fluted ornamentation

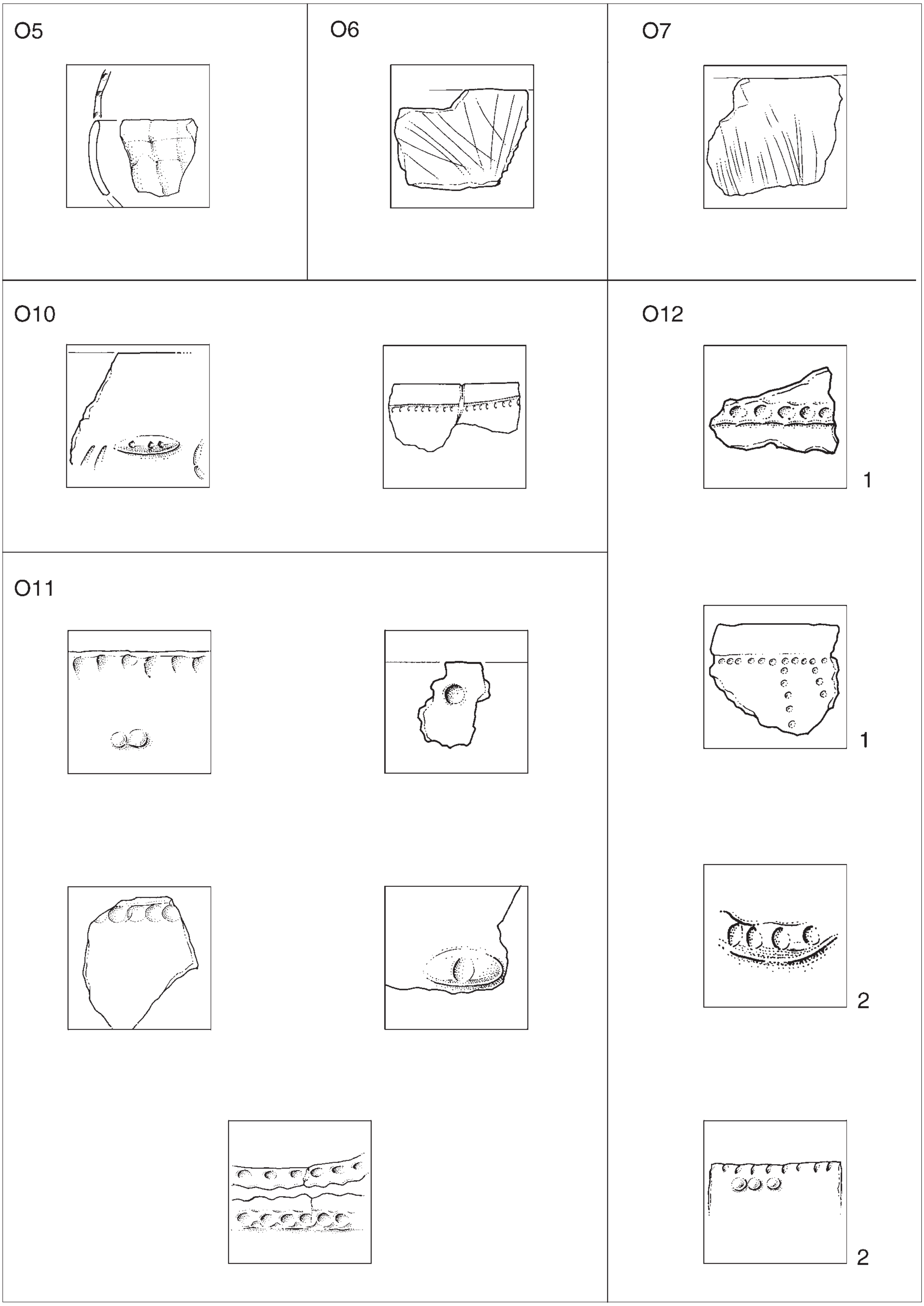
Very wide, rounded flutes (grooves) are characteristic of this technique (*fig. 4.2.15:* O5).

Brushed ornamentation

The brushing technique requires the use of a brush for this ornamentation. Uneven lines are thus created upon the wall of the vessel (*fig. 4.2.15:* O6).




*Sl. 4.2.14:* Ornament tipa O1 do O4. Ni v merilu.
*Fig. 4.2.14:* Ornamentation, type O1 to O4. Not in scale.




*Sl. 4.2.15:* Ornament tipa O5 do O12. Ni v merilu.
*Fig. 4.2.15:* Ornamentation, type O5 to O12. Not in scale.

Premazovanje

Podobno je tudi s premazovanjem, ornamentalno tehniko, ki je sicer manj pogosta od poliranja. Zanj je značilna uporaba premaza, ki površino posode obarva v barvo premaza. Tako se na nekaterih fragmentih pojavljajo rumenorjavi in črni premazi, ki imajo podoben ornamentalen značaj kot poliranje (tip O9).[3]

Vtiskovanje

Z uporabo tehnike vtiskovanja dobimo na posodju odtise. Glede na orodje za izvedbo okrasa lahko odtise ločimo na vbode (tip O10), odtise prsta (tip O11), odtise topega predmeta (tip O12), nohta (tip O13), noža oziroma ostrega predmeta (tip O14) in na odtise pletenine (tip O15).

Vbod

Za izdelovanje vbodov se uporablja oster koničast predmet, ki pušča globoke odtise stožčaste oblike (*sl. 4.2.15:* O10).

Odtis prsta

Odtisi prsta nastanejo z vtiskovanjem blazinice na konici prsta v sveže ostenje, ustje, ročaje, držaje itd. posode (*sl. 4.2.15:* O11).

Odtis topega predmeta

Odtisi topega predmeta nastanejo z uporabo topega orodja za okraševanje. Glede na izvedbo se lahko pojavljajo v dveh različicah:

1. z uporabo topega zaključka orodja za okraševanje dobimo navpične odtise (*sl. 4.2.15:* O12/1);
2. z uporabo podolgovatega dela orodja pa dobimo bočne odtise (*sl. 4.2.15:* O12/2).

Odtis nohta

Odtisi nohta nastanejo z vtiskovanjem konice prsta z nohtom (*sl. 4.2.16:* O13).

Odtisi noža oziroma podolgovatega ostrega predmeta

Kratki in ostri odtisi nastanejo z vtiskovanjem noža ali podolgovatega ostrega predmeta (*sl. 4.2.16:* O14).

Odtis pletenine

Odtis pletenine nastane, ko na sveže izdelano posodo pritisnemo pletenino. Značilen je mrežast vzorec pravokotnih odtisov (*sl. 4.2.16:* O15).

[3] Oba tipa premazov sta bila laboratorijsko analizirana (Osterc 1975, 123 ss). Izkazalo se je, da je rumenorjavi premaz po mineralni sestavi podoben drobnoznrnatem delu stene keramike, le da je revnejši s kalcitom in bogatejši s kremenom ter minerali glin. Črni premaz vsebuje limonit, kalcedon in morebiti kakšen manganov mineral.



Combed ornamentation

The combing technique requires the use of a tool similar to a comb. Parallel lines are thus formed upon the wall of the vessel (*fig. 4.2.15:* O7).

Polished ornamentation

A smoothed and polished surface is attained using this technique. As the entire surface of vessels were polished using this technique, there is no other specific ornamental characterization for it (type O8).

Slip type ornamentation

Similar holds true also for the slip type ornamental technique, which is also slightly less popular than the polished technique. A slip color is used to cover the surface of the entire vessel. Some fragments evidence yellowish-brown or black slips, which have a similar ornamental quality as does a polished ornamentation (type O9).[3]

Impressed ornamentation

The impressing ornamental technique creates impressions upon the surface of the vessel. Various types can be classified, depending upon the type of tool used for making the impressions: stitch or prick impressions (type O10), fingerprint impressions (type O11), blunt object impressions (type O12), fingernail impressions (type O13), knife or sharp object impressions (type O14) and plaited impressions (type O15).

Stitch impressions

A sharp, pointed object is used to create stitch impressions, which resemble deep, conical imprints (*fig. 4.2.15:* O10).

Fingerprint impressions

Fingerprint impressions are the result of pressing a fingertip into a freshly formed wall, lip, handle, grip, etc. of a vessel (*fig. 4.2.15:* O11).

Blunt object impressions

Blunt object impressions are made by using a blunt object to form the ornamentation. Two variants are known:

1. using the blunt tip of a tool to form vertical impressions (*fig. 4.2.15:* O12/1),
2. using the long side of a tool to form lateral impressions (*fig. 4.2.15:* O12/2).

[3] Both types of slips were analyzed in a laboratory (Osterc 1975, 123 pp). The results demonstrated that the yellowish-brown slip was similar in mineral content to the fine-grained part of the pottery wall only that it contained less calcite and more quartz and clay minerals. The black slip contained limonite, chalcedony and perhaps a bit of manganese minerals.

Plastično apliciranje

Za tehniko plastičnega apliciranja je značilen ornament, ki je apliciran na steno posode. Delimo ga na več zvrsti: barbotin (tip O16), aplicirana nerazčlenjena (tip O17) in razčlenjena rebra (tip O18), držaji ali bradavice (tip O19) ter ploščate okrogle (tip O20) in obročkaste nalepke (tip O21).

Barbotin

Barbotin je zelo specifična in stara ornamentalna zvrst. Gre za grob nanos, ki na posodi ustvari razgibano površino. Na splošno se deli na organiziran in neorganiziran barbotin. Predvsem slednji je dekorativno manj izpoveden in bolj funkcionalen (*sl. 4.2.16:* O16).

Aplicirano nerazčlenjeno rebro

Aplicirana nerazčlenjena rebra so podolgovat plastični okras, ki je prilepljen na površino posode (*sl. 4.2.16:* O17).

Aplicirano razčlenjeno rebro

Aplicirana razčlenjena rebra so z eno izmed tehnik vtiskovanja okrašena nerazčlenjena rebra (*sl. 4.2.16:* O18).

Bradavica

Bradavice so različno oblikovane plastične aplikacije, ki imajo običajno bolj uporabno kot ornamentalno funkcijo. Prevladujejo enostavne, stožčasto oblikovane bradavice, ki so lahko včasih ornamentirane s tehniko vtiskovanja ali pa preoblikovane v držaje. Pojavljajo se tudi dvojne bradavice (*sl. 4.2.16:* O19).

Ploščata okrogla nalepka

Gre za sploščeni bradavici podoben ornament (*sl. 4.2.16:* O20).

Obročkasta nalepka

Za obročkaste nalepke je značilna obročkasto oblikovana aplika (*sl. 4.2.16:* O21).

Modeliranje

Pri modeliranju je za razliko od tehnike apliciranja ornament izoblikovan iz posode. Pojavljajta se dva tipa okrasa: izvlečeno plastično rebro (tip O22) in gubanje (tip O23).

Izvlečeno plastično rebro

Za izvlečena plastična rebra je značilno, da so bila narejena iz stene posode brez uporabe tehnike apliciranja (tip O22). Pojavljajo se kot samostojno plastično rebro, ki je lahko razčlenjeno ali nerazčlenjeno, in je običajno na najširšem obodu (podobno kot *sl. 4.2.16:* O14 oz. Bregant 1975, t. 14: 5).



Fingernail impressions

The fingernail is used to create fingernail impressions (*fig. 4.2.16:* O13).

Knife or sharp object impressions

Short and sharp impressions are created by using a knife or other elongate, sharp object to impress (*fig. 4.2.16:* O14).

Plaited impressions

Plaited impressions are the result of impressing a plait into the wall of a freshly made vessel. A meshed pattern of rectangular impressions is characteristic (*fig. 4.2.16:* O15).

Appliquéd ornamentation

Appliquéd ornamentations characteristically comprise of ornamentations that are molded and applied to the wall of the vessel. Appliqués are divided into numerous types: barbotine (type O16), appliquéd cordon without finger imprints (type O17), appliquéd cordon with finger imprints (type O18), grips or embossments (type O19), flat-round appliqués (type O20) and plain appliqués (type O21).

Barbotine

Barbotine is a very specific and old ornamental technique. It is a rough covering that forms an uneven surface on the vessel. In general, barbotine is divided into an organized type and an unorganized type. The latter is for the most part less decorative and more functional (*fig. 4.2.16:* O16).

Appliquéd cordon without finger imprints

An appliquéd cordon without finger imprints is an elongate ornamental appliqué attached to the surface of the vessel (*fig. 4.2.16:* O17).

Appliquéd cordon with finger imprints

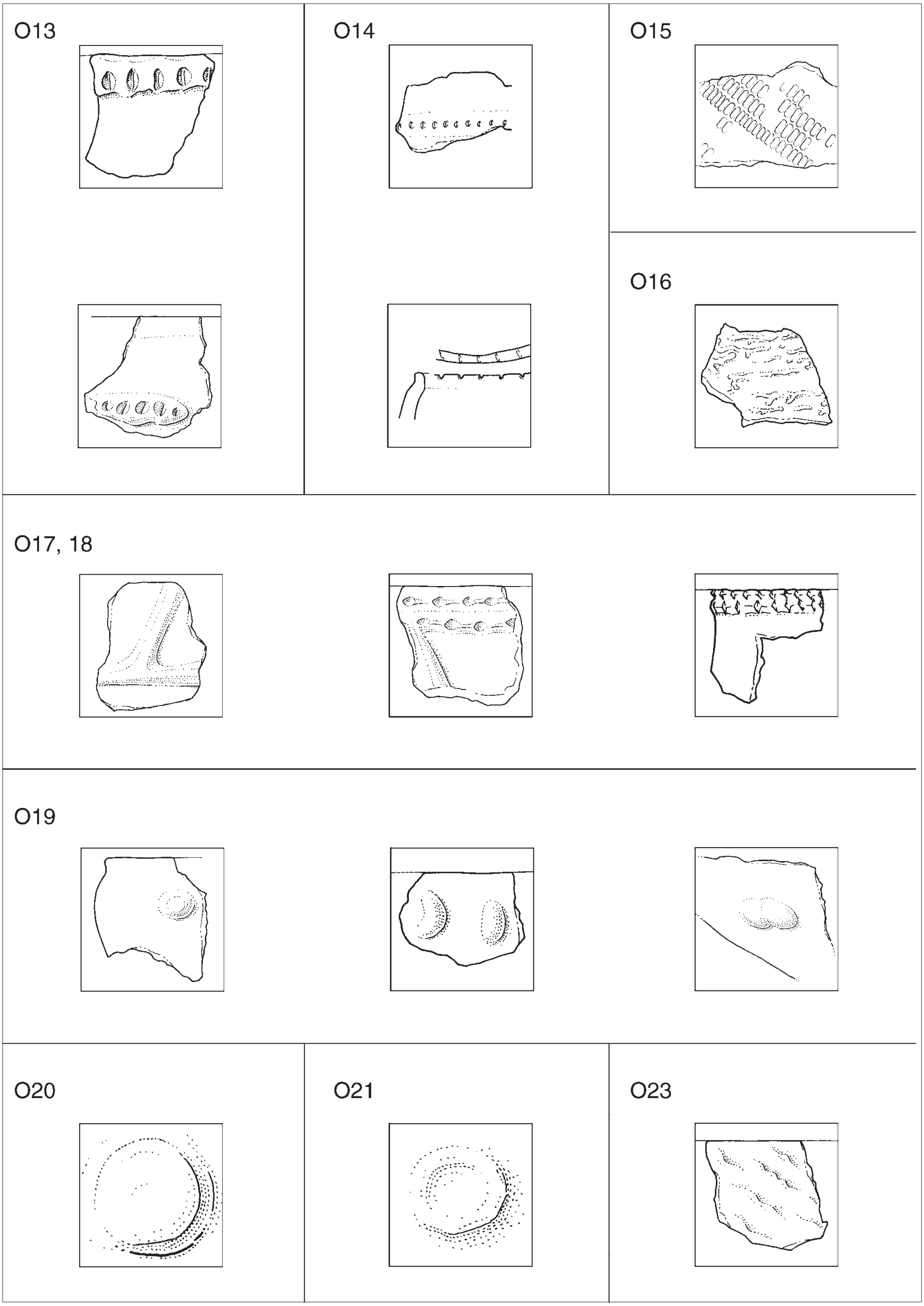
An appliquéd cordon with finger imprints incorporates the use of an impressing technique for ornamenting a cordon without finger imprints (*fig. 4.2.16:* O18).

Embossment

Embossments are variously shaped appliqués that usually serve a more functional purpose as opposed to ornamental. The majority are simple, conical knobs that may sometimes be ornamented with impressions or reshaped into grips. Double embossments are also known (*fig. 4.2.16:* O19).

Flat-round appliqués

These resemble a flattened embossment ornamentation (*fig. 4.2.16:* O20).




*Sl. 4.2.16:* Ornament tipa O13 do O23. Ni v merilu.
*Fig. 4.2.16:* Ornamentation, type O13 to O23. Not in scale.

Gubani okras

Za gubanje je značilna grobo modelirana površina s šibkim plastičnim efektom. Je bolj funkcionalna kot ornamentalna zvrst (*sl. 4.2.16:* O23).



Ring-shaped appliqués

The appliqués are molded in the shape of a ring and then attached to the vessel (*fig. 4.21.6:* O21)

Modeled ornamentation

The difference between a modeled ornamentation and an appliqué is that modeling requires that the ornament is modeled from the vessel itself. Two types of ornamentation are known: a drawn out cordon appliqué (type O22) and a buckled ornamentation (type O23).

Drawn out cordon appliqué

It is typical for this type of cordon that it is worked out from the wall of the vessel as opposed to being an attached appliqué (type O22). These cordons are independent and they may be with or without finger imprints; they are usually at the maximum diameter (*fig. 4.2.16:* O14, or Bregant 1975, Pl. 14: 5).

Buckled ornamentation

A rough modeled surface with a slight relief effect is characteristic for buckling. This type is more functional than ornamental (*fig. 4.2.16:* O23).

# 5 HOČEVARICA: OVREDNOTENJE PODATKOV

# 5 HOČEVARICA: DATA EVALUATION

ANTON VELUŠČEK

## **5.1** ANALIZA STRATIGRAFSKE RAZPOREDITVE NAJDB

*Izvleček*

*Iz sonde na Hočevarici analiziramo najdbe glede na stratigrafsko lego. Ugotovili smo, da se v obeh naselbinskih fazah pojavljajo podobne najdbe, kar kaže, da moremo Hočevarico uvrstiti v enoten kulturni horizont.*

### **5.1.1** UVOD

Kakor je že bilo omenjeno, sta na Hočevarici ugotovljeni dve naselbinski fazi (glej *sl. 3.1.5* in *poglavje 3.1.3*), ki ju potrjujeta palinološka (glej *poglavje 3.2*) raziskava ter analiza fosfatov (*tab. 3.1.1*). Podobno kažejo tudi rezultati dendrokronoloških raziskav (glej *poglavji 6.2* in *6.3*). Zato bodo v nadaljevanju najdbe predstavljene po fazah.

Med arheološkimi najdbami prevladuje keramika. Največ fragmentov lahko pripišemo loncem in skledam. Lonci so razvrščeni v 13, sklede pa v 17 tipov (*histogram 5.1.1*; *5.1.2*).

## **5.1** ANALYSIS OF THE STRATIGRAPHIC DISTRIBUTION OF FINDS

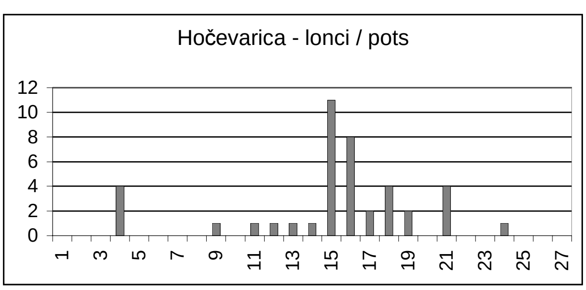
*Abstract*

*The finds from the sample trench at Hočevarica are analyzed here according to their stratigraphic position. It was established that both settlement phases show similar finds, which indicates that Hočevarica should be placed in a single cultural horizon.*

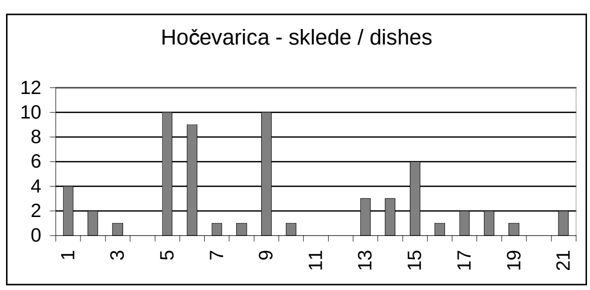
### **5.1.1** INTRODUCTION

Two settlement phases were determined at Hočevarica (check *fig. 3.1.5* and *chapter 3.1.3*), which are confirmed by both pollen analyses (check *chapter 3.2*) and phosphate analyses (*table 3.1.1*). Dendrochronological research has produced similar results (check *chapters 6.2* and *6.3*). In the following the presentation of finds shall thus be presented corresponding to the two phases.

Archaeological finds comprise mostly of pottery. Most fragments can be ascribed to pots and dishes. The pots are divided into 13 and the dishes into 17 types (*histograms 5.1.1*; *5.1.2*).




*Histogram 5.1.1:* Hočevarica. Zastopanost loncev po tipih.
*Histogram 5.1.1:* Hočevarica. Representation of pot types.




*Histogram 5.1.2:* Hočevarica. Zastopanost skled po tipih.
*Histogram 5.1.2:* Hočevarica. Representation of dish types.

### 5.1.2 PRVA NASELBINSKA FAZA – SKUPKI 23 DO 18 V PLASTEH 10 DO 7 (*SL. 3.1.5*)

Prva faza je izpričana z ostanki hiše, ki so ležali v zgornjem delu zelenkastosive plasti v mikrokvadratih 7 in 5. Stratigrafsko pomemben je detajl z loncem tipa L16 (*t. 4.1.3:* 2). Lonec, ki je ležal razbit v plasti nad plastjo z mahom, je namreč prebil klan hrastov kol št. 25, kar neposredno kaže na več naselbinskih oziroma gradbenih faz (*sl. 3.1.6*).

Za prvo naselbinsko fazo je značilna redukcijsko žgana keramika. Med lonci po številu izstopa tip L16 (*t. 4.1.2:* 1; *4.1.3:* 1–4), ki ga v drugi fazi ni (*histogram 5.1.3*). Tako številne kot lonci so sklede (*histogram 5.1.4*). V tej fazi se pojavljajo še vrč (*t. 4.1.1*: 1,2), kupe (*t. 4.1.2:* 5,6; *4.1.5:* 7), viseča posoda in zajemalka tipa Z1 (*t. 4.1.5:* 9). Na keramiki so jezičasti držaji in bradavice, ki so lahko tudi v paru (*t. 4.1.2:* 6; *4.1.3:* 2,3; *4.1.4:* 1–4,6; *4.1.5:* 1,8). Pri enem je na loncu tipa L16 velika, rahlo izdolbena elipsoidna nalepka (*t. 4.1.3:* 4).

Izjema je ornament na vrču, katerega fragmenti so bili razpršeni po mikrokvadratih 6 in 7 v skupkih 23, 21 in 14 (*t. 4.1.1:* 1,2). Gre za kombinacijo navadnega vreza in kapljičastih vbodov. Na vratu je šrafiran trikotnik z resicami, trup pa je ornamentiran s krivočrtnim in ravnočrtnim lestvičastim motivom, ki preide v cikcakast trak ter motiv smrekove vejice (*t. 4.1.1:* 1,2).

Podobno ornamentirana fragmenta posod nedoločljive oblike sta bila najdena v skupku 23 na dnu sonde. Pri prvem je fragment ornamentiran z brazdastim vrezom, pri drugem pa gre za kapljičaste vbode, ki oblikujejo cikcakast motiv (*t. 4.1.12:* 1).

V skupino keramičnih najdb spada tudi ploščato vretence, katerega fragment je bil najden v skupku 19 (*t. 4.1.5:* 10) in kaže na prejo.

Med nekeramičnimi najdbami, ki označujejo prvo fazo, je potrebno našteti tudi nakitne predmete: dva majhna kamnita obročka za ogrlico (npr. *sl. 3.1.20*), prevrtana kalcitna jagoda (*sl. 3.1.21*), 16 prevrtanih koničnih jagod iz roževine (npr. *sl. 3.1.14:* 1–4) ter 1 prevrtan obesek iz živalskega zoba.

Najdeni so bili tudi trnek iz kosti (*sl. 3.1.19*), več koščenih šil in sveder iz kremena (*sl. 3.1.24*).

O poljedelstvu priča več fragmentov kamnitih žrmelj, ki jih poznamo iz skupkov 23, 22 in 19.

V skupku 19 smo naleteli tudi na tri fragmentarno ohranjene človeške zobe (glej *poglavje 3.6*).



### 5.1.2 FIRST SETTLEMENT PHASE – SUB-PHASES 23 TO 18 IN LAYERS 10 TO 7 (*FIG. 3.1.5*)

The first phase is attested to by the remains of a house lying in the upper part of the greenish-gray layer in micro-quadrants 7 and 5. Stratigraphically important is the detail from the L16 type pot (*pl. 4.1.3:* 2). Namely, the pot, which lay broken in the layer covering the moss layer, was pierced through by the split oak pile no. 25. This is directly indicative of more than one settlement or building phase (*fig. 3.1.6*).

The first settlement phase is characterized by pottery fired in a reducing atmosphere. The prevalent pot type is form L16 (*pl. 4.1.2:* 1; *4.1.3:* 1–4), which is absent in the second settlement phase (*histogram 5.1.3*). Dishes appear in as great a number as pots (*histogram 5.1.4*). This phase reveals the presence of pitchers (*pl. 4.1.1:* 1,2), tumblers (*pl. 4.1.2:* 5,6; *4.1.5:* 7), a hanging vessel and a Z1 type ladle (*pl. 4.1.5:* 9). There are tongue-shaped grips and embossments appearing on the pottery, the latter also in pairs (*pl. 4.1.2:* 6; *4.1.3:* 2,3; *4.1.4:* 1–4,6; *4.1.5:* 1,8). One of the L16 type pots bears a large, slightly concave, ellipsoid application (*pl. 4.1.3:* 4).

The exception in ornamentation is to be found on a pitcher, fragments of which were scattered throughout micro-quadrants 6, 7 and sub-phases 23, 21 and 14 (*pl. 4.1.1:* 1,2). The pitcher is ornamented with a combination of simple incisions and droplet-shaped stitches. The neck bears a hatched triangle with fringes, while the body is ornamented with curved and straight lines forming a ladder motif that is transformed into a zig-zag band and a pine branch motif (*pl. 4.1.1:* 1,2).

Similarly ornamented fragments of indefinable vessel types were found in sub-phase 23 at the bottom of the trench. One fragment bears furrowed incisions while the other has droplet-shaped stitches forming a zig-zag motif (*pl. 4.1.12:* 1).

Also classified among the ceramic finds is a disc-shaped spindle whorl, fragments of which were found in sub-phase 19 (*pl. 4.1.5:* 10). This find is indicative of the presence of spinning activity.

The non-ceramic finds that characterize the first phase include also jewelry objects: two small stone ringlets for a necklace (e.g. *fig. 3.1.20*), a perforated calcite bead (*fig. 3.1.21*), 16 perforated conical beads made of horn (e.g. *fig. 3.1.14:* 1–4) and a perforated pendant made of an animal tooth. A bone hook was also found (*fig. 3.1.19*), as well as several bone awls and a flint auger (*fig. 3.1.24*).

Farming is attested to by several fragments of stone querns known from sub-phases 23, 22 and 19. Three fragmented human teeth were also discovered in sub-phase 19 (check *chapter 3.6*).

## 5.1.3 DRUGA NASELBINSKA FAZA – SKUPKI 16, 15 IN 13 DO 4 V PLASTEH 5 IN 4 (*SL. 3.1.5*)

Druga poselitvena faza je izpričana z ostanki hiš, ki se pojavljajo v mikrokvadratih 1, 3 in 8.

Tudi za drugo fazo je značilna redukcijsko žgana keramika. V oblikovanju keramike ni opaziti bistvene razlike v primerjavi s prejšnjo fazo, čeprav se število oblik posod nekoliko poveča. Tipi, ki so bili v prvi fazi številčno bolje zastopani, se tudi v tej običajno pojavljajo v večjem številu. Med lonci izstopa tip L15 (*t. 4.1.9:* 1; *histogram 5.1.3*).

Sklede so številčnejše kot v prvi fazi (*histogram 5.1.4*). Najpogostejše so sklede tipa S5 (*t. 4.1.7:* 1,7; *4.1.10:* 9,10), S6 (*t. 4.1.11:* 10) in S9 (*t. 4.1.9:* 3; *4.1.10:* 2; *4.1.11:* 1).

Med preostalimi oblikami je potrebno ponovno omeniti kupe (*t. 4.1.8:* 3; *4.1.9:* 5,12; *4.1.11:* 2), vrče (*t. 4.1.7:* 2), zajemalke s polnim držajem (*t. 4.1.9:* 9; *4.1.11:* 7). Pojavlja se tudi posoda na nizki nogi (*t. 4.1.7:* 3).

Tudi v drugi fazi naselbine prevladuje neornamentirana keramika, čeprav je ornamentiranih fragmentov neprimerno več kot v prvi fazi. Zasledimo jezičaste držaje ali bradavice, ki so lahko tudi v paru (*t. 4.1.7:* 6,7; *4.1.9:* 5,11; *4.1.10:* 6,8). Pri enem se pojavlja velika okrogla plastična aplikacija (*t. 4.1.9:* 10). Številni so z brazdastim vrezom ornamentirani fragmenti – večina jih je najdena v skupku 8.[1] Motivno gre za šrafirane trikotnike (kot *t. 4.1.5:* 12) in pravokotnike oziroma rombe (*t. 4.1.12:* 4). Pojavljajo se tudi ravnočrtni motivi, ki jih spremljajo kapljičasti vbodi (*t. 4.1.12:* 2). Kapljičasti vbodi so kombinirani tudi s horizontalno globoko vrezano linijo (kot *t. 4.1.6:* 1). Na nekaj fragmentih najdemo horizontalen lestvičast motiv (kot *t. 4.1.5:* 11). Takšen ornament se običajno pojavlja na vratu tik pod ustjem. Ustja so okrašena z vrezi ali odtisi ostrega predmeta (*t. 4.1.9:* 1; *4.1.11:* 6).

Tudi v skupkih 2. naselbinske faze smo, podobno kot v 1. naselbinski fazi, naleteli na fragmentarno ohranjeno ploščato vretence za prejo (*t. 4.1.11:* 3).

Med nekeramičnimi najdbami je potrebno omeniti nakitne predmete, kot so obročki iz metamorfne kamnine (npr. *sl. 3.1.20:* 1)[2] in obeski iz živalskih zob (npr. *sl. 3.1.15*). Številne so tudi prevrtane lesene jagode (npr. *sl. 3.1.7*).

Pogosta so koščena šila (*sl. 3.1.16* in *3.1.17*). V skupku 5 se pojavlja tudi manjša koščenemu šilu podobna lesena konica. Najbrž gre za zob mikalnika (glej Eberli 1998-1999, sl. 4).

[1] Največ fragmentov, ki so okrašeni z brazdastim vrezom, izvira iz skupkov 17 in 14, tj. vmesnih skupkov med naselbinskima fazama 1 in 2.

[2] Večina obročkov je sive do temnosive barve. Analiza dveh temnosivih obročkov iz 2. naselbinske faze je pokazala, da sta narejena iz metamorfne kamnine (glej *poglavje 3.3*).



## 5.1.3 SECOND SETTLEMENT PHASE – SUB-PHASES 16, 15 AND 13 TO 4 IN LAYERS 5 AND 4 (*FIG. 3.1.5*)

The second settlement phase is attested to by the remains of houses, which were found in micro-quadrants 1, 3 and 8. This phase is also characterized by pottery fired in a reducing atmosphere. Pottery forms do not reveal any significant differences in comparison to the previous phase, although the number of forms increases slightly. The types that have appeared in great numbers already in the first phase now appear in even greater numbers. Among pot types, the L15 form is particularly noteworthy (*pl. 4.1.9:* 1; *histogram 5.1.3*).

Dishes appear in greater numbers than in the first phase (*histogram 5.1.4*). Dishes of the S5 (*pl. 4.1.7:* 1,7; *4.1.10:* 9,10), S6 (*pl. 4.1.11:* 10) and S9 types (*pl. 4.1.9:* 3; *4.1.10:* 2; *4.1.11:* 1) are most common. Other forms again include tumblers (*pl. 4.1.8:* 3; *4.1.9:* 5,12; *4.1.11:* 2), pitchers (*pl. 4.1.7:* 2) and ladles with a solid grip (*pl. 4.1.9:* 9; *4.1.11:* 7). There is also a vessel on a low foot (*pl. 4.1.7:* 3).

The second settlement phase presents, as did the first one, a prevalence of unornamented pottery; although ornamented fragments are now incomparably more frequent. There are tongue-shaped grips or embossments that can appear in pairs (*pl. 4.1.7:* 6,7; *4.1.9:* 5,11; *4.1.10:* 6,8). One fragment has a large round plastic application (*pl. 4.1.9:* 10). There are numerous fragments ornamented with furrowed incisions – most were found in sub-phase 8.[1] The motifs include hatched triangles (as *pl. 4.1.5:* 12) and rectangles or rhombs (*pl. 4.1.12:* 4). There are also motifs with straight lines accompanied by droplet-shaped stitches (*pl. 4.1.12:* 2). The latter can also be combined with a deeply incised horizontal line (as *pl. 4.1.6:* 1). Some fragments bear a horizontal ladder motif (as *pl. 4.1.5:* 11). This ornament is usually found on the necks of vessels, just below the lip. Lips can be ornamented with incisions or impressions made with a blunt object (*pl. 4.1.9:* 1; *4.1.11:* 6).

The sub-phases of the second settlement phase have yielded, similarly to those of the first phase, a fragment of a disc-shaped spindle whorl (*pl. 4.1.11:* 3).

Non-ceramic finds include jewelry objects such as ringlets made of metamorphic rock (as e.g. *fig. 3.1.20:* 1)[2] and animal teeth pendants (as e.g. *fig. 3.1.15*). There are also numerous perforated wooden beads (e.g. *fig. 3.1.7*).

Bone awls are frequent (*fig. 3.1.16* and *3.1.17*). A

[1] Most fragments ornamented with furrowed incisions originate from sub-phases 17 and 14, i.e. the sub-phases between the first and the second settlement phase.

[2] Most ringlets are gray to dark gray in color. The analysis of two dark gray ringlets from the second settlement phase has established that they are made of metamorphic rock (check *chapter 3.3*).

Kapitalna najdba je skoraj v celoti ohranjen lok iz lesa tise, ki je ležal med skupkoma 15 in 6 (*sl. 3.1.9–3.1.11*). Najdeni sta tudi kamnita trikotna puščična ost s krilci (*sl. 3.1.23*) ter ploščata kamnita sekira (*sl. 3.1.25*).

Tudi v mlajši fazi Hočevarice kažejo na poljedelstvo fragmenti žrmelj, ki se pojavljajo v skupkih 8, 7 in 4.

Iz 2. naselbinske faze so zelo pomembni tudi bakrena kapljica (*sl. 3.1.28*), ki je bila najdena v skupku 15, in fragmenta, verjetno iste livarske posode iz skupkov 14 ter 11 (*sl. 3.1.27* in *t. 4.1.8:* 11). Ti predmeti dokazujejo, da so se v naselbini ukvarjali z metalurgijo bakra.

Človeške zobe smo našli v skupkih 8 in 5 (glej *poglavje 3.6*).

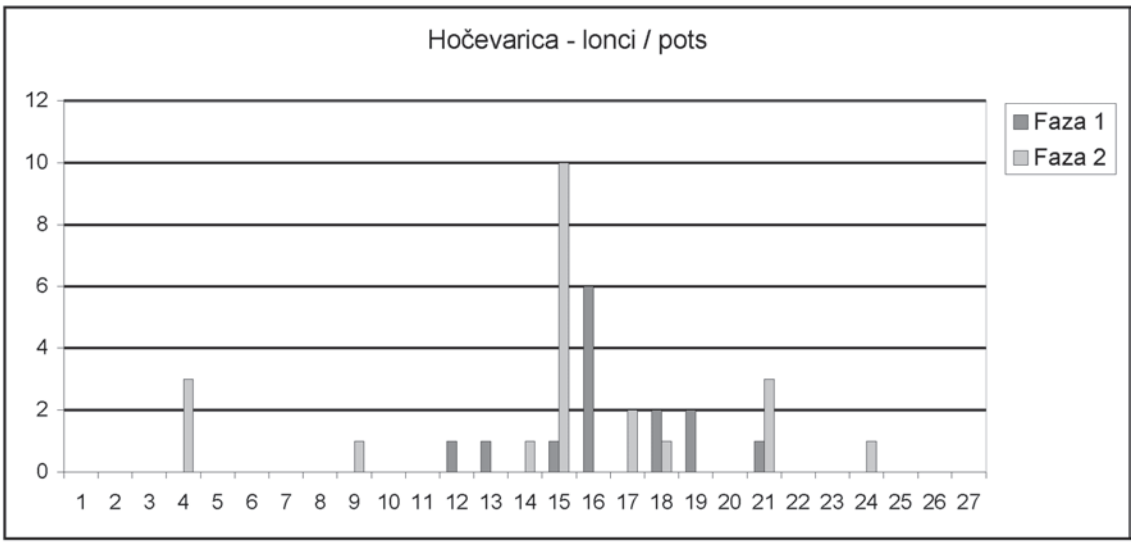


small wooden point was found in sub-phase 5 that resembles a bone awl but is probably a tooth of a hackle (check Eberli 1998-1999, fig. 4).

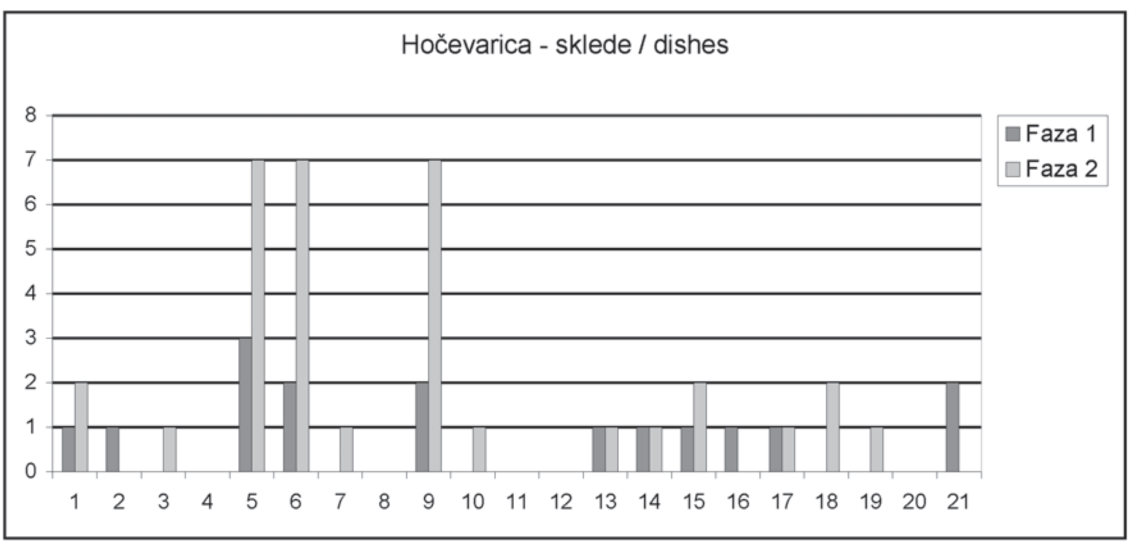
The most important find, however, is an almost completely preserved bow made of yew, found lying between sub-phases 15 and 16 (*fig. 3.1.9–3.1.11*). A triangular stone arrowhead with wings (*fig. 3.1.23*) and a flat stone axe (*fig. 3.1.25*) were also found.

The late phase at Hočevarica also attests to agricultural activity, again through quern fragments. They were found lying in sub-phases 8, 7 and 4.

The second settlement phase further produced highly significant pieces: a piece of copper droplet (*fig. 3.1.28*) found in sub-phase 15, and two fragments of probably the same founder's vessel from sub-phases 14 and 11




*Histogram 5.1.3:* Hočevarica, 1. in 2. faza. Zastopanost loncev po tipih.
*Histogram 5.1.3:* Hočevarica, 1st and 2nd phase. Representation of pot types.




*Histogram 5.1.4:* Hočevarica, 1. in 2. faza. Zastopanost skled po tipih.
*Histogram 5.1.4:* Hočevarica, 1st and 2nd phase. Representation of dish types.

## **5.1.4** REZULTAT

V prvi naselbinski fazi se pojavlja lonec z lijakastim ustjem tipa L16 (*t. 4.1.2:* 1; *4.1.3*), ki ga v okviru druge naselbinske faze ni najti. Naslednja opazna razlika je tudi v številu rekonstruiranih posod, saj so v drugi naselbinski fazi številčnejše. Razlogov za razliko še ne moremo pojasniti, ker je raziskana površina premajhna.

Ostale arheološke najdbe so v glavnem enakomerno razpršene v obeh fazah. Dokaze o metalurški dejavnosti pa imamo zaenkrat samo v okviru mlajše naselbinske faze.

Skratka, iz analize je razvidno, da se v prvi in drugi naselbinski fazi pojavljajo podobne keramične posode (*histograma 5.1.3*; *5.1.4*) ter ornament, zato lahko sklepamo, da gre za enoten kulturni horizont.



(*fig. 3.1.27* and *pl. 4.1.8:* 11). These objects evidence the practice of metallurgy within the settlement.

Human teeth were found in sub-phases 8 and 5 (check *chapter 3.6*).

## **5.1.4** RESULTS

The first settlement phase reveals the L16 pot type with a spout-shaped lip (*pl. 4.1.2:* 1; *4.1.3*), which is not present within the second settlement phase. The next noticeable difference concerns the number of reconstructed vessels since they are more frequent for the second phase. This cannot be explained as of yet, since the area researched proves too small.

Other archaeological finds are for the most part evenly represented in both phases. Metallurgic activity, however, can at present only be attested for during the second phase.

In summary, the analysis clearly shows that the first and the second settlement phases show similar pottery vessels (*histograms 5.1.3*; *5.1.4*) and ornamentation, which can therefore lead to the conclusion that we are dealing with a single cultural horizon.

# **5.2** SORODNE NASELBINE NA LJUBLJANSKEM BARJU

*Izvleček*

*Analizirane so najdbe z Maharskega prekopa, Blatne Brezovice in Notranjih Goric, edinih v večjem obsegu raziskanih naselbin 4. tisočletja pr. Kr. na Ljubljanskem barju. Ugotovitve primerjamo s Hočevarico.*

*Pokazalo se je, da Hočevarico kronološko lahko vsaj delno povežemo z Notranjimi Goricami. Sočasnosti z Maharskim prekopom in Blatno Brezovico pa glede na analizo najdb ni pričakovati.*

## **5.2.1** UVOD

Da bi Hočevarico relativno kronološko umestili, je potrebno najprej preveriti njen relativno kronološki odnos do koliščarskih naselbin na Ljubljanskem barju. Analizo bomo opravili s pomočjo keramičnega posodja, saj je ostalih, predvsem manjših najdb na drugih barjanskih najdiščih glede na obseg izkopavališč razmeroma malo. Vzrok moramo iskati v tehniki izkopavanja.

Že J. Korošec (1963) in za njim T. Bregant (1984 in tam navedena literatura), H. Parzinger (1984) ter Z. Harej (1986 in tam navedena literatura) so opozorili na podobnost med keramiko z Notranjih Goric, Blatne Brezovice in Maharskega prekopa. Ker najdemo za Hočevarico največ analogij prav na teh najdiščih, sledi predstavitev Maharskega prekopa, ki je v največjem obsegu in predvsem najbolje moderno raziskana koliščarska naselbina na Ljubljanskem barju. Nato sledi predstavitev nekoliko slabše poznane Blatne Brezovice in na koncu tudi Notranjih Goric, ki jih je v večjem obsegu raziskal že W. Schmid na začetku 20. stoletja (Schmid 1910).

## **5.2.2** MAHARSKI PREKOP

Osnovne podatke o Maharskem prekopu smo predstavili v poglavju o tipologiji keramičnega gradiva, zato jih na tem mestu ne bomo ponavljali (glej *poglavje 4.2*). Važna je ugotovitev, da je, za razliko od Hočevarice, na Maharskem prekopu pomembna predvsem hori-



# **5.2** RELATED SETTLEMENTS IN THE LJUBLJANSKO BARJE

*Abstract*

*This chapter analyzes the finds from Maharski prekop, Blatna Brezovica and Notranje Gorice, the only settlements of the 4th millennium B.C. in the Ljubljansko barje that have been researched more extensively. These findings are then compared to those from Hočevarica.*

*It was established that Hočevarica at least partially chronologically correlates with Notranje Gorice, while on the other hand, contemporaneity with Maharski prekop and Blatna Brezovica is not to be expected.*

## **5.2.1** INTRODUCTION

To determine the relative chronology of Hočevarica, we first need to examine its relationship to the pile dwelling settlements in the Ljubljansko barje. This analysis will be based on pottery since other – mostly small – finds of the Ljubljansko barje settlements are relatively scarce considering the sizes of the excavated sites. The cause for the latter is to be sought in the technique of excavation.

J. Korošec (1963) and afterwards T. Bregant (1984 with cited literature), H. Parzinger (1984) as well as Z. Harej (1986 with cited literature) have already pointed out the similarity of the Notranje Gorice, Blatna Brezovica and Maharski prekop pottery. These three sites also provide for most of the analogies for Hočevarica. As such, the analysis below first presents Maharski prekop, which is the largest excavated pile dwelling settlement in the Ljubljansko barje and, most importantly, it is the site where modern techniques of excavation were applied. This is followed by the slightly less known Blatna Brezovica and finally also by Notranje Gorice. The latter was largely researched already by W. Schmid in the beginning of the 20th century (Schmid 1910).

## **5.2.2** MAHARSKI PREKOP

The basic data on this site is already presented in zontalna stratigrafija, saj je podatkov o vertikalni razporeditvi najdb zelo malo, pa še ti so praviloma nenatančni (glej Bregant 1974a, 8 ss; 1974b, 39 ss; 1975, 12 ss; Velušček 2001).

Med arheološkimi najdbami prevladuje keramično posodje. Naleteli so tudi na več arhitekturnih ostankov, med katerimi je potrebno omeniti zaplate glinastega ometa, v ravne vrste postavljene lesene stojke, sistem palisad in večjo količino lesenih, koščenih, roženih, kamnitih ter keramičnih najdb: lesene jagode (npr. Bregant 1975, t. 8: 18; 1996, 39, sl. 1), leseno šilo (Bregant 1975, t. 13: 9), prevrtani zobje sesalcev (Bregant 1974b, t. 4: 12; 1975, t. 8: 9; 12: 4; 40: 4), obročki in jagode iz kalcita (Bregant 1974b, t. 4: 11; 1975, t. 8: 15–17,19; 12: 1; Strmole 1974, 72) – v eni izmed njih je bila ohranjena prepletena vrvica iz živalskega črevesa (Bregant 1974b, 64, t. 4: 11; Šercelj 1974, 71),[1] koščen trnek (Bregant 1975, t. 8: 10), različna koščena in rožena orodja (Bregant 1974a, t. 7: 3; 1974b, t. 4: 1–6; 1975, t. 8: 6–8,13; 10: 1–5 itd.), kamnita orodja, kot so žrmlje, brus, sekire, konice, praskala ali strgala itd. (npr. Bregant 1975, sl. 4; t. 8: 1–5,12; 9: 1; 11: 1–9; 12: 3 itd.), keramična jagoda (Bregant 1975, t. 12: 2), antropomorfni idol (Bregant 1996, 34, sl. 1) ter ploščata, piramidalna in bikonična vretenca za prejo (npr. Bregant 1975, t. 13: 8; 15: 13,17; 16: 10,15 itd.) – nekatera so okrašena (Bregant 1974a, t. 8: 3; 1975, t. 16: 15). Izredno važen je tudi fragment kalupa oziroma livarske posode, kar priča o metalurški dejavnosti v naselbini (Velušček, Greif 1998, 32, sl. 2: 1,2; Šmit, Nečemer 1998, 55 ss).

Kakor je omenjeno, tudi na Maharskem prekopu prevladujejo med arheološkimi najdbami keramične posode, ki pa so večinoma zelo fragmentarno ohranjene. Na podlagi rekonstrukcij lahko govorimo, da se pojavljajo globoke in plitve posode ter zajemalke.[2]

Posode, ki smo jih uvrstili v skupino pitosev, so redke. Lonci se pojavljajo v 26 tipih (*histogram 5.2.1*), med katerimi izstopajo kroglasti lonci tipa L9 (prim. *sl. 4.2.2:* L9), lonci tipa L11 (prim. *sl. 4.2.3:* L11) ter lonci tipov L17 (prim. *sl. 4.2.4:* L17) in L18 (prim. *sl. 4.2.4:* L18). Najmanj številna je tipološka skupina bikoničnih

[1] V Hornstaadu so odkrili s »krpami« iz netilne gobe pokrit lonec, v katerem je bila ogrlica iz kalcitnih jagod (Körber-Grohne, Feldtkeller 1998, 152, sl. 13).

[2] Keramiko z Maharskega prekopa je na podoben način analiziral že H. Parzinger in pri tem določil veliko keramičnih tipov (1984, sl. 2). Do večjega odstopanja s tukaj predstavljenimi ugotovitvami je prišel predvsem pri številu loncev oziroma loncem podobnim posodam (nem. *topfförmige Gefäße*), ki na Maharskem prekopu, tako Parzinger, absolutno prevladujejo (1984, sl. 3). Razloge za takšno odstopanje najdemo v tem, da so si lonci in sklede glede na obliko zelo podobne posode ter jih brez upoštevanja povsem enakih parametrov lahko zamenjamo. Tako se zdijo ugotovljene razlike zgolj navidezne, pravzaprav subjektivno pogojene, in nimajo kronološko interpretativne vrednosti.



the chapter on pottery types and will therefore not be repeated here (check *chapter 4.2*). The important observation is that, unlike Hočevarica, the horizontal stratigraphy at Maharski prekop is more relevant than the vertical one since the latter data is very scarce and largely inaccurate (check Bregant 1974a, 8 pp; 1974b, 39 pp; 1975, 12 pp; Velušček 2001).

The archaeological finds consist mostly of pottery. The excavators also stumbled upon some architectural remains, such as patches of clay plaster, wooden posts placed in straight lines, a system of palisades and a large number of finds made of wood, bone, horn, stone and clay: wooden beads (e.g. Bregant 1975, Pl. 8: 18; 1996, 39, fig. 1), a wooden awl (Bregant 1975, Pl. 13: 9), perforated mammal teeth (Bregant 1974b, Pl. 4: 12; 1975, Pl. 8: 9; 12: 4; 40: 4), calcite ringlets and beads (Bregant 1974b, Pl. 4: 11; 1975, Pl. 8: 15–17,19; 12: 1; Strmole 1974, 72) – in one of the beads a plaited cord made of animal intestines was found (Bregant 1974b, 64, Pl. 4: 11; Šercelj 1974, 71),[1] a bone hook (Bregant 1975, Pl. 8: 10), various tools made of bone or horn (Bregant 1974a, Pl. 7: 3; 1974b, Pl. 4: 1–6; 1975, Pl. 8: 6–8,13;10: 1–5 etc.), stone tools such as a quern, a whetstone, axes, points, scrapers and so forth (e.g. Bregant 1975, fig. 4; Pl. 8: 1–5,12; 9: 1; 11: 1–9; 12: 3, etc.), a ceramic bead (Bregant 1975, Pl. 12: 2), an anthropomorphic idol (Bregant 1996, 34, fig. 1) and flat, pyramidal and biconical spindle whorls (e.g. Bregant 1975, Pl. 13: 8; 15: 13,17; 16: 10,15, etc.) – some also ornamented (Bregant 1974a, Pl. 8: 3; 1975, Pl. 16: 15). Of great importance is also a fragment of a mold or a founder's vessel that testifies to the presence of metallurgic activity within the settlement (Velušček, Greif 1998, 32, fig. 2: 1,2; Šmit, Nečemer 1998, 55 pp).

As mentioned above, the prevailing archaeological find from Maharski prekop is also pottery, which is mostly preserved in small fragments. Reconstructions of the vessels establish that they include deep and shallow vessels as well as ladles.[2]

Vessels classified in the pithos group are rare. Pots appear in a range of 26 different types (*histogram 5.2.1*), among which spherical pots of the L9 type stand out (cf. *fig. 4.2.2:* L9), also pots of the L11 (cf. *fig. 4.2.3:*

[1] In Hornstaad a pot covered with »patches« of spunk was discovered that contained a necklace of calcite beads (Körber-Grohne, Feldtkeller 1998, 152, fig. 13).

[2] Maharski prekop has been similarly analyzed already by H. Parzinger, who determined many pottery types (1984, fig. 2). His observations differ from those presented here mostly as regards the number of pots or pot-like vessels (in German: *topfförmige Gefässe*), which according to Parzinger, absolutely predominate at Maharski prekop (1984, fig. 3). The reason for this deviation is in the similar shapes of pots and bowls, which can easily be mistaken if not applying exactly the same parameters. The observed differences would therefore be purely imaginary, subjectively predetermined as a matter of fact, and lacking any chronologically interpretative value.

loncev in loncev tipa L10 (prim. *sl. 4.2.3:* L10), L13 (prim. *sl. 4.2.3:* L13) ter L23 (prim. *sl. 4.2.6:* L23).

Kupe so razdeljene na 4 tipe: K1 (prim. *sl. 4.2.7:* K1), K2 (prim. *sl. 4.2.7:* K2), K3 (prim. *sl. 4.2.7:* K3) in K4 (prim. *sl. 4.2.7:* K4). Po pričakovanju so najpogostejše enostavne kupe tipa K1.

Zelo pogoste so sklede, ki so razvrščene v 21 tipov (*histogram 5.2.2*). Količinsko izstopajo bikonične sklede tipov S1 (prim. *sl. 4.2.8:* S1) in S3 (prim. *sl. 4.2.8:* S3), enostavne sklede tipa S9 (prim. *sl. 4.2.9:* S9), polkroglaste sklede tipov S15 (prim. *sl. 4.2.10:* S15) in S19 (prim. *sl. 4.2.11:* S19). Najmanj pa je skled tipov S10 (prim. *sl. 4.2.9:* S10) in S12 (prim. *sl. 4.2.9:* S12).

V naselbini se pojavljajo t. i. viseče posode (prim. *sl. 4.2.11:* VP; npr. Bregant 1974b, t. 6: 5; 1975, t. 15: 4; 18: 7; 20: 12; 28: 7; 31: 5,8), pogoste pa so tudi miniaturne posode (prim. *sl. 4.2.11:* MP; npr. Bregant 1974b, t. 5: 13; 1975, t. 12: 13,16; 13: 4; 15: 1; 18: 5; 34: 10; 37: 14).

Posodo z izlivom je najti samo v enem primeru (Bregant 1975, t. 15: 5). Redke so tudi ročate posode in pokrovi (npr. Bregant 1975, t. 21: 2).

Kronološko so pomembne zajemalke. Pojavljajo se izključno tiste s polnim držajem oziroma tip Z1 (prim. *sl. 4.2.11:* Z1; npr. Bregant 1975, t. 13: 5).

Na Maharskem prekopu se pojavljajo trakasti in tunelasti ročaji in več tipov držajev. Trakasti ročaji so najpogostejši in lahko povezujejo ustje z ostenjem; ti so običajno profilirani ali pa se pojavljajo na trebuhu (prim. *sl. 4.2.12:* R1; kot npr. Bregant 1975, t. 21: 2). Tunelasti ročaji se pojavljajo zelo redko (npr. Bregant 1975, t. 36: 7). Vedno jih najdemo na trebuhu (prim. *sl. 4.2.12*: R2). Številni so razčlenjeni in nerazčlenjeni držaji različnih tipov (prim. *sl. 4.2.12:* D1,D2; *4.2.13:* D3,D4). Tudi držaji z ušescem so razmeroma pogost tip (prim. *sl. 4.2.13:* D5,D6; npr. Bregant 1975, t. 15: 4; 18: 7; 20: 12). Vedno se pojavljajo na visečih posodah, kjer jih lahko najdemo na eni posodi tudi po štiri. Lahko imajo vertikalno ali horizontalno luknjo. Enkrat zasledimo tudi posodo, ki ima vertikalno prevrtan trebuh oziroma t. i. subkutani držaj (prim. *sl. 4.2.13:* D7).

Na Maharskem prekopu zasledimo tehniko vrezo-



L11) as well as the L17 (cf. *fig. 4.2.4:* L17) and the L18 types (cf. *fig. 4.2.4:* L18). The smallest typological group is that of biconical pots and pots of the L10 (cf. *fig. 4.2.3:* L10), L13 (cf. *fig. 4.2.3:* L13) and L23 types (cf. *fig. 4.2.6:* L.23).

Tumblers are divided into four types: K1 (cf. *fig. 4.2.7:* K1), K2 (cf. *fig. 4.2.7:* K2), K3 (cf. *fig. 4.2.7:* K3) and K4 (cf. *fig. 4.2.7:* K4). As expected, the simple tumblers of the K1 type are the most common.

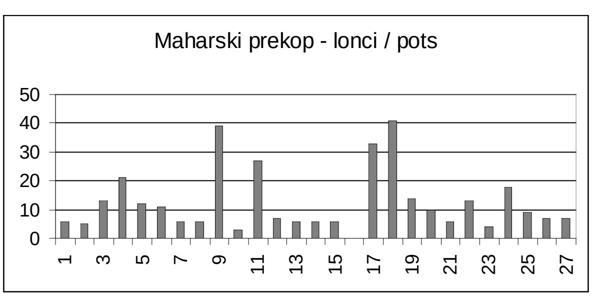
Dishes, divided into 21 types, are very frequent (*histogram 5.2.2*). Most frequent are biconical dishes of the S1 (cf. *fig. 4.2.8:* S1) and S3 types (cf. *fig. 4.2.8:* S3), but also simple dishes of the S9 type (cf. *fig. 4.2.9:* S9), semi-spherical dishes of the S15 (cf. *fig. 4.2.10:* S15) and S19 types (cf. *fig. 4.2.11:* S19). The least frequent are dishes of the S10 (cf. *fig. 4.2.9:* S10) and the S12 types (cf. *fig. 4.2.9:* S12).

The so-called hanging vessels appear in the settlement (cf. *fig. 4.2.11:* VP; e.g. Bregant 1974b, Pl. 6: 5; 1975, Pl. 15: 4; 18: 7; 20: 12; 28: 7; 31: 5,8) and frequently also miniature vessels (cf. *fig. 4.2.11:* MP; e.g. Bregant 1974b, Pl. 5: 13; 1975, Pl. 12: 13,16; 13: 4; 15: 1; 18: 5; 34: 10; 37: 14).

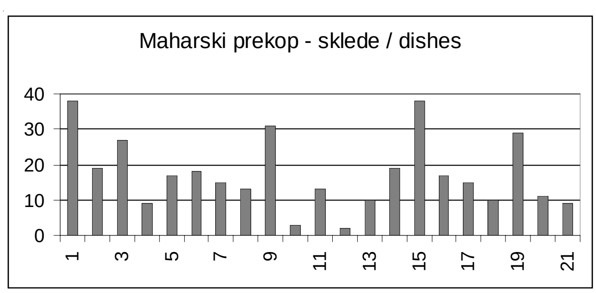
Only one vessel with a spout was found (Bregant 1975, Pl. 15: 5). Vessels with handles and lids are also rare (e.g. Bregant 1975, Pl. 21: 2).

The chronologically important finds are the ladles. They all belong to the Z1 type with a solid grip (cf. *fig. 4.2.11:* Z1; e.g. Bregant 1975, Pl. 13: 5).

The Maharski prekop site revealed band- and unnel-shaped handles, as well as several types of grips. Band-handles are most frequent and can link the lip to the wall of the vessel (these are usually profiled) or appear on the bellies of vessels (cf. *fig. 4.2.12:* R1; as e.g. Bregant 1975, Pl. 21: 2). Tunnel-shaped handles are very rare (e.g. Bregant 1975, Pl. 36: 7). They are, as a rule, found on the bellies of vessels (cf. *fig. 4.2.12:* R2). There are also numerous grips with or without finger imprints of various types (cf. *fig. 4.2.12:* D1,D2; *4.2.13:* D3,D4). Grips with eyelets are a relatively frequent type (cf. *fig. 4.2.13:* D5,D6; e.g. Bregant 1975, Pl. 15: 4; 18: 7; 20:




*Histogram 5.2.1:* Maharski prekop. Zastopanost loncev po tipih.
*Histogram 5.2.1:* Maharski prekop. Representation of pot types.




*Histogram 5.2.2:* Maharski prekop. Zastopanost skled po tipih.
*Histogram 5.2.2:* Maharski prekop. Representation of dish types.

vanja s topim vrezom samo na vratu lonca (prim. *sl. 4.2.14:* O2; Bregant 1975, t. 17: 16) in na trebuhu sklede tipa S2, kjer je z vrezanimi linijami izoblikovan motiv smrekove vejice (*sl. 4.2.8:* S2; Bregant 1975, t. 9: 5). Podoben motiv, toda izdelan v tehniki žlebljenja, najdemo na posodi neznanega tipa (*sl. 4.2.14:* O4; Bregant 1975, t. 13: 3). Tudi kaneliranje se redko pojavlja (*sl. 4.2.15:* O5).

Metličenje je zastopano na fragmentu sklede tipa S20 (prim. *sl. 4.2.15:* O6). Glavničasti okras je na loncih tipa L6 (tipa kot *sl. 4.2.2:* L6) in L27 (prim. *sl. 4.2.15:* O7).

Med dobro zastopane ornamentalne tehnike lahko uvrstimo tehniko poliranja pred žganjem. Pojavljajo se posode s polituro črne barve. Na nekaterih fragmentih pa se najdejo tudi rumenorjavi in črni premazi, ki imajo podoben ornamentalen značaj kot poliranje.

Vbode smo zasledili na razčlenjenih držajih (prim. *sl. 4.2.15:* O10; kot npr. Bregant 1975, t. 9: 5). Nekajkrat pa so tudi na vratu, na trebuhu in na dnu posod (Bregant 1975, t. 13: 6).

Odtisi prsta so bili na Maharskem prekopu zelo priljubljena ornamentalna zvrst. Najpogosteje jih najdemo na zgornjem, zunanjem in notranjem robu ustja ter na držajih in rebrih (prim. *sl. 4.2.15:* O11).

Odtisi nohta se skoraj vedno pojavljajo v kombinaciji s prejšnjim ornamentom in jih tudi vedno najdemo na mestih, kjer se običajno pojavlja odtis prsta (prim. *sl. 4.2.16:* O13).

Navpični odtisi topega predmeta so na ustjih, plastičnih rebrih, držajih in bradavicah (Bregant 1975, t. 30: 1 itd.). Včasih pa se pojavljajo tudi samostojno, na ramenu loncev tipa L9 (*sl. 4.2.2:* L9; *4.2.15:* O12; Bregant 1975, t. 9: 2) in skled tipa S3 (prim. *sl. 4.2.8:* S3). Bočne odtise s topim predmetom največkrat zasledimo na zgornjem, redko tudi zunanjem robu ustja (prim. *sl. 4.2.15:* O12). Najdemo jih tudi na držajih (prim. *sl. 4.2.15:* O12).

Odtisi noža ali podolgovatega ostrega predmeta se največkrat pojavljajo na ustjih, plastičnih rebrih in držajih (*sl. 4.2.16:* O14; Bregant 1975, t. 21: 11; 33: 5 itd.). So razmeroma pogosti in zdi se, da so bili na Maharskem prekopu dokaj priljubljeni.

Odtise pletenine najdemo na dnu posod (*sl. 4.2.16:* O15; Bregant 1975, t. 9: 7). Gre za ornament, ki se redko pojavlja.

Aplicirana razčlenjena in nerazčlenjena rebra so dokaj pogost ornament med okrašenim posodjem z Maharskega prekopa (*sl. 4.2.16:* O17,O18). Obe vrsti reber lahko najdemo pod ustjem ali na trebuhu. Prevladujejo horizontalna, so pa tudi poševna in vertikalna rebra (Bregant 1975, t. 25: 2 itd.).

Pogosto zasledimo tudi držaje in bradavice (*sl. 4.2.16:* O19), pač pa se obročkaste nalepke redko pojavljajo (*sl. 4.2.16:* O21). Številnejša so izvlečena rebra (tip O22), ki so lahko razčlenjena ali nerazčlenjena in so



12). They always appear on hanging vessels, where as many as four can be found on one vessel. They can have a vertical or a horizontal hole. There is also an example of a vessel with a perforated belly or the so-called subcutaneous grip (cf. *fig. 4.2.13:* D7).

The technique of incision with a blunt object is detected at Maharski prekop, but is only present on the neck of a pot (cf. *fig. 4.2.14:* O2; Bregant 1975, Pl. 17: 16) and on the belly of an S2 type dish, where incised lines form a pine branch motif (*fig. 4.2.8:* S2; Bregant 1975, Pl. 9: 5). A similar motif, made with grooves, can be found on a vessel of an unknown type (*fig. 4.2.14:* O4; Bregant 1975, Pl. 13: 3). Fluting is also rare (*fig. 4.2.15:* O5). Brush ornamentation is present on a fragment of an S20 type dish (cf. *fig. 4.2.15:* O6). Combed ornamentation is used on the L6 type (type like *fig. 4.2.2:* L6) and L27 type pots (cf. *fig. 4.2.15:* O7).

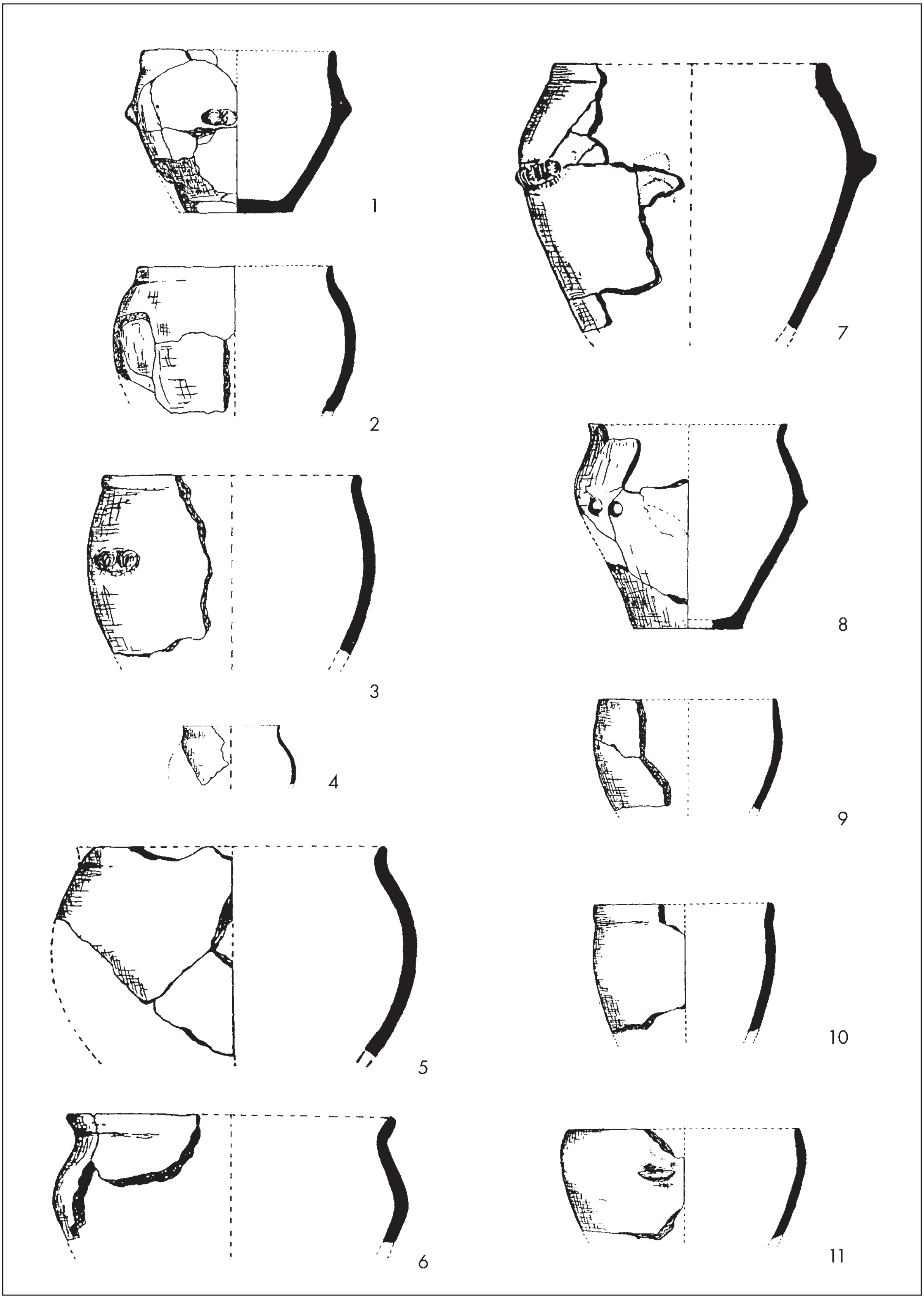
Among the more frequent techniques of ornamentation is polishing that precedes firing. There are also vessels with a black polish. Furthermore, some fragments have yellowish brown and black coats with a similar ornamental character to polishing. Stitching is seen on grips with finger imprints (cf. *fig. 4.2.15:* O10; as e.g. Bregant 1975, Pl. 9: 5) and sometimes also on the necks, bellies or bases of vessels (Bregant 1975, Pl. 13: 6). Finger impressions were a very popular ornamentation technique at Maharski prekop. They are most frequently found on upper, exterior and interior rims as well as on grips and plastic cordons (cf. *fig. 4.2.15:* O11).

Nail impressions almost always appear in combination with finger impressions and are found on the same vessel sections (cf. *fig. 4.2.16:* O13). Vertical impressions made with a blunt object can be found on lips, plastic cordons, grips and embossments (Bregant 1975, Pl. 30: 1 etc.). They sometimes appear independently: on shoulders of the L9 type pots (*fig. 4.2.2:* L9; *4.2.15:* O12; Bregant 1975, Pl. 9: 2) and S3 type dishes (cf. *fig. 4.2.8:* S3). Side impressions made with a blunt object are mostly to be found on upper, rarely also on exterior rims (cf. *fig. 4.2.15:* O12). They can also be found on grips (cf. *fig. 4.2.15:* O12).

Impressions made with a knife or an elongated sharp object are most frequent on lips, plastic cordons and grips (*fig. 4.2.16:* O14; Bregant 1975, Pl. 21: 11; 33: 5 etc.). They are relatively common and appear to have been fairly popular at Maharski prekop.

Plait impressions can be found on the bases of vessels (*fig. 4.2.16:* O15; Bregant 1975, Pl. 9: 7). However, they appear only rarely.

Applied cordons with or without finger imprints are fairly common on the ornamented pottery of Maharski prekop (*fig. 4.2.16:* O17,O18). Both types of cordons can be found underneath lips or on the bellies of vessels. Horizontal cordons prevail but oblique and vertical cordons are present as well (Bregant 1975, Pl. 25: 2, etc.).




*Sl. 5.2.1:* Blatna Brezovica. Vse keramika (po Korošec 1963). M. = 1 : 5.
*Fig. 5.2.1:* Blatna Brezovica. All pottery (after Korošec 1963). Scale = 1 : 5.

običajno pod ustjem oziroma na najširšem obodu (Bregant 1975, t. 14: 5).

Na Maharskem prekopu je bilo najdenih tudi nekaj fragmentov, ki so ornamentirani z barbotinom (*sl. 4.2.16:* O16; Bregant 1975, t. 24: 15) in gubanjem (*sl. 4.2.16:* O23).

### **5.2.3** BLATNA BREZOVICA

Blatna Brezovica leži jugozahodno od istoimenskega osamelca na jugozahodu Ljubljanskega barja, nedaleč od Hočevarice. Naselbina je bila odkrita leta 1942 (Velušček 1997b, 193 s), leta 1953 pa je na najdišču izkopaval J. Korošec (Korošec 1963).

Večina keramike je sive ali sivočrne barve. Med lonci sta najpogostejša tip L17 (kot npr. *sl. 5.2.1:* 7) in L18 (kot npr. *sl. 5.2.1:* 8). Številne so tudi sklede (kot npr. *sl. 5.2.3:*1–12). Pojavljajo se viseče (npr. Korošec 1963, t. 31: 13,15) in miniaturne posode (npr. Korošec 1963, t. 31: 4,9,10) ter zajemalke s polnim držajem (kot npr. *sl. 5.2.3:* 13).

Na praviloma neornamentirani keramiki se pojavljajo razčlenjena rebra (kot npr. *sl. 5.2.4:* 1; Korošec 1963, t. 30: 1; 31: 17). Pogostejši so razčlenjeni držaji (kot npr. *sl. 5.2.1:* 1,3,7), so pa tudi pari ali trojke bradavic, ki so na trebuhu (kot npr. *sl. 5.2.1:* 8). Pomembni so tudi maj-



Grips and embossments are frequent (*fig. 4.2.16:* O19). Ringlet-shaped applications, on the other hand, are rare (*fig. 4.2.16:* O21). Drawn-out cordons are more numerous (type O22). They can appear with or without finger imprints and are usually found underneath lips or on the broadest rims (Bregant 1975, Pl. 14: 5).

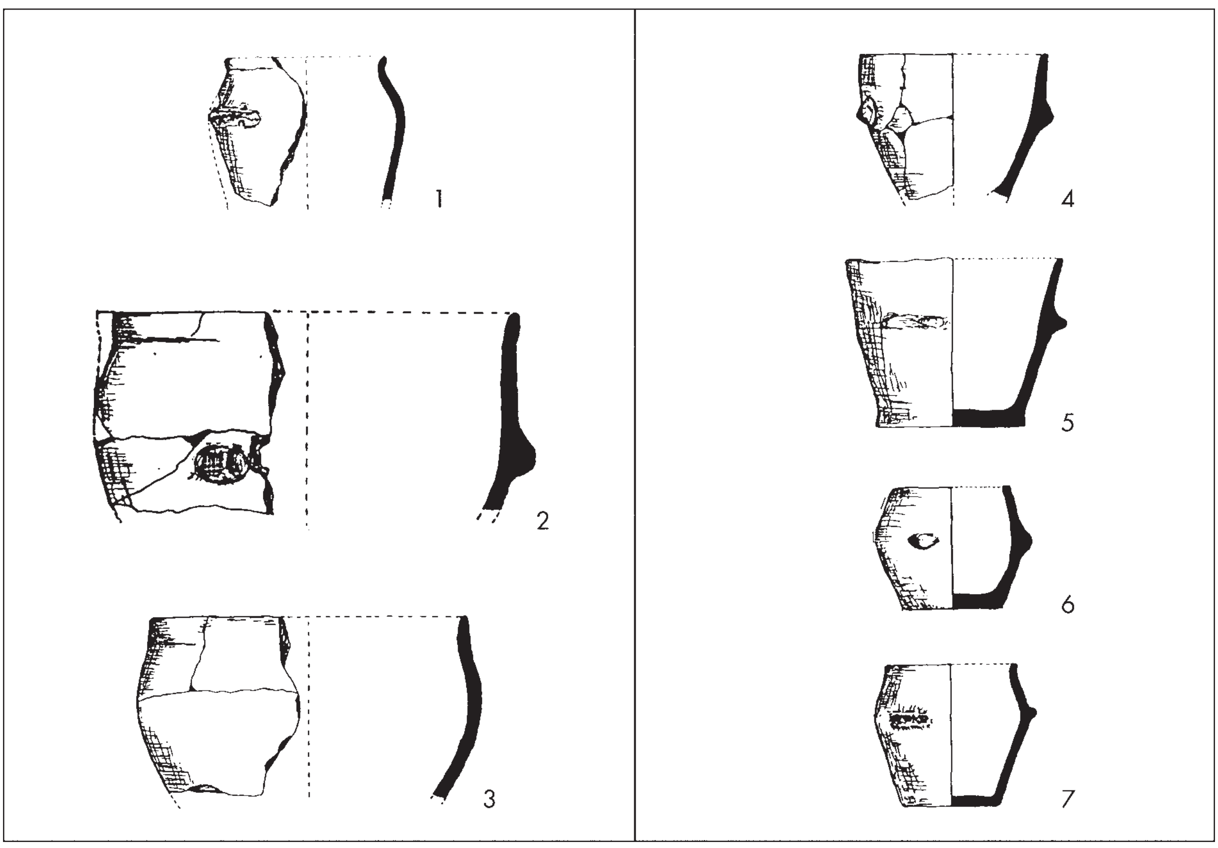
Maharski prekop also yielded some fragments ornamented in the barbotine (*fig. 4.2.16:* O16; Bregant 1975, Pl. 24: 15) and the buckling techniques (*fig. 4.2.16:* O23).

### **5.2.3** BLATNA BREZOVICA

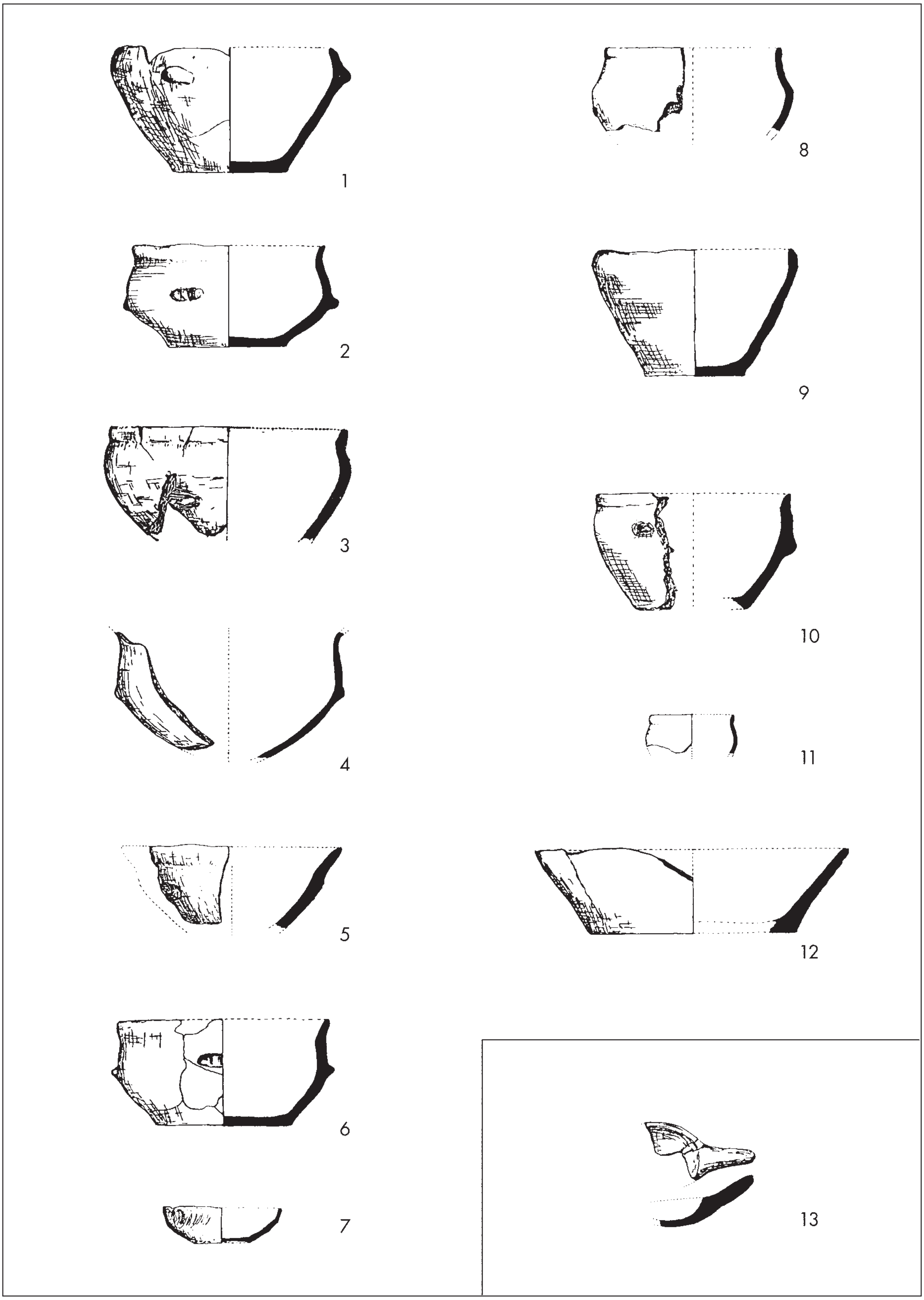
Blatna Brezovica lies southwest of the isolated hill of the same name, in the southwestern part of the Ljubljansko barje, and not far from Hočevarica. The settlement was discovered in 1942 (Velušček 1997b, 193 p); excavations, conducted by J. Korošec, followed in 1953 (Korošec 1963).

The pottery is mostly gray or grayish-brown in color. The most common pots are those of the L17 (as e.g. *fig. 5.2.1:* 7) or the L18 types (as e.g. *fig. 5.2.1:* 8). There are also numerous dishes to be found (as e.g. *fig. 5.2.3:* 1–12). There are hanging (e.g. Korošec 1963, Pl. 31: 13,15) and miniature vessels (e.g. Korošec 1963, Pl. 31: 4,9,10), as well as ladles with solid grips (as e.g. *fig. 5.2.3:* 13).

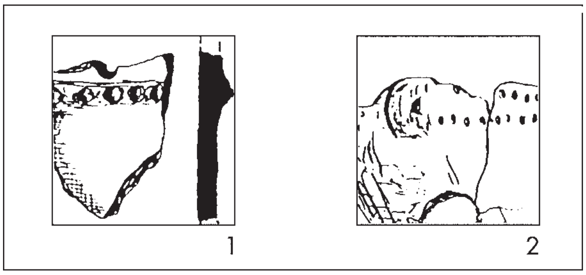
The generally unornamented pottery also appears




*Sl. 5.2.2:* Blatna Brezovica. Vse keramika (po Korošec 1963). M. = 1 : 5.
*Fig. 5.2.2:* Blatna Brezovica. All pottery (after Korošec 1963). Scale = 1 : 5.




*Sl. 5.2.3:* Blatna Brezovica. Vse keramika (po Korošec 1963). M. = 1 : 5.
*Fig. 5.2.3:* Blatna Brezovica. All pottery (after Korošec 1963). Scale = 1 : 5.




*Sl. 5.2.4:* Blatna Brezovica. Vse keramika (po Korošec 1963). M. = 1 : 3.
*Fig. 5.2.4:* Blatna Brezovica. All pottery (after Korošec 1963). Scale = 1 : 3.

hni krožni ali elipsoidni odtisi, razporejeni v ravni liniji, in so na trebuhu loncev (*sl. 5.2.4:* 2) in na vretencih (Korošec 1963, t. 17: 18; 18: 8; 24: 9). Korošec navaja še keramiko, ki je ornamentirana z grobimi, neenakomernimi črtami, kar lahko razumemo, kot da gre za metličenje (glej Korošec 1963, 32).

## **5.2.4** NOTRANJE GORICE

Notranje Gorice ležijo vzhodno od osamelca Plešivica na Ljubljanskem barju. Leta 1904 je župan J. Kušar našel pri čiščenju jarkov kamnito kladivasto sekiro, ki jo je izročil v Rudolfinum v Ljubljano.[3] Ker so naslednje leto v okolici našli tudi ostanke koliščarske naselbine, je W. Schmid zastavil izkopavanja, ki so potekala v letih 1907 in 1908 (Schmid 1910, 92a ss). Leta 1974 in 1979 je v Notranjih Goricah sondiral Z. Harej (Harej 1976, 85 ss; 1980, 77 ss).

V Notranjih Goricah prevladuje keramika sive in sivorjavkaste barve, temnosivi in črni toni so redki. Glina je bila mešana z apnenčevim peskom.

Med keramičnimi oblikami prevladujejo lonci tipov L17 (kot npr. *sl. 5.2.5:* 9) in L18 (kot npr. *sl. 5.2.5:* 10). Najdemo tudi sklede različnih tipov, kot npr.: S2 (*sl. 5.2.6:* 4), S4 (*sl. 5.2.6:* 5), S6 (*sl. 5.2.6:* 6), S7 (*sl. 5.2.6:* 7), S8 (*sl. 5.2.6:* 8), S9 (*sl. 5.2.6:* 9) itd.

Pojavljajo se viseče posode (Harej 1976, t. 2: 1,2), miniaturne posode (npr. Harej 1976, t. 1: 2,3), vrči (Harej 1976, t. 4: 5), kupe (npr. Harej 1976, t. 7: 6), zajemalka s polnim držajem tipa Z1 (Harej 1980, t. 6: 5) in livarska posoda (Harej 1976, t. 3: 7).[4] Med keramiko je tudi cigarast pečatnik (*sl. 5.2.6:* 13).

Tudi za Notranje Gorice je značilna neornamentirana keramika. Med okrasnimi zvrstmi na posodah so z

[3] Današnji Narodni muzej Slovenije.
[4] Posode podobne oblike se običajno interpretira kot livarske posode in jih najdemo v naselbinah iz 4. tisočletja pr. Kr. v Švici in jugozahodni Nemčiji (Schlichtherle, Rottländer 1982, 59 ss; Schlichtherle, Wahlster 1986, sl. 142; Mainberger 1998, t. 14: 273; Altorfer, Huber, Médard 2000-2001, sl. 16: 2; glej še Schlichtherle 1995, 80).



with cordons, with or without finger imprints (as e.g. *fig. 5.2.4:* 1; Korošec 1963, Pl. 30: 1; 31: 17). Grips with finger imprints are more common (as e.g. *fig. 5.2.1:* 1,3,7). Embossments in twos and threes are also to be found and appear on the bellies of vessels (as e.g. *fig. 5.2.1:* 8). Of importance are also circular and ellipsoid impressions. They are impressed in straight lines on the bellies of pots (*fig. 5.2.4:* 2) and on spindle whorls (Korošec 1963, Pl. 17: 18; 18: 8; 24: 9). Apart from the above, Korošec also mentions pottery ornamented with coarse, uneven lines, which could be understood as brush ornamentation (see Korošec 1963, 32).

## **5.2.4** NOTRANJE GORICE

Notranje Gorice lies east of the isolated hill of Plešivica in the Ljubljansko barje. During ditch cleaning in 1904, mayor J. Kušar found a stone hammer axe, which he gave to the Rudolfinum in Ljubljana.[3] The following year, pile dwelling settlement remains were found in the vicinity, which prompted W. Schmid to excavate the area in the years 1907 and 1908 (Schmid 1910, 92a pp). Later, in 1974 and 1979, Z. Harej conducted sample trenching in Notranje Gorice (Harej 1976, 85 pp; 1980, 77 pp).

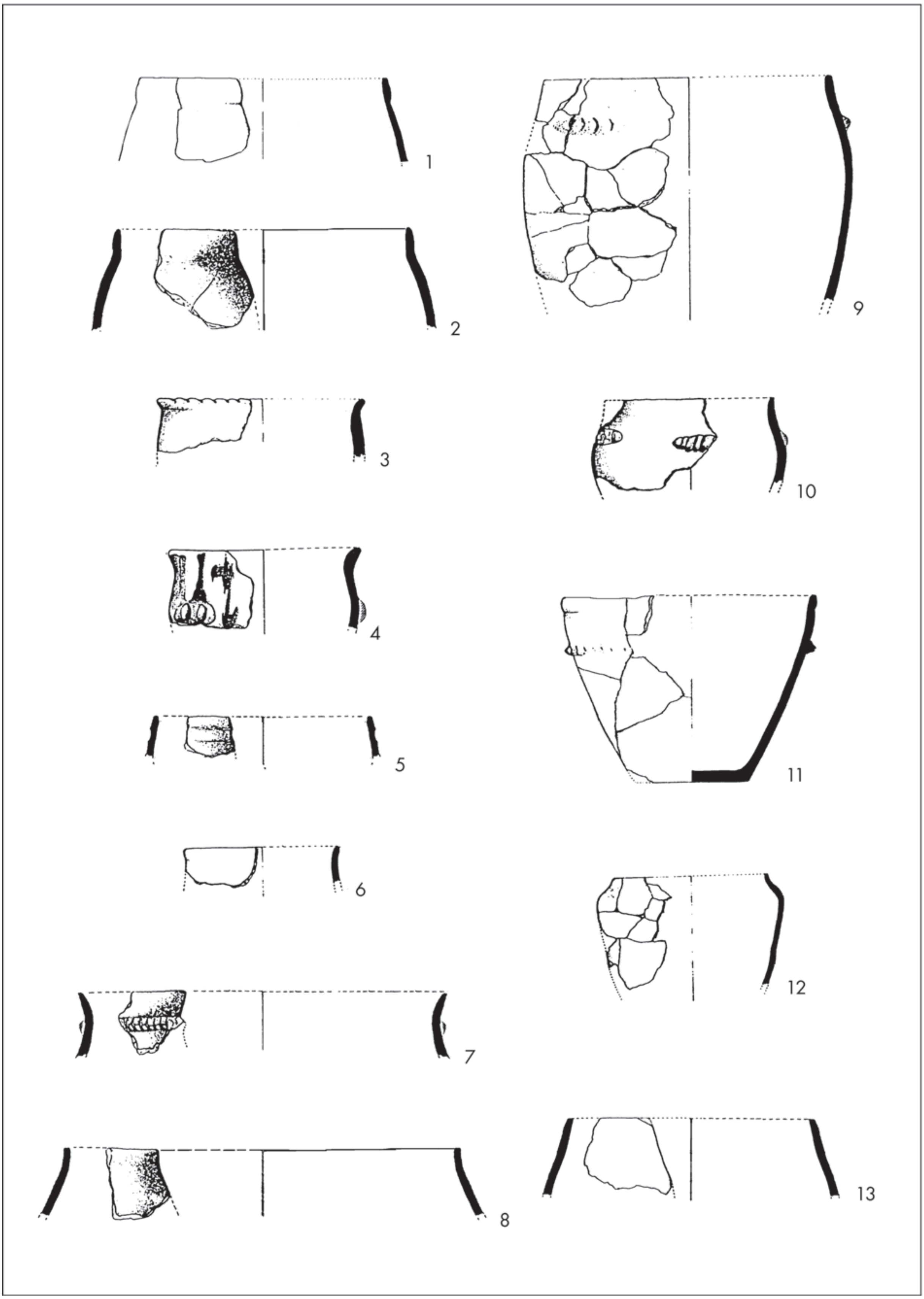
At Notranje Gorice gray and brownish-gray pottery is dominant, while dark gray and black shades are rare. The clay is mixed with limestone sand.

The prevailing pottery forms are pots of the L17 (as e.g. *fig. 5.2.5:* 9) and the L18 types (as e.g. *fig. 5.2.5:* 10). Dishes of various types are also to be found, such as S2 (*fig. 5.2.6:* 4), S4 (*fig. 5.2.6:* 5), S6 (*fig. 5.2.6:* 6), S7 (*fig. 5.2.6:* 7), S8 (*fig. 5.2.6:* 8), S9 (*fig. 5.2.6:* 9) and so forth.

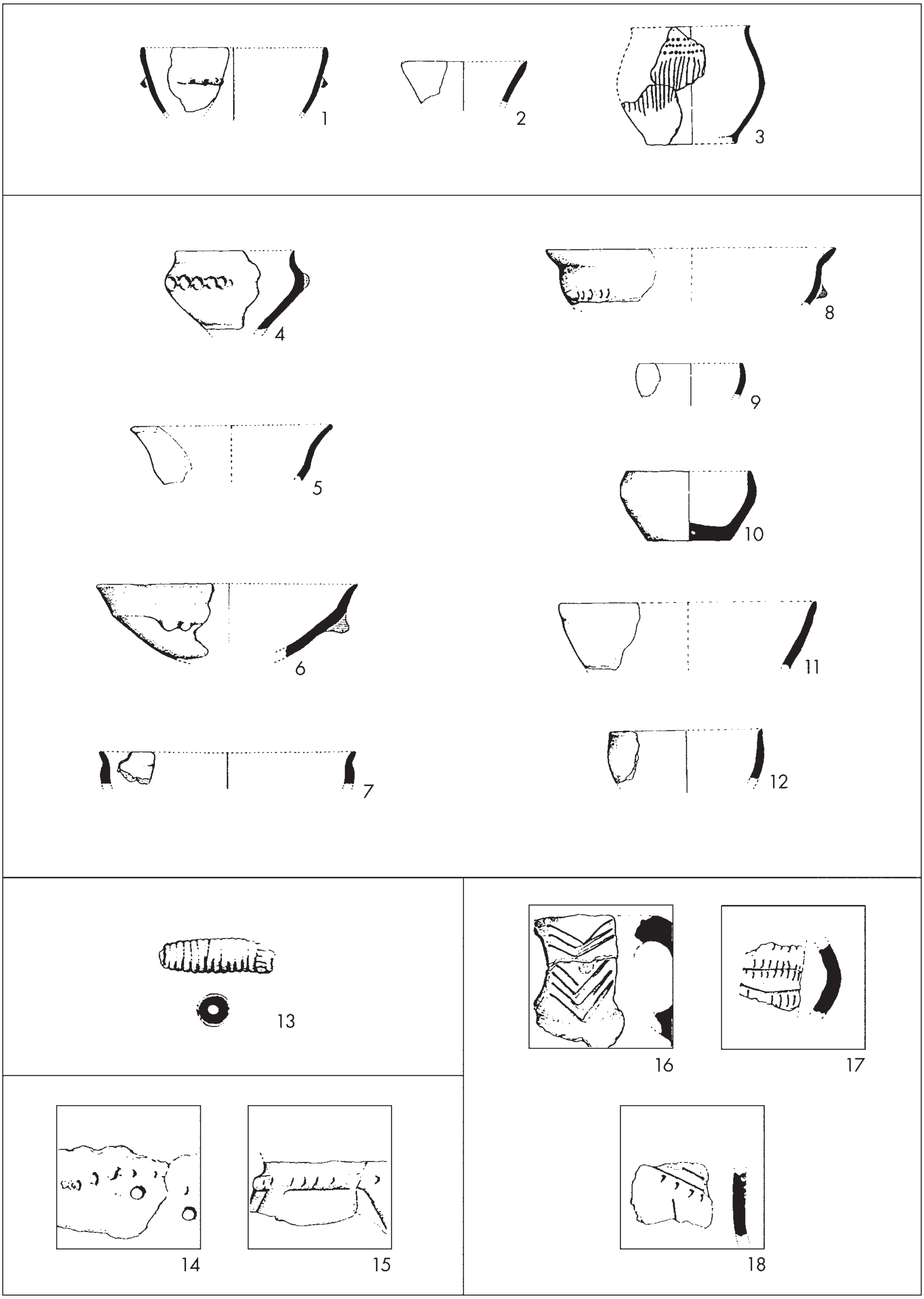
There are hanging (Harej 1976, Pl. 2: 1,2) and miniature vessels (e.g. Harej 1976, Pl. 1: 2,3), pitchers (Harej 1976, Pl. 4: 5), tumblers (e.g. Harej 1976, Pl. 7: 6), a ladle with a solid grip of the Z1 type (Harej 1980, Pl. 6: 5) and a founder's vessel (Harej 1976, Pl. 3: 7).[4] In addition to the pottery discovered there was also a cigar-shaped seal stamp (or »pintadera«) (*fig. 5.2.6:* 13).

Unornamented pottery is characteristic for Notranje Gorice as well as for the other three sites. The ornamentation types here include cordons, separated by impressions, and grips (as e.g. *fig. 5.2.5:* 7; *5.2.6:* 1,14,15). There are also a few examples of bluntly incised ornaments, accompanied by circular and triangular impressions (*fig. 5.2.6:* 3,16–18). Necks of pots and dishes can also be ornamented with a deep horizontal groove (*fig.*

[3] The present National Museum of Slovenia.
[4] Similar forms of vessels are usually interpreted as founder's vessel and were found in settlements of the 4th millennium BC in Switzerland and southwestern Germany (Schlichtherle, Rottländer 1982, 59 pp; Schlichtherle, Wahlster 1986, fig. 142; Mainberger 1998, Pl. 14: 273; Altorfer, Huber, Médard 2000-2001, fig. 16: 2; see also Schlichtherle 1995, 80).




*Sl. 5.2.5:* Notranje Gorice. Vse keramika (po Harej 1976; 1980). M. = 1 : 5.
*Fig. 5.2.5:* Notranje Gorice. All pottery (after Harej 1976; 1980). Scale = 1 : 5.




*Sl. 5.2.6:* Notranje Gorice. Vse keramika (po Harej 1967; 1980). M. = 1 : 5 (1 do 12); 1 : 3 (13 do 18).
*Fig. 5.2.6:* Notranje Gorice. All pottery (after Harej 1976; 1980). Scale = 1 : 5 (1 to 12); 1 : 3 (13 to 18).

odtisi razčlenjena rebra in držaji (kot npr. *sl. 5.2.5:* 7; *5.2.6:* 1,14,15). Nekajkrat je topo vrezan ornament, ki ga lahko spremljajo krožni ali trikotni odtisi (*sl. 5.2.6:* 3,16–18). Vratovi loncev in skled so ornamentirani tudi s horizontalnim globokim žlebom (*sl. 5.2.5:* 5). Na nekaterih posodah se pojavlja metličast ornament (Harej 1976, t. 1: 4), pa tudi sledovi črnega premaza (*sl. 5.2.5:* 4). Enkrat je navedena tudi kronološko mlajša – bronastodobna – skleda s pramenastim okrasom (Harej 1976, t. 1: 1).

### **5.2.5** PRIMERJAVA HOČEVARICE Z MAHARSKIM PREKOPOM, BLATNO BREZOVICO IN NOTRANJIMI GORICAMI

Preden primerjamo najdbe s Hočevarice z Maharskim prekopom, Blatno Brezovico in Notranjimi Goricami je potrebno poudariti, da raziskana površina na Hočevarici ustreza 0,7 % raziskane površine Maharskega prekopa in 2,6 % raziskane površine Blatne Brezovice, podobno razmerje pa velja tudi do Notranjih Goric. Zato se zdi odsotnost nekaterih oblik posod in ornamenta na Hočevarici, ki jih omenjena najdišča poznajo, pripisati temu razlogu in ni odraz dejanskega stanja.

Za Hočevarico, Maharski prekop, Blatno Brezovico in Notranje Gorice je značilna keramika, izdelana iz gline, v kateri je bil apnenec glavna primes. Izrazito prevladuje redukcijsko žgana keramika temnejših barvnih tonov oziroma sive, temnosive do črne barve.

Med naselbinami tudi glede oblik posodja ni opaziti bistvenih razlik (*tab. 5.2.1–5.2.4*). Odsotnost nekaterih tipov je iskati predvsem v različni stopnji raziskanosti ter v dejstvu, da je bila analiza za Blatno Brezovico in Notranje Gorice narejena samo iz objav. Značilni oziroma najpogostejši tipi loncev in skled se vedno pojavljajo hkrati na več naselbinah. To velja tako za lonce tipa L4, L9, L11, L15, L17, L18 in L24 (*tab. 5.2.1*; *5.2.2*), kupe tipa K1 (*tab. 5.2.2*), kot za sklede tipa S1, S2, S3, S9, S14 in S19 (*tab. 5.2.3*; *5.2.4*) in zajemalke s polnim držajem tipa Z1 (*tab. 5.2.4*). Med oblikami opazno izstopa lonec tipa L16 (npr. *t. 5.2.2*), ki je značilen samo za prvo naselbinsko fazo na Hočevarici, drugod se ne pojavlja (*histogram 5.1.3*; *tab. 5.2.1*).

Majhno število ornamentiranih posod je naslednja značilnost, ki povezuje obravnavane naselbine. Na po-



*5.2.5:* 5). Some vessels bear brush ornamentation (Harej 1976, Pl. 1: 4) as well as traces of a black coat (*fig. 5.2.5:* 4). A younger – Bronze Age – dish with »Litzen« decoration was also found (Harej 1976, Pl. 1: 1).

### **5.2.5** COMPARISON OF HOČEVARICA WITH MAHARSKI PREKOP, BLATNA BREZOVICA AND NOTRANJE GORICE

Prior to comparing the finds from Hočevarica with those from Maharski prekop, Blatna Brezovica and Notranje Gorice, it should be emphasized that the excavated area at Hočevarica corresponds to 0.7 % of that at Maharski prekop, 2.6 % of that at Blatna Brezovica and similarly of that at Notranje Gorice. The absence of some forms of vessels or types of ornamentation that appear at the three other settlements but not at Hočevarica should therefore be ascribed to the smaller area of excavation rather than to the actual differences between the sites.

The characteristic pottery from Hočevarica, Maharski prekop, Blatna Brezovica and Notranje Gorice is made of clay, with limestone as its main admixture. It is almost exclusively fired in a reducing atmosphere and is of darker shades, i.e. gray and dark gray to black.

Nor do the pottery forms reveal any substantial differences among the settlements (*tables 5.2.1–5.2.4*). The reason for the absence of certain types is primarily to be sought in the different degrees of site research carried out; additionally, the fact remains that the analysis for Blatna Brezovica and Notranje Gorice was made solely on the basis of publications. Characteristic or the most common types of pots and dishes generally appear simultaneously at many settlements. This holds true for pots of the L4, L9, L11, L15, L17, L18 and L24 types (*tables 5.2.1*; *5.2.2*), tumblers of the K1 type (*table 5.2.2*), as well as for dishes of the S1, S2, S3, S9, S14 and S19 types (*tables 5.2.3*; *5.2.4*) and ladles with a solid grip of the Z1 type (*table 5.2.4*). The L16 type pot visibly stands out from other pottery forms (e.g. *table 5.2.2*), since it is characteristic only for the first settlement phase at Hočevarica and does not appear elsewhere (*histogram 5.1.3*; *table 5.2.1*).

The small number of ornamented vessels is the next characteristic that binds the four settlements under discu-

| | L1 | L2 | L3 | L4 | L5 | L6 | L7 | L8 | L9 | L10 | L11 | L12 | L13 | L14 | L15 | L16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HO | | | | • | | | | | • | | • | • | • | • | • | • |
| MP | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| BB | • | | • | • | • | | | | • | | • | | | | | |
| NG | • | | • | • | • | • | | | | | | • | | • | • | |

*Tab. 5.2.1:* Zastopanost loncev tipa L1–L16 na Hočevarici (HO), Maharskem prekopu (MP), Blatni Brezovici (BB) in v Notranjih Goricah (NG).
*Table 5.2.1:* Representation of the L1–L6 pot types at Hočevarica (HO), Maharski prekop (MP), Blatna Brezovica (BB) and Notranje Gorice (NG).

| | L17 | L18 | L19 | L20 | L21 | L22 | L23 | L24 | L25 | L26 | L27 | K1 | K2 | K3 | K4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HO | • | • | • | | • | | | • | | | | • | • | | |
| MP | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| BB | • | • | • | • | | | | • | • | • | • | • | • | • | • |
| NG | • | • | | • | | | | | • | • | | • | • | • | |

*Tab. 5.2.2:* Zastopanost loncev tipa L17–L27 in kup tipa K1–K4 na Hočevarici (HO), Maharskem prekopu (MP), Blatni Brezovici (BB) in v Notranjih Goricah (NG).
*Table 5.2.2:* Representation of the L17–L27 pot types and K1–K4 tumbler types at Hočevarica (HO), Maharski prekop (MP), Blatna Brezovica (BB) and Notranje Gorice (NG).

| | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HO | • | • | • | | • | • | • | • | • | • | | | • | • |
| MP | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| BB | • | • | • | • | | • | • | | | | • | | • | • |
| NG | | • | | • | | • | • | • | • | | | | | • |

*Tab. 5.2.3:* Zastopanost skled tipa S1–S14 na Hočevarici (HO), Maharskem prekopu (MP), Blatni Brezovici (BB) in v Notranjih Goricah (NG).
*Table 5.2.3:* Representation of the S1–S14 dish types at Hočevarica (HO), Maharski prekop (MP), Blatna Brezovica (BB) and Notranje Gorice (NG).

| | S15 | S16 | S17 | S18 | S19 | S20 | S21 | Z1 |
|---|---|---|---|---|---|---|---|---|
| HO | • | • | • | • | • | | • | • |
| MP | • | • | • | • | • | • | • | • |
| BB | | | | • | • | | • | • |
| NG | | | | • | • | | | • |

*Tab. 5.2.4:* Zastopanost skled tipa S15–S21 in zajemalke tipa Z1 na Hočevarici (HO), Maharskem prekopu (MP), Blatni Brezovici (BB) in v Notranjih Goricah (NG).
*Table 5.2.4:* Representation of the S15–S21 dish types and Z1 ladle type at Hočevarica (HO), Maharski prekop (MP), Blatna Brezovica (BB) and Notranje Gorice (NG).

sodah se sicer pojavljajo vrezi, odtisi in plastičen okras. Površina je včasih tudi polirana ali pa premazana s črno barvo.

Vrezani okras je značilen za Hočevarico, kjer se pojavlja tako brazdasti (*tab. 5.2.5:* O3) kot navadni vrez (*tab. 5.2.5:* O1,O2). Brazdastega vreza ostale naselbine ne poznajo. Nekaj fragmentov, ki so okrašeni z navadnim vrezom, sicer najdemo tudi v Notranjih Goricah (*tab. 5.2.5:* O2; *sl. 5.2.6:* 3,16–18). Še redkeje ter s povsem drugačno motiviko ga zasledimo tudi na Maharskem prekopu (*tab. 5.2.5:* O1,O2; *sl. 4.2.14:* O2; Bregant 1975, t. 17: 16 in *sl. 4.2.8:* S2; Bregant 1975, t. 9: 5), kjer se posamično pojavlja tudi žlebljenje (*tab. 5.2.5:* O4; *sl. 4.2.14:* O4; Bregant 1975, t. 13: 3).

Odtisi se pojavljajo na keramiki z vseh štirih naselbin (*tab. 5.2.5:* O12; *5.2.6:* O14). Maharski prekop, Blatno Brezovico in Notranje Gorice še posebej povezuje ornament majhnih krožnih odtisov, ki so razvrščeni v ravnočrten motiv (prim. Bregant 1975, t. 9:2; 17: 16; oziroma *sl. 4.2.14:* O2/3; *4.2.15:* O12/1 s *sl. 5.2.4:* 2 in *5.2.6:* 3).

Razčlenjena rebra so bila poleg razčlenjenih držajev zelo priljubljena na Maharskem prekopu (kot npr. *sl. 4.2.12:* D2; *4.2.16:* O17,18), Blatni Brezovici (npr. *sl. 5.2.1:* 1,3,7; *5.2.4:* 1) in v Notranjih Goricah (npr. *sl. 5.2.5:*

ssion. Nevertheless, some vessels do reveal incised, impressed and plastic ornaments. The surface is sometimes polished or coated with a black paint.

Incised ornaments are characteristic for Hočevarica, where furrowed (*table 5.2.5:* O3) as well as simple incisions (*table 5.2.5:* O1,O2) also appear. The former is unknown at other settlements. Some fragments with simple incisions can be found also at Notranje Gorice (*table 5.2.5:* O2; *fig. 5.2.6:* 3,16–18). Such fragments are even less frequent and with completely different motifs at Maharski prekop (*table 5.2.5:* O1,O2; *fig. 4.2.14:* O2; Bregant 1975, Pl. 17: 16 and *fig. 4.2.8:* S2; Bregant 1975, Pl. 9: 5), where there is also the occasional grooving to be found (*table 5.2.5:* O4; *fig. 4.2.14:* O4; Bregant 1975, Pl. 13: 3).

Impressions appear on the pottery from all four settlements (*table 5.2.5:* O12; *5.2.6:* O14). Maharski prekop, Blatna Brezovica and Notranje Gorice are particularly linked by the ornament of small circular impressions, arranged in a straight-lined motif (cf. Bregant 1975, Pl. 9: 2; 17: 16; or *fig. 4.2.14:* O2/3; *4.2.15:* O12/1 with *fig. 5.2.4:* 2 and *5.2.6:* 3).

Cordons and grips with finger imprints were very popular at Maharski prekop (as e.g. *fig. 4.2.12:* D2; *4.2.16:* O17,18), Blatna Brezovica (as e.g. *fig. 5.2.1:* 1,3,7; *5.2.4:*

4,7,9–11). Na Hočevarici jih ni bilo najti, čeprav jih v bodoče lahko pričakujemo, saj smo doslej sistematično raziskali samo 8 m$^2$ površine. V nasprotju z razčlenjenimi rebri pa se plastične nalepke in bradavice pojavljajo tako na Hočevarici kot v ostalih naselbinah. Podobno velja tudi za poliranje.

| | O1 | O2 | O3 | O4 | O5 | O6 | O7 | O8 | O9 | O10 | O11 | O12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HO | • | • | • | | | | | • | | | | • |
| MP | • | • | | • | • | • | • | • | • | • | • | • |
| BB | | | | | | • | | • | • | • | • | • |
| NG | | • | | | | • | | • | • | | • | • |

*Tab. 5.2.5:* Tip ornamenta na posodju s Hočevarice (HO), Maharskega prekopa (MP), Blatne Brezovice (BB) in Notranjih Goric (NG).

| | O13 | O14 | O15 | O16 | O17 | O18 | O19 | O20 | O21 | O22 | O23 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| HO | | • | | | | | • | • | • | | |
| MP | • | • | • | • | • | • | • | • | | • | • |
| BB | | • | | | • | • | • | | | • | |
| NG | • | • | | • | • | • | • | | | • | |

*Tab. 5.2.6:* Tip ornamenta na posodju s Hočevarice (HO), Maharskega prekopa (MP), Blatne Brezovice (BB) in Notranjih Goric (NG).

## **5.2.6** ZAKLJUČEK

Med obravnavanimi naselbinami je najti največjo podobnost v fakturi in v skoraj dosledni uporabi redukcijske atmosfere pri žganju keramike. Enako velja tudi za oblike posod. Razlik je malo in še te so verjetno posledica odstopanj v raziskanosti.

Drugače pa je z ornamentom. Po bogatem vrezanem ornamentu, ki je narejen tudi s tehniko brazdastega vrezovanja, izstopa sicer po površini skromno raziskana Hočevarica. Za vrezane motive na keramiki s Hočevarice (*t. 4.1.1*) najdemo nekaj analogij v Notranjih Goricah (*sl. 5.2.6:* 16,18), nič pa na Maharskem prekopu in na Blatni Brezovici. Maharski prekop, Blatno Brezovico in Notranje Gorice povezuje plastični ornament, saj se na keramiki s Hočevarice redko pojavlja.

Na podlagi tipološke analize keramike se tako zdi, da lahko Hočevarico kronološko vsaj delno povezujemo z Notranjimi Goricami. Sočasnosti z Maharskim prekopom in Blatno Brezovico pa glede na analizo najdb ni pričakovati. Ker je H. Parzinger (1984, 34 ss) postavil Maharski prekop, Blatno Brezovico in Notranje Gorice v horizonta Ljubljansko barje III in IV, to je v obdobje paralelno z razvojem badenske kulture v srednjem Podonavju, se postavlja vprašanje, kje je časovno mesto Hočevarice?



1) and Notranje Gorice (as e.g. *fig. 5.2.5:* 4,7,9–11). They were not found at Hočevarica, but can be expected in the future since only 8 m$^2$ of the settlement area is systematically researched as of yet. Unlike cordons with finger imprints, plastic applications and embossments appear at Hočevarica as well as elsewhere. The same holds true for burnishing.

*Table 5.2.5:* Type of ornamentation on the pottery from Hočevarica (HO), Maharski prekop (MP), Blatna Brezovica (BB) and Notranje Gorice (NG).

*Table 5.2.6:* Type of ornamentation on the pottery from Hočevarica (HO), Maharski prekop (MP), Blatna Brezovica (BB) and Notranje Gorice (NG).

## **5.2.6** CONCLUSION

The greatest similarity between the settlements under discussion is to be found in the technology and in the almost consistent use of a reducing atmosphere for firing pottery. The same holds true for vessel forms. The differences are few and even those can probably be ascribed to differences in site research.

The ornamentation offers a slightly altered picture. Hočevarica, in spite of the small excavated area, stands out due to the rich incised ornamentation, including furrowed incisions. The incised motifs of Hočevarica (*pl. 4.1.1*) have some analogies from Notranje Gorice (*fig. 5.2.6:* 16,18), but none from Maharski prekop and Blatna Brezovica. The two latter correspond with Notranje Gorice for the plastic appliqués, which appear only rarely at Hočevarica.

The typological analysis substantiates the possible chronological tie between Hočevarica, at least in part, with Notranje Gorice. On the other hand, contemporaneity with Maharski prekop and Blatna Brezovica is not to be expected. Since H. Parzinger (1984, 34 pp) set Maharski prekop, Blatna Brezovica and Notranje Gorice into the Ljubljansko barje III and IV horizons, in a period parallel to the development of the Baden culture in the middle Danube basin, we are therefore now facing the question of the chronological classification of Hočevarica.

# 5.3 HOČEVARICA IN HORIZONT KERAMIKE Z BRAZDASTIM VREZOM (HKBV) V OSREDNJI SLOVENIJI IN SOSEDNJIH POKRAJINAH

*Izvleček*

*Za keramično posodje s Hočevarice, kjer se pojavlja značilna keramika z brazdastim vrezom, je veliko analogij na najdiščih v osrednji Sloveniji in sosednjih pokrajinah. Tako na podlagi teh najdb definiramo horizont keramike z brazdastim vrezom, krajše HKBV, ki ga relativno kronološko postavljamo med lasinjsko kulturo ter boleraško stopnjo badenske kulture.*

## 5.3.1 UVOD

Za Hočevarico je značilna keramika z brazdastim vrezom (*t. 4.1.5:* 12; *4.1.11:* 13; *4.1.12:* 2–4). Gre za zelo bogato okrašeno keramiko, ki se v 4. tisočletju pr. Kr. pojavlja na območju od Sedmograške do Češke ter od Slovaške do Slovenije. S. Dimitrijević jo je uvrstil v t. i. retz-gajarsko kulturo (1979c; 1980).

Danes je mnenje o tem ali sploh gre za enoten kulturni pojav močno deljeno (npr. Horváth 1994). Odprto ostaja tudi vprašanje kronologije, ki bazira predvsem na tipološki analizi najdb. Vsekakor prevladuje mnenje, da gre za pojav, ki sledi lengyelski kulturi in njej sorodnim kulturam in je predhodnica badenski kulturi. Bilo naj bi več regionalnih skupin, znotraj katerih lahko sledimo tudi lokalnemu razvoju (Ruttkay 1995; 1997; Zápotocký 2000).

## 5.3.2 KERAMIKA Z BRAZDASTIM VREZOM V OSREDNJI SLOVENIJI IN SOSEDNJIH POKRAJINAH

S slovensko keramiko z brazdastim vrezom se je največ ukvarjal S. Dimitrijević (1967; 1979c; 1980). Na območju Slovenije je prepoznal dva regionalna tipa t. i. retz-gajarske kulture, ki se prostorsko in delno tudi kronološko prekrivata. Starejši je tip Višnjica, mlajši pa Kevderc-Hrnjevac. Dimitrijević retz-gajarsko kulturo



# 5.3 HOČEVARICA AND THE POTTERY WITH FURROWED INCISIONS HORIZON (HKBV) IN CENTRAL SLOVENIA AND NEIGHBORING REGIONS

*Abstract*

*There are many analogies with sites in central Slovenia and neighboring regions for the pottery vessels from Hočevarica, the characteristic pottery with furrowed incisions. It is thus on the basis of these finds that the horizon of pottery with furrowed incisions, referred to as »HKBV« in the following, is defined and in the framework of a relative chronology set between the Lasinja culture and the Boleraz phase of the Baden culture.*

## 5.3.1 INTRODUCTION

Pottery with furrowed incisions (*pl. 4.1.5:* 12; *4.1.11:* 13; *4.1.12:* 2–4) is characteristic for Hočevarica. This is a richly ornamented type of pottery that appears in the 4th millennium BC in the region ranging from western Romania to the Czech Republic and from Slovakia to Slovenia. S. Dimitrijević classifies it to the so-called Retz-Gajary culture (1979c; 1980).

The general opinion of whether this is a unified cultural phenomenon is strongly divided today (e.g. Horváth 1994). The issue of chronology, which is primarily based on a typological analysis of finds, also remains debatable. The predominant opinion is by all means that this phenomenon succeeds the Lengyel culture and its analogous cultures, and that it is a precursor to the Baden culture. There are supposedly numerous regional groups within which the local development may also be traced (Ruttkay 1995; 1997; Zápotocký 2000).

## 5.3.2 POTTERY WITH FURROWED INCISIONS IN CENTRAL SLOVENIA AND NEIGHBORING REGIONS

S. Dimitrijević has carried out the most research regarding Slovenian pottery with furrowed incisions (1967; 1979c; 1980). He recognized two regional types of the so-called Retz-Gajary culture within the region of kronološko postavi ob bok lasinjski, badenski in vučedolski kulturi. Njen izvor išče na območju vzhodno od Alp s središčem na južnem Moravskem in v Spodnji Avstriji.

Drugačno rešitev je predlagal N. Kalicz (1973; 1991). Čeprav se s keramiko z brazdastim vrezom iz Slovenije ni posebej ukvarjal, je Dimitrijevićeva regionalna tipa vključil v stopnjo Balaton 2/3 zahodne Madžarske (Kalicz 1973, 136 ss) ter kasneje v horizont keramike z brazdastim vrezom (ekvivalent tipu Višnjica) in protoboleraški horizont (ekvivalent tipu Kevderc-Hrnjevac) (Kalicz 1991, 362 ss). Pojav keramike z brazdastim vrezom naj bi tako zapolnjeval vrzel med lasinjsko in badensko kulturo. Kalicz išče njen izvor v domači, lokalni tradiciji pod močnim vplivom z alpskega območja.

Od časov Dimitrijevića do danes se je poznavanje keramike z brazdastim vrezom iz osrednje Slovenije zelo spremenilo. Naraslo je predvsem število najdišč in s tem tudi število tako ornamentiranih keramičnih fragmentov. Najdbe izvirajo z naravno zavarovanih naselbin, ki ležijo bodisi na vlažnih tleh ali na dominantnih višinskih točkah. Veliko jih je tudi iz jamskih najdišč: naselbin ali grobišč. Njihova razporeditev nakazuje, da nosilci kulture niso bili samo nomadi oziroma polnomadi, kot to zagovarja Dimitrijević (1979c, 346, 348; 1980, 79), pač pa da gre tudi za sedentarne skupnosti.[1]

Najbližje analogije za keramiko z brazdastim vrezom s Hočevarice najdemo na Drulovki pri Kranju (*sl. 5.3.1:* 3–5), kjer sicer prevladujejo starejše najdbe, saj so paralele zanje na Resnikovem prekopu (Korošec 1964, 25 ss; Harej 1975, 145 ss), na Gradišču pri Stiški vasi (Cevc 1997, sl. 5; Dular 2001, t. 5: 1–6), na Škocijanu/Kanzianibergu (Pedrotti 1990, sl. 2) in na Raababergu pri Gradcu (Ruttkay 1993-1994, 223, sl. 1; 2).

Mlajšo naselbinsko fazo Drulovke predstavlja že omenjena keramika z brazdastim vrezom (*sl. 5.3.1:* 3–5), keramika, ki je ornamentirana z razčlenjenim rebrom (*sl. 5.3.1:* 6,7), vertikalnim plastičnim rebrom (*sl. 5.3.1:* 8,9) ter bradavico ali parom bradavic (*sl. 5.3.1:* 10; prim. Dimitrijević 1979c, 361). V mlajši časovni okvir Drulovke pa najbrž sodijo tudi viseča posoda z dvojnim tunelastim ročajem (Korošec 1960, t. 32: 9) in zajemalke s polnim držajem (*sl. 5.3.1:* 1,2).

Brazdasti vrez se pojavlja tudi na keramiki z Malega gradu (Sagadin 1996, t. 4: 5,6,7), naravno zavarovani višinski točki nad Kamnikom. Tudi na Malem gradu prevladuje kronološko starejša keramika, kot so rdeče barvane sklede na nogi, fragmenti amfor s konveksnim ramenom in konkavnim spodnjim delom ter zajemalka s tulastim držajem (Sagadin 1996, 110 ss).

[1] Do podobnih sklepov so prišli tudi raziskovalci na tellu Pepelane. Zaradi debeline retz-gajarskih kulturnih horizontov sklepajo na dolgotrajno poselitev nosilcev retz-gajarske kulture (Minichreiter 1989, 37; Marković 1989, 46).



Slovenia; they overlap spatially as well as chronologically. The Višnjica type is the earlier type and the Kevderc-Hrnjevac type is later. Dimitrijević chronologically establishes the Retz-Gajary culture concurrent with the Lasinja, Baden and Vučedol cultures. He believes its origins to be in the region east of the Alps, with its center in southern Moravia and Lower Austria.

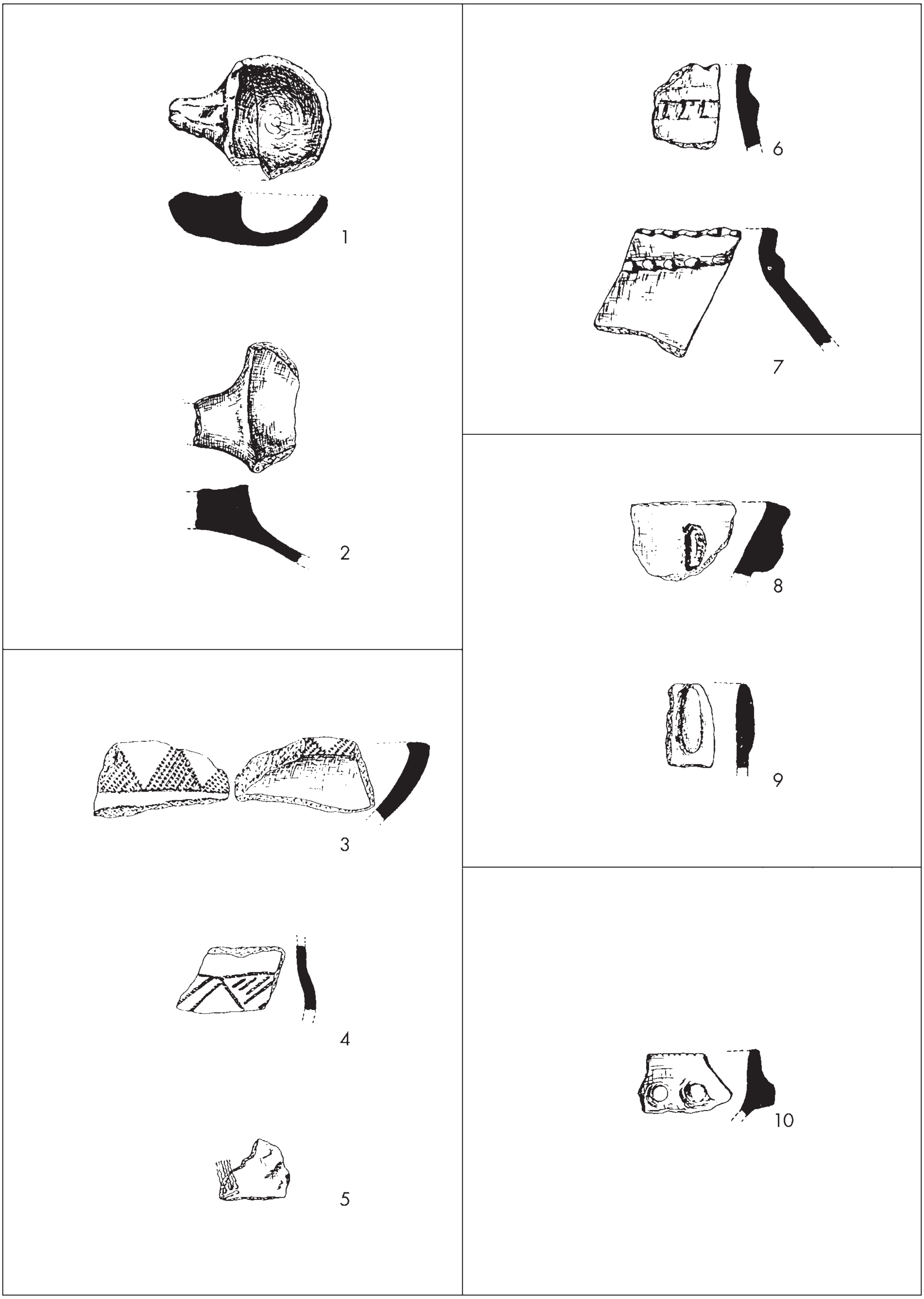
N. Kalicz proposed an alternative solution (1973; 1991). Despite that he did not deal with pottery with furrowed incisions from Slovenia in particular, he nonetheless included Dimitrijević's regional type in the Balaton 2/3 phase in western Hungary (Kalicz 1973, 136 pp) and later also in the horizon of pottery with furrowed incisions (equivalent with the Višnjica type) and the Proto-Boleraz horizon (equivalent with the Kevderc-Hrnjevac type) (Kalicz 1991, 362 pp). As such, the appearance of pottery with furrowed incisions would thus fill in the gap between the Lasinja and Baden cultures. Kalicz believes its origins are local and under the heavy influence of the Alpine region.

Our current comprehensive knowledge of pottery with furrowed incisions from central Slovenia has undergone much change since the time of Dimitirjević. Above all, the number of sites has increased, and consequently also the number of thus ornamented pottery fragments. The finds are from naturally well-protected settlements, which are situated either upon wet grounds or atop dominant upland positions. Many of the finds are also from cave sites: settlements or necropolises. Their distribution hints that the carriers of the culture were not only nomadic or semi-nomadic, as Dimitrijević argues (1979c, 346, 348; 1980, 79), but that there were also sedentary groups.[1]

The closest analogies for pottery with furrowed incisions from Hočevarica are found at Drulovka near Kranj (*fig. 5.3.1:* 3–5), which is where chronologically earlier finds – with parallels from Resnikov prekop (Korošec 1964, 25 pp; Harej 1975, 145 pp), from Gradišče pri Stiški vasi (Cevc 1997, fig. 5; Dular 2001, Pl. 5: 1–6), from Škocijan/Kanzianiberg (Pedrotti 1990, fig. 2) and from Raababerg near Graz (Ruttkay 1993-1994, 223, fig. 1; 2) – are otherwise predominant.

The later settlement phase at Drulovka is represented by the above mentioned pottery with furrowed incisions (*fig. 5.3.1:* 3–5), pottery ornamented with cordons with finger imprints (*fig. 5.3.1:* 6,7), vertical cordon appliqués (*fig. 5.3.1:* 8,9) and one or two embossments (*fig. 5.3.1:* 10; cf. Dimitrijević 1979c, 361). The later chronological frame at Drulovka presumably also incorporates hanging vessels with a double tunnel-sha-

[1] Similar conclusions were also attained by researchers at the Pepelane tell. The thickness of the Retz-Gajary cultural horizons led to the conclusion of there having been a long-term settlement by the population of the Retz-Gajary culture (Minichreiter 1989, 37; Marković 1989, 46).




*Sl. 5.3.1:* Drulovka. Vse keramika (po Korošec 1960). M. = 1 : 3.
*Fig. 5.3.1:* Drulovka. All pottery (after Korošec 1960). Scale = 1 : 3.

Podobno je tudi na Gradišču nad Dešnom, visoko nad dolino Save. Med keramiko, kot sta zajemalka s tulastim držajem in rdeče barvana skleda na nogi, se pojavlja tudi redukcijsko žgana keramika, ki je ornamentirana z brazdastim vrezom (Velušček 1999b, 66).

Keramiko z brazdastim vrezom so našli tudi na večfazni naselbini Gradec pri Mirni na Dolenjskem (*sl. 5.3.3:* 1–4).

Za prvo a in prvo b naselbinsko fazo Gradca so značilne sklede in sklede na nogah z rdeče barvano površino (Dular et al. 1991, t. 22: 1,2,10 itd.) ter zajemalke s tulastim držajem (Dular et al. 1991, t. 23: 12,13). Na skledah in loncih se pojavljajo okrogle plastične aplikacije (Dular et al. 1991, t. 22: 1; 23: 5; 24: 3). Ustja in obodi loncev so lahko ornamentirani z odtisi prsta in snopi topih vrezov (Dular et al. 1991, t. 22: 5,12–14; 23: 5,6).

Drugo naselbinsko fazo na Gradcu opredeljuje keramika iz jame s pečjo (Dular et al. 1991, 89, t. 25: 10–14), med katero sta kronološko pomembna lonec in vrč. Krasi ju tračni motiv, ki je narejen z vbadanjem (Dular et al. 1991, t. 25: 13,14). Na vrču so tudi snopi plitvih vrezanih linij ter plastične okrogle aplikacije (Dular et al. 1991, t. 25: 14).

Tretja, najmlajša, eneolitska naselbinska faza na Gradcu leži nad jamo s pečjo, od katere jo loči do 12 cm debela nasuta plast ilovice. V tem nasutju sicer ni bilo najdb (Dular et al. 1991, 87), kar pa ni preprečilo, da se ne bi, verjetno zaradi erozijskega delovanja, v skupkih najmlajše naselbinske faze posamično pojavljale tudi starejše najdbe (Dular et al. 1991, npr. t. 27: 2,3; 32: 21, t. 34: 8–11 ter zajemalke s tulastim držajem).

Kakor koli že, v tretji naselbinski fazi prevladuje temno žgana keramika, ki je lahko ornamentirana z brazdastim vrezom (*sl. 5.3.3:* 1–4) ali dolbenim okrasom (*sl. 5.3.3:* 5). Zastopana je keramika, ki je okrašena s krivočrtnimi trakovi (*sl. 5.3.3:* 6,7), okras je bil narejen tako, da so s topim orodjem vrezovali v steno sklede še pred pečenjem. Pojavlja se tudi cikcakast motiv (*sl. 5.3.3:* 8), izdelan s koleščkom (prim. Dimitrijević 1979c, 356). Na več posodah je opaziti metličasti ornament (*sl. 5.3.3:* 9,10). Pogosta so tudi ornamentirana ustja z odtisi prsta ali topega predmeta (*sl. 5.3.3:* 11,12) ter razčlenjena rebra (*sl. 5.3.3:* 12,13). Najdemo tudi plastične aplikacije, kot so bradavice, dvojne bradavice ter razčlenjeni držaji (*sl. 5.3.2:* 10; *5.3.3:* 14). Včasih je na ustju modeliran držaj (Dular et al. 1991, t. 28: 8,18). Med ročaji prevladujejo trakasti (Dular et al. 1991, t. 27: 1,8 itd.), so pa tudi tunelasti (Dular et al. 1991, t. 26: 15). Pojavljajo se različni tipi loncev s stožčastim vratom (*sl. 5.3.2:* 1,2) in kroglasti lonci (*sl. 5.3.2:* 3,4). Pogoste so tudi polkroglaste (*sl. 5.3.2:* 13–16), bikonične (*sl. 5.3.2:* 10) ter profilirane sklede (*sl. 5.3.2:* 11,12). Med posebnimi najdbami z Gradca izstopajo pečatniki (*sl. 5.3.2:* 5–7) in tudi fragment kalupa (*sl. 5.3.2:* 8), kar kaže na metalurško dejavnost.



ped handle (Korošec 1960, Pl. 32: 9) and ladles with a solid grip (*fig. 5.3.1:* 1,2).

Furrowed incisions are also known from the pottery from Mali grad (Sagadin 1996, Pl. 4: 5,6,7), a naturally well-protected upland position above Kamnik. Chronologically earlier pottery, such as red-slip footed bowls, fragments of amphorae with a convex shoulder and concave lower body as well as ladles with a socketed handle, are also predominant at Mali grad (Sagadin 1996, 110 pp).

A similar situation is also known at Gradišče nad Dešnom, high above the Sava valley. Among the pottery, such as ladles with a socketed handle and red-slip footed bowls, are also finds of pottery fired in a reducing atmosphere and ornamented with furrowed incisions (Velušček 1999b, 66).

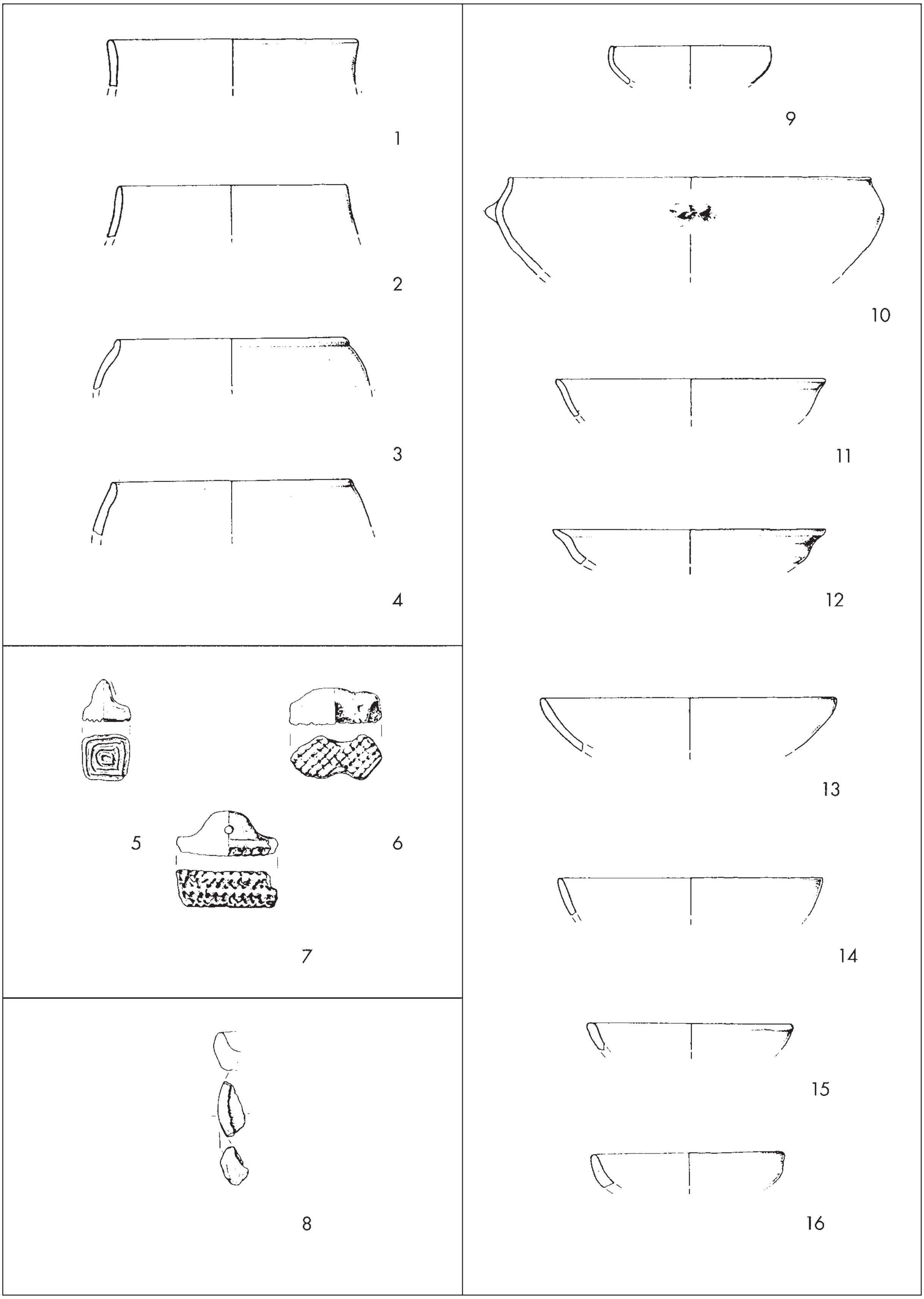
Pottery with furrowed incisions was also found at the multi-phase settlement of Gradec pri Mirni in the Dolenjska region (*fig. 5.3.3:* 1–4).

Red-slip footed bowls are characteristic for the 1st – a and 1st – b settlement phases at Gradec (Dular et al. 1991, Pl. 22: 1,2,10, etc.), as well as ladles with a socketed handle (Dular et al. 1991, Pl. 23: 12,13). Round appliqués are known from the dishes and pots (Dular et al. 1991, Pl. 22: 1; 23: 5; 24: 3). Lips and pot rims are occasionally ornamented with fingertip impressions and splotches of blunt incisions (Dular et al. 1991, Pl. 22: 5,12–14; 23: 5,6).

The second settlement phase at Gradec is classified by pottery from the pit with the hearth (Dular et al. 1991, 89, Pl. 25: 10–14), among which a pot and a pitcher are chronologically significant. They are both ornamented with a stitch-band motif (Dular et al. 1991, Pl. 25: 13,14). The pitcher also has patches of shallow incised lines and round appliqués (Dular et al. 1991, Pl. 25: 14).

The third, youngest, Eneolithic phase at Gradec lies above the pit with the hearth, which is separated by an up to 12 cm thick accumulated layer of loam. Although indeed there were no finds in this layer (Dular et al. 1991, 87), this did not prevent chance occasions of earlier finds to appear among the sub-phases attributed to the latest Eneolithic settlement phase, presumably due to erosive activity (Dular et al. 1991, e.g. Pl. 27: 2,3; 32: 21; 34: 8–11 and ladles with a socketed handle).

At any rate, dark fired pottery, ornamented with either furrowed incisions (*fig. 5.3.3:* 1–4) or an engraved ornamentation (*fig. 5.3.3:* 5), predominates in the third settlement phase. Pottery ornamented with undulating bands (*fig. 5.3.3:* 6,7), which were incised with a blunt tool into the wall of the vessel before it was fired, are also present. Another known ornament is that of a zigzag motif (*fig. 5.3.3:* 8) made with a wheel (cf. Dimitrijević 1979c, 356). Many vessels also demonstrate a brushed ornament (*fig. 5.3.3:* 9,10). Lips ornamented with finger imprints or by a blunt object (*fig. 5.3.3:* 11,12) are also frequent, as well as cordons with finger imprints (*fig. 5.3.3:* 12,13). Appliqués, such as embossments, dou-




*Sl. 5.3.2:* Gradec pri Mirni. Vse keramika (po Dular et al. 1991). 1 do 4, 9 do 16 v merilu 1 : 5, 5 do 8 v merilu 1 : 3.
*Fig. 5.3.2:* Gradec pri Mirni. All pottery (after Dular et al. 1991). 1 to 4, 9 to 16 on a scale of 1 : 5, 5 to 8 on a scale of 1 : 3.

Leta 1979 in 1980 je M. Hirschbäck-Merhar na Spahi, hribu nad Poljansko dolino ob Kolpi, zastavila več sond in pri tem naletela na naselbinske ostanke iz neolitske-eneolitske dobe (Hirschbäck-Merhar 1982, 139; Dular 2001, 94).

Doslej je objavljen samo izbor keramičnih najdb. Paralele zanje so v mlajšeneolitskih in najstarejši eneolitski naselbinski plasti v Moverni vasi (prim. Dular 2001, t. 8: 2–6,8,10–13; Tomaž 1999, t. MV 30: 1,2; 34: 7; 35: 14,16; 36: 3,18; 37: 2,7; 38: 5). Paralele za ornament, tj. snope vrezanih črt pred pečenjem (Dular 2001, t. 8: 9), in fragment ročaja, ki je ornamentiran z brazdastim vrezom (Hirschbäck-Merhar 1982, 139; Dular 2001, t. 8: 7), so v najmlajši naselbinski fazi na Gradcu pri Mirni (npr. *sl. 5.3.3:* 1–4). Podobno velja tudi za fragmente, ki so ornamentirani z razčlenjenimi rebri ali imajo pritrjene razčlenjene držaje (Hirschbäck-Merhar 1982, 139; prim. z Gradcem pri Mirni: *sl. 5.3.3:* 13,14).

Gradišče pri Dunaju, naselbina leži nad Savo nasproti Brestanice na vzhodu Dolenjske, je naslednja naravno zavarovana točka, kjer se pojavlja eneolitska keramika z brazdastim vrezom. Eneolitsko naselbino[2] naj bi odkril J. Pečnik, ki je na Gradišču domnevno izkopaval. Koščena in rožena orodja, ki naj bi jih pri tem našel, je namreč primerjal z Ižanskimi kolišči na Ljubljanskem barju (Pečnik 1912, 4; Šašel 1975b, 260 in tam navedena literatura). Keramiko z brazdastim vrezom z Gradišča pa so šele leta 1996 odkrili ljubiteljski arheologi, in sicer gre za osamljen keramični fragment, na katerem je motiv šrafiranih trikotnikov (*sl. 5.3.4:* 1).[3]

Na širšem območju osrednje Slovenije se keramika z brazdastim vrezom, kakor je omenjeno, pogostokrat pojavlja tudi v jamskih najdiščih. Tako je Dimitrijević v okviru retz-gajarske kulture posebej izpostavljal jami Kevderc in Predjamo (Dimitrijević 1979c; 1980). Jamsko najdišče Kevderc tudi kot predstavnika posebne variante retz-gajarske kulture, v kateri naj ne bi bil značilen brazdasti vrez (Dimitrijević 1979c, 355 ss; 1980, 44 ss). Kasneje se je taka trditev izkazala za napačno, saj je ob reviziji najdb iz Kevderca prišla na plano tudi tako ornamentirana keramika.

Med izkopavanjem v Kevdercu so v prvi dvoranici naleteli na enotno kulturno plast s prazgodovinskimi najdbami in kuriščem. Na podlagi tipoloških značilnosti lahko razdelimo to keramiko na dve fazi (Dimitrijević 1979b, 146).

[2] Najdišče je veliko bolje poznano po najdbah iz mlajših obdobij prazgodovine in pozne antike (Šašel 1975b, 260; Kos 1977, 134; Ciglenečki 1992, 24 ss; Božič 1999, 201).

[3] Na najdbo nas je opozoril J. Dular, za kar se mu zahvaljujemo. Zahvala gre tudi P. Turku, ki nam je posredoval podatke iz akcesijske knjige Narodnega muzeja Slovenije 1996/147 – najdbo hrani omenjeni muzej pod inv. št. P19523 – in I. Murgelj, ki je fragment narisala.



ble embossments as grips with finger imprints are also known (*fig. 5.3.2:* 10; *5.3.3:* 14). On occasion there is a modeled grip on the lip (Dular et al. 1991, Pl. 28: 8,18). Band-handles are predominant among handle forms (Dular et al. 1991, Pl. 27: 1,8, etc.), although there are also tunnel-shaped handles (Dular et al. 1991, Pl. 26: 15). Various types of pots with a conical neck are represented (*fig. 5.3.2:* 1,2) as well as globed pots (*fig. 5.3.2:* 3,4). Semi-globed dishes are frequent (*fig. 5.3.2:* 13–16), as well as biconical (*fig. 5.3.2:* 10) profiled dishes (*fig. 5.3.2:* 11,12). Among the more exceptional finds from Gradec are seal stamps, or »pintaderas« (*fig. 5.3.2:* 5–7), as well as a fragment of a mold (*fig. 5.3.2:* 8), which is indicative of the presence of metallurgy.

In 1979 and 1980, M. Hirschbäck-Merhar set up a number of trenches upon Spaha, a hill above the Poljanska dolina (valley) near the Kolpa river; her excavations brought to light settlement remains attributed to the Neolithic-Eneolithic period (Hirschbäck-Merhar 1982, 139; Dular 2001, 94).

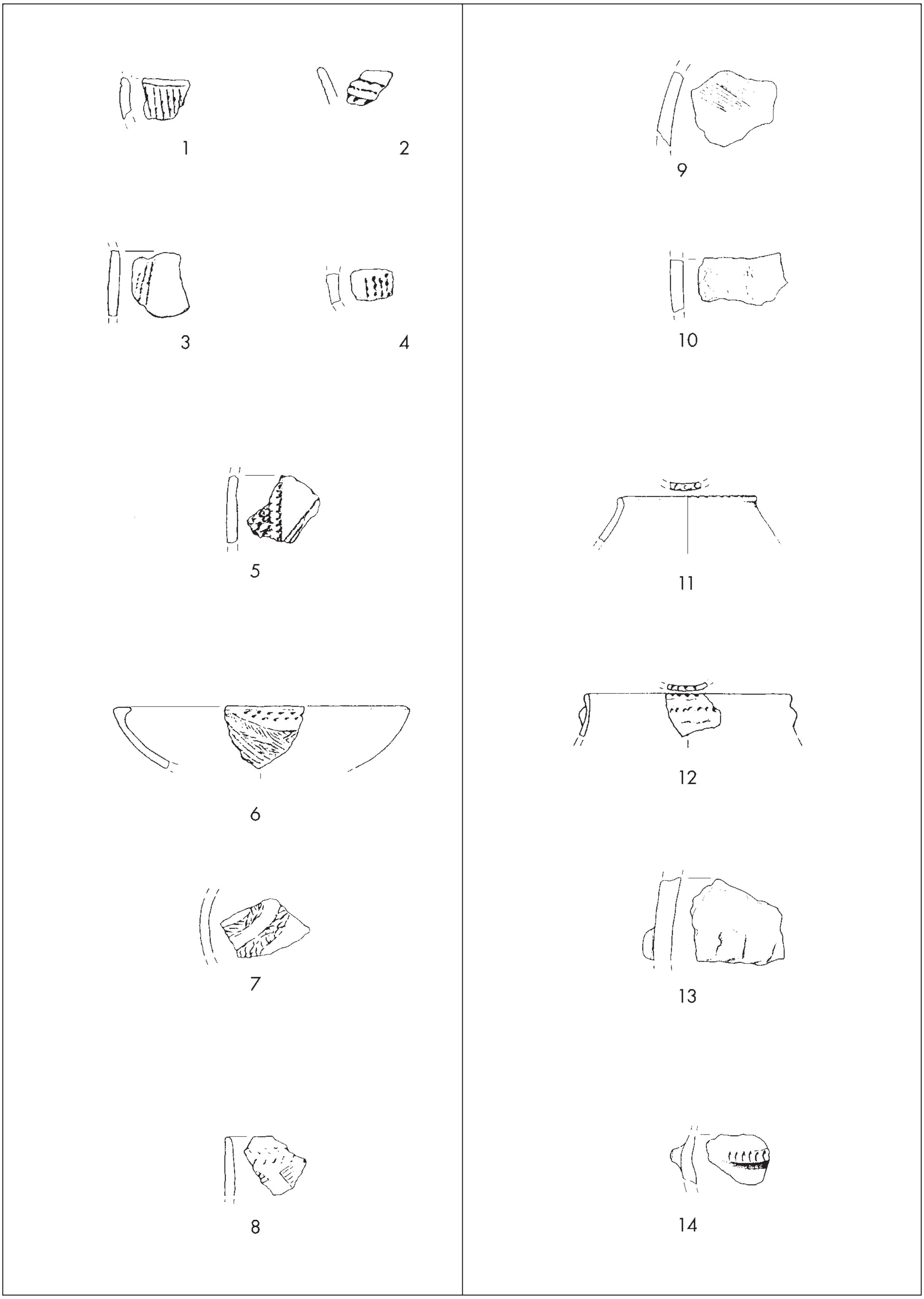
Only a selection of pottery finds are published as of yet. Parallels for these are among the Late Neolithic and Early Eneolithic settlement layers at Moverna vas (cf. Dular 2001, Pl. 8: 2–6,8,10–13; Tomaž 1999, Pl. MV 30: 1,2; 34: 7; 35: 14,16; 36: 3,18; 37: 2,7; 38: 5). Parallels for the ornamentation, that is patches of lines incised prior to firing (Dular 2001, Pl. 8: 9), and a handle fragment ornamented with furrowed incisions (Hirschbäck-Merhar 1982, 139; Dular 2001, Pl. 8: 7), are in the latest settlement phase at Gradec pri Mirni (e.g. *fig. 5.3.3:* 1–4). Similarly also holds true for fragments ornamented with a cordon with finger imprints or an attached grip with finger imprints (Hirschbäck-Merhar 1982, 139; cf. Gradce pri Mirni: *fig. 5.3.3:* 13,14).

Gradišče pri Dunaju, a settlement situated above the Sava and opposite Brestanica in the eastern part of the Dolenjska region, is another naturally well-protected site that presented Eneolithic pottery with furrowed incisions. J. Pečnik, who supposedly excavated at Gradišče, presumably discovered the Eneolithic settlement.[2] He compared the bone and horn tools with the finds from the Ig pile dwellings in the Ljubljansko barje (Pečnik 1912, 4; Šašel 1975b, 260 and the literature there cited). The example of pottery with furrowed incisions from Gradišče was only discovered in 1996 by amateur archaeologists – an individual pottery fragment with a motif of hatched triangles (*fig. 5.3.4:* 1).[3]

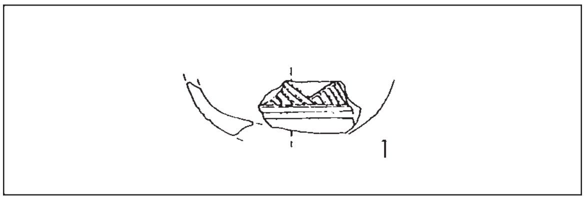
Throughout the wider region of central Slovenia,

[2] The site is much better known for its material finds from later prehistoric periods and the Late Roman period (Šašel 1975b, 260; Kos 1977, 134; Ciglenečki 1992, 24 pp; Božič 1999, 201).

[3] We are grateful to J. Dular for bringing this find to our attention. Thanks also to P. Turk, who mediated information from the inventory book of the National Museum of Slovenia 1996/147 – the find is preserved by the Museum under the inv. no. P19523 – and I. Murgelj, who drew the fragment.



*Sl. 5.3.3:* Gradec pri Mirni. Vse keramika (po Dular et al. 1991). M. = 1 : 3.
*Fig. 5.3.3:* Gradec pri Mirni. All pottery (after Dular et al. 1991). Scale = 1 : 3.



*Sl. 5.3.4:* Gradišče pri Dunaju. Keramika (risba: I. Murgelj). M. = 1 : 3.
*Fig. 5.3.4:* Gradišče pri Dunaju. Pottery (drawing: I. Murgelj). Scale = 1 : 3.

V starejšo fazo uvrščamo zelo fragmentarno ohranjen lonec ali amforo z izvihanim ustjem, izbočenim ramenom in vbočenim spodnjim delom. Rame je ornamentirano s poševnimi topo vreznimi črtami. Rekonstruirano posodo, ki se zelo razlikuje od objavljene rekonstrukcije, danes hranijo v Škofjeloškem muzeju pod inventarno številko AP 209 (prim. Leben 1963, t. 8: 4,5). V to skupino lahko uvrstimo še zajemalko s tulastim držajem in nekatere sklede s klekastim kolenom in konkavnim spodnjim delom.

V mlajšo fazo nedvomno sodi keramika, ki je ornamentirana z brazdastim vrezom (*sl. 5.3.5:* 8; *5.3.6:* 12; Korošec 1973, t. 1: 2). Takšen ornament smo sicer odkrili samo na nekaj fragmentih. Zelo verjetno jih je še več, kar pa ni mogoče preveriti, saj ornament prekriva debel apnenčast nanos.

V mlajšo fazo zelo verjetno spada tudi keramika, na kateri zasledimo dolbeni ornament (*sl. 5.3.6:* 6), vbode (*sl. 5.3.6:* 9) in krivočrtne trakove, ki so bili vrezani pred pečenjem (*sl. 5.3.6:* 8) – na tako ornamentirani keramiki so zelo pogosto ohranjeni sledovi bele inkrustacije –, šrafirane trikotnike (*sl. 5.3.5:* 7; *5.3.6:* 10–12) in cikacakaste motive (*sl. 5.3.6:* 6). Podobno si razlagamo tudi za fragmente ustij ali vratov loncev, ki so lahko ornamentirani z odtisi prsta, razčlenjenimi rebri, odtisi nohta (*sl. 5.3.5:* 1–6). Na posodah so držaji, bradavice, ki so lahko v paru (*sl. 5.3.6:* 4).

Med značilne oblike mlajše faze uvrščamo vrče (*sl. 5.3.5:* 7–15), razne tipe skled (*sl. 5.3.6:* 1–4) ter viseče posodje (Leben 1963, t. 9: 5,6,9; 11: 6). K tej skupini najdb verjetno spada tudi pečatnik (*sl. 5.3.6:* 5).

Jamsko najdišče Predjama pri Postojni je na kraškem območju v zahodni Sloveniji. V obdobju med obema vojnama so v njej izmenično izkopavali ekipa »Soprintendenze di Trieste alle Opere di Antichità ed Arte« in U. di Windisch-Graetz (Windisch-Graetz 1938), med drugo vojno pa kapetan F. Arnreiter in major R. Ferenčak, slednja na Windisch-Graetzove stroške (Korošec 1956b, 5). Predvojna izkopavanja je kritično ovrednotil J. Korošec, ki je objavil izbor najdb (Korošec 1956b). Nekaj pomembnih eneolitskih najdb je kasneje objavila tudi P. Korošec (Korošec 1973, 178 ss).



pottery with furrowed incisions is also frequent at cave sites. It follows that Dimitrijević, within the framework of the Retz-Gajary culture, singled out the Kevderc and Predjama caves (Dimitrijević 1979c; 1980). The Kevderc cave site also served as a representative of a special variant of the Retz-Gajary culture for which furrowed incisions are not characteristic (Dimitrijević 1979c, 355 pp; 1980, 44 pp). Later, this assertion proved erroneous as a revision of the finds from Kevderc brought such pottery to light.

A unified cultural layer with prehistoric finds and a hearth were discovered in the first hall during the excavations at Kevderc. The pottery can be divided into two phases on the basis of typological characteristics (Dimitrijević 1979b, 146).

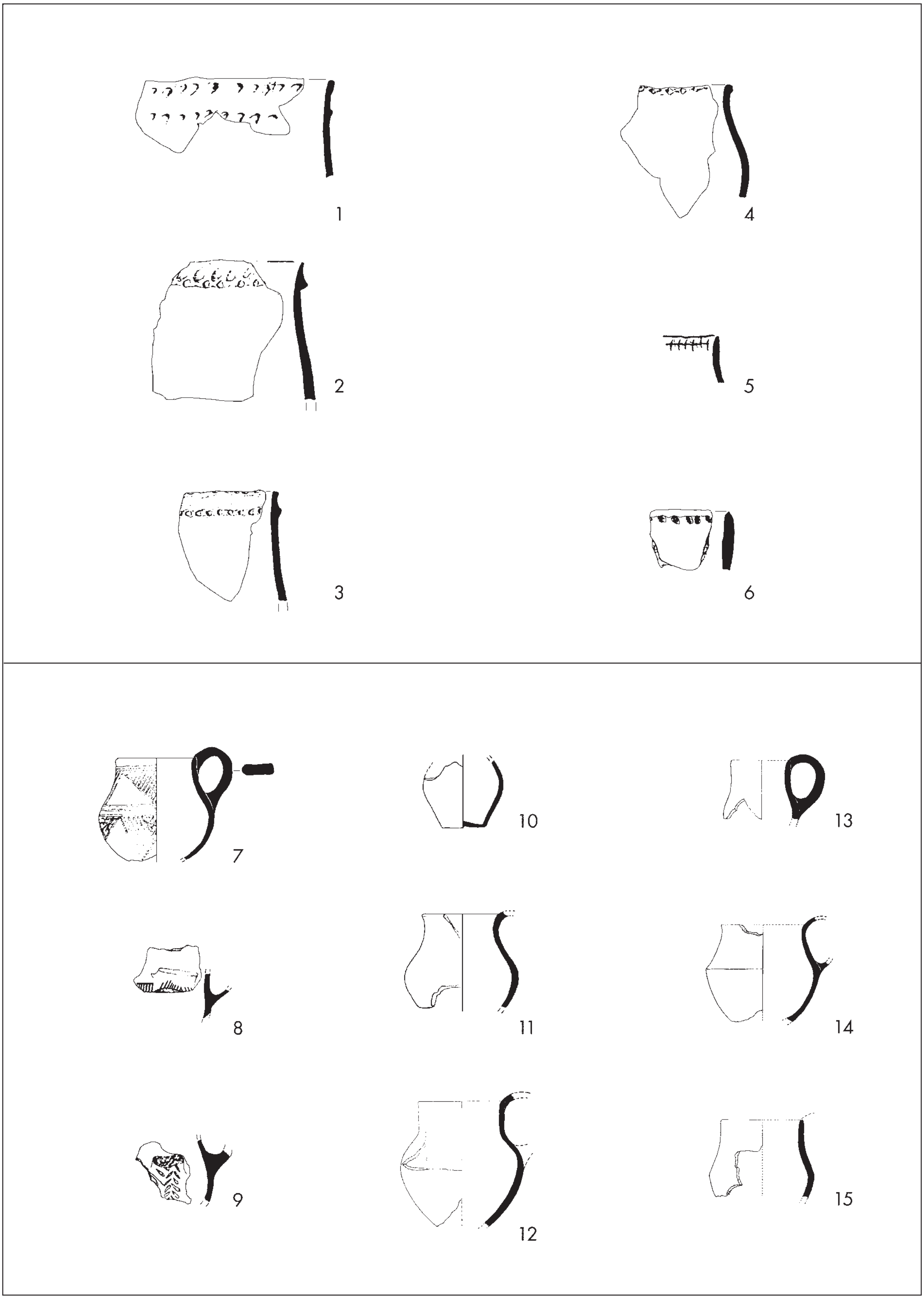
The earlier phase presents a very fragmentarily preserved pot or amphora with an everted lip, a convex shoulder and a concave lower body. The shoulder is ornamented with slanted, bluntly incised lines. The reconstructed vessel, which differs greatly from the published reconstruction, is today preserved at the Škofja Loka Museum under the inv. no. AP 209 (cf. Leben 1963, Pl. 8: 4,5). The ladle with socketed handle and select dishes with hooked bend and concave lower body are also attributed to this group.

The later phase certainly incorporates pottery ornamented with furrowed incisions (*fig. 5.3.5:* 8; *5.3.6:* 12; Korošec 1973, Pl. 1: 2). However, this type of ornamentation was only found on a few fragments. There are quite likely more such fragments, however this is not examinable as a thick limy layer covers the ornament.

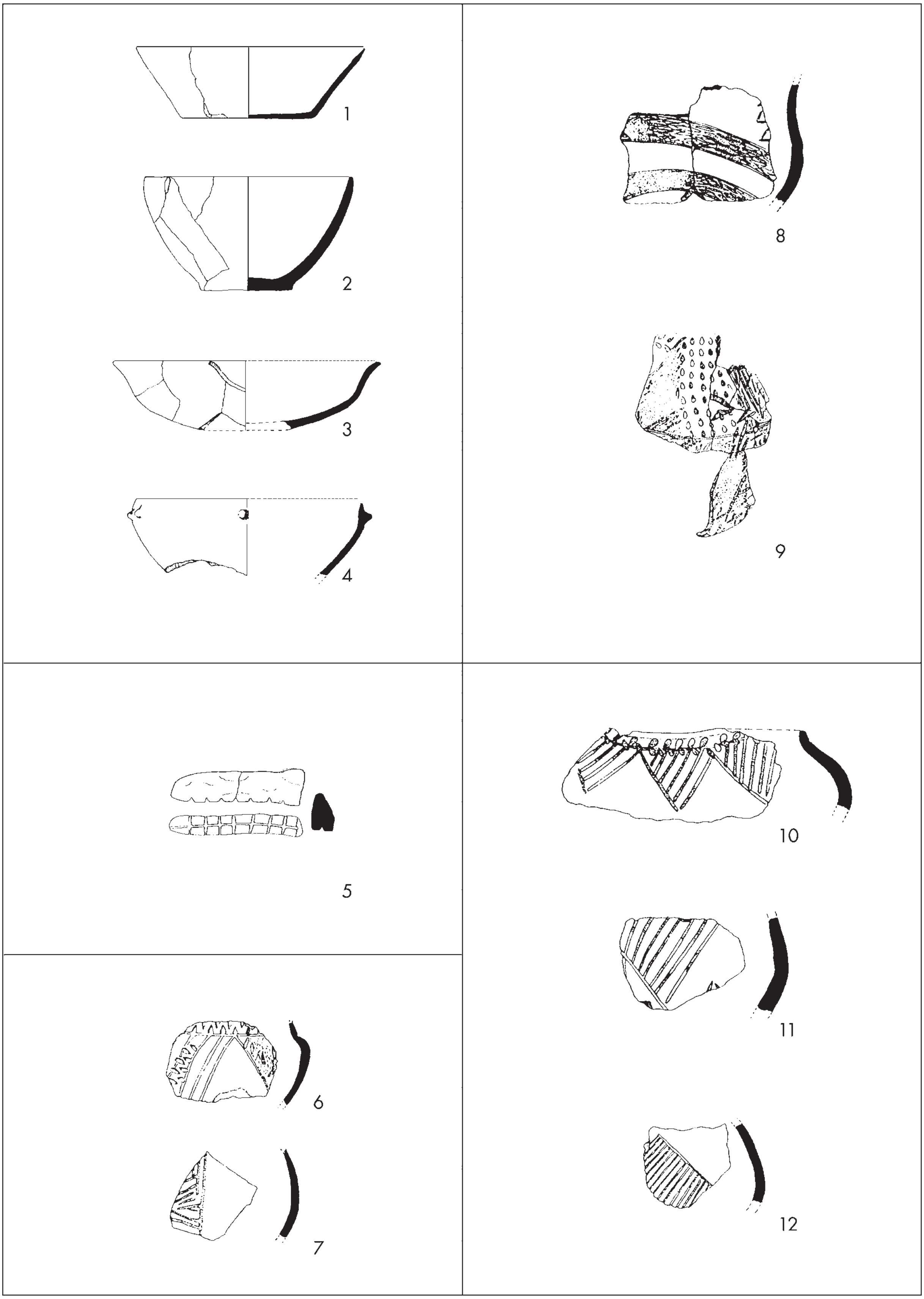
The later phase most likely also comprises of pottery with traces of an engraved ornament (*fig. 5.3.6:* 6), stitches (*fig. 5.3.6:* 9) and undulating bands that were incised before firing (*fig. 5.3.6:* 8) – traces of white encrustation are frequently preserved on pottery ornamented as such – hatched triangles (*fig. 5.3.5:* 7; *5.3.6:* 10–12) and zigzag motifs (*fig. 5.3.6:* 6). A similar explanation holds true also for fragments of lips or necks from pots, which may be ornamented with finger imprints, cordons with finger imprints or fingernail impressions (*fig. 5.3.5:* 1–6). The vessels have grips, embossments, sometimes a pair of them (*fig. 5.3.6:* 4).

Among the characteristic forms attributed to the later phase are pitchers (*fig. 5.3.5:* 7–15), various types of dishes (*fig. 5.3.6:* 1–4) and hanging vessels (Leben 1963, Pl. 9: 5,6,9; 11: 6). This group of finds presumably also includes the seal stamp (*fig. 5.3.6:* 5).

The cave site of Predjama near Postojna lies in a karstic region in western Slovenia. During the period between the two World Wars, excavations were carried out alternately here by a team from the »Soprintendenza di Trieste alle Opere di Antichità ed Arte« and U. di Windisch-Graetz (Windisch-Graetz 1938). During WW II, Captain F. Arnreiter excavated and Major R. Fe-



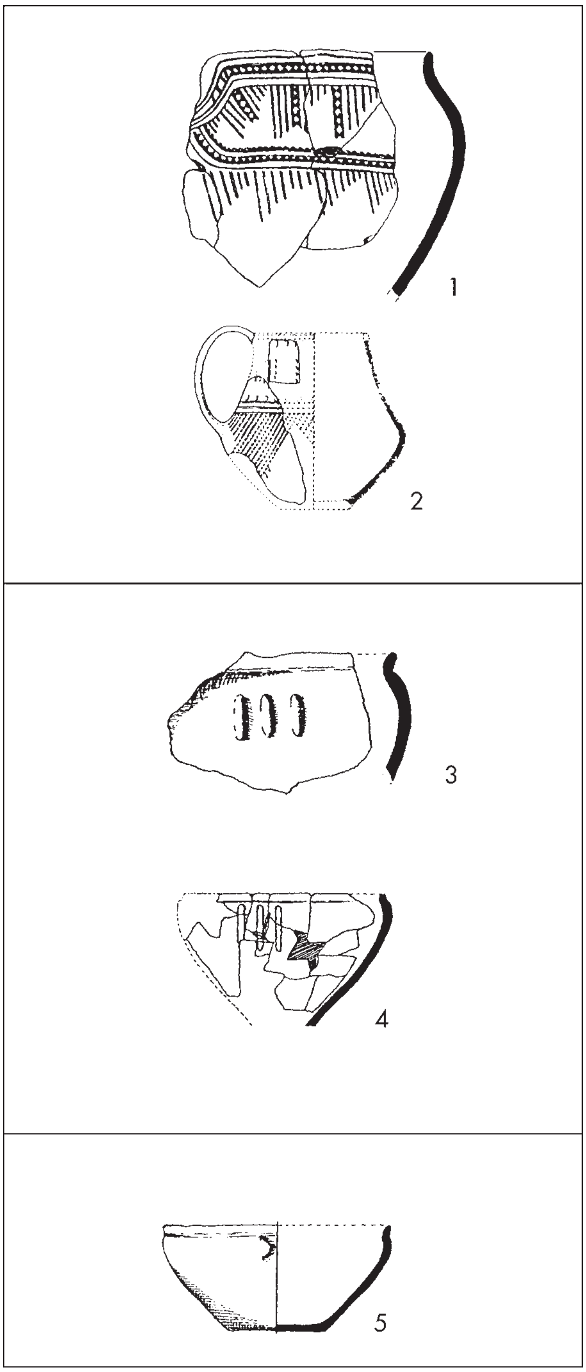

*Sl. 5.3.5:* Kevderc. Vse keramika (po Leben 1963). M. = 1 : 5.
*Fig. 5.3.5:* Kevderc. All pottery (after Leben 1963). Scale = 1 : 5.




*Sl. 5.3.6:* Kevderc. Vse keramika (po Leben 1963). 1 do 4 v merilu 1 : 5, 5 do 12 v merilu 1 : 3.
*Fig. 5.3.6:* Kevderc. All pottery (after Leben 1963). 1 to 4 on a scale of 1 : 5, 5 to 12 on a scale of 1 : 3.

Čeprav je relevantnih stratigrafskih podatkov malo in so nezanesljivi, Korošec uvršča v sklop t. i. prazgodovinske plasti eneolitske, bronastodobne in železnodobne najdbe (Korošec 1956b, 6 ss). Med njimi je veliko prevrtanih obeskov iz živalskih zob (Korošec 1956b, t. 30: 1,3), koščenih šil (npr. Korošec 1956b, t. 23: 1–11; 24: 4–8), roženih orodij (npr. Korošec 1956b, t. 24: 1,2; 25: 1,2; 26: 1–5), kamnitih puščičnih osti (npr. Korošec 1956b, t. 20: 1–8), kamnitih sekir (npr. Korošec 1956b, t. 21: 1–5) in žrmelj (npr. Korošec 1956b, t. 21: 8–10).

Ker nas na tem mestu zanima predvsem keramika, ki jo lahko tipološko uvrstimo v eneolitik, naj omenimo,






renčak, both on the expense of U. di Windisch-Graetz (Korošec 1956b, 5). J. Korošec, who published a selection of the finds, wrote a critical evaluation of the prewar excavations (Korošec 1956b). P. Korošec also published select significant Eneolithic finds at a later stage (Korošec 1973, 178 pp).

Despite that there is little relevant and reliable stratigraphic data, Korošec attributes the finds to a context of so-called prehistoric layers of Eneolithic, Bronze and Iron Age finds (Korošec 1956b, 6 pp). There are many perforated pendants and animal teeth among them (Korošec 1956b, Pl. 30: 1,3), as well as bone awls (e.g. Korošec 1956b, Pl. 23: 1–11; 24: 4–8), horn tools (e.g. Korošec 1956b, Pl. 24: 1,2; 25: 1,2; 26: 1–5), stone arrowheads (e.g. Korošec 1956b, Pl. 20: 1–8), stone axes (e.g. Korošec 1956b, Pl. 21: 1–5) and querns (e.g. Korošec 1956b, Pl. 21: 8–10).

As it is chiefly pottery that can be attributed to the Eneolithic that is of particular significance at the moment, it is noteworthy that the pitcher has furrowed incisions forming hanging, hatched triangles surrounded by droplet-shaped stitches and parallel, plain and furrowed incisions forming horizontal and vertical lines (*fig. 5.3.7:* 2). A similar ornament is also known on a fragment of a deep dish (*fig. 5.3.7:* 1). A semi-spherical dish of the S19 type has a lip ornamented with a line of small, circular stitches (Korošec 1973, Pl. 7: 2). The same type of stitches also ornament a pot of the L17 type (Korošec 1956b, Pl. 36: 7) and a tumbler with a conical grip (Korošec 1956b, Pl. 36: 1). Appliqués also appear on the pottery from Predjama, such as the cordon with finger imprints on the neck under the lip (Korošec 1956b, Pl. 11: 1,2, etc.). A flanged grip is on a dish with a plain rim and concave lower body (Korošec 1956b, Pl. 10: 6; 36: 3; Korošec 1973, Pl. 7: 1). Vertical cordon appliqués are also frequent (*fig. 5.3.7:* 3,4), as well as various variants of grips (Korošec 1956b, Pl. 33: 7; 34: 6,13; 36: 1; 38: 1) and embossments, which may appear singularly or in a pair (Korošec 1956b, Pl. 33: 4; 34: 5). A vertical crescent grip is on a biconical dish of the type S3 (*fig. 5.3.7:* 5).

The archaeologically interesting Koblarska jama lies between Ribnica and Kočevje. This is most likely a prehistoric cave necropolis. The first more comprehensive report of archaeological finds, more precisely human and animal teeth remains and prehistoric pottery, was written by K. Moser (Moser 1897, 10 p). F. Leben later summarizes this (Leben 1969, 30 p; 1978, 18 p).

The finds that were collected by amateur archaeo-

*Sl. 5.3.7:* Predjama. Vse keramika. 1, 3 do 5 ni v merilu (po Korošec 1956b). 2 v merilu 1 : 5 (po Korošec 1973).
*Fig. 5.3.7:* Predjama. All pottery. 1, 3 to 5 not in scale (after Korošec 1956b). 2 on a scale of 1 : 5 (after Korošec 1973).

da so na vrču z brazdastim vrezom narejeni viseči šrafirani trikotniki, ki jih obdajajo kapljičasti vbodi ter z navadnim in tudi brazdastim vrezovanjem narejene vzporedne horizontalne in vertikalne črte (*sl. 5.3.7:* 2). Podoben ornament zasledimo tudi na fragmentu globoke sklede (*sl. 5.3.7:* 1). Polkroglasta skleda tipa S19 je pod ustjem ornamentirana z majhnimi, v vrste razporejenimi krožnimi vbodi (Korošec 1973, t. 7: 2). Enaki vbodi so še na loncu tipa L17 (Korošec 1956b, t. 36: 7) in na kupi s stožčastim držajem (Korošec 1956b, t. 36: 1). Na keramiki iz Predjame se pojavljajo tudi plastične aplikacije, kot je na vratu pod ustjem razčlenjeno rebro (Korošec 1956b, t. 11: 1,2 itd.). Na skledi z ravnim ustjem in konkavnim spodnjim delom je jezičast držaj (Korošec 1956b, t. 10: 6; 36: 3; Korošec 1973, t. 7: 1). Pogosta so tudi vertikalna plastična rebra (*sl. 5.3.7:* 3,4), razne variante držajev (Korošec 1956b, t. 33: 7; 34: 6,13; 36: 1; 38: 1) ter bradavic, ki so lahko v paru (Korošec 1956b, t. 33: 4; 34: 5). Na bikonični skledi tipa S3 je vertikalen polmesečast držaj (*sl. 5.3.7:* 5).

Med Ribnico in Kočevjem leži arheološko zanimiva Koblarska jama. Gre zelo verjetno za prazgodovinsko jamsko grobišče.

Prvo obširnejše poročilo o arheoloških najdbah, tj. ostankih človeških in živalskih kosti ter prazgodovinski keramiki, dobimo pri K. Moserju (Moser 1897, 10 s). To kasneje povzame F. Leben (Leben 1969, 30 s; 1978, 18 s). Našo pozornost pa so vzbudile najdbe, ki so jih leta 2000 ob obisku v Koblarski jami nabrali ljubiteljski arheologi (Jamnik et al. 2002, 31 ss). Poleg živalskih in človeških kosti, ki pripadajo več osebkom, so med prazgodovinsko (*sl. 5.3.8*) in poznoantično keramiko našli tudi fragment, ki je ornamentiran z brazdastim vrezom (*sl. 5.3.8:* 4).

Lukenjska jama v dolini Prečne pri Novem mestu je že več kot 80 let poznana kot najdišče človeških kosti holocenske starosti in nekoliko manj časa tudi kot najdišče keramike iz rimskega obdobja (Brodar 1960-1961, 11; Leben 1969, 29; 1978, 18).

Pred približno dvema desetletjema je v Lukenjski jami nekaj sezon raziskoval F. Osole. Odkril je paleolitsko postojanko ter najdbe iz mlajših obdobij, med katerimi so prazgodovinska, antična ter srednjeveška keramika, kamnita orodja, človeške in živalske kosti ter dve bakreni sekiri tipa Altheim (*sl. 5.3.9:* 2,3) (Osole 1977, 172; 1982, 133; 1983, 9 ss). Zato ne preseneča, da smo

*Sl. 5.3.8:* Koblarska jama. Vse keramika (po Jamnik et al. 2002). 1 do 3 v merilu 1 : 5, 4 v merilu 1 : 3.
*Fig. 5.3.8:* Koblarska jama. All pottery (after Jamnik et al. 2002). 1 to 3 on a scale of 1 : 5, 4 on a scale of 1 : 3.



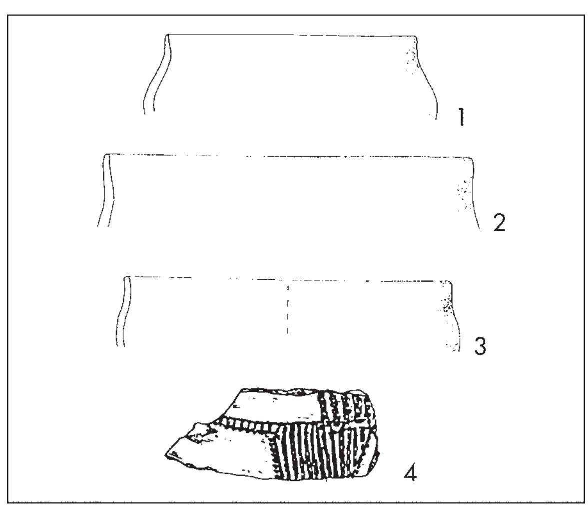
logists in 2000 during a visit to Koblarska jama are what captured our attention (Jamnik et al. 2002, 31 pp). In addition to the animal and human bones, of a variety of individuals, and among the prehistoric (*fig. 5.3.8*) and Late Roman pottery was also found a fragment ornamented with furrowed incisions (*fig. 5.3.8:* 4).

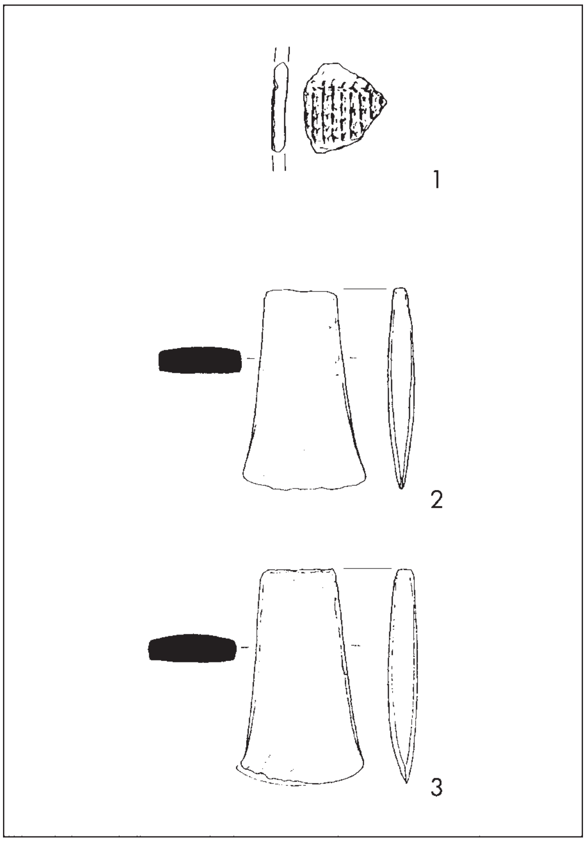
For more than 80 years the Lukenjska jama in the Prečna valley near Novo mesto is known as a site of human bones, attributed to the Holocene. More recently it is also known as a site of pottery from the Roman period (Brodar 1960-1961, 11; Leben 1969, 29; 1978, 18).

Approximately two decades ago F. Osole investigated Lukenjska jama a few seasons. He discovered a Paleolithic encampment and finds from later periods, including prehistoric, Roman and medieval pottery, stone tools, human and animal bones and two bronze axes of the Altheim type (*fig. 5.3.9:* 2,3) (Osole 1977, 172; 1982, 133; 1983, 9 pp). Thus it is not surprising that among the artifacts, preserved at the Archaeological Museum in Novo mesto, was also a fragment with a furrowed incision ornamentation (*fig. 5.3.9:* 1).

Pottery with furrowed incisions is also known from Levakova jama, which is situated in Dol near Šutna in the eastern Dolenjska region. O. Auman excavated in the cave in 1937, although reliable stratigraphic data was attained almost 40 years later with the investigations of M. Guštin.

Guštin uncovered two separate layers, of which the lower was prehistoric and the upper was Roman (Guštin 1976, 267). The unified prehistoric layer allows for the finds to be typologically distributed into two phases (Parzinger 1993). The earlier phase had two vessels with a concave lower body and a convex shoulder that develops into a conical neck and an everted lip (Guštin 1976, Pl. 1: 3; 2: 1). From among the pottery from the later phase, particularly noteworthy are the amphora ornamented with droplet-shaped stitches and an engraved decoration, where the negative contained white encrustation (*fig. 5.3.10:* 2), and a fragment, quite likely of the






*Sl. 5.3.9:* Lukenjska jama. 1 keramika v merilu 1 : 3, 2 do 3 baker v merilu 1 : 2 (po Velušček, Greif 1998).
*Fig. 5.3.9:* Lukenjska jama. 1 pottery on a scale of 1 : 3, 2 to 3 copper on a scale of 1 : 2 (after Velušček, Greif 1998).

med artefakti, ki jih hrani Dolenjski muzej v Novem mestu, našli fragment, na katerem je ornament, ki je narejen z brazdastim vrezovanjem (*sl. 5.3.9:* 1).

Keramika z brazdastim vrezom se pojavlja tudi v Levakovi jami, ki leži v Dolu pri Šutni na vzhodu Dolenjske. Leta 1937 je v jami izkopaval O. Auman, zadovoljive stratigrafske podatke pa smo pridobili šele z raziskovanjem M. Guština skoraj 40 let kasneje.

Guštin je naletel na dva ločena sloja, od katerih je spodnji prazgodovinski, zgornji pa antični (Guštin 1976, 267). V enotnem prazgodovinskem sloju lahko najdbe tipološko razvrstimo na dve fazi (Parzinger 1993). V starejšo spadata dve posodi s konkavnim spodnjim delom in konveksnim ramenom, ki prehaja v stožčast vrat in izvihano ustje (Guštin 1976, t. 1: 3; 2: 1). Med keramiko mlajše faze pa bi še posebej izpostavili amforo, ki je ornamentirana s kapljičastimi vbodi in z dolbenim okrasom, negativ je belo inkrustiran (*sl. 5.3.10:* 2), in odlomek, najbrž gre za del pravkar omenjene amfore, ki je bil najden že leta 1937 (*sl. 5.3.10:* 1), ki je okrašen z vbodi in brazdastim vrezom (Leben 1969, 28; Guštin 1976, 267). V isto fazo bi lahko postavili še fragmenta keramike z razčlenjenim rebrom (*sl. 5.3.10:* 3) in metličastim okrasom (*sl. 5.3.10:* 4). K njim pa verjetno spada tudi bakrena sekira tipa Altheim (*sl. 5.3.10:* 5).

Naslednje jamsko najdišče s keramiko z brazdastim vrezom je Ajdovska jama, ki je z jamsko nekropolo iz okvirno druge polovice 5. tisočletja pr. Kr. zagotovo eno izmed najpomembnejših prazgodovinskih najdišč v Slo-

very same amphora, which was found already in 1937 (*fig. 5.3.10:* 1) and which is ornamented with stitches and furrowed incisions (Leben 1969, 28; Guštin 1976, 267). A fragment of pottery with a cordon with finger imprints (*fig. 5.3.10:* 3) and a brushed ornamentation (*fig. 5.3.10:* 4) could also be attributed to this same phase, and probably also a copper axe of the Altheim type (*fig. 5.3.10:* 5).

The next cave site that revealed pottery with furrowed incisions is Ajdovska jama, which with its cave necropolis from approximately the second half of the 5th millennium BC is certainly one of the most important prehistoric sites in Slovenia (Korošec 1981-1982, 15 pp; Horvat 1989; Corrain, Capitanio 1991, 207 pp). The cave is situated in eastern Dolenjska region near Nemška vas near Krško. J. Pečnik excavated in this cave in the 19th century (Brodar 1953, 10). S. Brodar excavated in the cave in 1938 (Brodar 1953, 7 pp; Korošec 1953, 45 pp). Almost 30 years later P. Korošec continued with excavations (Korošec 1975, 170 pp). And in the 1980s and the beginning of the 1990s large-scale excavations were carried out, largely under the leadership of Mi. Horvat (Horvat 1986, 77 pp; Horvat 1989).

Numerous prehistoric layers or cultural horizons are documented in the cave. Dimitrijević (1979b, 144 p) and Parzinger (1984, 35; 1993, 15 pp) put forth the most popular of interpretations. They base their interpretations on the material finds that P. Korošec published (1975, 170 pp), while Parzinger additionally considered the report of Ma. Horvat (1986, 77 pp).

Dimitrijević differentiates five Neolithic and Eneolithic cultural horizons. He attributes the deepest horizon to the Neolithic and he terms it the Alpine-Lengyel cultural horizon, thus emphasizing the connection with the Lengyel culture (Dimitrijević 1979a, 347 pp). Lasinja horizons follow and then from the uppermost Eneolithic horizon he even cites an import from the Kostolac culture (Dimitrijević 1979b, 144 p).

Parzinger parallels the deepest horizon at Ajdovska jama with the first horizon of the Ljubljansko barje at Resnikov prekop, the oldest settlement phase at Gradec pri Mirni and the lower settlement phases at Moverna vas. According to Parzinger, the two Lasinja horizons then follow. The last horizon is the already post-Lasinja horizon, which is well determinable with its stratigraphy in the right corridor (1993, 16).

As it is primarily the finds from the latest prehistoric horizon that are of particular interest, they shall also be presented here in greater detail. The vessels have a cordon with fingernail impressions below the lip (*fig.*

veniji (Korošec 1981-1982, 15 ss; Horvat 1989; Corrain, Capitanio 1991, 207 ss). Jama je na vzhodu Dolenjske pri Nemški vasi pri Krškem. V 19. stoletju je v njej kopal J. Pečnik (Brodar 1953, 10). Leta 1938 v jami sondira S. Brodar (Brodar 1953, 7 ss; Korošec 1953, 45 ss). Skoraj 30 let kasneje pa je z raziskavami nadaljevala P. Korošec (Korošec 1975, 170 ss). V osemdesetih in na začetku devedesetih so v jami potekala širše zastavljena izkopavanja, večinoma pod vodstvom Mi. Horvat (Horvat 1986, 77 ss; Horvat 1989).



*5.3.11:* 1) or a cordon with finger imprints on the belly (*fig. 5.3.11:* 2), and one vessel has a zigzag band made with incisions or stitches (*fig. 5.3.11:* 3). Brushed ornamentation (*fig. 5.3.11:* 4) and barbotine decoration (*fig. 5.3.11:* 5) are also documented.

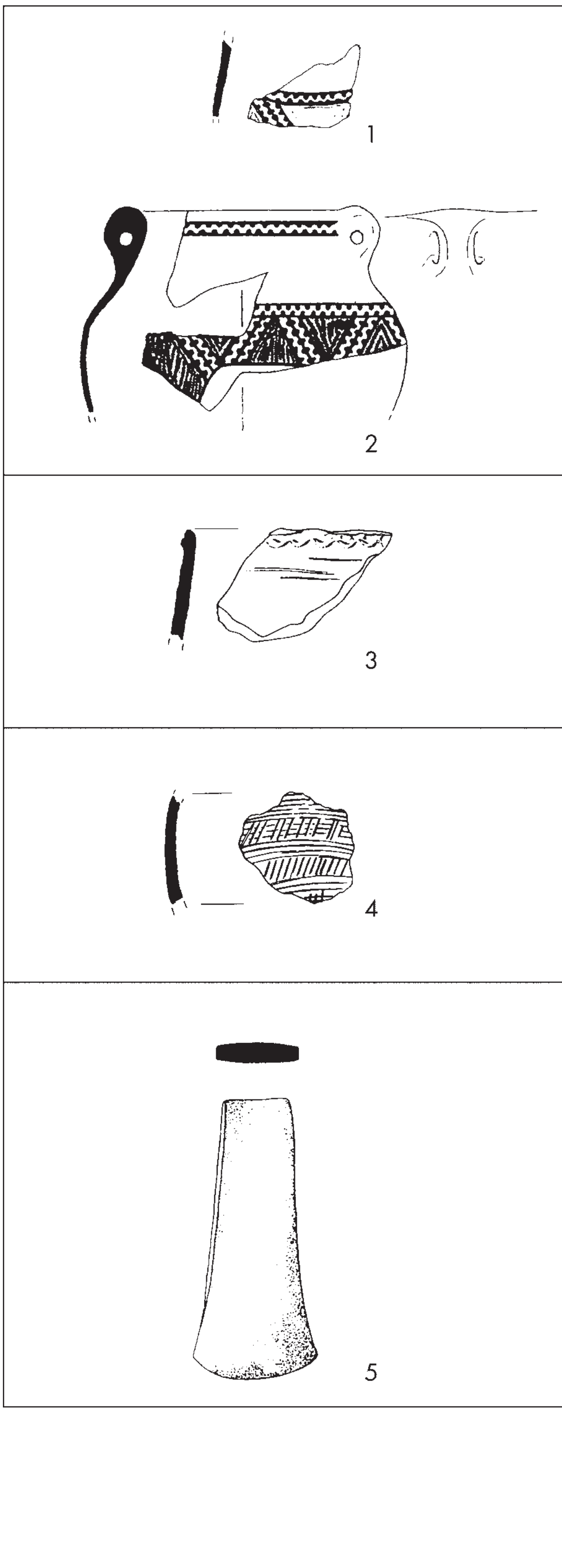
Select finds which were discovered already before WW II may also be attributed to the latest horizon (similarly Korošec 1975, 176, 185 p; Dimitrijević 1979c, 361). This also holds true for pottery with furrowed incisions (*fig. 5.3.11:* 6–9), as well as for a pottery fragment with an engraved chessboard motif (*fig. 5.3.11:* 10).

Pottery with furrowed incisions is also known from the cave Jermanova jama in Pijavško region (*fig. 5.3.12:* 5–7). O. Auman and R. Ložar supposedly excavated in the cave prior to WW II (Ložar 1941b, 133; Brodar 1953, fn. 1; Leben 1969, 27 p).[4]

The oldest finds that can be differentiated from among the finds from Jermanova jama are dishes with band-handles and a linear incised ornamentation (Korošec, Uršič 1965, Pl. 5: 1) and a similarly ornamented dish and pot with a convex upper and a concave lower body (Korošec, Uršič 1965, Pl. 6: 3; 8: 1), as well as ladles with a socketed handle (Korošec, Uršič 1965, Pl. 5: 5,6).

Chronologically younger are pottery vessels with furrowed incisions with the characteristic motif of hanging, hatched triangles (*fig. 5.3.12:* 5–7) (cf. Dimitrijević 1979c, 361), three pitchers (*fig. 5.3.12:* 1–3) and a fragmentarily preserved, large gray fired vessel (*fig. 5.3.12:* 4). The vessel has a thickened lip ornamented with finger imprints and a handle with finger imprints on the shoulder. The upper part of the body is smooth, although a rough barbotine covering is on the lower body.

Two small round plates with conical cross-sections may also be attributed to the later group of finds. They are made of limestone and they reminisce of round metal pendants, characteristic for the period prior to the onset of the classical Baden culture in the central Danube region (Pavelčík 1979, 319 pp, fig. 2: 2–4; clay imitations – fig. 8: 1–3,5,6). The first plate is entirely preserved and unornamented (*fig. 5.3.12:* 8). The second plate, which is slightly damaged, has two perforations and an ornament of circular depressions along the rim (*fig. 5.3.12:* 9).




*Sl. 5.3.10:* Levakova jama. 1 keramika v merilu 1 : 5 (risba: I. Murgelj). Keramika v merilu 1 : 5 (2, 3) in merilu 1 : 3 (4). 5 baker v merilu 1 : 2 (po Guštin 1976).

*Fig. 5.3.10:* Levakova jama. 1 pottery on a scale of 1 : 5 (drawing: I. Murgelj). Pottery on a scale of 1 : 5 (2, 3) and on a scale of 1 : 3 (4). 5 copper on a scale of 1 : 2 (after Guštin 1976).

[4] Check also the commentary by P. Korošec, who doubts that Auman and Ložar excavated in the cave (Korošec, Uršič 1965, 55 p).

V jami je dokumentiranih več prazgodovinskih plasti oziroma kulturnih horizontov. Najodmevneje jih interpretirata Dimitrijević (1979b, 144 s) in Parzinger (1984, 35; 1993, 15 ss). Naslanjata se na gradivo, ki ga objavlja P. Korošec (1975, 170 ss), Parzinger pa tudi na poročilo Ma. Horvata (1986, 77 ss).

Dimitrijević loči 5 neolitskih in eneolitskih kulturnih horizontov. Najgloblji horizont uvršča v neolitik in ga poimenuje horizont alpsko-lengyelske kulture ter tako izpostavi povezavo z lengyelsko kulturo (Dimitrijević 1979a, 347 ss). Nato sledijo lasinjski horizonti. Iz najvišjega eneolitskega horizonta pa omenja celo import iz kroga kostolaške kulture (Dimitrijević 1979b, 144 s).

Parzinger vzporeja najgloblji horizont Ajdovske jame s prvim horizontom Ljubljanskega barja na Resnikovem prekopu, najstarejšo naselbinsko fazo na Gradcu pri Mirni in s spodnjimi naselbinskimi fazami v Moverni vasi. Po Parzingerju se nato razvrstijo dva lasinjska horizonta ter najmlajši, že postlasinjski horizont, ki je dobro določljiv predvsem s stratigrafijo v desnem hodniku (1993, 16).

Ker nas zanimajo predvsem najdbe iz najmlajšega prazgodovinskega horizonta, jih tudi podrobneje predstavljamo. Gre za posode, ki imajo pod ustjem z odtisi nohta razčlenjeno rebro (*sl. 5.3.11:* 1) ali na trebuhu z odtisi prsta razčlenjeno rebro (*sl. 5.3.11:* 2), za posodo s cikcakastim trakom, ki je bil narejen z vrezovanjem in vbadanjem (*sl. 5.3.11:* 3). Dokumentirana sta tudi metličasti (*sl. 5.3.11:* 4) in barbotinski okras (*sl. 5.3.11:* 5).

V najmlajši horizont lahko tipološko uvrstimo še nekatere najdbe, ki so bile odkrite že pred drugo svetovno vojno (podobno Korošec 1975, 176,185 s; Dimitrijević 1979c, 361). To velja tako za keramiko z brazdastim vrezom (*sl. 5.3.11:* 6–9) kot tudi za fragment keramike, na katerem je s tehniko dolbenja izveden motiv šahovnice (*sl. 5.3.11:* 10).

Keramiko z brazdastim vrezom poznamo tudi iz Jermanove jame na Pijavškem (*sl. 5.3.12:* 5–7). Pred drugo svetovno vojno naj bi v njej izkopavala O. Auman in R. Ložar (Ložar 1941b, 133; Brodar 1953, op. 1; Leben 1969, 27 s).[4]

Iz Jermanove jame med najdbami kot najstarejše lahko izločimo skodele s trakastim ročajem in linearnim vrezanim ornamentom (Korošec, Uršič 1965, t. 5: 1) ter podobno ornamentirano skledo in lonec s konveksnim zgornjim in konkavnim spodnjim delom (Korošec, Uršič 1965, t. 6: 3; 8: 1) pa tudi zajemalke s tulastim držajem (Korošec, Uršič 1965, t. 5: 5,6).

Kronološko mlajša je keramika z brazdastim vrezom, z značilnim motivom visečih šrafiranih trikotnikov (*sl. 5.3.12:* 5–7) (prim. Dimitrijević 1979c, 361), trije vrči (*sl. 5.3.12:* 1–3) in fragmentarno ohranjena večja sivo žgana posoda (*sl. 5.3.12:* 4). Posoda ima odebeljeno

[4] Glej še komentar P. Korošec, ki dvomi, da sta Auman in Ložar izkopavala v jami (Korošec, Uršič 1965, 55 s).



The next site is Bezgečeva jama in the Pirešica valley. From among the chance palaeontological[5] and archaeological finds attributed to various periods, select pieces are especially noteworthy as they may be classified to the Neolithic-Eneolithic period (Leben 1980). They may be typologically classified into two horizons. A fragment of a dish with a hooked shoulder (Leben 1980, fig. 2) is designated as an earlier example, and similarly also a fragment of a pot (Leben 1980, fig. 3) and a ladle with a socketed handle (Leben 1980, fig. 10). To the later horizon are attributed a fragment ornamented with furrowed incisions (*fig. 5.3.13:* 1), a fragment of the wall of a vessel with a series of cordons with finger imprints (*fig. 5.3.13:* 2) and two copper axes of the Podkrnos/Gurnitz type (*fig. 5.3.13:* 3).[6]

Throughout the wider region of central Slovenia pottery with furrowed incisions is known from 15 sites (*fig. 5.3.14*): 1 pile dwelling, 6 settlements upon naturally well-protected and dominant positions and 8 cave sites.[7]

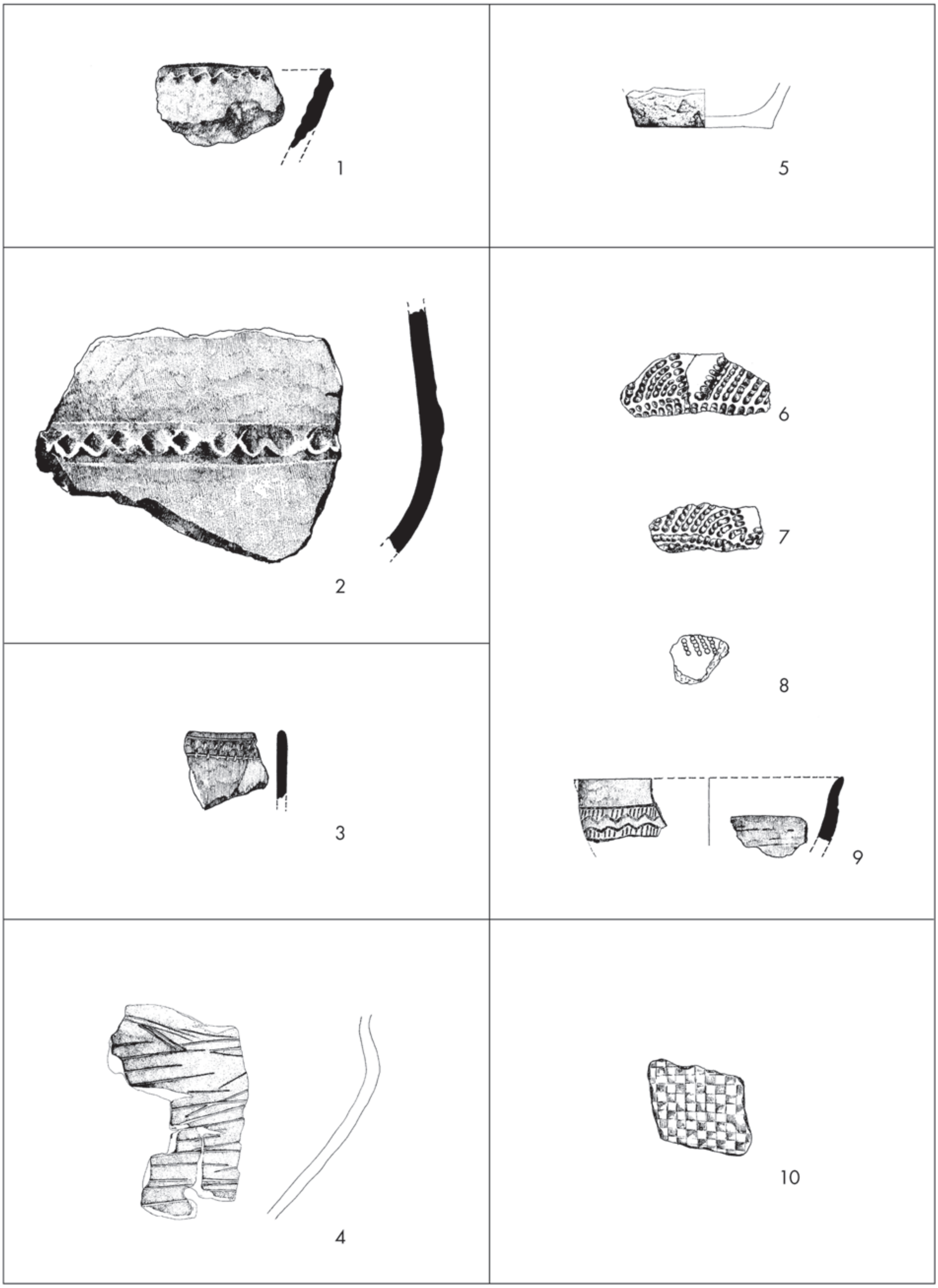
At first glance it would seem that analogies for the inventory from these sites should be sought chiefly among pottery with furrowed incisions. And yet there are many more analogous elements. Pottery with furrowed incisions may be linked with settlement horizons in which a reducing atmosphere was used while firing pottery or in horizons where pottery of darker tones prevails. These horizons, as a rule, represent a settlement phase that is stratigraphically and typologically later than the phase when an oxidizing atmosphere was used while firing pottery or than the phase with pottery of lighter tones. This is a phenomenon known also at Drulovka,[8] at Gradec pri Mirni (Dular et al. 1991, 89),

[5] Half of a human mandible was also discovered in the cave. R. Krempuž mediated the information.

[6] Another axe of the Podkrnos/Gurnitz type was discovered in 2003 in Bezgečeva jama. R. Krempuž from the Institute for the Preservation of Cultural Heritage in Celje referred the information regarding this find (check *chapter 7.1*).

[7] F. Leben also classifies the cave site Ciganske jame near Kočevje to the Retz-Gajary culture: »That the southeastern Alpine region is not entirely devoid of remains of the Retz-Gajary culture is evident from other finds known today: from Levakova jama near Podbočje, from Bezgečeva jama near Arja vas, from Ciganske jame near Kočevje (1985, 400).«
Unfortunately this is all that is known regarding these finds. Among the finds discovered in 1972 and preserved at the Institute of Archaeology at the SRC SASA, there are no such examples of this type of pottery. However, there are fragments of red-slip pottery with analogies in the Neolithic layers at Moverna vas (check Budja 1992), pottery with cordons with finger imprints, brushed ornamentation and also later – Middle Ages and Early Modern period pottery. Nevertheless, considering that pottery with furrowed incisions is known from Spaha and that material finds characteristic of HKBV are found also at Ciganske jame, pottery with furrowed incisions would thus certainly be expected here as well.

[8] According to J. Korošec, the pottery attributed to the later




*Sl. 5.3.11:* Ajdovska jama. Vse keramika. 1 do 3, 9 (po Korošec 1975), 4, 5 (po Horvat 1986), 6, 8 (po Korošec 1953) in 10 (po Korošec, Uršič 1965). M. = 1 : 3.
*Fig. 5.3.11:* Ajdovska jama. All pottery. 1 to 3, 9 (after Korošec 1975), 4, 5 (after Horvat 1986), 6, 8 (after Korošec 1953) and 10 (after Korošec, Uršič 1965). Scale = 1 : 3.

ustje, ki je okrašeno z odtisi prsta. Na ramenu je razčlenjen držaj. Zgornji del posode je gladek, medtem ko je na spodnjem nanešen grob barbotinski nanos.

K mlajši skupini najdb lahko postavimo tudi dva okrogla ploščka koničnega preseka iz apnenca, ki spominjata na okrogle kovinske obeske, značilne za obdobje pred nastopom klasične badenske kulture na območju srednjega Podonavja (Pavelčík 1979, 319 ss, sl. 2: 2–4; glinaste imitacije – sl. 8: 1–3,5,6). Prvi plošček je v celoti ohranjen in je neornamentiran (*sl. 5.3.12:* 8). Na drugem ploščku, ki je rahlo poškodovan, sta izvrtani dve luknji, na obodu pa je ornament iz krožnih poglobitev (*sl. 5.3.12:* 9).

Naslednje najdišče je Bezgečeva jama v dolini Pirešice. Med slučajnimi paleontološkimi[5] in arheološkimi najdbami iz različnih obdobij želimo posebej izpostaviti tiste, ki jih lahko uvrstimo v neolitsko-eneolitsko obdobje (Leben 1980). Tipološko jih lahko razdelimo na dva horizonta. Kot starejša označujemo fragment skodele s klekastim ramenom (Leben 1980, sl. 2), podoben fragment lonca (Leben 1980, sl. 3), in zajemalko s tulastim držajem (Leben 1980, sl. 10). V mlajši horizont pa uvrščamo fragment, ki je ornamentiran z brazdastim vrezom (*sl. 5.3.13:* 1), ostenje z nizom razčlenjenih reber (*sl. 5.3.13:* 2) ter dve bakreni sekiri tipa Podkrnos/Gurnitz (*sl. 5.3.13:* 3).[6]

Na širšem območju osrednje Slovenije se torej keramika z brazdastim vrezom pojavlja kar na 15 najdiščih (*sl. 5.3.14*): 1 kolišče, 6 naselbin na naravno zavarovanih oziroma dominantnih točkah in 8 jamskih najdišč.[7]

Na prvi pogled se zdi, da je med inventarjem s teh najdišč treba iskati sorodnost predvsem v keramiki z brazdastim vrezom, vendar ni tako, saj je sorodnih elementov veliko več.

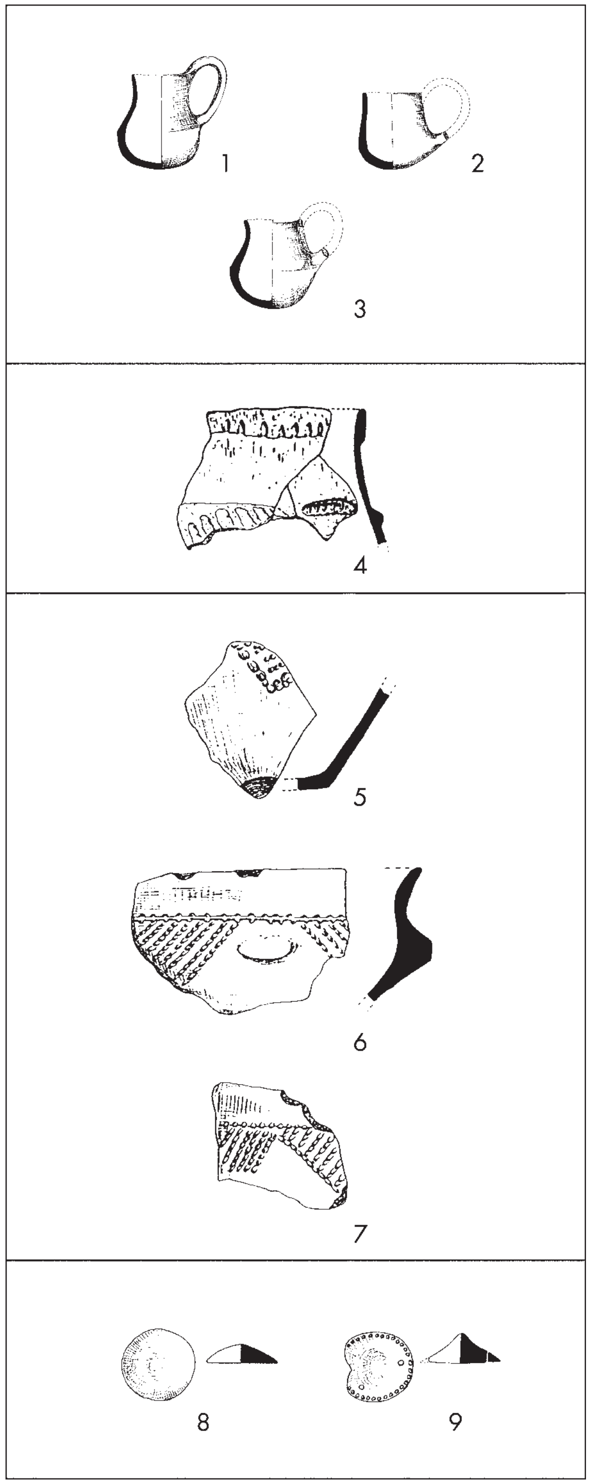
Keramiko z brazdastim vrezom povezujemo z naselbinskimi horizonti, v katerih je zaznati uporabo redukcijske atmosfere pri žganju keramike oziroma s horizonti, v katerih prevladuje keramika temnejših barvnih

[5] V jami je bila najdena tudi polovica človeške mandibule. Podatek je posredoval R. Krempuž.

[6] Leta 2003 je v Bezgečevi jami najdena še ena sekira tipa Podkrnos/Gurnitz. Podatek o najdbi nam je posredoval R. Krempuž z ZVKD Celje (glej *poglavje 7.1*).

[7] F. Leben uvršča v retz-gajarsko kulturo tudi Ciganske jame pri Kočevju: »Da ni jugovzhodni alpski prostor povsem prazen z ostalinami Retz-Gajary kulture, poznamo od tod danes še druge najdbe: z Levakove jame pri Podbočju, iz Bezgečeve jame pri Arji vasi, iz Ciganskih jam pri Kočevju (1985, 400).«
Žal je to tudi vse, kar vemo o teh najdbah. Med najdbami iz leta 1972, ki jih hranimo na Inštitutu za arheologijo ZRC SAZU, takšne keramike namreč ni. Je pa najti rdeče barvano keramiko z analogijami v neolitskih plasteh Moverne vasi (glej Budja 1992), keramiko z razčlenjenimi rebri, metličastim ornamentom ter tudi mlajšo srednje- ali novoveško keramiko. Toda glede na to, da poznamo keramiko z brazdastim vrezom na Spahi in da se v Ciganskih jamah pojavljajo najdbe, ki so značilne za HKBV, bi dejansko lahko pričakovali tudi keramiko z brazdastim vrezom.





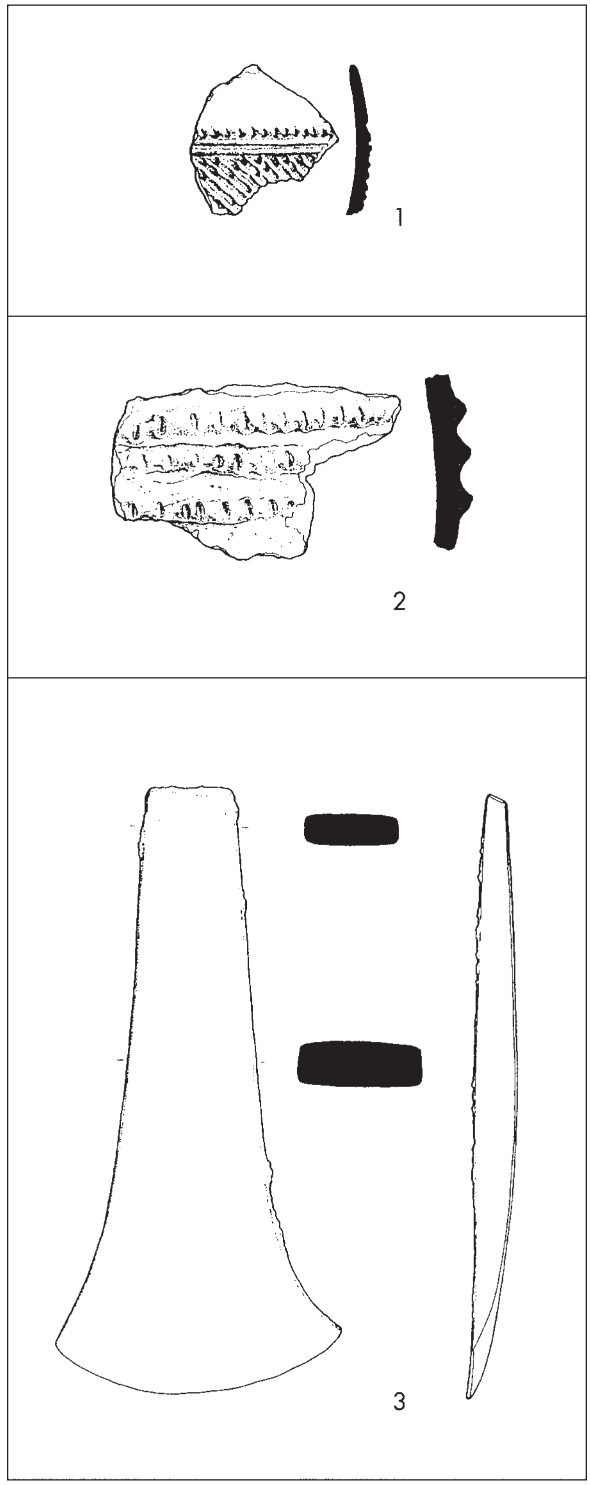

*Sl. 5.3.12:* Jermanova jama. 1 do 4 keramika v merilu 1 : 5, 5 do 7 keramika in 8, 9 apnenec v merilu 1 : 3 (po Korošec, Uršič 1965).
*Fig. 5.3.12:* Jermanova jama. 1 to 4 pottery on a scale of 1 : 5, 5 to 7 pottery and 8, 9 calcite on a scale of 1 : 3 (after Korošec, Uršič 1965).

phase is different from the earlier finds. He links this pottery with those fired in a reducing atmosphere from the Ig pile dwellings on the Ljubljansko barje (Korošec 1960, 37 p).

tonov. Ti horizonti, praviloma, predstavljajo naselbinsko fazo, ki je stratigrafsko in tipološko mlajša od faze z oksidacijsko žgano keramiko oziroma od faze s keramiko svetlejših barvnih tonov. Gre za pojav, ki ga opazujemo na Drulovki,[8] na Gradcu pri Mirni (Dular et al. 1991, 89), Gradišču nad Dešnom (Velušček, Greif 1998, 42), v Bezgečevi jami (*sl. 5.3.13:* 2), Levakovi jami (prim. Guštin 1976, 271) in najbrž tudi v Ajdovski jami (Korošec 1975, 178; prim. Horvat 1986, 81 s).[9]

Nekoliko drugače je na Hočevarici, v Predjami (Korošec 1956b, 18) in Koblarski jami (Jamnik et al. 2002, 31 ss), kjer redukcijsko žgana keramika izrazito prevladuje. Na teh najdiščih namreč faza z oksidacijsko žgano keramiko ni dokumentirana.

Med inventarjem z obravnavanih najdišč je veliko sorodnosti tudi v oblikah posodja. Sklede, kot jih poznamo s Hočevarice (*t. 4.1.5:* 2,4–6; *4.1.6:* 8; *4.1.7:* 1), so na Gradcu pri Mirni (*sl. 5.3.2:* 9–14), v Kevdercu (*sl. 5.3.6:* 3,4), Predjami (*sl. 5.3.7:* 5), Ajdovski (*sl. 5.3.11:* 9) in Jermanovi jami (*sl. 5.3.12:* 6). Enako lahko rečemo tudi za lonce, zato primerjaj: Hočevarica (*t. 4.1.5:* 11; *4.1.7:* 4), Drulovka (*sl. 5.3.1:* 7), Gradec pri Mirni (*sl. 5.3.2:* 2–4; *5.3.3:* 11,12), Kevderc (*sl. 5.3.5:* 1–4), Predjama (Korošec 1956b, t. 36: 7) in Koblarska jama (*sl. 5.3.8:* 1–3). Identični vrčki kot v Kevdercu (*sl. 5.3.5:* 13–15) so tudi v Jermanovi jami (*sl. 5.3.12:* 1–3). Bogato okrašen vrč s Hočevarice (*t. 4.1.1*) ima dobro paralelo v Predjami (*sl. 5.3.7:* 2). Bogato okrašen je tudi nekoliko drugačen vrč iz Kevderca (*sl. 5.3.5:* 7). Ima podoben motiv šrafiranih trikotnikov, kot je na zelo fragmentarno ohranjeni posodi s Hočevarice (*t. 4.1.5:* 12).




*Sl. 5.3.13:* Bezgečeva jama. 1, 2 keramika v merilu 1 : 3, 3 baker v merilu 1 : 2 (po Leben 1980).
*Fig. 5.3.13:* Bezgečeva jama. 1, 2 pottery on a scale of 1 : 3, 3 copper on a scale of 1 : 2 (after Leben 1980).

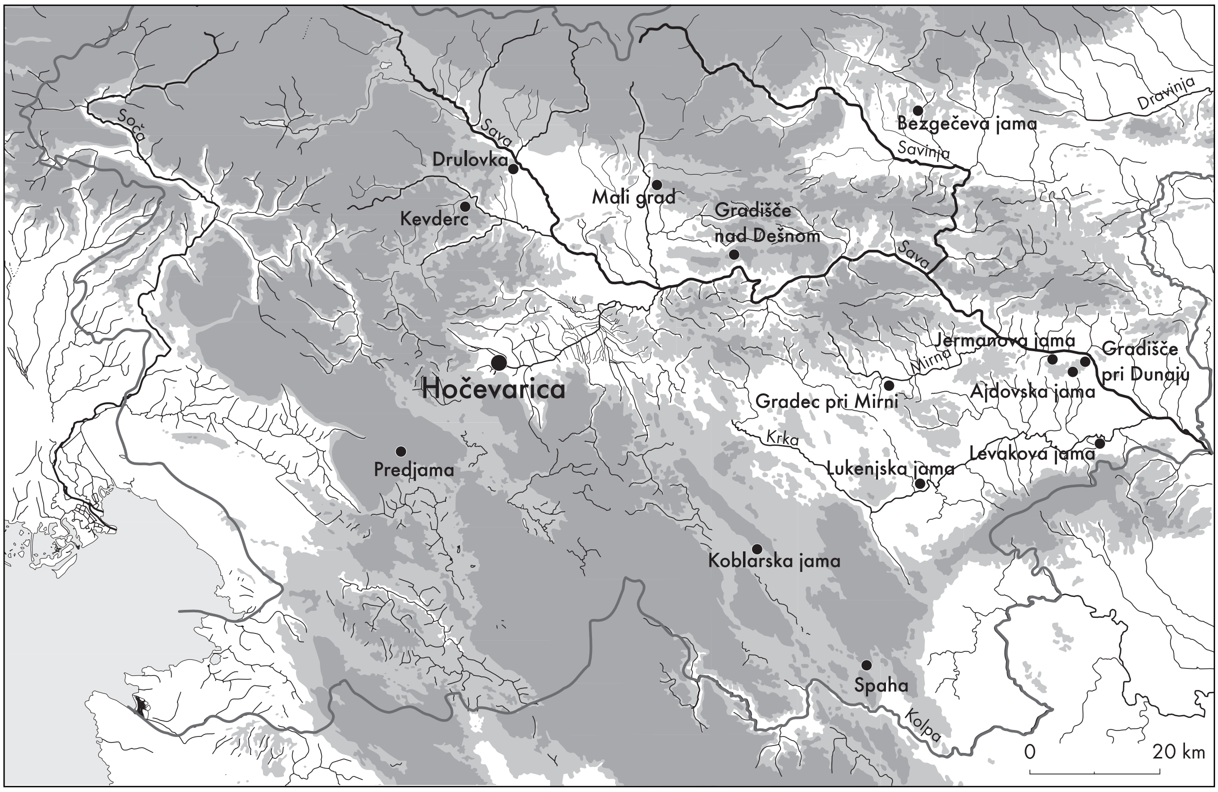
[8] Po J. Korošcu se keramika, ki jo postavljamo v mlajšo fazo, razlikuje od starejših najdb. Povezuje jo z redukcijsko žgano keramiko z ižanskih koliščih na Ljubljanskem barju (Korošec 1960, 37 s).

[9] Podoben trend zasledujemo tudi na najdiščih, kjer keramike z brazdastim vrezom doslej še nismo odkrili, bi jo pa lahko pričakovali. Gradec nad Podgorjem pri Pišecah (Ciglenečki 1979, 260 s). Tipična zajemalka s tulastim držajem (Ciglenečki 1979, sl. 6) in fragmenti posod z razčlenjenimi rebri dajejo slutiti na dve fazi. Podobno je tudi v Sevnici na ledini Pri hrastih. Tipično posodje z analogijami v spodnjih plasteh Ajdovske jame, Moverne vasi in Gradca pri Mirni (Budja 1991, sl. 7: 5–10; 8: 1–10) spremlja keramika, ki je značilna za retz-gajarsko kulturo (Budja 1991, sl. 7: 1–4; 8: 11–12; prim. Dimitrijević 1979c, 353, 355).



Gradišče nad Dešnom (Velušček, Greif 1998, 42), Bezgečeva jama (*fig. 5.3.13:* 2), Levakova jama (cf. Guštin 1976, 271) and probably also Ajdovska jama (Korošec 1975, 178; cf. Horvat 1986, 81 p).[9]

[9] A similar trend is noticed also at sites where pottery with furrowed incisions has not yet been found, although it would be anticipated. Gradec above Podgorje pri Pišecah (Ciglenečki 1979, 260 p). A typical ladle with a socketed handle (Ciglenečki 1979, fig. 6) and fragments of vessels with cordons with finger




*Sl. 5.3.14:* Najdišča s keramiko z brazdastim vrezom na širšem območju osrednje Slovenije.

*Fig. 5.3.14:* Sites with pottery decorated with furrowed incisions throughout the extended area of central Slovenia.

Najdišča, poleg brazdastega vreza, povezuje tudi ostala ornamentika. Razčlenjena rebra poznamo na Drulovki (*sl. 5.3.1:* 6,7), na Gradcu pri Mirni (*sl. 5.3.3:* 12,13), Spahi (Hirshbäck-Merhar 1982, 139), v Kevdercu (*sl. 5.3.5:* 3), Bezgečevi (*sl. 5.3.13:* 2), Levakovi (*sl. 5.3.10:* 3) in Ajdovski jami (*sl. 5.3.11:* 2). Dvojne bradavice na skledah najdemo na Hočevarici (*t. 4.1.9:* 5), Drulovki (*sl. 5.3.1:* 10), Gradcu pri Mirni (*sl. 5.3.2:* 10), v Kevdercu (*sl. 5.3.6:* 4) in Predjami (Korošec 1956b, t. 33: 4; 34: 5). Metličast ornament smo našli na Gradcu (*sl. 5.3.3:* 9,10), v Koblarski, Levakovi (*sl. 5.3.10:* 4) in Ajdovski jami (*sl. 5.3.11:* 4). Dolben okras pozna Gradec (*sl. 5.3.3:* 5), Kevderc (*sl. 5.3.6:* 6), Predjama (*sl. 5.3.7:* 1), Levakova (*sl. 5.3.10:* 2) in Ajdovska jama (*sl. 5.3.11:* 10).

Številne primerjave so v motiviki. Na Gradcu in v Ajdovski jami se npr. pojavlja identičen izdolben motiv šahovnice (prim. *sl. 5.3.3:* 5 s *sl. 5.3.11:* 10). Šrafirane trikotnike najdemo na Hočevarici (*t. 4.1.1:* 1,2; *4.1.5:* 12; *4.1.11:* 13), Drulovki (*sl. 5.3.1:* 3,4), na Gradišču pri Dunaju (*sl. 5.3.4:* 1) ter v Kevdercu (*sl. 5.3.5:* 7; *5.3.6:*

A somewhat different situation is noticed at Hočevarica, Predjama (Korošec 1956b, 18) and Koblarska jama (Jamnik et al. 2002, 31 pp), where pottery fired in a reducing atmosphere is markedly prevalent. The phase of pottery fired in an oxidizing atmosphere is not even documented at these sites.

Many analogies exist also regarding the forms of pottery vessels from among the inventory from the discussed sites. Dishes, as those known from Hočevarica (*pl. 4.1.5:* 2,4–6; *4.1.6:* 8; *4.1.7:* 1), are also at Gradec pri Mirni (*fig. 5.3.2:* 9–14), in Kevderc (*fig. 5.3.6:* 3,4), Predjama (*fig. 5.3.7:* 5), Ajdovska jama (*fig. 5.3.11:* 9) and Jermanova jama (*fig. 5.3.12:* 6). Likewise also holds true for pots when comparing: Hočevarica (*pl. 4.1.5:* 11; *4.1.7:* 4), Drulovka (*fig. 5.3.1:* 7), Gradec pri Mirni (*fig. 5.3.2:* 2–4; *5.3.3:* 11,12), Kevderc (*fig. 5.3.5:* 1–4), Predjama (Korošec 1956b, Pl. 36: 7) and Koblarska jama (*fig. 5.3.8:* 1–3). Identical pitchers as those from Kevderc (*fig. 5.3.5:* 13–15) are also at Jermanova jama (*fig. 5.3.12:* 1–3). A richly ornamented pitcher from Hočevarica (*pl. 4.1.1*) has good parallels in Predjama (*fig. 5.3.7:* 2). A somewhat different pitcher from Kevderc is also richly ornamented (*fig. 5.3.5:* 7). It displays a similar motif of hat-

imprints hint at the existence of two phases. A similar situation is known from the Pri hrastih fallow in Sevnica. Typical vessels with analogies in the lower layers at Ajdovska jama, Moverna vas and Gradec pri Mirni (Budja 1991, fig. 7: 5–10; 8: 1–10) accompany pottery vessels which are characteristic for the Retz-Gajary culture (Budja 1991, fig. 7: 1–4; 8: 11–12; cf. Dimitrijević 1979c, 353, 355).

10,11), Predjami (*sl. 5.3.7:* 2) in Jermanovi jami (*sl. 5.3.12:* 6,7). Cikcakasti motiv, ki je narejen z vbadanjem, poznamo s Hočevarice (*t. 4.1.1:* 1,2; *4.1.12:* 1), iz Kevderca (*sl. 5.3.6:* 6), Levakove (*sl. 5.3.10*: 1) in Ajdovske jame (*sl. 5.3.11:* 3). Gradec pri Mirni in Ajdovsko jamo povezuje tudi cikcakast plastični ornament (prim. *sl. 5.3.3:* 8 s *sl. 5.3.11:* 9). Na Hočevarici, v Kevdercu in na Gradcu je najti keramiko, ki je ornamentirana s krivočrtnimi trakovi (prim. Hočevarica: *t. 4.1.1:* 1,2*;* Gradec pri Mirni: *sl. 5.3.3:* 6,7; Kevderc: *sl. 5.3.6:* 8).

Vzorec na pečatniku iz Kevderca (*sl. 5.3.6:* 5) spominja na pečatnik iz retz-gajarske zemljanke v Drljanovcu na Hrvaškem (*sl. 5.3.21*). Ker poznamo pečatnike tudi z Gradca pri Mirni (*sl. 5.3.2:* 5–7), se zdi, da gre za podobno kulturno ozadje.

Nekatera najdišča povezuje zajemalka s polnim držajem. Poznamo jih s Hočevarice (*t. 4.1.5:* 9; *4.1.9:* 9; *4.1.11:* 7) in na Drulovki (*sl. 5.3.1:* 1,2).

Ploščatih vretenc za prejo nismo posebej omenjali. So na Hočevarici (*t. 4.1.5:* 10; *4.1.6:* 11; *4.1.11:* 3), v tretji naselbinski fazi na Gradcu (Dular et al. 1991, t. 31: 10) in v Kevdercu (Leben 1963, t. 3: 1,2). Najdemo jih tudi v Predjami, kjer pa so v glavnem brez stratigrafskih podatkov ter so tako lahko tudi mlajša (Korošec 1959b, npr. t. 14: 2–8).

Kakor je videti, je med obravnavanimi najdišči zelo veliko stičnih točk. Zato je videti, da moremo, podobno kot v zahodni Panoniji, tudi na območju osrednje Slovenije računati z obstojem HKBV. Naj spomnimo, govorimo o horizontu, ki ga Kalicz kronološko postavlja med stopnjo Balaton-Lasinja 1 in boleraško oziroma protoboleraško stopnjo badenske kulture (Kalicz 1991, 362 ss). Tako se zastavlja vprašanje, ali takšna kronološka lestvica velja tudi za osrednjo Slovenijo?

### **5.3.3** KRONOLOŠKA UVRSTITEV HKBV

Stratigrafijo, ki zajema obdobje keramike z brazdastim vrezom, najdemo na Gradcu pri Mirni in v Ajdovski jami. Na Gradcu faza s keramiko z brazdastim vrezom leži nad t. i. lasinjsko fazo. Podobno je tudi v Ajdovski jami. Na obeh najdiščih se s fazo, v kateri je keramika z brazdastim vrezom, zaključi eneolitska poselitvena sekvenca (prim. Dular et al. 1991, 89, sl. 53; Horvat 1989, 28), kar je tudi sicer značilnost tega območja (prim. Parzinger 1993).

Na stratigrafijo od neolitika do horizonta, ki je primerljiv s HKBV, naletimo tudi v Moverni vasi v Beli krajini, na skrajnem jugu Slovenije (Dular 1985, 101 s; Leben 1985, 396; Budja 1992, sl. 4). Neolitske faze 2 do 6 je mogoče primerjati s panonskim neolitikom, z najstarejšimi fazami v Ajdovski jami in na Gradcu pri Mirni (po Budja 1991, 76; 1992, 102; Parzinger 1993). Značilnosti so oksidacijsko žgana keramika, rdeče barvanje



ched triangles as is on the very fragmentarily preserved vessels from Hočevarica (*pl. 4.1.5:* 12).

The site has analogies, in addition to its furrowed incisions, also for other ornamentation. Cordons with finger imprints are known at Drulovka (*fig. 5.3.1:* 6,7), at Gradec pri Mirni (*fig. 5.3.3:* 12,13), Spaha (Hirshbäck-Merhar 1982, 139), Kevderc (*fig. 5.3.5:* 3), Bezgečeva jama (*fig. 5.3.13:* 2), Levakova jama (*fig. 5.3.10:* 3) and Ajdovska jama (*fig. 5.3.11:* 2). Double embossments are found on dishes at Hočevarica (*pl. 4.1.9:* 5), Drulovka (*fig. 5.3.1:* 10), Gradec pri Mirni (*fig. 5.3.2:* 10), in Kevderc (*fig. 5.3.6:* 4) and Predjama (Korošec 1956b, Pl. 33: 4; 34: 5). Brushed ornamentation was discovered at Gradec pri Mirni (*fig. 5.3.3:* 9,10), in Koblarska jama, Levakova jama (*fig. 5.3.10:* 4) and Ajdovska jama (*fig. 5.3.11:* 4). Engraved ornamentation is known at Gradec (*fig. 5.3.3:* 5), Kevderc (*fig. 5.3.6:* 6), Predjama (*fig. 5.3.7:* 1), Levakova (*fig. 5.3.10:* 2) and Ajdovska jama (*fig. 5.3.11:* 10).

Numerous comparisons are also notable among the motifs. At Gradec and Ajdovska jama, for instance, is an identical engraved motif of a chessboard (cf. *fig. 5.3.3:* 5 with *fig. 5.3.11:* 10). Hatched triangles are found at Hočevarica (*pl. 4.1.1:* 1,2; *4.1.5:* 12; *4.1.11:* 13), Drulovka (*fig. 5.3.1:* 3,4), at Gradišče pri Dunaju (*fig. 5.3.4:* 1) and in Kevderc (*fig. 5.3.5:* 7; *5.3.6:* 10,11), Predjama (*fig. 5.3.7:* 2) and Jermanova jama (*fig. 5.3.12:* 6,7). A zigzag motif made with stitches is known from Hočevarica (*pl. 4.1.1:* 1,2; *4.1.12:* 1), from Kevderc (*fig. 5.3.6:* 6), Levakova jama (*fig. 5.3.10*: 1) and Ajdovska jama (*fig. 5.3.11:* 3). Gradec pri Mirni and Ajdovska jama are further linked by a zigzag appliqué (cf. *fig. 5.3.3:* 8 with *fig. 5.3.11:* 9). Pottery ornamented with undulating bands is similar to Hočevarica, Kevderc and Gradec (cf. Hočevarica: *pl. 4.1.1:* 1,2*;* Gradec pri Mirni: *fig. 5.3.3:* 6,7; Kevderc: *fig. 5.3.6:* 8).

The pattern on the seal stamp from Kevderc (*fig. 5.3.6:* 5) reminisces of a seal stamp from the Retz-Gajary dugout hut in Drljanovac, Croatia (*fig. 5.3.21*). As other seal stamps are also known from Gradec pri Mirni (*fig. 5.3.2:* 5–7), it seems a similar cultural background.

Some sites have analogous ladles with a solid handle. Such ladles are known from Hočevarica (*pl. 4.1.5:* 9; *4.1.9:* 9; *4.1.11:* 7) and at Drulovka (*fig. 5.3.1:* 1,2).

Flat spindle whorls have yet to be mentioned. Such spindle whorls were found at Hočevarica (*pl. 4.1.5:* 10; *4.1.6:* 11; *4.1.11:* 3), in the third settlement phase at Gradec (Dular et al. 1991, Pl. 31: 10) and in Kevderc (Leben 1963, Pl. 3: 1,2). They were also discovered in Predjama, although these items are mainly lacking of stratigraphic data, and some could even be of later origin (Korošec 1959b, e.g. Pl. 14: 2–8).

It would appear that there are many common factors among the discussed sites. Consequently, the existence of HKBV must be reckoned with, just as in western Pannonia, also in the region of central Slovenia.

posod, topo vrezovanje, prevladujejo zajemalke s tulastim držajem.

V fazi 7, ki jo M. Budja označi za eneolitsko, je zaznati spremembo v obliki posod in v ornamentiki. Prevladuje redukcijsko žgana keramika, kar velja tudi za fazi 8 in 9 (po Budja 1992, 102, sl. 4 in Tomaž 1999, 104 ss).

Če sklepamo po objavljenih fragmentih (Budja 1992, sl. 4: faza 7), najdbe iz faze 7 še najbolj ustrezajo najdbam, ki jih Dimitrijević uvršča v Lasinja 3 stopnjo (prim. Dimitrijević 1979b, sl. 5). V fazah 8 in 9 se pojavljajo profilirane sklede (npr. *sl. 5.3.15:* 5), lonec in manjši vrč; slednja sta ornamentirana s krivočrtnimi trakovi (*sl. 5.3.15:* 1,4). Na loncu so šrafirani viseči trikotniki (*sl. 5.3.15:* 3). Pojavljajo se tudi razčlenjeni držaji (Budja 1992, sl. 4: faza 8), razčlenjena rebra (Tomaž 1999, t. MV41: 6), z odtisi ornamentirana odebeljena ustja in barbotin (Budja 1992, sl. 4: faza 8). Zanje je zelo veliko analogij na najdiščih HKBV v osrednji Sloveniji (prim. npr. Moverna vas: *sl. 5.3.15:* 1–5; Hočevarica: *t. 4.1.1*; *4.1.7:* 1; *4.1.8:* 1; Gradec pi Mirni: *sl. 5.3.3:* 6,7; Kevderc: *sl. 5.3.5:* 7–15; *5.3.6:* 8). Zato se zdi, da gre za okvirno isto obdobje.

Pomembna neolitska in eneolitska stratigrafska sekvenca je ugotovljena tudi v Podmolu pri Kastelcu in Acijevem spodmolu, dveh jamskih najdiščih na Krasu v zahodni Sloveniji. Med leti 1989 in 1991 je v njih raziskoval I. Turk z Inštituta za arheologijo ZRC SAZU (Turk et al. 1992; 1993). Jami ležita na robu vrtače, kar je v neolitiku in eneolitiku za območje, kjer je malo površinske vode, pogost pojav. Vrtače so namreč nudile naravno zatočišče za ljudi in živali pred burjo, močnim in mrzlim vetrom, debelejša plast zemlje na dnu vrtač pa je bila primerna tudi za poljedelstvo (Novaković, Simoni 1997, 19 ss).

V najglobljih plasteh Podmola pri Kastelcu se pojavljajo najdbe, ki jih lahko povežemo z neolitskimi kulturami vzhodnega Jadrana (Turk et al. 1993, 59, t. 1; 2: 1–13). V višje ležečih plasteh oziroma skupkih I do E so sklede tipa S1 (npr. *sl. 5.3.16:* 9). Na skledah (*sl. 5.3.16:* 8) in loncih (*sl. 5.3.16:* 4) so plastična rebra. Lonec s

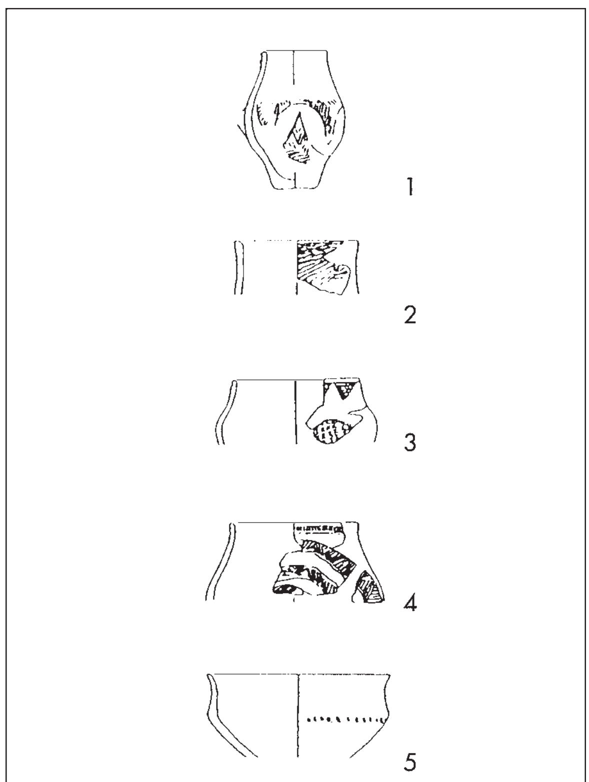


Let us recall that this is a horizon, which Kalicz chronologically sets between the Balaton-Lasinja 1 and the Boleraz or proto-Boleraz phase of the Baden culture (Kalicz 1991, 362 pp). The question arises as to whether this chronological scale is legitimate for central Slovenia as well.

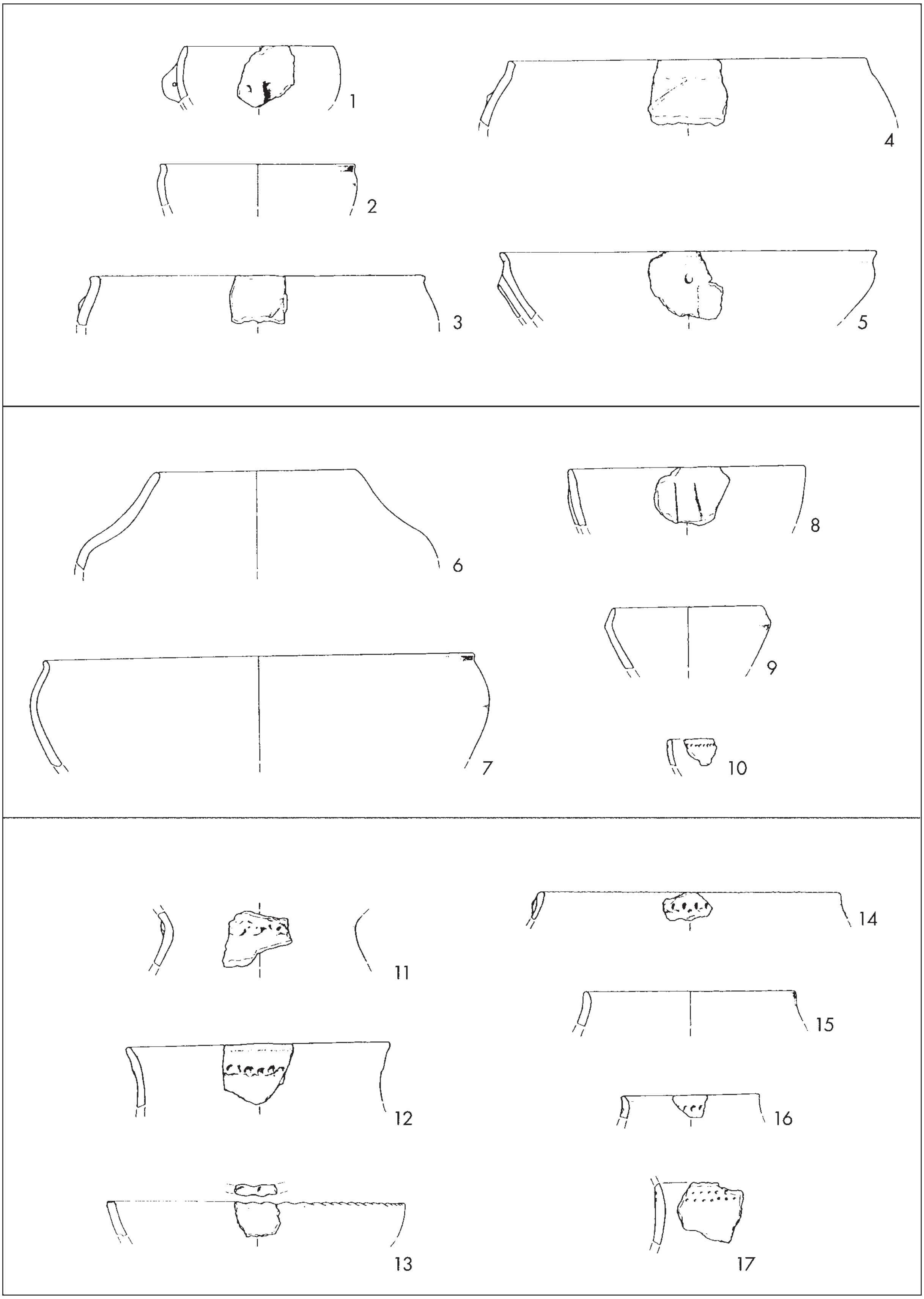
### **5.3.3** CHRONOLOGICAL CLASSIFICATION OF HKBV

The stratigraphy that incorporates the period of pottery with furrowed incisions is present at Gradec pri Mirni and at Ajdovska jama. The phase of pottery with furrowed incisions at Gradec lies above the so-called Lasinja phase. A similar situation is also at Ajdovska jama. At both sites the phase tendering pottery with furrowed incisions concludes the Eneolithic settlement sequence (cf. Dular et al. 1991, 89, fig. 53; Horvat 1989, 28), which is the characteristic of this region anyway (cf. Parzinger 1993).

The stratigraphy that follows from the Neolithic to a horizon comparable with HKBV is also found at Moverna vas in Bela Krajina in the far southern part of Slovenia (Dular 1985, 101 p; Leben 1985, 396; Budja 1992, fig. 4). The Neolithic phases from 2 through 6 are analogous with the Pannonian Neolithic, with the earliest phases at Ajdovska jama and at Gradec pri Mirni (according to Budja 1991, 76; 1992, 102; cf. Parzinger 1993). The telling characteristics are pottery vessels fi-




*Sl. 5.3.15:* Moverna vas. Vse keramika (po Budja 1992). Ni v merilu.
*Fig. 5.3.15:* Moverna vas. All pottery (after Budja 1992). Not in scale.




*Sl. 5.3.16:* Podmol pri Kastelcu. Vse keramika (po Turk et al. 1993). M. = 1 : 5.
*Fig. 5.3.16:* Podmol pri Kastelcu. All pottery (after Turk et al. 1993). Scale = 1 : 5.

stožčastim vratom ima lahko pod ustjem na vratu razčlenjeno rebro (*sl. 5.3.16:* 11) ali pa z odtisi ornamentirano in odebeljeno ustje (*sl. 5.3.16:* 12). Pogosti so odtisi prsta ali topega predmeta (*sl. 5.3.16:* 13,16) ter majhni krožni odtisi (*sl. 5.3.16:* 17). V skupku I je zelo pogost metličasti ornament (Turk et al. 1993, t. 4: 1).

Da so najdbe skupkov I do E vsaj eneolitske starosti, dokazuje višje ležeči skupek D z ornamentirano keramiko, ki je tipična za poznoeneolitsko ljubljansko kulturo (Turk et al. 1993, 60, t. 13: 22; 14: 7,15,22 itd.; za datacijo jadranskega tipa (skupine) ljubljanske kulture glej Primas 1996; Della Casa 1996 ter prim. Velušček, Čufar 2003; Gilli, Montagnari Kokelj 1992, 157).

Tudi v Acijevem spodmolu se v skupku F pojavljajo najdbe, ki so značilne za vzhodnojadranski neolitik (Turk et al. 1992, t. 1: 1–8; 2: 1,3,4). Skupek F prekriva-

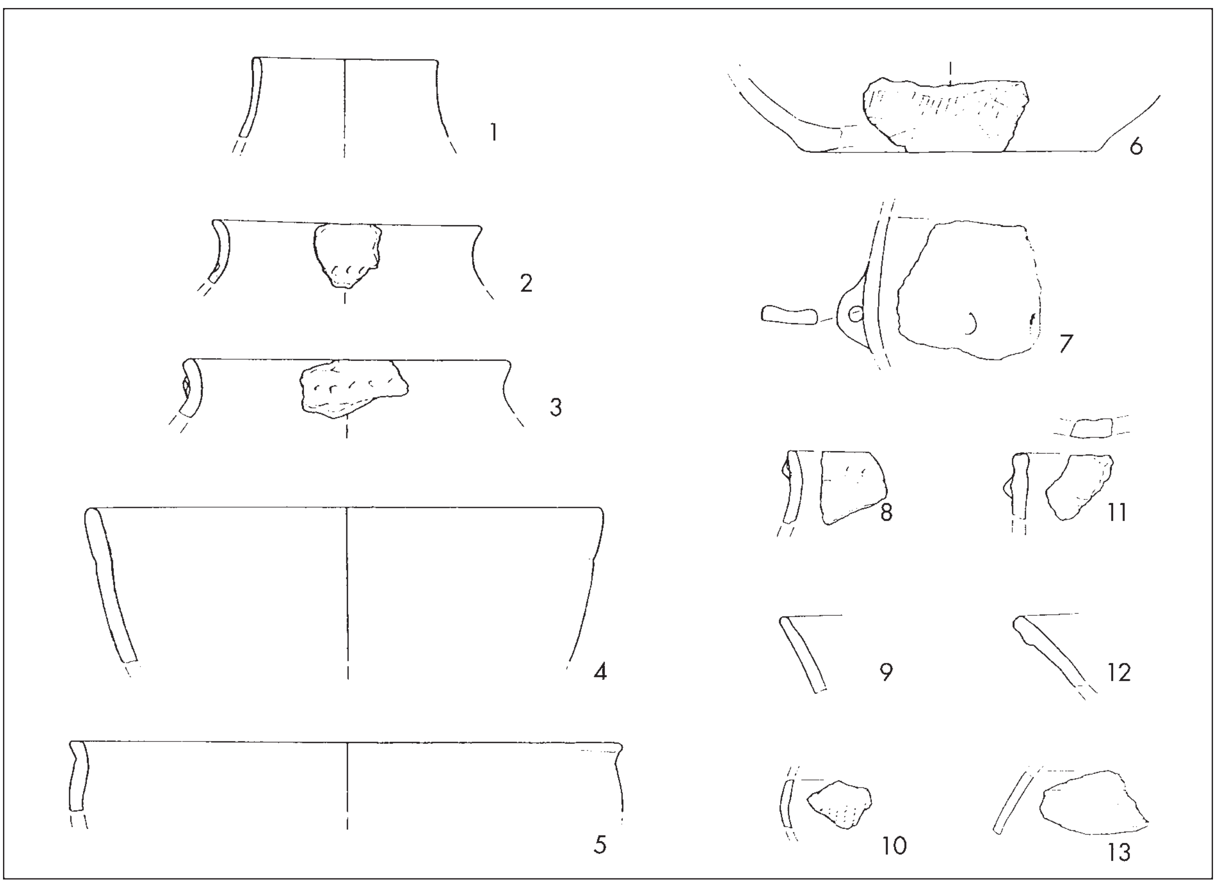
*Sl. 5.3.17:* Acijev spodmol. Vse keramika (po Turk et al. 1992). M. = 1 : 5.

*Fig. 5.3.17:* Acijev spodmol. All pottery (after Turk et al. 1992). Scale = 1 : 5.



red in an oxidizing atmosphere, red-slip pottery vessels, blunt incised ornamentation and a predominance of ladles with socketed handles. Phase 7, which M. Budja designates as Eneolithic, presents a discernible change in the forms of vessels and ornamentation. Pottery fired in a reducing atmosphere prevails; this also holds true for phases 8 and 9 (according to Budja 1992, 102, fig. 4 and Tomaž 1999, 104 pp).

Determined on the basis of published finds (Budja 1992, fig. 4: phase 7), it would seem that the finds from phase 7 are the most analogous with those that Dimitrijević attributes to the Lasinja 3 phase (cf. Dimitrijević 1979b, fig. 5). Profiled dishes appear in phases 8 and 9 (e.g. *fig. 5.3.15:* 5), as well as a pot and a small pitcher. The latter two are ornamented with undulating bands (*fig. 5.3.15:* 1,4). Hanging, hatched triangles decorate the pot (*fig. 5.3.15:* 3). Grips with finger imprints also appear (Budja 1992, fig. 4: phase 8), as well as cordons with finger imprints (Tomaž 1999, Pl. MV 41: 6), thickened lips ornamented with impressions and barbotine (Budja 1992, fig. 4: phase 8). There are a multitude of analogies for this phase at HKBV sites in central Slovenia (cf. e.g. Moverna vas: *fig. 5.3.15:* 1–5; Hočevarica: *pl. 4.1.1*; *4.1.7:* 1; *4.1.8:* 1; Gradec pri Mirni: *fig. 5.3.3:* 6,7; Kevderc: *fig. 5.3.5:* 7–15; *5.3.6:* 8). Consequently, it would appear that they belong to the same chronological period.



ta skupka E in D s keramiko, ki, predvsem iz skupka D, kaže na sočasnost s skupki I do E v Podmolu pri Kastelcu. Tako se pojavljajo lonec s stožčastim vratom, ki ima na vratu razčlenjeno rebro (*sl. 5.3.17:* 3), keramika z odtisi prsta na ustju in vratu (*sl. 5.3.17:* 2,11) ter manjšimi krožnimi vbodi (*sl. 5.3.17:* 10). Prisoten je tudi metličasti okras (*sl. 5.3.17:* 6).

Zanimivo je, da podobno kot v Podmolu pri Kastelcu, tudi v Acijevem spodmolu, skupku D sledi skupek C s keramiko ljubljanske kulture (Turk et al. 1992, 31, predvsem t. 4: 13).

Za večino najdb iz skupkov I do E v Podmolu pri Kastelcu in skupkov E in D v Acijevem spodmolu so analogije v Predjami (glej npr. *sl. 5.3.7:* 3,4; Korošec 1956b, t. 34: 3,4; 35: 1,14; 36: 1; 38: 2), v tretji naselbinski fazi Gradca pri Mirni (*sl. 5.3.2:* 9,10; *5.3.3:* 9,10,12), nekaj tudi na Hočevarici (*t. 4.1.6:* 10; *4.1.10:* 1,9; *4.1.11:* 10), še več pa na Maharskem prekopu (npr. Bregant 1975, t. 14: 1,10, 12; 16: 13; 20: 12; 24: 4; 30: 5,6; 34: 2), Blatni Brezovici (*sl. 5.2.1:* 4,6,10,11) in v Notranjih Goricah (*sl. 5.2.5:* 7,11; *5.2.6:* 3).

Gre za paralele, ki dajejo slutiti na sočasnost, tudi s HKBV v osrednji Sloveniji. Toda, ker je keramika z vrezanim ornamentom odsotna, se trenutno zdi časovna korelacija z osrednjeslovenskimi najdišči tipa Maharski prekop verjetnejša (prim. Parzinger 1984).

V vzhodni Sloveniji so Andrenci edino objavljeno najdišče iz neolitskega-eneolitskega obdobja s podatki o vertikalni stratigrafiji. Naselbino je raziskal S. Pahič. V sondah je dokumentiral dve stratigrafsko ločeni plasti (Pahič 1976, 29 ss in tam navedena literatura).

Kljub temu se zdi, da lahko keramiko z Andrencev tipološko uvrstimo v enoten kulturni horizont, ki najdišče vključuje v krog pozno lengyelskih naselbin jugozahodne Panonije (prim. npr. Bondár 1995, 51 ss; Bánffy 1995, 72 ss).

Za lengyelsko kulturo je značilno, da se na keramiki brazdasti vrez pojavlja zelo redko (Kalicz 1991, 362; Horváth 1994, 87), podobno velja za razčlenjena rebra (glej Lichardus 1974, 33). Tako tudi na Andrencih izvira iz zgornje plasti objekta A osamljen in slabo ohranjen fragment keramike z brazdastim vrezom in vbodi (Pahič 1976, 39, t. 3: 8). V naselbinskem arealu pa so bili najdeni tudi redki fragmenti keramike z razčlenjenimi rebri (Pahič 1973, 20).

Naslednje najdišče s keramiko z brazdastim vrezom je enoslojno. Gre za prazgodovinsko naselbino na Pavlovskem vrhu pri Ormožu, ki je bila odkrita leta 1959. V sondi, ki jo je zastavila B. Perc, so naleteli na enotno kulturno plast z ostanki hišnega ometa in na keramiko, okrašeno z barbotinom, vrezanim ornamentom, vretence ter sileks.

Obetavne najdbe so vzpodbudile obsežnejše raziskave v letu 1971 (Tomanič-Jevremov 1973, 20 ss). Zastavljeno je bilo več sond. V sondah 3 in 6 so odkrili ku-



A significant Neolithic and Eneolithic stratigraphic sequence was also determined at Podmol pri Kastelcu and at Acijev spodmol, two cave sites in the Kras in western Slovenia. I. Turk, from the Institute of Archaeology at the SRC SASA, investigated these caves between the years 1989 and 1991 (Turk et al. 1992; 1993). The two caves lie at the edge of a sinkhole, which is a common phenomenon during the Neolithic and Eneolithic in regions where there is little surface water. Sinkholes provided a source of natural protection for people and animals from the strong and cold north-east winds; while the thicker layer of soil at the bottom of the sinkholes was highly cultivable (Novaković, Simoni 1997, 19 pp).

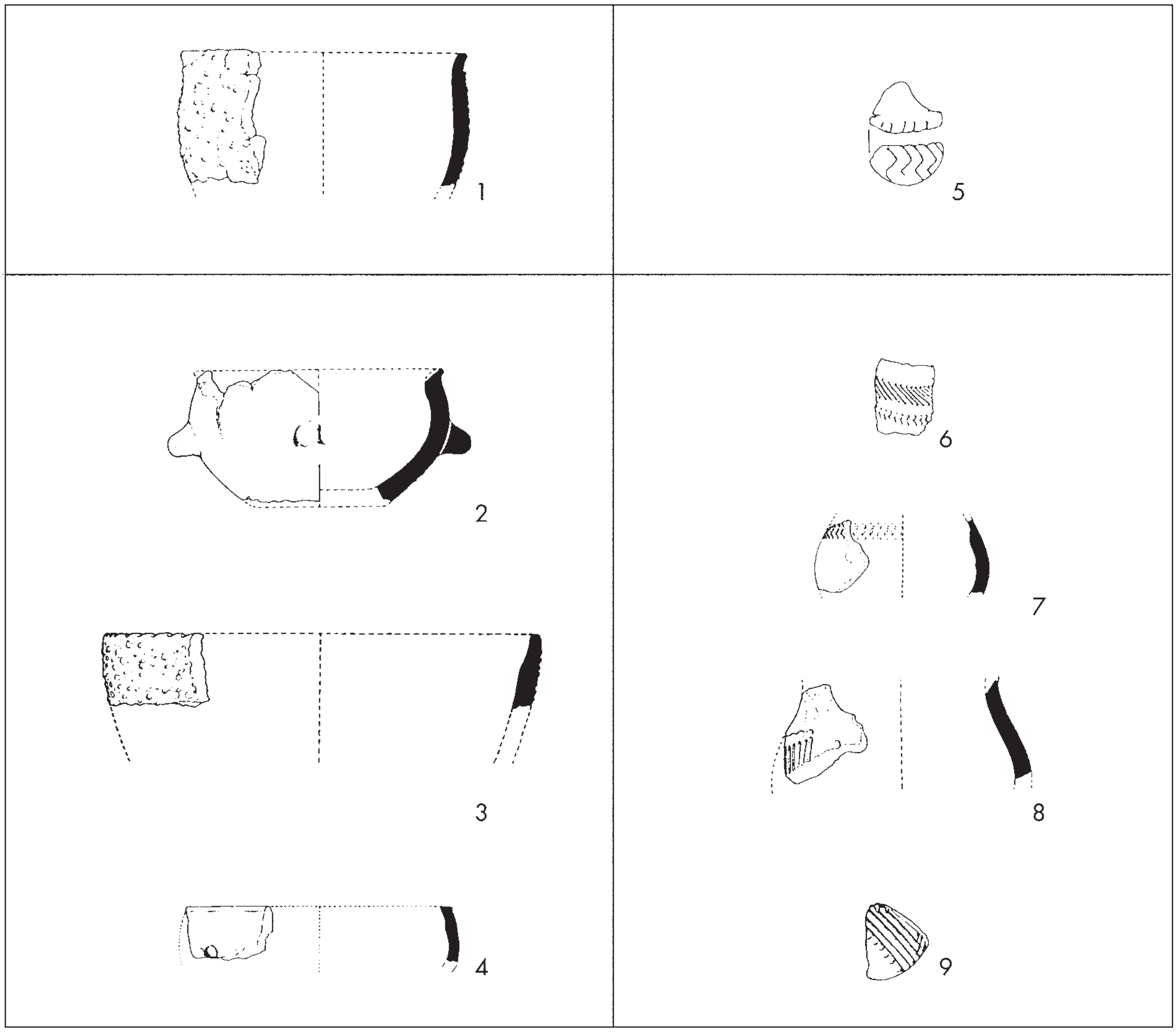
The deepest layers at Podmol pri Kastelcu revealed material finds analogous with Neolithic cultures in the eastern Adriatic (Turk et al. 1993, 59, Pl. 1; 2: 1–13). Lying in the upper layers, or sub-phases I through E, were dishes of the S1 type (e.g. *fig. 5.3.16:* 9). The dishes (*fig. 5.3.16:* 8) and pots (*fig. 5.3.16:* 4) were ornamented with cordon appliqués. Pots with a conical neck have either a cordon with finger imprints on the neck under the lip (*fig. 5.3.16:* 11) or a thickened lip ornamented with impressions (*fig. 5.3.16:* 12). Fingerprint impressions and blunt object impressions are frequent (*fig. 5.3.16:* 13,16) as well as small circular impressions (*fig. 5.3.16:* 17). The brushed ornamentation is a very common element present in sub-phase I (Turk et al. 1993, Pl. 4: 1).

That the finds from sub-phases I through E are at least Eneolithic is confirmed by the higher lying sub-phase D with ornamented pottery typical of the Late Eneolithic Ljubljana culture (Turk et al. 1993, 60, Pl. 13: 22; 14: 7,15,22, etc.; regarding the dating of the Adriatic type (group) of the Ljubljana culture, check Primas 1996; Della Casa 1996 and cf. Velušček, Čufar 2003; Gilli, Montagnari Kokelj 1992, 157).

Also at Acijev spodmol, finds characteristic of the eastern Adriatic Neolithic make their appearance in sub-phase F (Turk et al. 1992, Pl. 1: 1–8; 2: 1,3,4). Sub-phase F is covered by sub-phases E and D, which contain pottery, mainly from sub-phase D, that demonstrate concurrence with sub-phases I through E at Podmol pri Kastelcu: for instance, the find of a pot with a conical neck that has a cordon with finger imprints on its neck (*fig. 5.3.17:* 3), pottery with fingerprint impressions on the lip and neck (*fig. 5.3.17:* 2,11) as well as smaller circular stitches (*fig. 5.3.17:* 10). The brushed ornament is also accounted for (*fig. 5.3.17:* 6).

What is interesting is that, similar to the situation at Podmol pri Kastelcu, sub-phase C with pottery of the Ljubljana culture follows after sub-phase D at Acijev spodmol as well (Turk et al. 1992, 31, especially Pl. 4: 13).

The majority of material finds from sub-phases I through E at Podmol pri Kastelcu and sub-phases E and D at Acijev spodmol have analogies at Predjama (check e.g. *fig. 5.3.7:* 3,4; Korošec 1956b, Pl. 34: 3,4; 35: 1,14; 36: 1; 38: 2), in the third settlement phase at Gradec pri




*Sl. 5.3.18:* Pavlovski vrh pri Ormožu. Vse keramika (po Tomanič-Jevremov 1973). 1 do 4 v merilu 1 : 5, 5 do 9 v merilu 1 : 3.
*Fig. 5.3.18:* Pavlovski vrh near Ormož. All pottery (after Tomanič-Jevremov 1973). 1 to 4 on a scale of 1 : 5, 5 to 9 on a scale of 1 : 3.

rišče, hišni omet ter keramiko, med katero prevladuje posodje, okrašeno z barbotinom (*sl.5.3.18:* 1,3). Kronološko najpomembnejše so najdbe iz sonde 6, kjer so našli keramiko z brazdastim vrezom (*sl. 5.3.18:* 6,7) in pečatnik (*sl. 5.3.18:* 5). »S« motiv na vrču (*sl. 5.3.18:* 6) ima analogijo v Mödlingu, ki ga E. Ruttkay uvršča v horizont Brno-Lišeň III (Ruttkay 1997, 167) in tudi v Višnjici, eponimnem najdišču tipa Višnjica retz-gajarske kulture (Dimitrijević 1980, t. 8: 6).

V podoben kulturni krog spada tudi pečatnik (*sl. 5.3.18:* 5). Dobra paralela zanj je na Škocijanu/Kanzianibergu v Avstriji (Dolenz 1938, t. 3: 1).

Mirni (*fig. 5.3.2:* 9,10; *5.3.3:* 9,10,12), some also at Hočevarica (*pl. 4.1.6:* 10; *4.1.10:* 1,9; *4.1.11:* 10), even more at Maharski prekop (e.g. Bregant 1975, Pl. 14: 1,10, 12; 16: 13; 20: 12; 24: 4; 30: 5,6; 34: 2), Blatna Brezovica (*fig. 5.2.1:* 4,6,10,11) and at Notranje Gorice (*fig. 5.2.5:* 7,11; *5.2.6:* 3).

These are parallels that hint at simultaneousness with even the HKBV horizon in central Slovenia. However, as pottery with furrowed incisions is absent, the chronological correlation with central Slovenian sites of the Maharski prekop type seems more likely at the moment (cf. Parzinger 1984).

In eastern Slovenia, Andrenci is the only published site from the Neolithic-Eneolithic period that is published with data regarding the vertical stratigraphy. S. Pahič investigated the settlement. He documented two stratigraphic layers in his trenches (Pahič 1976, 29 pp and the literature there cited). Nonetheless, it still seems that the pottery from Andrenci typologically belongs to a unified cultural horizon, which incorporates the site in the sphere of the Late Lengyel settlements of southwes-

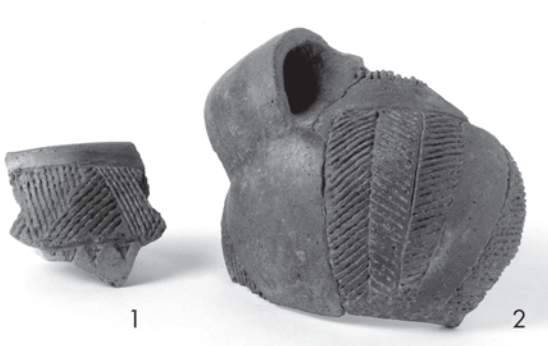
Kronološko pomembna je tudi posoda z držajem (*sl. 5.3.18:* 2). Spominja na sklede tipa S3, ki jih poznamo z Ljubljanskega barja (glej *sl. 4.2.8:* S3).

Pred nekaj leti so naleteli na keramiko z brazdastim vrezom z zelo pomembnimi stratigrafskimi podatki tudi v okviru zaščitnih izkopavanj na trasi bodoče avtoceste Ljubljana–Lendava.

Tako se brazdasti vrez pojavlja na keramiki s še neobjavljene žarne nekropole na lokaciji Pod Kotom-jug na skrajnem severovzhodu Slovenije,[10] se pravi z območja, kjer tako keramiko že dalj časa poznamo.[11] Na grobišču Pod Kotom-jug se pojavlja skupaj z lončenino, ki je ornamentirana z razčlenjenimi rebri, barbotinom itn. Zanimivo je, da je v otroškem grobu 41 najdena tudi majhna bakrena ploščica.

Tudi v Slivnici pri Mariboru so naleteli na naselbinsko keramiko z brazdastim vrezom in na tipične najdbe, ki jih v Sloveniji uvrščamo v obdobje boleraške stopnje badenske kulture (Strmčnik-Gulič 1999, 229, sl. 6; 2001, 120, sl. 3; 4; prim. Parzinger 1984; 1993).[12] Ker rezultati še niso v celoti objavljeni, tudi ni jasno, v kakšnem stratigrafskem odnosu sta ti dve skupini najdb.

V tem trenutku je pomembno, da vemo, da predstavlja keramika z brazdastim vrezom najstarejšo fazo na najdišču v Slivnici (Strmčnik-Gulič 2001, 117 ss). Za skodelo z okrasom v motivu volčjega zoba (*sl. 5.3.19:* 1) imamo analogijo v Ondrochovu na jugozahodu Slovaške (Dimitrijević 1980, t. 17: 10). Vrč (*sl. 5.3.19:* 2) lahko primerjamo z inventarjem z najdišč v osrednji Sloveniji, kjer so primerjave tako s tehniko brazdastega vrezovanja kot tudi motiva smrekove vejice (glej *t. 4.1.1:* 1,2) in lestvičastega motiva (glej *t. 4.1.5:* 11).




*Sl. 5.3.19:* Slivnica pri Mariboru. Vse keramika (po Strmčnik-Gulič 2001). Ni v merilu.
*Fig. 5.3.19:* Slivnica near Maribor. All pottery (after Stmčnik-Gulič 2001). Not in scale.

[10] I. Šavel, Prvi metalurgi. – V: *Odkopane kulture Prekmurja*, Arheološka razstava – Pokrajinski muzej Murska Sobota, December 2002–februar 2003.

[11] Bukovnica (Šavel 1994, Priloga 23: 1,2; 1995, 7 ss (idol)), Šafarsko (Horvat-Šavel 1984, t. 8: 7; Šavel 1994, t. 12: 24).

[12] Ustna informacija S. Djure-Jelenko, za kar se ji zahvaljujemo.



tern Pannonia (cf. e.g. Bondár 1995, 51 pp; Bánffy 1995, 72 pp).

It is characteristic for the Lengyel culture that furrowed incisions very rarely decorate the pottery (Kalicz 1991, 362; Horváth 1994, 87). Likewise also holds true for cordons with finger imprints (check Lichardus 1974, 33). From the upper layer of object A at Andrenci only a single, poorly preserved fragment of pottery with furrowed incisions and stitches was discovered (Pahič 1976, 39, Pl. 3: 8). Furthermore, the settlement area also revealed occasional fragments of pottery with cordons with finger imprints (Pahič 1973, 20).

The next site bearing pottery with furrowed incisions, the prehistoric settlement upon Pavlovski vrh near Ormož, discovered in 1959, had only a single layer. B. Perc established a trench in which a unified cultural layer revealed remains of house roughcasting and pottery ornamented with barbotine and incised decoration, spindle whorls and a silex. The promising finds sparked the onset of more extensive excavations in 1971 (Tomanič-Jevremov 1973, 20 pp). Numerous trenches were set up. Trenches 3 and 6 revealed a hearth, house roughcasting and pottery. Vessels ornamented with barbotine prevailed (*fig. 5.3.18:* 1,3). Chronologically the most significant are the finds from trench 6, where pottery with furrowed incisions was found (*fig. 5.3.18:* 6,7) as well as a seal stamp (*fig. 5.3.18:* 5). An »S« motif on a pitcher (*fig. 5.3.18:* 6) has analogies in Mödling, which E. Ruttkay classifies to the horizon Brno-Lišeň III (Ruttkay 1997, 167) and also to Višnjica, an eponymic site of the Višnjica type of the Retz-Gajary culture (Dimitrijević 1980, Pl. 8: 6).

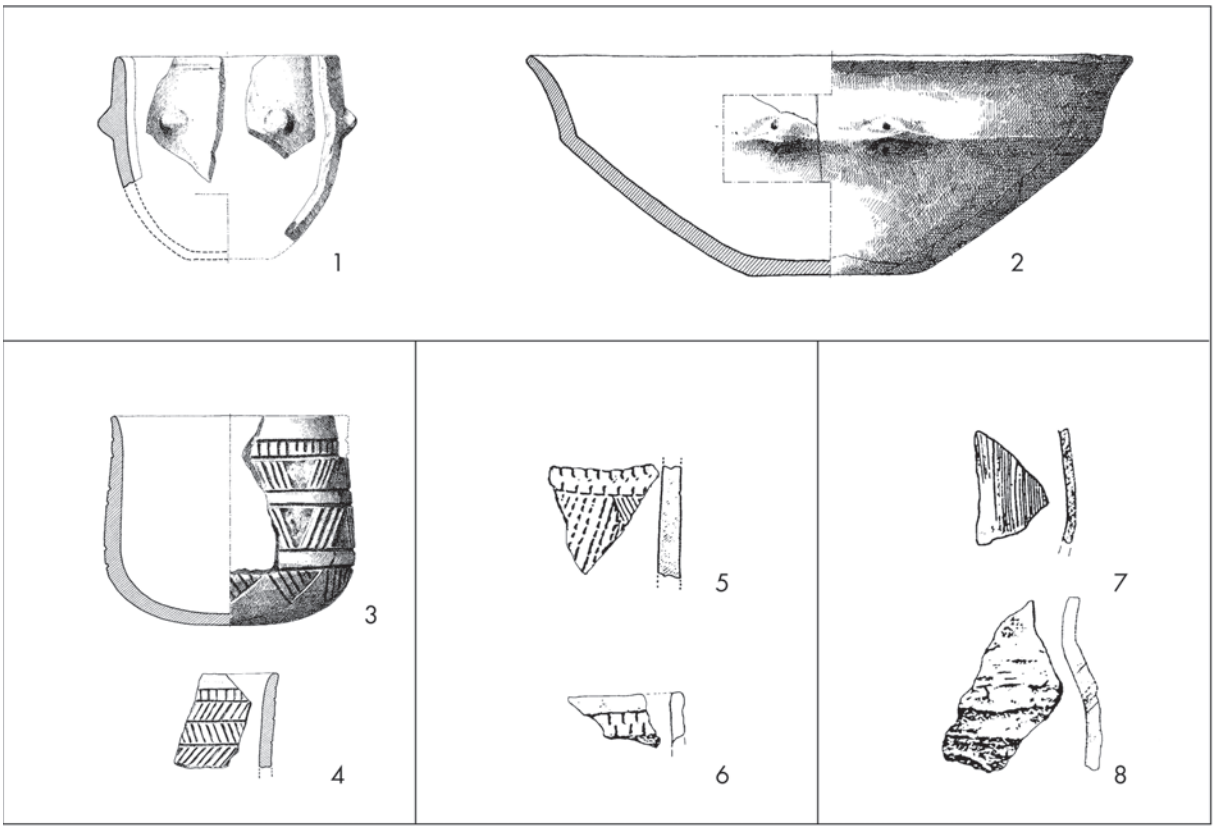
The seal stamp also belongs to a similar cultural circle (*fig. 5.3.18:* 5). A good parallel for it is from Kanzianiberg, Austria (Dolenz 1938, Pl. 3: 1).

The vessel with a grip is also chronologically important (*fig. 5.3.18:* 2). It reminisces of the S3 type dish familiar from the Ljubljansko barje (check *fig. 4.2.8:* S3).

Just a few years ago pottery with furrowed incisions was discovered – this time equipped with very important stratigraphic data – within the framework of the rescue excavations along the laying out of the future highway Ljubljana–Lendava. Thus it is that furrowed incisions are witnessed on pottery from the yet unpublished urn necropolis at Pod Kotom-jug in the far northeastern part of Slovenia,[10] precisely the region from where this type of pottery is already long known.[11] At the Pod Kotom-jug necropolis it appears together with pottery ornamented with cordons with finger imprints, barbotine, etc. One noteworthy grave is the child grave 41 in which a small copper plate was also found.

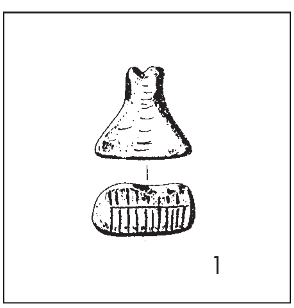
[10] I. Šavel, Prvi metalurgi. – In: *Odkopane kulture Prekmurja*, Archaeological exhibition – Provincial Museum in Murska Sobota, December 2002–February 2003.

[11] Bukovnica (Šavel 1994, App. 23: 1,2; 1995, 7 pp (idol)), Šafarsko (Horvat-Šavel 1984, Pl. 8: 7; Šavel 1994, Pl. 12: 24).




*Sl. 5.3.20:* Drljanovac pri Bjelovarju. Vse keramika (po Durman 1982). M. = 1 : 3.
*Fig. 5.3.20:* Drljanovac near Bjelovar. All pottery (after Durman 1982). Scale = 1 : 3.

Na tellu Pepelane so naleteli na 8 naselbinskih horizontov s časovnim razponom od starčevske do retz-gajarske kulture (Minichreiter 1989, 19 ss). Horizonti retz-gajarske kulture[13] stratigrafsko prekrivajo seške kul-




*Sl. 5.3.21:* Drljanovac pri Bjelovarju. Keramika (po Durman 1982). M. = 1 : 3.
*Fig. 5.3.21:* Drljanovac near Bjelovar. The pottery (after Durman 1982). Scale = 1 : 3.

Settlement pottery with furrowed incisions was also discovered at Slivnica near Maribor, as well as other typical finds, which in Slovenia are attributed to the period of the Boleraz level of the Baden culture (Strmčnik-Gulič 1999, 229, fig. 6; 2001, 120, fig. 3; 4; cf. Parzinger 1984; 1993).[12] As the results have yet to be fully published the stratigraphic relationship of these two groups of finds is not yet entirely clear.

At this point it is quite important to acknowledge that pottery with furrowed incisions represents the earliest phase at the site of Slivnica (Strmčnik-Gulič 2001, 117 pp). An analogy for the dish ornamented with the motif of a wolf's tooth (*fig. 5.3.19:* 1) is found at Ondrochov in southwestern Slovakia (Dimitrijević 1980, Pl. 17: 10). The pitcher (*fig. 5.3.19:* 2) is comparable with the inventory from sites in central Slovenia, which presents examples of the use of furrowed incisions as well as the motif of pine branches (check *pl. 4.1.1:* 1,2) and the motif of a scale (check *pl. 4.1.5:* 11).

Eight settlement horizons were discovered at the Pepelane tell, with a chronological span ranging from the Starčevo to the Retz-Gajary cultures (Minichreiter 1989, 19 pp). The Retz-Gajary culture horizons[13] stratigraphically cover the Seče cultural horizons. The final Seče

[13] Tip Hrnjevac po Z. Markoviću (1994, 98) oziroma tip Višnjica po K. Minichreiter (1989, 32).

[12] We are thankful for the information referred to us by S. Djura-Jelenko by word of mouth.

[13] Type Hrnjevac according to Z. Marković (1994, 98) or type Višnjica according to K. Minichreiter (1989, 32).

turne horizonte. V zadnjem seškem naselbinskem horizontu in v prvih dveh horizontih retz-gajarske kulture zasledimo tudi posamezne fragmente lasinjske keramike (Minichreiter 1989, 29, 32, sl. 16: 20,22,23; 18: 17–20).

K. Minichreiter na podlagi stratigrafskih opažanj meni, da je lasinjska kultura delno sočasna seški, v njeni zgodnjeklasični fazi pa retz-gajarski kulturi (1989, 29, 32, 37). Pri tem se sklicuje tudi na Dimitrijevićevo hipotezo, po kateri so zgodnjeklasične lasinjske najdbe z Drulovke, Ajdovske in Jermanove jame sočasne z retz-gajarsko kulturo (prim. Dimitrijević 1979c, 361), torej na hipotezo, ki je že dolgo časa označena kot nesprejemljiva (glej Budja 1983; Parzinger 1984; 1993).

Hipotezo ovrže tudi Z. Marković. Lasinjske najdbe s Pepelan okarakterizira kot keramiko mlajših lasinjskih horizontov in tako vzpostavi novo korelacijo: pozna Lasinja–začetek retz-gajarske kulture (Marković 1989, 46; 1994, 100).

Gre za korelacijo, ki je v nasprotju s horizontalnostratigrafskim odnosom med retz-gajarsko zemljanko (zaključena celota!) in 30 m oddaljenimi vkopanimi objekti pozne lasinjske kulture na Drlajnovcu pri Bjelovarju (prim. Dimitrijević 1979b, 146; Durman 1982). Ker iz zemljanke izhajajo izključno retz-gajarske najdbe (*sl. 5.3.20*; *5.3.21*), saj do mešanja z lasinjskimi najdbami ni prišlo (Durman 1982), sklepamo, da takšen horizontalnostratigrafski odnos dokazuje obstoj dveh kronološko različnih faz (lasinjske in retz-gajarske).

Če ugotovitev primerjamo s trendom, ki se kaže v stratigrafiji na Pepelanah, pridemo do zaključka, da je pozna lasinjska kultura na Drljanovcu starejša od retz-gajarske kulture (prim. Durman 1982, 37; Marković 1994, 98). Slednje pa morda velja tudi za Pepelane.

Začetek mlajšeneolitskega[14] obdobja v južni Avstriji (Koroška in južna Štajerska) označuje skupina Škocijan-Lasinja (prim. Pittioni 1954; Modrijan 1973a; 1973b; Ruttkay 1993-1994; 1996; Vahlkampf 1995). Opredelitev skupine pa številnim najdiščem navkljub (okoli 50) še vedno ni jasna (Ruttkay 1993-1994, 222; 1996, 44), saj se v Avstriji srečujejo s podobnim problemom kot pri nas. Raziskana najdišča z dobro stratigrafijo v glavnem še niso objavljena, na voljo so le osnovni podatki (npr. Dietenberg, Schloßberg (Wildon)) (Ruttkay 1993-1994, 222 s). Le najdbe iz jam naselbine Kapfenstein so obravnavane kot zaključene celote (Lochner 1986, 25 ss). Čeprav si je na takšni podlagi težko ustvariti sliko o kulturnem razvoju, se zdi, da je južnoavstrijska problematika primerljiva s slovensko, saj je znano, da so naj-

[14] Ker se avstrijska prazgodovinska terminologija razlikuje od slovenske, moramo najprej pojasniti, da našemu eneolitiku ustrezata mlajši in končni neolitik. Po avstrijski terminologiji je tukaj obravnavano mlajšeneolitsko obdobje.



settlement horizon and the first two Retz-Gajary culture horizons bear traces also of individual fragments of Lasinja pottery (Minichreiter 1989, 29, 32, fig. 16: 20,22,23; 18: 17–20).

K. Minichreiter is of the opinion, on the basis of stratigraphic observations, that the Lasinja culture is partially concurrent with the Seče culture, and in its Early Classical phase with the Retz-Gajary culture (1989, 29, 32, 37). He also refers to the hypothesis of Dimitrijević, by which Early Classical Lasinja finds from Drulovka, Ajdovska jama and Jermanova jama are concurrent with the Retz-Gajary culture (cf. Dimitrijević 1979c, 361). This is a hypothesis, which has long been designated as unacceptable (check Budja 1983; Parzinger 1984; 1993).

Z. Marković also refutes the hypothesis. He characterizes the Lasinja finds from Pepelane as pottery of the later Lasinja horizons and he establishes a new correlation: Late Lasinja–Early Retz-Gajary culture (Marković 1989, 46; 1994, 100).

This correlation contradicts the horizontal-stratigraphic relationship between the Retz-Gajary dugout hut (a close unit!) and the late Lasinja culture structures dug in 30 m away at Drljanovac near Bjelovar (cf. Dimitrijević 1979b, 146; Durman 1982). As exclusively Retz-Gajary finds (*fig. 5.3.20*; *5.3.21*) were discovered in the dugout hut, there were certainly no Lasinja finds intermixed (Durman 1982). It follows that this horizontal-stratigraphic relationship confirms the existence of two chronologically independent phases (Lasinja and Retz-Gajary).

In comparing this determination with the trend evidenced in the stratigraphy at Pepelane, presumably the Late Lasinja culture at Drljanovac is earlier than the Retz-Gajary culture (cf. Durman 1982, 37; Marković 1994, 98). And perhaps the latter also holds true for Pepelane.

The beginning of the Late Neolithic[14] in southern Austria (Carinthia and southern Styria) is demarcated by the Škocijan-Lasinja group (cf. Pittioni 1954; Modrijan 1973a; 1973b; Ruttkay 1993-1994; 1996; Vahlkampf 1995). Despite the large number of sites (approx. 50) the final classification of the group is yet unclear (Ruttkay 1993-1994, 222; 1996, 44); Austria is plagued with a similar problem as Slovenia. The investigated sites equipped with good stratigraphy are for the most part still unpublished, and only basic information is available (e.g. Dietenberg, Schloßberg (Wildon)) (Ruttkay 1993-1994, 222 p). Only the material finds from the pits of the Kapfenstein settlement are interpreted as their own complete unit (Lochner 1986, 25 pp). Although it

[14] As the Austrian prehistoric terminology differs from the Slovenian one, let us first clarify that the Slovenian Eneolithic corresponds to the Austrian Late and Final Neolithic. The Late Neolithic period according to the Austrian terminology is currently the topic of discussion.

dišča lasinjske kulture oziroma škocijansko-lasinjske skupine na obeh straneh današnje administrativne meje.

Na Oberburgstallu pri Flambergu na Štajerskem so v sondi 4 × 4 m naleteli na dve stratigrafsko ločeni plasti, ki brez jasne ločnice prehajata ena v drugo (Hebert 1989, 175). Za spodnjo plast je značilna lasinjska keramika: zajemalke s tulastim držajem ter klekaste sklede in lonci, ki so ornamentirani s snopi vrezanih linij in odtisi topega predmeta (Hebert 1989, sl. 208–211; 216–218). V zgornji plasti pa se poleg tipične lasinjske keramike, kot npr. zajemalke s tulastim držajem, pojavlja tudi keramika z vrezanimi lestvičastimi, mrežastimi motivi ter vrezanimi trakovi (Hebert 1989, sl. 227–232), ki jo lahko primerjamo z najdbami stopnje Balaton 2 v Panoniji in tudi z najdišči HKBV v osrednji Sloveniji (npr. *sl. 5.3.11:* 3; Dular et al. 1991, t. 29: 16,17; Leben 1963, t. 1: 5; 2: 2).

Podobno velja za Schloßberg, kjer so naleteli na 4 m debelo kulturno plast. Dokumentirali so 8 do 10 arheoloških slojev. Na najdbe lasinjske kulture so naleteli v spodnjih treh, po nekaterih podatkih celo štirih slojih (Ruttkay 1993-1994, 227). V tretjem (najvišjem!) lasinjskem sloju se pojavlja tudi keramika z brazdastim vrezom (Ruttkay 1996, 45).

Na podoben stratigrafski odnos do lasinjskih naselbinskih ostankov kaže tudi keramika z brazdastim vrezom s Kögelberga pri St. Ulrichu na Waasnu, saj je bila najdena v zgornjem delu lasinjskega sloja (Fuchs 1984, 237; 1985-1986, 224).[15]

Nekoliko drugače je bilo v okolici Schönberga pri Lipnici/Leibnitz. Ob gradnji avtoceste so odkrili naselbinske jame z redkimi fragmenti keramike, med katerimi je bila tudi keramika tipa Retz-Gajary, ni bilo pa lasinjskih najdb (Fuchs 1987, 203). Nasprotno pa najdemo značilno poznolasinjsko keramiko v naselbinski jami v Kopfingu na vzhodnem Štajerskem, kjer se ne pojavlja keramika z brazdastim vrezom (Artner, Obereder 1998, 75 ss).

Kakor vidimo, je za keramiko z brazdastim vrezom na območju od severozahodne Hrvaške preko osrednje in vzhodne Slovenije do južne Avstrije malo ustreznih vertikalnostratigrafskih podatkov. Kljub vsemu lahko podamo nekaj ugotovitev:

1. Zdi se, da stratigrafija Gradca pri Mirni, Ajdovske jame, Pepelan, Oberburgstalla, Schloßberga in Kögelberga kaže na časovno prioriteto lasinjske kulture pred HKBV.
2. Na podlagi stratigrafskih podatkov z Gradca pri Mirni, Pepelan, Oberburgstalla, Schloßberga, Kögelberga bi lahko sklepali tudi na mogočo delno sočasnost lasinjske kulture in HKBV.

[15] Izkopavalec o tem piše: »Zanimivo je mešanje lasinjskih najdb s posameznimi fragmenti keramike tipa Retz-Gajary, ki se pojavljajo v zgornjem delu kulturnega sloja« (Fuchs 1984, 237).



is difficult to form an idea of the cultural development on such a basis, it would nonetheless seem that the southern Austrian issue is comparable with the Slovenian one. It is a recognized fact, for instance, that sites of the Lasinje culture or the Škocjan-Lasinja group are found on both sides of today's administrative border.

At Oberburgstall near Flamberg in Styria, two stratigraphically independent layers that pass over from one to the next without any distinct dividing line were found in a trench measuring 4 × 4 m (Hebert 1989, 175). Lasinja pottery was characteristic for the lower layer: ladles with socketed handles and hooked dishes and pots ornamented with splotches of incised lines and impressions made with a blunt object (Hebert 1989, fig. 208–211; 216–218). The upper layer comprised of, in addition to typical Lasinja pottery, such as ladles with socketed handles, also pottery with incised scaled and meshed motifs as well as incised bands (Hebert 1989, fig. 227–232). These finds are analogous with the material finds attributed to the Balaton 2 phase in Pannonia and also to HKBV sites in central Slovenia (e.g. *fig. 5.3.11:* 3; Dular et al. 1991, Pl. 29: 16,17; Leben 1963, Pl. 1: 5; 2: 2).

Similarly holds true also for Schloßberg, where a 4 m thick cultural layer was discovered. Eight to ten archaeological layers were documented. Lasinja cultural finds were uncovered in the lower three layers; according to some data even four layers (Ruttkay 1993-1994, 227). The third (uppermost!) Lasinja layer also revealed pottery with furrowed incisions (Ruttkay 1996, 45).

A similar stratigraphic relationship to the Lasinja settlement remains is demonstrated by the pottery with furrowed incisions from Kögelberg near St. Ulrich upon Waasen; this pottery was found in the upper part of the Lasinja layer (Fuchs 1984, 237; 1985-1986, 224).[15]

A slightly different portrait was painted in the surroundings of Schönberg near Leibnitz. Settlement pits with rare pottery fragments were discovered while building the highway; pottery of the Retz-Gajary type was also among these finds, while Lasinja finds were absent (Fuchs 1987, 203). Contrarily, characteristic Late Lasinja pottery was discovered in the settlement pit in Kopfing in eastern Styria, where pottery with furrowed incisions is also known (Artner, Obereder 1998, 75 pp).

It is evident that there is little reliable, vertical stratigraphic data regarding pottery with furrowed incisions in the region ranging from northwestern Croatia over central and eastern Slovenia to southern Austria. Nonetheless, a few determinations can be established:

1. It would seem that the stratigraphy at Gradec pri Mirni, Ajdovska jama, Pepelane, Oberburgstall, Schloßberg and Kögelberg all demonstrate chrono-

[15] The excavator cites the following on the matter: »The mixing of Lasinja finds with individual fragments of Retz-Gajary type pottery, which appear in the upper part of the cultural layer, is quite interesting« (Fuchs 1984, 237).

3. Da lasinjska kultura in HKBV nista sočasna kažejo podatki z najdišč, kot so: Hočevarica, Slivnica pri Mariboru, Pavlovski vrh pri Ormožu, Pod Kotom-jug v Prekmurju, najdišče iz okolice Schönberga pri Lipnici in Drljanovac.

Na podlagi teh ugotovitev se nam zdi kronološko zaporedje lasinjska kultura–HKBV najverjetnejše. To posredno dokazuje tudi stratigrafija Moverne vasi, kjer se najdbe, ki smo jih povezali s HKBV, pojavljajo v post-lasinjskih naselbinskih horizontih (prim. Budja 1992, sl. 4).

V srednjem Podonavju sledi horizontu keramike z brazdastim vrezom obdobje badenske kulture (npr. Kalicz 1991; Ruttkay 1995). Na podlagi podatkov, ki smo jih zbrali, sklepamo na primerljiv razvoj tudi v osrednji Sloveniji. Na nekaterih najdiščih[16] se skupaj s keramiko z brazdastim vrezom pojavlja keramika, ki se jo primerja z boleraškim horizontom v srednjem Podonavju (prim. Parzinger 1984; 1993; Dular et al. 1991; Velušček 1999b).

Po našem mišljenju to ne drži povsem. Verjetneje gre za najdbe, ki so sorodne najdbam t. i. protoboleraškega horizonta (Kalicz 1991), ki ga pri nas (še) ne moremo ločiti od HKBV. Šele nato sledi obdobje, ki je paralelno z razvojem zgodnejše badenske kulture v srednjem Podonavju. Dokaze vidimo v horizontalni stratigrafiji naselbin t. i. boleraškega horizonta na Ljubljan-



logical priority to the Lasinja culture before the HKBV horizon.

2. The stratigraphic data from Gradec pri Mirni, Pepelane, Oberburgstall, Schloßberg and Kögelberg serve as a good basis for the inference of possible partial contemporaneity of the Lasinja culture and HKBV.
3. That the Lasinja culture and HKBV are not contemporaneous is demonstrated by sites such as: Hočevarica, Slivnica near Maribor, Pavlovski vrh near Ormož, Pod Kotom-jug in Prekmurje, sites from the surroundings of Schönberg near Leibnitz and Drljanovac.

These determinations lead us to believe that the Lasinja culture–HKBV chronological sequence is the most likely. Indirectly, this also confirms the stratigraphy at Moverna vas, where finds correlating to the HKBV horizon appear in the Post-Lasinja settlement horizons (cf. Budja 1992, fig. 4).

In the central Danube region the period of the Baden culture succeeds the horizon of pottery with furrowed incisions (e.g. Kalicz 1991; Ruttkay 1995). The data collected as of yet alludes to an analogous development in central Slovenia as well. At select sites[16] pottery analogous with the Boleraz horizon in the central Danube region appears alongside pottery with furrowed incisions

<table>
<tr><th>Ljubljansko barje<br>(Velušček 2001; Velušček, Čufar 2003)</th><th>Osrednja Slovenija<br>(Velušček 2001; Velušček, Čufar 2003)</th><th>Severozahodna Hrvaška<br>(Velušček 2001; Velušček, Čufar 2003)</th><th>Koroška in Južna Štajerska<br>(Velušček 2001)</th><th>Zahodna Madžarska<br>(prirejeno po Kalicz 1991; Marković 1994; Raczky 1995)</th><th>Severozahodna Hrvaška<br>(Marković 1994)</th><th>Ljubljansko barje<br>(Parzinger 1984)</th></tr>
<tr><td>(?)</td><td>Lasinja</td><td>Lasinja</td><td>Škocijan–Lasinja</td><td>Balaton–Lasinja I</td><td>Lasinja</td><td rowspan="6">Lb II<br>Lb III<br>Lb IV</td></tr>
<tr><td rowspan="2">Hočevarica (HKBV)</td><td rowspan="2">HKBV</td><td rowspan="2">Retz-gajarska kultura (HKBV)</td><td rowspan="2">HKBV</td><td>HKBV / Retz–Gajary / Bajč–Retz</td><td rowspan="5">Retz-Gajary</td></tr>
<tr><td>Protoboleraz</td></tr>
<tr><td rowspan="2">Maharski prekop, Blatna Brezovica</td><td>(?)</td><td>(?)</td><td>(?)</td><td>Boleraz</td></tr>
<tr><td>(?)</td><td></td><td></td><td>Baden</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Baden–Kostolac / Kostolac</td></tr>
<tr><td>Parte–Iščica</td><td>(?)</td><td>Vučedol</td><td>(?)</td><td>Vučedol</td><td>Vučedol</td><td>Lb V</td></tr>
</table>

*Tab. 5.3.1:* Primerjalna kronološka tabela.

[16] Najboljši primeri: Gradec pri Mirni, Ajdovska jama, Pod Kotom-jug.

[16] The best examples: Gradec pri Mirni, Ajdovska jama, Pod Kotom-jug.

skem barju: Maharski prekop, Blatna Brezovica itn. Njihova skupna značilnost je odsotnost keramike z brazdastim vrezom ter tudi sicer zelo skromen ornamentalni izbor na keramiki.

### 5.3.4 ZAKLJUČEK

Na Hočevarici smo dokumentirali dve naselbini oziroma dve arheološki naselbinski fazi, ki ju uvrščamo v HKBV.

Kakor smo videli, lahko najdbam HKBV sledimo po celotni osrednji in, kot smo pričakovali, tudi v vzhodni Sloveniji, se pravi v smeri proti zahodni Panoniji in severozahodni Hrvaški (prim. Kalicz 1991, sl. 1: 4). Kraška planota je meja na zahodu, z najdiščem Predjama, in morda tudi s Tominčevo jamo, kjer so bojda našli keramiko z analogijami v Predjami (Leben 1971, 121). Iz Tominčeve jame sicer poznamo bakreno sekiro, ki ima analogijo v Bezgečevi jami (Leben 1980, 27; Velušček, Greif 1998, 39 s). Na severu se Horizont širi v Avstrijo. Na jugu prekorači Kolpo, če sprejmemo interpretacijo Z. Markovića, po kateri se keramično »stekleničko« iz jame Vrlovke pri Kamanju uvršča v retz-gajarsko kulturo (Marković 1985, 22; 1994, 98), ter L. Čučkovića, ki v t. i. retz-gajarsko kulturo, poleg Vrlovke, uvršča tudi Kiringrad (Čučković 1985, 9).[17]



(cf. Parzinger 1984; 1993; Dular et al. 1991; Velušček 1999b).

This is not entirely true in our opinion. It is more likely that these are finds similar to the finds of the so-called Proto-Boleraz horizon (Kalicz 1991), which cannot (yet) be distinguished from HKBV in Slovenia. It is only after this that a period, parallel with the development of earlier Baden culture in the central Danube region follows. Evidence of this is seen in the horizontal stratigraphy of settlements with the so-called Boleraz horizon at the Ljubljansko barje: Maharski prekop, Blatna Brezovica, etc. Their common factor is the absence of pottery with furrowed incisions as well as on otherwise very limited selection of ornamentation on pottery vessels.

### 5.3.4 CONCLUSION

Two settlements were documented at Hočevarica, or rather two archaeological settlement phases, which are attributed to the HKBV horizon.

It was demonstrated that finds attributed to the HKBV horizon can be traced throughout the entire central and, as was expected, also eastern Slovenia, that is in the direction of western Pannonia and northwestern Croatia (cf. Kalicz 1991, fig. 1: 4). The Kras plain forms the dividing line towards the west, with the Predjama

<table>
<tr><th>Ljubljansko barje (Velušček 2001; Velušček, Čufar 2003)</th><th>Central Slovenia (Velušček 2001; Velušček, Čufar 2003)</th><th>NW Croatia (Velušček 2001; Velušček, Čufar 2003)</th><th>Carinthia and S Styria (Velušček 2001)</th><th>W Hungary (after Kalicz 1991; Marković 1994; Raczky 1995)</th><th>NW Croatia (Marković 1994)</th><th>Ljubljansko barje (Parzinger 1984)</th></tr>
<tr><td>(?)</td><td>Lasinja</td><td>Lasinja</td><td>Škocijan-Lasinja</td><td>Balaton-Lasinja I</td><td>Lasinja</td><td rowspan="6">Lb II<br>Lb III<br>Lb IV</td></tr>
<tr><td rowspan="2">Hočevarica (HKBV)</td><td rowspan="2">HKBV</td><td rowspan="2">Retz-Gajary (HKBV)</td><td rowspan="2">HKBV</td><td>HKBV / Retz-Gajary / Bajč-Retz</td><td rowspan="5">Retz-Gajary</td></tr>
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<tr><td rowspan="2">Maharski prekop, Blatna Brezovica</td><td>(?)</td><td>(?)</td><td>(?)</td><td>Boleraz</td></tr>
<tr><td>(?)</td><td></td><td></td><td>Baden</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Baden-Kostolac / Kostolac</td></tr>
<tr><td>Parte-Iščica</td><td>(?)</td><td>Vučedol</td><td>(?)</td><td>Vučedol</td><td>Vučedol</td><td>Lb V</td></tr>
</table>

*Table 5.3.1:* A comparative chronological table.

[17] Dimitrijević uvršča Vrlovko in Kiringrad v lasinjsko kulturo (Vrlovka: Dimitrijević 1961, 33, sl. D, t. 17: 130; Kiringrad:

Horizont (HKBV) kronološko postavljamo v obdobje po lasinjski kulturi (po 2. fazi na Gradcu; po fazi 7 v Moverni vasi) in pred t. i. boleraški horizont, ki je v Sloveniji dobro dokumentiran predvsem na Ljubljanskem barju (najdišča tipa Maharski prekop; Ljubljansko barje III po Parzingerju (1984)).

Dimitrijević 1961, 30 ss, t. 14: 98–100; 15; 16; 17: 123–129), Z. Markovič pa Kiringrad, povsem upravičeno, celo v halštatsko obdobje (Marković 1985, 22).



site and perhaps also Tominčeva jama, where supposedly pottery analogous with that from Predjama was found (Leben 1971, 121). A copper axe is also known from Tominčeva jama; it is analogous with that from Bezgečeva jama (Leben 1980, 27; Velušček, Greif 1998, 39 p). Northwards the horizon extends into Austria. It crosses the Kolpa in the south, if accepting Z. Marković's interpretation, by which the pottery bottle-like vessel from the Vrlovka cave near Kamanj attributes it to the Retz-Gajary culture (Marković 1985, 22; 1994, 98); in addition to Vrlovka, L. Čučković also attributes Kiringrad to the so-called Retz-Gajary culture (Čučković 1985, 9).[17]

We are of the opinion that the HKBV horizon chronologically fits in the period after the Lasinja culture (after phase 2 at Gradec pri Mirni; after phase 7 at Moverna vas) and before the so-called »Boleraz« horizon, which is well documented in Slovenia, especially upon the Ljubljansko barje (sites of the Maharski prekop type; Ljubljansko barje III according to Parzinger (1984)).

[17] Dimitrijević classifies Vrlovka and Kiringrad to the Lasinja culture (Vrlovka: Dimitrijević 1961, 33, fig. D, Pl. 17: 130; Kiringrad: Dimitrijević 1961, 30 pp, Pl. 14: 98–100; 15; 16; 17: 123–129), Z. Marković even attributes Kiringrad, justifiably so, to the Hallstatt period (Marković 1985, 22).

# 6 HOČEVARICA: ABSOLUTNO DATIRANJE

# 6 HOČEVARICA: ABSOLUTE DATING

## **6.1** DENDROKRONOLGIJA IN DENDROKRONOLOŠKE RAZISKAVE V SLOVENIJI

## **6.1** DENDROCHRONOLOGY AND DENDROCHRONOLOGICAL INVESTIGATIONS IN SLOVENIA

KATARINA ČUFAR & ANTON VELUŠČEK

*Izvleček*

*Predstavljamo stanje in možnosti dendrokronologije v Sloveniji. Posebej izpostavljamo rezultate raziskav na Ljubljanskem barju, kjer je bilo sestavljeno več kronologij, ki pokrivajo del 4. in 3. tisočletja pr. Kr. Ugotavljamo tudi, da so na Ljubljanskem barju za gradnjo bivališč največ uporabljali jesenov in hrastov les. Na koncu opišemo lastnosti arheološkega lesa, ki ga imenujemo tudi »moker les«, z Ljubljanskega barja. Če ga želimo ohraniti, moramo najprej poskrbeti, da se ne izsuši, zato pa se je potrebno ravnati po natančno določenem načrtu.*

*Abstract*

*Presented are the state of art and potentials of dendrochronology in Slovenia. The results of the investigations in the Ljubljansko barje are several tree-ring chronologies that cover parts of the 4th and the 3rd millennium B.C. The wood of ash and oak trees was mainly used in the Ljubljansko barje for the construction of the pile dwellings. The characteristics of waterlogged archaeological wood preserved underwater or buried in the soil in the Ljubljansko barje, are described. If the goal is to preserve it, then it must be prevented from desiccation. We present a strategy of its conservation treatment.*

### **6.1.1** UVOD

Dendrokronologija je veda, ki temelji na analizi branik v lesu. V osnovi je to metoda za ugotavljanje starosti lesa, zato se je v arheologiji dobro uveljavila. Pri delu z arheološkim lesom smo ugotovili, da ta poleg potenciala za datiranje vsebuje še mnoge druge informacije, uporabne za boljše razumevanje preteklih dogodkov. Poseben pomen ima pri raziskavi koliščarskih naselbin. V zadnjih letih vse več govorimo o dendroarheologiji, ki vključuje celovite raziskave arheološkega lesa, vključno z določanjem starosti, rekonstrukcijo poselitev in gradbenih aktivnosti, pridobitvami spoznanj o rabi okolja in gozda ter rabi in obdelavi lesa (Billamboz, Tegel 2001).

Dendrokronološke raziskave predstavljajo analize branik v lesu, ki najpogosteje temeljijo na merjenju širin branik. Metoda temelji na predpostavki, da drevesa našega podnebnega pasu vsako leto prirastejo za eno prirastno plast – braniko, ki jo v prečnem prerezu debla ali hloda vidimo kot kolobar. Mejo med dvema branikama imenujemo letnica* (Torelli 1990). Posebno v branikah

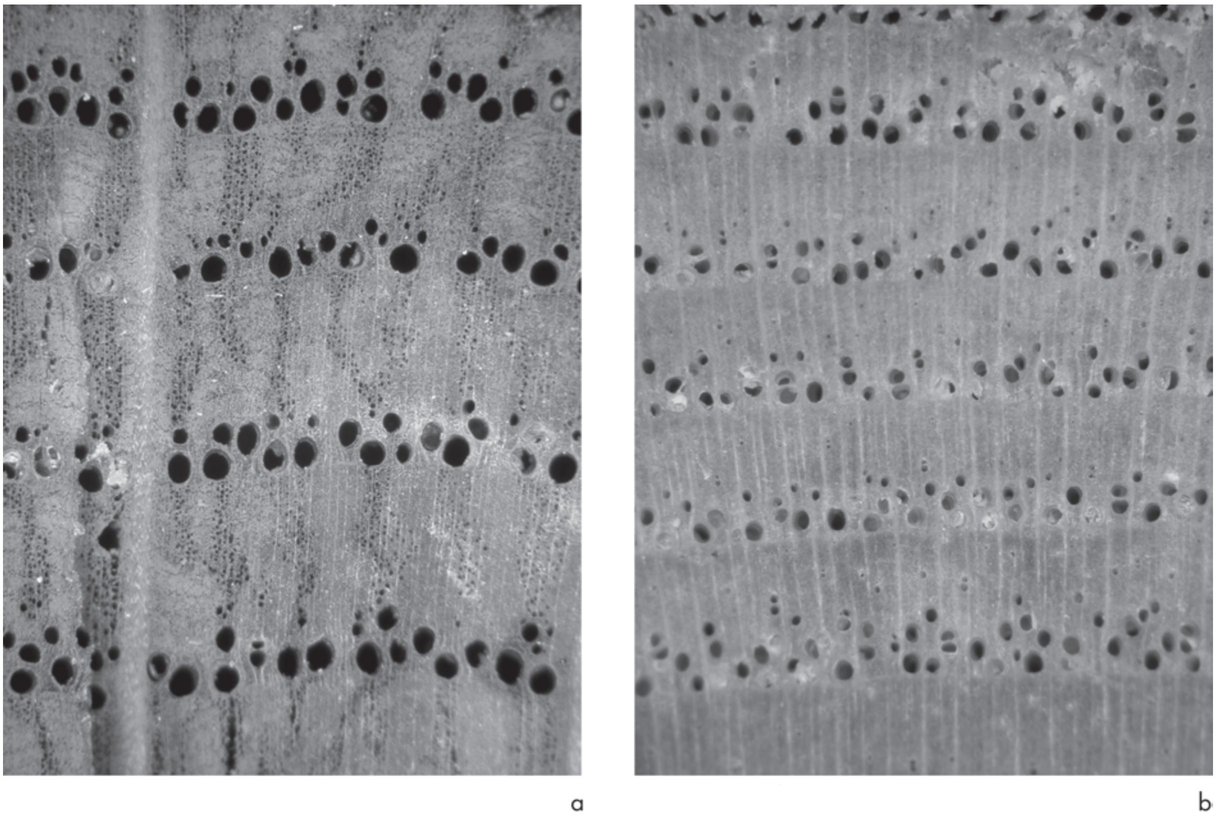
* V pogovornem jeziku izraz letnica uporabljamo za poimenovanje branike.

### **6.1.1** INTRODUCTION

Dendrochronology is a science that is based upon the analysis of tree-rings in wood. This is basically a method for determining the age of wood and thus it is well established in the field of archaeology. Our work with archaeological wood further established that, in addition to its dating potential, it provides a whole array of information useful for bettering our understanding of past events. It is particularly significant in the investigations of pile dwelling settlements. The term »dendroarchaeology« is increasingly common in recent years. It incorporates comprehensive investigations of archaeological wood, including age determination, reconstructions of settlements and building activity, and the attainment of information regarding the environment and forestland as well as how wood was processed and used (Billamboz, Tegel 2001).

Dendrochronological investigations are essentially an analysis of the tree-rings in wood, most often based on measuring the width of tree-rings. The method is grounded on the supposition that the trees in our climate zone every year form one growth layer – that is, an annual tree-ring, which in a transverse cross-section of

HOČEVARICA: ABSOLUTE DATING



*Sl. 6.1.1:* Prečni prerez lesa (a) hrasta in (b) jesena z razločnimi branikami. Foto: M. Zupančič.
*Fig. 6.1.1:* Transverse cross-section of the wood of (a) oak and (b) ash trees with distinguishable tree-rings. Photo: M. Zupančič.

lesa iglavcev lahko jasno razločimo redkejši rani les in gostejši kasni les.

Širine branik v zaporednih letih praviloma niso enake, pač pa variirajo. Na variiranje vplivajo številni dejavniki, od klime do vrojenih značilnosti drevesne vrste, kvalitete rastišča, socialnega položaja drevesa v sestoju, vpliva ljudi in divjadi in drugih. Drevesa iste drevesne vrste na istem območju imajo navadno podobno variiranje širin branik. Tako za isto drevesno vrsto in regijo lahko sestavimo standardno referenčno kronologijo za datiranje.

Dendrokronološka analiza najpogosteje vključuje merjenje širin branik (*sl. 6.1.1*). Te merimo na primerno pripravljenih vzorcih lesa, po merjenju pa jih grafično prikažemo v odvisnosti od časa. Nastali graf imenujemo zaporedje širin branik. Zaporedja širin branik več vzorcev medsebojno primerjamo, sinhroniziramo in združujemo ter datiramo.

Če kronologijo sestavimo iz vzorcev živih dreves, poznamo leto nastanka zadnje branike, po njem pa lahko določimo tudi leto nastanka vseh ostalih branik v kronologiji oziroma opravimo datiranje. Za datiranje lesa iz preteklosti pa potrebujemo datirane referenčne kronologije (Čufar, Levanič 1999a; 1999b).

the trunk of a tree or a log manifests itself as a ring. The dividing line between two tree-rings is referred to as the annual-ring boundary. Especially in the wood of coniferous trees, lighter early wood can be clearly distinguished from the darker and more dense late wood.

The tree-ring widths are usually not the same in sequential years, rather they vary. Numerous factors influence this variation: from climate to inherent characteristics of tree species, the quality of the soils where the trees grow, the social position of the tree within its stand and the influence of humans, animals and others. Trees of the same tree species in the same region usually have a similar variation in the width of their tree-rings. Consequently, a standard reference chronology for dating can be established for the same tree species and region.

Dendrochronological analysis most frequently embodies the measuring of the tree-ring widths (*fig. 6.1.1*). These are measured on appropriately prepared wood samples. After the measurements are collected they are graphically presented in their relation to time. Such a graph is referred to as a sequence of tree-rings. The sequences of tree-rings of multiple samples are then compared to each other, cross-dated (synchronized) and consequently dated.

By composing a chronology from samples of living trees, the calendar year of the last tree-ring is known. Then the years of the other tree-rings can also be established in the chronology. In other words, they can be dated. For dating wood from the past, dated reference chronologies are required (Čufar, Levanič 1999a; 1999b).

### 6.1.2 STANDARDNE REFERENČNE KRONOLOGIJE ZA DATIRANJE

Standardna referenčna kronologija je povprečje širin branik iz več datiranih zaporedij širin branik (Kaennel, Schweingruber 1995). Krivulja je reprezentativna za drevesno vrsto in regijo. Osnova za sestavljanje referenčne kronologije je vedno drevo, pri katerem poznamo leto nastanka zadnje branike pod skorjo. Pri sestavljanju dolgih kronologij so med prvimi imeli velik uspeh v severni Ameriki, kjer rastejo mamutovci in vrste borov, ki dosegajo starosti do 4000 let in več (npr. Ferguson 1969). V Evropi drevesa le redko dosegajo starost do 500 let, zato so daljše kronologije sestavljene iz kronologij dreves podaljšanih s kronologijami na osnovi zgodovinskega, arheološkega in subfosilnega lesa. Standardne kronologije so tako »lepljenke« krajših kronologij, ki se med seboj prekrivajo. Najdaljše evropske kronologije so kronologije hrasta, med njimi južno nemška hrastova kronologija iz laboratorija Hohenheim, ki presega 10.000 let (Becker 1993). Dolge hrastove kronologije so še na primer severno irska, ki sega do 5479 pr. Kr., angleška 4989 pr. Kr. in severno nemška do 6200 pr. Kr. (Baillie 1995). V zadnjih letih so pri sestavljanju dolgih kronologij uspešni tudi na Nizozemskem, Poljskem in v Baltskih državah. V naši neposredni bližini so imeli največ uspeha pri sestavljanju dolgih hrastovih kronologij v Avstriji, kjer so sestavili 807 let dolgo hrastovo kronologijo za vzhodno Avstrijo,[1] na Madžarskem, v Italiji in Sloveniji pa tako dolgih hrastovih kronologij kljub sistematičnem delu še nismo uspeli sestaviti.

Dolgim hrastovim kronologijam v Evropi so se v zadnjih letih pridružile še kronologije drugih lesnih vrst. Med njimi izstopa 7500 let dolga borova kronologija za Skandinavijo (Zetterberg, Eronen, Lindholm 1996), 3474 let dolga kronologija bora iz Dachsteina v Avstriji (Grabner et al. 2001), v pripravi pa je tudi več tisočletna kronologija cemprina (Nicolussi, Lumassegger 1998). Na našem območju je trenutno najdaljša 1242 let dolga kronologija macesna, ki smo jo sestavili v sodelovanju laboratorijev iz Verone in Ljubljane (Levanič, Pignatelli, Čufar 2001).

### 6.1.3 STANJE DENDROKRONOLOGIJE V SLOVENIJI

V Sloveniji so se sistematične dendrokronološke raziskave za potrebe datiranja pričele v letu 1993, potekale pa so v okviru več projektov na Oddelku za lesarstvo Biotehniške fakultete in na Inštitutu za arheologijo ZRC SAZU, ki so jih financirali Ministrstvo za znanost, šolstvo in šport republike Slovenije, Javni zavod repu-

[1] Ustna informacija M. Grabner in R. Wimmer.



### 6.1.2 STANDARD REFERENCE CHRONOLOGIES FOR DATING

The standard reference chronology is an average from a multitude of dated tree-ring series (Kaennel, Schweingruber 1995). The curve is representative of the tree species and the region. The basis for composing the reference chronology is usually a tree for which the calendar year of its last tree-ring below the bark is known. The first long chronologies in North America were constructed for sequoias and bristle cone pines that reach an age of up to 4000 years or more (e.g. Ferguson 1969). Trees in Europe rarely reach an age of up to 500 years. Consequently, longer chronologies are composed from chronologies of trees prolonged with chronologies based on historical, archaeological and subfossil wood. Standard chronologies are thus »composites« of shorter chronologies that overlap with each other. The longest European chronologies are oak tree chronologies. The longest is the southern German oak chronology from the Hohenheim laboratory, which exceeds 10,000 years (Becker 1993). Other long oak chronologies are also, for instance, in Ireland which reaches back to 5479 B.C., the English one reaching back to 4989 B.C. and in northern Germany reaching back to 6200 B.C. (Baillie 1995). In recent years success in composing long chronologies has been attained also in the Netherlands, Poland and in the Baltic states. In our direct vicinity the longest oak chronology was composed in eastern Austria: an 807 year long oak chronology.[1] Despite systematic research efforts, such an accomplishment has yet to be achieved in Hungary, Italy and Slovenia.

In recent years, other wood species have been investigated to produce long chronologies in Europe, like a 7500 year long Scots pine chronology for Scandinavia (Zetterberg, Eronen, Lindholm 1996), a 3474 year long larch chronology from Dachstein in Austria (Grabner et al. 2001), and a multi-millennium stone pine chronology (Nicolussi, Lumassegger 1998). Currently the longest chronology in our region is a 1242 year long larch tree chronology, which was composed in collaboration of laboratories from Verona and Ljubljana (Levanič, Pignatelli, Čufar 2001).

### 6.1.3 THE STAND OF DENDROCHRONOLOGY IN SLOVENIA

Systematic dendrochronological investigations for dating purposes began in Slovenia in 1993 and continued within the framework of a series of projects at the Department of Wood Science and Technology at the Biotechnical Faculty and at the Institute of Archaeology SRC SASA, and financed by the Ministry of Science,

[1] Personal communication: M. Grabner and R. Wimmer.

blike Slovenije za varstvo kulturne dediščine, Restavratorski center in Mestna občina Ljubljana.

Ob začetku raziskav ni bilo v Sloveniji nobene referenčne kronologije. Zaradi velike klimatske in fitogeografske raznolikosti tudi ni bilo znano, ali bi za datiranje potrebovali eno ali več regionalnih kronologij najpomembnejših lesnih vrst. Manjkale so informacije o podobnosti rastnih vzorcev dreves v Sloveniji in v sosednjih deželah. Na razpolago tudi ni bilo podatkov o primerljivosti kronologij različnih lesnih vrst na istem rastišču.

Danes sta v Sloveniji najbolj raziskani lesni vrsti jelovina in macesnovina. Sestavili smo 876 let dolgo jelovo kronologijo (Čufar, Levanič 1999b). Z njo lahko datiramo macesnov les iz vse Slovenije, ki je nastal med leti 1120 in 1995. Macesnova kronologija je dolga 1242 let. Sestavili smo jo v sodelovanju z O. Pignatelli iz laboratorija DENDRODATA v Veroni v Italiji (Levanič, Pignatelli, Čufar 2001). Z njo lahko datiramo les, nastal v obdobju od leta 756 do 1997.

Pri primerjanju jelovih in macesnovih kronologij iz Slovenije s tistimi iz drugih srednjeevropskih regij smo večkrat ugotovili statistično značilne podobnosti (Čufar, Levanič 1998).

Pri sestavljanju smrekovih in hrastovih kronologij nismo bili tako uspešni. Trenutno obstoječe smrekove in hrastove kronologije ne presegajo 300 let in temeljijo na lesu dreves. Za obe vrsti smo sestavili preko 10 kronologij za različna območja v Sloveniji. Ugotovili smo, da se rastni vzorci smreke in hrasta razlikujejo že znotraj Slovenije in da nobena od kronologij ni bila statistično značilno podobna ustreznim kronologijam iz sosednjih regij. Raziskave obeh zelo pomembnih lesnih vrst se nadaljujejo, kopičijo pa se tudi trenutno še nedatirane kronologije iz preteklih obdobij.

### **6.1.4** TELEKONEKCIJA IN HETEROKONEKCIJA

V Sloveniji še nimamo referenčnih krivulj za prazgodovinsko obdobje, ki bi jih potrebovali za raziskave koliščarskih naselbin na Ljubljanskem barju, imamo pa vse več nedatiranih plavajočih kronologij. Trenutno ni videti, da bi lahko zbrali dovolj primernega lesa za premostitev obdobja od danes do 4. tisočletja pr. Kr., zato se veliko ukvarjamo z vprašanjem telekonekcije in heterokonekcije.

**Telekonekcija** pomeni možnost sinhroniziranja (in datiranja) kronologij na velike razdalje. V praksi bi to pomenilo, da lahko npr. plavajočo kronologijo iz Slovenije datiramo s kronologijo iz Nemčije. Za prazgodovinsko obdobje bi nas zanimala predvsem telekonekcija s hrastovimi kronologijami iz Nemčije, Švice in Francije. Tam deluje več laboratorijev, ki so sestavili referenčne kronologije za obdobje obstajanja koliščarskih naselij. Tako sodelujemo z laboratorijem iz Hemmenhofna v



Education and Sports of the Republic of Slovenia, the Institute for the Preservation of the Natural and Cultural Heritage, the Restoration Center and the Municipality of Ljubljana.

There was no reference chronology in Slovenia at the onset of our investigations. Due to great climatic and phytogeographic variance it was also unclear as to how many regional chronologies of the most important wood species would be required for dating purposes. Information regarding similarities among tree-ring growth patterns of trees from Slovenia and in neighboring countries was lacking. Nor was any information available concerning the comparability of the chronologies of various wood species in the same forest stand.

The two most researched wood species in Slovenia today are silver fir and larch. An 876 year long fir chronology is already composed (Čufar, Levanič 1999b). It can serve to date larch wood that grew in Slovenia between the years 1120 and 1995. The larch chronology is 1242 years long. We composed this chronology in collaboration with O. Pignatelli from the DENDRODATA laboratory in Verona, Italy (Levanič, Pignatelli, Čufar 2001). It can be used to date wood that grew between the years 756 and 1997.

While comparing the fir and larch chronologies from Slovenia with those from other central European regions, statistically significant similarities have often been determined (Čufar, Levanič 1998).

We were less successful in composing Norway spruce and oak chronologies. The existing chronologies currently fail to exceed 300 years and they are based upon tree wood. Over ten chronologies from a variety of locations throughout Slovenia have been composed for both wood species. It was established that the tree-ring patterns of spruce and oak had different tree ring patterns when growing at different locations in Slovenia, and that none of the chronologies was similar to the corresponding chronologies from neighboring regions. Investigations of each of these very important wood species continue, furthermore, we have more and more undated chronologies from past times.

### **6.1.4** TELECONNECTION AND HETEROCONNECTION

As of yet, there are no absolutely dated reference curves for the prehistoric period in Slovenia, which could be used for the investigations of the pile dwelling settlements in the Ljubljansko barje. Nonetheless, there are increasing numbers of undated floating chronologies. Currently it seems doubtful that enough suitable wood can be collected to bridge the period from today until the 4$^{th}$ millennium B.C. Consequently, teleconnection and heteroconnection are expedient issues at the moment.

Nemčiji, ki med drugim razpolaga s kronologijami za obdobje neolitika[2] in bronaste dobe (Billamboz 1992; 1996).

Za območje južno od Alp trenutno trenutno še ni na razpolago natančno datiranih prazgodovinskih hrastovih krivulj. V severni Italiji že več kot deset let potekajo sistematične dendrokronološke raziskave (Martinelli 1989; 1990) in do danes so sestavili nad 16 lokalnih hrastovih kronologij iz obdobja neolitika ter zgodnje in srednje bronaste dobe. Te sicer še niso dendrokronološko datirane, zato pa so v sodelovanju z laboratorijem iz Heidelberga pridobili že dokaj natančne radiokarbonske datume (Fasani, Kromer, Martinelli 1995; Martinelli 1996).

Za nas je pomembno tudi vprašanje **heterokonekcije**, to je sinhroniziranja in datiranja kronologij različnih lesnih vrst. Glede na veliko količino jesenovih kolov na Ljubljanskem barju je za nas zelo pomembno ali jih lahko sinhroniziramo z domačimi hrastovimi kronologijami, ki kasneje nudijo mnogo boljše izhodišče za telekonekcijo. Ker v Evropi ni nikakršne verjetnosti, da bi kdaj sestavili dolge referenčne jesenove kronologije, bi dendrokronološko datiranje jesenovih kronologij lahko opravili le posredno s pomočjo hrastovih.

Pri našem delu smo že uspešno sinhronizirali hrastove in jesenove kronologije s Spodnjega mostišča (Čufar, Levanič, Velušček 1998) in z Založnice (Velušček, Čufar 2003), heterokonekcija med hrastom in jesenom pa je bila uspešna tudi na primeru dreves, ki danes rastejo na Ljubljanskem barju (Čufar, Levanič 1999a).

### **6.1.5** DENDROKRONOLOŠKE RAZISKAVE NA LJUBLJANSKEM BARJU

Leta 1995 so se začele dendrokronološke raziskave lesa iz eneolitskih naselbin na Ljubljanskem barju (Čufar, Levanič, Velušček 1997; Čufar, Levanič 1998; Velušček 1999b; Velušček, Čufar 2002).[3] Doslej je bil dendrokronološko raziskan les s Spodnjega mostišča 1 in 2 (Čufar et al. 1997; Čufar, Levanič, Velušček 1998), s Hočevarice (Čufar et al. 1997; Čufar, Levanič, Velušček 1998), s Part-Iščice (Čufar, Levanič, Velušček 1999; Velušček, Čufar, Levanič 2000), s Part (Čufar, Levanič, Velušček 1997) in Založnice (Čufar, Levanič, Velušček 1997; Velušček, Čufar 2003). Sestavljenih je bilo nad 14 hrastovih, jesenovih in bukovih kronologij, za katere imamo večinoma tudi prve radiokarbonske datume (Čufar, Levanič 1998; Čufar, Levanič, Velušček 1999; Velušček, Čufar 2002; 2003).

[2] Mišljeno je obdobje, ki ustreza našemu eneolitiku oziroma bakreni dobi (op. avtorjev).

[3] O rezultatih dendrokronoloških raziskav, ki jih je na lesu z Resnikovega prekopa opravil P. I. Kuniholm, nimamo podatkov, zato ne bodo vključeni v obravnavo (Turk 1991).



**Teleconnection** refers to the possibility of synchronizing (and dating) chronologies over great distances. If the teleconnection worked, a floating chronology from Slovenia could be for example dated with a chronology from other region like Germany. As far as concerns the prehistoric period, a teleconnection with oak chronologies from Germany, Switzerland and France would interest us most. There are a number of laboratories in these countries that have composed reference chronologies for the period that the pile dwelling settlements were extant. We thus collaborate with the laboratory in Hemmenhofen, Germany, which among others also has several chronologies for the Neolithic[2] and Bronze Age periods (Billamboz 1992; 1996).

Currently there is still no precisely dated prehistoric oak wood curve for the region south of the Alps. Systematic dendrochronological investigations are underway in northern Italy for more than a decade now (Martinelli 1989; 1990); over 16 local oak chronologies from the Neolithic and Early and Middle Bronze Age periods have been composed up to date. These have yet to be dendrochronologically dated; as such, they are collaborating with the laboratory in Heidelberg to attain relatively precise radiocarbon dates (Fasani, Kromer, Martinelli 1995; Martinelli 1996).

**Heteroconnection**, that is possibility to cross-date the chronologies of different wood species, is also a significant prospect for us. Regarding the large amount of ash wood piles in the Ljubljansko barje, it remains decisive as to whether we may synchronize them with local oak wood chronologies. The latter, in the long run, would be much better for a teleconnection. As there is only little chance of composing a long reference ash wood chronology in Europe, then dendrochronological dating of ash chronologies is realizable only indirectly with the help of oak chronologies.

We have already succeeded in our efforts to synchronize the oak and ash chronologies from Spodnje mostišče (Čufar, Levanič, Velušček 1998) and from Založnica (Velušček, Čufar 2003), and a heteroconnection has also been successfully established between the oak and ash trees currently growing in the Ljubljansko barje (Čufar, Levanič 1999a).

### **6.1.5** DENDROCHRONOLOGICAL RESEARCH IN THE LJUBLJANSKO BARJE

Dendrochronological investigations of wood from Eneolithic settlements in the Ljubljansko barje were initiated in 1995 (Čufar, Levanič, Velušček 1997; Čufar, Levanič 1998; Velušček 1999b; Velušček, Čufar 2002).[3] So

[2] The period referred to corresponds with our Eneolithic or Copper Age (authors' remark).

[3] Considering that we do not have the results of the dendrochro-

Raziskave lesa vključujejo pripravo dendrokronoloških krivulj, relativno datiranje znotraj iste naselbine in med naselbinami, sistematičen odvzem lesa za radiokarbonske analize in redne primerjave s kronologijami drugih laboratorijev. Raziskave se usmerjajo tudi v proučevanje paleookolja in strukturiranosti naselbin (Čufar, Levanič, Velušček 1999; Velušček, Čufar, Levanič 2000). Potekajo tudi sistematične raziskave lastnosti lesa z Ljubljanskega barja kot osnove za njegovo optimalno ohranitev (Čufar, Tišler, Gorišek 2002).

Doslej smo objavili rezultate raziskav na koliščarskih naselbinah, ki jih uvrščamo v 4. tisočletje (Hočevarica, Spodnje mostišče 1 in 2) in v 3. tisočletje pr. Kr. (Parte-Iščica, Parte, Založnica), potekajo še dodatne raziskave na novih lokacijah.

Na Spodnjem mostišču 1 in 2 smo ugotovili, da sta naselbini obstajali istočasno oziroma da sta najdišči ostanka iste naselbine. Naselbina je nastajala postopoma in se je njen obseg z leti spreminjal (Čufar, Levanič, Velušček 1998).

Odnos naselbine Spodnje mostišče do bližnjega Maharskega prekopa pa še ni pojasnjen. Glede na keramiko spadata naselbini v isti časovni horizont (Harej 1986). Predpostavke o tem, ali gre za enoten naselbinski kompleks ali pa za dve kronološko ločeni naselbini, ostajajo še nerešene, dokler ne bomo dendrokronološko raziskali tudi Maharskega prekopa.

Med najdišči iz 3. tisočletja pr. Kr. je najstarejša Parte-Iščica, Parte in Založnica pa sta mlajši. Dendrokronološke raziskave so pokazale, da sta dve bližnji najdišči Parte in Parte-Iščica ostanka naselbin, ki sta obstajali v različnih stoletjih. Po drugi stani pa smo za najdišči Parte in Založnica, ki sta oddaljeni 10 kilometrov, ugotovili, da sta obstajali istočasno (Velušček, Čufar 2003).

Na najdišču Parte-Iščica smo sestavili več kronologij, ki se časovno ne prekrivajo in jih radiokarbonsko nismo uspeli zanesljivo relativno datirati. To kaže na daljši obstoj naselja z možnimi prekinitvami. Znotraj ene kronologije, ki vključuje največje število vzorcev, smo uspeli razpoznati 4 obdobja gradbenih aktivnosti (Čufar, Levanič, Velušček 1999; Velušček, Čufar, Levanič 2000). Te 4 gradbene faze so nastajale v približno 50 letnem obdobju, z relativnim datiranjem pa smo do leta natančno ugotovili, koliko časa je preteklo med gradbenimi aktivnostmi.

Pomembno je, da smo na najdišču Parte-Iščica lahko rekonstruirali prve tlorise prazgodovinskih hiš na Ljubljanskem barju (Velušček, Čufar, Levanič 2000). Prevladujejo objekti dimenzije 3,5 × 7 m, orientirani pa so pretežno v smeri jugozahod-severovzhod.

Zanimivo je, da so gradbene aktivnosti večkrat potekale na skoraj istem prostoru. Za obdobje ene od gradbenih faz smo ugotovili, da so bile stavbe postavljene vzporedno ena poleg druge, kar kaže na strogo notranjo organiziranost naselbine. Tudi pri Parte-Iščica se je po-



far wood from Spodnje mostišče 1 and 2 has been dendrochronologically researched (Čufar et al. 1997; Čufar, Levanič, Velušček 1998), as well as from Hočevarica (Čufar et al. 1997; Čufar, Levanič, Velušček 1998), Parte-Iščica (Čufar, Levanič, Velušček 1999; Velušček, Čufar, Levanič 2000), Parte (Čufar, Levanič, Velušček 1997) and Založnica (Čufar, Levanič, Velušček 1997; Velušček, Čufar 2003). Over 14 oak, ash and beech chronologies have been composed, for which the majority also have their first radiocarbon dates (Čufar, Levanič 1998; Čufar, Levanič, Velušček 1999; Velušček, Čufar 2002; 2003).

Investigations of wood incorporate the preparation of tree-ring chronologies, relative dating within the same settlement and among settlements, the systematic collection of wood for radiocarbon analyses and regular comparisons with chronologies from other laboratories. The investigations are also directed towards the study of the paleo-environment and structuration of settlements (Čufar, Levanič, Velušček 1999; Velušček, Čufar, Levanič 2000). Systematic investigations are also running to determine the characteristics of waterlogged archaeological wood from the Ljubljansko barje; the results are to serve as a basis for providing its optimal preservation (Čufar, Tišler, Gorišek 2002).

Up-to-date we have published the research results of pile dwelling settlements attributed to the 4$^{th}$ millennium B.C. (Hočevarica, Spodnje mostišče 1 and 2) and the 3$^{rd}$ millennium B.C. (Parte-Iščica, Parte, Založnica); in the meantime, further investigations continue at new locations.

It was established that the two settlements at Spodnje mostišče 1 and 2 existed concurrently or indeed that the two sites are the remains of one settlement. The settlement grew gradually, its extent changing through the years (Čufar, Levanič, Velušček 1998).

The relationship of Spodnje mostišče to the nearby Maharski prekop is still unclear. The pottery remains evidence that the two settlements belong to the same chronological horizon (Harej 1986). The suppositions as to whether this is a unified settlement complex or two chronologically independent settlements remain unsettled, at least until Maharski prekop is also dendrochronologically researched.

Among the sites dating to the 3$^{rd}$ millennium B.C., Parte-Iščica is the oldest, while Parte and Založnica are later. Dendrochronological investigations have demonstrated that the two proximate sites of Parte and Parte-Iščica are the remains of settlements that existed in different centuries. On the other hand, it was also determined that the sites Parte and Založnica, which are 10 km apart, existed simultaneously (Velušček, Čufar 2003).

A number of tree-ring chronologies were compo-

nological research carried out by P. I. Kuniholm on wood from Resnikov prekop, they shall not be included in the discussion (Turk 1991).

dobno kot na Spodnjem mostišču obseg naselbine stalno spreminjal. Kalibrirane vrednosti radiokarbonskih datacij za naselbino Parte-Iščica kažejo, da je bila naselbina obljudena na prehodu prve četrtine v drugo četrtino 3. tisočletja pr. Kr. (Čufar, Levanič, Velušček 1999).

Dendrokronološke raziskave in radiokarbonske datacije kažejo, da je naselbina na Partah-Iščici starejša od sosednje naselbine na Partah (Čufar, Levanič, Velušček 1997; 1999; Velušček, Čufar, Levanič 2000; Velušček, Čufar 2002). Tudi raziskave na najdišču Založnica so prinesle nove podatke. Z lesom, ki zajema najdišči Parte in Založnico, smo sestavili enotno kronologijo, s katero smo relativno datirali hrastove in jesenove vzorce. Pokazalo se je, da so na Založnici in na Partah gradili skoraj istočasno (Velušček, Čufar 2003). To je tudi prvi dokaz o istočasnem obstajanju naselij na različnih koncih Ljubljanskega barja.

6.1.5.1 Lesne vrste

Vsaka dendrokronološka raziskava se začne z identifikacijo lesa, ki nudi prve podatke o tem, katere lesne vrste so koliščarji imeli na razpolago. Na Ljubljanskem barju so se ohranili predvsem koli, ki so jih zabijali vertikalno v zemljo in na njih postavljali bivališča. Izbor in deleži lesnih vrst ohranjenih kolov se med raziskanimi kolišči precej razlikujejo. Najpogostejši lesni vrsti sta jesenovina in hrastovina. Jesenovina je prevladovala na koliščih Parte-Iščica, Parte, Hočevarica in Založnica, hrastovina pa na kolišču Spodnje mostišče 1 in 2. Parte-Iščica je med raziskanimi kolišči edina z večjim številom bukovih kolov. Jesenovina in hrastovina sta domnevno uspevali v bližini kolišč, bukovino kot lesno vrsto klimaksnega gozda pa so verjetno morali sekati na bolj oddaljenih rastiščih in so jo začeli izkoriščati takrat, ko je v bližini naselij primanjkovalo lesa.

Raziskave kažejo, da so največ sekali drevesa s premerom približno 10 cm. Verjetno so les za kole sprva sekali v bližini bivališč, na terenih, ki so jih najverjetneje izmenoma izkoriščali za poljedelstvo in pridobivanje lesa. Les na teh rastiščih se je pomlajeval na panju.[4] Kadar je začelo primanjkovati lesa z ustreznim premerom so posegli po deblih z večjim premerov. Ponavadi, so bila to hrastova debla, ki so jih pred uporabo vzdolžno razklali.

Omenjene domneve temeljijo na ugotovitvah dendrokronologov, ki so na leto natančno datirali različne faze obstajanja koliščarskih naselij. V francoski Juri se je npr. izkazalo, da so bili okrogli neklani koli na enem in istem kolišču praviloma vedno starejši od klanih kolov iz večjih debel (Pétrequin 1996; Pétrequin et al.

[4] Jesen, najpogostejša vrsta na naših koliščih, je za tak način gospodarjenja posebno primeren.



sed at the Parte-Iščica site; they do not overlap chronologically and they could not be reliably relatively dated by radiocarbon. This is indicative of the settlement's longer existence, with possible discontinuances. Four periods of building activity were distinguished within one chronology that includes the largest number of wood samples (Čufar, Levanič, Velušček 1999; Velušček, Čufar, Levanič 2000). These four building phases occurred within a period of approximately 50 years. Using relative dating we even established the exact amount of years that passed between each building activity.

One significant success at the Parte-Iščica site was our reconstruction of the first ground-plans of prehistoric houses in the Ljubljansko barje (Velušček, Čufar, Levanič 2000). Structures measuring 3.5 × 7 m prevail; they are mainly oriented in the direction southwest-northeast.

In addition we found out that building activities in different periods often occurred almost in exactly the same place. During one of the phases the structures were positioned parallel with each other, which demonstrates a strict internal settlement organization. Similar to the situation at Spodnje mostišče, the extent of the settlement at Parte-Iščica constantly changed. The calibrated radiocarbon dates for the Parte-Iščica settlement establish that it was populated at the transition of the first quarter to the second quarter of the 3rd millennium B.C. (Čufar, Levanič, Velušček 1999).

Dendrochronological research and radiocarbon dates indicate that the settlement at Parte-Iščica was older than its neighboring settlement at Parte (Čufar, Levanič, Velušček 1997; 1999; Velušček, Čufar, Levanič 2000; Velušček, Čufar 2002). Investigations carried out at the Založnica site also produced new data. A unified treering chronology was composed with wood both from the Parte and Založnica sites; this unified chronology was then used to relatively date the oak and ash samples. The results substantiated that building activity occurred almost simultaneously at Založnica and Parte (Velušček, Čufar 2003). This is also the first evidence of concurrent settlements at different ends of the Ljubljansko barje.

6.1.5.1 Wood species

Every dendrochronological investigation begins with the identification of wood species; this is the first piece of information, which reveals which wood species the pile dwellers had available. Primarily piles that were pounded vertically into the ground, and upon which dwellings were then built, were preserved at the Ljubljansko barje. The selection and proportion of wood species of the preserved piles varies greatly among the researched pile dwellings. Ash and oak are the most common species. Ash wood was predominant at the Parte-Iščica, Parte, Hočevarica and Založnica pile dwellings, while oak predominated at the Spodnje mostišče 1 and 2 pile

| Genus | Hočevarica (1995, 1998) | Spodnje Mostišče 1 in 2 (1996, 1997) | Založnica (1995, 1999, 2001) | Parte (1996) | Parte-Iščica (1997, 1998) |
|---|---|---|---|---|---|
| ***Fraxinus*** | 62 | 22 | 53 | 62 | 70 |
| ***Quercus*** | 16 | 59 | 29 | 33 | 2 |
| ***Alnus*** | 10 | 7 | | 4 | 9 |
| ***Acer*** | 2 | 11 | 2 | 1 | 3 |
| ***Abies*** | 5 | | | | 1 |
| ***Fagus*** | | | 2 | | 7 |
| ***Populus*** | 3 | | 2 | | 3 |
| ***Carpinus*** | | | 3 | | 2 |
| ***Ulmus*** | | | | | 1 |
| ***Salix*** | 2 | | 6 | | 1 |
| ***Corylus*** | 1 | 1 | 1 | | 1 |
| **inidentif.** | | | 1 | | |
| **Skupaj / Total** | 100 | 100 | 100 | 100 | 100 |
| **Skupno število vzorcev / Total number of samples** | 350 | 677 | 1282 | 242 | 1275 |

*Tab. 6.1.1:* Odstotni deleži lesnih vrst v dendrokronološko raziskanih koliščarskih naselbinah na Ljubljanskem barju, stanje marec 2002.
*Table 6.1.1:* The percentage of wood species at dendrochronologically researched pile dwelling settlements in the Ljubljansko barje; stand in March, 2002.

1998). Po mnenju Pétrequina in sodelavcev so debla z večjim premerom pridobivali v bolj oddaljenem, praviloma bolj ohranjenem gozdu, v katerega so posegli šele takrat, ko so izčrpali gozd v bližini naselbin. Transport večjih debel in priprava lesa je zahteval tudi drugačno tehnologijo in transport kot predelava debel z manjšim premerom (Eberschweiler, Riethmann 1998).

Razlike v uporabi lesa so opazne tudi na koliščih na Ljubljanskem barju, vendar bo interpretacija razlik v rabi lesa med posameznimi naselbinami in znotraj njih mogoča, ko bodo naselbine natančneje datirane (prim. Velušček, Čufar, Levanič 2000). Zdi se, da je izbor in kvaliteta lesa na koliščih najbrž v neposredni zvezi s poraslostjo bližnje okolice, ta pa je med drugim odvisna tudi od gostote poseljenosti ter staleža domačih živali in divjadi.

dwellings. Parte-Iščica is the only site among those researched that disclosed a large number of beech wood piles. Ash and oak trees presumably grew at the nearby pile dwellings, while beech, as a wood species of a climax forest, probably had to be chopped down at more remote growth areas. Presumably beech wood was sought after once there was a shortage of other wood in the vicinity of the settlement.

Investigations indicate that the majority of felled trees had a diameter of 10 cm. Presumably the wood for piles was first felled nearby the settlement, in areas that were likely to have been used alternately for cultivation and the acquisition of wood. The trees in these growth areas were regenerated by leaving tree-stumps.[4] Whenever wood of an appropriate diameter began to be deficient, trees with larger trunks were then chosen. These were usually oak trunks, which were split down their length before they were used.

The above mentioned suppositions are based upon the determinations of dendrochronologists, who precisely dated the various phases of subsistence at the pile dwelling settlements. For instance, at Jura, France, the round, un-split piles were at the very same site always older than the split piles of thicker trunks (Pétrequin 1996; Pétrequin et al. 1998). According to Pétrequin and colleagues, the trunks with larger diameters were found farther away from the site, usually in some better preserved forest which was presumably accessed only when the forest more proximate to the settlement was exhausted. Furthermore, the larger trunks and the preparation

[4] Ash trees, the most common type at our pile dwelling sites, is especially appropriate for this type of management.

### 6.1.5.2 Lastnosti in konzerviranje arheološkega lesa

Ljubljansko barje je naše največje in skoraj edino nahajališče večjih količin lesa iz preteklih obdobij. Les, ki ima sledove človeške obdelave in uporabe, imenujemo arheološki les. Raziskave zadnjih let so pokazale, da je ta bogat vir informacij, ki jih trenutno še ne znamo popolnoma izkoristiti. Zaradi izsuševanja barja ter poljedelskih in gradbenih posegov vsako leto propade veliko arheološkega lesa, s tem pa nepovratno izgubljamo materialni vir informacij, ki so morda ključnega pomena za razlago dogajanj v preteklosti. Zato je pomembno, da arheološki les in njegov potencial ohranjamo za raziskave.

Arheološki les, ohranjen v vlažni zemlji ali pod vodo, imenovan tudi »moker les«, je ob odkritju pogosto videti dobro ohranjen, vendar takoj ko ga izpostavimo sušenju na zraku, začne vidno propadati. Napačno ravnanje zaradi preslabega poznavanja njegovih lastnosti je bilo v preteklosti pogosto krivo za propad lesenih najdb, med njimi tudi tistih najvrednejših.

Arheološki les iz mokrega okolja je bil v preteklosti predmet številnih raziskav (prim. Rowel, Barbour 1990). Kljub temu so podatki v literaturi praviloma presplošni za pravilno razumevanje in ohranjanje konkretne najdbe. Tako ima tudi les z Ljubljanskega barja številne specifičnosti, ki so odvisne od lesne vrste, nahajališča, starosti in vrste najdbe. Ker lastnosti lesa z Ljubljanskega barja doslej še niso bile sistematično raziskane, smo se na Oddelku za lesarstvo Biotehniške fakultete odločili,

of its wood required different technology and transport than the preparation of trunks with smaller diameters (Eberschweiler, Riethmann 1998).

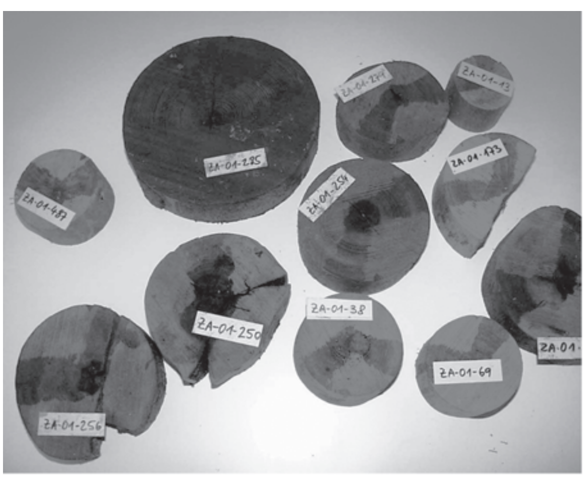
The differences in the usage of wood are also distinguishable at the pile dwellings in the Ljubljansko barje. However, an interpretation of the differences in the usage of wood among the settlements and within each settlement will only be possible once the settlements are dated more precisely (cf. Velušček, Čufar, Levanič 2000). It seems that the selection and quality of wood at the pile dwelling sites corresponds directly with the vegetation in the nearby surroundings; this, in turn, is also dependent upon the population density and the amount of domestic animals and game.

### 6.1.5.2 The characteristics and conservation of waterlogged archaeological wood

The Ljubljansko barje is our largest and almost only habitat for greater amounts of wood from past times. Wood bearing traces of human workmanship is referred to as archaeological wood. Investigations in recent years have demonstrated that this wood is a highly revealing source of information, and also one that we do not yet fully know how to fully take advantage of. Due to the drainage of the Ljubljansko barje and continual cultivation and construction efforts, much archaeological wood is lost every year. And consequently a material source of information, which might have proved of key importance to the explanation of past events, is irrevocably lost. This only emphasizes the importance of archaeological wood and why its potential must be preserved for further research.

Archaeological wood, preserved in moist soil or under water, and referred to also as »waterlogged wood«, often looks well preserved upon discovery. However, as soon as it is exposed to the air it begins to desiccate and visibly decay. False treatment due to insufficient exper-

*Sl. 6.1.2:* Vzorci (a) okroglih in (b) klanih kolov pripravljeni za dendrokronološke analize. Foto: K. Čufar.
*Fig. 6.1.2:* Samples of (a) round and (b) split piles prepared for dendrochronological analyses. Photo: K. Čufar.



a

b

da začnemo z raziskavami najpomembnejših fizikalnih in kemijskih lastnosti lesa iz koliščarskih naselbin, ki so ključne za razumevanje sprememb v lesu in za razvoj postopkov za njegovo ohranitev.

Doslej smo raziskali osnovne fizikalne in kemične lastnosti arheološkega lesa, ki se je ohranil v mokrih tleh ali pod vodo (Čufar, Tišler, Gorišek 2002). Z vodo napojen les je imel zelo visoko vlažnost, vselej nad 500 %, kar vsaj 2-krat presega napojitveno vlažnost normalnega lesa. Gostota arheološkega lesa preiskovanih vrst z

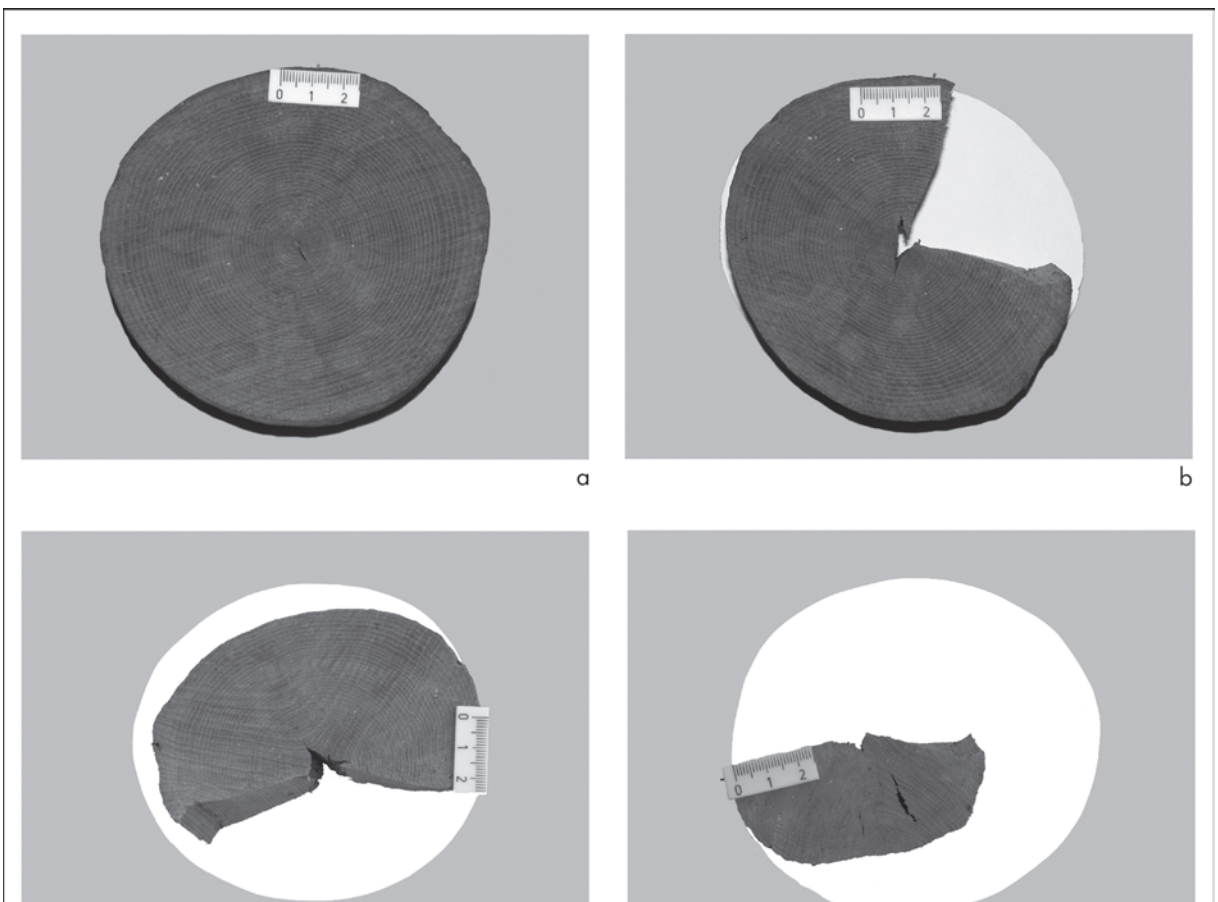
*Sl. 6.1.3:* Vzorec jesenovega kola, starega 4500 let, premera 12 cm in debeline 7 cm. (a) Vzorec napojen z vodo (vlažnost u = 900 %), (b), (c) isti vzorec med sušenjem in (d) vzorec, uravnovešen v normalni klimi (vlažnost u = 14 %). Foto: M. Zupančič.
*Fig. 6.1.3:* A disc of a 4500 years old archaeological ash-wood, with diameter 12 cm and thickness 7 cm. (a) Water saturated sample (Moisture Content = 900 %), (b), (c) the same sample during drying, and (d) sample equilibrated in normal climate (Moisture Content = 14 %). Photo: M. Zupančič.



tise was in past times often the cause for the decay of wooden finds, sometimes even those most valuable.

Archaeological wood from a wet environment used to be the subject of many investigations (cf. Rowel, Barbour 1990). Nonetheless, the data cited in literature is usually too general for an accurate interpretation and preservation of the actual finds. And the wood from the Ljubljansko barje has a variety of specificities, all of which are dependent on the wood species, its habitat, age and type of wooden artefact. As the traits of wood from the Ljubljansko barje have yet to be systematically researched, we at the Department of Wood Science and Technology at the Biotechnical Faculty have chosen to initiate our research with the most important physical and chemical properties of the wood from the pile dwelling settlements; these are essential to our comprehension of the changes that wood undergoes, as well as for the development of preservation procedures.

So far we have investigated the physical and chemical properties of archaeological wood, which has remained preserved in wet ground or under water (Čufar, Tišler, Gorišek 2002). Waterlogged wood had a high moisture content, always more than 500 %, which exceeds the waterlogged moisture level of normal wood at



Ljubljanskega barja je bila pri najpogostejših lesnih vrstah od 3,3 do 6,3-krat manjša kot pri normalnem lesu iste vrste. Najmanj se je zmanjšala pri hrastovini, največ pa pri jesenovini. Volumensko krčenje lesa je bilo 3 do 7-krat večje kot pri normalnem lesu. Povezano je bilo tudi s kolapsom lesa in izgubo oblike. Vse to kaže na visoko stopnjo razkroja celičnih sten v lesu. Kemične analize arheološke jesenovine pa so pokazale, da v njem daleč najbolj prevladuje lignin, ki ga je bilo do 70 %, delež celuloze pa se je zmanjšal na 8 %. V normalnem lesu prevladuje celuloza s pribl. 40 %, lignina pa je okoli 25 %.

Če želimo arheološki les ohraniti, moramo najprej poskrbeti, da se ne izsuši, zato smo vedno že na terenu poskrbeli, da se ni začel sušiti. Za izdelavo mikroskopskih preparatov in gladko obdelavo površin smo ga predhodno globoko zamrznili. Po opravljenih analizah smo ga takoj ponovno zalili z vodo in ga neprodušno zaprli. Za arhiviranje smo ga vakuumsko zavarili v vrečke iz debelejšega polietilena. Naše izkušnje in izkušnje kolegov iz tujine kažejo, da tako zaščitenega lahko hranimo več let in ga po potrebi lahko vedno znova uporabimo za dodatne raziskave. To je še posebej pomembno zato, ker les za radiokarbonske analize ne sme vsebovati kemikalij in mora biti v biološko neoporečnem stanju. Vakuumsko zapakiran les, zložen v označene plastične kontejnerje, trenutno arhiviramo v prostorih Javnega zavoda za varstvo kulturne dediščine, Restavratorskega centra v Ljubljani.

HOČEVARICA: ABSOLUTE DATING

least twice. The density of the archaeological wood investigated from the Ljubljansko barje measured in the most frequent wood species was from 3.3 to 6.3 times less than in normal wood of the same species. Oak wood density values decreased the least and ash wood values decreased the most. The volume shrinkage of archaeological wood was 3 to 7 times greater than that of normal wood. This also correlates to the collapse of wood and the loss of its form. All these factors indicate a high level of decomposition in the cell walls of wood. The chemical analyses of archaeological ash wood evidenced by far the greatest prevalence of lignin, reaching a value of 70 %, while its share of cellulose decreased to 8 %. The respective values in normal wood are approximately 40 % of cellulose and 25 % of lignin.

In order to preserve archaeological wood it must not desiccate. We always strove, already in the field, not to let the wood dry out. The wood was preliminarily deep frozen for the preparation of microscopic samples and a smooth surface. Immediately following any analyses the wood was re-imbibed in water and sealed airtight. In preparation for the archives, the water-saturated wood was then placed in a thick plastic bag. Our experience, as well as that of our colleagues abroad, is that wood protected in such a manner remains preserved for many years, while at the same time it remains accessible for further research purposes. This is especially important as wood samples for radiocarbon analyses must not contain any chemicals, rather they must remain in a biologically flawless condition. Wood samples packed in a vacuum atmosphere and placed in marked plastic containers are currently archived at the Restoration Center in Ljubljana.

*Sl. 6.1.4:* Z vodo napojeni vzorci arheološkega lesa zavarjeni v polietilenske vrečke pripravljeni za arhiviranje (a), (b). Foto: K. Čufar.
*Fig. 6.1.4:* Samples of archaeological wood enclosed in plastic bags and soaked in water, prepared for archiving (a), (b). Photo: K. Čufar.

a

b

# 6.2 DENDROKRONOLOŠKE RAZISKAVE NA KOLIŠČARSKI NASELBINI HOČEVARICA

# 6.2 DENDROCHRONOLOGICAL RESEARCH OF THE HOČEVARICA PILE DWELLING SETTLEMENT

KATARINA ČUFAR & ANTON VELUŠČEK

*Izvleček*

*Predstavljeni so rezultati dendrokronoloških raziskav na kolišču Hočevarica. Sestavljeni sta dve plavajoči kronologiji: 72 let dolga jesenova kronologija in 139 let dolga hrastova kronologija.*

*Abstract*

*The results of dendrochronological research of the Hočevarica pile dwelling settlement are presented. Two floating tree-ring chronologies are composed: a 72 year long ash wood chronology and a 139 year long oak wood chronology.*

## 6.2.1 UVOD

Vzorce lesa za raziskave na Hočevarici smo prvič odvzeli v drenažnem jarku Hočevarica v letu 1995 (Čufar et al. 1997; Čufar, Levanič, Velušček 1998). Poleti 1998 smo nadaljevali z vzorčenjem v istem jarku in v arheološki sondi tik ob njem (Velušček 2001).

## 6.2.2 DENDROKRONOLOŠKE RAZISKAVE

### 6.2.2.1 Vzorčenje lesa

Iz načrta (*sl. 6.2.5*) je razvidno, da so bili koli vzeti iz jarka širine 2–3 m, ki poteka približno v smeri sever-jug. Vzeti so bili na razdalji približno 70 m. Sonda velikosti približno 2 × 4 m je približno na polovici vzorčnega območja. V obeh letih je bilo vzetih in raziskanih skupno 361 vzorcev. Arheološki les je tako kot pri drugih koliščarskih naselbinah na Ljubljanskem barju večinoma ostanek kolov oziroma pilotov, ki so jih koliščarji zabili v tla in na njih postavili bivališča.

### 6.2.2.2 Priprava in identifikacija lesa

Za dendrokronološke raziskave je bil odvzet les vseh ohranjenih elementov, ne glede na obliko, premer in lesno vrsto. Najdbam lesa smo najprej izmerili natančne koordinate in nato odžagali 10–20 cm dolg kos, ki

## 6.2.1 INTRODUCTION

The first wood samples for our Hočevarica investigations were collected from the Hočevarica drainage ditch in 1995 (Čufar et al. 1997; Čufar, Levanič, Veluščeк 1998). In the summer of 1998 more samples were gathered from the same drainage ditch as well as from the archaeological trench alongside (Velušček 2001).

## 6.2.2 DENDROCHRONOLOGICAL RESEARCH

### 6.2.2.1 Wood sampling

The plan (*fig. 6.2.5*) shows that the piles were taken from a 2–3 m wide ditch running approximately in a north-south direction. The piles were taken at a distance of approximately 70 m. The trench measured about 2 × 4 m and was positioned approximately in the middle of the sampling zone. All together a total of 361 samples were collected and researched in the two year time span. Archaeological wood is, similarly to other pile dwelling settlements in the Ljubljansko barje, primarily the remains of piles that the settlers drove into the ground and upon which they built their dwellings.

### 6.2.2.2 Preparation and identification of wood

Wood was gathered from all preserved elements smo ga takoj po odvzemu izmerili, označili z identifikacijsko številko in ga zalitega z vodo shranili v neprodušno zaprti polietilenski vrečki.

Zbrane vzorce smo odpeljali na Oddelek za lesarstvo, kjer smo jih obdelali z mizarskimi stroji. V nadaljevanju smo vsak vzorec globoko zamrznili in zamrznjenemu zgladili površino ter ga pregledali pod stereo mikroskopom in mu prešteli branike. Lesno vrsto smo pri hrastu ali jesenu določili z opazovanjem pod stereo mikroskopom, za ostale primere pa smo naredili tanke preparate za mikroskopsko identifikacijo lesa.

Najpogostejša lesna vrsta na kolišču je bil jesen, ki je zastopan kar z 59 % vzorcev, sledil pa mu je hrast s 16 % vzorcev (*sl. 6.2.1*). Pri nas uspeva več vrst iz rodu jesena (*Fraxinus*) in hrasta (*Quercus*), vendar lesa različnih vrst jesenov in hrastov ne moremo zanesljivo razlikovati. Približno četrtina vzorcev je pripadala drugim vrstam, med katerimi je prevladovala jelša (*Alnus*). Manjše število vzorcev lesa (4 %) je bilo preveč uničenih, da bi lahko določili lesno vrsto.

Med raziskanimi koli so prevladovali tisti z manjšim premerom (*sl. 6.2.2*). Več kot tri četrtine oziroma 78 % kolov je imelo premer 6–11 cm in 26 do 43 branik.

Dendrokronološke meritve smo opravili samo na vzorcih hrasta in jesena, ki so imeli nad 45 branik. Po tem kriteriju je bilo za merjenje širin branik primernih le 26 % vzorcev (oznaka NS in S na *sl. 6.2.1*), uspešno pa smo sinhronizirali oziroma relativno datirali le 13 % vzorcev (oznaka S na *sl. 6.2.1*).

### 6.2.2.3 Merjenje

Postopek merjenja širin branik je potekal tako, da smo gladko obdelanim vzorcem s pomočjo pomične mizice, stereo mikroskopa in programa TSAP/X izmerili širine branik. Rezultate meritev smo grafično prikazali kot zaporedje širin branik v odvisnosti od časa. Na vsakem vzorcu smo širine branik izmerili vzdolž dveh radijev. Meritve na vsakem kolutu smo preverili in jih združili v povprečje, ki smo ga uporabili za nadaljnje primerjave (sinhroniziranje) grafov različnih kolutov (glej npr. Čufar, Levanič 1999a).

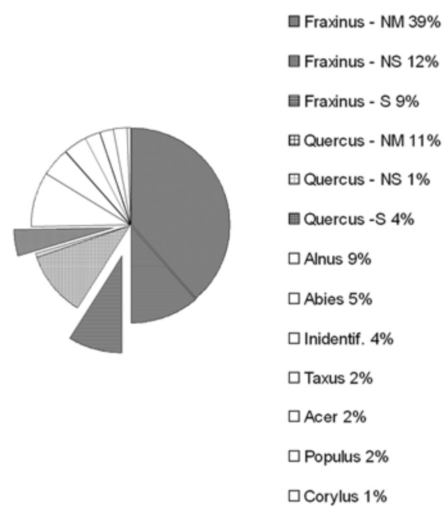
Vsa zaporedja, ki so izkazovala optično in statistično značilno ujemanje, smo združili v plavajoče nedatirane kronologije, ločeno za vsako lesno vrsto. Sestavili smo po eno jesenovo in eno hrastovo kronologijo.



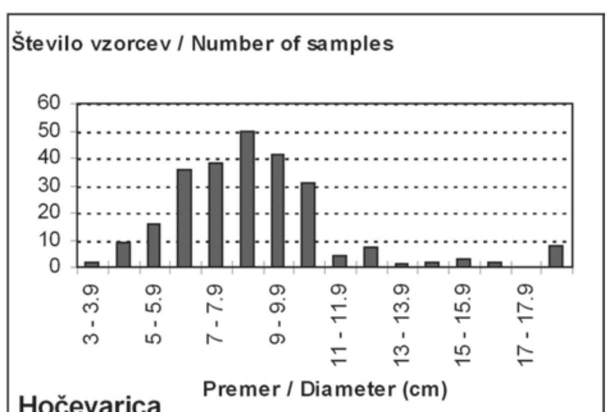
for the dendrochronological research, regardless of its form, size or wood species. The precise geographic coordinates were first measured for the wood finds, upon which a piece measuring 10–20 cm long was cut off. The piece was measured and marked, fully soaked in water and ultimately packed in a plastic bag.

The collected samples were taken to the Department of Wood Science and Technology at the Biotechnical Faculty, whereupon they were further prepared using carpenter's machines. Each sample was eventually deep-frozen and then its surface was smoothed. These were the circumstances established for their observation under a stereo microscope while their tree-rings were counted. The wood species was determined under a stereo microscope when it was ash or oak; other species had to have thin slides made for microscopic identification.

Ash wood was the most common wood species at




*Sl. 6.2.1:* Delež lesnih vrst na kolišču Hočevarica. Dendrokronološko preiskani so bili samo vzorci jesena (*Fraxinus*) in hrasta (*Quercus*) z oznako NS (nesinhroniziran) in S (sinhroniziran). NM – nemerjeni vzorci.
*Fig. 6.2.1*: Percentages of different wood species at the Hočevarica pile dwelling. Only samples of ash (*Fraxinus*) and oak (*Quercus*) were dendrochronologically researched, with the mark NS (non-synchronized) and S (synchronized). NM – unmeasured samples.




*Sl. 6.2.2:* Število kolov po premerih.
*Fig. 6.2.2:* The number of piles according to their respective diameters.

### 6.2.2.4 Jesenova kronologija

Jesen je bil prevladujoča lesna vrsta z 213 vzorci, kar je 59 % vseh odvzetih vzorcev. Njihova značilnost so bili majhni premeri in majhno število branik, zato je bilo po našem kriteriju za meritve primernih le 74 jesenovih vzorcev (*sl. 6.2.1*), uspešno pa smo jih sinhronizirali oziroma relativno datirali le 32. Les je vseboval veliko rastnih anomalij, kar nakazuje intenzivno rabo okolja, zato je bilo sinhroniziranje zelo zahtevno. *Slika 6.2.3* prikazuje ujemanje zaporedij širin branik sinhroniziranih vzorcev. Največ lesa je bilo posekanega v relativnem letu 68. Zgradba zadnje branike pod skorjo kaže, da je bila večina dreves posekanih v zimskem času.

Na *sliki 6.2.3* je prikazana tudi plavajoča kronologija HOC-FRSP1, dolga 72 let, in pomeni, povprečje zaporedij širin branik sinhroniziranih vzorcev, prikazanih na isti sliki.

Položaj relativno datiranih vzorcev smo kasneje vrisali tudi na načrt kolišča (*sl. 6.2.5*) in primerjali njihovo lego.

### 6.2.2.5 Hrastova kronologija

Delež hrasta na kolišču je 16 % vseh vzorcev. Večina hrastovih vzorcev prihaja iz vzdolžno razklanih večjih debel, ki so večinoma imela premere nad 15 cm. Ob prvem vzorčenju v letu 1995 je bilo najdenih le nekaj hrastovih vzorcev, v letu 1998 pa je bilo v južnem delu jarka število hrastovih vzorcev večje. Večinoma so imeli nad 70 branik in jih je bilo mogoče brez težav sinhronizirati in sestaviti kronologijo. Pri večini vzorcev je skorja že odpadla, propadlo pa je tudi nekaj branik beljave tik pod skorjo.

Iz *slike 6.2.4* je razvidno, da so imela zaporedja širin branik različne zadnje (desne) relativne datume. Ker vzorci večinoma niso imeli ohranjenih zadnjih branik pod skorjo, ne moremo zanesljivo ugotoviti, ali so bila posekana v istem letu. Položaj relativno datiranih hrastovih vzorcev smo tudi vrisali na načrt kolišča (*sl. 6.2.5*).

### 6.2.2.6 Načrt kolišča in gradbene aktivnosti

Ko so bile raziskave lesa v grobem zaključene, smo želeli na načrtu kolišča preveriti morebitno grupiranje vzorcev, posebno tistih, ki so bili posekani v istem letu. Kadar so koli z enakim letom poseka drevesa v neposredni bližini, lahko po njihovi razporeditvi na načrtu kolišča rekonstruiramo tlorise stavb in faze gradbenih aktivnosti. Tovrstne rekonstrukcije so bile doslej najpodrobneje izdelane na kolišču Parte-Iščica (Čufar, Levanič, Velušček 1999; Velušček, Čufar, Levanič 2000).



the pile dwelling with 59 % of the samples being ash wood and 16 % being oak wood (*fig. 6.2.1*). Several species of ash (*Fraxinus*) and oak (*Quercus*) grow in Slovenia; however the different species of ash and oak cannot be wood anatomically distinguished. Approximately one quarter of the samples were attributed to other wood species, alder (*Alnus*) being prevalent. A smaller number of samples (4 %) were too damaged for their wood identification or tree ring measurements.

From among the researched piles, those with smaller diameters were predominant (*fig. 6.2.2*). More than three quarters, or 78 % of the piles had diameters measuring 6–11 cm and between 26 and 43 tree-rings.

Dendrochronological measurements were carried out only on the samples of oak and ash wood, which had more than 45 tree-rings. Consequently, only 26 % of the samples (marked NS and S in *fig. 6.2.1*) were suitable for measuring tree-ring widths according to these criteria. Furthermore, only 13 % of these were successfully cross-dated or relatively dated (marked S in *fig. 6.2.1*).

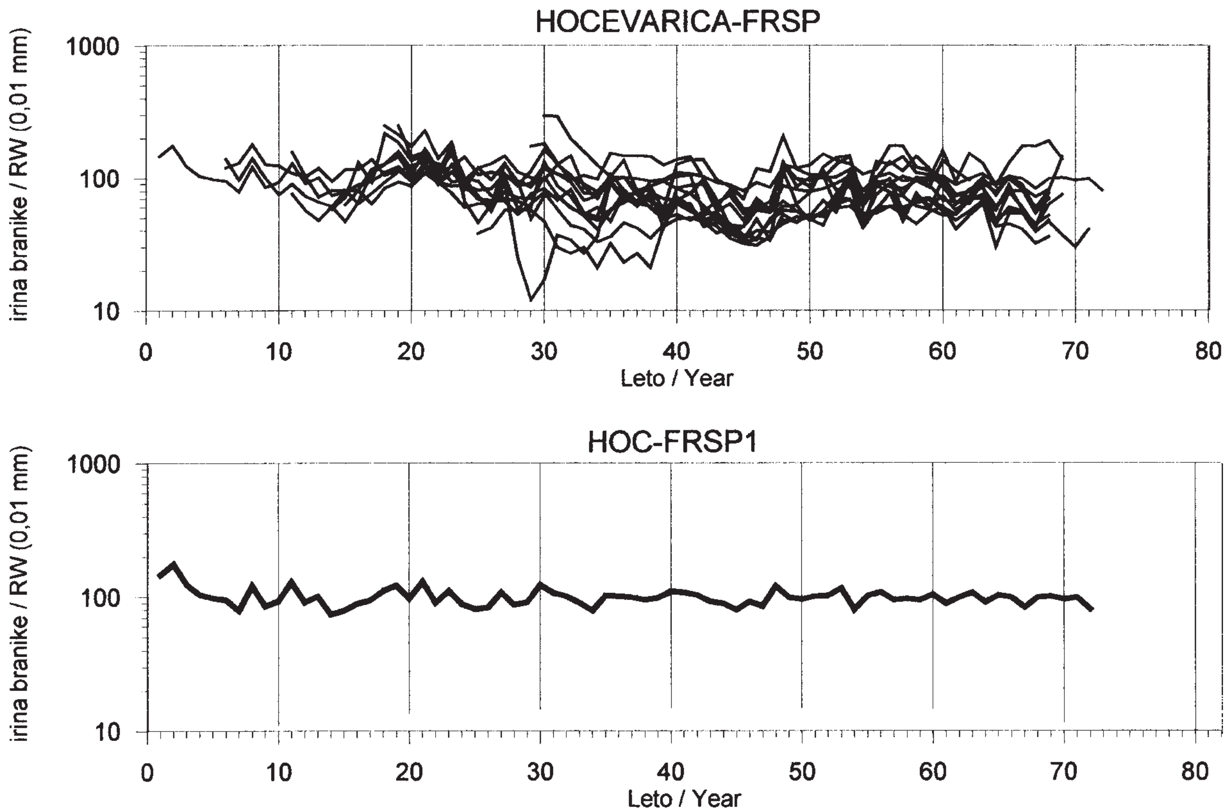
### 6.2.2.3 Measuring

The procedure of measuring tree-rings followed as such: the tree-rings were measured on the smoothly prepared samples with the help of a movable table, a stereo microscope and the TSAP/X program. The measurement results were graphically displayed as a sequence of ring widths relative to time. The ring width was measured on each sample along two radii. The measurements on each disc were verified and then combined to attain an average, which was then used for further comparisons (cross-dating, synchronization) among graphs of the various discs (check e.g. Čufar, Levanič 1999a).

All the sequences that demonstrated optical and statistical characteristic conformity were combined into floating undated chronologies, divided into their respective wood species. Ultimately one ash and one oak chronology were composed.

### 6.2.2.4 Ash chronology

Ash was the predominant wood species with among the 213 samples, which constitutes 59 % of all samples collected. Their common traits were small diameters and a small number of tree-rings. Consequently, only 74 of the ash wood samples were suitable for measuring according to our criteria (*fig. 6.2.1*), and only 32 were successfully synchronized or relatively dated. This also rendered the synchronization very difficult. *Figure 6.2.3* demonstrates the correspondence of the sequences of tree-rings of the synchronized samples. The most wood was chopped in the relative year 68. The composition of the last tree-ring under the bark shows that the majority




*Sl. 6.2.3:* Zaporedja širin branik sinhroniziranih jesenovih vzorcev (zgoraj) in plavajoča kronologija HOC-FRSP1 dolga 72 let (spodaj). Na abscisi so prikazana relativna leta.
*Fig. 6.2.3:* The tree-ring sequences of the synchronized ash wood samples (above) and the HOC-FRSP1 floating chronology measuring 72 years long (below). The relative years are shown at the abscissa.

Iz *slike 6.2.5* je razvidno, da so bili jesenovi vzorci, vključeni v kronologijo HOC-FRSP1, dveh skupin. Prva je bila v arheološki sondi in ob njej, druga skupina kolov pa je bila od prve oddaljena približno 10 metrov proti severu. Hrastovi vzorci, vključeni v kronologijo HOC-QUSP1, so bili prav tako v arheološki sondi in v jarku nekaj metrov severno od sonde. Sinhronizirani hrastovi vzorci so se tako nahajali na istem mestu kot sinhronizirani jesenovi vzorci, vendar z dendrokronološkimi primerjavami nismo mogli potrditi, da so bila drevesa zanje posekana istočasno.

Jarek je na žalost le ozek transekt skozi koliščarsko naselbino in seka samo dele naselbine. V našem primeru je bil transekt preozek, da bi lahko rekonstruirali različne faze gradbenih aktivnosti na kolišču. V sondi je bila gostota kolov zelo velika, pa tudi število relativno datiranih kolov je bilo tu presenetljivo veliko, kar kaže, da je bilo mesto za arheološko sondiranje dobro izbrano.

Za južni del jarka je značilno, da so bili tam premeri kolov zelo majhni. Imeli so tudi malo branik, zato niso bili primerni za dendrokronološke raziskave. Različne lesne vrste so po vzorčnem transektu dokaj enakomerno razporejene; samo zadnjih 5 m južnega dela jarka je pestrost lesnih vrst večja kot sicer v jarku. Tudi iz

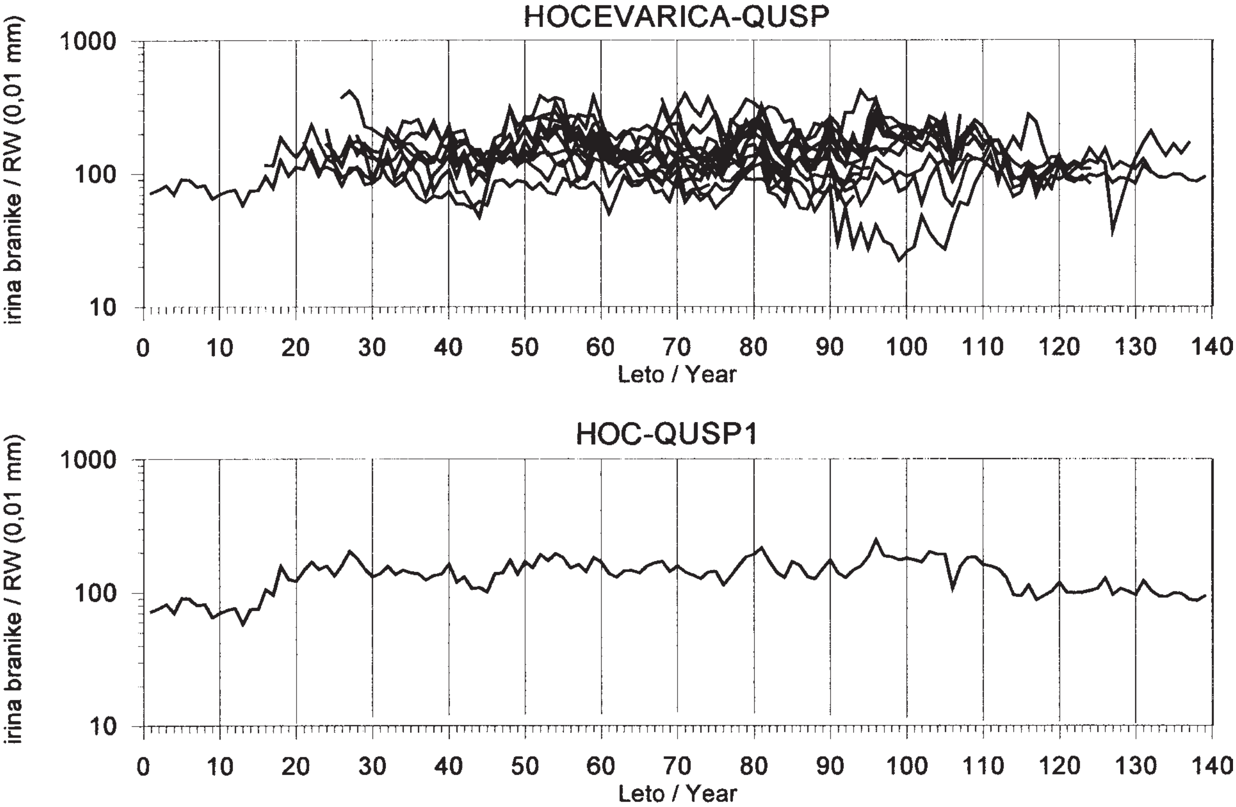
of trees were felled in the winter. The ash wood contained numerous growth anomalies, which is indicative of the intensive use of the environment.

*Figure 6.2.3* also portrays the HOC-FRSP1 floating chronology. This chronology is 72 years long and it displays the tree-ring sequences of the synchronized samples shown on the same graph.

The positioning of relatively dated samples were later drawn into the plan of the pile dwelling (*fig. 6.2.5*) and compared, respective to their positions.

### 6.2.2.5 Oak chronology

The percentage of oak wood from the pile dwelling was 16 % of all samples. Most of the oak samples originate from trunks, with diameters of over 15 cm in most cases, split lengthwise. Only a few oak samples were found during the first sampling session in 1995, and then in 1998 there was a larger selection of oak samples in the southern part of the ditch. The majority had more than 70 tree-rings and thus the synchronization and composition of a chronology was much easier. The bark had already fallen off from most of the samples, as did some of the tree-rings of the sapwood just beneath the bark decay.




*Sl. 6.2.4:* Zaporedja širin branik sinhroniziranih hrastovih vzorcev (zgoraj) in plavajoča kronologija HOC-QUSP1 dolga 139 let (spodaj). Na abscisi so prikazana relativna leta.
*Fig. 6.2.4:* Sequence of tree-rings of synchronized oak samples (above) and a floating HOC-QUSP1 chronology measuring 139 years long (below). The relative years are shown on the abscissa.

grupiranja lesnih vrst lahko sklepamo na faze gradbenih aktivnosti na kolišču.

6.2.2.7 Postopki za datiranje kronologij

Sestava kronologij HOC-FRSP1 in HOC-QUSP1 pomeni prvi korak k dendrokronološkem absolutnem datiranju lesa s kolišča Hočevarica. Kronologiji sta plavajoči, kar pomeni, da so prikazana leta na grafih (*sl. 6.2.3*; *6.2.4*) samo relativna in ne koledarska. Sestava plavajočih kronologij je tudi prvi korak za kasnejše primerjave in absolutno datiranje.

Obe kronologiji smo najprej primerjali med seboj, ker nas je zanimalo, ali izvira les jesena in hrasta iz istega obdobja. Ker ni podobnosti med kronologijama, kaže, da ti vsebujeta les iz različnih poselitvenih obdobij na kolišču (Velušček, Čufar, Levanič 2000), časovnega razmaka med njima pa, čeprav gre morda samo za nekaj desetletij, dendrokronološko ni mogoče ugotoviti.

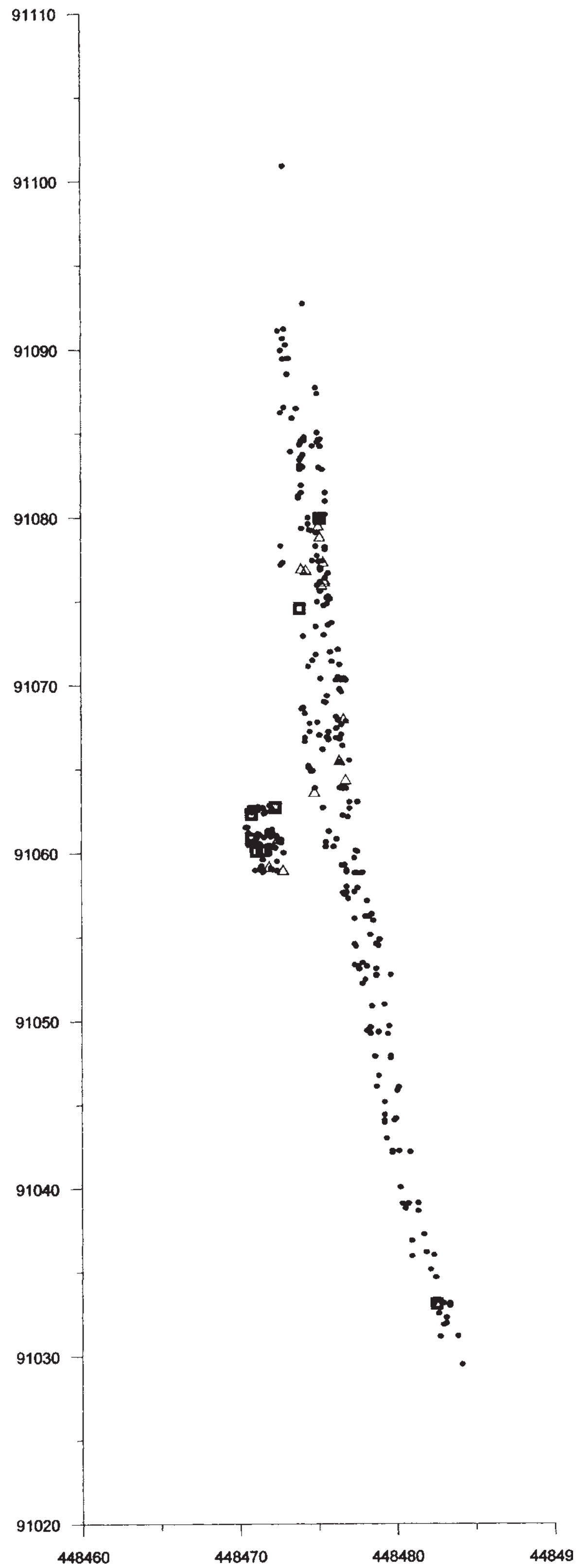
Ker gre v tem primeru za dendrokronološko primerjavo med kronologijama dveh različnih lesnih vrst, govorimo o heterokonekciji. Naši dosedanji rezultati kažejo, da je heterokonekcija med jesenom in hrastom mogoča (glej *poglavje 6.1*).

*Figure 6.2.4* evidences that the sequences of tree-rings had different final (right) relative dates. As the last tree-rings from beneath the bark were missing in most samples, it remains indeterminable as to whether all the trees were felled the same year. The positions of relatively dated oak samples were also drawn into the plan of the pile dwelling (*fig. 6.2.5*).

6.2.2.6 Plan of the pile dwelling and building activity

Once the wood analyses were basically concluded, the next goal was to check the ground plan of the pile dwelling site for possible groupings of samples, especially those chopped down the same year. Whenever piles from trees cut down in the same year are in close proximity their distribution in the ground plan of the pile dwelling site can be quite revealing for the reconstruction of dwelling ground plans and phases of building activity. The most detailed reconstruction of this type in Ljubljansko barje as of yet is of the Parte-Iščica pile dwelling settlement (Čufar, Levanič, Velušček 1999; Velušček, Čufar, Levanič 2000).

*Figure 6.2.5* demonstrates that the ash wood samples included in the HOC-FRSP1 chronology were origi-




*Sl. 6.2.5:* Razpored lesa po načrtu jarka in arheološke sonde na Hočevarici. Pravokotniki predstavljajo mesta istočasno posekanih hrastovih kolov, trikotniki pa mesta relativno datiranih jesenovih kolov. Črne pike predstavljajo preostale, večinoma nedatirane vzorce.

nally from two groups. The first group of piles was situated in the archaeological trench and alongside it, while the second group of piles was situated approximately 10 m north of the first group. The oak samples included in the HOC-QUSP1 chronology were, likewise, in the archaeological trench and in the ditch just a few meters north of the trench. The synchronized oak samples were thus in the same place as the synchronized ash samples, however dendrochronological comparisons were not able to confirm that the trees were cut down at the same time.

The ditch is merely a narrow transection through the pile dwelling settlement, a cut through only a part of the settlement. In this particular instance the transection was too narrow to enable a reconstruction of the various phases of building activity at the pile dwelling site. The density of the piles in the trench was very high, and the number of relatively dated piles was also surprisingly high, which suggests that the positioning of the archaeological trench was well chosen.

Characteristically for the southern part of the ditch, the diameters of the piles were small. These piles also had few tree-rings, which made them inappropriate for dendrochronological research. Various wood species are relatively equally distributed through the sample transection; only the last 5 m of the southern part of the ditch evidences a greater variety of wood types than elsewhere in the ditch. The groupings of the wood speceis also enable suppositions regarding the phases of building activity at the pile dwelling site.

### 6.2.2.7 Procedures for dating chronologies

The composition of the HOC-FRSP1 and HOC-QUSP1 chronologies represents the first step towards the dendrochronological absolute dating of wood from the Hočevarica site. Both chronologies are floating, which means that the years displayed in the graphs (*fig. 6.2.3*; *6.2.4*) are only relative and not calendar. The composition of floating chronologies is also the first step towards eventual comparisons and absolute dating.

Both chronologies were initially compared with each other. We were keen to find out whether the ash and oak woods were from the same period. The chronologies showed no similarities, which indicates that they incorporate woods from different settlement periods at the pile dwelling site (Velušček, Čufar, Levanič 2000). And the time

*Fig. 6.2.5:* The distribution of wood in the plan of the ditch and the archaeological trench at Hočevarica. The rectangles represent the position of the oak piles that were cut down at the same time, and the triangles represent the position of the relatively dated ash piles. Black dots represent the remaining, predominantly undated samples.

Tako smo obe kronologiji s kolišča Hočevarica primerjali z vsemi doslej sestavljenimi kronologijami s koliščarskih naselbin Ljubljanskega barja (prim. Velušček, Čufar 2002). Zanimalo nas je predvsem, ali je bilo kolišče Hočevarica naseljeno istočasno, kot katera od dendrokronološko raziskanih naselbin iz 4. tisočletja pr. Kr. Jesenova kronologija s Hočevraice HOC-FRSP1 se je vizualno dokaj dobro ujemala s hrastovo kronologijo VMO-QUSP2 s Spodnjega mostišča 1, statistična kazalnika pa sta bila: koeficient skladnosti (Gleichläufigkeit) 70 % in t-vrednost po Baillie in Pilcherju ($t_{BP}$) 4.3. Vrednosti so na meji značilnosti, zato smo za potrditev ujemanja potrebovali še dodatne podatke, npr. radiokarbonsko datiranje. Rezultati trenutno kažejo, da je na Hočevarici konec gradbenih aktivnosti dokumentiran 80 let pred začetkom gradbenih aktivnosti na Spodnjem mostišču 1 (glej *poglavje 6.3.2*).

Ker v Sloveniji še nimamo datiranih referenčnih krivulj za prazgodovinsko obdobje, naše kronologije redno primerjamo s kronologijami drugih laboratorijev. Dendrokronološki laboratorij pri Landesdenkmalamt Baden-Württemberg, Hemmenhofen, Nemčija, je vodilni laboratorij pri raziskavah prazgodovinskih koliščarskih naselbin in razpolaga z referenčnimi kronologijami, ki pokrivajo obdobje obstajanja kolišč na Ljubljanskem barju (Billamboz 1992; 1996).

Primerjava obeh kronologij s kolišča Hočevarica z referenčnimi kronologijami v Hemmenhofnu ni bila uspešna.[1] Telekonekcija, tj. sinhronizacija oddaljenih kronologij z Ljubljanskega barja in Nemčije tako zaenkrat še ni uspela. Glavna ovira za uspešno telekonekcijo so relativno kratke kronologije in izbor lesnih vrst, tj. hrasta in jesena, ki ju doslej še nismo uspeli sinhronizirati s kronologijami severno od Alp. To velja tudi za moderno hrastovino (Čufar, Levanič 1999b). Več uspeha smo imeli, ko smo naše kronologije primerjali s prazgodovinskimi kronologijami laboratorija DENDRODATA iz Verone v Italiji, ki je opisano v *poglavju 6.4*.

Trenutno si najboljše rezultate absolutnega datiranja lahko obetamo od radiokarbonske metode. Rezultate radiokarbonskega datiranja pa predstavljamo v *poglavju 6.3*.

[1] Ustna informacija A. Billamboz, W. Tegel.



span between them, despite that it may be only a few decades, is not dendrochronologically determinable.

This example is also referred to as a heteroconnection, a dendrochronological comparison between chronologies of two different wood species. Our current results indicate that a heteroconnection between ash and oak wood is plausible (check *chapter 6.1*).

Both Hočevarica pile dwelling chronologies were then compared with all currently composed chronologies from the pile dwelling settlements of the Ljubljansko barje (cf. Velušček, Čufar 2002). The question was whether the Hočevarica pile dwelling was settled concurrently with any of the other dendrochronologically researched settlements from the 4$^{th}$ millennium B.C. The HOC-FRSP1 ash chronology from Hočevarica corresponds visually quite well with the VMO-QUSP2 oak chronology from Spodnje mostišče 1, and the statistical indicators were: a congruity coefficient (in German: »Gleichläufigkeit«) measuring 70 % and a t-value according to Baillie and Pilcher ($t_{BP}$) measuring 4.3. The values are only borderline characteristic, so further confirmation of accordance was needed, such as radiocarbon dating. The results currently show that the end of building activity at Hočevarica was documented 80 years prior to the beginning of building activity at Spodnje mostišče 1 (check *chapter 6.3.2*).

As dated reference curves for the prehistoric period of our chronologies are still lacking, our chronologies are under constant comparison with those from other laboratories. The Dendrochronology Laboratory in Landesdenkmalamt Baden-Württemberg, Hemmenhofen, Germany is the leading laboratory for the investigation of prehistoric pile dwelling settlements. It operates with reference chronologies that cover the pile dwelling period in the Ljubljansko barje (Billamboz 1992; 1996).

The comparison of both the Hočevarica pile dwelling chronologies with the reference chronologies in Hemmenhofen was not a success.[1] Teleconnection, e.g. synchronization of remote chronologies with the Ljubljansko barje and Germany has also been unavailing. The main obstacle in establishing a successful teleconnection are the relatively short chronologies and the selection of wood species, that is oak and ash. So far our attempts to synchronize our oak and ash chronologies with chronologies from north of the Alps have failed. This also holds true for modern-day oak wood (Čufar, Levanič 1999b). Better results came with the comparison of our chronologies with the prehistoric chronologies from the DENDRODATA laboratory in Verona, Italy (described in *chapter 6.4*).

At the moment the best results for absolute dating can be expected from radiocarbon dating methods. The results of the radiocarbon dating are presented in *chapter 6.3*.

[1] Personal communication: A. Billamboz and W. Tegel.

# **6.3** RADIOKARBONSKO DATIRANJE KRONOLOGIJ ŠIRIN BRANIK S HOČEVARICE

# **6.3** RADIOCARBON DATING OF TREE-RING CHRONOLOGIES FROM HOČEVARICA

KATARINA ČUFAR & BERND KROMER

*Izvleček*

*Predstavljamo rezultate radiokarbonskega datiranja kronologij širin branik s Hočevarice. Začetek 139 let dolge hrastove kronologije je datiran v drugo polovico 38. stoletja pr. Kr., začetek 72 let dolge jesenove kronologije pa v drugo polovico 37. stoletja pr. Kr. Na podlagi teh rezultatov sklepamo, da so se gradbene aktivnosti na naselbini končale v sredini 36. stoletja pr. Kr. Radiokarbonski datumi nakazujejo, da se jesenova kronologija HOC-FRSP1 s Hočevarice časovno prekriva s hrastovo kronologijo VMO-QUSP2 s Spodnjega mostišča 1.*

*Abstract*

*The results of radiocarbon dating of tree-ring chronologies from Hočevarica are presented. The beginning of the 139 year long oak chronology is dated to the second half of the 38th century B.C., while the beginning of the 72 year long ash chronology is set in the 2nd half of the 37th Century. The anticipated end of building activity in the settlement is set in the mid 36th century B.C. The $^{14}C$ dates indicate that the ash HOC-FRSP1 chronology from Hočevarica could be concurrent with the VMO-QUSP2 chronology from Spodnje mostišče 1.*

## **6.3.1** RADIOKARBONSKO DATIRANJE LESA S HOČEVARICE

Kronologije širin branik s Hočevarice, prikazane v *poglavju 6.2*, so plavajoče oziroma nedatirane. Ker za njihovo absolutno dendrokronološko datiranje še nimamo ustreznih referenčnih kronologij, si trenutno pri njihovem datiranju največ obetamo od radiokarbonskih analiz. Radiokarbonske raziskave lesa iz pričujoče študije so bile opravljene v Heidelbergu v Nemčiji na *Heidelberger Akademie der Wissenschaften, Radiometrische Altersbestimmung von Wasser und Sedimenten*.

Potem ko smo sestavili kronologije širin branik, smo za vsako kronologijo izbrali vzorce lesa za radiokarbonske analize. To smo naredili tako, da smo med dendrokronološkimi vzorci, katerih zaporedja širin branik so bila vključena v kronologije, poiskali najbolj reprezentativne. Tem smo izrezali manjše vzorce, ki so vsebovali 10–20 branik iz perifernega dela vzorca in vsaj 20–30 g suhe snovi.

Za kronologijo HOC-FRSP1 smo tako odvzeli en vzorec, ki je vseboval zaporedne branike iz relativnih let 48–68, za daljšo hrastovo kronologijo HOC-QUSP1 pa smo izbrali dva vzorca z branikami iz relativnih let 38–

## **6.3.1** RADIOCARBON DATING OF WOOD FROM HOČEVARICA

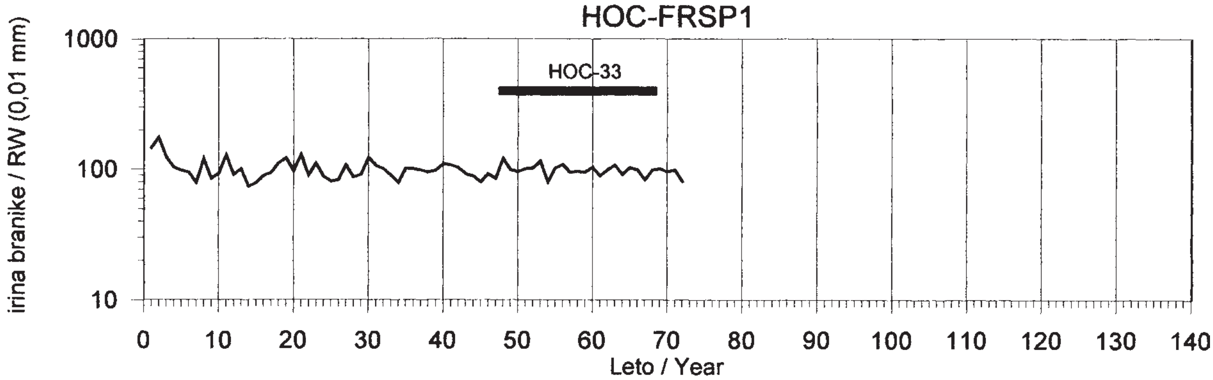
The tree-ring chronologies from Hočevarica presented in *chapter 6.2* are floating i.e. undated. Since there exist no adequate reference chronologies for their dendrochronological dating, radiocarbon analyses are currently the most promising for absolute dating. The radiocarbon analyses were carried out at the *Heidelberger Akademie der Wissenschaften, Radiometrische Altersbestimmung von Wasser und Sedimenten* in Heidelberg, Germany.

Following the composition of the tree-ring chronologies, one or two wood samples were selected from each of the chronologies for radiocarbon dating. One wood sample with 48–68 rings was selected from the HOC-FRSP1 and two sections with 38–54 and 99–119 rings from the HOC-QUSP1 were dated (*fig. 6.3.1* and *6.3.2*).

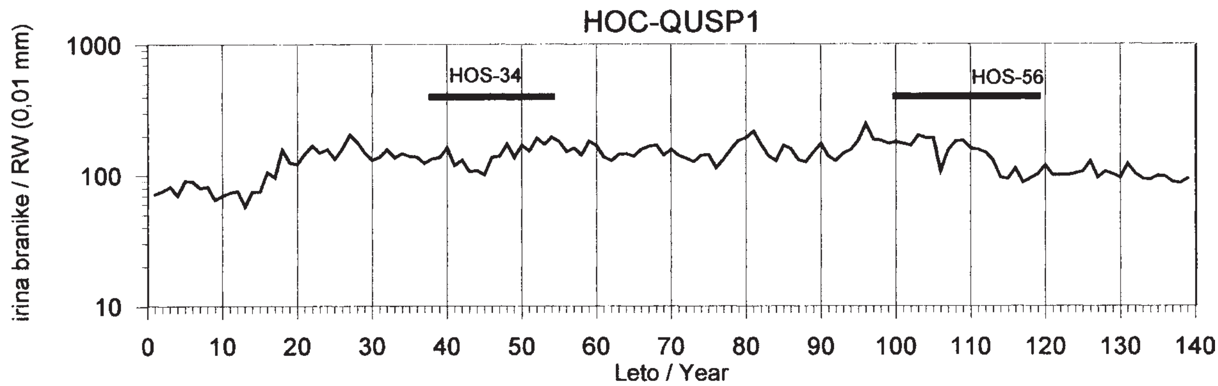
The sequence of $^{14}C$ dates was calibrated using the OxCal 3.5 program.[1] The results are presented in *table 6.3.1*.

The HOS-34 and HOS-56 samples represented two

[1] OxCal v3.5 Bronk, Ramsey (2000).




*Sl. 6.3.1:* Kronologija HOC-FRSP1 in mesto odvzema branik (vzorec HOC-33) za radiokarbonske raziskave.
*Fig. 6.3.1:* The HOC-FRSP1 chronology and the position of the HOC-33 sample, taken for radiocarbon analyses.




*Sl. 6.3.2:* Kronologija HOC-QUSP1 in mesto odvzema branik (vzorca HOS-56 in HOS-34) za radiokarbonske raziskave.
*Fig. 6.3.2:* The HOC-QUSP1 chronology and the position of samples HOS-56 and HOS-34, taken for radiocarbon analyses.

54 in 99–119. Položaj vzorcev glede na relativno časovno os obeh kronologij je razviden iz *slik 6.3.1* in *6.3.2.*

Zaporedje radiokarbonskih datumov ($^{14}$C BP) je bilo kalibrirano s pomočjo programa OxCal 3.5.[1] Rezultati so predstavljeni v *tabeli 6.3.1.*

Vzorca HOS-34 in HOS-56 sta vsebovala branike iz dveh območij iste kronologije HOC-QUSP1 (branike št. 38–54 in 99–119). Ker smo z dendrokronološko metodo lahko določili natančen časovni razpon med njima, smo za določitev absolutne starosti kronologije, ki sta ji pripadala vzorca, lahko zaporedje kalibrirali še s pomočjo opcije »sequence« programa OxCal 3.5. Na podlagi preračuna zaporedij je bila določena kalibrirana starost za braniko 1 kronologije HOC-QUSP1: 3742–3708 cal BC (1σ) oziroma 3745–3705 (2σ).[2]

To zaporedje je prikazano na *slikah 6.3.3a* in *6.3.3b* v primerjavi z INTCAL98 kalibracijsko krivuljo. Branika 1 je na *sliki 6.3.3a* postavljena na najstarejšo lego, na

[1] OxCal v3.5 Bronk, Ramsey (2000).

[2] Že objavljen kalibriran interval 3785–3705 BC za radiokarbonski datum kronologije HOC-QUSP1 s Hočevarice (glej Velušček, Čufar 2002, tab. 2) je bil ponovno preverjen z anali-

sections (rings 38–54 and 99–119) from the same HOC-QUSP1 chronology. To determine the absolute age of the chronology the sequence was calibrated using the »sequence« option of the OxCal 3.5 program. The result of the sequence-calculation showed that the age of the ring 1 of HOC-QUSP1 measured 3742– 3708 cal BC (1σ), and 3745–3705 (2σ) for ring 2.[2]

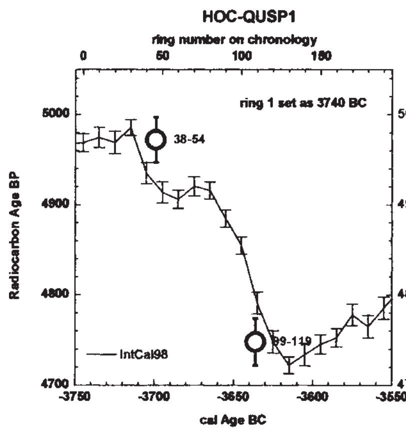
*Fig. 6.3.3a* and *6.3.3b* display the sequences, compared to the INTCAL98 calibration curve, with ring 1 set to the oldest/youngest possible position.

[2] The already published calibrated range 3785–3705 BC of the radiocarbon date for the HOC-QUSP1 chronology from Hočevarica (see Velušček, Čufar 2002, Table 2) has been verified by analysis of an additional sample and is here corrected. The new radiocarbon date is slightly younger than the previously published one.

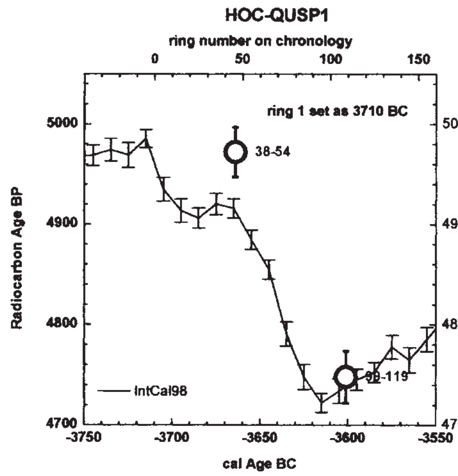
| Številka vzorca / Sample Number | Kronologija / Chronology | Lesna vrsta / Wood Species | Leva branika / Ring Left | Desna branika / Ring Right | δ13C | $^{14}$C BP | cal BC (1σ) | cal BC (2σ) |
|---|---|---|---|---|---|---|---|---|
| **HOC-33 (Hd-18976)** | HOC-FRSP1 | Fraxinus | 48 | 68 | -28,79 | 4822 ± 39 | 3650–3545 | 3665–3525 |
| **HOS-34 (Hd-22139)** | HOC-QUSP1 | Quercus | 38 | 54 | -28,4 | 4972 ± 25 | 3780–3710 | 3890–3675 |
| **HOS-56 (Hd-20765)** | HOC-QUSP1 | Quercus | 99 | 119 | -29,2 | 4746 ± 26 | 3635–3520 | 3640–3385 |

*Tab. 6.3.1:* Radiokarbonsko datiranje vzorcev s Hočevarice.
*Table 6.3.1:* Radiocarbon dating of the samples from Hočevarica.

*sliki 6.3.3b* pa na najmlajšo lego, ki ju dopušča razpon kalibriranja.




a




b

*Sl. 6.3.3a* in *6.3.3b*: Absolutno datiranje kronologije HOC-QUSP1 z uporabo opcije »sequence« programa OxCal 3.5.
*Fig. 6.3.3a* and *6.3.3b:* Absolute ages of the HOC-QUSP1 chronology, as determined by the »sequence«-option of OxCal 3.5.

## 6.3.2 HOČEVARICA IN DRUGE KOLIŠČARSKE NASELBINE NA LJUBLJANSKEM BARJU

Primerjava radiokarbonskih datumov s Hočevarice z datumi z drugih naselbin na Ljubljanskem barju je pokazala, da bi se obstoj naselbine Hočevarica lahko vsaj delno časovno prekrival s poselitvijo na Spodnjem mostišču 1 (prim. Čufar et al. 1997). Ko smo prvič sestavili in objavili kronologije z obeh naselbin, nismo ugotovili ujemanja med kronologijami širin branik (Čufar et al. 1997). Ko smo kasneje (v letu 1998) opravili dodatno vzorčenje na Hočevarici, smo izboljšali v objavi predstavljeno jesenovo kronologijo HOC-FRSP2. Nova izboljšana verzija HOC-FRSP1 je pokazala ujemanje s hrastovo kronologijo s Spodnjega mostišča VMO-QUSP2. Statistični parametri ujemanja so: koeficient skladnosti (Gleichläufigkeit) 70 % in t-vrednost po Bail-

zo dodatnega vzorca in je tu popravljen, saj je novi radiokarbonski datum nekoliko mlajši od objavljenega.

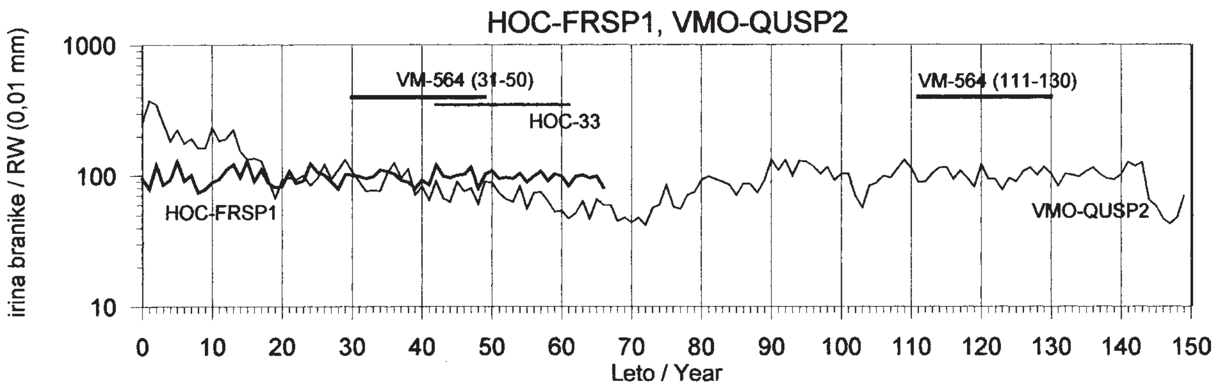
## 6.3.2 HOČEVARICA AND ITS RELATION TO OTHER PILE DWELLING SETTLEMENTS IN THE LJUBLJANSKO BARJE

After attaining the radiocarbon dating of the Hočevarica chronologies, our next question was whether the chronologies from Hočevarica match those from Spodnje mostišče 1. According to previous radiocarbon dating Spodnje mostišče 1 could have existed during the same period (Čufar et al. 1997). When the first tree-ring chronologies from Hočevarica and Spodnje mostišče 1 were composed and presented (Čufar et al. 1997) they could not be cross-matched. Later, in 1998, additional wood samples were collected from Hočevarica and ultimately resulted in improving the chronologies. The new improved version of the ash HOC-FRSP1 chronology could be cross-dated with the Spodnje mostišče VMO-QUSP2 chronology. The overlapping period of the chronologies measured 65 years, the cross-matching parameters had a 70 % congruity coefficient (in German:

lie in Pilcherju ($t_{BP}$) 4.3. Na *sliki 6.3.4* sta prikazani kronologiji sinhrono. Prekrivanje je dolgo 65 let. Ker je dendrokronološko ujemanje tik nad mejo značilnosti, v nadaljevanju prikazujemo, kako smo ga preverili še z radiokarbonsko metodo.

»Gleichläufigkeit«, or GLK) and a t-value, according to Baillie and Pilcher ($t_{BP}$), of 4.3. The matching of the chronologies is portrayed in *figure 6.3.4*.

The radiocarbon dates of samples from both chronologies were compared. The samples from the HOC-




*Sl. 6.3.4:* Kronologija HOC-FRSP1 s Hočevarice in VMO-QUSP2 s Spodnjega mostišča z mesti odvzema vzorcev za radiokarbonske raziskave.
*Fig. 6.3.4:* The chronologies HOC-FRSP1 from Hočevarica and VMO-QUSP2 from Spodnje mostišče 1, and the positions of samples taken for radiocarbon analyses.

Iz *slike 6.3.4* je razviden časovni razmik med vzorci iz obeh kolišč, odvzetimi za radiokarbonske analize. Vzorca iz kronologije HOC-FRSP1 (HOC-33) in VMO-QUSP2 (VM-564 (31–50)) sta imela podobne nekalibrirane ($^{14}$C BP) radiokarbonske datume (*tab. 6.3.2*).

S pomočjo programa OxCal 3.5 smo izračunali absolutni položaj zaporedij, ki so prikazana na *sliki 6.3.5*. Kalibriran radiokarbonski datum za prvo braniko krivulj je na *sliki 6.3.5* je 3738–3570 cal BC (2σ interval).

Na podlagi rezultatov, prikazanih v *tabeli 6.3.2* in na *sliki 6.3.5*, lahko sklepamo, da je sinhroni položaj dendrokronoloških krivulj na *sliki 6.3.4* glede na interval zaupanja radiokarbonskega datiranja najverjetneje pravilen.

S kombinacijo dendrokronoloških in radiokarbonskih analiz smo tako prišli do zaključka, da so se

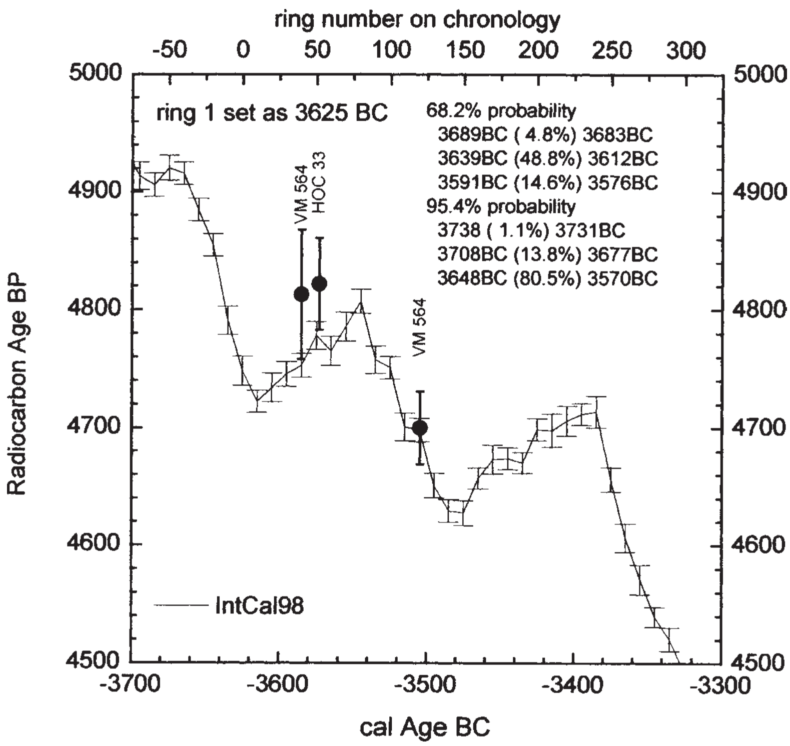
FRSP1 (HOC-33) and VMO-QUSP2 (VM-564 (31–50)) chronologies had comparable BP dates, as also shown in *table 6.3.2*.

The absolute position of this sequence was obtained using the OxCal 3.5 program; it is shown in *figure 6.3.5*, with 3738–3570 cal BC as the 2-ó interval of the position of ring 1.

*Table 6.3.2* and *figure 6.3.5* demonstrate that within the $^{14}$C error the two chronologies may indeed be synchronous, as indicated by the ring position shown in *figure 6.3.4*. The combined dendrochronological and radiocarbon dating indicates that building phases at Hočevarica, as described by the HOC-FRSP1 chronology, ended around 80 years before those at Spodnje Mostišče 1, as described by the VMO-QUSP2.

*Tab. 6.3.2:* Primerjava radiokarbonskih datumov vzorcev iz kronologije Hočevarica (HOC-FRSP1) in Spodnje Mostišče 1 (VMO-QUSP2).
*Table 6.3.2:* Comparison of $^{14}$C dates of samples of the chronologies from Hočevarica (HOC-FRSP1) and Spodnje Mostišče 1 (VMO-QUSP2).

| **Številka vzorca / Sample Number** | **Najdišče / Site** | **Kronologija / Chronology** | **Lesna vrsta / Wood Species** | **δ13C** | **$^{14}$C BP** | **cal BC (1σ)** | **cal BC (2σ)** |
|---|---|---|---|---|---|---|---|
| **HOC-33 (Hd-18976)** | Hočevarica | HOC-FRSP1 | *Fraxinus* | -28,79 | 4822 ± 39 | 3650–3545 | 3665–3525 |
| **VM-564 (31–50) (Hd-18856)** | Spodnje mostišče 1 | VMO-QUSP2 | *Quercus* | -27,8 | 4813 ± 55 | 3660–3520 | 3710–3380 |
| **VM-564 (111–130) (Hd-18785)** | Spodnje mostišče 1 | VMO-QUSP2 | *Quercus* | -28,6 | 4703 ± 32 | 3630–3370 | 3630–3370 |




*Sl. 6.3.5:* Absolutne starosti treh vzorcev iz kronologij HOC-FRSP1 in VMO-QUSP2 na INTCAL98 kalibracijski krivulji. Rezultat kalibriranja z opcijo »sequence« programa OxCal je prikazan v zgornjem desnem kotu.

*Fig. 6.3.5:* Absolute ages of three samples of the chronologies HOC-FRSP1 and VMO-QUSP2, shown on the INTCAL98 calibration curve. The result of the calibration using the »sequence«-option of OxCal is shown in the inset.

gradbene aktivnosti, ki jih opisuje kronologija HOC-FRSP1, končale 80 let prej kot aktivnosti na Spodnjem Mostišču 1, ki jih opisuje kronologija VMO-QUSP2.

Kombinacija radiokarbonskih in dendrokronoloških metod trenutno predstavlja najboljšo pot za absolutno datiranje poselitvenih aktivnosti na Ljubljanskem barju v četrtem tisočletju pr. Kr.

The $^{14}C$ method combined with dendrochronology is currently the only prospect for absolute dating of the settlement activities in the Ljubljansko barje during the 4th millennium B.C.

Translation: Katarina Čufar & Bernd Kromer

# 6.4 TELEKONEKCIJA KRONOLOGIJ Z NASELBIN HOČEVARICA IN PALÙ DI LIVENZA, ITALIJA

# 6.4 TELECONNECTION OF CHRONOLOGIES FROM HOČEVARICA AND PALÙ DI LIVENZA, ITALY

KATARINA ČUFAR & NICOLETTA MARTINELLI

*Izvleček*

*Predstavljamo uspešno telekonekcijo prazgodovinskih kronologij širin branik s Hočevarice HOC-QUSP1 in strukture 1 koliščarske naselbine Palù di Livenza (Pordenone, SV Italija). Po radiokarbonskem datiranju je bila struktura 1 s Palùja uvrščena v prvo polovico četrtega tisočletja pr. Kr., kar se ujema z radiokarbonskim datiranjem kronologije s Hočevarice. Gradbene aktivnosti na strukturi 1 v Palùju so se končale pred zaključkom aktivnosti na Hočevarici. Opisani rezultati pomenijo prvo znano dendrokronološko ujemanje prazgodovinskih kronologij iz Slovenije in Italije.*

*Abstract*

*A successful teleconnection of the Hočevarica HOC-QUSP1 chronology and the chronology structure 1 from Palù di Livenza (Pordenone, NE Italy) is presented. According to radiocarbon dating, structure 1 in Palù is attributed to the first half of the 4$^{th}$ millennium B.C. This coincides with the radiocarbon dating of the chronology from Hočevarica. The building activities for structure 1 in Palù ended earlier than those at Hočevarica. The results represent the first known dendrochronological correspondence of prehistoric chronologies from Slovenia and Italy.*

## **6.4.1** UVOD

Kot smo že omenili, so kronologije širin branik s Hočevarice predstavljene v *poglavju 6.2* plavajoče oziroma nedatirane. Za njihovo dendrokronološko datiranje bi potrebovali referenčne kronologije, ki ustrezajo raziskanim lesnim vrstam, območju in obdobju. Doslej nam v Sloveniji še ni uspelo sestaviti absolutno datiranih kronologij za prazgodovinska obdobja, zato nas še prav posebej zanima možnost telekonekcije, to je primerjave oziroma sinhroniziranja naših kronologij z datiranimi in nedatiranimi kronologijami iz drugih regij.

Med vodilnimi in geografsko najbližjimi laboratoriji, ki poseduje datirane prazgodovinske kronologije, je Dendrokronološki laboratorij pri *Landesdenkmalamt Baden-Württemberg*, Hemmenhofen, Nemčija. Ta laboratorij je tudi med vodilnimi na področju raziskav prazgodovinskih koliščarskih naselbin in v svojem arhivu med drugim hrani več datiranih prazgodovinskih kronologij širin branik (Billamboz 1992; 1996; Billamboz, Tegel 2001). Dendrokronološkemu laboratoriju iz Ljubljane je omogočil primerjave prazgodovinskih kronologij s svojimi referenčnimi kronologijami. Primerjave so

## **6.4.1** INTRODUCTION

As already mentioned, the tree-ring chronologies from Hočevarica presented in *chapter 6.2* are floating i.e. undated. For their dendrochronological dating, reference chronologies suitable for the investigated species, region and period would be required. As there are no absolutely dated chronologies for the prehistoric period in Slovenia, teleconnection, i.e. cross-dating with dated or undated chronologies from other regions embodies an indispensable procedure.

The Dendrochronological Laboratory of the *Landesdenkmalamt Baden-Württemberg* from Hemmenhofen, Germany is among the leading and geographically nearest laboratories that possesses dated prehistoric chronologies. Furthermore, this laboratory is also one of the leading ones for pile dwelling research. It operates with several dated prehistoric chronologies (Billamboz 1992; 1996; Billamboz, Tegel 2001) and supports the attempts of the laboratory in Ljubljana to cross-date the prehistoric chronologies from Slovenia with references from southern Germany. Since the oak wood from different European regions often evidences a good teleconnecbile usmerjene predvsem na hrastove kronologije, ki v mnogih evropskih regijah izkazujejo dobro telekonekcijo (Baillie 1995), vendar so bili vsi poskusi datiranja doslej neuspešni. Na podobne težave so naleteli tudi kolegi iz Italije, ki se že dolgo sistematično trudijo, da bi svoje prazgodovinske kronologije sinhronizirali s tistimi z območij severno od Alp.

Laboratorij DENDRODATA s.a.s. iz Verone že leta opravlja dendrokronološke raziskave na prazgodovinskih koliščarskih naselbinah v severni Italiji. Sestavili so več kronologij za neolitik in bronasto dobo. Kronologije so bile večinoma radiokarbonsko datirane, vendar so kljub dolgoletnemu sodelovanju z dendrokronološkim laboratorijem iz Hemmenhofna in od drugod ostale dendrokronološko nedatirane.

Zdi se, da so razlogi za neuspešno sinhroniziranje prazgodovinskih kronologij iz severne Italije podobni kot za slovenske. Med glavnimi razlogi za slabo telekonekcijo hrastovih kronologij se zdijo razlike v klimi, ki jo južno od Alp definirajo alpski, celinski in sredozemski vplivi.

Zaradi relativne bližine in podobnosti med severno Italijo in Slovenijo, laboratorija iz Verone in Ljubljane redno izmenjujeta in primerjata dendrokronološke podatke. Primerjave so pokazale, da je telekonekcija kronologij nekaterih lesnih vrst možna in da je odvisna od narave posamezne drevesne vrste ter od tega, kje so rasla raziskana drevesa in kdaj. Največ uspeha sta laboratorija dosegla pri skupnem sestavljanju kronologije macesna (*Larix decidua*). Sestavila sta regionalno kronologijo, dolgo 1242 let, ki premošča obdobje od leta 756 do 1997 in jo lahko uspešno uporabljamo v severni Italiji in v Sloveniji (Levanič, Pignatelli, Čufar 2001). Njena sestava pomeni velik uspeh, saj tako v Italiji kot v Sloveniji močno primanjkuje starih dreves ter zgodovinskega in arheološkega lesa iz nekaterih obdobij. Primerjave kronologij modernih hrastov so bile v splošnem manj uspešne, najnovejši rezultati pa vendarle nakazujejo, da so za nekatera pretekla obdobja izgledi za telekonekcijo hrasta iz Italije in Slovenije boljši kot za današnje hraste.

V nadaljevanju predstavljamo prvo uspešno sinhroniziranje prazgodovinskih kronologij hrasta s Hočevarice in s koliščarske naselbine Palù di Livenza, ki leži v SV Italiji približno 150 km zahodno od Hočevarice.

## 6.4.2 PRIMERJAVA KRONOLOGIJ ŠIRIN BRANIK IZ HOČEVARICE IN PALÙ DI LIVENZA

Arheološki kompleks Palù (Polcenigo, Pordenone) leži ob izviru reke Livenza ob vznožju gore Massiccio Cansiglio-Cavallo v predalpski regiji SV Italije. Naselbino so odkrili po letu 1960 (Peretto, Taffarelli, 1973). Raziskave pod vodstvom *Soprintendenza Archeologica del Veneto e Friuli Venezia Giulia* in *Soprintendenza per i Beni A.A.A.A.S. del Friuli Venezia-Giulia* med leti 1983 in 1999



tion (Baillie 1995), our comparisons are focused mainly on oak chronologies.

Unfortunately, the attempts to cross-date the Slovenian prehistoric chronologies with those from Germany have proved unsuccessful so far. Similar observations have been made by Italian colleagues, who have, despite systematic and long-term efforts also failed to teleconnect their prehistoric chronologies with those from the regions north of the Alps.

The DENDRODATA s.a.s. laboratory from Verona completed several dendrochronological investigations of prehistoric pile dwellings throughout northern Italy. They constructed several prehistoric tree-ring chronologies both for the Neolithic and Bronze Age periods. They incorporate radiocarbon dates, although they remain dendrochronologically undated, despite collaboration with the laboratory in Hemmenhofen as well as other laboratories.

It seems that the reasons for the unsuccessful cross-dating of northern Italian prehistoric chronologies are similar to those for Slovenian ones. One of the difficulties concerning the teleconnection of oak wood could also be climate, which is, south of the Alps, determined by the Alpine, Continental and Mediterranean influences.

Due to the relative vicinity and similarities between northern Italy and Slovenia, the laboratories from Verona and Ljubljana regularly exchange data and compare their respective chronologies. Investigations in northern Italy and Slovenia have demonstrated that the prospect of teleconnecting tree-ring patterns varies with regard to tree species, location and time. The most successful common project was the construction of the larch (*Larix decidua*) chronology for NE Italy and Slovenia. This regional chronology is 1242 years long and spans the period between 756–1997 AD (Levanič, Pignatelli, Čufar 2001). Comparisons of modern oak chronologies were less successful but our most recent results indicate that cross-matching of prehistoric chronologies might indeed be possible.

The first successful cross-dating of prehistoric chronologies from Hočevarica and from Palù di Livenza, a pile dwelling site in NE Italy, around 150 km west from Hočevarica (*fig. 6.4.1*), is presented in the continuation.

## 6.4.2 COMPARISON OF CHRONOLOGIES FROM HOČEVARICA AND PALÙ DI LIVENZA

The archaeological complex of Palù (Polcenigo, Pordenone) is located near the river Livenza at the foot of the Massiccio Cansiglio-Cavallo mountain in the subalpine region of NE Italy. It was discovered in the 1960s (Peretto, Taffarelli 1973). The investigations of teams from *Soprintendenza Archeologica del Veneto e Friuli Venezia Giulia* and *Soprintendenza per i Beni A.A.A.A.S. del*


*Sl. 6.4.1:* Lega naselbin Hočevarica, Slovenija in Palù di Livenza, SV Italija.

*Fig. 6.4.1:* Map showing the locations of Hočevarica, Slovenia and Palù di Livenza, NE Italy.

so pokazale, da je bilo v prazgodovini območje poseljeno s koliščarskimi naselbinami, ki so živele v poznem neolitiku in eneolitiku (Vitri 2001).

Arheološka izkopavanja med leti 1992 in 1994 (Bassetti, Cavulli 2001; Vitri 2001) so vključevala tudi vzorčenje lesa za dendrokronološke raziskave, ki jih je opravil laboratorij DENDRODATA. Sestavili so več plavajočih kronologij za več različnih ostankov konstrukcij v naselbini. Na podlagi radiokarbonskega datiranja so ugotovili,da je bilo območje poseljeno v 5. in 4. tisočletju pr. Kr. Rekonstruirali so več poselitvenih in gradbenih faz.

Več hrastovih kronologij iz naselbine Palù z nad 50 branikami smo dendrokronološko primerjali s kronologijami z Ljubljanskega barja. Izkazalo se je, da se je hrastova kronologija iz Hočevarice HOC-QUSP1 vizualno in statistično značilno ujemala s kronologijo strukture 1 iz strukturnega sistema III na Palùju (Vitri, Martinelli, Čufar 2002). Sinhroni položaj obeh krivulj je prikazan na *sliki 6.4.2*.

Rezultati kažejo, da se kronologija s Palùja prekriva s starejšim delom HOC-QUSP1 in se konča v relativnem letu 80 (*sl. 6.4.2*). Parametri datiranja so: koeficient skladnosti (Gleichläufigkeit) 69 %, t-vrednost po Baillie in Pilcherju ($t_{BP}$) 4.4 in indeks datiranja (Cross Date

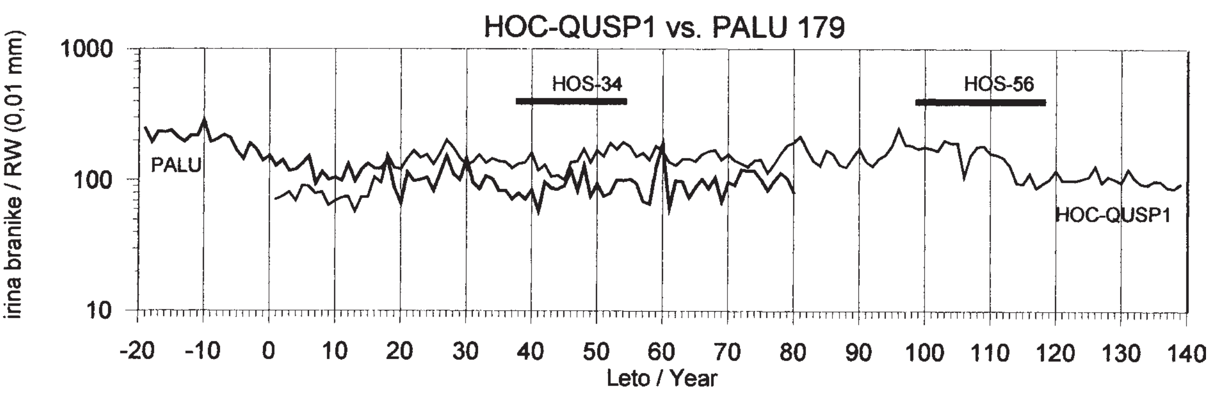
*Friuli Venezia-Giulia*, carried out between 1983 and 1999, established that it was a site of prehistoric pile dwellings. The dwellings were inhabited during the late Neolithic and Eneolithic (Vitri 2001).

Archaeological excavations between 1992 and 1994 (Bassetti, Cavulli 2001; Vitri 2001) also incorporated wood sampling for dendrochronological investigations, which were carried out by the DENDRODATA laboratory. They composed several floating chronologies related to different wooden structures. Based on radiocarbon dating, they established that the area was inhabited during the 5$^{th}$ and 4$^{th}$ millenniums B.C. They also succeeded in reconstructing several different phases of building activity in the pile dwelling settlement.

Several oak chronologies from Palù, each containing more than 50 tree-rings, were compared with those from the Ljubljansko barje. The Hočevarica HOC-QUSP1 oak chronology and the mean tree-ring curve of structure 1 belonging to the structural system III at Palù both demonstrated good visual and statistical correspondence (see also Vitri, Martinelli, Čufar 2002). The cross-dated position of the chronologies is displayed in *figure 6.4.2*.

The results show that the Palù chronology overlaps with the older part of the HOC-QUSP1 chronology, and ends at the relative year 80 (*fig. 6.4.2*). The cross-dating parameters for this position are statistically significant with a congruity coefficient (»Gleichläufigkeit« or »GLK«) of 69 %, a t-value according to Baillie and Pilcher ($t_{BP}$) of 4.4 and a cross-date index (CDI) of 177. The indicators are statistically significant. Furthermore, the chronologies also show good visual agreement.

The sample from the pile no. ES 373 was dated to




*Sl. 6.4.2:* Sinhron položaj kronologij z naselbin Hočevarica (HOC-QUSP1) in Palù di Livenza.

*Fig. 6.4.2:* Cross-dated position of the chronologies from Hočevarica (HOC-QUSP1) and Palù di Livenza.

Index) 177. Kazalniki so statistično značilni. Krivulji se poleg tega dobro ujemata tudi glede značilnih let.

Vzorec št. ES 373 je bil radiokarbonsko datiran 4880 ± 105 BP (Vitri, Martinelli, Čufar 2002), kar strukturo 1 s Palùja uvršča v prvo polovico 4. tisočletja pr. Kr. To datiranje se ujema z radiokarbonskim datiranjem kronologije HOC-QUSP1 s Hočevarice (*poglavje 6.3.1*) in še dodatno potrjuje ugotovitve dendrokronoloških primerjav.

Rezultati nakazujejo, da so se gradbene aktivnosti, kot jih opisuje kronologija strukture 1 s Palùja, končale prej kot aktivnosti na Hočevarici, ki jih zajema kronologija HOC-QUSP1. Glede na to, da kronologija HOC-QUSP1 najverjetneje vključuje les iz različnih gradbenih faz, jarek, kjer smo pridobili vzorce lesa, je najverjetneje sekal ostanke različno starih delov naselbine lahko sklepamo, da so se gradbene aktivnosti na strukturi 1 v Palùju zaključile nekaj let pred začetkom najstarejše faze na Hočevarici oziroma 59 let pred najmlajšo bolje dokumentirano fazo.

Rezultati pomenijo prvo uspešno sinhroniziranje prazgodovinskih kronologij iz Italije in Slovenije. Pripomogli bodo k boljšem poznavanju aktivnosti na koliščarskih naselbinah v severni Italiji in v Sloveniji in odnosov med njimi. Pričakujemo, da bodo pripomogli tudi k bodočem datiranju naših kronologij z referencami z območij severno od Alp. Rezultati tudi nakazujejo, da so težave pri telekonekciji hrasta med regijami severno in južno od Alp verjetno v veliki meri posledica različnih klimatskih dejavnikov.



4880 ± 105 BP (Vitri, Martinelli, Čufar 2002). According to this radiocarbon dating, the structure 1 at Palù is attributed to the first half of the 4th millennium B.C. This result coincides with the radiocarbon dating of the HOC-QUSP1 chronology from Hočevarica (*chapter 6.3.1*) and additionally reconfirms the dendrochronological matching.

The results evidence that the building activity accounted for by the chronology of structure 1 at Palù occurred earlier than the building phases at Hočevarica. As the HOC-QUSP1 chronology most likely contains wood samples from different building phases, and the ditch – from where the wood samples were collected – probably traversed the remains of variously aged sections of the settlement, we can conclude that the building activity at Palù ended a few years before the oldest phase at Hočevarica, or 59 years before the youngest better-documented building activity.

The results represent the first successful cross-dating of prehistoric chronologies from Italy and Slovenia. They will help to better understand and date the activities in the pile dwelling sites in NE Italy and Slovenia and to study other possible correspondences between them. Improved comprehension of the relations between these two regions could presumably help in future efforts to cross-date with reference chronologies from north of the Alps. The results also support the assumption that different climatic factors influenced the growth of the trees in the regions south of the Alps, which may also be the main reason for the faults in teleconnecting oak chronologies throughout the Alps.

Translation: Katarina Čufar & Nicoletta Martinelli

# **6.5** INTERPRETACIJA REZULTATOV ABSOLUTNEGA DATIRANJA HOČEVARICE IN ABSOLUTNO DATIRANJE HORIZONTA KERAMIKE Z BRAZDASTIM VREZOM (HKBV) V SLOVENIJI

ANTON VELUŠČEK

*Izvleček*

*Na podlagi radiokarbonskih datacij in dendrokronoloških raziskav postavljamo zaključek gradbenih aktivnosti na Hočevarici v okvirno prvo četrtino 36. stoletja (kronologija HOC-QUSP1) oziroma v sredino 36. stoletja pr. Kr. (kronologija HOC-FRSP1). Izpostavljena je tudi dendrokronološko potrjena skorajšnja sočasnost Hočevarice s koliščarsko naselbino Palù di Livenza v severni Italiji in na podlagi radiokarbonskih datacij predlagan absolutni časovni razpon za HKBV v osrednji Sloveniji, ki okvirno kaže na drugo četrtino 4. tisočletja pr. Kr.*

## **6.5.1** UVOD

Za absolutno datiranje je na voljo več metod. Za Hočevarico in najdišča po Sloveniji sta v tem trenutku najaktualnejši radiokarbonsko datiranje in dendrokronologija.

Na Ljubljanskem barju ima daljšo tradicijo radiokarbonsko datiranje, saj se prvi absolutni datumi za koliščarske naselbine pojavijo že sredi sedemdesetih let. V zagrebški laboratorij so bili poslani vzorci kolov z Resnikovega in Maharskega prekopa (Bregant 1974c; 1975) ter Notranjih Goric (Bregant 1975; Harej 1980), nekoliko kasneje tudi s Part (Harej 1978; 1981-1982; 1987). Ker z vidika moderne znanosti vzorčenje ni potekalo sistematično (prim. Ambers 1994, 7 ss), čeprav po premišljenem načrtu (glej Bregant 1975, 49), smo tako dobili samo zelo okvirno kronološko sliko poselitve. Natančnejše datume in podatke o absolutnih kronoloških odnosih med naselbinami pa pridobivamo šele nekaj let, ko smo tudi na Ljubljanskem barju pričeli v raziskave vključevati dendrokronologijo (glej Velušček, Čufar 2002 in *poglavje 6.1.5*).

# **6.5** INTERPRETATION OF THE RESULTS OF ABSOLUTE DATING AT HOČEVARICA AND OF THE HORIZON OF POTTERY WITH FURROWED INCISIONS (HKBV) IN SLOVENIA

*Abstract*

*On the basis of radiocarbon dates and dendrochronological research, the end of building activity at Hočevarica is set approximately in the first quarter of the 36$^{th}$ century (HOC-QUSP1 oak chronology) and the mid 36$^{th}$ century B.C. (HOC-FRSP1 ash chronology). The dendrochronologically confirmed proximate concurrence of Hočevarica with the pile dwelling settlement of Palù di Livenza in northern Italy is also extended, as well as the $^{14}C$ based absolute time span proposed for the HKBV horizon in central Slovenia, which falls approximately in the second quarter of the 4$^{th}$ millennium B.C.*

## **6.5.1** INTRODUCTION

A number of methods are available for absolute dating. At the moment radiocarbon dating and dendrochronology provide the best prospects for Hočevarica and other sites throughout Slovenia.

There is a long tradition of radiocarbon dating at the Ljubljansko barje. The first absolute dates for the pile dwelling settlements are proffered already in the mid 1970s. Pile samples from Resnikov prekop and Maharski prekop were sent to the laboratory in Zagreb (Bregant 1974c; 1975), as well as from Notranje Gorice (Bregant 1975; Harej 1980), and somewhat later also from Parte (Harej 1978; 1981-1982; 1987). In the eyes of modern science sampling was not carried out systematically (cf. Ambers 1994, 7 pp), even though it followed a well thought plan (check Bregant 1975, 49); consequently, the chronological framework for settlement is considered only a very rough estimate. More precise dates and data on absolute chronological relations between settlements are being attained in only recent years with the onset of dendrochronological research efforts in the

## **6.5.2** INTERPRETACIJA REZULTATOV ABSOLUTNEGA DATIRANJA HOČEVARICE

Na Hočevarici sta potekali dve arheološko-dendrokronološki terenski akciji (1995, 1998) (glej *poglavji 3.1* in *6.2*). Sestavljeni sta hrastova in jesenova kronologija za kateri, glede na trenutno stanje raziskav, lahko rečemo, da se med seboj ne prekrivata ter opisujeta različni rastni obdobji.[1] Torej se zdi mogoče, če kronologiji primerjamo s stratigrafijo Hočevarice, da se starejša kronologija ujema s prvo fazo, mlajša pa z drugo fazo. Da bi pridobili absolutni časovni okvir in pojasnili odnos med kronologijama, so bili natančno protokolirani vzorci poslani na radiokarbonsko datiranje v Heidelberg.

Datiranje je pokazalo (glej *poglavje 6.3*), da lahko postavimo najmlajši dokumentirani posek lesa znotraj hrastove kronologije v okvirno prvo četrtino 36. stoletja pr. Kr. (1 in 2 σ) (*sl. 6.3.3a*; *6.3.3b*), zadnje leto poseka v jesenovi kronologiji pa v sredino 36. stoletja pr. Kr. (1 σ) (glej *sl. 6.3.5*). Skratka, gre za čas, ki ga opisujejo tudi radiokarbonske datacije semen in sedimenta iz kulturne plasti (prim. *poglavje 6.3* s *poglavjem 3.2* in z Jeraj 2002, tabela 1).

## **6.5.3** PREKRIVANJE KRONOLOGIJ

Za uspešno datiranje je pomembno tudi prekrivanje kronologij, saj se kronologija tako izboljša ter podaljša (glej *poglavje 6.1*). Dendrokronološke raziskave in radiokarbonsko datiranje kažeta, da se plavajoča jesenova kronologija s Hočevarice (HOC-FRSP1) zelo verjetno prekriva s skoraj 150 let dolgo kronologijo s Spodnjega mostišča 1 na jugovzhodu Ljubljanskega barja (glej Čufar et al. 1997; Čufar, Levanič, Velušček 1998 in *poglavji 6.2* ter *6.3*). Tako je tudi videti, da so najmlajše gradbene aktivnosti v jesenovi kronologiji s Hočevarice dokumentirane okoli 80 let pred pričetkom gradbenih aktivnosti na Spodnjem mostišču. Torej kaže, da je Hočevarica (kronologija HOC-FRSP1) starejša od Spodnjega mostišča 1 (kronologija VMO-QUSP2).

Hrastova kronologija se trenutno ne prekriva z nobeno kronologijo z Ljubljanskega barja, pač pa je prišlo do prekrivanja s kronologijo s Palù di Livenze v okolici Pordenona v severni Italiji. Novejše raziskave na Palùju, ki so podprte z dendrokronologijo in radiokarbonskim datiranjem, kažejo, da je bilo območje poseljeno dalj časa (glej *poglavje 6.4*; Vitri 1995; Corti et al. 1997). S Hočevarico se prekriva kronologija PALU 179, sestavljena iz Ljubljansko barje as well (check Velušček, Čufar 2002 and *chapter 6.1.5*).

[1] Čeprav obstaja glede na trenutno stanje raziskav možnost, da se kronologiji za nekaj desetletij prekrivata, morda celo opisujeta isto obdobje gradbenih aktivnosti, se zdi bolj verjetno, da so se gradbene aktivnosti znotraj jesenove kronologije dogajale nekaj let do nekaj desetletij po gradbenih aktivnostih, dokumentiranih s hrastovo kronologijo (glej *poglavje* 6.2).



## **6.5.2** INTERPRETATION OF THE RESULTS OF ABSOLUTE DATING AT HOČEVARICA

Two archaeological-dendrochronological field actions were carried out at Hočevarica (1995, 1998) (check *chapters 3.1* and *6.2*). Two tree-ring chronologies, an oak and an ash, were composed; however the current stance of research has established that they do not overlap but rather document two different growth periods.[1] It does seem plausible that, if the two tree-ring chronologies are compared with the stratigraphy at Hočevarica, the earlier chronology corresponds with the first settlement phase and the later chronology corresponds with the second phase. In the hopes of establishing an absolute time span and clarifying the relationship between the two tree-ring chronologies, samples collected according to precise protocol were sent to Heidelberg for $^{14}C$ dating.

The attained dates evidence (check *chapter 6.3*) that the latest felling of trees documented in the oak chronology may be set to approximately the first quarter of the 36$^{th}$ century B.C. (1 and 2 σ) (*fig. 6.3.3a*; *6.3.3b*), and that the final year of felling in the ash chronology can be attributed to the mid 36$^{th}$ century B.C. (1 σ) (check *fig. 6.3.5*). In other words, this is the same time frame estimated by the radiocarbon dates of seeds and sediments from the cultural layer (cf. *chapter 6.3* with *chapter 3.2* and with Jeraj 2002, Table 1).

## **6.5.3** OVERLAPPING OF TREE-RING CHRONOLOGIES

The overlapping of tree-ring chronologies is fundamental for successful dating as the chronologies are thus rendered more reliable and also longer (check *chapter 6.1*). Dendrochronological research and radiocarbon dating demonstrate that the floating ash chronology from Hočevarica (HOC-FRSP1) quite likely overlaps with the almost 150 year long chronology from Spodnje mostišče 1 in the southeastern part of the Ljubljansko barje (check Čufar et al. 1997; Čufar, Levanič, Velušček 1998 and *chapters 6.2* and *6.3*). Thus it also appears that the latest phase of building activity in the ash chronology from Hočevarica is documented about 80 years prior to the beginning of building activity at Spodnje mostišče. Evidently Hočeva-

[1] Despite the possibility – considering the current stance of investigations – of the two chronologies overlapping by a few decades, and of perhaps even documenting the same period of building activity, it still seems more likely that the building activity within the ash chronology occurred a few years or even a few decades after the building activity documented by the oak chronology (check *chapter* 6.2).

vzorcev strukture 1, najmlajšega neolitskega sklopa lesenih gradbenih elementov (*sistema strutturale III*). Videti je, da je struktura 1 s Palùja nekaj let, ne desetletij, starejša od začetka gradbenih aktivnosti v okviru kronologije HOC-QUSP1 na Hočevarici. Tezo potrjuje tudi radiokarbonska datacija vzorca kola ES 373 iz strukture 1, ki se prekriva z absolutnimi datacijami s Hočevarice (Corti et al. 1997, 74, tab. 1; glej še *poglavji 6.3* in *6.4*). Lahko torej govorimo o skoraj sočasnih naselbinah.

Časovno ujemanje potrjujejo tudi arheološke najdbe, saj imajo nekatere med njimi paralele na Hočevarici oziroma na najdiščih HKBV v Sloveniji. Gre za fragmente, ki so ornamentirani z razčlenjenimi rebri (Montagnari Kokelj, Vitri 1989, 386; Vitri 1995, 184), fragment, ki je ornamentiran z vrezanim linearnim motivom in vbodi (Peretto, Taffarelli 1973, sl. 2: 3), štiri pintadere (Peretto, Taffarelli 1973, 242 s, sl. 2: 6,7), med katerimi sta dve okrašeni s cikcakastim motivom (Gnesotto 1983, sl. E: 1,2), analogijo zanju pa je najti v tretji naselbinski fazi Gradca pri Mirni (*sl. 5.3.2:* 7). Morda lahko v to skupino uvrstimo tudi fragment sklede, ki so jo uvrstili v skupino Brijuni-Škocijan (Peretto, Taffarelli 1973, 243, sl. 2: 2).

Pomembno sorodnost s Hočevarico kažejo tudi koščki bakra, ki so jih našli na Palùju in se jih uvršča v obdobje kulture Lagozza (Peretto, Taffarelli 1973, 252, 258; prim. Gnesotto 1983, 62), kamor spada tudi struktura 1 (prim. Corti et al. 1997, 75).

## **6.5.4** ABSOLUTNO DATIRANJE HKBV V SLOVENIJI

Ker so trenutno dendrokronološke raziskave na prazgodovinskih najdiščih po Sloveniji omejene samo na Ljubljansko barje,[2] se moramo za absolutno datiranje preostalih naslanjati predvsem na radiokarbonsko metodo. Obstaja niz radiokarbonskih datumov za eneolitsko obdobje v Sloveniji (Velušček 1999b). Med njimi jih je nekaj, ki uokvirjajo obdobje, o katerem je govor. Mislimo na radiokarbonske datacije za Ajdovsko jamo in Moverno vas.

V Ajdovski jami kažejo na časovni okvir horizonta keramike z brazdastim vrezom kalibrirane vrednosti radiokarbonskih datacij vzorcev iz najmlajšega, postlasinjskega prazgodovinskega horizonta (*sl. 6.5.1*).

Na *sliki 6.5.1* je razvidno, da se večina datacij razmeroma dobro pokriva z datacijami za Hočevarico. Najstarejša datacija vzorca oglja iz levega hodnika pa se zdi nekoliko prestara. Enega izmed vzrokov iščemo v neposrečenem izboru vzorca, ki je morda v sedimentu migriral, in tudi v dejstvu, da je z datiranjem oglja prišlo

[2] Pregled stanja dendrokronoloških raziskav v Sloveniji dobimo v *poglavju 6.1* in pri Čufar, Levanič 1998; za raziskave na Ljubljanskem barju pa glej *poglavje 6.1* in Velušček, Čufar 2002.



rica (the HOC-FRSP1 chronology) is older than Spodnje mostišče 1 (the VMO-QUSP2 chronology).

The oak chronology currently does not overlap with any other tree-ring chronology from the Ljubljansko barje; it does however overlap with the tree-ring chronology from Palù di Livenza in the vicinity of Pordenone in northern Italy. More recent investigations at Palù, which are supported by dendrochronology and radiocarbon dating, indicate that the region was settled for a longer period of time (check *chapter 6.4*; Vitri 1995; Corti et al. 1997). The Hočevarica oak chronology overlaps with the PALU 179 chronology, which is constituted from samples of structure 1, the youngest Neolithic complex of wooden architectural elements (*sistema strutturale III*). It seems that structure 1 from Palù is a few years, not decades, older than the onset of building activity within the framework of the HOC-QUSP1 chronology at Hočevarica. Radiocarbon dates of the pile ES 373 from structure 1, which overlaps with the absolute dates from Hočevarica, also confirm this thesis (Corti et al. 1997, 74, Table 1; check also *chapters 6.3* and *6.4*). We may thus speak of the almost synchronous settlements.

Archaeological finds also attest to the chronological correspondence; some of these finds also have analogies at Hočevarica and the HKBV sites throughout Slovenia. These finds mainly constitute fragments ornamented with cordons with finger imprints (Montagnari Kokelj, Vitri 1989, 386; Vitri 1995, 184), a fragment, ornamented with an incised linear motif and stitches (Peretto, Taffarelli 1973, fig. 2: 3), four seal stamps (Peretto, Taffarelli 1973, 242 p, fig. 2: 6,7), of which two are decorated with a zigzag motif (Gnesotto 1983, fig. E: 1,2) and for which there is an analogy in the third settlement phase at Gradec pri Mirni (*fig. 5.3.2:* 7). Perhaps a fragment of a dish attributed to the Brijuni-Škocjan group (Peretto, Taffarelli 1973, 243, fig. 2: 2) also belongs in this group.

Pieces of copper found at Palù also hint at the correspondence with Hočevarica; they were attributed to the period of the Lagozza culture (Peretto, Taffarelli 1973, 252, 258; cf. Gnesotto 1983, 62), which also happens to hold true for structure 1 (cf. Corti et al. 1997, 75).

## **6.5.4** ABSOLUTE DATING OF »HKBV« IN SLOVENIA

As dendrochronological investigations of prehistoric sites throughout Slovenia are currently limited to the Ljubljansko barje,[2] absolute dating of other sites must thus rely primarily on the radiocarbon method. An entire se-

[2] A review of the stance of dendrochronological research in Slovenia is presented in *chapter 6.1* and in Čufar, Levanič 1998; regarding research in the Ljubljansko barje, check *chapter 6.1* and Velušček, Čufar 2002.

do napake, ki izhaja iz pozicije vzorca v drevesu (Ambers 1994).

V Moverni vasi je faza z lasinjskimi najdbami datirana v časovni razpon 3875 ± 130 BC (Budja 1993b, sl. 5: faza 7). To je datum, ki na najdišču pomeni *terminus post quem* 8. in 9. naselbinski fazi (prim. Budja 1988, 50; 1990, 13, 16; 1992, sl. 4; 1993b, sl. 5). Torej moremo za naselbinski fazi, ki smo ju vzporejali s HKBV (glej *poglavje 5.3*), pričakovati mlajši absolutni datum.[3]

Za osrednjeslovensko območje so pomembni tudi absolutni datumi s Hodiškega jezera/Keutschacher See na Koroškem v Avstriji, kjer že več let potekajo dendrokronološke raziskave (Cichocki 1994; 2003). Kot rezultat raziskovalne kampanije v sezoni 1993/1994 je sestavljena 294 let dolga hrastova kronologija, ki je vpeta med leti 4158 in 3864 pr. Kr. (Cichocki 2000, 51; prim. Cichocki 2003, 17 ss).

Na žalost ni znan odnos med kronologijo, stratigrafijo in najdbami. Kljub temu se zdi, da radiokarbonski datum 4900 ± 100 BP (*sl. 6.5.1*) kaže na obdobje najmlajše mlajšeneolitske poselitve na jezeru, tj. na naselbino iz okvirno prve polovice 4. tisočletja pr. Kr. (prim. Cichocki 2003, 25).

Takšen datum se približuje datacijam s Hočevarice in datacijam HKBV. Zato ne preseneča, da se med najdbami, ki jih raziskovalci, kot S. Dimitrijević (1961; 1979b), E. Ruttkay (1990; 1996; 1997) in nedavno še B. Samonig (2003), uvrščajo v lasinjsko kulturo (Škocijan-Lasinja skupino), pojavlja nekaj keramičnih najdb, ki imajo paralelo v HKBV: npr. bogato ornamentirani vrči (Nicolussi 1982, sl. 11), med katerimi dva objavlja Samonig in ju tipološko uvršča v najmlajšo **IIc** stopnjo skupine Škocijan-Lasinja oziroma v t. i. hodiški facies/Fazies Keutschacher See (2003, 33, sl. 6,7).

Na Hodiškem jezeru torej lahko pričakujemo tudi naselbino, ki je sočasna HKBV-ju. Zanimivo je tudi, da se prav v stopnjo **IIc** postavlja fragmente livarskih posod za ulivanje arzenskega bakra. Ti naj bi bili dokaz o začetku domače metalurške dejavnosti na Koroškem (Samonig 2003, 33).

Če torej časovni razpon 3875 ± 130 BC z Moverne vasi označuje spodnjo mejo HKBV-ja, potem imamo najboljši vpogled v dogajanje po HKBV-ju v Sloveniji prav na Ljubljanskem barju. Na Barju se po obdobju Hočevarice pojavi skupina naselbin, kot sta Maharski prekop, Blatna Brezovica, pa tudi Spodnje mostišče ter v novejšem času odkrite Stare gmajne. Za omenjena najdišča je značilna keramika, ki je sicer podobna Hočevarici, a so vendar razlike. Na teh najdiščih ni keramike z brazdastim vrezom oziroma keramike z bogatim vrezanim ornamentom (glej *poglavje 5.2*; za Stare gmajne glej še tablo z

[3] Faza 8 je radiokarbonsko datirana, toda datacija 2705 ± 145 BC se zdi občutno prenizka za najdbe, ki se v njej oziroma v naslednji 9. fazi pojavljajo (glej Budja 1992, sl. 4).



ries of radiocarbon dates exist for the Eneolithic period in Slovenia (Velušček 1999b). There are quite a few among them which correspond to the period of discussion, or more precisely, those from Ajdovska jama and Moverna vas.

At Ajdovska jama the calibrated values for the radiocarbon dates of the samples from the latest, post-Lasinja prehistoric horizon designate the time frame of the horizon of pottery with furrowed incisions (*fig. 6.5.1*).

*Figure 6.5.1* demonstrates how the majority of dates overlap relatively well with those from Hočevarica. The oldest date of a charcoal sample from the left corridor does seem somewhat too old though. One possible reason might be the unfortunate selection of a sample, which could possibly have migrated into the sediment; furthermore, the dating of the charcoal might be inaccurate, as the sample position is considered within a tree (Ambers 1994).

At Moverna vas the phase with Lasinja finds is dated to the time span of 3875 ± 130 B.C. (Budja 1993b, fig. 5: phase 7). This date is interpreted as *terminus post quem* to the 8th and 9th settlement phases at the site (cf. Budja 1988, 50; 1990, 13, 16; 1992, fig. 4; 1993b, fig. 5). As such, a later date is anticipated for these two settlement phases, which have been paralleled with HKBV (check *chapter 5.3*).[3]

The absolute dates from the Keutschacher See in Carinthia in Austria, where dendrochronological investigations are under way already for a number of years now, are also crucial to the central Slovenian region (Cichocki 1994; 2003). As a result of the investigative campaign in the 1993/1994 season, a 294 year long oak chronology was composed and it covers the span between the years 4158 and 3864 B.C. (Cichocki 2000, 51; cf. Cichocki 2003, 17 pp).

Unfortunately, the relationship between the chronology, stratigraphy and finds remains unknown. Nonetheless, it seems that the radiocarbon date of 4900 ± 100 BP (*fig. 6.5.1*) indicates the youngest Late Neolithic settlement at the lake, that is, a settlement dating to approximately the first half of the 4th millennium B.C. (cf. Cichocki 2003, 25).

This dating approaches the dates from Hočevarica and the HKBV dates. Thus it is not surprising that among the finds, which investigators such as S. Dimitrijević (1961; 1979b), E. Ruttkay (1990; 1996; 1997) and recently also B. Samonig (2003) attribute to the Lasinja culture (the Škocijan-Lasinja group), are also select pottery finds with parallels with HKBV: e.g. richly ornamented pitchers (Nicolussi 1982, fig. 11), two of which Samonig publishes and typologically classifies to the

[3] Phase 8 is radiocarbon dated, however the date 2705 ± 145 BC seems considerably too low for the finds discovered in this phase as well as in the next, phase 9 (check Budja 1992, fig. 4).

gradivom pri Velušček 2002). Tako je tudi H. Parzinger npr. Maharski prekop in Blatno Brezovico uvrstil v horizonta, ki sta paralelna badenskemu razvoju v Podonavju (Parzinger 1984).[4] Skratka, gre za najdišča, ki pomenijo nekakšno homogeno skupino, zato je pomembno, kako so absolutno datirana.

Radiokarbonske datacije z Maharskega prekopa so preveč razpršene in si z njimi ne moremo veliko pomagati (npr. Bregant 1996). Za Blatno Brezovico pa radiokarbonskih datacij še nimamo. Tako so zelo pomembne dendrokronološke raziskave, ki smo jih doslej opravili na najdiščih s sorodnimi najdbami, kot sta Spodnje mostišče in Stare gmajne. Rezultati kažejo na poselitev v okvirno tretji četrtini četrtega tisočletja pr. Kr. (glej *poglavje 6.3*; prim. Velušček 2001).[5]

Videti je, da se okoli sredine 4. tisočletja na Ljubljanskem barju zgodi nekaj pomembnega. Pride do spremembe, ki jo za zdaj lahko opazujemo samo med keramičnimi najdbami, saj se keramika z brazdastim vrezom oziroma keramika z bogato vrezanim ornamentom, kot jo pozna Hočevarica, ne pojavlja več.

### **6.5.5** ZAKLJUČEK

Na podlagi dendrokronoloških raziskav in z radiokarbonskim datiranjem lahko postavimo zaključek gradbenih aktivnosti na Hočevarici okvirno v prvo četrtino 36. stoletja pr. Kr. (kronologija HOC-QUSP1) oziroma okvirno na sredino 36. stoletja pr. Kr. (kronologija HOC-FRSP1).

Datacijo Hočevarice potrjuje dendrokronološko dokazana skorajšnja sočasnost s koliščarsko naselbino Palù di Livenza v severni Italiji. Sočasnost med naselbinama se kaže tudi v nekaterih arheoloških najdbah (npr. baker, keramika).

Analogije za najdbe iz HKBV-ja so tudi na Hodiškem jezeru v okviru Škocijan-Lasinja **IIc** stopnje. Zato domnevamo, da gre za isti časovni horizont. Tezo dodatno potrjuje tudi iz mlajšeneolitskega paketa najmlajši datum s Hodiškega jezera, ki kaže na poselitev okvirno v drugi četrtini 4. tisočletja pr. Kr. (*sl. 6.5.1*). Zato je zanimivo, da se ravno v ta čas na Hodiškem jezeru postavlja začetek domače metalurške dejavnosti.

Skratka, zdi se verjetno, da lasinjska kultura predstavlja spodnjo mejo HKBV-ja. To je, če sodimo po stratigrafiji in radiokarbonski dataciji z Moverne vasi, ver-

[4] Iz skupine naselbin, ki jih Parzinger uvršča v horizonta Ljubljansko Barje III in IV, smo izločili Notranje Gorice, saj smo v *poglavju 5.2* pokazali, da gre lahko za Hočevarici sočasno naselbino. To potrjujejo tudi nekatere radiokarbonske datacije z Notranjih Goric (Bregant 1975, 49; Harej 1980, 89). Seveda pa ne smemo pozabiti, da so Notranje Gorice tudi mlajše od Hočevarice, saj je bilo območje še večkrat poseljeno, morda do zgodnje bronaste dobe (glej Harej 1980; Parzinger 1984).

[5] Ustna informacija K. Čufar.



latest **IIc** phase of the Škocijan-Lasinja group or the so-called »Fazies Keutschacher See« (2003, 33, fig. 6,7).

A settlement concurrent with HKBV can also be anticipated by the Keutschacher See. It is also thought-provoking that fragments of foundry vessels for casting arsenic copper are attributed precisely to the **IIc** phase. These supposedly evidence the onset of local metallurgic activity in Carinthia (Samonig 2003, 33).

So if the time span 3875 ± 130 B.C. from Moverna vas designates the lower limit of HKBV, then the best insight into the period after HKBV in Slovenia is to be found in the Ljubljansko barje. Following the period of Hočevarica, a group of settlements appears in the Ljubljansko barje: such as Maharski prekop, Blatna Brezovica, as well as Spodnje mostišče and the more recently discovered Stare gmajne. These sites all proffer characteristic pottery, similar to that from Hočevarica, although there are some differences. There is no pottery with furrowed incisions or pottery with rich incised ornamentation at these sites (check *chapter 5.2*; regarding Stare gmajne check also the table with materials in Velušček 2002). H. Parzinger also attributes, for instance Maharski prekop and Blatna Brezovica to the horizons that are parallel with the Baden development in the Danube region (Parzinger 1984).[4] In short, these are sites representative of some homogenous group; and as such, their absolute dating is essential.

The radiocarbon dates from Maharski prekop are too dispersed to serve well in their purpose (e.g. Bregant 1996). And there are no radiocarbon dates for Blatna Brezovica as of yet. Consequently, the dendrochronological investigations carried out at sites with similar finds, such as Spodnje mostišče and Stare gmajne, are all the more indispensable. The results evidence settlement during approximately the third quarter of the 4th millennium B.C. (check *chapter 6.3*; cf. Velušček 2001).[5]

It seems apparent that something significant transpired in the Ljubljansko barje around the mid 4th millennium B.C. Changes occur, although they may only be discerned through the pottery finds: pottery with furrowed incisions and pottery with rich incised ornamentation, as is known from Hočevarica, no longer appears.

[4] We eliminated Notranje Gorice from the group of settlements that Parzinger attributes to the Ljubljansko barje III and IV horizons. *Chapter 5.2* presents our concept of Hočevarica being a concurrent settlement. This is further confirmed by radiocarbon dates from Notranje Gorice (Bregant 1975, 49; Harej 1980, 89). However, Notranje Gorice was also inhabited later on, perhaps even through to the Early Bronze Age (check Harej 1980; Parzinger 1984).

[5] By word of mouth: K. Čufar.

jetno še prva četrtina 4. tisočletja. Zgornjo mejo pa predstavlja skupina najdišč tipa Maharski prekop in Blatna Brezovica na Ljubljanskem barju, ki spadajo v drugo polovico 4. tisočletja.Tako se zdi, da je časovni okvir HKBV-ja treba iskati v drugi četrtini 4. tisočletja pr. Kr., kar je primerljivo s predlagano absolutno datacijo za HKBV v zahodni Panoniji (prim. Raczky 1995, 51 ss).

*Sl. 6.5.1:* Ajdovska jama (Aj) – radiokarbonski datumi za najmlajši prazgodovinski kulturni horizont: L-hodnik, centralna dvorana, SE 42 in SE 5 (po Horvat 1989, 28; Culiberg, Horvat, Šercelj 1992, 112, Sl. 2 in 3); Hodiško jezero/Keutschacher See (Hj) – najmlajši radiokarbonski datum, ki je pripisan neolitski naselbini (po Offenberger 1982, 136).
*Fig. 6.5.1:* Ajdovska jama (Aj) – radiocarbon dates for the latest prehistoric cultural horizon: L-corridor, central hall, SE 42 and SE 5 (after Horvat 1989, 28; Culiberg, Horvat, Šercelj 1992, 112, fig. 2 and 3); Keutschacher See (Hj) – latest radiocarbon date, which is attributed to the Neolithic settlement (after Offenberger 1982, 136).



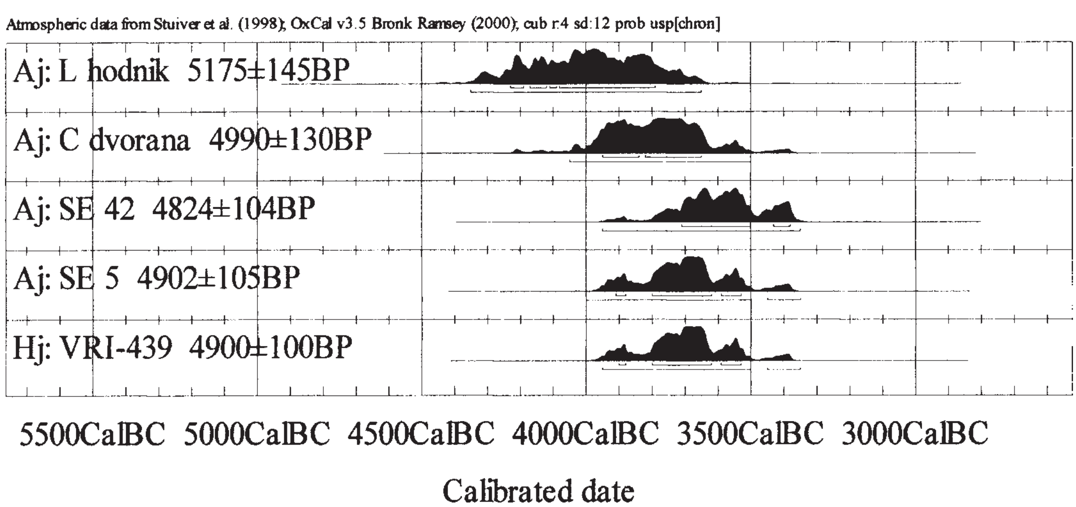
**6.5.5** CONCLUSION

Established on the grounds of dendrochronological research and radiocarbon dating, the end of building activity at Hočevarica falls approximately in the first quarter of the 36th century (HOC-QUSP1 chronology) and to the mid 36th centuries B.C. (HOC-FRSP1 chronology).

This chronological determination of Hočevarica confirms the dendrochronological substantiation of the near contemporaneity with the pile dwelling settlement of Palù di Livenza in northern Italy. The concurrence of these two settlements is further corroborated by select archaeological finds (e.g. copper, pottery).

Analogies for HKBV finds are also known from the Keutschacher See in the context of the Škocijan-Lasinja **IIc** phase. The conjecture follows that they are from the same chronological horizon; and this is further substantiated by the latest dating from the Keutschacher See Late Neolithic package, which evidences settlement in approximately the second quarter of the 4th millennium B.C. (*fig. 6.5.1*). It is interesting that the onset of local metallurgy activity by the Keutschacher See should be set precisely to this time period.

In short, it seems probable that the Lasinja culture marks the lower limit of HKBV. That is, as far as the stratigraphy and radiocarbon dates from Moverna vas are concerned, then most likely still the first quarter of the 4th millennium B.C. The upper limit is represented by a group of settlements of the type Maharski prekop and Blatna Brezovica in the Ljubljansko barje, which are all attributed to the second half of the 4th millennium B.C. As such, the chronological frame for HKBV presumably belongs in the second quarter of the 4th millennium B.C., which is also analogous with the proposed absolute dating for »Furchenstich-Horizont« in western Pannonia (cf. Raczky 1995, 51 pp).



# 7 HOČEVARICA IN ZAČETKI UPORABE BAKRA V SLOVENIJI

ANTON VELUŠČEK

*Izvleček*

*V obdobju lasinjske kulture se v Sloveniji pojavijo prvi bakreni predmeti. Kmalu nato se verjetno že izkorišča lokalne surovinske vire in se začne razvijati domača metalurška dejavnost. Številne najdbe kažejo, da moremo višek teh aktivnosti postaviti v obdobje horizonta keramike z brazdastim vrezom.*

*Nekoliko kasneje, v obdobju, ki je paralelno z zgodnejšo badensko kulturo, je opaziti upad števila bakrenih najdb. Še vedno se ohranja domača metalurška dejavnost. Do popolne prekinitve pride v poznem 4. tisočletju pr. Kr, kar se odraža tudi v poselitveni sliki.*

## **7.1.1** UVOD

Znano je, da je v osrednji Sloveniji veliko nahajališč kovinskih mineralov, med katerimi so tudi bakrovi (Drovenik 1987, sl. 5; Vidrih, Mikuž 1995; Ocepek 1996, 313; Veluščki, Greif 1998, karta 1). Nahajališča bakrovih mineralov so danes ekonomsko nepomembna, čeprav so nekatera večja med njimi še nedavno, občasno, izkoriščali.[1] Veliko več pa je manjših nahajališč.[2] Jih je tudi težko najti. Velikokrat morda zato, ker so bila že v prazgodovini v celoti izkoriščena (Cierny 1997, 76).

[1] V Sloveniji so večja nahajališča bakrovih mineralov redka. Eno izmed takšnih je rudišče Škofje pri Cerknem, kjer so od leta 1853 do danes bakrovo rudo celo občasno kopali (Drovenik 1987, 28).

[2] Npr. malahit lahko najdemo kjer koli v 90 km dolgem pasu od Cerkljanskega in Loškega hribovja do vzhodnega dela Posavskega hribovja, kjer se pojavljajo bakrovi minerali (Vidrih, Mikuž 1995, 207).
Manjše nahajališče bakrovih mineralov domnevno leži npr. tudi v Cerovi staji v bližini Ilirske Bistrice na jugozahodu Slovenije (po M. F., Cerova staja, *Kočanski vestnik* 6, leto 2, julij 1998, Podgraje, 7–9).

# 7 HOČEVARICA AND THE ONSET OF COPPER USE IN SLOVENIA

*Abstract*

*The first copper objects appear in Slovenia during the period of the Lasinja culture. Soon thereafter it seems that local sources of raw materials begin to be exploited and local metallurgy develops. Numerous finds indicate that the vertex of these activities occurs during the period of the horizon of pottery with furrowed incisions (HKBV).*

*Somewhat later, during the period parallel to the Early Baden culture, a decline in the number of copper finds is discerned. However, the local metallurgic industry continues. Complete discontinuation ensues in the late 4$^{th}$ millennium B.C., which has a reflexion in the settlement pattern.*

## **7.1.1** INTRODUCTION

It is known that there are many deposits of metal minerals, including copper, throughout central Slovenia (Drovenik 1987, fig. 5; Vidrih, Mikuž 1995; Ocepek 1996, 313; Velušček, Greif 1998, map 1). These copper mineral deposits are economically insignificant today, despite that select larger deposits were still recently, occasionally exploited.[1] Smaller deposits are much more prevalent.[2] They are also quite difficult to locate; perhaps because they were already fully exploited in prehistory (Cierny 1997, 76).

[1] Extensive copper deposits are a rarity in Slovenia. Škofje near Cerkno is one such deposit; ever since 1853 and through until today, copper ore has been occasionally mined here (Drovenik 1987, 28).

[2] E.g. malachite can be found anywhere in a 90 km tract spanning from the Cerkljansko to the Loško hribovje and all to the eastern part of the Posavsko hribovje, where copper minerals are (Vidrih, Mikuž 1995, 207).
Smaller deposits of copper minerals are supposedly situated, for instance, in Cerova staja near Ilirska Bistrica in southwestern Slovenia (according to M. F., Cerova staja, *Kočanski vestnik* 6, Year 2, July 1998, Podgraje, 7–9).

O prazgodovinskem izkoriščanju slovenskih nahajališč bakrovih mineralov (še) nimamo zanesljivih podatkov.[3] Na to sklepamo posredno. Predvsem iz lege prazgodovinskih naselbin, ki so v bližini teh nahajališč.[4] Zato se zdi, da v bodoče tudi pri nas lahko pričakujemo podobna odkritja, kot jih poznajo v Avstriji. Na Götschenbergu, ki leži na območju z bakrovo rudo, so odkrili naselbinske ostanke metalurgov in rudarjev iz sredine 4. tisočletja pr. Kr. (Lippert 1992, 19 ss; Moesta 1992, 143 ss).

O izkoriščanju nahajališč bakrove rude posredno govori tudi kamnito orodje (sekire, kladiva, zagozde), ki bi ga lahko povezali z rudarstvom (Cierny 1997, 78). Kot je na primeru Pohorja opozorila B. Teržan, se takšno orodje pogosto pojavlja v bližini teh nahajališč (Teržan 1983; 1989). Zato si morda lahko na podoben način razložimo tudi pojav kamnitih sekir v Trebiji in Sovodnjah v Cerkljansko-Loškem hribovju.

V študiji ob odkritju fragmenta livarske posode z Maharskega prekopa se je pokazalo, da je v Sloveniji veliko eneolitskih bakrenih in z metalurgijo bakra povezanih najdb in da, vsaj od okvirno druge polovice 4. tisočletja pr. Kr. naprej, lahko govorimo o domači metalurgiji bakra (Velušček, Greif 1998, 31 ss; glej še *sl. 7.1.1* ). Torej obstaja kar nekaj argumentov v prid tezi, da se že v 4. tisočletju pr. Kr. izkorišča lokalna bakrova rudišča. Tako se zastavlja vprašanje, kdaj se v Sloveniji pojavijo prve bakrene najdbe in od kdaj naprej lahko govorimo tudi o izkoriščanju jugovzhodnoalpskih surovinskih virov?

## **7.1.2** NAJSTAREJŠE BAKRENE NAJDBE SLOVENIJE

Kakor smo pred leti pokazali, lahko slovenske eneolitske kovinske in z metalurgijo bakra povezane najdbe razdelimo na dva horizonta: starejšega in mlajšega. V starejši horizont smo vključili najdbe, ki so okvirno datirane v 4. tisočletje. Kronološko jih lahko povežemo z obdobjem lasinjske kulture, s horizontom keramike z brazdastim vrezom (HKBV) in z obdobjem badenske

[3] Po podatkih, ki nam jih je posredoval J. Osterman iz Luž, za kar se mu zahvaljujemo, leži v okolici Olševka na Gorenjskem nahajališče malahita. O njegovem obsegu in bogastvu danes ne vemo praktično nič. Zanimivo pa je, da leži v neposredni bližini nahajališča naselbina »Lipov vrh«, ki jo lahko datiramo v KŽG, iz okolice pa poznamo tudi starejše naselbinske najdbe (Josipović 1984; Cevc 1997). Torej lahko upravičeno domnevamo, da je bilo nahajališče izkoriščano že v prazgodovini, morda že v eneolitiku.

[4] Najdišča v Posavskem hribovju (Gradišče nad Dešnom, Vrh Sv. Miklavža), v Cerkljansko-Škofjeloškem hribovju (Kevderc, morda Stara Oselica (glej *poglavje 2.2.2*)) in najdišča na Ljubljanskem barju, kjer bi lahko pričakovali manjša nahajališča malahita v dolini Želimeljščice (Vidrih, Mikuž 1995, 207).

There is (still) no reliable data regarding prehistoric exploitation of copper mineral deposits in Slovenia.[3] This is an indirect inference based chiefly on the positions of prehistoric settlements in the vicinity of these deposits.[4] Consequently, it seems that discoveries similar to those in Austria can also be anticipated in Slovenia in the future. At Götschenberg, which is situated in a region with copper deposits, settlement remains of metallurgists and miners from the mid 4$^{th}$ millennium B.C. were discovered (Lippert 1992, 19 pp; Moesta 1992, 143 pp).

Stone tools (axes, hammers, wedges) that could be interpreted in connection with mining activity also indirectly speak of the exploitation of copper deposits (Cierny 1997, 78). As in the example of Pohorje, cautions B. Teržan, such tools are often found in the vicinity of these sites (Teržan 1983; 1989). The discovery of stone axes in Trebija and Sovodnje in the Cerkljansko-Loško hribovje can thus also be interpreted in similar manner.

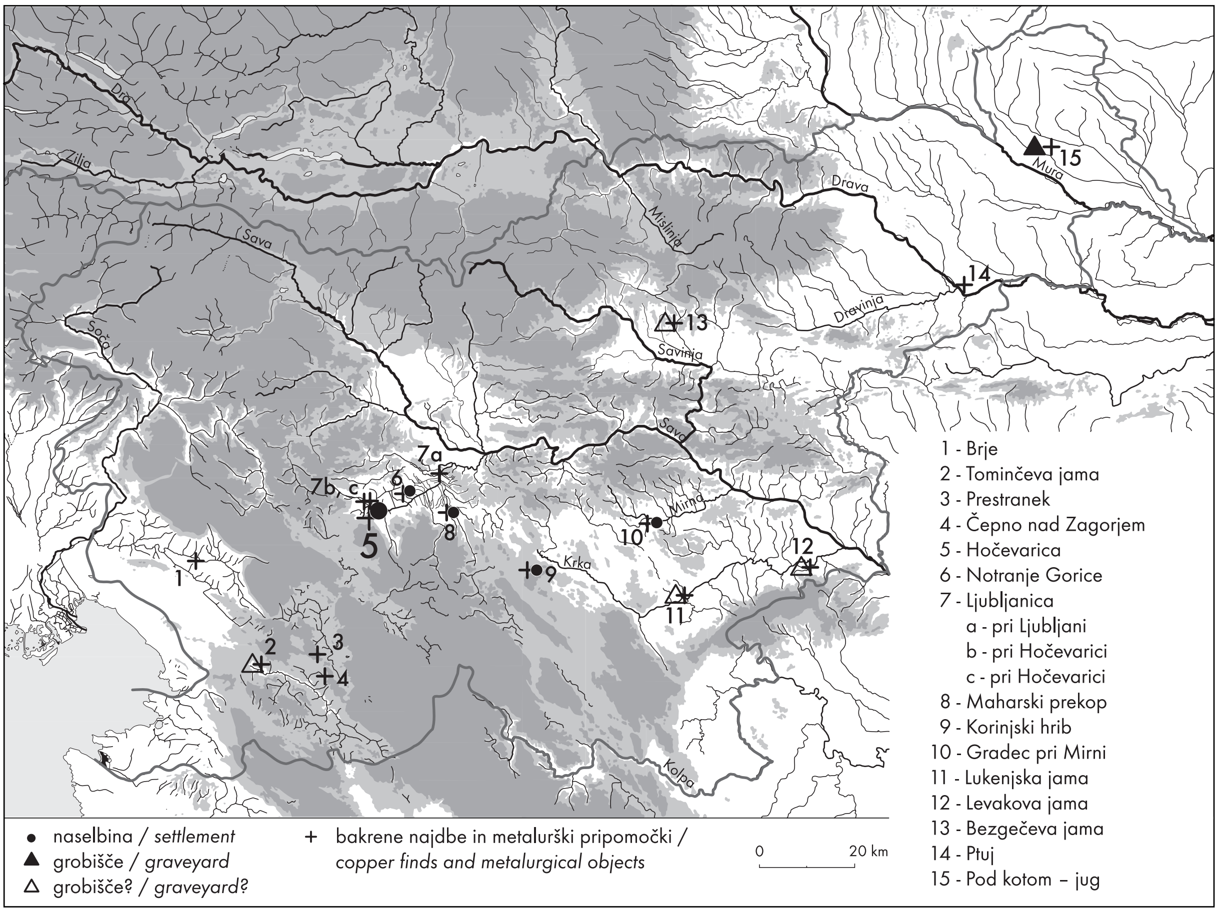
The study regarding the discovery of a fragment of a founder's vessel at Maharski prekop demonstrates that many Eneolithic copper finds and finds relative to the metallurgy of copper are known in Slovenia, and that at least until approximately the second half of the 4$^{th}$ millennium onwards local copper metallurgy was in effect (Velušček, Greif 1998, 31 pp; check also *fig. 7.1.1*). In short, there is quite a selection of arguments in favor of the thesis that local copper deposits were exploited already in the 4$^{th}$ millennium B.C. The question arises as to when the first copper finds appear in Slovenia, and from when onwards may we speak of the exploitation of southeastern Alpine sources of raw materials.

## **7.1.2** THE OLDEST COPPER FINDS IN SLOVENIA

As demonstrated already years ago, Slovenian Eneolithic metal finds and finds relative to copper metallurgy may be divided into two horizons: Early and Late. The Early horizon incorporates finds dating approxima-

[3] According to the data mediated to us by J. Osterman from Luže, for which we are grateful, a deposit of malachite lies in the vicinity of Olševek in the Gorenjska region. Almost nothing is known today about its extent and amplitude. However, it is noteworthy that it lies in the direct vicinity of the settlement site »Lipov vrh«, which is dated to the Urnfield Cemetery period (KŽG); furthermore, older settlement finds are also known from the nearby surroundings (Josipović 1984; Cevc 1997). Thus the conjecture justifiably follows that the deposits were exploited already in prehistory, perhaps even already during the Eneolithic.

[4] Sites in the Posavsko hribovje (Gradišče nad Dešnom, Vrh Sv. Miklavža), in the Cerkljansko-Škofjeloško hribovje (Kevderc, perhaps also Stara Oselica (check *chapter 2.2.2*)) and sites in the Ljubljansko barje, where smaller malachite deposits can be expected in the Želimeljščica valley (Vidrih, Mikuž 1995, 207).




*Sl. 7.1.1:* Bakrene najdbe in metalurški pripomočki iz 4. tisočletja pr. Kr.

*Fig. 7.1.1:* Copper finds and metallurgical implements from the 4th millennium B.C.

kulture. V mlajši horizont so bile uvrščene poznoeneolitske najdbe 3. tisočletja, ki smo jih povezali z vučedolskim kulturnim krogom (Velušček, Greif 1998, 38 ss).

Med najstarejše kovinske najdbe Slovenije uvrščamo bakreno kladivasto sekiro z ušesom (Šinkovec 1995, 33, t. 1: 4; Velušček, Greif 1998, 38 s). Še najbolj je sorodna sekiram tipa Székely-Nádudvar (prim. Patay 1984, 47 ss, t. 20: 240) in zato jo lahko datiramo v obdobje t. i. horizonta masivnih kovinskih orodij (Ruttkay 1991; Strahm 1994, 10 s). Sekire tipa Székely-Nádudvar se sicer pojavijo že v zgodnji bakreni dobi, najpogosteje pa so v visoki bakreni dobi (*Hochkupferzeit*) Karpatskega bazena (Patay 1984, 54 s). Čeprav izvor naše sekire ni povsem razjasnjen, na podlagi inventarne knjige naj bi bila najdena v okolici Ptuja, se najdba dobro vključuje v maloštevilno skupino masivnih kovinskih orodij epilengyelskega kulturnega kroga, ki jih poznamo iz sosednje Avstrije (Ruttkay 1998, 341).

tely to the 4th millennium B.C. Chronologically they correspond with the period of the Lasinja culture, with the horizon of pottery with furrowed incisions (HKBV) and with the period of the Baden culture. The Late horizon incorporates Late Eneolithic finds from the 3rd millennium B.C., which correspond with the Vučedol cultural circle (Velušček, Greif 1998, 38 pp).

A copper hammer-form axe with a hole (Šinkovec 1995, 33, Pl. 1: 4; Velušček, Greif 1998, 38 p) is among the oldest metal finds in Slovenia. This axe is most similar to those of the type Székely-Nádudvar (cf. Patay 1984, 47 pp, Pl. 20: 240), which also justifies its dating to the period of the so-called horizon of massive metal tools (Ruttkay 1991; Strahm 1994, 10 p). Axes of the Székely-Nádudvar type do appear already in the Early Copper period, however they are most frequently found during the »Hochkupferzeit« of the Carpathian Basin (Patay 1984, 54 p). Although the origin of this axe is not entirely known, the inventory books cite that it was found in the vicinity of Ptuj; this find incorporates well into the small numbered group of massive metal finds of the Epi-Lengyel cultural circle known from the neighboring Austria (Ruttkay 1998, 341).

Copper flat axes are also characteristic for the Eneolithic. The majority of Slovenian axes may be classified to the Altheim type, which is the characteristic axe type in the central and eastern Alps (from Switzer-

Za eneolitik so značilne tudi bakrene ploščate sekire. Večino slovenskih sekir lahko uvrstimo v tip Altheim, ki je značilen sekirni tip osrednjih in vzhodnih Alp (od Švice, južne Nemčije, severne Italije, Avstrije do Slovenije), kjer jih najdemo na najdiščih 4. in 3. tisočletja (Mayer 1977, 60 ss).

S Korinjskega hriba izhaja, morda, najstarejša sekira te vrste v Sloveniji. Na znanem poznoantičnem najdišču so namreč odkrili nekaj fragmentov eneolitske keramike, ki spominja na lasinjsko (glej Dular 2001, t. 6: 3), in tudi skoraj v celoti ohranjeno sekiro tipa Altheim ter fragment, tipološko nedoločljive, sekire (Ciglenečki 1984, sl. 3,4; Dular 2001, t. 6: 1,2).

Verjetno nekoliko mlajše so sekire tipa Altheim iz Levakove jame (*sl. 5.3.10:* 5) in Lukenjske jame (*sl. 5.3.9:* 2,3). Kakor smo pokazali v *poglavju 5.3*, sodijo v obdobje HKBV-ja.

Sekire tipa Altheim poznamo tudi iz Ljubljanice na Ljubljanskem barju (Šinkovec 1995, 33 s; glej še *poglavje 3.1.6*). Dve sta bili analizirani. Sekira, ki je bila najdena v Ljubljanici pri Hočevarici (*sl. 3.1.36*), je iz razmeroma čistega bakra. Odstopa nekoliko visoka vrednost svinca (glej *poglavje 3.5*), kar kaže, da je bila izdelana iz mineralne rude (po De Marinis 1992, 392). O izvoru druge sekire ni natančnejših podatkov (Šinkovec 1995, t. 2: 6). Analiza je pokazala, da je narejena iz dokaj čistega bakra (Šinkovec 1995, 34).

Morda bi k tipu Altheim lahko prišteli tudi sekiro, ki je bila prav tako najdena v Ljubljanici pri Hočevarici (*sl. 3.1.35*; prim. Žeravica 1993, t. 15: 165). Od zgoraj omenjenih se razlikuje v enakomernem prehodu iz temena v rezilo. Analiza z metodo EDS XRF je pokazala, da je narejena iz bakra z arzenom (glej *poglavje 3.5*). Visoka vsebnost arzena je ugotovljena tudi v zelo poškodovani sekiri s Čepna nad Zagorjem v dolini Pivke (Šinkovec 1995, 38, t. 2: 15; Velušček, Greif 1998, 41).

Leta 1856 je bila v Prestranku najdena ploščata sekira tipa Vinča (Ljubić 1889, 104, št. 2; Mayer 1977, 63, op. 3, 64, op. 9). Gre za tip, ki ga E. F. Mayer datira v obdobje od začetka skupine Mondsee do Jevišovice B stopnje (Mayer 1977, 64).

V Sloveniji so dobro zastopane tudi sekire tipa Podkrnos/Gurnitz in njim sorodne sekire. Dve poznamo iz Bezgečeve jame (*sl. 5.3.13:* 3).[5] Ena je najdena v Tominčevi jami (Marchesetti 1889), kjer so bili v plasti s sekiro še bakreno bodalo tipa Mondsee (Marchesetti 1889, sl. 8; prim. Kuna 1981, 29; Matuschik 1998, 224) in eneolitska keramika z vzporednicami v Predjami (glej Leben 1971, 121).

Tipu Podkrnos/Gurnitz je sorodna sekira z Brij na Vipavskem, ki je označena kot posamična najdba (Šinkovec 1995, 36, t. 2: 10).

Dejstvo je, da se podobne ploščate sekire pod različnimi imeni in v več variantah pojavljajo v Srednji Ev-

[5] R. Krempuž, ustna informacija.

land, southern Germany, northern Italy, Austria to Slovenia), where they are represented at sites of the 4$^{th}$ and 3$^{rd}$ millenniums B.C. (Mayer 1977, 60 pp).

Perhaps the oldest axe of this type found in Slovenia was from Korinjski hrib. The well known Late Roman period site also revealed a few fragments of Eneolithic pottery, reminiscent of Lasinja pottery (check Dular 2001, Pl. 6: 3), as well as an almost entirely preserved Altheim type axe and a fragment of a typologically undeterminable axe (Ciglenečki 1984, fig. 3; 4; Dular 2001, Pl. 6: 1,2).

Presumably somewhat younger are the Altheim type axes from Levakova jama (*fig. 5.3.10:* 5) and Lukenjska jama (*fig. 5.3.9:* 2,3). As already demonstrated in *chapter 5.3*, these axes belong to the HKBV period.

Altheim type axes are also known from the Ljubljanica in the Ljubljansko barje (Šinkovec 1995, 33 p; check also *chapter 3.1.6*). Two were analyzed. The axe that was discovered in the Ljubljanica at Hočevarica (*fig. 3.1.36*) is made of relatively pure copper. The high value of lead in it is somewhat deviant (check *chapter 3.5*), which indicates that the axe was manufactured with mineral ore (according to De Marinis 1992, 392). The data is lacking regarding the origins of the other axe (Šinkovec 1995, Pl. 2: 6). The analysis established that it was made of relatively pure copper (Šinkovec 1995, 34).

Perhaps the axe, also found in the Ljubljanica at Hočevarica (*fig. 3.1.35*; cf. Žeravica 1993, Pl. 15: 165) should also be attributed to the Altheim type. It differs from the above mentioned examples with its even transition from the back to the blade. The EDS XRF analysis established that it is made of copper mixed with arsenic (check *chapter 3.5*). A high value of arsenic was also determined in the terribly damaged axe from Čepno above Zagorje in the Pivka valley (Šinkovec 1995, 38, Pl. 2: 15; Velušček, Greif 1998, 41).

A flat axe of the Vinča type was discovered in 1856 in Prestranek (Ljubić 1889, 104, no. 2; Mayer 1977, 63, fn. 3, 64, fn. 9). This is a type, which E. F. Mayer dates to the period at the beginning of the Mondsee group to the Jevišovice B phase (Mayer 1977, 64).

Axes of the Podkrnos/Gurnitz type, and other similar axes, are also well represented in Slovenia. Two are known from Bezgečeva jama (*fig. 5.3.13:* 3).[5] One was discovered in Tominčeva jama (Marchesetti 1889), where a copper dagger of the Mondsee type (Marchesetti 1889, fig. 8; cf. Kuna 1981, 29; Matuschik 1998, 224) and Eneolithic pottery with parallels in Predjama (check Leben 1971, 121) were found in the same layer with the axe.

An axe from Brje in the Vipava valley, designated as a chance find (Šinkovec 1995, 36, Pl. 2: 10), is correspondent to the Podkrnos/Gurnitz type.

The fact remains that analogous flat axes, referred to by different names and in an array of varieties, are

[5] By word of mouth: R. Krempuž.

ropi (npr. na Madžarskem, v Avstriji, Švici, Nemčiji, v severni Italiji) in na Balkanu (Mayer 1977; Kibbert 1980; Patay 1984; Aspes, Fasani 1992; De Marinis 1992; Říhovský 1992; Žeravica 1993; Strahm 1994). Čeprav njihovo kronološko mesto še ni povsod dobro razjasnjeno, velja, da so značilne predvsem za zgodnejši del eneolitika (prim. Mayer 1977, 49 ss; Patay 1984, 29; De Marinis 1992, 389, 392; Žeravica 1993, 54 s).

Naslednji bakren predmet, ki ga lahko z veliko gotovostjo datiramo v starejši horizont kovinskih najdb, to se pravi v 4. tisočletje, je majhna ploščica. Izvira iz otroškega groba 41 na grobišču Pod Kotom-jug v Prekmurju. Glede na najdbe sodi grobišče v čas HKBV.[6]

Prav tako lahko v obdobje HKBV postavimo tudi fragment kalupa z Gradca pri Mirni, ki kaže na domačo metalurško dejavnost (*sl. 5.3.2:* 8). Metalurška dejavnost pa je veliko bolje dokumentirana na Hočevarici, kjer smo našli bakreno kapljico (*sl. 3.1.28*) ter dva odlomka iste livarske posode (*sl. 3.1.27*). Najdbi dokazujeta, da so se najkasneje v zgodnjem 36. stoletju na Ljubljan-skem barju ukvarjali z metalurgijo bakra. Kapljica naj bi bila iz skoraj čistega bakra. Analiza vsebine s stene posode pa ne izključuje možnosti, da so v njej talili celo sulfidno rudo, čeprav je to manj verjetno (glej *poglavje 3.4*).

Morda spada v čas Hočevarice tudi fragment zajemalke z Notranjih Goric, ki jo po novem interpretiramo kot livarsko posodo (glej *poglavje 5.2.4*).

Nekoliko mlajši od najdb HKBV pa je odlomek livarske posode z Maharskega prekopa (Velušček, Greif 1998). Je iz obdobja, ki je sočasno z zgodnejšo badensko kulturo v srednjem Podonavju (glej kronološko tabelo v *poglavju 5.3* in Velušček 2001), torej okvirno iz druge polovice 4. tisočletja. S to najdbo pa tudi zaključujemo pregled bakrenih najdb Slovenije, saj sodi večina ostalih bakrenih predmetov že v 3. tisočletje, ki ga ne obravnavamo (glej Velušček, Greif 1998).

### **7.1.3** ZAČETEK IZKORIŠČANJA LOKALNIH SUROVINSKIH VIROV

O začetku izkoriščanja lokalnih surovinskih virov veliko povedo naselbine iz obdobja HKBV, ki so v bližini nahajališč bakrovih mineralov. Zaenkrat zadovoljivo poznamo samo dve: Gradišče nad Dešnom je oddaljeno nekaj kilometrov zračne črte od bakrovih rudišč v Posavskem hribovju, Kevderc pa leži na območju cerkljansko-loškega hribovja, ki je bogato z bakrovo rudo.

Zanimiva je tudi geografska lega teh naselbin. Gradišče nad Dešnom leži na ozkem slemenu visoko nad Savo, jama Kevderc se odpira visoko na pobočju razmeroma strmega Lubnika. Lega ni primerna za polje-

[6] I. Šavel, Prvi metalurgi. – V: *Odkopane kulture Prekmurja*, Arheološka razstava – Pokrajinski muzej Murska Sobota, December 2002–februar 2003.



known throughout central Europe (e.g. in Hungary, in Austria, Switzerland, Germany, northern Italy) and in the Balkans (Mayer 1977; Kibbert 1980; Patay 1984; Aspes, Fasani 1992; De Marinis 1992; Říhovský 1992; Žeravica 1993; Strahm 1994). Despite that their chronological frame has yet to be fully resolved, it is evident that they are characteristic for the earlier part of the Eneolithic (cf. Mayer 1977, 49 pp; Patay 1984, 29; De Marinis 1992, 389, 392; Žeravica 1993, 54 p).

The next copper object, which can be reliably dated to the earlier horizon of metal finds, that is the 4th millennium B.C., is a small plate. This was discovered in child's grave 41 at the Pod Kotom-jug necropolis in Prekmurje. The context of other finds establishes the necropolis to the HKBV period.[6]

The fragment of a casting mould from Gradec pri Mirni (*fig. 5.3.2:* 8), which is indicative of a local metallurgic industry, also belongs to the HKBV period. Metallurgic activity is much better documented at Hočevarica, where an amorphous copper droplet (*fig. 3.1.28*) and two fragments of the same founder's vessel (*fig. 3.1.27*) were discovered. These discoveries confirm that by the early 36th century B.C., at the latest, the inhabitants of the Ljubljansko barje were already developing copper metallurgy. The droplet is made of almost entirely pure copper. The analysis of the content in the wall of the founder's vessel does not exclude the possibility that a sulfurous ore was even melted in it, although this is less likely (check *chapter 3.4*).

Perhaps the fragment of a ladle from Notranje Gorice, which is now interpreted as a founder's vessel, also belongs to the Hočevarica period (check *chapter 5.2.4*).

A little younger than the HKBV finds is a fragment of a founder's vessel from Maharski prekop (Velušček, Greif 1998). This fragment is from a period concurrent with the earlier Baden culture in the central Danube region (check the chronological table in *chapter 5.3* and Velušček 2001), which is approximately the second half of the 4th millennium B.C. This find concludes the review of copper finds in Slovenia, as most of the remaining copper finds date to the 3rd millennium B.C., which is not under discussion (check Velušček, Greif 1998).

### **7.1.3** THE BEGINNINGS OF EXPLOITATION OF LOCAL SOURCES OF RAW MATERIAL

Settlements from the HKBV period, which are in the vicinity of copper mineral deposits, reveal much about the beginnings of exploitation of local raw sources. Currently only two such sites are known. Gradišče nad Dešnom lies a few kilometers – »as the crow flies« –

[6] I. Šavel, Prvi metalurgi. – In: *Odkopane kulture Prekmurja*, Archaeological exhibition – Provincial Museum in Murska Sobota, December 2002–February 2003.

delstvo in verjetno tudi ne za živinorejo oziroma rejo drobnice kot primarno dejavnost. Zato je mogoče, da so v njih živeli iskalci bakra in morda tudi metalurgi, kar za Gradišče nad Dešnom nedvomno dokazujejo sicer mlajši, železnodobni ostanki žlindre (glej *poglavje 2.2*).

Tako se lahko vprašamo o pomenu kronološko starejših najdb, predvsem keramike, ki jo poznamo z obeh najdišč in jo okvirno datiramo v lasinjsko kulturo, kar kronološko sovpada z epilengyelskim obdobjem v Avstriji. So bili torej že nosilci te keramike iskalci bakra?

V srednji Evropi se prvi bakreni predmeti pojavijo v 5. tisočletju pr. Kr. (Gleser, Schmitz 2001, 365 ss). Ob koncu tisočletja, v epilengyelskemu obdobju, jih srečamo tudi v jugovzhodnih Alpah (Samonig 2003, 31, op. 40). Prišli naj bi z vzhoda kot dragoceno trgovsko blago. Gre za bakrene okrasne predmete in masivno kovinsko orodje, kamor uvrščamo tudi sekiro, ki je domnevno iz okolice Ptuja. E. Ruttkay je mnenja, da lahko posamezne tipe teh orodij interpretiramo kot surovinsko bazo, s pomočjo katere se je v srednji Evropi razvila metalurška dejavnost, ki se je kmalu nato osamosvojila (Ruttkay 1991). Kot dokazujejo fragmenti livarske posode z epilengyelskega najdišča Bisamberg-Hochfeld, je videti, da je proces osamosvajanja potekal razmeroma hitro (Hauptmann, Ruttkay 1991).

Ker pojav livarske posode v naselbini kaže na domačo metalurško dejavnost, je povsem mogoče, da so že v tem času izkoriščali tudi lokalen surovinski vir. Povezavo med predmetom in rudnim virom je sicer težko dokazati (Trampuž Orel 1999, 409), toda najdbe in naselbine iz bližine rudišč kažejo na to, da bi lahko začetek izkoriščanja lokalnih surovinskih virov tudi v jugovzhodnih Alpah postavili že v obdobje lasinjske kulture (glej Virág 1986, 14; Ruttkay 1998, 341).

V jugovzhodnih Alpah imamo zanesljive dokaze o domači metalurški dejavnosti šele iz obdobja HKBV. Najbrž se izkoriščanje lokalnih surovinskih virov še bolj intenzivira. Razcvet takšnih aktivnosti pa se odraža v količini bakrenih najdb, ki jih je veliko.

To so večinoma sekire. Največ jih je tipa Altheim, ki je značilen za vzhodnoalpski in predalpski svet. Drugače je s sekirami tipa Podkrnos/Gurnitz, ki se najpogosteje pojavljajo na zahodnem Balkanu in v jugovzhodnih Alpah (glej Žeravica 1993). Torej bi lahko govorili o živahnih stikih.

Kamniti obročki iz metamorfne kamnine s Hočevarice razkrivajo komunikacijo med osrednjo Slovenijo in Alpskim svetom oziroma s Koroško ali severovzhodno Slovenijo (glej *poglavje 3.3*). Zdi se, da to ne preseneča, saj sta ti območji znani po nahajališčih bakrove rude, ki so jo v tem času morda tudi že izkoriščali (Teržan 1983; 1989; Vahlkampf 1995, 66 s, sl. 12). Vsekakor pa se za Koroško že predpostavlja tudi domača metalurška dejavnost (glej *poglavje 6.5*).

Živahna komunikacija je potekala tudi v smeri proti zahodu, kar dokazuje skatova kost, ki verjetno izvira s



away from copper ore deposits in the Posavsko hribovje, and Kevderc lies in the region of the Cerkljansko-Loško hribovje, which is rich with copper ore deposits.

The geographic situations of these sites are also noteworthy. Gradišče nad Dešnom lies atop a narrow ridge, high above the Sava. The Kevderc cave opens high up on the relatively steep slope of Lubnik. These locations are not exactly suitable for land cultivation, and probably not for animal husbandry or the breeding of sheep, goats and pigs, as the primary source of subsistence. So perhaps these sites were inhabited by copper ore miners or even metallurgists; this is certainly evidenced at Gradišče nad Dešnom by the later, Iron Age remains of slag (check *chapter 2.2*).

This leads to the question of the significance of the chronologically older finds, especially pottery, known from both of these two sites; these finds are dated approximately to the period of the Lasinja culture, which chronologically corresponds with the Epi-Lengyel period in Austria. Were then the carriers of these pottery types searching for copper ore deposits?

The first copper finds in central Europe appear in the 5th millennium B.C. (Gleser, Schmitz 2001, 365 pp). Towards the end of the millennium such finds are discovered in the southeastern Alps as well (Samonig 2003, 31, fn. 40). They supposedly came from the east as precious trading merchandise. These finds constitute copper ornamental objects and massive metal tools; the axe, assumedly from the surroundings of Ptuj, is also attributed to this group. E. Ruttkay believes that individual types of these tools may be interpreted as a raw materials base, with the help of which metallurgy developed in central Europe and eventually also attained independence (Ruttkay 1991). Fragments of a founder's vessel from the Epi-Lengyel site of Bisamberg-Hochfeld prove that the process of becoming independent proceeded quite quickly (Hauptmann, Ruttkay 1991).

As the presence of a founder's vessel in the settlement evidences the existence of local metallurgic activity, it is all the more possible that a local source of raw materials was already being exploited. The connection between the object and the ore source is definitely difficult to prove (Trampuž Orel 1999, 409), however finds and settlements in the vicinity of ore deposits indicate that the beginnings of exploitation of local raw sources in the southeastern Alps may be set already to the period of the Lasinja culture (check Virág 1986, 14; Ruttkay 1998, 341).

Reliable evidence of local metallurgic activity in the southeastern Alps is only from the HKBV period. The exploitation of local raw sources probably became even more intense. The prosperity of such activity is well reflected in the number of copper finds, which is ample.

For the most part these finds are axes. The majority are of the Altheim type, which is characteristic for the eastern Alpine and sub-Alpine world. The situation is difsevernega Jadrana, morda iz tržaškega zaliva (glej *poglavje 3.9*). Se pravi z območja, ki ga v tem času jugovzhodnoalpski prostor oskrbuje s surovino, ali že z gotovimi izdelki, za kamnite sekire (D'Amico 1998, 180 ss; Peloi 1998; Montagnari Kokelj 2001, 76).

V tako že vzpostavljeno povezavo se verjetno zelo hitro vključi tudi kovina – baker. Ta se preko Furlanije-Julijske krajine razširi po vzhodnem delu severne Italije. Gre za čas, ko to območje še ne pozna lastne metalurške dejavnosti, prve bakrene najdbe pa se že pojavljajo (De Marinis 1992, 389).[7]

Širjenje proti zahodu je morda najbolj razvidno iz razprostranjenosti sekir tipa Podkrnos/Gurnitz in sorodnih sekir južno od Alp, če izločimo zahodnobalkanske primerke, poznamo štiri v Sloveniji, eno na Koroškem (Mayer 1977, t. 9: 103), tri v severovzhodni Istri (Mihovilić 1991, sl. 2: a–c) in sedem v vzhodnem delu severne Italije, od Furlanije do Gardskega jezera (Anelli 1956, t. 3: 4; Aspes, Fasani 1992, 381; De Marinis 1992, 392). Tako se zdi, da na podlagi razprostranjenosti teh sekir in zaradi že obstoječe jugovzhodnoalpske metalurške dejavnosti lahko ovržemo tezo, po kateri pridejo v severno Italijo prvi impulzi o poznavanju bakra z juga Apeninskega polotoka (prim. Bagolini, Barfield 1991, 287). Videti je, da se je to zgodilo s posredovanjem jugovzhodnoalpskega prostora (prim. Matuschik, Schlichtherle 2001, 19).

### **7.1.4** ZAKLJUČEK

Torej, če povzamemo, lahko rečemo, da najstarejša bakrena najdba, ki je po izvoru, sicer samo domnevno, iz Slovenije, zelo verjetno sodi v čas lasinjske kulture. Njeno poreklo naj bi bilo na vzhodu in bi lahko kazala na prve stike z bakrom. Očitno pa se položaj hitro spremeni, saj lahko že v istem kulturnem horizontu pri nas pričakujemo tudi iskalce bakra in začetek domače metalurške dejavnosti.

Lasinjski kulturi kronološko sledi HKBV. Vanj uvrščamo večino bakrenih najdb 4. tisočletja. V jugovzhodnih Alpah je to čas razcveta metalurgije bakra. Verjetno se še bolj intenzivno izkoriščajo jugovzhodnoalpski, tj. lokalni surovinski viri. Poznavanje bakra se razširi na zahod v severno Italijo.

V obdobju, ki je paralelno z zgodnejšo badensko kulturo slutimo, kljub ohranjanju domače metalurške tradicije, zaton v produkciji bakrenih predmetov.

[7] Fragmenti bakra s Palù di Livenze, na skrajnem zahodnem delu Furlanije-Julijske krajine (glej *poglavje 6.5*; Peretto, Taffarelli 1973, 252, 258, bakrene ploščate sekire (glej v nadaljevanju) itd.



ferent with axes of the Podkrnos/Gurnitz type, which are most frequently represented in the western Balkans and the southeastern Alps (check Žeravica 1993). It follows that dynamic connections and trade are presumable.

Stone ringlets made of metamorphous rock from Hočevarica disclose that there was communication between central Slovenia and the Alpine world, as well as with Carinthia or northeastern Slovenia (check *chapter 3.3*). This is not particularly surprising regarding that these regions are all known for having copper ore deposits, which they perhaps even already exploited at this time (Teržan 1983; 1989; Vahlkampf 1995, 66 p, fig. 12). Local metallurgic activity is by all means also presumed in Carinthia (check *chapter 6.5*).

Active communications were also in course towards the west; this is substantiated by the find of a sea ray bone, the origins of which are probably in the northern Adriatic, perhaps the Trieste bay (check *chapter 3.9*). This is a region which is during this period supplied by the southeastern Alpine world with the raw materials, or even finished products, for stone axes (D'Amico 1998, 180 pp; Peloi 1998; Montagnari Kokelj 2001, 76).

An already established connection such as this presumably incorporates metals, such as copper, very quickly into the system. And this system then extends across the Friuli-Venezia Giulia region and throughout the eastern part of northern Italy. This is a time when the region is not yet familiar with its own metallurgic activities, although the first copper finds are already making their appearance (De Marinis 1992, 389).[7]

The expansion westwards is perhaps most evident from the distribution of Podkrnos/Gurnitz type axes as well as other relative types. South of the Alps, excluding the western Balkan examples, four are known of in Slovenia, one from Carinthia (Mayer 1977, Pl. 9: 103), three from northeastern Istria (Mihovilić 1991, fig. 2: a–c), as well as seven from the eastern part of northern Italy, ranging from Friuli to the Garda lake (Anelli 1956, Pl. 3: 4; Aspes, Fasani 1992, 381; De Marinis 1992, 392). Consequently, on the basis of the distribution of these axes and also due to the already existant southeastern Alpine metallurgic activities, the thesis by which the first impulses regarding the use of copper come to northern Italy from the southern Apennine peninsula is refutable (cf. Bagolini, Barfield 1991, 287). It is quite evident that this came about with the mediation of the southeastern Alpine region (cf. Matuschik, Schlichtherle 2001, 19).

[7] Copper fragments from Palù di Livenza, at the far western edge of the Friuli-Venezia Giulia region (check *chapter 6.5*; Peretto, Taffarelli 1973, 252, 258, copper flat axes (check the continuation), etc.

Proti koncu 4. tisočletja se zgodi še korenitejša sprememba. V jugovzhodnih Alpah je namreč zaznati prekinitev v poselitvi, ki traja vse do zgodnjega 3. tisočletja (glej *poglavje 5.3*; Velušček 2001), ko npr. Ljubljansko barje ponovno postane pomemben metalurški center (prim. Durman 1983; za datacije glej Velušček, Čufar 2003).

### **7.1.4** CONCLUSION

In conclusion, the oldest copper find, which was found – albeit presumably – in Slovenia, quite likely belongs to the period of the Lasinja culture. Its origins are supposedly eastern, which could also be an indication of the first contact with copper. The situation evidently soon changes, as searchers for copper ore and the beginnings of local metallurgic activity can be expected already in the same cultural horizon in Slovenia.

The Lasinja culture chronologically follows the HKBV period. The majority of copper finds from the 4$^{th}$ millennium B.C. are attributed to it. This is the time of prospering copper metallurgy in the southeastern Alps. The southeastern, that is, local sources of raw materials are probably being exploited even more intensively. Knowledge of copper extends westwards into northern Italy.

A decline in the production of copper objects is sensed during this period, which is parallel with the earlier Baden culture, despite the preservation of the local metallurgic tradition.

Towards the end of the 4$^{th}$ millennium B.C. an even more radical change occurs. Discontinuance in settlement is discerned in the southeastern Alps, and it lasts through to the early 3$^{rd}$ millennium B.C. (check *chapter 5.3*; Velušček 2001), when for instance the Ljubljansko barje again becomes an important metallurgic center (cf. Durman 1983; regarding dates check Velušček, Čufar 2003).

## DODATEK

Seznam novo odkritih bakrenih in s predelavo bakra povezanih najdb, ki ga objavljamo kot dodatek h katalogu sorodnih predmetov, ki je bil objavljen v *Arheološkem vestniku* 49 (Velušček, Greif 1998):

1. *Ljubljanica (pri Hočevarici),* posamezna najdba, ploščata bakrena sekira tipa Altheim (?) (glej *poglavje 3.1.6*; *sl. 3.1.35*).
Sestava: glej *poglavje 3.5*.
Dat.: Okvirno starejši horizont eneolitskih kovinskih najdb Slovenije (po Velušček, Greif 1998).
Lit.: Prva objava.

2. *Ljubljanica (pri Hočevarici),* posamezna najdba, ploščata bakrena sekira tipa Altheim (glej *poglavje 3.1.6*; *sl. 3.1.36*).
Sestava: glej *poglavje 3.5*.
Dat.: Okvirno starejši horizont eneolitskih kovinskih najdb Slovenije (po Velušček, Greif 1998).
Lit.: Prva objava.

3. *Med Vodicami in Laniščem (Logatec)*, posamezna najdba, ploščata bakrena sekira tipa Altheim. Teme je rahlo usločeno. Proti rezilu se enakomerno razširi. Rezilo je zaobljeno. D = 47 mm, š1 = 23 mm, š2 = 30 mm.[8]
Dat.: Eneolitik.
Lit.: Švajncer 2000, 3, sl.

4. *Bezgečeva jama*, naselbinska najdba, ploščata sekira tipa Podkrnos/Gurnitz.[9]
Pričakovana dat.: Horizont keramike z brazdastim vrezom (HKBV) (glej še Velušček, Greif 1998, 39 s).
Vir: R. Krempuž, ustna informacija.
Lit.: Prva omemba.[10]

5. *Pod Kotom-jug (Prekmurje)*, grobiščna najdba, iz otroškega groba 41, majhna bakrena ploščica.
Pričakovana dat.: HKBV.
Lit.: I. Šavel, Prvi metalurgi. – V: *Odkopane kulture Prek-*

[8] Najdbo hrani zasebni Vojni muzej Logatec.
[9] Tipološko naj bi bila podobna že znani bakreni sekiri iz te jame, ki jo objavlja Leben (glej Leben 1980, sl. 1; *sl. 5.3.13:* 3).
[10] Za podatek o sekiri se najlepše zahvaljujemo R. Krempužu (ZVKD Celje).



## APPENDIX

A list of newly discovered copper objects, as well as objects connected with the processing of copper, is being published as a supplement to the catalogue of similar finds, which was published in *Arheološki vestnik* 49 (Velušček, Greif 1998):

1. *Ljubljanica (near Hočevarica),* chance find, flat copper axe of the Altheim type (?) (check *chapter 3.1.6*; *fig. 3.1.35*).
Composition: check *chapter 3.5*.
Date: Approximately the early horizon of Eneolithic metal finds in Slovenia (according to Velušček, Greif 1998).
Lit.: First publication.

2. *Ljubljanica (near Hočevarica),* chance find, flat copper axe of the Altheim type (check *chapter 3.1.6*; *fig. 3.1.36*).
Composition: check *chapter 3.5*.
Date: Approximately the early horizon of Eneolithic metal finds in Slovenia (according to Velušček, Greif 1998).
Lit.: First publication.

3. *Between Vodice and Lanišče (Logatec)*, chance find, flat copper axe of the Altheim type. The back is slanted slightly inwards. It expands equally towards the blade. The blade is rounded. L = 47 mm, w1 = 23 mm, w2 = 30 mm.[8]
Date: Eneolithic.
Lit.: Švajncer 2000, 3, fig.

4. *Bezgečeva jama*, settlement find, flat axe of the Podkrnos/Gurnitz type.[9]
Anticipated date: Horizon of pottery with furrowed incision (HKBV) (check also Velušček, Greif 1998, 39 p).
Source: R. Krempuž, by word of mouth.
Lit.: First mentioning.[10]

5. *Pod Kotom-jug (Prekmurje)*, necropolis find, from child grave 41, small copper plate.
Anticipated date: HKBV.
Lit.: I. Šavel, Prvi metalurgi. – In: *Odkopane kulture Prek-*

[8] The find is preserved in the private War Museum in Logatec.
[9] Typologically it supposedly corresponds with the already known copper axe from this cave, published by Leben (check Leben 1980, fig. 1; *fig. 5.3.13:* 3).
[10] We would like to kindly thank R. Krempuž (ZVKD Celje) for the information regarding this axe.

*murja*, Arheološka razstava – Pokrajinski muzej Murska Sobota, December 2002–februar 2003.

6. *Hočevarica (Ljubljansko barje),* naselbinska najdba, bakrena kapljica (glej *poglavje 3.1.4.5*; *sl. 3.1.28*).
Sestava: glej *poglavje 3.4*.
Dat.: 1. polovica 36. stoletja pr. Kr., HKBV (glej *poglavje 6.5*).
Lit.: Velušček 2001, sl. 15: 3.

7. *Za Raščico (Prekmurje)*, naselbinska najdba, fragment 25 mm dolg in 10 mm širok fragment bakrenega predmeta.
Dat.: Somogyvár-Vinkovci, pozni eneolitik.
Lit.: I. Šavel, Prvi metalurgi. – V: *Odkopane kulture Prekmurja*, Arheološka razstava – Pokrajinski muzej Murska Sobota, december 2002–februar 2003.

8. *Hočevarica (Ljubljansko barje),* naselbinska najdba, dva fragmenta iste glinene posode z ostanki bakra (glej *poglavje 3.1.4.5*; *sl. 3.1.27*; *t. 4.1.8:* 4).
Sestava bakra: glej *poglavje 3.4*.
Dat.: 1. polovica 36. stoletja pr. Kr., HKBV (glej *poglavje 6.5*).
Lit.: Velušček 2001, sl. 15: 2.

9. *Notranje Gorice (Ljubljansko barje)*, naselbinska najdba, fragment domnevno livarske posode.
Dat.: Eneolitik, najverjetneje 4. tisočletje pr. Kr.
Lit.: Schmid 1910, 95b, sl. 4: 5803; Harej 1976, t. 3: 7.

10. *Založnica (Ljubljansko barje)*, naselbinska najdba, fragment dvodelnega kalupa.
Dat.: Somogyvár-Vinkovci, pozni eneolitik, 2. polovica 26. do 1. polovice 24. stoletja pr. Kr.
Lit.: Velušček, Čufar 2003, t. 4: 10.

11. *Za Raščico (Prekmurje)*, naselbinski najdbi:
   a. Delno poškodovan glinast kalup.
   b. Poškodovan kalup iz peščenca.
Dat.: Somogyvár-Vinkovci, pozni eneolitik.
Lit.: I. Šavel, Prvi metalurgi. – V: *Odkopane kulture Prekmurja*, Arheološka razstava – Pokrajinski muzej Murska Sobota, december 2002–februar 2003.



*murja*, Archaeological exhibition – Provincial Museum in Murska Sobota, December 2002–February 2003.

6. *Hočevarica (Ljubljansko barje),* settlement find, fragment of copper (check *chapter 3.1.4.5*; *fig. 3.1.28*).
Composition: check *chapter 3.4*.
Date: 1st half of the 36th century B.C., HKBV (check *chapter 6.5*).
Lit.: Velušček 2001, fig. 15: 3.

7. *Za Raščico (Prekmurje)*, settlement find, fragment is 25 mm long and 10 mm wide, fragment of a copper object.
Date: Somogyvár-Vinkovci, Late Eneolithic.
Lit.: I. Šavel, Prvi metalurgi. – In: *Odkopane kulture Prekmurja*, Archaeological exhibition – Provincial Museum in Murska Sobota, December 2002–February 2003.

8. *Hočevarica (Ljubljansko barje*), settlement find, two fragments of the same casting vessel with traces of copper remains (check *chapter 3.1.4.5*; *fig. 3.1.27*; *pl. 4.1.8:* 4).
Copper composition: check *chapter 3.4*.
Date: 1st half of the 36th century B.C., HKBV (check *chapter 6.5*).
Lit.: Velušček 2001, fig. 15: 2.

9. *Notranje Gorice (Ljubljansko barje)*, settlement find, fragment of a presumed founder's vessel.
Date: Eneolithic, most likely the 4th millennium B.C.
Lit.: Schmid 1910, 95b, fig. 4: 5803; Harej 1976, Pl. 3: 7.

10. *Založnica (Ljubljansko barje)*, settlement find, fragment of a casting mold.
Date: Somogyvár-Vinkovci, Late Eneolithic, second half of the 26th to the first half of the 24th century B.C.
Lit.: Velušček, Čufar 2003, Pl. 4: 10.

11. *Za Raščico (Prekmurje)*, settlement finds:
   a. Partly damaged pottery casting mold.
   b. Damaged mold made of sandstone.
Date: Somogyvár-Vinkovci, Late Eneolithic.
Lit.: I. Šavel, Prvi metalurgi. – In: *Odkopane kulture Prekmurja*, Archaeological exhibition – Provincial Museum in Murska Sobota, December 2002–February 2003.

# 8 ZAKLJUČEK

ANTON VELUŠČEK

Osrednjo Slovenijo označuje pretežno hribovit in strm svet z veliko vodami (rekami, potoki, hudourniškimi potoki, jezerom) in poplavno ravnico na Ljubljanskem barju, kjer je v 4. tisočletju pr. Kr. še obstajalo jezero.

Še danes je v pokrajini razmeroma malo območij, ki so ugodna za poljedelstvo. Največ jih je na ravninskem Ljubljanskem polju in na obrobju Ljubljanskega barja. Pečat pokrajini pa so skozi celotno zgodovino človekove prisotnosti dajala nahajališča kamnin za izdelavo kamnitih orodij, v kovinskih obdobjih pa tudi številna nahajališča kovinskih mineralov, med katerimi predvsem v Cerkljansko-Loškem in Posavskem hribovju najdemo tudi bakrove.

Prazgodovinska, neolitska in eneolitska poselitev pokrajine je razmeroma slabo poznana. Največ podatkov je z Ljubljanskega barja, kjer dominirajo koliščarske naselbine. Drugod po pokrajini pa se zdi, da prevladujejo naravno zavarovane nižinske, predvsem pa višinske naselbine.

Grobišč iz 4. tisočletja v pokrajini doslej še ne poznamo. Več jamskih skeletnih nekropol oziroma jam, iz katerih izvirajo človeški kostni ostanki ter artefakti, ki morda spadajo v to obdobje, je najti v bližnji okolici (npr. Bezgečeva jama, Lukenjska jama, Koblarska jama, Tominčeva jama). Kronološko je veliko bolje opredeljeno žarno grobišče Pod Kotom-jug v Prekmurju, ki ga uvrščamo v horizont keramike z brazdastim vrezom (HKBV).

Veliko je posamičnih najdb, kot so npr. kamnite sekire, ki jih pogojno lahko uvrstimo tudi v 4. tisočletje. Zanimivo je, da jih nekaj poznamo z območij, kjer je malo oziroma še ni podatkov o eneolitski poselitvi. To velja predvsem za slabo raziskano Cerkljansko-Loško hribovje, kjer naključne najdbe sekir in puščične osti morda kažejo na stalnejšo človekovo prisotnost.

V 4. tisočletju pr. Kr. naj bi v pokrajini prevladoval jelovo-bukov gozd. Na območjih, kjer je bil človekov vpliv na okolje močnejši, je gozd prešel na nižjo razvojno stopnjo, v odprt mešani gozd. Takšna gozdna združba naj bi tudi dominirala v bližnji okolici Ljubljanskega barja, katerega osrednji del prekriva že omenjeno jezero.



# 8 CONCLUSION

Central Slovenia is characterised by mostly hilly and steep landscape with numerous waters (rivers, streams, rapids, lake) and the flooded flatland of the Ljubljansko barje, where a lake used to be in the 4th millennium B.C.

Today, there are still relatively few areas in this region that are suitable for agriculture. Those that are, tend to be located in the flat fields of the Ljubljansko polje and along the outskirts of the Ljubljansko barje. This landscape's defining characteristics have emerged as a result of man's historical presence in the region and, in particular, as a result of the development of stone tool production and the extraction of numerous metal minerals during the »Metal« periods (most important among them being the discovery of copper in the Cerkljansko-Loško and the Posavsko hribovje).

Relatively little is known about prehistoric, Neolithic and Eneolithic settlements in this region. Existing information is mostly about the Ljubljansko barje, which was dominated by pile dwelling settlements. Elsewhere in the region settlements tended to be situated in naturally well protected areas of the lowlands, and even more so in elevated places.

Up until now, there were no known necropolises from the 4th millennium B.C. Several cave necropolises (that is caves that contain the remains of human bones and artifacts) that may belong to this period have been found in the nearby surroundings (for example: Bezgečeva jama, Lukenjska jama, Koblarska jama and Tominčeva jama). The urn necropolis at Pod Kotom-jug in Prekmurje is much better defined in chronological terms and is classified in the horizon of pottery with furrowed incisions (HKBV).

There have also been a large number of individual chance finds, for example stone axes, which could be conditionally classified as being from the 4th millennium B.C. Given what we know about the region, it is beguiling that there is so little information about Eneolithic settlements. This is particularly true of the poorly researched Cerkljansko-Loško hribovje, where several chance discoveries of stone axes and arrowheads may be indicative of a long-term human presence.

The landscape was probably covered with a fir-

Najverjetneje nekje na obrobju jezera s kraškimi izviri Ljubije, Bistre in Ljubljanice v zaledju[1] je v drugi polovici 37. in v prvi polovici 36. stoletja pr. Kr. stala koliščarska naselbina Hočevarica (glej *poglavja 6.2–6.5*). Pravzaprav sta bili dve naselbini, saj se zdi, da se je življenje starejše naselbine, morda tudi zaradi nenadne spremembe v mikrookolju, prekinilo. Prekinitev v poselitvi je trajala le nekaj let do največ nekaj desetletij, ko so na Hočevarici ponovno, tokrat zadnjič, v blatna tla zabijali nosilne kole koliščarskih hiš.

Danes se po najdišču Hočevarica kulturna plast in arheološke najdbe razprostirajo na površini, ki presega 10.000 $m^2$. O dejanskem obsegu prazgodovinskih naselbin, notranji ureditvi in številu objektov pa ne vemo praktično nič. Na podlagi paralele v Maharskem prekopu na Ljubljanskem barju (Velušček 2001, sl. 23) in tudi v podobno starih naselbinah v Švici, Nemčiji, Franciji bi lahko sklepali na notranje urejeni manjši naselbini, ki ju je morda s kopenske strani varovala lesena palisada.

Na podlagi determiniranega lesa (glej *poglavje 6.1*), ki izvira iz jarka in sonde, vemo, da so za gradnjo koliščarskih hiš največ uporabljali jesenov (*Fraxinus*) in tudi, toda veliko manj od jesenovega, hrastov les (*Quercus*). Približno četrtina vzorcev je pripadala drugim vrstam, med katerimi je prevladovala jelša (*Alnus*), pojavljajo pa se še jelovi (*Abies*), topolovi (*Populus*), vrbovi (*Salix*) in leskovi (*Corylus*) koli (glej *poglavji 6.1* in *6.2*). Nasprotno pa so za kurjavo porabili največ leskovega in jelševega lesa, veliko manj pa že jesena, še manj bukve (*Fagus*), hrasta, javorja (*Acer*), jerebike (*Sorbus*) itd. (glej *poglavje 3.2*)

Koliščarji s Hočevarice so v bližini naselbin, verjetno v smeri proti trdinskemu svetu pod 605 m visokim Javorčem v Menišiji, obdelovali polja. Na njih so gojili ječmen (*Hordeum vulgare*) in pšenico (*Triticum monococcum*, *T. turgidum* ssp. *dicoccum*). Na odprtih travniških površinah se je verjetno pasla živina (glej *poglavje 3.2*). Kostne najdbe sicer kažejo, da domače govedo (*Bos taurus*) ni bilo preveč priljubljeno. Nekoliko več kosti je pripisano drobnici (*Ovis* s. *capra*) in psu (*Canis familiaris*). Največ kostnih ostankov domačih živali domnevno pripada domačemu prašiču (*Sus domesticus*), katerega ostanke je bilo sicer težko ločevati od kosti njegovega divjega sorodnika (*Sus scrofa*).

Kakor kažejo izsledki raziskave ostankov makrofavne sesalcev (glej *poglavje 3.7*), je bil pomemben delež drobnice zaklan med prvim in četrtim letom starosti, pri čemer so nekateri osebki dočakali tudi precej višjo starost, npr. 8 do 10 let. Podobno se domneva tudi, kljub majhnosti vzorca, za govedo, oziroma kljub vprašljivosti vzor-

[1] Delovanje omenjenih treh kraških vodotokov in drugih nekraških voda je razvidno tudi iz zgradbe jezerske krede oziroma polžarice, ki je na tem delu Ljubljanskega barja že precej pomešana z glinastimi in peščenimi naplavinami; zaradi razredčevanja z nekraškimi vodami je tudi manj nasičena s kalcijevim karbonatom (Tancik 1965, 69, 71).



beech forest during the 4th millennium B.C. In areas where the human influence on the landscape was more pronounced the forest transformed to a lower development level, that is into an open mixed forest. This kind of forest society probably dominated the near environs of the Ljubljansko barje, the central part of which was covered by the above-mentioned lake.

The Hočevarica pile dwelling settlement (check *chapters 6.2–6.5*) was most likely somewhere at the edge of the lake, which was fed by the karstic sources of the Ljubija, Bistra and Ljubljanica rivers,[1] during the second half of the 37th and the first half of the 36th centuries B.C. Actually, there were probably two distinct settlements, as it appears that the existence of an earlier settlement was interrupted, perhaps because of sudden changes in the microenvironment. The interruption of the settlement appeared to have lasted only several years (at the most several decades) when the Hočevarica inhabitants once again (this time for the last time) began to drive piles into the muddy ground to support their pile dwellings.

Today the cultural layers and archeological finds from Hočevarica cover a surface area of roughly 10,000 $m^2$. We know practically nothing about the actual extent of this prehistoric settlement, its internal organization and the number of houses it included. On the basis of parallels with Maharski prekop in the Ljubljansko barje (Velušček 2001, fig. 23) and also with other settlements of similar age in Switzerland, Germany and France, we can conclude that the settlements were well organized and were perhaps protected on their exposed, land side by a wooden palisade.

On the basis of analyses performed on the wood fragments (check *chapter 6.1*) found in the ditch and trench, we know that ash trees (*Fraxinus*) were used in the construction of the pile dwellings and also that oak (*Quercus*) was used much less than ash. Approximately one quarter of the sample was attributed to other species of wood dominated by wood from alder trees (*Alnus*). Fir (*Abies)*, poplar (*Populus)*, willow (*Salix*) and hazel (*Corylus)* were also found in the piles (check *chapters 6.1* and *6.2*). In contrast, it appears that hazel and alder were used for firewood, and to a lesser degree beech (*Fagus*), oak, maple (*Acer*), rowan (*Sorbus*), etc. (check *chapter 3.2*).

Pile dwellers from the Hočevarica settlement worked the land in the vicinity of the settlement, probably in the area below the hill called Javorč (605 m above sea level) in Menišija. They cultivated barley (*Hordeum vulgare*) and wheat (*Triticum monococcum*, *T. turgidum* ssp. *dicoccum)*. They probably grazed livestock on the grassy meadows (check *chapter 3.2*). Otherwise, disco-

[1] The functioning of these three karstic flows and other non-karstic water is also apparent from the development of snail-clay soil (or sea chalk), which is in this part of the Ljubljansko barje is mixed with clay and sand deposits. Because of the dilution from non-karstic sources, it is less saturated with calcium carbonates (Tanciki 1965, 69, 71).

ca, za prašiča. Torej se zdi, da so na Hočevarici redili domače živali predvsem za meso in maščobo.

Preskrbo z mesom je v veliki meri zagotavljal ali dopolnjeval tudi lov. To dokazuje sestava plena, saj prevladujejo odrasli osebki divjih živali. Največ so lovili srno (*Capreolus capreolus*), ki ji najbolj ustreza življenjski prostor, kot je gozd z gosto podrastjo in grmišča, torej mozaičen preplet travnikov, pašnikov in njiv z majhnimi gozdički. V večjem obsegu so verjetno lovili tudi divjega prašiča (*Sus scrofa*), ki danes v Sloveniji poseljuje listnate in mešane gozdove, ustrezajo pa mu tudi obsežnejša močvirja. Veliko manj uplenjenih osebkov pripada navadnemu jelenu (*Cervus elaphus*), ki sicer danes pri nas živi največ v dinarskih bukovo-jelovih gozdovih in njihovih spremenjenih, zlasti zasmrečenih sestojih, v nižinskem delu pa tudi v poplavnih gozdovih. Gre za tipično gozdno žival, ki ji najbolj ustrezajo stičišča gozdov in odprtih (obdelovalnih) površin. Med lovnimi živalmi je z nekaj kostmi zastopan tudi medved (*Ursus arctos*), naš največji predstavnik zveri.

Poleg večjih živali, ki so prispevale zadovoljivo količino mesa, pa so predvsem zaradi krzna lovili tudi manjše divje živali. Kostni ostanki dokazujejo, da so ujeli bobre (*Castor fiber*), žival, za katero je značilno, da živi izključno ob vodah, ki so gosto obrasle z vrbami, topoli, jelšami in brezami. V potokih bobri gradijo jezove ter s tem vzdržujejo želeno višino vodne gladine nastalih jezer. Ta morajo biti dovolj globoka, da voda pozimi ne zamrzne do dna, saj imajo bobri tam zalogo vej. Bobrišče, ki je narejeno iz vej, je blizu jezu, na kakem otoku ali pa na bregu. Predvsem zaradi krzna so verjetno lovili vidro (*Lutra lutra*), ki živi v rekah, potokih in jezerih. Morda pa tudi jazbeca (*Meles meles*), lisico (*Vulpes vulpes*) in divjo mačko (*Felis sylvestris*), še danes značilne prebivalce gozdov in obgozdnih področij na barjanskem obrobju.

Pomemben vir beljakovin v prehrani so bile tudi ribe, ki smo jih določevali predvsem po goltnih zobeh, manj pa na podlagi lusk, goltnih kosti, čeljustnic in preoperkulumov (glej *poglavje 3.8*). V vzorcu s Hočevarice so zastopane izključno vrste, ki danes živijo v spodnjih tokovih večjih rek in v številnih stoječih vodah (jezerih, mrtvih rokavih). Tako smo določili krapa (*Cyprinus carpio*), rdečeperko (*Scardinius erythrophthalmus*), navadnega ostriža (*Perca fluviatilis*), ščuko (*Esox lucius*) in rdečeoko (*Rutilus rutilus*).

Na Hočevarici smo določili kar 16 vrst ptic ter skupno najmanj 143 osebkov (glej *poglavje 3.10*). Največ jih je iz družine plovcev, po številu osebkov so zastopane po naslednjem vrstnem redu: čopasta črnica (*Aythya fuligula*), sivka (*Aythya ferina*), mlakarica (*Anas platyrhynchos*), reglja (*Anas querquedula*), mali žagar (*Mergus albellus*), raca žličarica (*Anas clypeata*), kostanjevka (*Aythya nyroca*), dolgorepa raca (*Anas acuta*), veliki žagar (*Mergus merganser*), njivska gos (*Anser fabalis*) in srednji žagar (*Mergus serrator*). Sledijo sebki iz družine ča-



veries of animal bone fragments indicate that cattle (*Bos taurus*) were not favored. A much larger number of bone fragments are ascribed to smaller herd animals such as sheep or goats (*Ovis* s. *Capra*) and to dogs (*Canis familiaris*). The largest number of bone fragments of domestic animals is presumed to belong to domestic pig (*Sus domesticus*), the remains of which are difficult to distinguish from its wild relatives (*Sus scrofa*).

The results of research performed on the remains of macro-fauna mammals (check *chapter 3.7*) indicate that a good many small herd animals were slaughtered between one and four years of age (although a lower number of remains indicate a higher age at death, for example from eight to ten). Similar assumptions, despite the limited sample, are made about cattle remains and, despite the questionable nature of the sample, about pigs as well. Therefore, it would seem that the Hočevarica settlers raised domestic animals principally for meat and lard.

To a great degree, meat was supplied or at least supplemented through hunting. This is substantiated by the content of the remains of prey (i.e. fully grown wild or undomesticated animals) found in the area. It appears that deer (*Capreolus capreolus*) was the most common quarry, no doubt because the habitat – forests with thick undergrowth and bushes, interspersed with grassy meadows, grazing areas and small groves – was ideally suited to it. The pile dwellers probably also hunted wild boar (*Sus scrofa*); nowadays wild boar live in deciduous and mixed forests in Slovenia, although they are also well-suited to marshlands. Red deer (*Cervus elaphus*) was a less frequently hunted prey. Today this type of deer tends to live in beech-fir forests, in modified pine stands and in lower-lying areas, even in flooded forests. Bone fragments of bear (*Ursus arctos*), the largest carnivore animal living in Slovenia, were also discovered among the remains of their prey.

In addition to the bigger animals that were hunted mostly to supply a satisfactory amount of meat, smaller wild animals were hunted for their fur. Remains of bone fragments show that the pile dwellers hunted beaver (*Castor fiber*), an animal which is characterized by living exclusively near water, often in areas populated with willow, poplar, alder and birch trees. Beavers build dams on the banks in order to maintain the desired level of the surface water. The water must be sufficiently deep so that during the winter it does not freeze at the bottom where the beavers keep a supply of branches. The beaver's shelter, which is made of branches, is near the dam on an island or on the bank itself. The pile dwellers are likely to have hunted otters (*Lutra lutra)*, which live in rivers, streams and lakes, for their fur. It is probable that they also hunted badger (*Meles meles*), fox (*Vulpes vulpes*) and wild cat (*Felis sylvestris*), which still typically reside in and around the forests that abut the edges of the Ljubljansko barje.

Fish also represented an important source of protein in food. We were distinguish fish remains mostly pelj (velika bobnarica (*Bataurus stellaris*), rjava čaplja (*Ardea purpurea*)), iz družine kljunačev (kozica (*Gallinago gallinago*)), iz družine galebov (rumenonogi galeb (*Larus* cf. *cachinnans*)) in vranov (poljska vrana (*Corvus frugilegus*)).

Domnevamo, da so ptice bile lovski plen in zato veliko povedo predvsem o lovnem habitatu eneolitskih lovcev s Hočevarice. Izrazito prevladujejo vrste, ki preferirajo stoječe vode ter naseljujejo litoralno in pelaško območje in pokrivajo vse spektre vodne globine. Prisotnost poljske vrane kaže na mozaično strukturirano kopno pokrajino s travišči in obdelovalnimi površinami. Morda je bila ulovljena na območju, kjer so koliščarji s Hočevarice gojili ječmen in pšenico (prim. *poglavje 3.2*).

Poleg hrane, ki so jo pridelali na polju ali so si jo zagotovili z rejo živine ter z lovom, so koliščarji nabirali tudi sadeže, plodove in zelišča (glej *poglavje 3.2*). Pri tem je presenetila izredno velika količina pešk vinske trte (*Vitis vinifera*). Vzorec je tako velik, da bi omogočil raziskavo o tem, za kakšno vrsto trte gre: divjo ali gojeno. Žal takšna analiza še ni bila opravljena, zato v tem trenutku prisotnost vinske trte v kulturni plasti Hočevarice priča le o tedanjih razmerah. Sklepamo na precej zmerno celinsko podnebje (prim. Budja 1994).

Na Hočevarici so izdelovali tudi keramiko. Glino so najbrž dobili kar na Ljubljanskem barju (prim. Osterc 1975, 127). Prevladuje keramika rjavih, temnosivih in črnih barvnih tonov. Za prebivalce s Hočevarice pa je značilno, da so nekatere tipe posod bogato okraševali. Kronološko zelo izpovedna je keramika z brazdastim vrezom.

Čeprav ostankov tkanine nismo našli, vemo, da so na Hočevarici izdelovali oblačila. To dokazujejo ploščata keramična vretenca za prejo.

Na Hočevarici (*poglavje 3.1.2*) so izdelovali in uporabljali orodja in orožja iz kamna, lesa, kosti in roževine, kot so žrmlje, sekira, puščične osti, lok, mikalnik, gladilo, šilo, trnek, s katerim so lahko lovili ribe in ptice, nastavek za nasaditev kamnitih sekir itd.

Orodje so nasajali tudi s pomočjo katranske smole, ki so jo pripravljali iz brezovega lubja (prim. Orel, Hadži 1978, 101 s). Kaže, da se je njena sled ohranila na kamnitem batu (*sl. 3.1.29*).

Iz kosti, živalskih zob, drevesne skorje in koščic so izdelovali obeske za ogrlice. Majhne jagode za ogrlice so delali tudi iz belega kalcita. Temnejši pa so obročki, ki so jih najverjetneje na Hočevarico prinesli že narejene. Podrobna analiza dveh takšnih obročkov je namreč pokazala, da sta izdelana iz metamorfne kamnine, ki se najbližje Ljubljanskemu barju pojavlja na Pohorju in v severnih Karavankah (glej *poglavje 3.3*).

Fragment skatove kosti, ki je najden v drugi naselbinski fazi (glej *poglavje 3.9*), pa dokazuje, da so koliščarji s Hočevarice imeli stike tudi s populacijami na morski obali, najverjetneje s severnega Jadrana.

V tej, najmlajši naselbinski fazi, ki jo datiramo okvir-

from pharyngeal teeth and bones, and to a lesser degree, from scales, mandibles and preopercula (check *chapter 3.8*). According to the sample from Hočevarica, the fish belonged to the species that today live in the lower currents of larger rivers and in still water (lakes and dead tributaries). The remains of common carp (*Cyprinus carpio*), rudd (*Scardinius erythrophthalmus*), perch (*Perca fluviatilis)*, pike (*Esox lucius*) and roach (*Rutilus rutilus*) were found.

We have defined 16 species of birds at Hočevarica and at least 143 individual subjects (check *chapter 3.10*). Most of them belong to the family of swimmers and have been recorded in the following order: tufted duck (*Aythya fuligula*), common pochard (*Aythya ferina*), mallard (*Anas platyrhynchos*), garganey (*Anas querquedula*), smew (*Mergus albellus*), shoveler (*Anas clypeata*), ferruginous pochard (*Aythya nyroca*), pintail (*Anas acuta*), common merganser (*Mergus merganser*), bean goose (*Anser fabalis*) and red-breasted merganser (*Mergus serrator*). There are also individual subjects from the herons family (bittern (*Bataurus stellaris*), purple heron (*Ardea purpurea*)), from the waders family (common snipe (*Gallinago gallinago*)), from the gulls family (yellow-legged gull (*Larus* cf. *cachinnans*)) and from crows (rook (*Corvus frugilegus*)).

We presume that these birds were also prey for the Hočevarica pile dwellers and therefore can tell us much about the habitat of Eneolithic hunters. The dominant features of most of these species are their preference for still water and their tendency to settle on littoral and pelagic areas. They include birds that settle near the whole specter of water depths. The presence of the rook is indicative of the mosaic-like structure of the landscape with its alternating meadows and cultivated surfaces. Perhaps these birds were hunted in areas where the Hočevarica pile dwellers grew barley and wheat (check *chapter 3.2*).

In addition to food derived from agricultural cultivation and from domesticated and wild animals, the pile dwellers also gathered fruits and herbs (check *chapter 3.2*). A surprising number of seeds from grape vines (*Vitis vinifera*) were discovered. Indeed, the sample is so large that it would allow for research into the type of vine in question: wild or cultivated. Unfortunately, this analysis has not yet been undertaken. For now, the presence of vineyards in the cultural layers of the Hočevarica pile dwellers only tells us about the general conditions at the time. We can presume, for example, a relatively continental climate (cf. Budja 1994).

Pottery was also produced by the Hočevarica pile dwellers. They probably obtained clay from the Ljubljansko barje (cf. Osterc 1975, 127). The pottery found in the area was predominately brown, dark gray and black tones. It was characteristic for Hočevarica dwellers to ornament certain types of vessels. In terms of chronology, pottery with furrowed incisions is the most declaratory.

Although fabric remains were not discovered, we do know that the Hočevarica pile dwellers did produce no v prvo polovico 36. stoletja pr. Kr., pa smo našli tudi dva fragmenta livarske posode, v kateri se je ohranil baker in kapljici podoben košček čistega bakra. Najdbi dokazujeta, da so se na Hočevarici ukvarjali z metalurško dejavnostjo (glej *poglavje 3.4*).

Hočevarica na Ljubljanskem barju je ena izmed naselbinskih točk iz okvirno druge četrtine 4. tisočletja pr. Kr. v osrednji Sloveniji, ki smo jo uvrstili v HKBV (glej *poglavji 5.3* in *6.5*). Za to obdobje je značilna redukcijsko žgana keramika oziroma keramika temnejših barvnih tonov. Za razliko od lasinjske kulture, za katero so značilni vrči z ostrimi prehodi v profilu, sklede s konkavnim spodnjim ter konveksnim zgornjim delom itd., tu prevladujejo bolj kroglasto oblikovani vrči, številni so lonci, bikonične, konične sklede, pojavljajo se zajemalke s polnim držajem. Med ornamentalnimi značilnostmi poudarjamo vrezano okrasje, med katerim je najreprezentativnejši brazdasti vrez, plastični ornament, kot so razčlenjena rebra, barbotinski in metličast okras. Med keramičnimi najdbami se pojavljajo tudi pečatniki.

Čeprav se v jugovzhodnih Alpah prve bakrene najdbe pojavijo že v obdobju, ki je sočasno epilengyelskemu kulturnemu kompleksu v Avstriji, tj. ob koncu 5. in v začetku 4. tisočletja pr. Kr.,[2] prav tako bi lahko v tem času pričakovali tudi začetek domače metalurške dejavnosti in že izkoriščanje lokalnih surovinskih virov, je analiza pokazala, da se bakrene najdbe v večjem številu pojavijo šele s HKBV (glej *poglavje 7.1*). Prevladujejo bakrene sekire tipov Altheim in Podkrnos/Gurnitz, pojavljajo se tudi bodalo in drugi tipološko neopredeljivi bakreni predmeti. Razprostranjenost bakrenih sekir tipa Podkrnos/Gurnitz in sorodnih tipov sekir dopušča tezo, da se je v drugi četrtini 4. tisočletja pr. Kr. poznavanje bakra preko jugovzhodnih Alp razširilo v severno Italijo. Kakor dokazujejo livarske posode s Hočevarice, Hodiškega jezera, morda tudi z Notranjih Goric, in kalup z Gradca pri Mirni (*sl. 5.3.2*:8) se v tem času v jugovzhodnih Alpah razmahne metalurška dejavnost.

V povezavi z metalurško dejavnostjo bi najbrž lahko iskali tudi odgovor na vprašanje, da se v obdobju lasinjske kulture, HKBV, v obdobju vučedolske kulture oz. v prvi polovici 3. tisočletja pr. Kr. na Ljubljanskem barju (glej Velušček, Čufar 2003), v obdobju pramenaste keramike itd. pojavlja keramika, za katero je značilen navaden ali brazdasti vrez, dolben okras ter drugi tipi globokega okrasa (prim. *poglavje 4.2*). Ta keramika je tudi zelo bogato ornamentirana. Značilno je, da se takšne vrste ornament pojavlja samo na določenih tipih posod (vrčki, amfore, sklede, skodele), kar kaže na ekskluzivnost (prim. Teržan 1983, 58 ss; 1989, 245). Arheologi sicer uporabljamo za vse tipe teh »ornamentov« izraz ornament, čeprav gre dejansko samo za eno izmed stopenj v procesu okraševanja (prim. Horváth 1994, 79

[2] Prim. Stadler 1995.



clothing. This is indicated by the discovery of a flat pottery spindle whorl used for spinning yarn.

The Hočevarica dwellers also produced and used tools and weapons from stone, wood, bones and horn. These include querns, axes, arrowheads, harpoons, bows, hackles, polishers, awls, hooks to hunt birds and fish, tools for helving stone axes, etc.

Tools were maintained using a sappy tar made from the bark of birch trees (check Orel, Hadži 1978, 101 p). Traces of this substance are preserved on stone mallet (*fig. 3.1.29*).

The Hočevarica dwellers also made pendants for necklaces out of bones, animal teeth, tree bark, pits and stone. Small beads for necklaces were made from white calcite. A darker variation of decoration can be found on the ringlets that were probably brought into the Hočevarica region already made. A detailed analysis of these ringlets indicates that they were made from metamorphic rock that, nearest to the Ljubljansko barje, can be found in the Pohorje and northern Karavanke mountains (check *chapter 3.3*).

Fragments of bones from sea rays, which were found in the second settlement phase (check *chapter 3.9*), suggest that the Hočevarica pile dwellers had contact with populations that lived near the sea, probably along the northern Adriatic coast.

This latest settlement phase, which dates to around the first half of the 36$^{th}$ century B.C., also revealed two fragments of a founder's vessel with traces of copper and a piece of pure copper droplet, were found. These finds indicate that Hočevarica dwellers engaged in metallurgical activities (check *chapter 3.4*).

The site Hočevarica on the Ljubljansko barje is one of the settlement areas in central Slovenia dating to the second quarter of the 4$^{th}$ millennium B.C., which we have classified to the HKBV period (check *chapters 5.3* and *6.5*). This period is characterized by pottery fired in a reducing atmosphere, that is, pottery with a darker color tone. It is distinct from the Lasinja culture, which is known for its pitchers with sharp transitions and profiles as well as dishes with concave lower and convex upper bodies. Instead, we see a rounder shape in the pitchers, various kinds of pots, biconical and conical dishes, and ladles with solid handles. In terms of ornamental characteristics, the incised markings are emphasized and, among them, the most representative are furrowed incisions. In terms of plastic ornamentation, the most distinct are cordons with finger imprints, barbotine and brushed ornamentation. Seal stamps, or »pintaderas« were also among the pottery finds.

The earliest copper finds in the southeastern Alps date from a period that corresponds to the Epi-Lengyel cultural complex in Austria, that is from the end of the 5$^{th}$ and beginning of the 4$^{th}$ millennium B.C.[2] Therefore,

[2] Cf. Stadler 1995.

s; glej še Horvat 1999, 40). Končni produkt je bil verjetno videti precej drugače, kot je videti danes. Čeprav se inkrustacija na keramiki s Hočevarice ni ohranila, se zdi verjetno, da je bil vrč (*t. 4.1.1*) inkrustiran, tj. poglobitve v steno posode so bile zapolnjene z neko snovjo, ki je najpogosteje bele, lahko tudi rdeče barve itd. Veliko inkrustiranih posod poznamo npr. iz Kevderca. Vrezana površina na keramiki je prekrita z belo apnenčasto snovjo (Leben 1963, 228; glej *poglavje 5.3*), torej s snovjo, ki se jo uporablja v metalurškem procesu (Ecsedy 1982, 89; Durman 1988, 38). Zato se zdi, da lahko to ekskluzivno keramiko povezujemo z metalurgijo oziroma z metalurškim procesom. Morda gre za kultno posodje pri magijskem obredju, ki ta proces spremlja. V mnogih kulturah je namreč metalurški proces povzdignjen na nivo magijskega: mineral se enači z embrijem, pri taljenju se dogaja »zorenje« kovine, tj. predčasno ali pospešeno rojstvo. Z magijskim je povezan tudi zelo visok družbeni status metalurgov, ki je lahko deden. To so »gospodarji ognja«, po rangu enakovredni ali celo pomembnejši od vrača (Eliade 1983, 85 ss).

Preplet magijskega in sekularnega morda lahko vidimo tudi v jamskih nekropolah,[3] glede na trenutno stanje raziskav pa bolj pravilno rečeno v jamskih najdiščih s prazgodovinskimi človeškimi kostnimi ostanki in najdbami iz HKBV, med katerimi so tudi bakrene sekire[4] in bodalo, ter v žarnem grobišču Pod kotom-jug, kjer bi še posebej izpostavili otroški grob 41 z žaro, v kateri je skupaj s človeškimi kostmi tudi bakrena ploščica (glej *poglavje 5.3*).

Če so torej najdbe človeških kosti dejansko iz obdobja HKBV, potem lahko glede na pridatke sklepamo na pokope zelo pomembnih članov v skupnosti, morda metalurgov ali bližnjih sorodnikov. Je bil s pokopom opravljen simbolni obred? Neke vrste vrnitev v maternico Matere-Zemlje (prim. Jamnik et al. 2002), v ponovno rojstvo? M. Eliade se sklicuje na starogrški mit, v katerem dva brata ubijeta tretjega, ga pokopljeta v nekem hribu, njegovo telo pa se spremeni v železo, tj. kovino (prim. Eliade 1983, 76). Torej se zdi, da ima tudi jamski pokop v skupnosti, ki se intenzivno ukvarja z metalurgijo, svoje mistično ozadje, ki se v materialnem svetu odvija v metalurškem procesu, ki je po svoji naravi preobrazba ene tvarine v drugo.

[3] V osrednji Sloveniji in bližnji okolici poznamo naslednje jame s prazgodovinskimi kostnimi ostanki človeka in najdbami, ki bi jih lahko uvrstili v HKBV: Tominčeva jama, Koblarska jama, Ciganske jame, Lukenjska jama, Levakova jama in Bezgečeva jama (prim. Leben 1978).

[4] Bakrene sekire iz Bocce-Lorenze, ki so tipološko sorodne sekiram tipa Podkrnos/Gurnitz (glej *poglavje 7.1*), prav tako izvirajo iz jamskega grobišča (De Marinis 1992, 392).



it would be expected that a similar time frame would apply to the beginning of local metallurgical activities and the exploitation of local raw resources in the region of what is now Slovenia. However, analysis of local copper finds indicates that a greater number date to the later period of HKBV (check *chapter 7.1*). The most numerous in this category are copper axes of the Altheim and Podkrnos/Gurnitz types. There are also a dagger and undefined typological copper objects. The widespread area where Podkrnos/Gurnitz copper axes and typologically smilar axes have been found support the thesis that in the second quarter of the 4$^{th}$ millennium B.C., knowledge of copper production crossed the southeastern Alps and spread into northern Italy. As indicated by the presence of a founder's vessel at Hočevarica, Keutschacher See and perhaps even Notranje Gorice and by a casting mold from Gradec pri Mirni (*fig. 5.3.2:* 8), metallurgical production activities began to spread throughout the southeastern Alps at about this time.

Metallurgical activity could presumably yield the answer to the question of whether, during the periods of the Lasinja culture, HKBV, the Vučedol culture – that is during the first half of the 3$^{rd}$ millennium BC on the Ljubljansko barje (check Velušček, Čufar 2003) – and the period of »Litzen« pottery, characteristic pottery was made plain or with furrowed incisions, carved ornamentation and other types of deep ornamentation (cf. *chapter 4.2*). This pottery was also very richly ornamented and this type of ornamentation tends to be found on certain specific vessel types (pitchers, amphoras, dishes, bowls) and indicates a kind of selectivity (cf. Teržan 1983, 58 pp; 1989, 245). Archeologists use the general term »ornaments« for all these types of ornamentation, although it is only one part of many in the process of decoration (cf. Horváth 1994, 79 p; check also Horvat 1999, 40). The final product no doubt originally looked very different than it does today. Although the encrustation on Hočevarica pottery is not preserved, in all likelihood the pitcher (*pl. 4.1.1*) was encrusted; deep furrows in the sides of the vessel were filled with a substance that was most frequently white and sometimes red. We are familiar with this variety of encrusted vessels from, for example Kevderc. The furrowed surface on the pottery was covered with a white limy substance (Leben 1963, 228, check *chapter 5.3*), that is, with a substance that was used in metallurgical processes (Ecsedy 1982, 89; Durman 1988, 38). Therefore, it seems likely that this type of exclusive pottery has something common with the metallurgical process. Perhaps it was related to vessels that were used in a magical or cult-like ritual that accompanied the process of metal extraction. In many cultures, metallurgical processes were elevated to the level of magic; minerals were equated with the embryo, and when melted »the maturation« of metal occurred, or in other words, a premature or accelerated birth took place. This type of magic was also linked to the very high social status of the metallurgist, a hereditary position. These were the »masters of fire« who occupied a place on the same or higher level than a shaman (Eliade 1983, 85 pp).

The interconnection of the magical and secular may also be seen in the cave necropolises[3] but given the current status of research, it would be more appropriate to refer to cave finds of prehistoric human bones and other finds from the HKBV period, including copper axes[4] and daggers. In the urn necropolis at Pot Kotom-jug, particular attention should be paid to child grave 41, which includes an urn in which human bones and a copper plate were found (check *chapter 5.3*). If these remains of human bones in caves are in fact from the HKBV era, then we can, if we consider the additions to the grave, make conclusions about the burials of important members of the community, perhaps metallurgists or their close relatives. Were burials also symbolic rituals? Some sort of return into the womb of Mother Earth (cf. Jamnik et al. 2002), into a new birth? M. Eliade refers to the ancient Greek myth in which two brothers kill a third brother and bury him in a hill where his body is transformed into metal/iron (cf. Eliade 1983, 76). It would seem therefore that cave burials for members of communities involved in metallurgy would have a specific mystical meaning: namely, the material world unfurling in the metallurgical process which by its very nature meant a transformation from one substance into another.

[3] In the central part of Slovenia and its environs, we are aware of the following caves containing prehistoric remains of human bones and finds which could be classified in HKBV: Tominčeva jama, Koblarska jama, Ciganske jame, Lukenjska jama, Levakova jama and Bezgečeva jama (cf. Leben 1978).

[4] Copper axes from Bocca-Lorenza typologically related to the Podkrnos/Gurnitz axe type (check *chapter 7.1*) were also found in cave necropolises (De Marinis 1992, 392).

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