

ANNALES ZBORNÍK  
MUSEI SLOVENSKÉHO  
NATIONALIS NÁRODNÉHO  
SLOVACI MÚZEA

ARCHEOLÓGIA 28  
ROČNÍK CXII- 2018

Bratislava 2018

ANNALES MUSEI NATIONALIS SLOVACI  
ZBORNÍK SLOVENSKÉHO NÁRODNÉHO MÚZEA

CXII– 2018  
ARCHEOLÓGIA 28

Predseda redakčnej rady/Head of editorial board  
PhDr. Juraj Bartík, PhD., Bratislava

Redakčná rada/Editorial Board  
Doc. PhDr. Gertrúda Březinová, CSc., Nitra  
Mgr. Radoslav Čambal, PhD., Bratislava  
PhDr. Beáta Egyházy-Jurovská, Bratislava  
PhDr. Zdeněk Farkaš, PhD., Bratislava  
Doc. PhDr. Matej Ruttkay, CSc., Nitra  
Prof. PhDr. Stanislav Stuchlík, CSc., Opava  
Dr. Eric Vrba, Boston

Zostavovateľ/Edited by  
PhDr. Vladimír Turčan

Preklad do nemeckého a anglického jazyka/translation into English and German languages:  
REELS, s. r. o., Stephanie Staffen a autori

Publikácia je recenzovaná/publication is reviewed

Grafická úprava /Graphic design  
Erika Mészárosová

Publikované príspevky sú dostupné na [www. archeologickemuzeum.sk](http://www.archeologickemuzeum.sk)  
Za jazykovú úpravu príspevkov zodpovedajú autori/the Authors are responsible for their contributions

Tlač/Print:  
Ultra Print, s.r.o. Bratislava

Vydalo/Published by: Slovenské národné múzeum-Archeologické múzeum, Bratislava 2018

Náklad/Numbers of the copies: 350 kusov

© Slovenské národné múzeum-Archeologické múzeum/Slovak National Museum-Archaeological Museum 2018

ISBN 978–80–8060–449–3  
ISSN 1336-6637



## OBSAH – INHALT

- 7 ZDENĚK FARKAŠ: Nález eneolitické medenej industrie zo západnej časti Bratislavy  
16 Funde der äneolithischen Kupferindustrie im Westteil von Bratislava
- 21 JURAJ BARTÍK: Pohrebisko zo staršej doby bronzovej v Šoporňi  
41 Gräberfeld aus der älteren Bronzezeit in Šoporňa
- 47 ALENA ŠEFČÁKOVÁ – MILAN THURZO – RON PINHASI – DAVID REICH: Anthropological and Genomic Analysis of the Burial Site of Únětice Culture at Šoporňa (Galanta district, Slovakia)  
71 Antropologická a genómová analýza pohrebiska únětickej kultúry zo Šoporne (okr. Galanta, Slovenská republika)
- 75 PETER BARTA: Radiocarbon Dating of Graves 1/08 and 5/09 from the Únětice Culture Cemetery in Šoporňa (Dist. Galanta, Slovak Republic)  
81 Rádiouhlíkové datovanie hrobov 1/08 a 5/09 z pohrebiska únětickej kultúry v Šoporňi (okres Galanta, Slovenská republika)
- 83 PAVOL JELÍNEK – JURAJ BARTÍK: Bronzová dýka zo Záhorskej Vsi  
88 Bronzedolch aus Záhorská Ves
- 89 DAVID VÍCH: Ojedinelé nálezy doby bronzové z periferních oblastí východných Čech  
94 Einzelfunde der Bronzezeit aus Peripheren Gebieten Ostböhmens
- 97 ONDREJ OŽDÁNI: Depot bronzových predmetov z Nitrianskej Blatnice  
112 Hort von Bronzegegenständen aus Nitrianska Blatnica
- 115 JURAJ BARTÍK – RADOSLAV ČAMBAL: Pár výzdobných puncov z Pohanskej pri Plaveckom Podhradí  
123 Musterpunzenpaar aus Pohanská bei Plavecké Podhradie
- 127 RADOSLAV ČAMBAL: Iron Sword and Bimetallic Gamów type Dagger from Dolné Vestenice  
137 Železný meč a bimetalická dýka typu Gamów z Dolných Vestenic
- 141 EVA KOLNÍKOVÁ – FRANTIŠEK BAKOS – PETER PAUDITŠ: Zdroje kovu v keltských mincovniach na Slovensku  
175 Metallquellen in keltischen Münzstätten in der Slowakei
- 197 IGOR BAZOVSKÝ: Antropomorfná plastika z Tvrdošoviec (okr. Nové Zámky)  
200 Anthropomorphe Plastik aus Tvrdošovce (bez. Nové Zámky)
- 201 KRISTIAN ELSCHKEK: Römische Bauten und das Germanische Fürstenmilieu während der römischen Kaiserzeit im 1. - 3. Jahrhundert nach Chr. nördlich der Mittleren Donau  
219 Rímske stavby a germánske kniežacie prostredie počas doby rímskej v 1. - 3. storočí po Kr. severne od stredného Dunaja
- 221 ROBERT MŮC: Príspevok k technológii výroby meča z Krásnej nad Hornádom  
233 Article on the Production Technology of the Sword from Krásna nad Hornádom

- 235 ANDREJ BOTEK – RÓBERT ERDÉLYI – PAVOL PAULINY – BARBORA VACHOVÁ: Poznámky k záverom archeologického výskumu kostola reformovanej cirkvi v Šamoríne
- 241 Bemerkungen zu den Schlussfolgerungen der Archäologischen Grabung der Reformierten Kirche in Šamorín
- 243 MÁRIO BIELICH – ZORA BIELICHOVÁ – MICHAL ŠIMKOVIC : Prvá sezóna archeologického výskumu na Plaveckom hrade v Malých Karpatoch
- 255 Die erste Saison der archäologischen Grabung auf der Burg Plavecký hrad in den Kleinen Karpaten
- 257 ZDENĚK FARKAŠ – IGOR CHOMA: Vyobrazenie „pudendum femininum“ v štítovom poli na keramike z hradu Čeklís
- 264 Abbildung „Pupendum Femininum“ im Schildfeld an der Keramik aus der Burg Čeklís
- 267 MAREK BUDAJ: Razidlá a zvyšky falzátorskej dielne z 15. storočia v Brusníku
- 272 Prägestempel und Reste einer Fälscherwerkstatt vom 15. Jahrhundert in Brusník
- KOLOKVIUM
- 275 VLADIMÍR TURČAN: Sedemnásťte kolokvium k otázkam rímsko-germánskej archeológie
- 277 Siebzehntes Kolloquium zu den Fragen der Römisch-Germanischen Archäologie
- 279 TOMÁŠ DRAGUN: Vleštovaná keramika z neskoroantickéj pevnosti v Bratislave-Rusovciach
- 284 Burnished Ceramics from the Late Antique Fortlet in Bratislava-Rusovce
- 287 VLADIMÍR TURČAN: Germánsky sídliskový objekt z Dunajskej Lužnej
- 299 Germanisches Siedlungsobjekt aus Dunajská Lužná
- RECENZIA
- 301 Vladimír Turčan: Kristián Elschek: Bratislava-Dúbravka im 1. bis 4. Jahrhundert n. Chr. Germanische Fürstensitz mit römischen Bauten und die germanische Besiedlung
- 303 Skratky časopisov a periodík – Abkürzungen von Zeitschriften und Periodika

# ANTHROPOLOGICAL AND GENOMIC ANALYSIS OF THE BURIAL SITE OF ÚNĚTICE CULTURE AT ŠOPORŇA (GALANTA DISTRICT, SLOVAKIA)

ALENA ŠEFČÁKOVÁ – MILAN THURZO – RON PINHASI – DAVID REICH

**Key words:** Early Bronze Age, Únětice Culture, burial ground, skeletal remains, paleodemography, anthropometric data, mitochondrial haplogroups, DNA, Central Europe

**Abstract:** *Anthropological and genomic analysis of the Únětice culture burial site at Šoporňa (district Galanta, Slovak Republic).* Altogether, four juvenile and ten adult individuals were examined in the total of 14 grave sets. DNA analysis clearly determined the sex of 10 persons. Of the 14 individuals, six are (42.85%) females, six (42.85%) males and two (14.29%) unidentified adults. All juveniles died at the age of infans II/juvenis, younger children were absent. Most individuals (six, 42.85%) belong to the older adult category with dominant part of females. On the other hand, there were no females in the category of younger adults.

Incomplete craniometric data was obtained only from five individuals, most of which provided the older male from the grave 5/09. His skull is basically long and moderately broad, dolichocranic and metriometopic. The body height could have been estimated in four individuals who proved to be taller. The data do not vary with the variability of other similarly dated series. At least half of the individuals have features characteristic of “food stress” such as cribra orbitalia, enamel dysplasia and parodontitis. The enamel of the front upper incisor tooth in one elderly male was abraded in a wavy shape and an enamel pearl was found on the left upper <sup>3</sup>M.

Spondylarthrosis was found in two individuals, of which one showed signs of other arthrotic changes. Two boys have a distinctive muscle attachment relief which probably developed due to considerable physical strain. In two individuals, a distinct crista musculi supinatorius is visible on the ulna, which could have been caused by intense rotational movements of the forearm.

Three males show traces of injuries on their skulls, in one case accompanied by shattering of the humeral diaphysis, while in other one the femur was shattered.

According to the archaeological analysis and radiocarbon dating, the population of Šoporňa lived in the Early Bronze Age. Genetic analysis has revealed six types of mitochondrial haplogroups actually belonging to the two basic cladogenetic groups. One group includes N1a and I (i.e., N1a1b2) and the second one includes T group. Haplogroup I was one of the significant components both in the late Neolithic period and the Early Bronze Age, while haplogroup T2 can also be found in the Únětice culture populations. Interestingly enough, the first degree family relationship (parent/offspring/siblings) was discovered between an older male buried in the grave 5 and an older female buried in grave 13.

Anthropological analysis was performed on the human skeletal remains from the section of a burial site dating back to the Early Bronze Age – Únětice Culture at Šoporňa, “Prvé Dlhé” location<sup>1</sup> (Galanta region, 48.223 N, 17.836 E, map, see Bartík 2018) in southern Slovakia. However, it could not be excluded that it was an entire small cemetery.

Besides other cemeteries, samples were taken also at this burial site in 2016 as part of the ERC international genetic research project (European Research Council) “From the Earliest Modern People to the Onset of Farming (45,000 – 4,500 BP)” and the results of DNA analysis successfully contributed to the basic morphological and metric findings. The radiocarbon dating was also realized.

Skeleton finds are deposited in the Anthropological Department of the Slovak National Museum–Museum of Natural History (SNM PM) in Bratislava (16/2011, reg. no. A9221–A9233).

## Methodology

### DNA analyses and <sup>14</sup>C AMS dating

Samples for analysis were taken at the anthropological depository of SNM PM in Bratislava, as recommended by Pinhasi et al. (2015), from the petrous parts (*pars petrosa s. pyramis*) of the temporal bone (*os temporale*). Where the mentioned parts were not preserved, molars were used instead.

<sup>1</sup> An archaeological exploration of the burial site was completed by Juraj Bartík (Slovak National Museum– Archaeological Museum Bratislava).

Samples were prepared and processed first at the ancient DNA Laboratory, University College Dublin and then further processed at the Harvard Medical School in Boston using current methods for the analysis of genome-wide data (Mathieson et al. 2018).

Y-chromosome was used to determine sex, among others, and mitochondrial haplogroups were used for closer determination of individuals in this population.

A sample for <sup>14</sup>C AMS dating was taken from the right petrous bone of the subject 5/09 (male died at the age of maurus II) and the dating took place at the Penn State Radiocarbon <sup>14</sup>C laboratory (Penn State University, Pennsylvania).

#### Morphological and metric analyses

The sex and age of adults were evaluated by standard anthropological methods, mostly that of Acsádi and Nemeskéri (1970) taking into account the recommendations of other authors (Ferembach et al. 1979; Szilvassy 1988; Sjøvold 1988; Brůžek et al. 2002).

The following categorizations were used for the age estimation in adults: 1) classical distribution of individuals by age: adultus I (20–29 years), adultus II (30–39 years), maurus I (40–49 years), maurus II (50–59 years) and senilis (60+ years); 2) reduced categories: younger adults (20–29 years), older adults (30–59 years) and senilis (60+ years).

In the juvenile individuals, we used the following age categories: circumnatale (0–0.5 years), infans I (0.5–6 years), infans II (7–14 years), and juvenis (15–19 years). The age of newborns was estimated mainly by the size of bones (Fazekas/Kósa 1978), in older children the age was estimated by the ossification of fontanelles and sutures of their skulls (Szilvassy 1988), by the degree of tooth formation and their eruption (Ubelaker 1989; Buikstra/Ubelaker 1994), by the fusion of vertebral bodies and epiphyseal fusion of long bones (Szilvassy 1988), and also by the lengths of long bone diaphysis (Stloukal/Hanáková 1978). The heights of adults were calculated according to the recommendations of Martin and Saller (1957), Bach (1965), Olivier et al. (1978), Rösing (1988), and Sjøvold (1990).

In order to determine the craniometric characteristics of skulls, we mostly used the measurement categories compiled from the database (Aleksjev/Debec 1964), consisting of the craniometric data of 88 ethnic groups from all over the world.

Craniometric data was also compared with data in individuals from other Early Bronze Age sites. Their measurements were taken from the anthropological databases at the Université de Geneve and Johannes Gutenberg-Universität Mainz<sup>2</sup>, from Blatné site (Bartík/Šefčáková 2004), and Zohor (Šefčáková 2014). The reference set was created from 50 adult individuals coming from eight sites in the Czech and Slovak Republics. Of those, 24 individuals (Bučovice, Holešov, Prušánky, Rebešovice) were attributed to the Únětice culture and 26 (Holešov, Výčapy-Opatovce, Blatné and Zohor) to the Nitra culture. 19 skeletons in the reference set were male and 31 were female.

## Results

#### Absolute dating of the burial site

A sample for dating was taken from *pars petrosa s. pyramis* from the skull of the 5/09 individual (male, maurus II age). The result of 3600 ± 20 BP (PSUAMS-4007) corresponds to the 2022–1897 calBCE calibration. This data is consistent with the Early Bronze Age. Chronometric analysis of graves 1/08 and 5/09 was discussed in detail by P. Barta (Barta 2018).

#### Catalog of human skeletal remains at the burial site of the Early Bronze Age – Únětice Culture from Šoporňa (Galanta district)

(Archaeological information and drawings are reported by Bartík 2018).

#### **Grave 1/08**

Preservation: Damaged fragmentary skeleton.

Morphological characteristics: Fragmentary medium-robust *cranium* with mean muscular relief (MR). Norma frontalis: oval shaped *margo supraorbitalis*, norma verticalis: medium *tubera parietalia*, norma occipitalis: small *processus mastoidei*.

Of the mandible, only medium sized *processus articularis mandibulae sin.* preserved, as well as the lower right canine (43) with damaged surface and root cavity. The entire enamel on the biting surface abraded (abrasion degree 3).

Damaged (fragmentary) upper and lower extremities. Medium curved fragment of the left gracile clavicle with moderate MR. The shoulder blades absent. Fragments of the diaphyses of both humeri– one fragment of metacarpals and one of phalanges.

<sup>2</sup> We would like to thank to Viktor Černý from AÚ AV ČR Praha for enabling access to the international database of burial sites from the Eneolithic Age and from the Early Bronze Age.

Measurements/ Indexes	Graves	4/09	Char.	5/09	Char.	8/09	Char.	9/09	Char.	13/09	Char.
	Sex	Male		Male		Female		Female		Female	
	Age	15 - 25		50 - 59		35 - 45		35 - 45		55 - 65	
M 1.	g-op			187	large					199	very large
M 1c.	m-op			185						193	
M 1d.	n-op			183						199	
M 3.	g-l			174						195	
M 8.	eu-eu			140	medium						
M 9.	ft-ft			96	medium	93	medium				
M 10.	co-co			122	large	122	very large				
M 11.	au-au			115	very small						
M 12.	ast-ast			109	medium						
M 13.	ms-ms			96							
M 23.	g-op-g			499	small						
M 24.	po-b-po			322	large						
M 25.	n.o			370	medium						
M 26.	n.b			124	small	129	large			123	medium
M 27.	b.l	123	medium	119	small	115	small			129	large
M 28.	l.o			127	very large						
M 29.	n-b			105	small	107	medium			109	medium
M 30.	b-l	109	small	112	medium	108	medium			116	large
M 31.	l-o			102	large						
M 43.	fmt-fmt			102							
M 45.	zy-zy			122	very small						
M 65.	kdl-kdl			126	large			111	medium		
M 66.	go-go			107	large			88	small		
M 67.	bim.šir.			48				41			
M 69.	id-gn					35	very large				
M 70.	r.m. height			70	very large	57	medium	51	small		
M 71.	r.m. breadth			26		30		25		27	
M 79.	ram.m. angle			120	medium			137	very large		
M 80a.	mand.dent.arch l.			48							
M 80(1).	mand.dent.arch b.			70							
M 80(3).	max.mol.l.			33		34					
N	dent.length			33							
I 1	8 : 1			74.8	dolichocran.						
I 11	11 : 24			35.70							
I 12	9 : 10			78.60	small	76.2	very small				
I 13	9 : 8			68.50	metriometop.						
I 14	12 : 8			77.80	medium						
I 16	27 : 26			95.90	medium	89.1	small			104.8	large
I 17	28 : 26			102.40	very large						
I 18	28 : 27			106.70	large						
I 19	26 : 25			33.50							
I 21	28 : 25			34.30							
I 22	29 : 26			84.60	small	82.9	very small			88.6	large
I 24	30 : 27	88.6	small	94.10	very large	93.9	very large			89.9	medium
I 25	31 : 28			80.30	small						
I 29	31 : 12			93.50							
I 40	66 : 45			87.70	very large						
I 63	71 : 70			37.10		52.6		49.0			
I 64	66 : 65			84.90	medium			79.2	small		
I 67mand	80(1) : 80a			145.83							
I 71	45 : 8			87.10	very large						
I 72	9 : 43			94.10							
I 73a	9 : 45			78.60	very large						

Table 1. Šoporňa cemetery. Cranial measurements (mm) and indexes of adults (according to *Martin/Saller 1957; Bräuer 1988*). Char. – characteristic.

Tab. 1. Šoporňa. Kraniálne miery (mm) a indexy dospelých jedincov (podľa *Martin/Saller 1957; Bräuer 1988*). Char. – charakteristika.



Two small fragments of the pelvis. Moderately damaged robust femora with medium MR, medium, bilaterally marked *linea aspera*. Damaged parts up to fragments of the diaphyses of gracile tibiae. The cross section of the central diaphyseal part defined as shape 5. Detailed identification of the fibula fragment was not possible.

Metrical characteristics (in mm): Table 1.

Varieties and pathological changes: A cavity in the preserved tooth. On the left side of *os parietale*, *os temporale* and *processus articularis mandibulae*, green colouration caused by verdigris.

Conclusion: Older adult (maturus/senilis) of unspecified sex.

Determination by DNA: Male.

Mitochondrial haplogroup: T2.

### **Grave 2/08**

Preservation: Extensive damage of the post-crania.

Morphological characteristics: Small fragments of vertebrae.

Fragments of moderately robust clavicles and scapulae. Heavily damaged robust ulna and radius bones, with fused epiphyses, one damaged *phalanx*.

Of the lower extremities, preserved fragments of the pelvis, damaged left tibia of robust structure with a massive MR, V-shaped middle cross section of diaphysis, a fragment of the diaphysis – probably from the left fibula.

Conclusion: An adult individual which could not be identified in detail.

### **Grave 3/09**

Preservation: Extensive damage of skeleton.

Morphological characteristics: Fragmentary medium robust to robust *cranium* with medium MR. *Os occipitale*, *ossa temporalia* and mandible. Weakly curved, almost flat nuchal lines in *os occipitale*, rather small *processus mastoidei*. The shape of the edge of the left mastoid area margin suggesting that a number of (at least three) suture bones was originally present. Similarly, at least three suture bones were present in *sutura lambdoidea*. Maxilla is missing.

Damaged, moderately robust *mandibula* with a medium MR, protruding chin of a rather narrow parabolic shape in the top view, localisation of a simple *foramen mentale* under  $P_1 - P_2$ . Thorn-like *spina mentalis*, straight left mandibular angle, relatively gross *margo inferior*, almost flat *angulus mandibulae*. Parabolic mandibular dental arch. Erupted right  $M_2$  (47), retained  $M_3$  (48). Abrasion of Grade 1 (worn teeth cusps) on the mandibular teeth. Ante-mortem loss of the first lower right incisor (41), hypoplasia of the enamel in the lower right incisor (43).

Damaged long bones of the upper and lower extremities with infused epiphyses in the tibia and the femur. These free epiphyses not preserved.

Damaged clavicle, moderately robust and moderately curved left clavicle with medium MR, damaged moderately robust diaphyses of both humeri, ulna and radius bones with medium MR.

Pelvis absent. Of the lower extremities, a damaged, moderately robust right femur with medium MR present, with slight *crista hypotrochanterica* and narrow and high *linea aspera*; damaged, moderately robust tibiae with medium MR, infused epiphyses and large retroversion. *Fossa solei* in the proximal part of the tibia, its diaphyseal middle cross section is of shape III. Fragment of the right fibula diaphysis.

Conclusion: Juvenile individual (infans II/juvenis).

Determination by DNA: Female.

Mitochondrial haplogroup: I1a1a.

### **Grave 4/09**

Preservation: Damaged skeleton of an adult individual.

Morphological characteristics: Damaged gracile to medium robust *cranium*. Only the back of the skull and mandible preserved. Norma lateralis: domed occiput, flat *protuberantia occipitalis externa*. Norma verticalis: slight *tubera parietalia*, *foramen parietale* on the left side. Norma occipitalis: damaged surface of the squamous part of the occipital bone, flat to slightly arched nuchal lines. All parts of *sutura lambdoidea* open (stage 0).

Damaged, moderately robust mandible with medium MR, protruding chin in the side view, a wide broad edge of the chin in the bottom view, only mentum visible in the top view. Simple *foramina mentalia* localized under  $P_2$ , *spina mentalis* elevated, everted angles of the mandible, *trigonum mentale* in form of bilateral protuberance, thin *margo inferior* under  $M_2$ , protruding *angulus mandibulae*. Parabolic shape of the mandibular dental arch, abrasion of Grade 1 on mandibular premolars, abrasion of Grade 2 on molars. In the mandible, erupted molars and left  $2P$  (35) on both sides.

Only fragments of the *os sacrum* and medium robust *costae*. Five damaged gracile and small vertebrae (two cervical, one chest and two dorsal ones) without degenerative changes.

Of the clavicles, only one fragment of the middle part of the diaphysis preserved. This was difficult to be identified in closer detail. Fragments of gracile to moderately robust shoulder blades, damaged, moderately robust humeri with weak

Graves	1/09		4/09		5/09		6/09		8/09		9/09		10/09		13/09	
Sex	Male		Male		Male		Female		Female		Female		?		Female	
Age	mat/sen		juv/ad1		mat2		mat		ad2/mat1		ad2/mat1		adult		mat/sen	
Humerus	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L
1.				315					304							
2.				310					302							
5.			22	20	24	24			22	23	23	22				25
6.			18	17	18	18			14	15	15	14				17
7.			61	60	66	66			58	59	59					61
8.									27							
6.:5.			81.8	85.0	75.0	75.0			63.6	65.2	65.2	63.6				68.0
7.:1.				19.0					19.1							
Radius	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L
3.									34	34	30					
4.					16				15	14	15					
5.					12				9	9	10					
5.:4.					75.0				60.0	64.3	66.7					
Ulna	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L
1.						260?										
2.																
3.						36					29	30				
11.						14			11	11	11	11				
12.						18			16	16	14	14				
3.:2.																
11.:12.						77.8			68.8	68.8	78.6	78.6				
Femur	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L
1.										417	422?					
2.										410	419?					
6.	25	25			31	31?	22	22	21	23	27	27			26	27
7.	26	28			27	27	24	25	21	23	24	23			27	25
8.	83	84			93	94	74	75	67	73	78	78			88	87
9.	32				34		28	31	28	27	31	31			32	32
10.	25				28	27	20	21	19	21	22	22			25	25
18.									42	43	42					
19.										42	42?	42?				
20.									34?							
8.:2.										17.8	18.6					
(6.+7.):2.										11.2	12.2					
6.:7.	96.2	89.3			114.8	115	91.7	88.0	100.0	100.0	112.5	117.4			96.3	108.0
10.:9.	78.1				82.4		71.4	67.7	67.9	77.8	71.0	71.0			78.1	78.1
19.:18.										97.7	100.0					
(19.+18.):2.										20.7	20.0					
Tibia	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L
8.					36	36	26	25	27	29		29	30			
8a.					41	40	28	28	29	32		34	31			
9.					22	22	17	18	17	15		19	18			22
9a.					24		18	19	18	19		20	18			
10b.					82	76	64	63	62	64		63	67			
9.:8.					61.1	61.1	65.4	72.0	63.0	51.7		65.5	60.0			
9a.:8a.					58.5		64.3	67.9	62.1	59.4		58.8	58.1			
Fibula	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L
2.							14	12	15							
3.							9	9	9							
4a.									33	33						
3.:2.							64.2	75.0	60.0							

Table 2. Šoporňa cemetery. Post-cranial metrical characteristics and indexes of adults (according to *Martin/Saller 1957; Bräuer 1988*).

Tab. 2. Šoporňa. Postkranialne miery (mm) a indexy dospelých jedincov (podľa *Martin/Saller 1957; Bräuer 1988*).



Fig. 1. *Cribra orbitalia* in the left eye socket, male, maturus II, grave 5/09. Photo by František Engel.

Obr. 1. *Cribra orbitalia* na strope ľavej očnice, muž, maturus II, hrob č. 5/09. Foto: František Engel.

Metrical characteristics (in mm): Tables 1; 2.

Conclusion: Based on the structure, skeletal morphology and the fusion of the long bones epiphyses, this is a young individual of unidentified sex, aged 15–25 years (juvenis/adultus I), ca 164 cm in height (in case of a male, reaching medium height).

Determination by DNA: Male.

Mitochondrial haplogroup: I1a1a.

#### Grave 5/09

Preservation: Damaged skeleton.

Morphological characteristics: Damaged (mostly facial part), partial post-mortem deformation, moderately robust cranium with a massive MR.

Norma frontalis: indicated *tubera frontalia*, protruding *arcus superciliares*, weakly arched *margo supraorbitalis*, closed orbits, shallow *fosae caninae*, obliterated *sutura metopica*. On the left orbital roof, slightly formed *cribra orbitalia* (Fig. 1). Norma lateralis: Grade 5 of glabella, weakly arched *os frontale*, high and thick *processus zygomaticus*, large *processus retromarginalis*, domed occiput, persisting *torus occipitalis*. Norma verticalis: ovoid skull, medium sized *tubera parietalia*, *foramina parietalia* persisting on both sides. Norma occipitalis: high arch with converging walls and a one-arched base, rough surface of nuchal lines and crest, very large *processus mastoidei*, *torus palatinus* absent in norma basalis.

Almost all sutures of *lamina interna* obliterated (Grade 4).

Damaged mandible of medium structure with medium MR, chin with wide edge in the bottom view, strongly protruding in the side view, visible *planum alveolare* and *mentum* in the top view, simple *foramina mentalia* under  $P_2$ , elevated *spina mentalis*, everted mandibular angles. *Trigonum mentale* in the shape of inverted T, thick *margo inferior* under  $M_2$ , large *processus articularis mandibulae*, weakly protruding *angulus mandibulae*.

Parabolic maxillar and mandibular dental arches, labidontia (pincer bite), teeth abraded from grade 2 to 3, tartar present. Post mortem loss of only the right  $I^1$  and ante-mortem loss of left C, the left  $I^1P$  slightly rotated towards the empty place. Crown hypoplasia of the left  $I^1$  and artificial wavy disruption of the enamel at the edge of the occlusal surface area (Fig. 2). Only the roots preserved of the left  $^2M$ , caries present in  $^3M$ .



Fig. 2. Hypoplasia and arteficial wavy enamel disruption in the labial side of the left upper central incisor ( $I^1$ ) occlusal area, the mesio-distal crown diameter is 8.6 mm; male, maturus II, grave 5/09. Photo by František Engel.

Obr. 2. Hypoplázia a arteficiálne vlnkovité narušenie skloviny na labiálnej strane oklúzálnych plochy prvého ľavého horného rezáka ( $I^1$ ), mesio-distálny priemer korunky je 8,6 mm; muž, maturus II, hrob č. 5/09. Foto: František Engel.

Fig. 3. The enamel pearl with a diameter of 1.6 mm on the distal side of the third left upper molar (<sup>3</sup>M) root; male, matusus II, grave 5/09. Photo by František Engel.

Obr. 3. Sklovinová perla s priemerom 1,6 mm na distálnej strane koreňa tretieho ľavého horného molára (<sup>3</sup>M); muž, matusus II, hrob č. 5/09. Foto: František Engel.

Enamel pearl on the distal side of <sup>3</sup>M with diameter of 1.6 mm (Fig. 3). Root cavities in both-sided mandibular teeth M<sub>2</sub> and M<sub>3</sub>. Paradentosis, especially in molars.

Almost the entire damaged post-crania preserved with bone surface abrasion.

Damaged to fragmentary gracile ribs. Damaged gracile and medium sized five cervical vertebrae. Arthrotic changes in *fovea epistrophei* C1 and in *dens epistrophei* C2 (Fig. 4).

Gracile clavicle bones with medium MR, fragmentary right clavicle, the left one damaged. Fragmentary shoulder blades. Damaged, moderately robust humeri with medium MR and fused epiphyses-moderately robust ulnae, fragment of right ulna, and damaged, moderately robust left ulna with fused epiphyses.

Damaged, moderately robust pelvis. Narrower *incisura ischiadica major* (male type), "arc compose" in form of a continuous arch.

Damaged, moderately robust femurs with medium MR, fused epiphyses, *crista hypotrochanterica*, vertical diameter of left *caput femoris* reaching 45 mm (male type). Damaged, medium sized patellae.

Damaged, medium robust to robust tibiae with fused epiphyses, slight retroversion and a V-shaped middle cross-section. Damaged, medium robust fibulae. Medium sized *tarsalia* and *metatarsalia*.

Metrical characteristics (in mm): Tables 1; 2.

Varieties and pathological changes: Wavy labial edge of the first left upper canine (21), caused by hypoplasia, paradentosis of the molars. Enamel pearl on <sup>3</sup>M (28). Bilateral green colour in the area of *processus mastoideus*. Arthrotic changes in *fovea epistrophei* C1 and arthrotic changes in *dens epistrophei* C2.

Conclusion: According to the degree of skull sexualization (D.S. = +1.32), this individual is a male. He was about 168 cm tall (above middle height) and died at the age of 50 to 59 years (matusus II).

Determination by DNA: Male.

Mitochondrial haplogroup: I1a1a, first degree of family relationship, relative of the individual 13/09.

#### Grave 6/09

Preservation: Damaged lower extremities.

Morphological characteristics: Fragments of the gracile pelvis: fragment of the left *os pubis* and *os ilium*. Damaged, gracile femurs with weak to moderate MR, fused epiphyses, *trochanter tertius* absent, narrower and higher medium large *linea aspera*. Grade III of medullary cavity size (extends to the upper edge of *trochanter minor*). Damaged and gracile crus bones with weak to moderate MR. Small retroversion of the tibiae, persisted distal joint facet, middle-diaphyseal cross section of the Type 4. Small *tarsalia* and medium long *metatarsalia*.

Metrical characteristics (in mm): Table 2.

Conclusion: Female aged 40–59 years (matusus).

Appendix: Damaged animal bones – *radius dx.* and *ulna sin.* – *Ovis/Capra*.

#### Grave 7/09

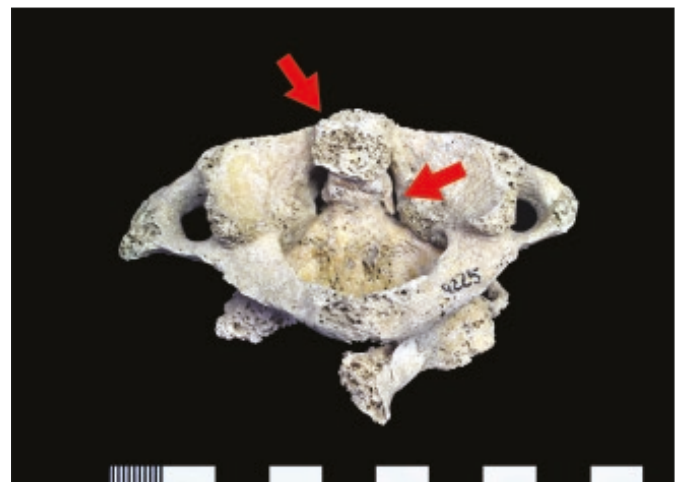
Preservation: Fragments of the skull, damaged and fragmentary post-cranial skeleton.

Morphological characteristics: Damaged right part of the maxilla, *os zygomaticum sin.*, fragment of *os*



Fig. 4. ; Spondylarthrotic changes in *fovea epistrophei* of the C1 and in *dens epistrophei* of the C2 vertebrae; partially view of the superior and posterior side; male, matusus II, grave 5/09. Photo by František Engel.

Obr. 4. Spondylartrotické zmeny na *fovea epistrophei* stavca C1 a na *dens epistrophei* stavca C2; pohľad čiastočne zvrchu a zozadu; muž, matusus II, hrob č. 5/09. Foto: František Engel.



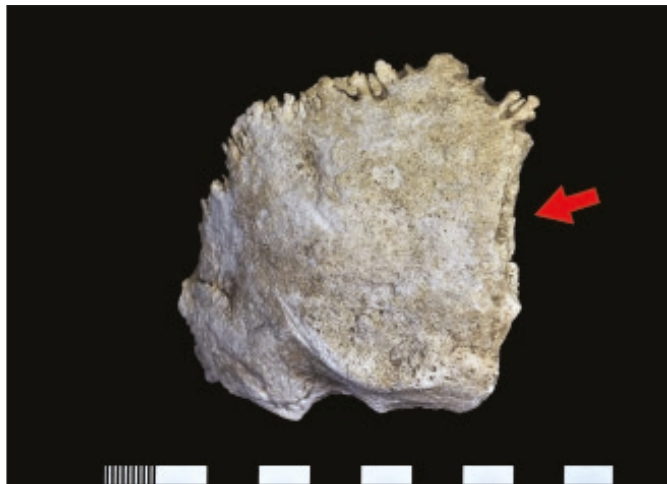


Fig. 5. *Os occipitale*, a possible anthropogenic interference in the right side, posterior view; male, adultus I, grave 7/09. Photo by František Engel.

Obr. 5. *Os occipitale*, na pravej strane pravdepodobný antropogénny zásah, pohľad zozadu; muž, adultus I, hrob č. 7/09. Foto: František Engel.

*parietale*, *os temporale sin.*, damaged *os occipitale* (synostosed *synchondrosis sphenoccipitalis*). *Norma lateralis*: high *os zygomaticum* with uneven surface, small *processus retromarginalis*, domed to oblong occiput, significant *protuberantia occipitalis externa*. *Norma occipitalis*: higher arch, significant nuchal lines and occipital cross, moderately large *processus mastoidei*, *sutura mendosa sin.*. Right side of *os occipitale* broken through an "old" fracture, while *lamina interna* extends beyond the

*lamina externa*; fracture is strikingly straight in the upper part. This is probably an anthropogenic intervention (Fig. 5). A slight hyperostosis in *squama occipitalis*.

The right upper teeth C, P<sup>1</sup>, P<sup>2</sup>, M<sup>1</sup> and M<sup>2</sup> (13 – 17) with Grade 1–2 of abrasion preserved in the damaged right maxilla (worn cusps or partially worn enamel with exposed dentine areas). Medium to robust damaged right part of the mandible without a ramus. Chin protruding in the side view, visible *planum alveolare* and *mentum* in the top view, localization of simple *foramen mentale* under P<sub>2</sub>, thorn-like *spina mentalis*, *trigonum mentale* in the form of bilateral protuberance, medium thick *margo inferior* under M<sub>2</sub>. Rather parabolic shape of dental arch, teeth abrasion of Grade 1–2. C (43) slightly rotated inward, hypoplasia in I<sub>2</sub> (42), caries in M<sub>2</sub> (47). Post-mortem loss of left C–<sub>3</sub>M (33–38) and right I<sub>1</sub> (41) teeth.

Fragment of *os sternum*, moderately robust fragments of the ribs. Damaged to fragmentary, moderately robust and medium-sized vertebrae – one cervical, six thoracal and three dorsal ones. Fragments of shoulder blades, damaged robust left *humerus* with a massive MR, *perforatio septi humeri*, fused epiphyses. Damaged to fragmentary, moderately robust to robust forearm bones with fused epiphyses, medium sized *metacarpalia*.

Fig. 6. Fragment of femur diaphysis, a possible anthropogenic interference, anterior view; male, adultus I, grave 7/09. Photo by František Engel.

Obr. 6. Úlomok diafýzy femuru, pravdepodobný antropogénny zásah, pohľad spredu; muž, adultus I, hrob č. 7/09. Foto: František Engel.



Fig. 7. Significant *crista musculi supinatorius* in ulnae (consequence of the forearm repeated rotary motion?); anterior view; male, adultus I, grave 8/09. Photo by František Engel.

Obr. 7. Výrazná *crista musculi supinatorius* na laktových kostiach (dôsledok opakovaného rotačného pohybu predlaktia?); pohľad spredu; muž, adultus I, hrob č. 8/09. Foto: František Engel.



Fragments of the pelvis, fragment of femur diaphysis with suspected anthropogenic interference (Fig. 6).

Varieties and pathological changes: C (43) slightly rotated inwards. Right side of *os occipitale* in the upper part with a straight fracture (possible anthropogenic interference), another intentional intervention visible also in the femoral fragment.

Conclusion: According to the degree of skull sexualization (D.S. = +0.67), the skeleton is of male character. The man died at the age of 20 to 40 years (adultus), probably adultus I (20 to 29 years).

#### **Grave 8/09**

Preservation: Damaged to fragmentary skeleton of an adult individual.

Morphological characteristics: Damaged to fragmentary (mostly face), post mortem deformations, gracile to medium robust *cranium* with medium MR. Norma frontalis: medium *tubera frontalia*, faint appearance of *arcus superciliares*, very sharp *margo supraorbitalis*, obliterated *sutura metopica*, other sutures infused. Norma lateralis: *os frontale* almost vertical, medium high right *os zygomaticum*, with uneven surface, big *processus retromarginalis*, faint appearance of *protuberantia occipitalis*. Norma verticalis: absent *foramina parietalia*, norma occipitalis: high arch, slightly arched nuchal lines, small *processus mastoidei*.

Chin protruding in the side view, only the *mentum* visible in the top view, simple *foramen mentalis* localized under  $P_2-M_1$ , thorn-like *spina mentalis*, inverted mandibular angle, slightly developed *trigonum mentale*, very thin *margo inferior* under  $M_2$ , slightly protruding surface of *angulus mandibulae*, small *processus articularis mandibulae*.

Parabolic dental arch of the rest of the upper jaw and mandible, Grade 1 and 2 of dental abrasion. Permanent set of teeth preserved in the damaged maxilla and in the left half of the mandible. On the right side, preserved maxillary teeth  $I^1$  and  $P^1-M^3$  (14–18), except  $^2I$  and  $^2M$ , all teeth present on the left side, partially worn enamel with areas of exposed dentine (Grade 2 of abrasion), damaged teeth roots. Slightly developed tartar, mostly in the maxillary teeth. Preserved left  $1M-3M$  (36 – 38) in the mandible.

Damaged, gracile and small vertebrae (five cervical, four thoracic, three dorsal ones) without degenerative changes, the first four cervical vertebrae coloured with verdigris. Damaged gracile ribs.

Damaged left gracile clavicle with weak MR and weak curvature, right gracile scapula, gracile humeri with weak MR and fused epiphyses, *perforatio septi humeri*, circumference of the right humeral head reaching 127? mm (female character), the medullary cavity in the proximal epiphysis reaching the height of the *collum chirurgicum* (Grade II). Damaged gracile ulnae with weak MR and fused epiphyses, damaged gracile radii with medium MR and a distinct *crista musculi supinatorius* (result of the rotational motion of the forearm?; Fig. 7).

Gracile damaged pelvic bones. *Incisura ischiadica major* with a distance A–C on the left side reaching 19 mm (female character), wide and deep *sulcus praeauricularis*, “arc composé” formed by two small arches intersecting in imaginary lines, roof shaped *ramus superior ossis pubis*.

Damaged gracile femoral bones with medium MR, fused epiphyses, *crista hypotrochanterica* present, weak and laterally marked *linea aspera*, vertical diameter of the right *caput femoris* reaching 42.0 mm (female character), the medullary cavity extending to the lower edge of trochanter minor (Grade II).

Damaged gracile long crural bones with weak MR and fused epiphyses. Tibiae having a Type II of middle cross-section. Short *metatarsalia*.

Metrical characteristics (in mm): Tables 1; 2.

Varieties and pathological changes: Traces of verdigris on both sides near *processus mastoidei* and on the left side of the jaw. First four cervical vertebrae coloured by verdigris, too. Radii with a distinct *crista musculi supinatorius* (result of the rotational motion?).

Conclusion: According to D.S. of the skull (-0.91) and D. S. of the post-cranium (-1.0), this individual was a female. She was about 157 cm tall (above middle height) and died at the age of 35 to 45 years (adultus II/maturus I).

Determination by DNA: Female.

Mitochondrial haplogroup: T2 (tooth – molar), T2f (*pars petrosa s. pyramis*).

#### **Grave 9/09**

Preservation: Damaged skeleton of an adult individual.

Morphological characteristics: Fragments of gracile cranium with weak MR, facial part missing. Norma frontalis: small *tubera frontalia*, slightly developed *arcus superciliaris*, weakly arched *margo supraorbitalis*, obliterated *sutura metopica*. *Cribrum orbitale* in the right orbit (Fig. 8). Norma lateralis: glabella 0, *os frontale* slightly inclined, lower and thinner *processus zygomaticus sin.*, slightly developed *protuberantia occipitalis externa*. Norma occipitalis: slightly arched nuchal lines, small *processus mastoidei*, slightly developed *crista mastoidea*.

Obliteration of Grade 1: *sutura lambdoidea, pars lambdoidea*; obliteration of Grade 2: *sutura sagittalis: pars verticis*; obliteration of Grade 3: *pars bregmatica*; obliteration of Grade 4: *sutura coronalis: pars bregmatica* and *pars complicata*. In the endocranial side of the parietal bones, alongside the *sutura sagittalis, foveolae granulares* (Pacchioni granulations) (Fig. 9).



Fig. 8. *Cribra orbitalia* in the right eye socket; female, adultus II/maturus I, grave 9/09. Photo by František Engel.

Obr. 8. *Cribra orbitalia* na strope pravej očnice; žena, adultus II/maturus I, hrob č. 9/09. Foto: František Engel.

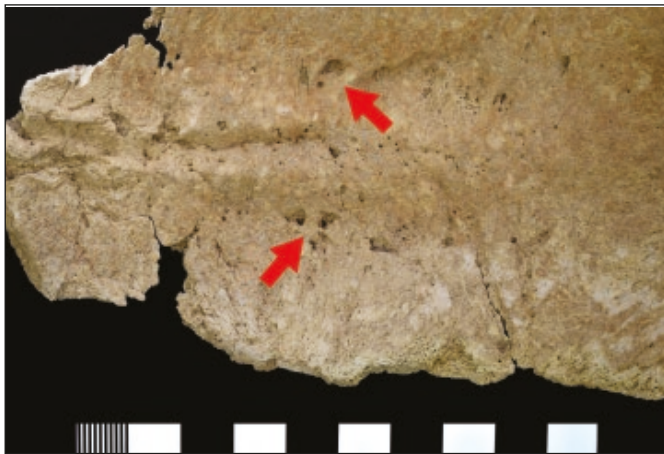


Fig. 9. *Foveolae granulares* (Pacchioni granulations), the inside of the parietal bones near sutura sagittalis; female, adultus II/maturus I, grave 9/09. Photo by František Engel.

Obr. 9. *Foveolae granulares* (Pacchioniho granulácie), vnútorná strana parietálnych kostí pri sutura sagittalis; žena, adultus II/maturus I, hrob č. 9/09. Foto: František Engel.



Fig. 10. Spondylarthrosis – raised edges of *fovea dentis* in C1, top view of C1 and C2 vertebrae; female, adultus II/maturus I, grave 9/09. Photo by František Engel.

Obr. 10. Spondylarthrosis – vyvýšené okraje *fovea dentis* na C1, pohľad zhora na C1 a C2; žena, adultus II/maturus I, hrob č. 9/09. Foto: František Engel.

Damaged gracile *mandibula* with weak MR (“aging” resorption?), chin strongly protruding in the side view, narrow parable with vertex in the center. Simple *foramina mentalia* on both sides (under  $P_2$ ), elevated *spina mentalis*, slightly inverted mandibular angles, medium appearance of *trigonum mentale*, thin *margo inferior* under  $M_2$ , slightly protruding *angulus mandibulae*, medium sized *processus articularis mandibulae*. From the unpreserved maxilla, only the right-sided  $P^2$  abraded to the Grade 3 present, as well the  $^1I - ^1M$  (21 – 26) teeth from its left side. Premolars and molars show abrasion of Grade 3–4. Intravital loss of all mandibular incisors, postmortem loss of the left *canine*, premolars, and the first molar. Large cavity presented in the right-sided  $P_1$ . Altogether 15 teeth preserved, with significant exposure of roots and damaged surface.

Fragments of *os sacrum*. Very small fragments of gracile ribs.

Preserved first two vertebrae and fragments of other gracile and small vertebrae. Degenerative spinal changes: *spondylarthrosis*, elevated edges of *fovea dentis* in C1 (Fig. 10).

Damaged, weakly curved clavicles with weak MR. Fragments of gracile scapulae. Damaged gracile humeri with weak MR, damaged right radius, fragment of the left radius, fragment of the left ulna; forearm bones gracile, with weak MR. Small carpalia, small metacarpals, short, gracile phalanges coloured by verdigris.

Gracile damaged pelvic bones. Wide *incisura ischiadica major* (-2, A–C: 26 mm), wide and medium deep *sulcus praeauricularis*, “arc compose” formed by two small arches intersecting in imaginary lines, roof shaped *ramus superior ossis pubis*, more opened angle of *facies auricularis* with constriction. Slight arthrotic changes in the edges of *facies auricularis*.

Damaged gracile femora with weak MR, fused epiphyses, *crista hypotrochanterica* on both sides, bilateral *linea aspera* of medium appearance, vertical diameter of the right *caput femoris*: 42? mm (female character). Grade III of medullary cavity size (extends to the lower edge of *trochanter minor*). Fragment of small right patella. Damaged, gracile left *tibia* with weak MR and fused epiphyses, small retroversion, V-shaped middle cross-section of the diaphysis. Two gracile fibula fragments with weak MR.

Metrical characteristics (in mm): Tables 1; 2.

Varieties and pathological changes: *Cribra orbitalia* in the right orbit, green colouration caused by verdigris in the area of *processus mastoideus* on both sides, first two vertebrae, *extremitas acromialis claviculae* and some phalanges, on the inside of the parietal bones, near *sutura sagittalis*, *foveolae granulares* (Pacchioni granulations), degenerative changes in the spine in form of *spondylarthrosis*, slightly elevated edges of the *fovea dentis* in C1. Slight arthrotic changes in the edges of *facies auricularis*.

Conclusion: According to the degree of skull sexualization (D.S. = -0.47) and structure of the skeleton, this individual is a female. She was about 158 cm tall (above middle height) and died at the age of 35 to 45 years (adultus II/maturus I).

Determination by DNA: Female.

Mitochondrial haplogroup: I1a1.

#### Grave 10/09

Preservation: We could evaluate only some damaged crural bones.

Morphological characteristics: Only the damaged *tibia dx.* of gracile to moderately robust structure preserved, with the medium MR and fused epiphyses, more developed retroversion, and diaphyseal middle cross-section of the Type III. Proximal epiphysis disturbed by two circular interventions (caused by unidentified taphonomic factors). A hole 13 x 12 mm in size in lateral position, faint appearance of another median hole of similar size (Fig. 11). Damaged to fragmentary fibulae of the gracile structure, with medium MR.

Metrical characteristics (in mm): Table 2.

Varieties and pathological changes: Proximal epiphysis of the right tibia disturbed by two circular interventions (caused by unidentified taphonomic factors).

Conclusion: An adult individual which could not be identified in detail.

Appendix: Costa – *Bos primigenius f. taurus.*

#### Grave 11/09

Preservation: Damaged skeleton of the juvenile individual.

Morphological characteristics: Damaged to fragmentary medium robust *cranium* with medium MR. There appears to be an anthropogenic interference in *os frontale* (Fig. 12). Its left side probably disturbed by a blunt blow from the outside, which in some places caused the protrusion of *lamina interna* over the *lamina externa*. Some cracks are only partial, which may indicate an injury of a fresh bone. All fractures have color identical with that of the surface. Norma frontalis: missing *tubera frontalia*, slightly developed *arcus superciliares*, sharp *margo supraorbitalis*, obliterated *sutura metopica*. Norma lateralis: glabella of Grade 2 (-1), medium *processus retromarginalis*, slightly developed *protuberantia occipitalis externa*. Norma verticalis: slightly developed *tubera parietalia*. Norma occipitalis: slightly arched nuchal lines, small *processus mastoidei*. All sutures open (including *sutura sphenobasilaris*), with wavy *sutura lambdoidea*.

Damaged, moderately robust to robust mandible with medium MR, chin protruding in the side view, narrow parable in the bottom view, with vertex in the center; *mentum* and *planum alveolare* visible in the top view. Right simple *foramen mentale* preserved (under  $P_1$ –  $P_2$ ), thorn-like *spina mentalis*, everted mandibular angles, thick *margo inferior* under  $M_2$ , protruding *angulus mandibulae*, small *processus articularis* mandibulae. Parabolic shape of mandibular dental arc. Almost all permanent teeth preserved (only isolated maxillary teeth, because maxilla as a whole was not preserved), abrasion of Grade 1, post-mortem loss of lower left  $I_1$  and  $I_2$ , signs of hypoplasia on the incisor and canine teeth in the mandible. Only two thirds of the roots developed in M3 in both the maxilla and the mandible.

Fragments of *os sacrum* with open *linae transversae*, fragments of *os sternum*. Fragments of gracile ribs. Damaged to fragmentary, gracile and medium sized vertebrae, C2 fused (suggesting age over 12 years).

Damaged, gracile and moderately curved clavicles with weak MR, fragments of shoulder blades. Damaged diaphyses of moderately robust humeri with moderate MR, fragmentary gracile to moderately robust bones of the forearm.

Damaged, unfused pelvic bones. Damaged, moderately robust femurs with medium MR and unfused epiphyses. *Linea aspera* rather narrow and tall, *sulcus* present in the place of *tuberositas glutea* (excessive strain of the muscle attachment due to physical activity?) (Fig. 13). Damaged, moderately robust diaphyses of tibiae with medium MR. Fragments of the right fibula.



Fig. 11. *Tibia dx.*, proximal epiphysis disrupted by two circular openings, dimensions 13 x 12 mm; unidentified adult individual, grave 10. Photo by František Engel.

Obr. 11. *Tibia dx.*, proximálna epifýza narušená dvomi kruhovitými otvormi, rozmery 13 x 12 mm; bližšie neidentifikovateľný dospelý, hrob č. 10; foto: František Engel.





Fig. 12. *Os frontale*, a possible anthropogenic interference on the right side, frontal view; male, infans II/juvenis, grave 11/09. Photo by František Engel.

Obr. 12. *Os frontale*, vpravo pravdepodobný antropogénny zásah, pohľad spredu, muž, infans II/juvenis, hrob č. 11/09, foto: František Engel.

*frontalia*, shallow *fossae caninae*, obliterated *sutura metopica*. Norma lateralis: *os zygomaticum sin.*, low with damaged surface, medium *processus retromarginalis*, slightly developed *protuberantia occipitalis externa*. Norma verticalis: small *tubera parietalia*, *foramina parietalia* missing. Norma occipitalis: slightly arched nuchal lines, small *processus mastoidei*. Norma basalis: *torus palatinus* absent.

All parts of *sutura coronalis*, *sutura sagittalis* and *sutura lambdoidea* not synostosed (Grade 0).

Damaged, gracile *mandibula* with medium MR, chin protruding in the side view, narrow parable in the bottom view, with vertex in the center; *mentum* and *planum alveolare* visible in the top view. Simple foramina mentalia localized

Varieties and pathological changes: Possible anthropogenic interference (?) in *os frontale*, signs of hypoplasia on the mandibular incisors and canines teeth. *Sulcus in tuberositas glutea* (caused by excessive strain?).

Conclusion: With regard to the bone morphology and development of teeth, this is a juvenile individual (male?) aged 10–15 years (infans II/juvenis).

Determination by DNA: Male.

Mitochondrial haplogroup: T2c1d + 152.

Appendix: Animal bones – *atlas* and *epistropheus* of *Canis lupus f. familiaris*, one unidentified fragment of a large bone diaphysis.

#### Grave 12/09

Preservation: Extensively damaged skeleton of a juvenile individual.

Morphological characteristics: Damaged to fragmentary, gracile to medium robust *cranium* with medium MR and post-mortem deformation. In particular, the facial part is damaged, the surface of the bones is disturbed – “abraded”. Norma frontalis: small *tubera*



Fig. 13. Sulcus in the place of *tuberositas glutea* on both femora (physical activity?), posterior view; male, infans II/juvenis, grave 11/09. Photo by František Engel.

Obr. 13. Sulcus na mieste *tuberositas glutea* na oboidvoch femuroch (fyzická aktivita?), pohľad zozadu; muž, infans II/juvenis, hrob č. 11/09. Foto: František Engel.



Fig. 14. The significant *tuberculum dentis* on pin-shaped I2 (1<sup>2</sup>); male, infans II/juvenis, grave 11/09. Photo by František Engel.

Obr. 14. Na kolíkovitom I<sup>2</sup> (1<sup>2</sup>) výrazné *tuberculum dentis*; muž, infans II/juvenis, hrob č. 11/09. Foto: František Engel.

under  $P_2$ , thorn-like *spina mentalis*, everted mandibular angles, medium appearance of *trigonum mentale*, medium *margo inferior* under  $M_2$ , small *processus articularis mandibulae*, slightly protruding *angulus mandibulae*, left one coloured by verdigris. The dental arch approximately U-shaped, and the mandible of horseshoe shape, Grade 2 abrasion of the incisors (partially worn enamel, with exposed dentine areas) and Grade 1 abrasion in the other teeth, mild hypoplasia. Post-mortem loss of the upper right  $I^1$  (11) and C (13). On the peg-shaped  $I^2$  (12) visible a significant *tuberculum dentis* (Fig. 14). Upper  $M^3$ s are unerupted, erupting lower  $M^3$ .

At least two fragments of the *os sacrum*, plus other fragments of apparently gracile *costae*. Gracile vertebrae of medium size in damaged to fragmentary condition. Identifiable C1 and fragment of C2. A lesion in the area of the *fovea articularis superior dx.* of the atlas (C 1; Fig. 15). Damaged clavicle bones of medium structure, with slight curvature. Damaged right shoulder blade and a fragment of the left shoulder blade; damaged, moderately robust diaphyses of humeri with medium MR on a more preserved diaphysis of *humerus dx.*, *sulcus tuberculi majoris* present in the area of *crista tuberculi majoris* (physical strain?; Fig. 16). Significant *crista musculi supinatorius* in ulnae (physical strain?; Fig. 17). Anthropogenic intervention in the diaphysis of *humerus sin.* – ante-mortem shattering of the bone (Fig. 18).

Preserved a part of the medium robust *os ilium dx.*, damaged but obviously wider *incisura ischiadica major* (female type), *sulcus praeauricularis* missing, *arc composité* forming a continuous arch.



Fig. 15. Atlas (C1), a lesion in the area of *fovea articularis superior dx.*, superior view; male, infans II/juvenis, grave 12/09. Photo by František Engel.

Obr. 15. Atlas (C1), lézia v oblasti *fovea articularis superior dx.*, pohľad zhora; muž, infans II/juvenis, hrob č. 12/09. Foto: František Engel.



Fig. 16. *Humerus dx.*, *sulcus tuberculi majoris* (physical activity?), anterior view; male, infans II/juvenis, grave 12/09. Photo by František Engel.

Obr. 16. *Humerus dx.*, *sulcus tuberculi majoris* (fyzická aktivita?), pohľad spredu; muž, infans II/juvenis, hrob č. 12/09. Foto: František Engel.



Fig. 17. The significant *crista musculi supinatorius* in both ulnae (physical activity?); male, infans II/juvenis, grave 12/09. Photo by František Engel.

Obr. 17. Na ulnách výrazná *crista musculi supinatorius* (fyzická aktivita?); muž, infans II/juvenis, hrob č. 12/09. Foto: František Engel.



Fig. 18. Diaphysis of *humerus sin.*, a possible anthropogenic interference; male, infans II/juvenis, grave 12/09. Photo by František Engel.

Obr. 18. Diafýza *humerus sin.*, pravdepodobný antropogénny zásah; muž, infans II/juvenis, hrob č. 12/09. Foto: František Engel.



Fig. 19. Tibia dx., *linea musculi solei* modified to sulcus; male, infans II/juvenis, grave 12/09. Photo by František Engel.

Obr. 19. Tibia dx., *linea musculi solei* zmenená na sulcus; muž, infans II/juvenis, hrob č. 12/09. Foto: František Engel.

Damaged, moderately robust femurs with moderate MR, infused proximal epiphyses, *trochanter major* fused in the right femur, slightly damaged proximal epiphysis, damaged distal epiphyses, *linea aspera* narrow and high. Medium robust, damaged to fragmentary long crural bones with a medium MR, the tibiae with diaphyseal midsection of the Type III. *Linea musculi solei*, especially in the right tibia, converted to *sulcus* (Fig. 19).

Varieties and pathological changes: Significant *tuberculum dentale* on I<sup>2</sup> (12). Low degree of hypoplasia in the teeth. The area of *angulus mandibulae sin.* coloured in green by verdigris. A lesion present on the surface of the atlas in the area of *fovea articularis superior dx.* In a better preserved diaphysis of the *humerus dx.*, in the area of *crista tuberculi minoris*, located the *sulcus tuberculi minoris*; significant *incisura radialis* and *crista musculi supinatorius* present in ulnae, *linea musculi solei* transformed into *sulcus*, with more expressive formation in the right tibia (caused by physical strain, intense rotational movement of the forearm? ). Anthropogenic intervention in the diaphysis of *humerus sin.*

Conclusion: Based on the structure, the morphology of the skeleton, dental age, and fusion of the epiphyses in the long bones, this is a juvenile individual, aged 12–18 years (infans II/juvenis).

Determination by DNA: Male.

Mitochondrial haplogroup: I1a1a.

### Grave 13/09

Preservation: Extensively damaged skeleton of an adult individual.

Morphological characteristics: Damaged to fragmentary, gracile to moderately robust *cranium* with weak MR. Norma frontalis: small *tubera frontalia*, slightly formed *arcus superciliares*, sharp *margo supraorbitalis*. Norma lateralis: glabella of Grade 4 (+1), slightly arched *os frontale*, thin *arcus zygomatici*, smooth *os zygomaticum*, small *processus retromarginalis*, domed occiput, flat *protuberantia occipitalis externa*. Norma verticalis: small *tubera parietalia*. Norma occipitalis: twice curved base, slightly curved nuchal lines, small *processus mastoidei*, weak *crista supramastoidea*. Almost complete obliteration of *sutura coronalis* (preserved pars bregmatica – Grade 3) and *sutura sagittalis* (all parts – Grade 4).

Fragments of moderately robust mandible, consisting of a part of the chin and *ramus mandibulae dx.* Left simple *foramen mentale* (under P), thorn-like *spina mentalis*, everted mandibular angles, slightly protruding *angulus mandibulae dx.*

Fragment of C2 (*epistropheus*) and a small fragment of the *os sternum*. Fragment of the acromion area in the left shoulder blade, damaged, right, moderately robust humerus, with a massive MR. Two fragments of the diaphyses of the right forearm bones (radius, ulna) of the medium structure.

Pelvis not preserved. Damaged diaphyses of moderately robust femurs with medium MR, medium to higher *linea aspera* and bilateral appearance. Diaphyseal fragments of moderately robust tibia with a cross-section of Type III.

Metrical characteristics (in mm): Table 2.

Varieties and pathological changes: The area near *processus mastoideus sin.* coloured in green by verdigris.

Conclusion: According to the degree of skull sexualization (D.S. = -0.44) and structure of the skeleton, this is a female who died at the age of 55–65 years (maturus/senilis).

Determination by DNA: Female.

Mitochondrial haplogroup: I1a1a, first degree family relationship identified, with the individual 5/09.

#### Grave 14/09

Preservation: Extensive damaged to fragmentary skeleton of a juvenile individual with unpreserved axial skeleton.

Morphological characteristics: Skull damaged to fragmentary. *Cribra orbitalia* in the right orbital roof (?). Damaged mandible with permanent teeth. A simple foramen mentale localized under P<sub>1</sub> – P<sub>2</sub> only preserved on the right side. The first lower molar just closing the roots, the third lower molars erupted, post-mortem loss of the left lower I<sub>2</sub> (32). Preserved free right canine (13) with open tip of the root. Outer surface of teeth disrupted.

Axial skeleton not preserved. Fragmentary upper extremities, preserved diaphysis of the *humerus dx*, fragments of the right clavicle and the bones of the right forearm. Of the lower extremities, diaphyses of femurs and fragments of tibia diaphyses.

Varieties and pathological changes: *Cribra orbitalia* in the right orbital roof (?). Both *processus articulares mandibulae* coloured by verdigris.

Conclusion: Juvenile individual aged 12–18 years (infans II/juvenis).

Determination by DNA: Female.

Mitochondrial haplogroup: N1a1a1a2.

#### Basic paleodemographic data

Of the total 14 grave units discovered, 14 individuals were examined, out of which four (28.57%) are juveniles and ten (71.43%) are adults (Table 3a, b). However, the skeleton remains demonstrate high degree of damage, in some cases they are fragmentary, sometimes with disrupted and abraded surface. This has caused the morphological and metrical assessment, as well as the obtaining of the necessary information, very difficult. However, DNA analysis clearly determined the sex of ten individuals. The sex of two individuals was determined morphologically. Of the 14 individuals, six (42.855%) are females, six (42.855%) are males and the sex of two (14.29%) adults could not be determined by the aDNA methods.

Of the younger individuals, the majority (four, i.e. 28.57%, of which two are boys and two girls) of the skeletal remains belonged to juvenile individuals aged infans II/juvenis. One male (7.14%), aged juvenis/adultus I (15–25 years), and one individual (7.14%), aged adultus I (20–29 years) were included in the younger adults when the categories were reduced. Younger females were not present at all.

Of the six elderly adults (four females, two males), two females died at the age of adultus II/maturus I (35–45 years), one female at the age of maturus (40–59 years), and one died at the age of maturus/senilis (55–60+ years). One male died at the age of maturus II (50–59 years), the other one at the age of senilis (60+ years), while we were unable to accurately determine the age in two adults (Table 3a, b).

Age categories	Intervals	Males		Females		Unidentified		Summary	
		n	%	n	%	n	%	n	%
infans II/juvenis	10 - 15	2	14.29	2	14.29			4	28.57
juvenis/adultus I	15 - 25	1	7.14					1	7.14
adultus I	20 - 29	1	7.14					1	7.14
adultus II/maturus I	35 - 45			2	14.29			2	14.29
maturus II	50 - 59	1	7.14					1	7.14
maturus	40 - 59			1	7.14			1	7.14
maturus/senilis	60 +	1	7.14	1	7.14			2	14.29
Unidentified	adults					2	14.29	2	14.29
Summary		6	42.85	6	42.86	2	14.29	14	100.00

Table 3a. Šoporňa cemetery. Sex and age distribution of individuals, age categories according to decades.

Tab. 3a. Šoporňa. Frekvencia jedincov z pohrebiska, vekové kategórie po desaťročiach.

Age categories	Intervals	Males		Females		Unidentified		Summary	
		n	%	n	%	n	%	n	%
Immatures	0 - 19	2	14.28	2	14.29			4	28.57
Younger adults	20 - 29	2	14.29					2	14.29
Older adults	35 - 59+	2	14.29	4	28.56			6	42.85
Unidentified	adults					2	14.29	2	14.29
Summary		6	42.86	6	42.85	2	14.29	14	100.00

Table 3b. Šoporňa cemetery. Sex and age distribution of individuals, reduced age categories.

Tab. 3b. Šoporňa. Frekvencia jedincov z pohrebiska, zredukované vekové kategórie.

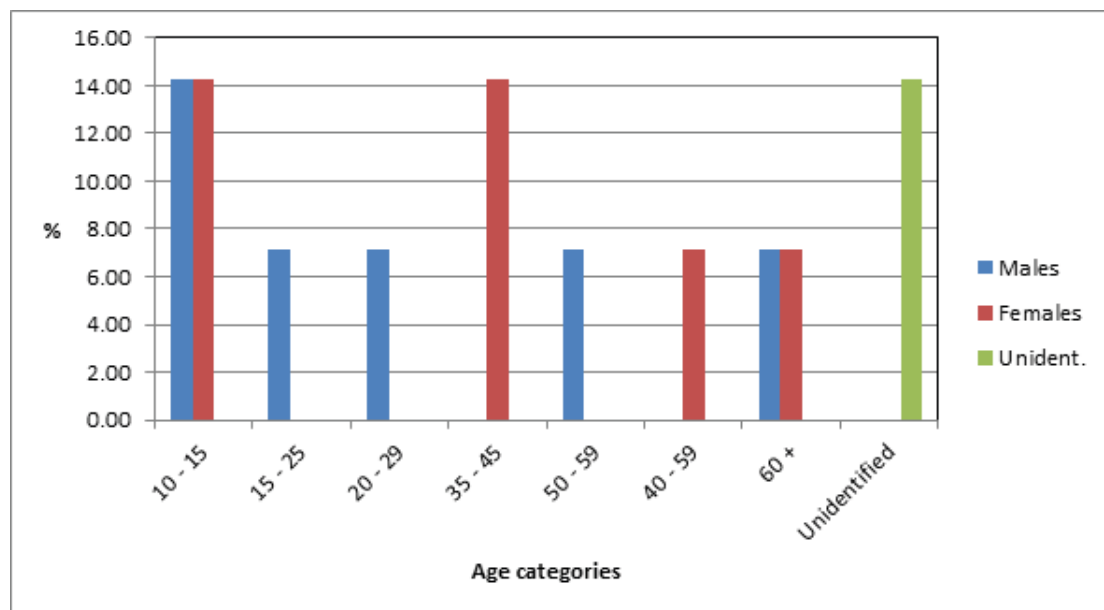


Fig. 20a. Šoporňa cemetery (Older Bronze Age – Únětice Culture). Sex and age distribution of individuals, age categories according to decades.

Obr. 20a. Šoporňa (staršia doba bronzová – únětická kultúra). Frekvencia jedincov s vekovými kategóriami po desaťročiach.

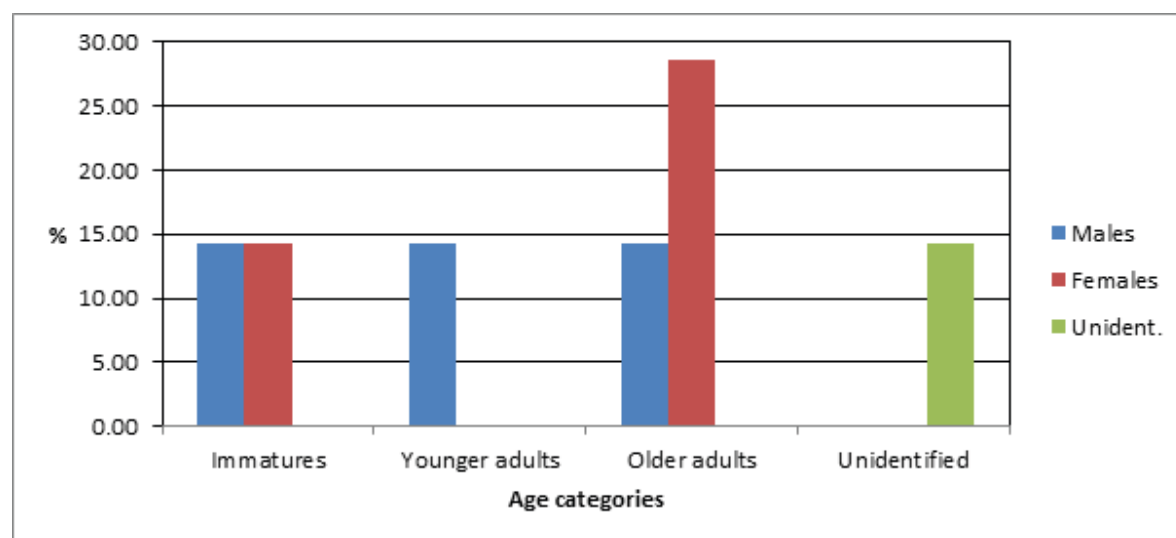


Fig. 20b. Šoporňa cemetery (Older Bronze Age – Únětice Culture). Sex and age distribution of individuals, reduced age categories.

Obr. 20b. Šoporňa (staršia doba bronzová – únětická kultúra). Frekvencia jedincov s zredukovanými vekovými kategóriami.



Fig. 21. Šoporňa – cemetery map. Females (green colour; graves 3, 8, 9, 13, 14) buried mostly in the northeast, males (yellow colour; graves 1, 4, 5, 7, 11, 12) buried in the southwest, immature individuals (red outlines graves 3, 11, 12, 14) buried at the border of these positions.

Obr. 21. Šoporňa – mapa pohrebiska. Ženy (zelená farba; hroby 3, 8, 9, 13, 14) pochovávané prevažne v severovýchodnej časti, muži (žltá farba; hroby 1, 4, 5, 7, 11, 12) v juhozápadnej časti, nedospelí (ohraničenia červenou farbou, hroby 3, 11, 12, 14) pochovávaní na hranici týchto polôh.

Interestingly enough, younger children are missing in this surveyed section of a probably larger burial site, with the lowest age of juveniles ranging in the category of infans II/juvenis (four, i.e. 28.57%). Most individuals (six, i.e. 42.85%) come from a group of older adults (35–60+ years), with the majority of females (four, i.e. 28.57%) (Fig. 20a, b).

Looking at the arrangement of graves, regardless of the position of the bodies in the graves (Fig. 21), it appears that females (graves 3, 8, 9, 13, 14) were buried mainly in the northeast and males (graves 1, 4, 5, 7, 11, 12) in the southwest part. An exception is grave 6 of an older female. Juveniles (graves 3, 11, 12, 14) are buried on the borders of these positions.

#### Genetic determination of sex and mitochondrial haplogroups

The sex and mitochondrial haplogroups were genetically determined in 10 individuals (five males and five females; Table 4). Damaged skeletons of the individuals 2, 6 and 10 were preserved only in parts without the necessary skull parts. Samples of the petrous bone could be taken in nine individuals, and teeth (molars) were used for analysis of two (4 and 8) individuals.

DNA analysis revealed a first-degree relationship (parent/offspring/siblings) between the older male 5 and older woman 13. The man died at maturus II age and the woman is older (maturus/senilis). Their age is similar so they could have been siblings. However, as the exact time span of burial is unclear, the parent-offspring relationship can not be ruled out, either.

Grave number	Dublin/ Vienna codes	Harvard ID	Skeletal element	Sex	mtDNA haplogroups	Note
1/09	SPRN1	I7903	petrous bone	M	T2	
3/09	SPRN3	I7906	petrous bone	F	I1a1a	
4/09	SPRN4	I7907	tooth (molar)	M	I1a1a	
5/09	SPRN5	I4809	petrous bone	M	I1a1	I4813 1d.rel. I4809
8/09	SPRN7	I4810	petrous bone	F	T2f	
8/09	SPRN8	I7908	tooth (molar)	F	T2	
9/09	SPRN9	I4811	petrous bone	F	I1a1	
11/09	SPRN11	I7904	petrous bone	M	T2c1d+152	
12/09	SPRN12	I4812	petrous bone	M	I1a1a	
13/09	SPRN13	I4813	petrous bone	F	I1a1	I4813 1d.rel. I4809
14/09	SPRN14	I7905	petrous bone	F	N1a1a1a2	

Table 4. Šoporňa cemetery. Distribution of mitochondrial aDNA haplogroups. Explanations: ID – identification, M – male, F – female, 1d. rel. – a first-degree relationship, gray colour– cladogenetic group T, yellow colour– cladogenetic group N1a1b2.

Tab. 4. Šoporňa. Frekvencie mitochondriálnych aDNA haploskupín. Vysvetlivky: ID – identifikácia, M – muž, F – žena, 1d. rel. – prvostupňová príbuznosť, sivá – kladogenetická skupina T, žltá – kladogenetická skupina N1a1b2.

In the group of the Únětice culture at Šoporňa, six types of mitochondrial haplogroups were found: N1a1a1a2, I1a1, I1a1a, T2, T2c1d+152, and T2f. Basically, these belong to two cladogenetic groups. One includes the N1a and I (i.e. N1a1b2) and the other includes group T. Haplogroup I consists of two I1 and I2 subclusters (*Finnilä et al. 2001*).

Most individuals (six) of Šoporňa belong to the I1a1 haplogroup which could be detailly specified to I1a1a in three of those individuals. N1a1a1a2 group was identified in one person. Three individuals belong to T2 group, while of two individuals one belongs to T2c1d + 152 and one to T2f group.

An interesting situation occurred in the case of 8/09 female. Here, mtDNA from molar (T2) was analysed first, however later it was determined that the skull originally found in the 7/09 grave belonged to this female. Separate analysis of mtDNA was completed in the petrous bone and it provided even more accurate results (T2f).

Haplogroup I was among the significant components in the Late Neolithic Period and in the Early Bronze Age (*Brandt et al. 2013; Allentoft et al. 2015*). The I1a1 mt-haplogroup is the most common in Únětice Culture. The haplogroup I is found in about 2.8% of the modern population (*Simoni et al. 2000*). N1a1a1a2 was currently found in Siberia in Buryat population, I1a1a in the north-eastern Europe and in Siberia.

T2 mt-haplogroup can also be found in Únětice Culture populations (*Brandt et al. 2013; Allentoft et al. 2015*). T2c is currently present in the Middle East and in the Mediterranean Europe region. The T haplogroup is quite common in modern European populations (*Simoni et al. 2000; Montiel et al. 2001*). It consists of two T1 and T2 subclusters (*Finnilä/Majamaa 2001*). T2c1d is typical for Italy (Sardinia), Spain and Iran (Qashqai). T2f is found particularly in Central and Eastern Europe.

#### Metric data

Incomplete craniometric data were obtained only in five individuals, most of them in the male from the grave 5/09, while only some fragmentary data were obtained in three females (graves 8/09, 9/09, 13/09) and a younger male from the grave 4/09 (Table 1).

Making comparisons with the *Alekseyev and Debec* (1964) database, it was only possible to complete a more precise characteristics of the shape of the skull of a male inhumated in grave 5: long skull (M1) with a medium wide neurocranium (M8), with great maximum frontal width (M10) and very small biauricular width (M11). Horizontal circumference of the skull (M23) is small but transversal arch (M24) is large. According to the length and width index (I 1), the skull is dolichochochranic (long) and according to the transverse fronto-parietal index (I 13) it is metriometopic.

The dimensions of the most preserved, although damaged male skull from the grave 5/09 are partly similar to the dimensions of skulls from other, similarly dated series. Both males and females of Únětice population in Pata burial site (Galanta district), which is even close to Šoporňa and where 241 individuals were analyzed, have a characteristic long, tall and narrow brain part of the skull. Their facial skeleton is medium tall and narrow (*Miklíková 2000, 2001; Masnicová/Miklíková/Beňuš 2010*).

According to the analysis of a larger set from the Early Bronze Age in Branč, Matúškovo, Abrahám and Zohor (although these come from the Nitra culture) sites, this population can be characterized as dolichochochranic to mesochochranic, orthochochranic to hypsichochochranic, metriochranic to acrochochranic, eurytopic to metriometopic, mesoconchic with a tendency towards mesorhinnic (*Tichá/Hanulík 1971; Thurzo 1978; Šefčáková 2014*).

Measur./ Indexes	NIT			Únk			Šoporňa			All Groups		
	Means	SD	n	Means	SD	n	Means	SD	n	Means	SD	n
M1	184.87	6.518	23	185.81	7.083	21	193.00	8.485	2	185.65	6.884	46
M8	133.91	7.634	22	134.19	6.112	21	140.00	0.000	1	134.18	6.831	44
M9	94.52	5.645	21	95.70	4.054	20	94.50	2.121	2	95.07	4.803	43
M10	117.16	8.228	19	113.67	8.972	9	122.00	0.000	2	116.43	8.312	30
M23	513.14	20.065	14	519.47	24.784	15	499.00	0.000	1	515.83	22.296	30
M27	125.56	6.905	18	130.00	5.416	7	121.5	5.972	4	126.07	6.787	29
M28	113.73	6.670	15	118.00	5.000	3	127.00	0.000	1	115.11	6.943	19
M45	125.63	6.653	8	124.29	4.680	7	122.00	0.000	1	124.81	5.516	16
M65	113.60	5.147	10	115.00	6.976	7	118.50	10.607	2	114.63	6.166	19
M66	95.19	5.600	16	95.83	11.207	12	97.50	13.435	2	95.60	8.394	30
M69	34.17	3.092	18	32.40	4.122	20	35.00	0.000	1	33.28	3.692	39
I1	72.71	4.593	21	72.30	3.987	21	74.80	0.000	1	72.56	4.217	43
I13	71.01	3.056	19	71.75	3.747	20	68.50	0.000	1	71.32	3.390	40

Table 5. Šoporňa cemetery. Comparison of some craniometric data with the database of the Early Bronze Age from the territory of the Czech Republic and Slovakia: Únk – Únětice Culture (24 individuals from Bučovice, Holešov, Prušánky, Rebešovice), NIT – nitrianska Culture (26 individuals from Holešov, Výčapy-Opatovce, Blatné, Zohor), SD – standard deviation, n – number of observations.

Tab. 5. Šoporňa. Porovnanie niektorých kraniometrických údajov z pohrebiska Šoporňa s databázou zo staršej doby bronzovej z územia Česka a Slovenska: Únk – únětická kultúra (24 jedincov z lokalít Bučovice, Holešov, Prušánky, Rebešovice), NIT – nitrianska kultúra (26 jedincov z lokalít Holešov, Výčapy-Opatovce, Blatné, Zohor), SD – smerodajná odchýlka, n – počet prípadov.

The indicative comparison of a relatively small number of measurements of Šoporňa skulls with the reference database from the Early Bronze Age shows that these skulls are slightly longer (Table 5; Fig. 22a, b). Only one data of the length-width index (I 1) is available, which corresponds to dolichocrania and does not deviate from the variability of the Early-Bronze-Age populations just like the other metric data. Interestingly enough, the male from the grave 5/09 has a distinct, very large parietal arch (M28).

Only partial metric data from the postcranial skeleton were possible to be obtained in four females (6/09, 8/09, 9/09, 13/09), three males (1/09, 4/09, 5/09) and one adult (10/09) which could not be identified in detail (Table 2). According to the length-width index (H7: H1) found in only two individuals (male 4/09 and female 8/09), both humeri are moderately robust. The humeri of this male are eurybrachic while the others have platybrachic humeri.

Regarding the lower extremities, according to the length-width index (F8: F2), the gracile femur is preserved in the female 8/09 and a medium robust femur is preserved in the female 9/09. In two individuals, there is no pilaster on the femur, weak to moderate pilaster was formed in three individuals, there is no pilaster on the right femur in one individual and it is

Grave Sex Age	4/09	5/09	8/09	9/09
	Male	Male	Female	Female
	15 - 25	50 - 59	35 - 45	35 - 45
Manouvrier	161.4	165.7	154.9	154.8
Pearson	161.8		155.2	154.9
Breitinger	167.0			
Bach			162.3	162.3
Trotter-Glaser	165.2	169.0	158.6	158.3
Telkkä	165.5		156.3	157.5
Olivier et al.	164.7	169.6	156.2	158.0
Sjøvold	164.6	168.9	158.3	159.6
Mean	164.3	168.3	157.4	158.0
Characteristic	medium	above medium	above medium	above medium

Table 6. Šoporňa. Stature of adults (according to different methodologies).

Tab. 6. Šoporňa. Telesná výška dospelých jedincov (podľa rôznych metodík).



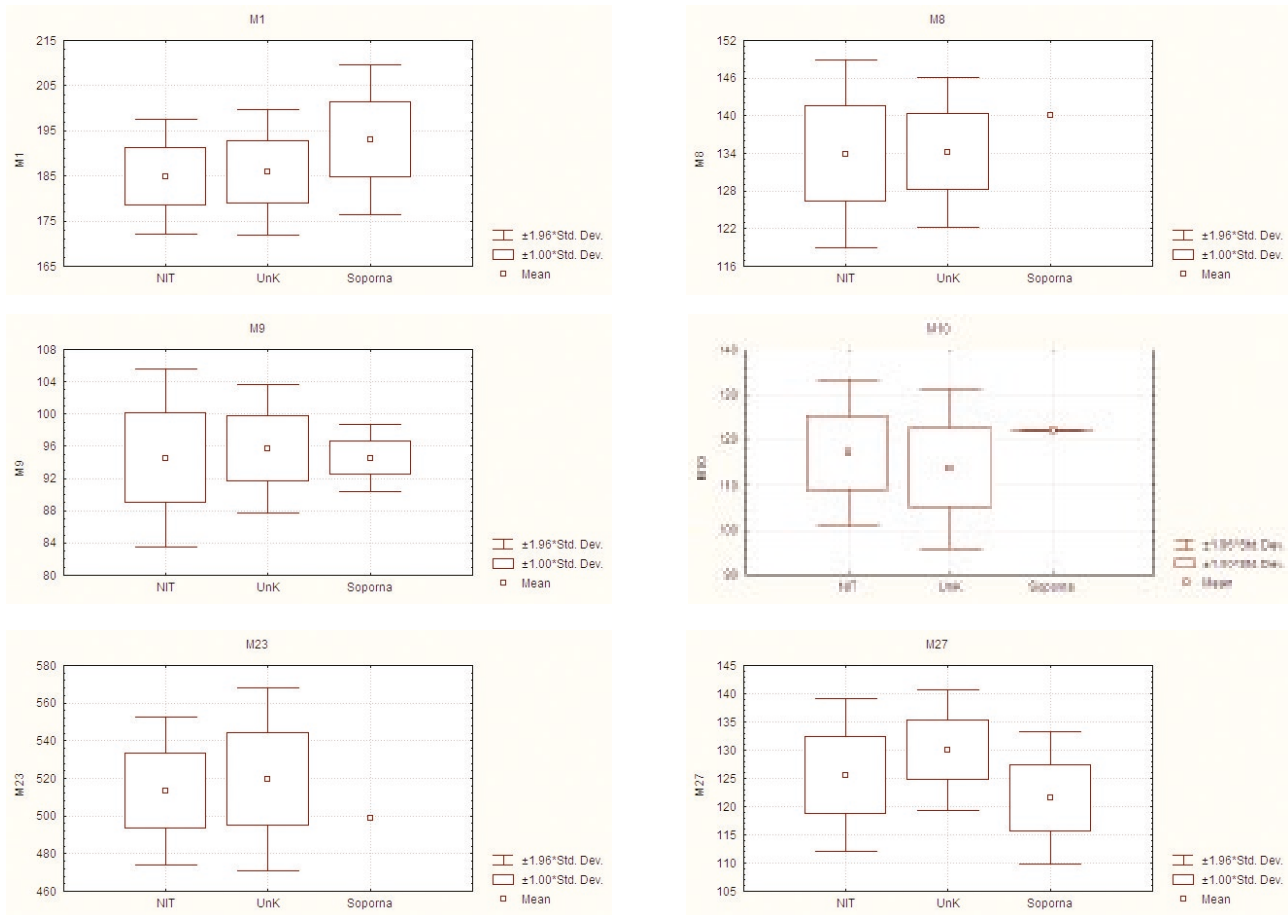


Fig. 22a. Šoporňa cemetery. Comparison of some craniometric data with the Early Bronze Age database considering the territory of the Czech Republic and Slovakia: UnK - Únětice Culture (24 individuals from Bučovice, Holešov, Prušánky, Rebešovice), NIT - Nitrianska Culture (26 individuals from Holešov, Výčapy-Opatovce, Blatné, Zohor), Std. Dev. – Standard Deviation, data in Table 5.

Obr. 22a. Šoporňa. Porovnanie niektorých mier lebiek s databázou zo staršej doby bronzovej z územia Česka a Slovenska: UnK – únětická kultura (24 jedincov z lokalít Bučovice, Holešov, Prušánky, Rebešovice), NIT – nitrianska kultura (26 jedincov z lokalít Holešov, Výčapy-Opatovce, Blatné, Zohor); Mean – priemer, Std. Dev. – smerodajná odchýlka, údaje v tab. 5.

weak on his left femur. In three individuals, the femur is platymeric and in three hyperplatymeric. In the case of tibiae, one female has mesocnemic tibiae and other four individuals have platycnemic tibiae.

We could calculate the height of four individuals – two females (8/09, 9/09) and two males (4/09, 5/09; Table 6). It turned out that three individuals had above medium stature and the youngest individual (a male) had a medium stature (possibly incomplete growth). It seems that the people of Šoporňa were rather taller than smaller which also corresponds to the Únětice population of Pata, where the average height of males was 170 cm tall and 160 cm of females (Miklíková 2000; Masnicová/Miklíková/Beňuš 2010). Similar results from the analysis of several similarly dated cemeteries from the territory of Slovakia and Czech Republic are also given by Hukelová (2016).

The heights of individuals from the burial sites in Branč, Matúškovo, Abrahám and Zohor sites vary in the wide range of categories, from sub-medium to above-medium in males and from medium to tall in females (Tichá/Hanulík 1971; Thurzo 1978; Šefčáková 2014).

### Health condition

Of the total of 14 individuals (Table 7), *cribra orbitalia* could be identified in an older male (5/09), an older female (9/09) and in a juvenile female (14/09). Enamel hypoplasia with root exposure was found in the male from the grave 5/09. Overall, the teeth are altered by dysplasia of enamel (hypoplasia) in three males (5/09, 7/09, 11/09), in two females (3/09, 12/09); while in three individuals (5/09, 8/09, 9/09) the roots are exposed (parodontitis). *Cribra orbitalia* and hypoplasia are signs of metabolic disturbance or the food stress. In the Šoporňa population, these signs appear in at least seven individuals.

The enamel of the preserved first left upper incisor in male from the grave 5/09 was artificially abraded in a wavy shape, besides this there is an enamel pearl on the left upper  $^3M$ . A similar tooth disruption was also found in an older man from the grave 21 at the cemetery of Zohor-Piesky (Šefčáková 2014) and in the men from the graves 215 and 310 from the Nižná Myšľa (Hukelova 2016). Apparently there are signs of using teeth for some activity or as tools (paramasticatory purposes).

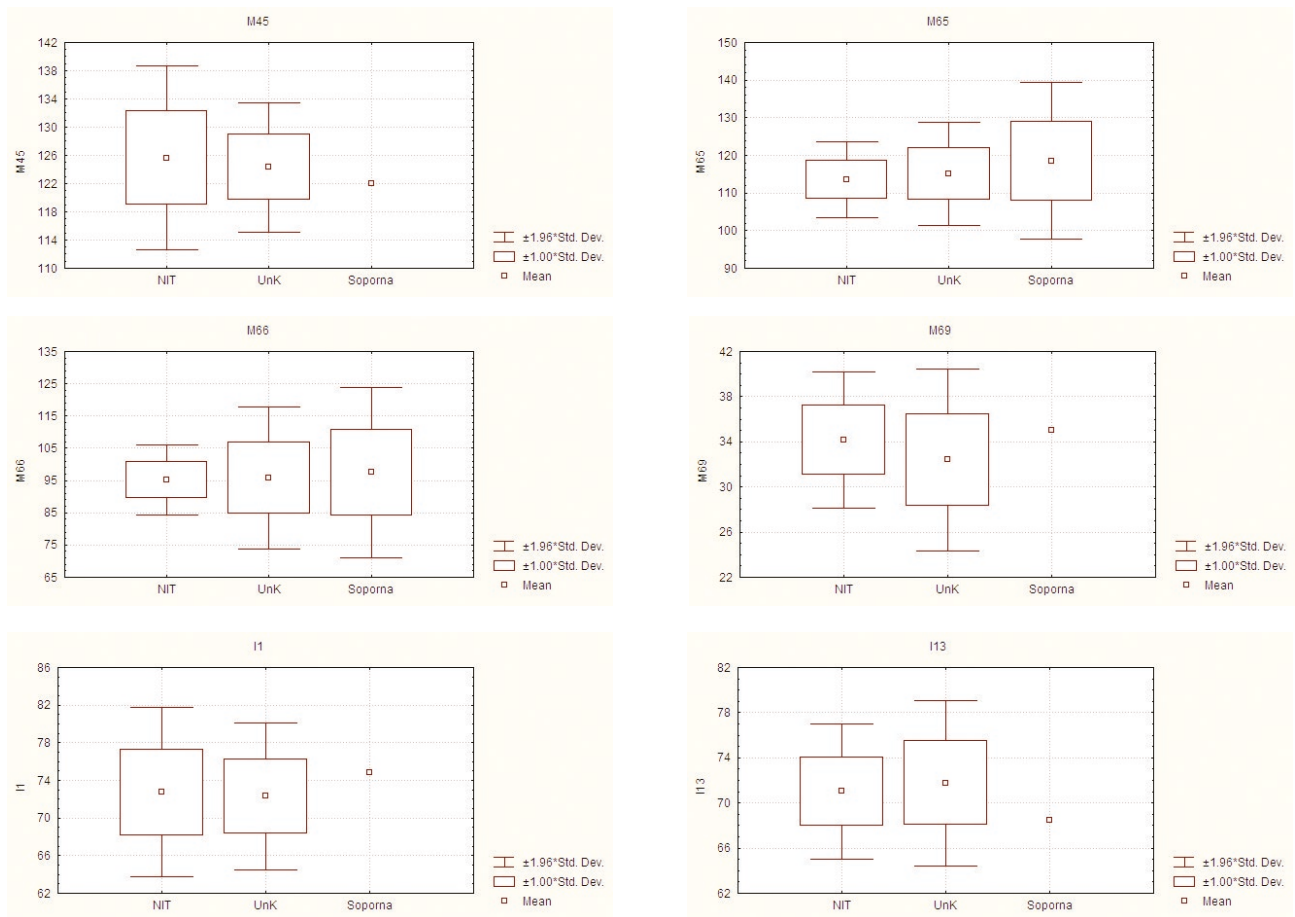


Fig. 22b. Šoporňa cemetery. Comparison of some cranial data indexes with the Early Bronze Age database considering the territory of the Czech Republic and Slovakia: UnK - Únětice Culture (24 individuals from Bučovice, Holešov, Prušánky, Rebešovice), NIT - Nitrianska Culture (26 individuals from Holešov, Vyčapy-Opatovce, Blatné, Zohor); Std. Dev. – Standard Deviation, data in Table 5.

Obr. 22b. Šoporňa. Porovnanie niektorých mier a indexov lebiek s databázou zo staršej doby bronzovej z územia Česka a Slovenska: UnK – únětická kultura (24 jedincov z lokalít Bučovice, Holešov, Prušánky, Rebešovice), NIT – nitrianska kultúra (26 jedincov z lokalít Holešov, Vyčapy-Opatovce, Blatné, Zohor); Mean – priemer, Std. Dev. – smerodajná odchýlka, údaje v tab. 5.

Spondylarthrosis was found in two individuals (5/09, 9/09), in one case (9/09) with other arthrotic changes in the bones. Two juvenile boys (11/09, 12/09) show visible traces of excessive irritation of the muscle attachment relief, caused probably by physical strain. There is a visible *crista musculi supinatorius* in boy 12/09 and in female 8/09, which could have been caused by long-term rotational movement of the forearm.

There are traces of possible injuries or intentional shattering of skulls in the male 7/09 and juvenile boy 11/09, in one case (7/09) there are also visible similar traces in the femur diaphysis and in one case (12/09) in the humeral one.

### Conclusion

According to the  $^{14}\text{C}$  AMS dating of grave 5/09 (2022–1897 calBCE; PSUAMS-4007), the population of Šoporňa lived in the Early Bronze Age, which is consistent with the archaeological and chronometric analysis, according to which it represents the Únětice culture of the 20th to the 1st half of the 19th century B.C. (Bartík 2018; Barta 2018).

Of the total 14 discovered grave sets, we were able to examine 14 individuals, of which four (28.57%) are juveniles and ten (71.43%) are adults. Despite relatively damaged skeletal remains, we could determine the sex in as many as ten individuals due to the DNA analysis. There are six males (i.e. 42.85%), as well as six females, while two (14.29%) adult individuals that could not be identified in closer detail. In the graves of three individuals, remains of animal bones were found (grave 6/09 of older female – *Ovis/Capra*, grave 10/09 of an adult individual – *Bos primigenius f. taurus* and grave 11/09 of juvenile male – *Canis lupus f. familiaris*).

It is unusual that younger children are missing in this population. The age of four (28.57%) juvenile individuals ranges in the category of infans II/juvenis. Most individuals (six, i.e. 42.85%) belong to a group of older adults (35–60+ years), with predominant number of females (four, i.e. 28.57%). There were no younger females.

According to the layout of graves, females seem to have been buried mostly in the northeastern part, while the males were buried in the southwestern parts. The juveniles were located at the border of the above mentioned areas.

Grave	Sex morph.	Sex aDNA	Age	Category	Category II	Mt aDNA	1	2	3	4	5	6	7	8	9	10	Notes
1/09	?	male	55-65+	adult	mat/senilis	T2									x		
2/09	?	–	?	adult	?	–											
3/09	?	female	12-18	immature	infans II/juv	I1a1a		x									
4/09	?	male	15-25	young	juv/adultus I	I1a1a											
5/09	male	male	50-59	adult	maturus II	I1a1	x	x	x	x	x	x					a
6/09	female	–	40-59	adult	maturus	–											
7/09	male	–	20-29	adult	adultus	–		x					x				b
8/09	female	female	35-45	adult	adult II/mat I	T2, T2f			x	x					x		c
9/09	female	female	35-45	adult	adult II/mat I	I1a1	x			x		x		x	x		d
10/09	?	–	?	adult	?	–											e
11/09	male?	male	10-15	immature	infans II/juv	T2c1d+152		x					x			x	
12/09	?	male	12-18	immature	infans II/juv	I1a1a		x					x		x	x	f
13/09	female	female	55-65+	adult	mat/senilis	I1a1									x		
14/09	immature	female	12-18	immature	infans II/juv	N1a1a2	x									x	

Table 7. Šoporňa cemetery. Skeletal varieties and pathological changes. 1 – *cribra orbitalia*, 2 – enamel hypoplasia, 3 – tartar, 4 – *parodontitis*, 5 – teeth with artificial features, 6 – *spondylarthrosis*, 7 – possible anthropogenic interventions, 8 – *arthrosis*, 9 – green colouring, 10 – excessive relief of muscle insertions; Notes: a – wavy edge on I, enamel pearl on 3M, b – right lower C slightly rotated inward, c – *crista musculi supinatorius*, d – *foveolae granulares* (Pacchioni granulations), e – circular holes in the proximal tibia dx. epiphysis, f – significant *tuberculum dentale* on I<sup>2</sup>, lesion on the surface of the atlas in the area of the *fovea articularis superior* dx., *crista musculi supinatorius*. Explanations: Sex morph. – sex determined morphologically, Sex aDNA – sex determined using aDNA, green – determined sex.

Tab. 7. Šoporňa. Odchýlky a patologické zmeny na kostrych pozostatkoch. 1 – *cribra orbitalia*, 2 – hypoplázia na zuboch, 3 – zubný kameň, 4 – *parodontitis*, 5 – zuby s arteficiálnymi zásahmi, 6 – *spondylarthrosis*, 7 – pravdepodobné antropogénne zásahy, 8 – *arthrosis*, 9 – zelené sfarbenie, 10 – nadmerný reliéf svalových úponov; Poznámky: a – vlnkovitý okraj na I, sklovinová perla na 3M, b – pravý dolný C mierne rotovaný dovnútra, c – *crista musculi supinatorius*, d – *foveolae granulares* (Pacchionioho granulácie), e – kruhové otvory na proximálnej epífyze tibia dx., f – na I<sup>2</sup> výrazné *tuberculum dentale*, na povrchu atlasu v oblasti *fovea articularis superior* dx. lézia, *crista musculi supinatorius*. Výsvetlivky: sex morph. – pohlavie určené morfoskopicky, Sex aDNA – pohlavie určené pomocou starobylej (ancient) DNA, zelená – určené pohlavie.

In the Únětice culture of Šoporňa population, six types of mitochondrial haplogroups were found: N1a1a1a2, I1a1, I1a1a, T2, T2c1d+152 a T2f. Basically, they belong to two basic cladogenetic groups. One group includes N1a and I (i.e. N1a1b2) and the second includes T group. Haplogroup I forms significant components in the late Neolithic period and in the Early Bronze Age, while the Mt haplogroup T2 can also be found in the Únětice culture populations. Interestingly enough, the first degree family relationship (parent/offspring/siblings) was found between an older male from grave 5 and an older female from grave 13.

Incomplete craniometric data was obtained only from five individuals, most of which were obtained from the older male buried in the grave 5/09. Comparison with categories defined in databases shows that his skull can be characterized as long and medium wide, with a great maximum frontal width and a very small biauricular width. Horizontal circumference of the skull is small but the transversal arch is large. Dimensions of skull are similar to the dimensions of skulls from other similarly dated series.

Only partial metric data from the post-cranial skeletons were obtained in eight individuals. We could identify the height in two females and two males. They turned out to be relatively tall, just like the individuals in other Early Bronze Age burial sites.

From the health point of view, it was possible to identify *cribra orbitalia* in three individuals. Teeth altered by dysplasia of enamel were found in three males and two females, while in three individuals exposure of roots is visible (*parodontitis*). There are characteristic signs of “food stress” in at least half of all individuals. The enamel of the preserved first left upper incisor in the older male from the grave 5/09 was artificially abraded in a wavy shape, while on his left upper <sup>3</sup>M is an enamel pearl.

Spondylarthrosis was found in two individuals, of which one individual showed signs of other arthrotic changes. There are visible traces of excessive physical strain in two juvenile boys. In two individuals, a distinct *crista musculi supinatorius* is visible on the ulnae, which could have been caused by intense rotational movement of the forearm.

Three males show traces of possible injuries on their skulls, in one case accompanied by shattering of the humeral diaphysis, while in other case the femur was shattered.

### Acknowledgements

DNA analysis and <sup>14</sup>C AMS dating were completed with the support of the ERC (European Research Council) project “From the Earliest Modern People to the Onset of Farming (45,000–4,500 BP): the role of climate, lifestyle, health, migration and selection in shaping European population history”, ADNABIOARC, Project ID: 263441, ERC-2010-StG\_20091209.

We wish to express our gratitude to František Engel for the photographic cooperation and to Radoslav Čambal for his assistance with the graphic design.

### LITERATURE

- Acsádi/Nemeskéri 1970 – Gy. Acsádi/J. Nemeskéri: History of Human Life Span and Mortality. Budapest 1970.
- Aleksejev/Debec 1964 – V. P. Aleksejev/G. F. Debec: Kranimetrija, metodika antropoloških issledovanij. Moskva 1964.
- Allentoft et al. 2015 – M. E. Allentoft/M. Sikora/K. G. Sjögren/S. Rasmussen/M. Rasmussen/J. Stenderup/.../A. S. Malaspinas: Population genomics of Bronze Age Eurasia. Nature 522, 2015, 167-172, doi:10.1038/nature14507.
- Bach 1965 – H. Bach: Zur Berechnung der Körperhöhe aus den langen Gliedmassenknochen weiblicher Skelette. Anthrop. Anz. 20, 1965, 12-21.
- Barta 2018 – P. Barta: Radiocarbon dating of graves 1/08 and 5/09 from the Únětice culture cemetery in Šoporňa (dist. Galanta, Slovak Republic). Zborník SNM 111, Arch. 28, 2018, 77-83.
- Bartík 2018 – J. Bartík: Pohrebisko zo staršej doby bronzovej v Šoporni. Zborník SNM 112, Arch. 28, 2018, 21-46.
- Bartík/Šefčáková 2004 – J. Bartík/A. Šefčáková: Hrob so šálkou protoúněticej kultúry z Blatného, okr. Bratislava-vidiek, Slovensko. In: E. Kazdová/Z. Měřínský/K. Šabatová (Eds.): K počtě Vladimíru Podborskému. Brno 2004, 235-239.
- Brandt et al. 2013 – G. Brandt/W. Haak/Ch. J. Adler/Ch. Roth/A. Szécsényi-Nagy/S. Karimnia/.../ The Genographic Consortium: Ancient DNA Reveals Key Stages in the Formation of Central European Mitochondrial Genetic Diversity. Science 342, 2013, 257-261.
- Bräuer 1988 – G. Bräuer: Osteometrie. In: R. Knussmann (Ed.): Anthropologie: Handbuch der vergleichenden Biologie des Menschen. Band I, 1. Teil. Stuttgart – New York 1988, 160-232.
- Brůžek/Likovský/Černý 2002 – J. Brůžek/J. Likovský/V. Černý: Současné metody biologické antropologie a jejich využití při hodnocení kostry přisuzované českému knížeti Spytihněvovi I. Archeologické rozhledy LIV, 2002, 439-456.
- Buikstra/Ubelaker 1994 – J. E. Buikstra/D. H. Ubelaker (Eds.): Standards for Data Collection from Human Skeletal Remains. Arkansas Archeological Survey Research Series 44, 1994, 205 pp.
- Fazekas/Kósa 1978 – I. Gy. Fazekas/F. Kósa: Forensic Fetal Osteology. Budapest 1978.
- Ferembach/Schwidetzky/Stloukal 1979 – D. Ferembach/I. Schwidetzky/M. Stloukal: Empfehlungen für die Alters- und Geschlechtsdiagnose am Skelett. Homo 30(2), 1979, 1-32.
- Finnilä/Lehtonen/Majamaa 2001 – S. Finnilä/M. S. Lehtonen/K. Majamaa: Phylogenetic Network for European mtDNA. Am. J. Hum. Genet. 68, 2001, 1475-1484.
- Finnilä/Majamaa 2001 – S. Finnilä/K. Majamaa: Phylogenetic analysis of mtDNA haplogroup TJ in Finnish population. J. Hum. Genet. 46, 2001, 64-69.

- Hukelova 2016* – Z. Hukelova: Comparative osteoarchaeological perspectives on health and lifestyle of Neolithic, Chalcolithic and Early Bronze Age populations from Slovakia, Moravia and Bohemia. (Unpublished dissertation; depon.: The University of Edinburgh). Edinburgh 2016.
- Martin/Saller 1957* – R. Martin/K. Saller: Lehrbuch der Anthropologie in systematischer Darstellung. Band I. Stuttgart 1957.
- Masnicová/Miklíková/Beňuš 2010* – S. Masnicová/Z. Miklíková/R. Beňuš: Rekonštrukcia podoby tváre muža a ženy zo staršej doby bronzovej. Študijné zvesti AÚ SAV 45, 2010, 61-89.
- Mathieson et al. 2018* – I. Mathieson/S. Alpaslan-Roodenberg/C. Posth/A. Szécsenyi-Nagy/N. Rohland/S. Mallick/.../D. Reich: The genomic history of southeastern Europe. *Nature* 555, 2018, 197-201, doi: 10.1038/nature25778.
- Miklíková 2000* – Z. Miklíková (Bielichová): Antropologický posudok VS 14434/2000 – Pata-Diely. (Výskumná správa, ms.; depon.: Dokumentácia AÚ SAV Nitra). Nitra 2000, 111.
- Miklíková 2001* – Z. Miklíková: Pohrebisko zo staršej doby bronzovej v Pate na juhozápadnom Slovensku. I. Pohlavie a vek. *Bull. Slov. Antropol. Spol.* 4, 2001, 126-130.
- Montiel/Malgosa/Francalacci 2001* – R. Montiel/A. Malgosa/P. Francalacci: Authenticating Ancient Human Mitochondrial DNA. *Hum. Biology* 73(5), 2001, 68-713.
- Olivier et al. 1978* – G. Olivier/C. Aaron/G. Fully/R. Tissier: New Estimations of Stature and Cranial Capacity in Man. *J. Hum. Evol.* 7(6), 1978, 513-518.
- Pinhasi et al. 2015* – R. Pinhasi/D. Fernandes/K. Sirak/M. Novak/S. Connel/S. Alpaslan-Roodenberg/.../M. Hofreiter: Optimal Ancient DNA Yields from the Inner Ear Part of the Human Petrous Bone. *PLoS ONE* 10(6), 2015: e0129102. doi:10.1371. doi:10.1371/ journal.pone.0129102.
- Rösing 1988* – F. W. Rösing: Körperhöhenrekonstruktion aus Skelettmassen. In: R. Knussmann (Ed.): *Anthropologie: Handbuch der vergleichenden Biologie des Menschen*. Band I, 1. Teil. Stuttgart – New York 1988, 586-600.
- Simoni et al. 2000* – L. Simoni/F. Calafell/D. Pettener/J. Bertranpetit/G. Barbujani: Geographic Patterns of mtDNA Diversity in Europe. *Am. J. Genet.* 66, 2000, 26-278.
- Sjøvold 1988* – T. Sjøvold: Geschlechtsdiagnose am Skelett. In: R. Knussmann (Ed.): *Anthropologie: Handbuch der vergleichenden Biologie des Menschen*. Band I, 1. Teil. Stuttgart – New York 1988, 444-480.
- Sjøvold 1990* – T. Sjøvold: Estimation of stature from long bones utilizing the line of organic correlation. *J. Hum. Evol.*, 5(5), 1990, 431-447.
- Stloukal/Hanáková 1978* – M. Stloukal/H. Hanáková: Die Längsknochen altslawischer Bevölkerungen unter besonderer Berücksichtigung von Wachstumsfragen. *Homo* 29, 1978, 53-69.
- Szilvássy 1988* – J. Szilvássy: Altersdiagnose am Skelett. In: R. Knussmann (Ed.): *Anthropologie: Handbuch der vergleichenden Biologie des Menschen*. Band I, 1. Teil. Stuttgart – New York 1988, 421-443.
- Šefčáková 2014* – A. Šefčáková: Antropologická analýza pohrebiska nitrianskej kultúry zo Zohora, okr. Malacky. *Slov. Archeol.* LXII(2), 2014, 293-314.
- Thurzo 1978* – M. Thurzo: A Survey of Anthropological Researches of the Bronze age realized in Slovakia. *Anthropologie* XVI/2, 1978, 123-126.
- Tichá/Hanulík 1971* – I. Tichá/M. Hanulík: Antropológia kostrových hrobov maďarovskej kultúry v Majcichove pri Seredi. *Acta F. R. N. Univ. Comen. – Anthropologia* XVI, 1971, 161-175.
- Ubelaker 1989* – D. H. Ubelaker: The Estimation of Age at Death from Immature Human Bone. In: Işcan, M.Y. (Ed.): *Age Markers in the Human Skeleton*. Springfield – Illinois 1989, 55-70.

# ANTROPOLOGICKÁ A GENÓMOVÁ ANALÝZA POHREBISKA ÚNĚTICKEJ KULTÚRY ZO ŠOPORNE (OKR. GALANTA, SLOVENSKÁ REPUBLIKA)

ALENA ŠEFČÁKOVÁ – MILAN THURZO – RON PINHASI – DAVID REICH

Antropologickej analýze sa podrobili ľudské kostrové pozostatky z časti pohrebiska zo staršej doby bronzovej – únětickej kultúry zo Šoporne, z polohy „Prvé Dlhé“ (okr. Galanta, 48,223 N, 17,836 E) na južnom Slovensku, ktoré archeologicky preskúmal J. Bartík. Nemožno však vylúčiť, že ide o celistvé malé pohrebisko.

Pohlavie a vek jedincov sa hodnotili štandardnými antropologickými metódami; metrické údaje sa porovnali s údajmi z iných pohrebísk z podobného obdobia.

V rámci medzinárodného genetického projektu ERC (European Research Council) „From the earliest modern humans to the onset of farming (45,000 – 4,500 BP)“ boli v roku 2016 odobrané vzorky aj z tohto pohrebiska, takže výsledky DNA analýzy úspešne doplnili základné antroposkopické a metrické zistenia. Navyše sa realizovalo rádiokarbónové datovanie.

Vzorky na analýzu sa odoberali zo skalných kostí (*pars petrosa s. pyramis*) – súčasti spánkovej kosti (*os temporale*), v prípade ich neprítomnosti sa použili moláre. Vzorky boli pripravované v Laboratóriu na starobylú DNA University College v Dubline a neskôr spracované na Harvard Medical School v Bostone podľa súčasných zaužívaných metódik na analýzu genómových údajov.

Determinovali sa Y-chromozóm (okrem iného na určenie pohlavia) a mitochondriálne haploskupiny s cieľom bližšie charakterizovať jedincov tejto populácie.

## Datovanie <sup>14</sup>C AMS

Vzorka na <sup>14</sup>C AMS datovanie bola odobraná od jedinca z hrobu 5/09 (muž vo veku maturus II) a datovanie sa uskutočnilo v Penn State Radiocarbon <sup>14</sup>C laboratory (Penn State University, Pennsylvania). Získaný výsledok 3600 ± 20 BP (PSUAMS-4007) zodpovedá kalibrácii 2022 – 1897 calBCE. Tento údaj spadá do staršej doby bronzovej a zodpovedá výsledkom archeologickej a chronometrickej analýzy, že populácia zo Šoporne patrila k únětickej kultúre.

## Základné paleodemografické údaje

Celkovo sa podarilo preskúmať 14 jedincov, z ktorých sú štyria nedospelí (28,57 %) a desať dospelých (71,43 %; tab. 1a, b; obr. 20a, b). Kostrové pozostatky sú však pomerne poškodené, vo viacerých prípadoch fragmentárne, pričom je niekedy narušený a obrúsený aj ich povrch. Toto veľmi sťažilo morfoskopické a metrické vyhodnotenie a získanie potrebných informácií. Vďaka analýze DNA sa podarilo jednoznačne určiť pohlavie až u desiatich jedincov. Pohlavie dvoch individuí bolo odhadnuté morfoskopicky. Zo 14 jedincov je šesť žien (42,85%), šesť mužov (42,85%) a dvaja dospelí jedinci sú bližšie neidentifikovateľní (14,29%).

Z mladších individuí najviac kostrových pozostatkov patrilo nedospelým vo veku infans II/juvenis (štyri t.j. 28,57 %, z toho dvaja chlapci, dve dievčatá). Medzi mladších dospelých bol pri redukcii kategórií zaradený jeden muž (7,14 %) vo veku juvenis/adultus I (15 – 25 r.) a jeden (7,14%) vo veku adultus I (20 – 29 r.). Mladšie ženy neboli prítomné.

Zo šiestich starších dospelých (štyri ženy, dvaja muži), dve ženy zomreli vo veku adultus II/maturus I (35 – 45 r.), jedna žena vo veku maturus (40 – 59 r.) a jedna vo veku maturus/senilis (55 – 60+ r.) (tab. 1a, b). Jeden muž zomrel vo veku maturus II (50 – 59 r.), jeden muž vo veku senilis (60+ r.) a u dvoch dospelých sa vek nepodarilo bližšie určiť.

Pomerne zaujímavé je, že v tejto preskúmanej časti zrejme väčšieho pohrebiska chýbajú mladšie deti, najnižší vek nedospelých sa pohybuje v kategórii infans II/juvenis (štyri t.j. 28,57 %). Najviac jedincov (šesť t.j. 42,85 %) pochádza zo skupiny starší dospelí (35 – 60+ r.), z ktorých výrazne prevažujú ženy (štyri t.j. 28,57 %; obr. 20a, b).

Pri pohľade na usporiadanie hrobov bez ohľadu na polohy tiel v hroboch (obr. 21) sa zdá, že ženy (hroby 3, 8, 9, 13, 14) boli pochovávané najmä v severovýchodnej časti a muži (hroby 1, 4, 5, 7, 11, 12) v juhozápadnej časti. Výnimkou je hrob 6 staršej ženy. Nedospelí (hroby 3, 11, 12, 14) boli pochovaní na hranici týchto polôh.

V hroboch troch jedincov sa našli zvyšky zvieracích kostí (hrob staršej ženy 6/09 – *Ovis/Capra*, hrob dospelého 10/09 – *Bos primigenius f. taurus* a hrob dospievajúceho muža 11/09 – *Canis lupus f. familiaris*).

## Genetické určenie pohlavia a mitochondriálne haploskupiny

Pohlavie a mitochondriálne haploskupiny sa podarilo geneticky určiť u desiatich individuí (päť mužov a päť žien; tab. 2). V prípade jedincov 2, 6 a 10 boli poškodené kostry zachované iba čiastočne, bez potrebných častí lebiek. U deviatich individuí bolo možné odobrať vzorky zo skalnej kosti a v prípade dvoch (jedinci 4 a 8) sa použili zuby – moláre.

Analýzou DNA sa zistilo prvostupňové príbuzenstvo (rodič/potomok/súrodenci) medzi starším mužom 5 a staršou ženou 13. Muž zomrel vo veku matusus II, kým žena je o čosi staršia (matusus/senilis). Vekovo sú si podobní, čiže by mohli byť súrodencami. Keďže však nie je jasné, v akom časovom rozpätí boli pochovaní, nemožno vylúčiť ani vzťah rodič – potomok.

V tejto skupine populácie únětickej kultúry zo Šoporne sa zistilo šesť typov mitochondriálnych haploskupín: N1a-1a1a2, I1a1, I1a1a, T2, T2c1d+152 a T2f. V podstate patria do dvoch základných kladogenetických skupín. Jedna zahŕňa N1a a I (t.j. N1a1b2) a druhá skupinu T. Haploskupina I pozostáva z dvoch podklasterov I1 a I2.

Najviac jedincov (šesť) zo Šoporne má haploskupinu I1a1, ktorú bolo možné u troch z nich skonkretizovať na I1a1a. U jedného človeka sa našla N1a1a1a2. Traja jedinci majú haploskupinu T2, pričom v jednom prípade ide o T2c1d+152 a v jednom o T2f.

Zaujímavá situácia nastala v prípade ženy 8/09, u ktorej sa najprv analyzovala mtDNA z molára (T2) a až neskôr sa zistilo, že k jej kostre patrí lebka pôvodne z hrobu 7/09. Z lebky bola nezávisle analyzovaná mtDNA odobraná zo skalnej kosti, pričom sa ju podarilo určiť ešte presnejšie (T2f).

Haploskupina I patrí medzi výrazné komponenty v období neskorého neolitu a skorej doby bronzovej. V rámci únětickej kultúry patrí mt-haploskupina I1a1 medzi najčastejšie. U moderných populácií sa I haploskupina vyskytuje zhruba u 2,8 %. V súčasnosti sa N1a1a1a2 našla na Sibíri u Burjatov a I1a1a v oblasti severo-východnej Európy.

Mt-haploskupinu T2 je možné tiež nájsť u populácií únětickej kultúry. T2c sa v súčasnosti vyskytuje na Blízkom východe a v oblasti mediteránnej Európy. Vlastná T-haploskupina sa pomerne bežne vyskytuje u moderných európskych populácií. Pozostáva z dvoch podklasterov T1 a T2. Kým haploskupina T2c1d je typická pre Taliansko (Sardínia), Španielsko a Irán (Qashqai), T2f sa vyskytuje najmä v centrálnej a východnej Európe.

### Metrické údaje

Neúplné kranio-metrické údaje sa podarilo získať iba od piatich jedincov, z toho najviac od muža 5/09 a iba veľmi torzovité od troch žien (8/09, 9/09, 13/09) a mladšieho muža 4/09 (tab. 3).

Porovnaním s databázou možno presnejšie charakterizovať iba tvar lebky muža z hrobu 5: dlhá (M1) so stredne širokou mozgovňou (M8), s veľkou najväčšou šírkou čela (M10) a veľmi malou biaurikulárnou šírkou (M11). Horizontálny obvod lebky (M23) je malý, ale priečny oblúk veľký (M24). Podľa dĺžkovo-šírkového indexu (I 1) je lebka dolichokranná (dlhá) a podľa transverzálneho frontoparietálneho indexu (I 13) metriometopná.

Rozmery najmä najzachovanejšej, hoci poškodenej mužskej lebky 5/09 sa čiastočne podobajú rozmerom lebiek z iných podobne datovaných sérií. Pre únětickú populáciu z pohrebiska Pata (okr. Galanta), ktoré sa dokonca nachádza blízko Šoporne a odkiaľ bolo analyzovaných 241 jedincov, je pre mužov aj ženy charakteristická dlhá, vysoká a úzka mozgová časť lebky. Tvárová časť lebky je stredne vysoká a úzka.

Podľa analýzy väčšieho súboru zo staršej doby bronzovej z lokalít Branč, Matúškovo, Abrahám a Zohor (patriaceho však do nitrianskej kultúry), možno túto populáciu charakterizovať ako dolichokrannú až mezokrannú, orthokrannú až hypsikrannú, metriokrannú až akrokrannú, eury-metopnú až metriometopnú, mezokonchnú s tendenciou k chamaekonchnosti a chamaerhinnú s tendenciou k mezorhinnosti.

Pri orientačnom porovnaní pomerne malého počtu mier lebiek zo Šoporne s referenčnou databázou zo staršej doby bronzovej (tab. 4) sú tieto lebky o niečo dlhšie (tab. 4, obr. 22a, b). K dispozícii je iba jeden údaj dĺžkovo-šírkového indexu (I 1), ktorý zodpovedá dolichokrannosti a nevybočuje z variability starobronzových populácií (tab. 4, obr. 22a, b) podobne ako ostatné metrické údaje. Zaujímavosťou je výrazný veľmi veľký temenný oblúk (M28) muža 5/09.

Iba neúplné metrické údaje z postkranialneho skeletu sa podarilo získať od štyroch žien (6/09, 8/09, 9/09, 13/09), troch mužov (1/09, 4/09, 5/09) a jedného bližšie neidentifikovateľného dospelého jedinca (10/09) (tab. 5). Podľa dĺžkovo-hrúbkového indexu (H7 : H1), zisteného iba u dvoch jedincov (muž 4/09 a žena 8/09), majú obaja ramenné kosti stredne robustné. Muž 4/09 má ramenné kosti eurybrachické, zatiaľ čo ostatní platybrachické.

Pokiaľ ide o dolné končatiny, podľa dĺžkovo-hrúbkového indexu (F8 : F2) má žena 8/09 ľavú zachovanú stehnovú kosť gracilnú a žena 9/09 pravú stredne robustnú. U dvoch jedincov sa na femure nenachádza pilaster, u troch je slabý až stredne vytvorený, kým u jedného individua sa na pravom femure pilaster nenachádza a na ľavom je slabý. U troch jedincov je femur platymerný a u troch až hyperplatymerný. V prípade tibií má jedna žena tibiie mesoknemné a ďalší štyria jedinci platyknemné.

Výšku sme mohli vypočítať u štyroch jedincov – dvoch žien (8/09, 9/09) a dvoch mužov (4/09, 5/09) (tab. 6). Ukázalo sa, že traja ju mali nadstrednú a najmladší jedinec (muž) strednú (možno ešte nedokončený rast). Zdá sa, že ľudia zo Šoporne boli skôr vyšší ako nižší, čo zodpovedá aj únětickej populácii z Paty, kde muži boli priemerne vysokí 170 cm a ženy 160 cm.

Výšky jedincov z pohrebísk nitrianskej kultúry z lokalít Branč, Matúškovo, Abrahám a Zohor u mužov varírujú v širokom rozpätí kategórií podstredná až nadstredná a u žien stredná až vysoká.

### Zdravotný stav

Z celkového počtu 14 jedincov (tab. 7) bolo *cribra orbitalia* možné identifikovať u staršieho muža (5/09), staršej ženy (9/09) a u nedospelaj ženy (14/09). U muža 5/09 sa vyskytuje aj hypoplázia skloviny na zuboch a odhalenie zubných krčkov. Celkovo sú zuby pozmenené dyspláziou skloviny (hypopláziou) u troch mužov (5/09, 7/09, 11/09) a dvoch žien (3/09, 12/09), a u troch jedincov (5/09, 8/09, 9/09) sú odhalené zubné krčky (*parodontitis*). *Cribra orbitalia* a hypoplázia sú znakmi poruchy metabolizmu resp. potravinového stresu. V populácii zo Šoporne sa tieto znaky objavujú minimálne u siedmich jedincov.

Muž 5/09 má na okraji zachovaného prvého horného ľavého incíziu sklovinu arteficiálne obrúsenú do tvaru vlnovky, kým na ľavej hornej <sup>3</sup>M má sklovinovú perlu.

U dvoch jedincov (5/09, 9/09) sa zistila spondylartróza, v jednom prípade (9/09) spolu s artrotickými zmenami na dlhých kostiach. U dvoch nedospelých chlapcov (11/09, 12/09) sú evidentné stopy po nadmernom dráždení reliéfov svalových úponov zrejme fyzickou záťažou. U chlapca 12/09 a u ženy 8/09 možno pozorovať na ulnách nápadnú *crista musculi supinatorius*, čo mohol spôsobiť dlhodobjší rotačný pohyb predlaktím.

U dospelého muža 7/09 a nedospelých chlapcov 11/09 a 12/09 sa na lebkách, v jednom prípade (7/09) aj na femure a v jednom (12/09) na ramennej kosti, vyskytujú stopy po možných poraneniach resp. po ich zámerných roztriešteniach.

### Poďakovanie

DNA analýza a <sup>14</sup>C AMS datovanie boli realizované s podporou projektu ERC (European Research Council) „From the earliest modern humans to the onset of farming (45,000 – 4,500 BP): the role of climate, life-style, health, migration and selection in shaping European population history“, ADNABIOARC, Project ID: 263441, ERC-2010-StG\_20091209.

Ďakujeme Františkovi Engelovi za fotografickú spoluprácu a Radoslavovi Čambalovi za grafickú pomoc.

Alena Šefčáková  
Slovenské národné múzeum, Prírodovedné múzeum  
Vajanského nábr. 2  
P. O. BOX 13, 810 06 Bratislava 16, Slovakia  
alena.sefcakova@snm.sk

Milan Thurzo  
Hrabová 12  
904 36 Hamuliakovo, Slovakia  
milanthurzo@gmail.com

Ron Pinhasi  
Earth Institute, University College Dublin  
Dublin 4, Ireland  
Department of Anthropology, University of Vienna  
Vienna 1090, Austria  
ron.pinhasi@univie.ac.at

David Reich  
Department of Genetics, Harvard Medical School  
Boston, Massachusetts 02115, USA  
Broad Institute of MIT and Harvard  
Cambridge, Massachusetts 02142, USA  
Howard Hughes Medical Institute, Harvard Medical School  
Boston, Massachusetts 02115, USA  
reich@genetics.med.harvard.edu



## SKRATKY ČASOPISOV A PERIODÍK ABKÜRZUNGEN VON ZEITSCHRIFTEN UND PERIODIKA

- Acta Arch. Acad. Scien. Hungaricae = Acta Archaeologica Academiae Scientiarum Hungaricae. Budapest  
 Acta Mus. Napocensis = Acta Musei Napocensis. Cluj  
 Acta Praehist. et Arch. = Acta Praehistorica et Archeologica. Berlin  
 AlbaReg = Alba Regia. Annales musei Stephani Regis. Székesfehérvár  
 Altschlesien = Altschlesien. Mitteilungen des Schlesischen Altertumsvereins. Breslau  
 AnnNMWien = Annalen des Naturhistorischen Museums in Wien. Wien  
 Anodos = Anodos. Studies of the ancient World. Trnava.  
 ANTAEUS = ANTAEUS. Mitteilungen des Archäologischen Instituts der Ungarischen Akademie der Wissenschaften. Budapest  
 AMAF = Archaeologia Medii Aevi Finlandiae. Turku  
 Arh. Vestnik = Arheološki Vestnik. Ljubljana  
 Arch. Österreichs = Archäologie Österreichs. Wien  
 Arch. Ért. = Archaeologiai Értesítő. Budapest  
 Arch. Austriaca = Archaeologia Austriaca. Beiträge zur Paläoanthropologie, Ur- und Frühgeschichte Österreichs. Wien  
 Arch. Hist. = Archaeologia Historica. Brno  
 Arch. Korrb. = Archäologisches Korrespondenzblatt. Urgeschichte, Römerzeit, Frühmittelalter. Mainz am Rhein  
 Arch. Rozhledy = Archeologické Rozhledy. Praha  
 Arch. Střední Čechy = Archeologie ve středních Čechách. Praha  
 ARS = ARS. Bratislava  
 ASM = Archeologické studijní materiály. Praha  
 AVANS = Archeologické výskumy a nálezky na Slovensku. Nitra  
 AZČ = Archeologie západních Čech. Plzeň  
 Balneol. Sprav. = Balneologický spravodajca. Piešťany  
 BAR. = British Archaeological reports. Oxford  
 Ber. RGK = Bericht der Römisch-Germanischen Kommission. Frankfurt am Mainz  
 BpR = Budapesti Regisegei. Budapest  
 Carnuntum Jahrb. = Carnuntum Jahrbuch. Wien  
 Commun. Arch. Hungariae = Communicationes Archaeologicae Hungariae. Budapest  
 Časopis Moravského Mus. = Časopis Moravského Musea v Brně. Brno  
 Denarius = Denarius. Bratislava  
 Études celtiques = Études celtiques. Paris  
 Eurasia Antiqua = Eurasia Antiqua: Zeitschrift fuer die Archäologie Eurasiens. Mainz  
 FasArchHist = Fasciculi Archaeologiae Historicae. Warszawa  
 Folia Arch. = Folia Archaeologica. Annales Musei Nationalis Hungarici. Budapest  
 Fol. Num. = Folia Numismatica. Brno  
 FStud = Frühmittelalterliche Studien. Berlin – New York  
 Fundber. Österreich = Fundberichte aus Österreich. Wien  
 Germania = Germania. Anzeiger der Römisch-Germanischen Kommission des Deutschen Archäologischen Instituts. Frankfurt am Mainz  
 Godišnjak Sarajevo = Godišnjak. Centar za balkanološka ispitivanja Akademije nauka i umjetnosti Bosne i Hercegovine. Sarajevo  
 Hist. Čas. = Historický časopis. Bratislava  
 Hist. Zbor. MS = Historický zborník Matice Slovenskej. Martin  
 Chrudimský vlastivědný sborník = Chrudimský vlastivědný sborník. Chrudim  
 Jahrb. RGZM = Jahrbuch des Römisch-Germanischen Zentralmuseums. Mainz  
 Koroze a ochrana materiálu = Koroze a ochrana materiálu. Bulletin AKI. Praha  
 Krásy Slov. = Krásy Slovenska. Bratislava  
 Mat. i Spraw. = Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego. Rzeszów

Mitt. Arch. Inst. Ungar. Akad. = Mitteilungen des Archäologischen Instituts der Ungarischen Akademie der Wissenschaften. Budapest

Mitt. Österr. Num. Ges. = Mitteilungen der Österreichischen Numismatischen Gesellschaft. Wien

Monument revue = Monument revue. Časopis na propagáciu vedeckého poznávania pamiatkového fondu Slovenska. Bratislava

Monumentorum tutela = Monumentorum tutela – Ochrana pamiatok. Bratislava

Musaica Archeologica = Musaica Archeologica. Bratislava

Národná osveta = Národná osveta. Mesačník pre rozvoj miestnej kultúry a záujmovej tvorivosti. Bratislava

NKBud = Numizmatikai Közlöny. Budapest

Num. Časopis = Numizmatický časopis. Praha

Num. Listy = Numismatické listy Numismatické společnosti Československé v Praze. Praha

NumSb = Numizmatický sborník. Praha

NumZ = Numismatische Zeitschrift. Wien

Paleobiology = Paleobiology. Cambridge

Pam. Arch. = Památky Archeologické. Praha

Pam. Múz. = Pamiatky a múzeá. Revue pre kultúrne dedičstvo. Bratislava

Pam. Prír. = Pamiatky a príroda. Metodicko-odborný a informačný časopis. Bratislava

PBF = Prähistorische Bronzefunde. München/Stuttgart

Præhist. = Præhistorica. Praha

Præhist. Zeitschr. = Præhistorische Zeitschrift. Berlin

Pravěk N. Ř. = Pravěk. Nová Řada. Sborník příspěvků moravských a slezských archeologů. Brno

Röm.-Germ. Forsch. = Römisch-Germanische Forschungen. Darmstadt

Sbor. MSS = Sborník Muzeálnej slovenskej spoločnosti. Martin

Sborník Narod. Mus. Praha = Sborník Národního musea v Praze. Praha

Sborník Prací Fil. Fak. Brno = Sborník prací Filosofické fakulty brněnské university. Brno

Situla = Situla. Razprave Narodnega Muzeja v Ljubljani. Ljubljana

Slov. Arch. = Slovenská archeológia. Časopis Archeologického ústavu Slovenskej akadémie vied v Nitre. Nitra

Slov. Num. = Slovenská numizmatika. Nitra.

Slovácko = Slovácko. Národopisný sborník pro Moravskoslezské pomezí. Uherské Hradiště

Stud. Arch. Ústavu ČSAV = Studie Archeologického Ústavu ČSAV. Brno

Studia Arch. slov. mediavalia = Studia archeologia Slovaca medievalia. Bratislava

Studia Hercynia = Studia Hercynia. Journal of the Institute of Classical Archaeology. Praha

Studia Historica Nitriensia = Studia Historica Nitriensia. Nitra

Sudeta = Sudeta. Zeitschrift für Vor- und Frühgeschichte. Reichenberg

Svet Vedy = Svet vedy. Populárno-vedecký mesačník. Bratislava

Štud. Zvesti AÚ SAV = Študijné zvesti Archeologického ústavu Slovenskej Akadémie vied. Nitra

UPA = Universitätsforschungen zur Prähistorischen Archäologie. Bonn

Vjesnik Arh. Muz. Zagreb = Vjesnik Arheološkog Muzeja u Zagrebu. Zagreb

Vlast. Čas. = Vlastivedný časopis. Revue kultúrneho dedičstva Slovenska. Bratislava

VPS = Vznik a počátky Slovanů. Praha

VZP = Vlastivedný zborník Považia. Martin

Wiener Præhist. Zeitschr. = Wiener Præhistorische Zeitschrift. Wien

Zalai Múz. = Zalai Múzeum. Zalaegerszeg

Zbor. SNM. Arch. = Zborník Slovenského národného múzea. Archeológia. Bratislava

Zbor. SNM. Hist. = Zborník Slovenského národného múzea. História. Bratislava

ZČSSA = Zprávy Československé společnosti archeologické při Československé akademii věd. Praha