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# ANTÆUS

*Communicationes ex Instituto Archaeologico  
Academiae Scientiarum Hungaricae*

33/2015

*Sigel: Antaeus*

# ANTÆUS

# 33

*Communicationes ex Instituto Archaeologico  
Academiae Scientiarum Hungaricae*

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Academiae Scientiarum Hungaricae

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Beyond archaeological finds and sites:  
multidisciplinary research projects  
in Hungary

I

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## ABBREVIATIONS

AARGnews	AARGnews. The newsletter of the Aerial Archaeology Research Group (E-Journal)
ABSA	Annual of the British School at Athens (London)
ACSS	Ancient Civilisations from Scythia to Siberia. An International Journal of Comparative Studies in History and Archaeology (Bedfordshire)
AAL	Acta Archaeologica Lovaniensia (Leuven)
ActaArchCarp	Acta Archaeologica Carpathica (Kraków)
ActaArchHung	Acta Archaeologica Hungarica Academiae Scientiarum Hungaricae (Budapest)
ActaMN	Acta Musei Napocensis (Cluj)
AES	Archaeological Exploration of Sardis (Cambridge)
AJA	American Journal of Archaeology (Boston)
Alba Regia	Alba Regia. Annales Musei Stephani Regis (Székesfehérvár)
AmAnt	American Antiquity (Gainesville)
AnAnt	Anatolia Antiqua (Istanbul)
AnatArch	Anatolian Archaeology (Cambridge Journals Online)
Annalen	Annalen. Zoologische wetenschappen (Tervuren/Belgium)
AnSt	Anatolian Studies (Ankara)
Antaeus	Antaeus. Communicationes ex Instituto Archaeologico Academiae Scientiarum Hungaricae (Budapest)
AnthrKözl	Anthropológiai Közlemények (Budapest)
Anthropozoologica	Anthropozoologica (Paris)
Antiquity	Antiquity. A quarterly review of archaeology (Cambridge)
APA	Acta Praehistorica et Archaeologica (Berlin)
AR	Archeologické Rozhledy (Praha)
ArchA	Archaeologia Austriaca (Wien)
Archeometriai Műhely	Archeometriai Műhely. E-journal (Budapest)
Archaeometry	Archaeometry. The Bulletin of the Research Laboratory for Archaeology and the History of Art (Oxford)
ArchÉrt	Archaeologiai Értesítő (Budapest)
ArchHung	Archeologica Hungarica (Budapest)
Arrabona	Arrabona. A Győri Xantus János Múzeum Évkönyve (Győr)
BAH	Bibliothèque Archéologique et Historique (Beirut)
Balcanica	Balcanica. Annuaire de l'Institut des Etudes Balkaniques (Beograd)
Banatica	Banatica (Reșița)
BAR BS	British International Reports, British Series (Oxford)
BAR IS	British International Reports, International Series (Oxford)
BCH Suppl	Supplements au Bulletin de Correspondance Hellénique (Athens)
BudRég	Budapest Régiségei (Budapest)
Byzantion	Byzantion. Revue Internationale des Études Byzantines (Paris)
BZ	Byzantinische Zeitschrift (München)
CEFR	Collection de l'École française de Rome (Roma)
CommArchHung	Communicationes Archaeologicae Hungaricae (Budapest)



Cumania	Cumania. A Bács-Kiskun megyei Múzeumok Közleményei (Kecskemét)
Das Altertum	Das Altertum (Berlin)
DMÉ	A Debreceni Déri Múzeum Évkönyve (Debrecen)
DocPraehist	Documenta Praehistorica (previously: Poročilo...) (Ljubljana)
DOP	Dumbarton Oaks Papers (Washington D.C.)
DOS	Dumbarton Oaks Studies (Washington D.C.)
EJA	European Journal of Archaeology
Ethnographia	Ethnographia (Budapest)
FÖ	Fundberichte aus Österreich (Wien)
FolArch	Folia Archaeologica (Budapest)
FontArchHung	Fontes Archaeologici Hungariae (Budapest)
GCBI	Godišnjak Centra za Balkanološka ispitivanja Akademije Nauka i Umjetnosti Bosne i Hercegovine (Sarajevo)
Germania	Germania. Anzeiger der Röm.-Germ. Kommission des Deutschen Archäologischen Instituts (Mainz)
Helinium	Helinium (Wetteren/Belgium)
Hesperia	Hesperia. Journal of the American School of Classical Studies at Athens (Princeton)
HOMÉ	A Herman Ottó Múzeum Évkönyve (Miskolc)
Homo	Homo, Zeitschrift für die vergleichende Forschung am Menschen. (Göttingen – Berlin – Frankfurt)
IJO	International Journal of Osteoarchaeology
IstMitt	Istanbuler Mitteilungen (Tübingen)
JAMÉ	A nyíregyházi Jósza András Múzeum Évkönyve (Nyíregyháza)
JAS	Journal of Archaeological Science (London)
JÖB	Jahrbuch der Österreichischen Byzantinistik (Graz)
JPMÉ	A Janus Pannonius Múzeum Évkönyve (Pécs)
JRA	Journal of Roman Archaeology (Portsmouth, Rhode Island)
JRA Suppl.	Journal of Roman Archaeology Supplementum Series (Portsmouth, Rhode Island)
JRS	The Journal of Roman Studies (London)
KRMK	A kaposvári Rippl-Rónai Múzeum Közleményei (Kaposvár)
LAA	Late Antique Archaeology (London)
Levant	Levant. Journal of the British School of Archaeology in Jerusalem (London)
MAGW	Mitteilungen der Anthropologischen Gesellschaft (Wien)
MFMA	Monographien zur Frühgeschichte und Mittelalterarchäologie (Innsbruck)
MFMÉ	A Móra Ferenc Múzeum Évkönyve (Szeged)
МИА	Материалы и исследования по археологии (СССР: Ленинград) / Materialy i Issledovanija po Arheologii SSSR (Moskva)
MittArchInst	Mitteilungen des Archäologischen Instituts der Ungarischen Akademie der Wissenschaften (Budapest)
MMMK	A Magyar Mezőgazdasági Múzeum Közleményei (Budapest)
MÖK	Magyar Östörténeti Könyvtár (Szeged – Budapest)
MR/HA	Magyar Régészet / Hungarian Archaeology – E-journal <a href="http://www.hungarianarchaeology.hu/">http://www.hungarianarchaeology.hu/</a> (Budapest)
Muqarnas	Muqarnas: An Annual on the Visual Cultures of the Islamic World (Boston)
Offa	Offa. Berichte und Mitteilungen des Museums Vorgeschichtlicher Altertümer in Kiel (Neumünster)
Opuscula Archeologia	Opuscula Archeologia (Zagreb)

Ősrégészeti Levelek	Ősrégészeti Levelek / Prehistoric Newsletter (Budapest)
Paleo-Aktueel	Paleo-Aktueel (Groningen)
PBF	Prähistorische Bronzefunde (München)
PrilInstArheolZagreb	Prilozi Instituta za arheologiju u Zagrebu (Zagreb)
PZ	Prähistorische Zeitschrift (Berlin – New York)
Radiocarbon	Radiocarbon. Publ. by the American Journal of Science (New Haven)
RCRF	Rei Cretariae Romanae Fautores Acta (Bonn)
RégFüz	Régészeti füzetek (Budapest)
RGZM	Römisch-Germanisches Zentralmuseum (Mainz)
RKM	Régészeti Kutatások Magyarországon – Archaeological Investigations in Hungary (Budapest)
Sargeția	Sargeția, Buletinul Muzeului județean Hunedoara (Deva)
SASTUMA	SASTUMA. Saarbrücker Studien und Materialien zur Altertumskunde (Saarbrücken)
Savaria	Savaria (Szombathely)
SBF CM	Studium Biblicum Franciscarum. Collectio Minor (Jerusalem)
SEMA	Studies in Eastern Mediterranean Archaeology (Turnhout)
SIA	Slovenská Archeológia (Bratislava)
SMK	Somogyi Múzeumok Közleményei (Kaposvár)
Speculum	Speculum. Journal of Medieval Studies (Cambridge, Mass.)
SprawArch	Sprawozdania Archeologiczne (Kraków)
SSz	Soproni Szemle (Sopron)
Starinar	Starinar (Beograd)
StCom	Studia Comitatus. A Ferenczy Múzeum Évkönyve (Budapest)
StudArch	Studia Archaeologica (Budapest)
Századok	Századok. A Magyar Történelmi Társulat folyóirata (Budapest)
Topoi	Topoi. An International Review of Philosophy (Roma)
VAH	Varia Archeologica Hungarica (Budapest)
VMMK	A Veszprém Megyei Múzeumok Közleményei (Veszprém)
WMMÉ	A Wosinsky Mór Múzeum Évkönyve (Szekszárd)
ZalaiMúz	Zalai Múzeum (Zalaegerszeg)

MÁRIA BONDÁR

**THE VÖRS DIADEM: A UNIQUE RELIC  
OF LATE COPPER AGE METALLURGY  
SUPPOSITION, FACT, NEW RESULTS**

**Keywords:** diadem, archeological and non-invasive metal analysis, Late Copper Age, Baden culture

The Vörs diadem came to light in one of the most remarkable Copper Age burials of the Carpathian Basin. I became aware of the many differing contentions regarding the grave while gathering data for my planned book on the burials of the Baden culture in Hungary.<sup>1</sup> The head ornament from Vörs has been variously described as having been made from copper, brass and bronze, and as a hammered and cast metal adornment. Its wearer has been interpreted as a chieftain, a shaman, a man and, more recently, a woman. I also noticed that despite the growing interest in early metallurgy and the proliferation of archaeometallurgical studies, the Vörs diadem is slowly fading from the archaeological literature – it is rarely mentioned in the catalogues of the relevant thematic exhibitions and even studies on early metallurgy seem to be unaware of its very existence.

Thus, it seems important to me to breathe new life into the diadem by re-publishing this remarkable find together with the findings of various archaeometric and other analyses. The overview of previous research on the Vörs diadem is followed by the results of the modern archaeometallurgical analyses and of the physical anthropological examination of the human remains in the hope that the new evidence presented here will contribute to the re-integration of this unique headband into Late Copper Age studies. It has also proved possible to identify, with reasonable accuracy, the exact findspot of the burial with the diadem.

*The discovery of the Late Copper Age graves*

The first report on the finds from Vörs appeared in the 1954 issue of *Archaeologiai Értesítő*: “Vörs (County Somogy, Fonyód District). Three silo pits were dug some 100 m north-east of the so-called farm buildings at the north-eastern end of the village. Three inhumation burials were found in the pits. Owing to the swift reporting of the burials, one of the graves was excavated professionally. Two graves were roughly east to west oriented, and their age could be determined from one of the precisely observed and documented burials. The professionally excavated grave contained a crouched burial laid on the left side with the head aligned to the south-south-east. A 2 cm wide bronze band decorated with *repoussé* knobs encircles the head. The two ends of the band tapered to a point and were twisted together on the forehead. Perforated shell beads lay on the neck and two vessels of the Pécel culture were deposited by the feet. One of the graves found earlier likewise dates from this period because a similar vessel accompanied the burial. The third grave was also an inhumation burial; the grey, wheel-turned vessels found in the grave can be assigned to the La Tène C period. Tamás Pekáry.”<sup>2</sup>

<sup>1</sup> I am deeply grateful to Bálint Havasi, director of the Balaton Museum in Keszthely, for his kind permission to loan the diadem and the skull from Vörs for the analyses, and to Judit P. Barna for her assistance.

<sup>2</sup> Pekáry 1954 72.

*The field documentation*

Tamás Pekáry's excavation report, dated November 19, 1952, is housed in the Archives of the Balaton Museum in Keszthely.<sup>3</sup> Accompanying the typewritten report are Pekáry's drawings of the vessels and a rough sketch of the findspot (*fig. 1*). We know from his report that Imre Szentmihályi, the then director of the museum of Zalaegerszeg, happened to be in Vörs on October 20, 1952, when the burials were found. Tamás Pekáry was notified, who inspected the site the next day. In the lack of a measuring tape, the young museum assistant could do no more than roughly estimate the distance of the graves from the outermost buildings of the farmstead (*fig. 2. 2*). He believed that he would be able to accurately measure and specify the position of the pits at some later date. Aside from the brief report published in *Archaeologiai Értesítő*, we also know from another description that "the two ends of the band tapered and that they had probably been fastened with some material that has since perished." It is also clear from the documentation that the two vessels in the grave with the diadem were not intact, but broken vessels. Pekáry had drawn them and specified their dimensions (*fig. 1*). He found beads made from "bone tubes"<sup>4</sup> with a diameter of *ca.* 1 cm on the neck; however, no drawings were made of these beads. He made a photo of the grave and took the finds to the Balaton Museum in Keszthely.<sup>5</sup> There was a slight confusion in the numbering of the graves: he first marked the finds of the burial he had excavated as Grave 3, which he later corrected to Grave 2, and the burial containing the broken Baden jug found earlier became Grave 3.<sup>6</sup> A copy of the report sent by Pekáry<sup>7</sup> to the National Centre of Museums and Monuments can also be found in the Archives of the Balaton Museum in Keszthely.<sup>8</sup>

*The publication of the grave with the diadem*

The Vörs site appears as Site 42 in János Banner's monograph on the Pécel culture because a larger jug<sup>9</sup> and the fragments of "two goblets" had earlier reached the museum of Kaposvár (in fact, of the latter two, only one came from the upper part of a goblet, while the other fragment represented the lower part of another vessel<sup>10</sup>). Banner knew nothing about their find circumstances.<sup>11</sup> The vessels were inventoried and drawn by Ferenc Gönczi.<sup>12</sup> The finds were discovered on the outskirts of Vörs, in an area known as Homokos gödör ["Sandy pit"] together with two lime-encrusted vessels. They were purchased in 1930 for eight *pengős* from János Visinszki, a local peasant. They were inventoried under no. 5234.<sup>13</sup>

<sup>3</sup> Filed under no. 344/1952.

<sup>4</sup> As far I know, their material was not examined at the time.

<sup>5</sup> Vörs currently lies in the activity area of the museum of Kaposvár; in the 1950s, however, the finds from the Balaton region were taken to Keszthely.

<sup>6</sup> The finds were inventoried in 1963 in the Balaton Museum in Keszthely: the diadem and the skull can be found under inv. no. 63.53.1.

<sup>7</sup> Tamás Pekáry (1929–2010) was a twenty-four-year-old assistant museologist when he excavated this unique burial. He left Hungary in 1956 and settled in Switzerland, where he studied under András Alföldi and became a renowned expert on Roman economic history. In 2003, he became Professor Emeritus at Münster University. He passed away in 2010. I would here like to thank Professor László Török for confirming the accuracy of the data.

<sup>8</sup> Filed under the same number, but without any drawings.

<sup>9</sup> *Banner 1956* Taf. IX. 4.

<sup>10</sup> *Banner 1956* fig. 7 (two vessels, non-joining fragments of the same vessels).

<sup>11</sup> *Banner 1956* 33–34.

<sup>12</sup> Unnumbered illustration on page 15 in *Németh et al. 2010*. I am indebted to Szilvia Honti for sending me a legible version of the entry in the museum's accessions register, which can be barely made out in the quoted volume.

<sup>13</sup> The topographic relation between the sites at Vörs and the pottery finds from Vörs will be discussed in my forthcoming study on the Late Copper Age burials in the Little Balaton region, to be published in Vol. 7 of *Castellum Pannonicum Pelsonense* (edited by Judit P. Barna and Eszter Bánffy).

## BALATONI MŰZEUM, KESZTHELY

Tárgy: leletmentés Vörsön.

344/1952.

Múzeumok és Emlékek Országos Központja

Elvi osztály

B u d a p e s t .

Vörs község tanácsa, valamint az éppen ott tartózkodó Szentmihályi Imre, a zalaegegyeségi múzeum vezetője okt. 20.-n értesítettek, hogy sílőgdör décea közben csontvázakra bukkantak. Másnap kiszálltam a helyszínre. A falu északkeleti szélén, az ugynevezett "majoradgi épületek"-nél, a szélső épülettől még mintegy 100 méterre északkeletre /mérőszalag hiányában pontosabban nem tudtam meghatározni, de a gödrök helyzetét utólag is kalkulálni lesz bennem/ a tanács három sílőgdör ásását rendelte el. Ezekben összesen három sirt találtak, kettőnek ezek közül már csak a leleteit kaptam meg, egyet magam bonthattam fel. Mindhárom sír csontváza, mai talajszin alatti mélységük 1.50. A három sír helyzete:



Az 1. sír melléklete két latens korongolt edény: egy tal és egy koró. A 3. s írban előkerült edény formája alapján Balstattkori, de esetleg bádeni is lehet. A 2. sírban zsugorított csontvázat találtam. Baloldalon feküdt, fej dél-délnyugatnak. Fején körül bronz-pánt, kb. 2 cm. széles, két szélén végig egy-egy sor kis dudorokból álló díszítés. A pánt két vége elkeskenyedik, a homlok előtt vsz. valami szőta elpusztult anyaggal lehetett összekötve. A csontváz nyakán nyaklánc: átfurt csont-hengerek, kb. 1 cm. átmérő. Lábnál két edény töredékei: egyik bádeni jellegű ~~nyaklánc~~ bögre, egészen kis méretű, másik neolitik vonaldíszítés edény. A sírről fényképfelvétel is készült. A leleteket a keszthelyi múzeumba szállítottam.

Keszthely, 1952, nov. 18.

Pekáry Tamás  
/Pekáry Tamás/  
s.muzeológus.

84.51.1

fig. 1. Tamás Pekáry's report

Banner published Tamás Pekáry's brief excavation report right before closing the manuscript of his monograph, in which it appears under site no. 324 (fig. 3).<sup>14</sup> He supplemented the first report on the site with additional information. The first grave dated from the La Tène period, while Grave 3 could be assigned to the Pécel culture. Grave 2 was excavated by Tamás Pekáry on October 21, 1952, after he was notified.<sup>15</sup> The professionally excavated grave contained the following finds: the body fragment of a smaller vessel with grooved decoration

<sup>14</sup> Banner 1956 111.

<sup>15</sup> In the excavation report published in *Archaeologiai Értesítő*, Tamás Pekáry described the Celtic burial as Grave 3. However, János Banner quoted the original field documentation for the grave numbers. I have been unable to find any clues as to how János Banner learnt of this grave. What seems quite certain is that he received permission to publish the finds and that he also obtained a copy of the original excavation report.

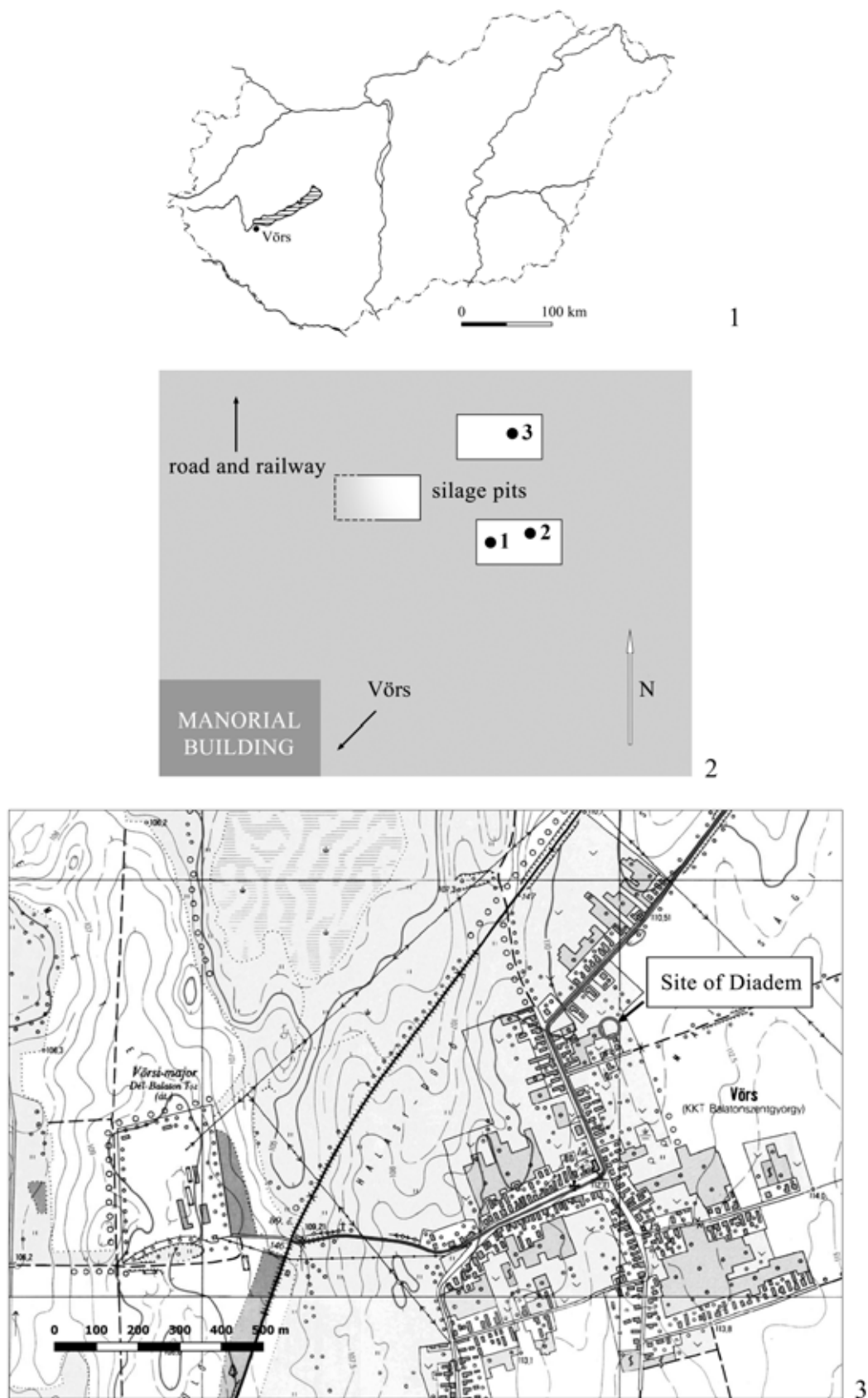
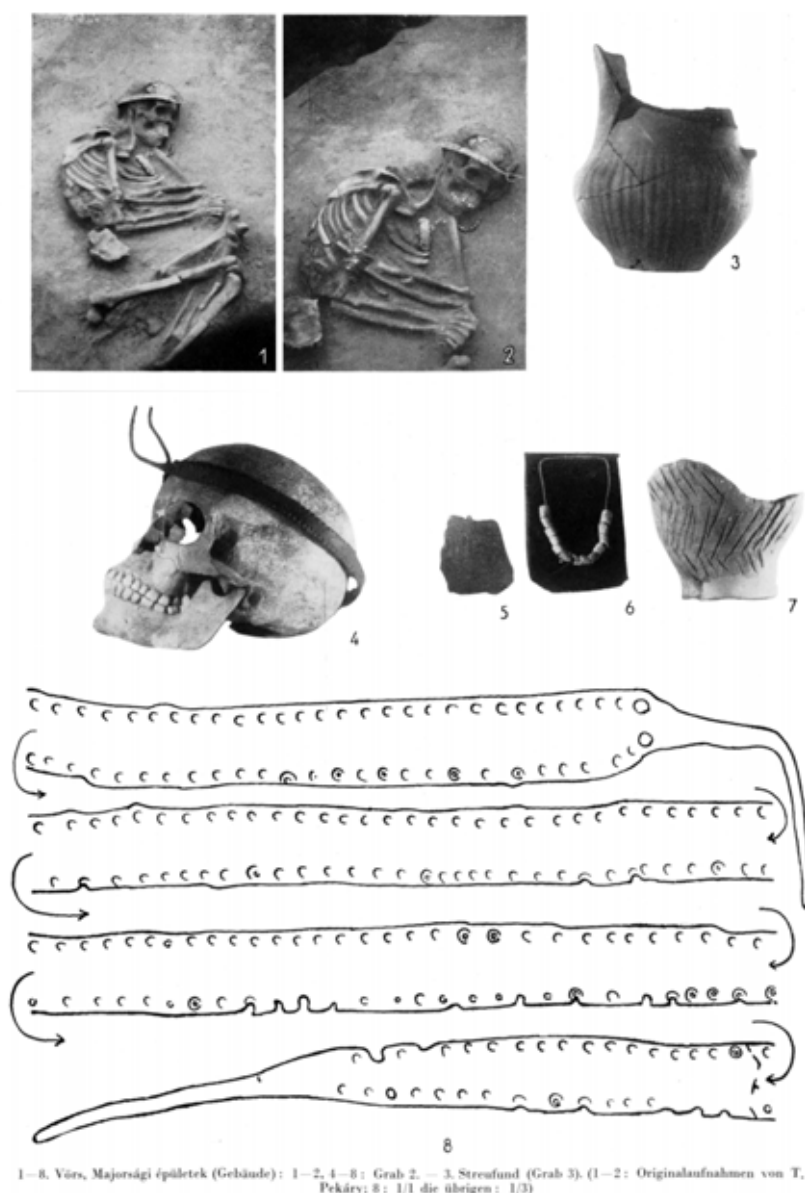


fig. 2. The findspot, based on Tamás Pekáry's sketch (drawing by Sándor Ósi)

(fig. 3. 5)<sup>16</sup> and the lower half of a vessel covered with incised zig-zag lines (fig. 3. 7);<sup>17</sup> however, Banner published an additional vessel fragment from Grave 3 (fig. 3. 3).<sup>18</sup> There were thirteen “bone beads” on the neck of the deceased (fig. 3. 6), each with a diameter of 1 cm.<sup>19</sup> A diadem of sheet copper with a length of 67 cm and a width of 1.6–1.8 cm was found around the head. The two ends of the diadem almost taper to a point. One end is straight, the other is bent for about two-thirds of its length and has two perforations at the beginning of the tapering section. A decoration of small *repoussé* knobs extends along both edges (fig. 3. 4).<sup>20</sup> Banner did not discuss the sex of the deceased or the dating of the vessel fragments. He believed that the diadem harked back to the Neolithic headbands made from shells.<sup>21</sup>



1–8. Vörs, Majorsági (pületek) (Geküld): 1–2, 4–8; Grab 2. – 3. Streufund (Grab 3). (1–2: Originalaufnahmen von T. Pekáry; 8: 1/1 die übrigen: 1/3)

fig. 3. The Vörs burial (after Banner 1956 Taf. LXXXVII)

<sup>16</sup> Banner 1956 Taf. LXXXVII. 5.

<sup>17</sup> Banner 1956 Taf. LXXXVII. 7.

<sup>18</sup> Banner 1956 Taf. LXXXVII. 3.

<sup>19</sup> Banner 1956 Taf. LXXXVII. 6.

<sup>20</sup> Banner 1956 Taf. LXXXVII. 4.

<sup>21</sup> Banner 1956 199.

*The physical anthropological analysis of the burial*

The human remains from the larger cemeteries in Banner's monograph were examined and, occasionally, analysed in detail by János Nemeskéri. He mentions one grave from Vörs,<sup>22</sup> which can at most be assumed to be identical with the grave yielding the diadem; no other mention is made of skeletal remains from Vörs elsewhere in the monograph. Neither does Zsuzsanna Zoffmann's CSc thesis on the Copper Age population of the Carpathian Basin contain any information on the Vörs graves.<sup>23</sup> Answering my inquiries about the whereabouts of the burial's post-cranial bones, Ildikó Pap of the Anthropological Department of the Hungarian Natural History Museum told me that they were not kept in the department.<sup>24</sup> Róbert Müller, László Horváth, Zsuzsanna M. Virág and Judit P. Barna, the archaeologists earlier and currently working in the Balaton Museum in Keszthely, had no idea where the bones might be, and Szilvia Honti, archaeologist of the Rippl-Rónai Museum in Kaposvár, was equally clueless.<sup>25</sup> Anthropologists Kitti Köhler and Balázs Gusztáv Mende did not know of any studies mentioning skeletal remains from the grave. On Tünde Horváth's request,<sup>26</sup> Balázs Gusztáv Mende examined the skull, which is exhibited together with the diadem at the exhibition of the Balaton Museum in Keszthely, and found that the skull had female traits.<sup>27</sup>

*The diadem in Hungarian archaeological literature*

In his study on the Bronze Age belt clasps and diadems, István Bóna argued that the Vörs diadem was the precursor of the Bronze Age headbands made from sheet bronze: "Diadems hammered from sheet bronze first appear in the Late Copper Age Pécel culture, a cultural complex imbued with south-eastern elements. The 1.9 cm wide diadem adorned with *repoussé* dots brought to light from the inhumation burial at Vörs was verifiably found on the skull of the deceased woman."<sup>28</sup> Bóna regarded this ornament type as being ultimately of Anatolian origin and an accessory of the costume worn by the high-ranking women of the aristocracy or by priestesses.<sup>29</sup> Bóna rejected Banner's ideas on the origins of the headband.<sup>30</sup> He quoted the then known Early Bronze Age pieces, among them a headband found on the head of the deceased buried in a pithos in Byblos. In his comprehensive overview of the Early Bronze Age cultures, Bóna mentions the Vörs diadem together with the piece from Vukovar in a single passage, describing them as forerunners of similar Bronze Age adornments, and suggests that both can be derived from the same cultural context as the diadem from Byblos.<sup>31</sup>

According to József Csalog, who had a keen interest in the Baden culture, the diadem was a shaman's crown. He was the first to point out that "in order to fasten [the diadem] on the forehead, the perforations for the fastening cord were not made at the two ends, but at the

<sup>22</sup> Nemeskéri 1956 298: "Die Zahl der zur Pécel Kultur gehörigen und archäologisch datierten anthropologischen Funde beträgt 162, sie gelangten von folgenden Fundorten in die Anthropologische Sammlung des Naturwissenschaftlichen Museums des Ungarischen Nationalmuseums: Alsónémedi (Kom. Pest – 43 Funde), Budakalász (Kom. Pest – 110 Funde), Palotabozsok (Kom. Baranya – 3 Funde), Szentés-Nagyhegy (Kom. Csongrád – 4 Funde), Budapest-Andor-Strasse (Kom. Pest – 1 Fund), Vörs (Kom. Somogy – 1 Fund)."

<sup>23</sup> K. Zoffmann 1992.

<sup>24</sup> I would here like to thank Ildikó Pap for her help.

<sup>25</sup> I am grateful to all these colleagues for their help, their letters and their personal communications.

<sup>26</sup> Horváth 2006 109; Horváth 2008 183.

<sup>27</sup> Balázs Gusztáv Mende's kind personal communication.

<sup>28</sup> Bóna 1959 54–55. Unfortunately, István Bóna makes no mention of where this piece of information, i.e. that the diadem was worn by a woman, came from.

<sup>29</sup> Bóna 1959 57.

<sup>30</sup> Bóna 1959 note 35.

<sup>31</sup> Bóna 1963–1964 31.



base of the horn-like extensions. This indicates that the copper headband was not a simple adornment, but that its purpose was to set two horns on the wearer's forehead."<sup>32</sup>

Nándor Kalicz mentioned the Vörs diadem in his monograph on the Anatolian connections of the Pécel culture, although he was apparently less concerned with its material and its one-time owner than with its analogies. In addition to the similar piece from the already-quoted Grave 630 at Byblos, he cites a Cretan gold headband and the well-known gold diadem from Alaca Hüyük.<sup>33</sup> In a later work, written for the broader public, Kalicz published a drawing based on Banner's photo and, probably influenced by Csalog's study, he noted that "the [diadem's] wearer was probably a chieftain or a priest."<sup>34</sup>

A small booklet designed to encourage museum friends to report archaeological finds they discovered was published in December 1963. The booklet was principally based on the documents in the Archives of the County Somogy Museum, which contained information on sites in County Somogy, in part based on the data from the archives in the museum of Keszthely assembled by Károly Sági.<sup>35</sup> The booklet briefly mentions the Vörs burial: "A grave of the Pécel culture came to light by the farm buildings (*ArchÉrt* 1954, 72). ... In 1952, burials were found while digging a silo pit. The most significant among them was Grave 3, in which a copper diadem was found on the skull. (Information provided by Károly Sági, based on the records in the Archives of the County Somogy Museums, inv. no. 792)."<sup>36</sup> In her MA thesis published in 1964, Éva Kocztur quotes Banner's data<sup>37</sup> in her description of the Vörs site: "A settlement and a cemetery of the Pécel culture were discovered in 1952 at the village's north-eastern end, some 100 m north-east of the farm buildings, when a silo pit was dug", followed by an account of the grave and its contents and a description of the diadem.<sup>38</sup> The Vörs diadem does not appear in the illustrated book of the archaeological discoveries made in County Somogy, published in 1970, and there is but a single line about Vörs itself, mentioned among the sites of the Pécel culture: "Vörs (settlement and cemetery<sup>39</sup>)".

The guide to the permanent exhibition of the Rippl-Rónai Museum in Kaposvár, opened in 1975, appeared in 1978. János Makkay devoted two sentences to the grave and the diadem, which according to him was made of either copper or bronze, an uncertainty resulting from the lack of a metallurgical analysis, and he also mentioned its distant parallels from the Greek islands and Asia Minor. In fact, only a photo was displayed of the diadem on the skull in Case 11 of the exhibition.<sup>40</sup> Curiously enough, Makkay makes no mention of the diadem in his other studies discussing prehistoric metallurgy and religion. Neither does the diadem crop up in the debate on the date and origins of the gold discs of the Copper Age between Bóna and Makkay, even though both addressed several aspects of prehistoric metallurgy and metalwork.<sup>41</sup>

The rehabilitation of the Little Balaton was carried out in several phases. The first was performed between 1981 and 1987, the second was begun in 1984 and is still in progress,

<sup>32</sup> Csalog 1961 14, fig. 6, is a drawn version of the photo in Banner 1956 Taf. LXXXVII. 4, from which the *repoussé* dots along the edges were omitted and only the perforations for fastening are shown.

<sup>33</sup> Kalicz 1963 62.

<sup>34</sup> Kalicz 1970 64, fig. 44.

<sup>35</sup> Kocztur 1964 1.

<sup>36</sup> Draveczy – Sági – Takáts 1964 52. The specified grave number is erroneous: the diadem was found in Grave 2.

<sup>37</sup> Banner 1941 Pls X–XI. Unfortunately, Éva Kocztur's citation of the data is erroneous. János Banner wrote four articles for *Dunántúli Szemle* (one in 1940 and three in 1941), and there are no Plates X–XI in either of the four articles. The finds from Vörs appear in Banner 1941 Pl. I. 1–3. Banner 1941 345 mentions that the archaeological collection of the museum of Kaposvár includes a closed assemblage, which, however, does not originate from a professional excavation; all that can be known is that the finds came to light in the same spot and that they reached the museum at the same time. The finds are inventoried under no. 5234 in the museum of Kaposvár.

<sup>38</sup> Kocztur 1964 157.

<sup>39</sup> Draveczy 1970 26.

<sup>40</sup> Jankovich – Makkay 1978 17.

<sup>41</sup> Makkay 1976; Makkay 1985; Bóna 1986; Bóna 1990 (the Makkay – Bóna debate on the gold discs of the Copper Age).

despite the occasional break in the work.<sup>42</sup> A series of exhibitions and conferences presented the findings of the fieldwork and excavations conducted as part of the rehabilitation project. The Vörs skull with the diadem (*fig. 4. 2*) appeared in several exhibition guides.<sup>43</sup> I wrote the chapter on the Late Copper Age sites for the volume covering the archaeological research in the Little Balaton region, in which I mentioned the Vörs diadem several times.<sup>44</sup> I described it as a bronze headband found on a male skull, based on the information in Banner's monograph.<sup>45</sup>

In his academic doctoral thesis, József Korek devoted a brief chapter to metallurgy, in which he noted that "jewellery made from copper is more frequent. The most remarkable and most significant among these is the Vörs diadem (Banner 1956, Pl. LXXXVII. 1, 4, 8), which, although preserving Boleráz traditions, can be assigned to the Fonyód I horizon. It was found in an inhumation burial."<sup>46</sup> József Korek's dating was based on the two vessel fragments recovered from the grave; however, these are unsuitable for a finer chronological assignment.

Inspired by the growing interest in prehistoric metallurgy in international research, Nándor Kalicz reviewed the most important metal finds of the Carpathian Basin in his study on the metalwork of the Balaton-Lasinja culture which he had identified. He discussed the cultural and historical context of the metal artefacts known at the time as well as the possible provenance of the metals used for their manufacture. He devoted a separate section to the much-debated dating of the period's gold discs and the copper and gold diadems. He distinguished three major copper horizons. He republished the Vukovar assemblage from Croatia, which included the fragment of a diadem, and reviewed various other contemporaneous metal finds, noting that the diadems of the Carpathian Basin could be assigned to the earlier Baden period. Only from the references in the note to this assertion does it become clear that Kalicz was thinking of the diadems from Vörs and Veľká Lomnica (Slovakia, Hung. Kakaslomnic).<sup>47</sup> In a later study, published in 1992, Kalicz outlined a fourth copper horizon, represented by the metalwork of the Baden culture. Interestingly enough, he does not mention the Vörs diadem, even though he refers to various Late Copper Age jewellery items,<sup>48</sup> and neither does the diadem appear in the notes to the study.

In a study devoted to the copper finds of the Baden culture, Zsuzsanna M. Virág assembled a catalogue of sites which includes Vörs and Veľká Lomnica, the findspots of the two diadems.<sup>49</sup> M. Virág called attention to the use of a copper type (specifically mentioning Vörs and Budakalász) whose composition differs from arsenic copper, whose presence was indicated by metal analyses.<sup>50</sup> In her view, the copper artefacts of the Baden culture that were not produced *en masse* – such as diadems, pectorals, torcs, spiral armbands and daggers – were the attributes of individuals with a special social power or a ritual role.<sup>51</sup>

István Bóna authored the chapter on metallurgy in the representative catalogue, published in several languages, to the travelling exhibition presenting the relics of the Early and Middle Bronze Age tell cultures of Hungary. He briefly writes about the Late Copper Age, so poor in metal finds, but makes no mention of the Vörs diadem, even as a possible precursor to the Bronze Age pieces.<sup>52</sup> Parallel to this exhibition, another temporary exhibition was organised; the chapter on Copper Age metallurgy in the accompanying catalogue was written by István Ecsedy. Neither in the section on Copper Age metalworking traditions,

<sup>42</sup> Harkay 1996 11.

<sup>43</sup> Virág 1987 fig. 9; Müller 1988 fig. 2; Bondár 1989 30, site 20, Taf. 4; Vándor – Müller – Szóke 1992 3, unnumbered colour photo.

<sup>44</sup> Bondár 1996 35, 40, colour photo, published on the front page to the chapter.

<sup>45</sup> Bondár 1996 site 145.

<sup>46</sup> Korek 1983 57.

<sup>47</sup> Kalicz 1982 14, note 89.

<sup>48</sup> Kalicz 1992 10.

<sup>49</sup> M. Virág 1999 40, note 5.

<sup>50</sup> M. Virág 1999 39. The results of the metal analyses are not included. From Kuna 1981 43 and Lozúk 1995 56, the former does discuss the Vörs diadem (see below), while the latter does not.

<sup>51</sup> M. Virág 1999 39.

<sup>52</sup> Bóna 1994.

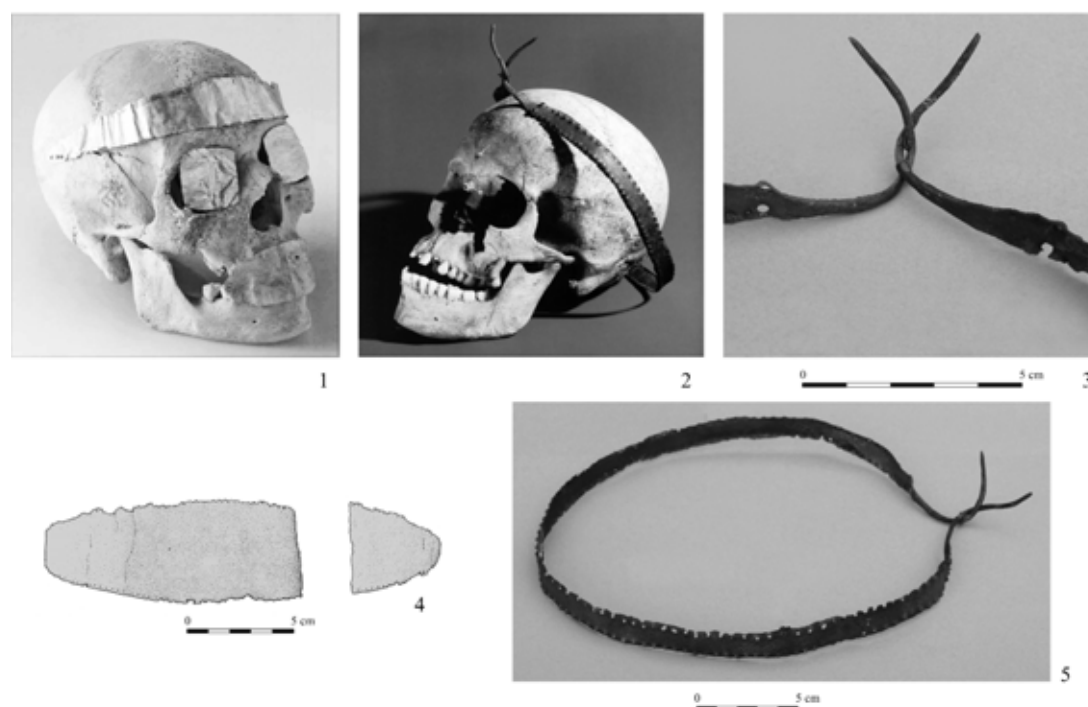


fig. 4. 1. Kültepe (after *Kulakoğlu – Kangal 2010* cat. nos 319–321) 2. the skull with the diadem, 3, 5. the diadem (photos by Tibor Kádas and Péter Hámori), 4. Vel'ká Lomnica (after *Novotná 1984* Taf. 61.362)

nor in the section on the onset of the Bronze Age is the Vörs diadem mentioned, despite the fact that Ecsedy briefly discussed the jewellery of the Copper Age and the metallurgy of the Late Copper Age.<sup>53</sup> Neither does Vörs appear in the section on the techniques of early metalworking and the period's moulds.<sup>54</sup> The same holds true for the permanent exhibition of the Hungarian National Museum, opened in 2002. Visitors are not even shown a photo of this unique find and neither is it mentioned in the Hungarian and foreign language catalogues to the exhibition.<sup>55</sup> While a photo of the skull and the diadem from Vörs appears on the title page to Chapter V in the book *Hungarian Archaeology at the Turn of the Millennium*, now used as a textbook, the site and the find itself are not mentioned in the text, which only contains a general reference to the diadem as a unique find in the period's copper metalwork.<sup>56</sup> I too merely mentioned “the diadem with twisted terminals imitating animal horns found at Vörs” in the chapter on the Copper Age sites and finds uncovered during the salvage excavations preceding the construction of the M7 Motorway.<sup>57</sup>

Addressing the various ritual aspects of the Late Copper Age clay mask found at Balatonőszöd-Temetői-dűlő, Tünde Horváth mentioned the Vörs diadem in several studies.<sup>58</sup> She first described the grave with the diadem found at Vörs-Majorság as probably representing the burial of a shaman.<sup>59</sup> Later, in 2006, she discarded this interpretation, noting that the diadem had been worn by a woman: “A crouched inhumation burial in which the deceased wore a diadem of sheet copper on the head was uncovered at the Vörs-Majorsági épületek site (Banner 1956 111). The burial, generally regarded as the grave of a witchdoctor, a male

<sup>53</sup> *Ecsedy 1994a; Ecsedy 1994b; Ecsedy 1995a; Ecsedy 1995b.*

<sup>54</sup> *Ecsedy 1990.*

<sup>55</sup> *Kalicz – Raczky 2005.*

<sup>56</sup> *M. Virág 2003* 132.

<sup>57</sup> *Bondár 2007* 26.

<sup>58</sup> *Horváth 2002a* (mistakenly quoting *Banner 1956* Taf. LXXXVIII instead of Taf. LXXXVII); *Horváth 2002b* 34; *Horváth 2004* 205; *Horváth 2006*, 92, 109, fig. 2; *Horváth 2008* 162, 183, Abb. 2; *Horváth 2010* 70, note 18.

<sup>59</sup> *Horváth 2002b* 34; *Horváth 2004* 205.

shaman, or a chieftain (despite the lack of any physical anthropological evidence to confirm this), was examined in 2005 on my request by Balázs Gusztáv Mende, the anthropologist of the Archaeological Institute of the Hungarian Academy of Sciences. Unfortunately, the postcranial bones could no longer be found; however, the skull itself had female traits! The unique, unparalleled copper diadem, signalling the special, outstanding social – and, perhaps, ritual – role and status of its wearer through its schematic portrayal of a horned creature, was owned by a woman both in life and death.<sup>60</sup> In a later study, Horváth discusses metal prestige items in relation to social differences.<sup>61</sup> The homepage of the Balaton Museum in Keszthely, where the diadem is currently housed, similarly notes that the diadem had been worn by a woman.<sup>62</sup>

Reviewing the over one hundred years of research on early metal artefacts, Viktória Kiss principally focuses on the metalwork of the Middle Bronze Age. In her discussion of prehistoric mining techniques and metalworking procedures, she briefly quotes the published findings of archaeometallurgical analyses and reviews the metal finds of earlier periods, noting that the metal artefacts found in western Hungary were manufactured from arsenic copper during the Middle and Late Copper Age. This metal was procured from the eastern Alpine mines worked by the population of the Mondsee culture. However, the well-known Vörs diadem and the provenance study of the metal finds from the Baden cemetery at Budakalász indicate that native copper too continued to be used. At the close of the Copper Age, during the classical Vučedol period, we find metalwork manufactured from copper oxide ores, while later, during the Hungarian Early Bronze Age, metal artefacts were made from arsenic copper, probably obtained from arsenic chalcopyrite.<sup>63</sup>

#### *The diadem in foreign archaeological literature*

One might have reasonably assumed that the publication of the Vörs diadem in Banner's German-language monograph would ensure a smooth sailing in the international archaeological mainstream and that it would be often quoted in the studies discussing metallurgy, social differences and prestige artefacts. This was not case: the initial familiarity with the diadem faded and after some time, it was only mentioned in footnotes or in the references, without even the briefest allusion to the site. Later still, it disappeared entirely from works addressing various issues of prehistoric metallurgy. One reason for this might be that artefacts that do not appear in illustrations or photos become virtually non-existent in our heavily image-focused discipline and few people make the effort to trace a piece of information to the field documentation, the first publication or the first summarizing work.

Viera Němejcová-Pavúková, who devoted several studies to the Baden culture, mentions the chronological aspect of the Vörs burial, which in her view can be assigned to the early horizon of the early classical Baden culture.<sup>64</sup> The Vörs diadem was not mentioned in the papers presented at the conference on the research of the Baden culture in Malé Vozokány (Slovakia, Hung. Kisvezekény) in 1969.<sup>65</sup>

Mária Novotná published several studies on prehistoric metallurgy. In a paper on the emergence of Central European metallurgy, she only mentions a few smaller copper artefacts of the Baden culture, with no reference to the Vörs diadem.<sup>66</sup> Neither does the Vörs diadem receive a mention in her book published in 1984, in which she reviewed the Copper Age and

<sup>60</sup> Horváth 2006 109; for the German version, see Horváth 2008 183.

<sup>61</sup> Horváth 2010 mentions the diadem in note 18 on page 70.

<sup>62</sup> [http://balatonimuzeum.hu/index.php?option=com\\_content&view=article&id=613:2012-november-a-honap-mtargya-az-okmanyirodaban&catid=61:a-honap-mtargya&Itemid=133&lang=hu](http://balatonimuzeum.hu/index.php?option=com_content&view=article&id=613:2012-november-a-honap-mtargya-az-okmanyirodaban&catid=61:a-honap-mtargya&Itemid=133&lang=hu) [06.03.2013]

<sup>63</sup> Kiss 2009 198; Kiss 2012 62.

<sup>64</sup> Němejcová-Pavúková 1974 344, 354.

<sup>65</sup> *Symposium Baden 1973*.

<sup>66</sup> Novotná 1976 127–128.

Bronze Age neck rings and diadems, and republished the other oft-mentioned Late Copper Age sheet metal diadem, the piece from Veľká Lomnica,<sup>67</sup> which, however, bears very little resemblance to the piece from Vörs.

In his study on the assemblage of copper jewellery from Hlinsko (Czech Republic), Jiří Pavelčík addressed various issues regarding the metalwork from the Carpathian Basin and the successive metal horizons. He discussed the various metal discs and other jewellery articles, the Vörs diadem among them, a drawing of which appears among the finds of the Middle Copper Age copper horizon.<sup>68</sup> The grave and its finds, including the diadem, are described in the catalogue to Gabriel Nevizánský's study.<sup>69</sup>

The Vörs diadem is occasionally quoted in the comprehensive overviews written for the broader public.<sup>70</sup>

Martin Kuna wrote an overview of the then known metal artefacts from the Neolithic and Copper Age of the Carpathian Basin in 1981. He reviewed the finds from various sites according to artefact types. He lists the diadems from the Baden burial at Vörs,<sup>71</sup> the Horodnica hoard<sup>72</sup> and a burial uncovered at Vukovar<sup>73</sup> in the section on diadems and breast ornaments. Earlier pieces were only known from the Caucasus and he too mentions the analogous pieces from Crete, Troy, Alaca Hüyük and Byblos, noting also that the Horodnica hoard, dating to the Tripolye B II-K period, is earlier than the other headbands from the quoted sites.<sup>74</sup> Kuna distinguished seven chronological horizons in the South-East European copper industry.<sup>75</sup> Linking the find horizons to metalworking techniques, he found that Horizon V (to which he assigned the Baden-Kostolac, Coțofeni, Cernavodă II, Folțesti II and other contemporaneous cultures) was first characterised by the use of arsenic copper, while the later period of this horizon saw the appearance of silver-copper and copper-antimony alloys made from copper sulphide.<sup>76</sup> South-East and Central Europe was dominated by a copper industry based on arsenic copper, even though the use of other copper ores has also been documented (Budakalász, Vörs).<sup>77</sup>

In the two-volume monograph on the burials of the Baden culture, Claudia Sachße lists Vörs (based on Banner's book) and quotes the most important references to the site in the archaeological literature.<sup>78</sup> She published the zig-zag decorated vessel fragment and the beads from the burial containing the diadem, but not the other vessel fragment from the grave. Although Sachße treats the uncertain burials separately, she lists the other site at Vörs<sup>79</sup> as "Belterület" [inner area] in the same table, i.e. among the burial sites, even though nothing is known about the find circumstances of these artefacts.

There has been a renewed interest in various aspects of prehistoric metallurgy (the identification of mines, analysis of metal compositions, production techniques, provenance based on chemical markers, etc.) and its social significance (prestige items, social ranking, trade, etc.). Following the astounding richness of metalwork during the Middle Copper Age in the Carpathian Basin, the Late Copper Age is visibly poorer in metal, at least judging from

<sup>67</sup> Novotná 1984 Kat. Nr. 362, Taf. 61. 362.

<sup>68</sup> Pavelčík 1979 Abb. 9. 31.

<sup>69</sup> Nevizánský 1985 268.

<sup>70</sup> Mentioned by Jażdżewski 1984 172, Abb. 68. 12, adopted from Kalicz 1970 fig. 44. The German version is based on the Polish original, published in 1981; Gimbutas 1991 figs 10–21 describing it as a copper crown worn by a man. The diadem does not appear in Lichardus et al. 1985 or Piggott 1987 (the book was originally published in 1965; it was translated into Hungarian by János Makkay, who also wrote the afterword to the volume).

<sup>71</sup> Kuna 1981 Taf. 21. E 12.

<sup>72</sup> Kuna 1981 Taf. 20. C 13.

<sup>73</sup> Kuna 1981 Taf. 20. B 6.

<sup>74</sup> Kuna 1981 33.

<sup>75</sup> Kuna 1981 39.

<sup>76</sup> Kuna 1981 41.

<sup>77</sup> Kuna 1981 43, quoting two SAM samples, of which Vörs is SAM 13738.

<sup>78</sup> Sachße 2010 Teil II, 112–113, site 189 and Teil I, 117.

<sup>79</sup> Banner 1956 site no. 42.

the surviving finds. The heavy copper artefacts (such as the various copper axe types) of the Middle Copper Age are now much better known owing to the wide range of metallurgical examinations. Interestingly enough, there seems to be much less interest in the few copper artefacts of the Late Copper Age. The copper axe and copper disc from Zalavár,<sup>80</sup> the copper dagger from Sármelek<sup>81</sup> and the Vörs diadem are not cited in the more recent archaeological literature on metal analyses, and neither are they mentioned in studies on metalworking techniques or in papers on the social dimensions of metallurgy.<sup>82</sup>

*The headbands resembling the Vörs diadem*

In a study published in 1998, discussing the possible interpretation of a curious depiction on a Middle Copper Age jug from Báticasék (County Tolna) – whether it should be seen as an anthropomorphic vessel, a diadem or a helmet – I also briefly touched upon headbands and other similar adornments, among them the Copper Age and Bronze Age diadems, reviewing briefly earlier research on this subject.<sup>83</sup> As mentioned in the above, István Bóna had earlier compiled a catalogue of the Bronze Age diadems and their Copper Age forerunners. In his view, this jewellery type originated from Asia Minor and was an accessory of the costume worn by prominent women who were members of the aristocracy or priestesses.<sup>84</sup> He noted that there was a Copper Age diadem that predated the one from Vörs, namely the piece in the jewellery assemblage from Vukovar.<sup>85</sup>

In addition to the head ornaments cited by Bóna, several other copper and gold diadems of sheet metal are known from the Copper Age, whose form, manufacturing technique and size share numerous similarities with the Vörs diadem. The narrow, undecorated gold strips from Csepin/Čepin (Croatia), measuring 45.3 cm and 49.8 cm in length, respectively,<sup>86</sup> and the fragmentary hammered gold band with a length of 13.5 cm found in Ercsi (County Fejér)<sup>87</sup> were first identified as diadems by János Makkay.<sup>88</sup> The diadem brought to light at Horodnica in eastern Galicia was made from a ca. 2 cm wide copper band (its length is roughly 41 cm, an estimate based on the diameter specified in its publication). The diadem has a *repoussé* ornamentation along the two edges; its tapering ends are rounded and there is a perforation through the ends. The diadem was found in a fragmentary condition.<sup>89</sup> It is dated to the Middle Copper Age by the Jászladány type copper axe found with it.<sup>90</sup> In Makkay's view, the narrow, plain gold bands of the Moigrad hoard (County Szilágy/Sălaj, Romania), which were published in their original size by Nándor Fettich,<sup>91</sup> could have been diadems,<sup>92</sup> although the

<sup>80</sup> M. Virág 1986.

<sup>81</sup> M. Virág 1999.

<sup>82</sup> There is no mention of the Vörs diadem in the papers published in the following conference volumes, whose main subject was the history of prehistoric metallurgy, metalworking techniques, prestige items, etc., where one might reasonably expect a mention of this unique find: Novotná 1976; Petrović – Đurđekanić 1995; Durman 1997; Ottaway 2001; Höppner et al. 2005; Kohl 2007; Hansen 2009; Roberts – Thornton – Pigott 2009; Kienlin – Roberts 2009; Kienlin 2010; Radivojević et al. 2010; Kienlin 2013; Merkl – Steiniger – Strahm 2013; Hansen 2013; Pernicka 2014.

<sup>83</sup> Bondár 1998 26–27. The vessel is part of a private collection.

<sup>84</sup> Bóna 1959 57.

<sup>85</sup> Bóna 1959 55.

<sup>86</sup> Makkay 1976 287, note 238. István Bóna challenged János Makkay's localisation of the findspot of the "Csepin" assemblage and wrote a detailed study on the find circumstances, the date and the findspot of the assemblage, see Bóna 1986 and Bóna 1990. However, the debate between the two scholars is hardly the subject of this study.

<sup>87</sup> Fettich 1953 Taf. LV. 2.

<sup>88</sup> Makkay 1976 283.

<sup>89</sup> Sulimirski 1961 92, 96, Pl. 1. 5.

<sup>90</sup> Kuna dated the assemblage to the Tripolye II B-K period: Kuna 1981 33.

<sup>91</sup> Fettich 1953 Taf. XLVIII. 1–3, 4–7, 8–9.

<sup>92</sup> Makkay 1985 72.

small, 18 to 29 cm long fragments can at best be regarded as diadem fragments, which could be assembled to fit around a human head if complemented with additional fragments.<sup>93</sup>

The copper diadem from Vukovar (Croatia) republished by Nándor Kalicz<sup>94</sup> is a narrow band with two perforations through one end. Its dimensions are known from the original publication: its length is 46.5 cm, its width is 1.8 cm.<sup>95</sup> Kalicz noted that metal diadems appear in the third copper horizon of South-East Europe,<sup>96</sup> to which he assigned the Balaton-Lasinja I and Balaton-Lasinja II–III cultures (as they were then called), arguing that they represented the earlier and later phase of this copper horizon and that they were contemporaneous with Bodrogkeresztúr A and B. Kalicz believed that the true flourishing of Central European metallurgy should be dated to this period.<sup>97</sup>

It is obvious from the above-quoted finds that diadems and headbands of sheet metal were known prior to the Baden period, appearing from the Csáford–Stollhof find horizon of the Middle Copper Age in the Carpathian Basin.

To date, two Late Copper Age diadems are known from the Carpathian Basin. The first is the piece from Vörs (*fig. 4. 2–3, 5*), the other was found at Veľká Lomnica in the foreland of the High Tatra Mountains in Slovakia in the 1960s (*fig. 4. 4*):<sup>98</sup> two fragments of an oval band with the occasional perforation along the edges, but without horn-like terminals,<sup>99</sup> i.e. differing from the Vörs piece. Not long ago, I found a possible explanation for this dichotomy, based on a recently published assemblage from Kültepe in Turkey. Several scholars presented the findings of their research at Kültepe that was resumed in 2009 in the Turkish language catalogue prepared for a major exhibition.<sup>100</sup> Described in the book was a skull onto which various articles of sheet gold had been placed: a diadem on the forehead, a small square sheet on each eye and a thin oval sheet on the mouth (*fig. 4. 1*). The latter is virtually identical to the Veľká Lomnica piece. It can be seen from the Kültepe assemblage that three different metal objects were associated with the cult of the dead: a diadem on the head, sheets covering the eyes and a shorter sheet for the mouth that was mistakenly believed to be a headband or diadem, but was in fact a plate that closed and covered the mouth of the deceased. Thus, the “fragmentary” or “short” metal bands had an entirely different function and were not diadems.

Several suggestions have been made on how the Vörs diadem was worn. Tamás Pekáry, who excavated the grave, wrote about a band fastened with some perished material in the field documentation. In the published report, however, he claimed that the diadem was worn with the horns twisted together in front.<sup>101</sup> In Banner’s description<sup>102</sup> and his drawing, there are two pronounced perforations on one side only, near the horns (*fig. 3. 8*). József Csalog believed that the sheet metal band had been perforated in two spots near the horns and that it had been fastened with a cord.<sup>103</sup> However, it is unclear from his text and from the published drawing whether he was thinking of the two perforations visible on Banner’s drawing, or whether he meant that both ends were perforated to ease the fastening. In fact, both ends of the Vörs diadem have a pair of perforations near the horn-like extensions (*fig. 4. 3, 5*).

We know virtually nothing about how exactly diadems were worn or whether they were accessories worn on festive occasions or part of the funerary costume. Neither do we know whether they were indicators of social rank, if at all. Similarly, it is uncertain whether these

<sup>93</sup> *Fettich 1953* Taf. XLVII. 15–20.

<sup>94</sup> *Kalicz 1982* fig. 5. 1.

<sup>95</sup> *Brunšmid 1902* 61.

<sup>96</sup> *Kalicz 1982* 11; *Kalicz 1993* 11.

<sup>97</sup> *Kalicz 1982* 11, 16.

<sup>98</sup> *Novotný 1972*.

<sup>99</sup> *Novotná 1967* Abb. 1; *Novotný – Novotná – Kovalčík 1985* fig. 14.

<sup>100</sup> *Kulakoğlu – Kangal 2010* cat. nos 319–321.

<sup>101</sup> *Pekáry 1954* 72.

<sup>102</sup> *Banner 1956* 111: “Das eine Ende ist im grossen und ganzen gerade, das andere im Zweidrittelteil gekrümmt. Am sich verschmälernden Ende sind vorne zwei Löcher angebracht.”

<sup>103</sup> *Csalog 1961* 14, fig. 6.

bands were placed directly on the head or whether they were the metal adornments of a textile or leather cap or headdress. In the case of the fragmentary sheet metal bands, it seems more likely that they had been attached to some sort of cap. The Vörs diadem has a circumference that is larger than that of the skull and the pair of perforations near the horns too suggests that it had been attached to a headgear made from organic material. However, these are merely conjectures without any substantiating evidence.

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The above review of the Hungarian and international archaeological literature and of the major studies on the Baden culture and on various aspects of early metallurgy indicate that we can hardly speak of a scholarly consensus regarding the Vörs diadem or even the burial itself.

Opinions are divided as regards the sex of the deceased buried at Vörs. Tamás Pekáry, János Banner, Nándor Kalicz, the authors of the museum booklet (Balázs Draveczky, Gyula Takács and Károly Sági), János Makkay, József Korek, Viera Němejcová-Pavúková and Martin Kuna did not address this issue. József Csalog, Zsuzsanna M. Virág and Marija Gimbutas believed the deceased was a male (as did the author of the present study), while István Bóna and Tünde Horváth argued that the deceased had been a woman. As we have seen, a published physical anthropological assessment was not available and that Balázs Gusztáv Mende could only examine the skull, which he found to have female traits.

The determination of the metal the diadem was made from was similarly controversial. Tamás Pekáry and István Bóna believed the diadem was made from bronze. János Banner, József Korek, Zsuzsanna M. Virág, Tünde Horváth, Viera Němejcová-Pavúková, Gabriel Nevizánsky and Claudia Sachße identified it as copper, while Balázs Draveczky, Károly Sági and Gyula Takács described it as being made of brass. János Makkay and the present author were undecided whether the diadem was made from bronze or copper. József Csalog and Nándor Kalicz did not take a stand regarding the diadem's material. The metal analysis performed in the 1970s as part of the SAM (Studien zu den Anfängen der Metallurgie) project and the republication of the results<sup>104</sup> apparently remained unacknowledged in archaeological research.

As regards dating, Viera Němejcová-Pavúková and József Korek proposed a closer date, as did Martin Kuna (copper horizon V) and Nándor Kalicz (copper horizon 4), essentially based on the two pottery sherds recovered from the burial; all other scholars mention the Vörs diadem as an artefact broadly dating to the Late Copper Age Baden culture.

### *Preliminary findings of the new analyses and tasks for future research*

#### *Previous metal analyses of the diadem*

The metallurgical analysis of this remarkable copper artefact was performed in the 1970s. The SAM volume on the Copper Age, containing the data on the Vörs diadem, appeared in 1974. We do not know which part of the diadem was sampled for the analysis.<sup>105</sup> The analytical results indicated that the trace elements included arsenic, antimony and silver.<sup>106</sup> The result of the analysis of the Vörs diadem was republished by Rüdiger Krause in his monograph appearing in 2003: he quoted the information in the Stuttgart database together with the SAM identification number (13738).<sup>107</sup> The trace elements include nickel (0.001%)

<sup>104</sup> Krause 2003.

<sup>105</sup> The results of the metal analysis of the diadem did not become part of common archaeological knowledge; only Zsuzsanna M. Virág knew about it. I am grateful to Viktória Kiss for bringing the fact of the analysis to my attention.

<sup>106</sup> SAM 1974 Bd. 2. Teil 4, 124–125, no. 13738.

<sup>107</sup> Krause 2003 Nr. 13738.



and silver (0.01%). The reason for the apparent divergences in the trace element composition in the SAM volume and in Krause's monograph remains unclear.<sup>108</sup>

*(1) Non-invasive analysis of the diadem's raw material and its manufacturing technique*

*Metal analysis*

The controversial analytical results published in the SAM volume and by Rüdiger Krause necessitated a new analysis and the diadem was therefore submitted to energy dispersive X-ray fluorescence (ED XRF) analysis<sup>109</sup> in the Nuclear Spectroscopy Laboratory of the Department of Chemical and Environmental Process Engineering at the Faculty of Chemical and Biochemical Engineering of the Budapest University of Technology and Economics in 2014, which conclusively proved that the diadem was made of almost pure copper. The presence of impurities such as zirconium can be attributed to post-depositional processes. Arsenic does not appear among the trace elements. In the case of the Vörs diadem, the quick analysis lasted for a few minutes, the precise analysis for two days. For a short report on the element composition and a description of the analytical procedure, see Iván Gresits's study in this volume.

As part of a collaborative archaeometric research project,<sup>110</sup> the diadem was also submitted to non-invasive neutron radiography (NR), prompt gamma activation (PGAA) and time of flight neutron diffraction (TOF ND) analyses in the laboratories of the Budapest Neutron Centre of the Budapest Research Reactor (the Nuclear Analytical and Radiography Laboratory in the Centre of Energy Research of the Hungarian Academy of Sciences and the Neutron Spectroscopy Department of the Institute for Solid State Physics and Optics in the Wigner Research Centre for Physics of the Hungarian Academy of Sciences). These analyses confirmed that the diadem was made of almost pure copper. The findings of the studies on manufacturing techniques will be published in a separate study.

*Stereo microscope images*

Stereo microscope images were made of the diadem (*fig. 5*) in the Archaeometric Laboratory of the Institute of Archaeology of the Eötvös Loránd University,<sup>111</sup> which would provide important information on how the diadem was made. This study is still in progress and will be complemented by other instrumental examinations, and thus only a few images of the diadem are published here. The row of tiny dots along the diadem's edges was created by hammering from the reverse (*fig. 5. 3–4*); in some spots, the band thinned to the extent that it became perforated. The stereo microscope images and the metal analyses also demonstrated that the wire holding together the horns is modern and was presumably added during the conservation of the diadem.

<sup>108</sup> The analytical results of the laboratories performing the metal analyses and a comparison with other archaeometallurgical examinations of the period's copper finds will be presented in a separate, forthcoming study, and they are therefore not discussed here.

<sup>109</sup> For a description of this analytical method, see Lutz – Pernicka 1996 and <https://www.bruker.com/products/x-ray-diffraction-and-elemental-analysis/handheld-xrf/how-xrf-works.html> [10.12.2014].

<sup>110</sup> The analyses were performed as part of the EU FP7-NMI3 project, "Studies on the local metal production of the Carpathian Basin from the Late Copper Age until the Middle Bronze Age (3500–1500 BC)". I would here like to thank Viktória Kiss for her kind co-operation as well as Zsolt Kasztovszky, Zoltán Kiss, Boglárka Maróti, György Káli and Eszter Horváth, who performed the analyses.

<sup>111</sup> Performed as part of the project "KMOP-4.2.1/B-10-2011-0002: Interdisciplinary, innovative research directions and the development of the infrastructural background of industrial cooperation as well as the introduction of new educational technologies at ELTE". A ZEISS SteREO Discovery.V8: zoom (6,3× – 80×) stereo microscope was used. The images were made by Zsuzsanna Tóth. I am grateful to Pál Raczky, director of the Institute of Archaeology of the Eötvös Loránd University, for his kind permission to perform the examination and to Zsuzsanna Tóth for her conscientious work.

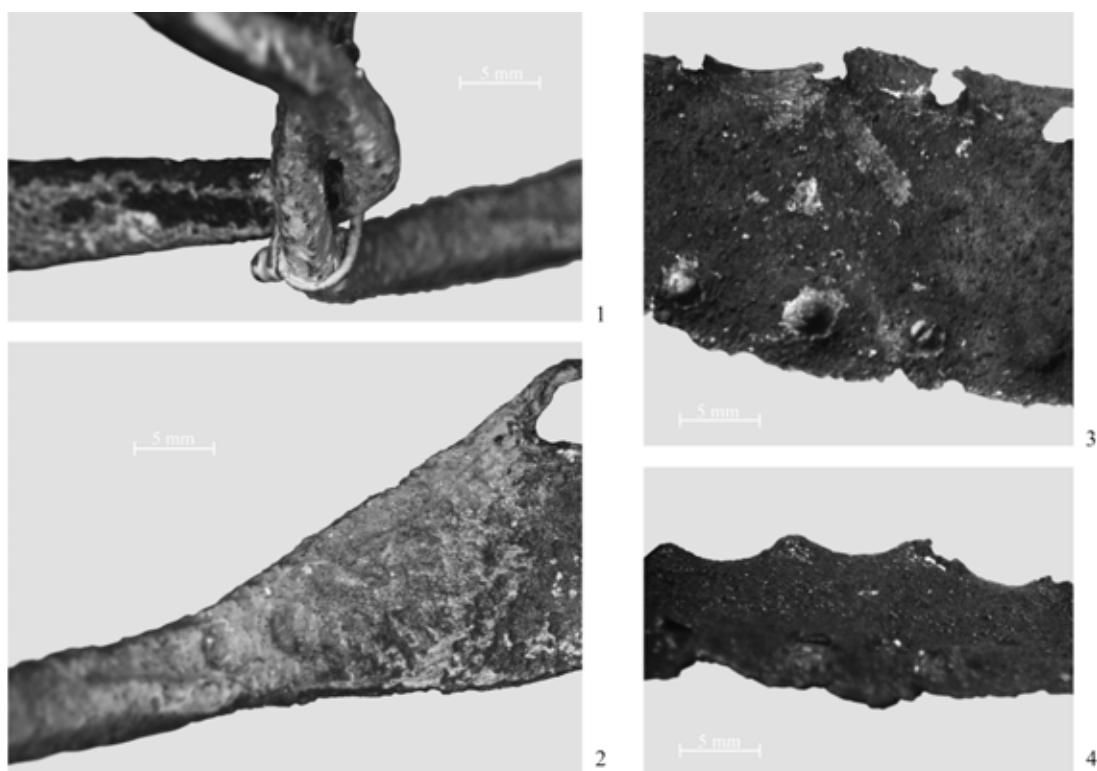


fig. 5. Stereo microscope image of the diadem (by Zsuzsanna Tóth)

#### *Experimental re-creation of the diadem*

On my request, goldsmith Borbála Barna made a smaller copy of the diadem from modern copper wire;<sup>112</sup> the stereo microscope images made during the re-creation of the diadem will be used in the later technical analyses. We found that the metal wire could be easily worked with a wooden hammer and that there was no need for heating. Another interesting observation was that the wire could be thinned into a sheet starting from one end and that the length ultimately depended on the wire's durability.

#### *(2) Physical anthropological analysis of the burial*

Anthropologists Kitti Köhler and Balázs Gusztáv Mende of the Institute of Archaeology, Research Centre for the Humanities, Hungarian Academy of Sciences took samples from the teeth of the skull in Keszthely for aDNA analyses. The physical anthropological analysis was performed by Kitti Köhler (see her study in this volume), who found that that the skull belonged to a 20-30-year-old adult and that the skull had predominantly female traits, as earlier established by Balázs Gusztáv Mende.

#### *(3) Identification of the findspot of the burial with the diadem*

In his report, Tamás Pekáry wrote the following about the findspot of the burials: “Vörs (County Somogy, Fonyód District). Three silo pits were dug some 100 m north-east of the so-called farm buildings at the north-eastern end of the village. Three inhumation burials

<sup>112</sup> I would here like to thank Borbála Barna for her creative collaboration on this project.

were found in the pits.” Appended to his report was a rough sketch showing the location of the findspot (*figs 1; 2. 2*).

I read through the reports of later excavations at Vörs in the hope that I would find some clues as to the exact location of the findspot because the location of the farm buildings on modern maps and Pekáry’s rough sketch are strongly at variance. After also doing an Internet search, I found references to a book written by Dénes Tóth, a retired local teacher, on the history of Vörs, published by him in 2002. Enlisting the help of my colleague László Költő, who was personally acquainted with Dénes Tóth, I received a copy of the book’s passage on the Vörs diadem. Dénes Tóth kindly provided the additional information on the findspot, enabling my colleague to determine the findspot’s most likely location on a modern map. I am immensely grateful to them both for their help in identifying the findspot after so many decades of uncertainty.

As it turned out, the “farm buildings” can indeed be identified with the farm buildings of the Festetich Manor: the manor house itself stood on the road’s southern side. The confusion in the location of the findspot was caused by the fact that new farm buildings had been constructed in addition to the earlier ones and that in the lack of more precise data, it was assumed that the graves had come to light near the new buildings. However, the findspot lay not west of the village, but near the manor’s earlier farm buildings, as recounted by Lajos Futó, Dénes Tóth’s neighbour, who had been present when the silo pits were dug. In fact, the findspot itself lay at the end of Dénes Tóth’s garden: using the information on street names and plots provided by Lajos Futó, it was now possible to accurately identify and map the findspot through the collation of Tamás Pekáry’s sketch, old cadastral maps and modern maps<sup>113</sup> (*fig. 2. 3*).

### *Conclusion*

The main purpose of this study was to re-introduce the almost forgotten Vörs diadem to archaeological scholarship, and to briefly present the findings of the new archaeometallurgical and physical anthropological analyses.

The analyses described in the above are no more than preliminary, interim findings. A detailed assessment of the metallurgical analyses, the reconstruction of the technical details of how the diadem was made, a discussion of Copper Age metalworking and mining and similar issues would exceed the scope of this study. These questions will be addressed in separate studies.

The aDNA analysis of the tooth samples that will either confirm or refute the results of the traditional physical anthropological examination is still in progress. The strontium isotope analyses of the tooth samples will shed light on diet and on whether the deceased was an immigrant or a member of the local population. The radiocarbon dating of the burial is similarly still in progress. The results of these analyses will be published as soon as they are available and they will also provide scientifically sound evidence on the sex of the deceased and the date of this remarkable find, alongside new insights into the techniques of Late Copper Age metalworking.

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<sup>113</sup> I would here like to thank Bence Vágvölgyi (Institute of Archaeology, Research Centre for the Humanities, Hungarian Academy of Sciences) for the georeferenced version of the map.

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IVÁN GRESITS

## NON-INVASIVE RAW MATERIAL ANALYSIS OF THE VÖRS DIADEM

**Keywords:** diadem, raw material analysis, ED-XRF, Late Copper Age, Baden culture

*Principles of energy dispersive X-ray fluorescence (ED-XRF) analysis*

The raw material analysis of the Vörs diadem (housed in the Balaton Museum, Keszthely) was conducted by the Nuclear Spectroscopy Laboratory of the Department of Chemical and Environmental Process Engineering at the Faculty of Chemical and Biochemical Engineering of the Budapest University of Technology and Economics. The applied method is isotope excited energy dispersive X-ray fluorescence (ED-XRF) analysis. This is a non-invasive analytical method for qualitative as well as quantitative determination of elements in a sample without sample preparation or with only a minimal one. (We conduct ED-XRF analyses of historical or archaeological artefacts without sample preparation.) It is based on the fact that elements that are irradiated with high-energetic X-rays have a certain probability of emitting characteristic X-rays, the intensity and energies of which are unique for each element (*fig. 1*).

The margin of error of the analytical method in ppm trace elements is  $\pm 10$  relative percent and  $\pm 2\%$  in percentage. The longer the time available for the analysis, the more detailed the analysis.

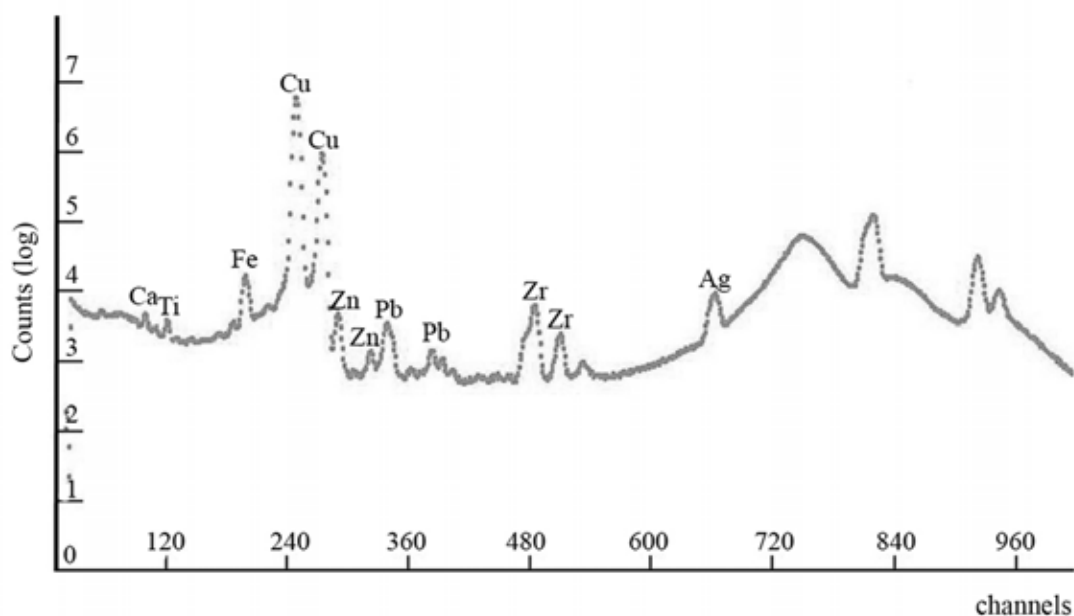


fig. 1. X-ray fluorescence (XRF) spectrum of the Vörs diadem

*General features of energy dispersive X-ray fluorescence (ED-XRF) analysis*

The instrumentation of the Nuclear Spectroscopy Laboratory of the Budapest University of Technology and Economics contains:

1. X-ray fluorescence measuring head with 125I x-ray source and Canberra SSL 8016 Si(Li) semiconductor detector,
2. Canberra DSA-1000 digital spectrum analyser (with signal booster and multi-channel analyzer),
3. HP computer.

The elements and their concentration detected in the raw material of the diadem:

Copper (Cu)	99.24 ±0.2 %
Calcium (Ca)	0.224 ±0.05 %
Lead (Pb)	0.19 ±0.02 %
Kalium (K)	0.172 ±0.009 %
Iron (Fe)	0.0789 ±0.008 %
Silver (Ag)	0.0344 ±0.0002 %
Zirconium (Zr)	0.0162 ±0.0002 %
Titanium (Ti)	0.015 ±0.0008 %
Manganese (Mn)	0.0144 ±0.0008 %
Chromium (Cr)	0.001 ±0.0009 %

The results show that the diadem was made of almost pure copper, with some other impurity elements in low concentration.

KITTI KÖHLER

## ANTHROPOLOGICAL ASSESSMENT OF THE VÖRS SKULL

**Keywords:** anthropology, Late Copper Age, Baden culture, Vörs*Material and method*

This study presents the findings of the physical anthropological assessment of the individual wearing a diadem buried in a crouched position in the Late Copper Age Baden grave uncovered at the Vörs-Majorsági épületek site in 1952. The skeletal remains comprise a relatively well-preserved skull and mandibles; the post-cranial bones were lost or dispersed after the excavation.<sup>1</sup> The surviving anthropological material is housed in the collection of the Balaton Museum in Keszthely.<sup>2</sup>

The determination of morphological sex was based on work by Kinga Éry, László Harsányi and János Nemeskéri.<sup>3</sup> For estimating the biological age I used the degree of tooth attrition and of cranial suture closure.<sup>4</sup> I used the procedures set down in the book by Rudolf Martin and Karl Saller for the metric measurements and the calculation of the indices, while classification was based on the categories set up by Valery P. Alekseev and Georgy F. Debets.<sup>5</sup> Anatomical variations were described according to the works of Gertud Hauser and Gian Franco De Stefano,<sup>6</sup> while the description of pathological alterations followed Arthur C. Aufderheide, Conrado Rodríguez-Martin and Donald J. Ortner.<sup>7</sup>

*Description*

The skull is relatively well preserved, with some damage and missing portions on the right side, at the junction of the frontal and parietal bones. A greenish band encircles the skull where the diadem was worn, which is wider than the artefact was. Following the earlier examination of the skull in 2005, performed by Balázs Gusztáv Mende on Tünde Horváth's request, it was suggested that the individual wearing the diadem was not a man, but a woman.<sup>8</sup> My study confirmed this earlier statement that the skull has unambiguous female traits. The average of the sexualisation values is –1.1.

The degree of cranial suture closure and of tooth attrition would suggest that the individual interred in the grave was a young, 20-30-year-old adult.

<sup>1</sup> As Mária Bondár has already noted in her overview of the research history of the site and its finds, the anthropological material disappeared. *Nemeskéri 1956* 298, simply mentions the site in his contribution to János Banner's monograph, but does not provide any further details (such as an estimate of the age at death, sexing, metric data, etc.). According to *Banner 1956* 111, the material was taken to the Keszthely museum. The site is not even mentioned in more recent studies on the culture's population (*Zoffmann 1992; Zoffmann 2004*).

<sup>2</sup> Inv. no. 63.53.1.

<sup>3</sup> Éry – Kralovánszky – Nemeskéri 1963.

<sup>4</sup> Miles 1963; Perizonius 1981; Nemeskéri – Harsányi – Acsádi 1960; Meindl – Lovejoy 1985.

<sup>5</sup> Martin – Saller 1957; Alekseev – Debets 1964.

<sup>6</sup> Hauser – De Stefano 1989.

<sup>7</sup> Aufderheide – Rodríguez-Martin 1988; Ortner 2003.

<sup>8</sup> Horváth 2006. In addition, I would like to thank Balázs Gusztáv Mende for his kind personal communication, providing additional details in connection with his earlier examination.

Based on the metric analysis, the absolute values of the neurocranium fall into the medium broad/broad/very high category (M1, M8, M17).<sup>9</sup> The forehead is medium broad (M9). The face and the upper face are broad and medium high (M45, M47, M48). The orbits are medium broad and low (M51, M52). The nose is medium high (M54, M55), the palate is very-very long and very broad (M62, M63). The bicondylar and the bigonial breadth of the mandible are broad (M65, M66). The height of the chin and the ramus of the mandible fall into the high and very high categories (M69, M70), while the minimum ramus breadth (M71) and the angle of the mandible (M79) are medium (Table 1, fig. 1).

According to the indices, the neurocranium is brachy-, hypsi- and acrocranic (M8:M1, M17:M1, M20:M1, M17:M8, M20:M8). The forehead index belongs to the metriometopic category (M9:M8). The facial and the upper facial indices are mesoprosopic and meseanic (M47:M45, M48:M45). The orbit is chamaeconchic (M52:M51), the palate is leptostaphylinic (M63:M62). The estimated cranial capacity (M38) can be assigned to the hyperaristencephalic category (Table 1, fig. 1).

The form of the brain-case viewed from the *norma verticalis* is sphenopid; the *norma occipitalis* view shows a transitional form between the bomb and house shape. The forehead is steep, the nape profile is bathrocranic. The glabellar relief and the external occipital protuberance are weakly developed (grade 1 and grade 0). The orbits are angular, the lower margin of the *apertura piriformis* has a *sulcus praenasalis* form, the *fossa canina* is deep, the alveolar prognathism is pronounced (fig. 1).

Among the anatomical variations, the occurrence of smaller and larger so-called surplus bones can be detected in the sagittal and lambdoid suture, and at the point of the lambdoid and the right sided asterion (*ossa suturae sagittalis*, *ossa suturae lambdoidea*, *os lambdae*, *os astericum*).

Martin No.	Vörs 63.53.1
1	174
5	88
8	143
9	96
10	–
11	117
12	125
17	138
20	119
23	515
38	1440?
40	85?
43	101
45	128?
46	95
47	112
48	66?
51	38
51s	39
52d	31
52s	31?
54	–
55	48
60	33
61.	62
62	54?
63	41?
65	123
66	104
68	64
69	32
70	62
71	30
72	–
79	123
8:1	82.2
17:1	79.3
20:1	68.4
17:8	96.5
20:8	83.2
9:8	67.1
47:45	87.5?
48:45	51.6?
52:51d	81.6
52:51s	79.5?
54:55	–
63:62	75.9

Table 1. Skull measurements and indices for the skull from Vörs-Majorsági épületek

<sup>9</sup> M1, M8, M17, etc. are abbreviations of the absolute cranial measurements and indices according to *Martin – Saller 1957*.



fig. 1. Frontal, lateral and posterior view of the skull from Vörs-Majorsági épületek

The examination of the oral pathology revealed that the degree of abrasion (AS2) corresponds to the age at death. The right lower 3rd molar is impacted. On the anterior teeth of the mandible plaque is visible, which reflects an inadequate dental hygiene. The tooth enamel hypoplasia may indicate a bad health status, moreover on the anterior teeth (on the incisors and canine teeth) of the *maxilla* and *mandibula* sign vitamin deficient diet, perhaps due to some disease or starvation.

Other pathological alterations could not be noted on the skull.

### *Conclusion*

Despite its extraordinary importance, the human skeletal remains from the grave excavated in 1952 at the site of Vörs-Majorsági épületek have not been anthropologically examined (or the results of any examination have not been published to date).

It is clearly visible from the excavation photo that the post-cranial skeletal remains were also in a fairly good state of preservation and that although the *ilium* was missing, the *os sacrum* was still in its place at the time the burial was uncovered. However, these remains were lost after the excavation. Thus, the present assessment is based on the surviving skull and on the original grave photos. In contrast to the earlier views published in the archaeological literature, the present assessment found that the skull has female traits in view of its characteristics.

The anthropological make-up of the Baden culture is fairly well known. The human remains from a total of 669 inhumation and cremation burials from smaller and larger cemeteries as well as from settlement and ritual contexts have been published from 36 sites in the Carpathian Basin.<sup>10</sup> Earlier and more recent analyses have shown that the Baden population was rather heterogeneous, with the dominance of dolichocranic and leptoprosopic/leptenic type individuals.<sup>11</sup> Additionally, compared to the Middle Copper Age, a new, brachy- and mesocephalic and euryprosopic element appeared in the culture's population. The woman who wore the copper diadem represents this latter, brachycranial variant.

<sup>10</sup> Köhler 2009; Köhler 2014b.

<sup>11</sup> Nemeskéri 1956; Zoffmann 1992; Zoffmann 2004; Köhler 2014a.

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