

RASTLINSKI MAKROOSTANKI Z GROBIŠČ NA MOLNIKU

BOTANICAL MACROREMAINS FROM THE CEMETERIES AT MOLNIK

Tjaša TOLAR

UVOD

V letu 2016 smo v obdelavo prejeli vzorce rastlinskih makroostankov (tj. lesa, oglja, tekstila ter redkih ostankov semen/plodov), ki jih je hraniil Mestni muzej Ljubljana z izkopavanj v osemdesetih in devetdesetih letih 20. stoletja na Molniku. V večini so bili zogleneli, nekaj je bilo tudi nezoglenelih. Slednji so prepojeni z laku podobno substanco, s čimer je sicer bila pridobljena daljša obstojnost predmeta, vendar hkrati izgubljena možnost natančnejše identifikacije rastlinske vrste (glej tu Grömer, Tolar, Kostajnšek, poglavje o ostankih tkanine in živalskih dlak).

METODE DELA

Vse vzorce smo natančno pregledali pod stereomikroskopom Leica z do 50-kratno povečavo in poskušali določiti pripadnost rastlinski vrsti. Kadar je bilo v vzorcu veliko koščkov oglja, smo podvzorcili tako, da smo iz vsakega vzorca naključno odbrali 3 do 4 primerke in jim določili vrsto lesa (glej tab. 1). Pri delu smo si pomagali z referenčno zbirko Inštituta za arheologijo ZRC SAZU in standardno literaturo za določevanje vrst lesa, oglja in semen/plodov (npr. Torelli 1991; Schweingruber 1990; Jacomet 2006; Cappers et al. 2006 idr.).

REZULTATI

Pregledanih je bilo 56 arheobotaničnih vzorcev: 9 s planega grobišča na Rojah, eden iz Kotarjevega peskokopa, 35 z gomilnega grobišča na Grmadi in 11 iz gomile v Pleški hosti. V večini gre za pooglenele vzorce lesa, torej oglje z grmad, ki je bilo raztreseno v grobnih jamah (Roje, gr. 6; Pleška hosta, gr. 1/6 in 1/11; Grmada, gr. 13/7, 17/1, 17/3, 17/10) ali shranjeno skupaj s sežganimi kostmi v žarah (Roje, gr. I/1978 in gr. 5; Grmada, gr. 13/3, 13/4, 17/6). Nekaj pa je ostankov preperelega lesa (verjetno ostankov krste) iz skeletnih grobov (Kotarjev peskokop, gr. 1; Pleška hosta, gr. 1/4; Grmada, gr. 13/2, 13/9, 13/13, 16/1, 17/2, 17/5, 17/8, 17/9) ter posebnih najdb, ki so bile grobni pridatek, npr. ostanek tkanine na zarjaveli železni fibuli (iz groba 1/6 – t. 40: 1; glej tu Grömer, Tolar, Kostajnšek, l. c.), ostanek lesenega držaja šila (iz groba 17/10 – sl. 1, t. 32: 12), več lesenih ostankov iz tulov za sekire (npr. sl. 2) ter ostanek lesa, obdan z bronastim okovom (iz groba 17/5 – sl. 3, t. 21: 1).

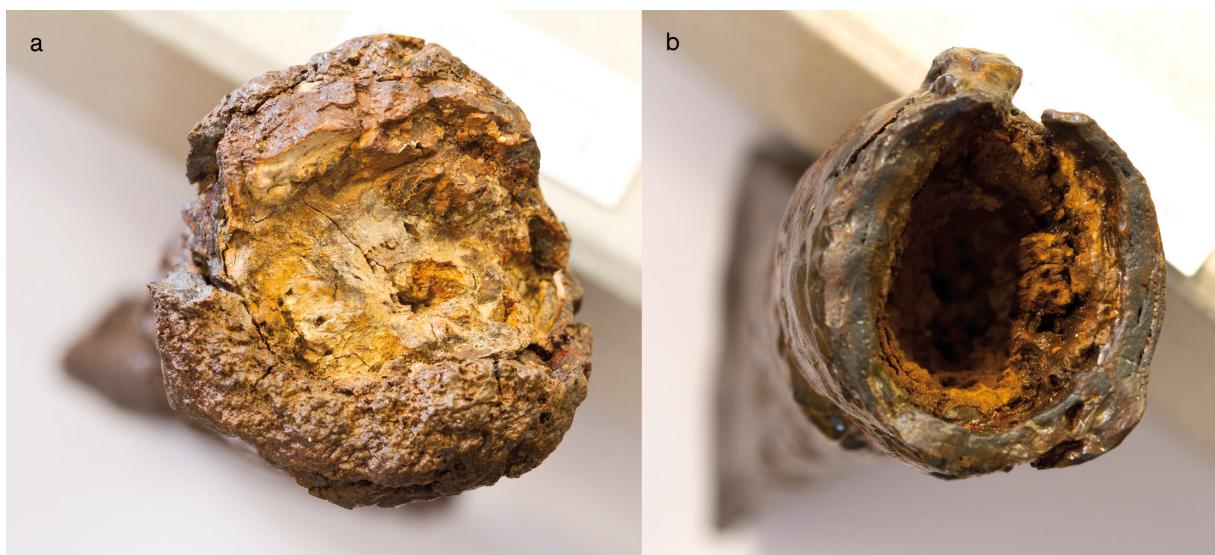
IDENTIFIKACIJE NEZOGLENELIH LESNIH OSTANKOV

Nezogleneli lesni ostanki, vdeti v različne kovinske predmete, pričajo o konkretni uporabi določene lesne vrste za držaje, toporišča, posode ipd. Zaradi prepojnosti vzorcev z neznano, laku podobno substanco nam je uspelo določiti le približno vrsto lesa na zgolj štirih



Sl. 1: a) Ostanek lesenega držaja šila iz groba 17/10 na Grmadi (inv. št. P 1609); b) Nizki 1- do 2-redni in izredno visoki 3- do 4-redni heterogeni trakovi v tangencialnem prerezu. Foto: a) D. Valoh; b) M. Merela.

Fig. 1: a) The wooden handle of the awl from Grave 17/10 at Grmada (Inv. No. P 1609); b) Low 1- to 2-cells wide rays and extremely high 3- to 4-cells wide heterocellular rays in tangential cut. Photo: a) D. Valoh; b) M. Merela.



Sl. 2: Lesni ostanki v tulih sekir iz grobov 17/2 (a) in 17/8 (b) na Grmadi (inv. št. P 1523 in P 1589). Neidentificirano. Foto: D. Valoh.

Fig. 2: Wooden remains in the socketed axes from Graves 17/2 (a) and 17/8 (b) at Grmada (Inv. Nos. P 1523 and P 1589). Unidentified. Photo: D. Valoh.

vzorcih, treh iz tulov dveh železnih sekir, najdenih v gomilah 13 in 16 na Grmadi (eden inv. št. P 1638 in dva inv. št. P 1428; t. 16: 4, 19: 5) in enem iz ostanka držaja šila (inv. št. P1609; sl. 1a). Vzorci iz tulov sekir pripadajo isti drevesni vrsti venčastoporoznega listavca, najverjetneje hrastu (*Quercus* sp.) ali jesenu (*Fraxinus* sp.). Iz vzorca držaja šila smo zaradi makroskopske nerazpoznavnosti izdelali lesno-anatomske preparate.¹ Na svetlobnem mikroskopu opravljena analiza je po-

kazala, da gre za difuzno, morda polvenčasto porozen les listavca z enostavnimi perforacijami in značilnimi helikalnimi odebilitvami na stenah trahej. Razpoznavni so tudi nizki eno- do dvoredni in izredno visoki tri- do štiriredni heterogeni trakovi (sl. 1b). Najverjetnejše gre za eno od grmovnih vrst, saj opisani znaki ne ustrezano nobeni domači komercialni lesni vrsti. Držaj šila niti ni bil posebno debel, tako je prav mogoče, da je bilo uporabljenjo tanjše deblo grmovne vrste.²

¹ Lesno-anatomske preparate so izdelali na Oddelku za lesarstvo, Biotehniška fakulteta, Univerza v Ljubljani.

² Anatomski opis vrste: doc. dr. Maks Merela, Univerza v Ljubljani, Biotehniška fakulteta, Oddelek za lesarstvo.

Ostali leseni ostanki v železnih predmetih zaradi prepojenosti z neznanim utrjevalcem oz. stabilizatorjem niso dopuščali priprave lesno-anatomskih preparatov za analizo drevesne vrste. Ostanki toporišč v tulih sekir iz grobov 17/2 in 17/8 (sl. 2, t. 22: 5, 30: 3) in ostanek lesa z bronastim okovom (verjetno posode) iz groba 17/5 (sl. 3, t. 21B: 1) so tako ostali neidentificirani.

IDENTIFIKACIJE OGLJA IN NEZOGLENELEGA PREPERELEGA LESA

Ostanki oglja in prepereloga lesa iz 14 grobov na Rojah, Grmadi in v Pleški hosti so med arheobotaničnimi ostanki najštevilnejši. Gre za les, ki so ga uporabili za sežiganje na grmadah (Roje, gr. I/1978, 5 in 6; Grmada, gr. 13/4, 13/7, 17/1, 17/3, 17/6, 17/10; Pleška hosta, gr. 1/6 in 1/11), ali za ostanke krst v skeletnih grobovih (Grmada, gr. 13/2 in 17/9; Pleška hosta, gr. 1/4). Enainsedemdeset naključno odbranih podvzorcev oglja pripada vsaj desetim različnim lesnim vrstam (glej tab. 1). Med najpogostejšimi identifikacijami je javor (*Acer sp.*), sledijo difuzno porozne vrste listavcev z agriranimi trakovi – sem sodijo jelša (*Alnus sp.*), leska (*Corylus avellana*) ali gaber (*Carpinus betulus*) –, nato pa difuzno porozni listavci z enorednimi trakovi, kamor sodita vrba (*Salix sp.*) ali topol (*Populus sp.*). Nekaterih vzorcev ni bilo mogoče natančneje identificirati, npr. difuzno porozni listavec, kamor sodi večina domačih listavcev razen hrasta, jesena, kostanja, bresta, oreha in češnje. Prevladujejo listavci, le v 7 % so bili identificirani iglavci (tab. 1).

IDENTIFIKACIJE SEMEN/PLODOV/ŽITNIH PLEV

Ostali rastlinski makroostanki (torej nelesni) so skromno zastopani. Vzorec iz groba 17/6 na Grmadi je vseboval 21 zoglenelih zrn ovsja (*Avena sp.*) in en ostanek rahisa z ostankoma ogrinjalnih plev dvozrne pšenice (*Triticum dicoccum*), ki dokazujejo poljedelske dejavnosti tedanjih naseljencev. Omembe vredne so še spore gliv iz več vzorcev z Grmade in iz Pleške hoste (iz grobov 1/2, 1/4, 1/6, 1/11, 13/3, 13/4, 16/1, 17/9). Spore gliv so običajen fosilni makroostanek v kulturnih plasteh. Njihovo prisotnost razlagajo z uporabo propadajočega lesa (napadenega z raznovrstnimi glivami) za kurjavo ali ognjišče v naselbini (npr. Moskal-del Hoyo et al. 2010).



Sl. 3: Ostanek lesene posode z bronastim okovom iz groba 17/5 na Grmadi (inv. št. P 1546). Neidentificirano.

Fig. 3: Remain of a wooden vessel with bronze attachment from Grave 17/5 at Grmada (Inv. No. P 1546). Unidentified. Foto / Photo: D. Valoh.

ZAKLJUČEK

Kljub starim organskim najdbam, ki izvirajo iz grobov iz prvega tisočletja pr. n. št. in so bile več desetletij hranjene v zanje neugodnem, sušnem in zračnem okolju muzejskega depoja ter nekatere prepjene z neznano substanco, je bilo mogoče identificirati vsaj del teh, predvsem zoglenelih najdb, ki niso tako zelo občutljive za izsušitev (Tolar et al. 2010). Analiza oglja in lesa je pokazala, da so prazgodovinski prebivalci Molnika uporabljali les iz lokalnega naravnega okolja, pri čemer so za grmade, na katerih so sežigali pokojnike, koristili predvsem razne vrste listavcev. Za lesene izdelke (npr. držaje šil, sekir) so raje izbirali odpornejše in trdnejše vrste, kot sta hrast in jasen (npr. Čufar 2006). Iz hrasta, jasena ali javorja so bile tudi domnevne krste, katerih ostanki so se ohranili v skeletnih grobovih. Analiza skromnih ostankov semen/plodov iz groba 17/6 na Grmadi pa je pokazala, da so gojili vsaj dve kulturni rastlini: oves in dvozrno pšenico.

Ostanki lesa / Wooden remains							
Grobovi / Graves							
Roje, gr. I/1978	5	javor / maple <i>Acer</i> sp.	hrast / oak <i>Quercus</i> sp.	hrast/jesen / oak/ash <i>Quercus</i> sp./ <i>Fraxinus</i> sp.	difuzno por. listavec z agregiranimi trakovi (jelska, leska, gaber) / diffuse porous deciduous tree with agg. rays (alder, hazel, hornbeam) <i>Alnus</i> / <i>Corylus</i> / <i>Carpinus</i>	difuzno por. listavec z 1-rednimi trakovi (topol, vrbba) / diff. por. decid. tree with uniseriate rays (poplar, willow) <i>Populus</i> / <i>Salix</i>	difuzno por. listavec z 1- do 2-rednimi trakovi (npr. rožnice) / diff. por. decid. tree with uni-/biserrate rays (e.g. Rose fam.) cf. <i>Rosaceae</i>
Roje, gr. 5				1			
Roje, gr. 6				1			
Grmada, gr. 13/4					3		
Grmada, gr. 13/2			1				
Grmada, gr. 13/7	3			1			2
Grmada, gr. 17/1	2			1		1	3
Grmada, gr. 17/3	1			1		1	
Grmada, gr. 17/6	13			3	2	1	
Grmada, gr. 17/9		3					3
Grmada, gr. 17/10							
Pleška hosta, gr. 1/4	3						
Pleška hosta, gr. 1/6	4					2	
Pleška hosta, gr. 1/11			2			1	

Tab. 1: Identifikacije oglja in preperelega lesa iz 14 grobov.

Tab. 1: Identification of charcoal and uncarbonised decayed wood samples from 14 graves.

- CAPPERS, R. T. J., R. M. BEKKER, J. E. A. JANS 2006, *Digitale Zadenatlas van Nederland*. – Groningen.
 ČUFAR, K. 2006, *Anatomija lesa*. – Ljubljana.
 JACOMET, S. 2006, *Identification of cereal remains from archaeological sites, 2nd edition*. – Basel.
 MOSKAL-DEL HOYO, M., M. WACHOWIAK, R. A. BLANCHETTE 2010, Preservation of fungi in archaeological charcoal. – *Journal of Archaeological Science* 37, 2106–2116.

- SCHWEINGRUBER, F. H. 1990, *Mikroskopische Holzanalytik*. – Birmensdorf.
 TOLAR, T., S. JACOMET, A. VELUŠČEK, K. ČUFAR 2010, Recovery techniques for waterlogged archaeological sediments: a comparison of different treatment methods for samples from Neolithic lake shore settlements. – *Vegetation History and Archaeobotany* 19, 53–67.
 TORELLI, N. 1991, *Makroskopska in mikroskopska identifikacija lesa (ključi)*. – Ljubljana.

BOTANICAL MACROREMAINS FROM THE CEMETERIES AT MOLNIK

INTRODUCTION

In 2016, the samples of plant macroremains (i.e. wood, charcoal, textile and few seeds/fruits) from the cemeteries at Molnik were handed over to the Institute of Archaeology ZRC SAZU for examination. Most of the organic remains were carbonised. Some uncarbonised wooden remains were coated with an unknown substance, similar to lacquer, which made the organic artefact more durable, but on the other hand made it impossible to identify the plant species (also see here Grömer, Tolar, Kostajnšek, Textile and fur remains).

METHODS

All the organic samples were precisely examined under a Leica stereomicroscope with up to 50-magnification and, if possible, identified. When a sample contained lots of charcoal fragments, it was subsampled. 3 to 4 randomly selected fragments of charcoal were analysed from each sample (see *Tab. 1*). The reference collection of charcoal, seeds and fruits held at the Institute of Archaeology ZRC SAZU and special literature (e.g. Torelli 1991; Schweingruber 1990; Jacomet 2006; Cappers et al. 2006 etc.) were used for plant identification.

RESULTS

56 archaeobotanical samples were analysed: 9 from the flat cemetery at Roje, 1 from the graves unearthed at Kotarjev peskokop, 35 from the tumulus cemetery at Grmada and 11 from a tumulus at Pleška hosta. Charcoal fragments prevail, i.e. charcoal from pyres that was scattered in graves (Roje, Gr. 6; Pleška hosta, Gr. 1/6, 1/11; Grmada, Gr. 13/7, 17/1, 17/3, 17/10) or that was deposited with cremated bones in urns (Roje, Gr. I/1978 and Gr. 5; Grmada, Gr. 13/3, 13/4, 17/6). In addition to charcoal, some uncarbonised wooden remains also survived. These are decayed wooden remains (probably from coffins) from inhumation graves

(Kotarjev peskokop, Gr. 1; Pleška hosta, Gr. 1/4; Grmada, Gr. 13/2, 13/9, 13/13, 16/1, 17/2, 17/5, 17/8, 17/9), and also wooden artefacts placed in graves, e.g. the wooden handle of an awl (from Grave 17/10 – *Fig. 1, Pl. 32: 12*), wooden remains in socketed axes (see *Fig. 2*) and a piece of wood with a bronze attachment (from Grave 17/5 – *Fig. 3, Pl. 21: 1*). Mineralized organic remains of textile from a rusty fibula (from Grave 1/6 – *Fig. 72; Pl. 40: 1*) is presented in a separate chapter (see here Grömer, Tolar, Kostajnšek).

IDENTIFICATION OF WOODEN ARTEFACTS

Uncarbonised wooden remains attached to the metal artefacts provide information about the concrete use of certain species of wood for specific purposes (e.g. for handles, vessels etc.). Some of the wooden finds were coated with an unknown substance (similar to lacquer), so only the approximate plant species could be determined for four samples of wood, three from the sockets of iron axes found in Tumuli 13 and 16 at Grmada (one of the axe with the Inv. No. P 1638; two from axe with the Inv. No. P 1428; *Pls. 16: 4, 19: 5*) and one from the wooden handle of the awl from Grave 17/10 at Grmada (Inv. No. P 1609). All three samples from the sockets of iron axes were identified as the same species of a ring-porous deciduous tree, probably oak (*Quercus* sp.) or ash (*Fraxinus*). Due to impossible macroscopic identification of the sample from the handle of the awl, wooden-anatomical slices were made.¹ Analyses under the microscope showed characteristics of diffuse porous, possibly half-ring porous deciduous wood species with simple perforation plates and significant helical thickenings in the walls of the vessel elements. Low 1- to 2-cells wide rays and extremely high 3- to 4-cells wide heterocellular rays were recognised (*Fig. 1b*). Most probably we are dealing with one of the shrub species, while the described characteristics do not suit any of the domestic

¹ Wooden-anatomical slices were made at the University of Ljubljana, Biotechnical faculty, Department of Wood Science and Technology.

commercial wooden species. The handle of the awl was not particularly thick, so it was very possibly made of a thin trunk of a shrub species.²

Other wooden remains attached to metal artefacts could not be identified due to the conservation treatment with an unknown consolidant. Remains in the socketed axes from Graves 17/2 and 17/8 (*Fig. 2, Pls. 22: 5, 30: 3*) and the piece of wood with a bronze attachment, likely part of a wooden vessel from Grave 17/5 (*Fig. 3, Pl. 21B: 1*), remain unidentified for the same reason.

IDENTIFICATION OF CHARCOAL AND UNCARBONISED DECAYED WOOD

The charcoal remains and fragments of uncarbonised decayed wood from 14 graves at Roje, Grmada and Pleška hosta are the most frequent archaeobotanical remains at the Molnik site. It is the wood that was used for pyres (Roje, Gr. I/1978, 5 and 6; Grmada, Gr. 13/4, 13/7, 17/1, 17/3, 17/6, 17/10; Pleška hosta, Gr. 1/6, 1/11), or for coffins in inhumation graves (Grmada, Gr. 13/2, 17/9; Pleška hosta, Gr. 1/4). 71 randomly sampled fragments of charcoal can be ascertained as at least ten different wood species (see *Tab. 1*). The most frequently identified species are maple (*Acer sp.*), followed by diffuse porous deciduous tree species with aggregate rays (alder (*Alnus sp.*), hazel (*Corylus avellana*) or hornbeam (*Carpinus betulus*)), and diffuse porous deciduous tree species with uniserrate rays (i.e. willow (*Salix sp.*) or poplar (*Populus sp.*)). Some of the samples could not be identified more specifically e.g. a diffuse porous deciduous tree (i.e. most of the European deciduous trees except oak, ash, chestnut, elm, walnut and cherry). Deciduous tree species prevail and only 7% of the identified samples are of coniferous tree species (*Tab. 1*).

IDENTIFICATION OF SEEDS/FRUITS/CHAFF FRAGMENTS

Other plant macroremains (i.e. non wooden) are less frequent. The sample from Grave 17/6 at Grmada contained 21 carbonised grains of oat (*Avena sp.*) and a single carbonised spikelet fork of emmer (*Triticum dicoccum*), which confirm the agricultural activities of the prehistoric inhabitants. It is also worth mentioning the numerous fungi spores in the samples from Grmada and Pleška hosta (from Graves 1/2, 1/4, 1/6, 1/11, 13/3, 13/4, 16/1, 17/9). Fungi spores are often found at archaeological sites and indicate decayed wood that was attacked by fungi and was probably brought to the settlement for making fire (e.g. Moskal-del Hoyo et al. 2010).

CONCLUSION

It was possible to identify at least some of the organic finds from the archaeological contexts from the first millennium BC that were deposited in the museum in unfavourable conditions (i.e. air dried, some soaked in a lacquer-like substance) for many decades. Carbonised remains that are less sensitive to drying prevailed (Tolar et al. 2010). Charcoal and wood analyses show that the prehistoric inhabitants at Molnik used locally available wood. For pyres, where the bodies of the deceased were burnt, different deciduous tree species were used. While for wooden products, i.e. handles, more durable, hard wood was selected, i.e. oak and ash (e.g. Čufar 2006). Oak, ash or maple was also used for making coffins, remains of which were found in inhumation graves. Modest remains of seeds/fruits from Grave 17/6 at Grmada indicate cultivation of at least oat and emmer.

² Anatomical description of the species: doc. dr. Maks Merela, University of Ljubljana, Biotechnical faculty, Department of Wood Science and Technology.

SEZNAM AVTORJEV

LIST OF CONTRIBUTORS

Karina Grömer
Naturhistorisches Museum Wien
Prähistorischen Abteilung
Burgring 7
1010 Wien
karina.groemer@nhm-wien.ac.at

Sneža Tecco Hvala
Znanstvenoraziskovalni center SAZU
Inštitut za arheologijo
Novi trg 2
SI-1000 Ljubljana
tecco@zrc-sazu.si

Klara Kostajnšek
Univerza v Ljubljani
Naravoslovno-tehniška fakulteta
Katedra za tekstilno in oblačilno inženirstvo
Snežniška ulica 5
SI-1000 Ljubljana
klara.kostajnsek@ntf.uni-lj.si

Tjaša Tolar
Znanstvenoraziskovalni center SAZU
Inštitut za arheologijo, Arheobotanika
Novi trg 2
SI-1000 Ljubljana
tjasa.tolar@zrc-sazu.si

Adrijan Košir
Znanstvenoraziskovalni center SAZU
Paleontološki inštitut Ivana Rakovca
Novi trg 2
SI-1000 Ljubljana
adrijan@zrc-sazu.si

Tatjana Tomazo-Ravnik
Stara cesta 21
SI-4000 Kranj
tatjana.ravnik@gmail.com

Brina Škvor Jernejčič
Univerza v Ljubljani
Filozofska fakulteta
Oddelek za arheologijo
Aškerčeva 2
SI-1000 Ljubljana
skvorjb@ff.uni-lj.si

Borut Toškan
Znanstvenoraziskovalni center SAZU
Inštitut za arheologijo, Arheozoologija
Novi trg 2
SI-1000 Ljubljana
borut.toskan@zrc-sazu.si