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ABBREVIATIONS

AAR	Analecta Archaeologica Ressoviensia (Rzeszów)
ActaArch	Acta Archaeologica (Leiden)
ActaArchHung	Acta Archaeologica Academiae Scientiarum Hungaricae (Budapest)
ActaMusPapensis	Acta Musei Papensis. A Pápai Múzeum Értesítője (Pápa)
Agria	Agria. Az Egri Múzeum Évkönyve (Eger)
AJPA	American Journal of Physical Anthropology (New York)
Alba Regia	Alba Regia. Annales Musei Stephani Regis (Székesfehérvár)
AnB	Analele Banatului. Buletinul Muzeului din Timişoara (Timişoara)
Antaeus	Antaeus. Communicationes ex Instituto Archaeologico (Budapest)
AnthrAnz	Anthropologischer Anzeiger (München)
AnthrK	Anthropológiai Közlemények (Budapest)
Antiquity	Antiquity. A Review of World Archaeology (Durham)
AÖ	Archäologie Österreichs (Wien)
Apulum	Apulum. Acta Musei Apulensis (Alba Iulia)
AR	Archeologické Rozhledy (Praha)
ArchA	Archaeologia Austriaca (Wien)
ArchBulg	Archaeologia Bulgarica (Sofia)
ArcheoSciences	ArcheoSciences. Revue d'Archéométrie (Rennes)
ArchÉrt	Archaeologiai Értesítő (Budapest)
ArchHung	Archaeologia Hungarica (Budapest)
Archiv für Anthropologie	Archiv für Anthropologie. Völkerforschung und kolonialen Kulturwandel (Braunschweig)
ArchKözl	Archaeologiai Közlemények (Budapest)
Arrabona	Arrabona. A Győri Xantus János Múzeum Évkönyve (Győr)
ASM	Archeologické Studijní Materiály (Praha)
AUB	Annales Universitatis Budapestinensis de Rolando Eötvös Nominatae (Budapest)
AVANS	Archeologické Výskumy a Nálezy na Slovensku (Nitra)
Balcanica	Balcanica. Annuaire du Comité Interacadémique de Balkanologie du Conseil des Académies des Sciences et des Arts de la R. S. F. Y. et de l'Institut des Etudes Balkaniques (Beograd)
BAR-IS	British Archaeological Reports – International Series (Supplementary) (Oxford)
BBV	Berliner Beiträge zur Vor- und Frühgeschichte (Berlin)
bioRxiv	bioRxiv. The Preprint Server for Biology
BRGK	Bericht der Römisch–Germanischen Kommission (Berlin)
BROB	Berichten van de Rijksdienst voor het Oudheidkundig Bodemonderzoek (Amersfoort)
BudRég	Budapest Régiségei (Budapest)
CommArchHung	Communicationes Archaeologicae Hungariae (Budapest)
Crisia	Crisia (Oradea)
CurrAnt	Current Anthropology (Chicago)

DissArch	Dissertationes Archaeologicae ex Instituto Archaeologico Universitatis de Rolando Eötvös nominatae (Budapest)
DMÉ	A Debreceni Déri Múzeum Évkönyve (Debrecen)
DocPraehist	Documenta Praehistorica (Ljubljana)
Dolg	Dolgozatok az Erdélyi Múzeum Érem- és Régiségtárából (Kolozsvár)
Dolgozatok	Dolgozatok a Magyar Királyi Ferencz József Tudományegyetem Archaeologiai Intézetéből (Szeged)
DuDolg	Dunántúli Dolgozatok (Pécs)
DuSz	Dunántúli Szemle (Szombathely)
EJA	European Journal of Archaeology (London)
Építés-Építészettudomány	Építés- Építészettudomány. A Magyar Tudományos Akadémia Műszaki Tudományok Osztályának Közleményei (Budapest)
EurAnt	Eurasia Antiqua. Zeitschrift für Archäologie Eurasiens (Bonn)
FAM	Fontes Archaeologiae Moravicae (Brno)
FolArch	Folia Archaeologica (Budapest)
FontArchHung	Fontes Archaeologici Hungariae (Budapest)
FrK	Földrajzi Közlemények (Budapest)
FSI	Forensic Science International. Genetics
FtK	Földtani Közlöny (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)
Gesta	Gesta. Historical Review (Miskolc)
HHR	The Hungarian Historical Review (Budapest)
HOMÉ	A Herman Ottó Múzeum Évkönyve (Miskolc)
HungArch	Hungarian Archaeology. E-Journal (Budapest)
JAA	Journal of Anthropological Archaeology (New York)
JAHA	Journal of Ancient History and Archaeology (Cluj-Napoca)
JAR	Journal of Archaeological Research (New York)
JAS	Journal of Archaeological Science (London)
JFA	Journal of Field Archaeology (Boston)
JFS	Journal of Forensic Sciences (Chicago)
JHE	Journal of Human Evolution (New York)
JIES	The Journal of Indo-European Studies (Washington, D. C.)
JLS	Journal of Lithic Studies (Edinburgh)
JPMÉ	A Janus Pannonius Múzeum Évkönyve (Pécs)
JWP	Journal of World Prehistory
KMK	A Komárom megyei Múzeumok Közleményei (Tata)
KMMK	Komárom-Esztergom Megyei Múzeumok Közleményei (Tata)
KRMK	A Kaposvári Rippl-Rónai Múzeum Közleményei (Kaposvár)
Marisia	Marisia. Studii şi Materiale. Muzeul Judeţean Tîrgu Mureş (Tîrgu Mureş)
MatArchSlov	Materialia Archaeologica Slovaca (Nitra)
MCA	Materiale şi Cercetări Archeologice (Bucureşti)
Menga	Menga. Revista de prehistoria de Andalucía. Journal of Andalusian Prehistory (Antequera)
MFMÉ	A Móra Ferenc Múzeum Évkönyve (Szeged)
MFMÉ StudArch	A Móra Ferenc Múzeum Évkönyve – Studia Archaeologica (Szeged)

MKCsM	Múzeumi Kutatások Csongrád Megyében (Szeged)
MRT	Magyarország Régészeti Topográfiája (Budapest)
Musaica	Musaica Archaeologica. Zborník Filozofickej Fakulty University Komenského (Bratislava)
Nartamongæ	Nartamongae. The Journal of Alano-Ossetic Studies. Epic, Mythology and Language (Vladikavkaz)
OA	Opuscula Archaeologica (Zagreb)
Ossa	Ossa. International Journal of Skeletal Research (Solna)
Ősrégészeti Levelek	Ősrégészeti Levelek. Prehistoric Newsletter (Budapest)
PBF	Prähistorische Bronzefunde (München)
PLoS One	PLoS One. E-Journal (San Francisco)
PNAS	Proceedings of the National Academy of Sciences (Washington, D. C.)
Pravěk	Pravěk (Brno)
Preistoria Alpina	Preistoria Alpina (Trento)
PZ	Praehistorische Zeitschrift (Berlin)
QuaternaryInt	Quaternary International. The Journal of the International Union for Quaternary Research (Oxford – New York)
Radiocarbon	Radiocarbon. An International Journal of Cosmogenic Isotope Research (Tucson)
RégFüz	Régészeti Füzetek (Budapest)
SA	Советская Археология (Moskva)
Satu Mare	Satu Mare. Studii şi comunicări. Seria Arheologie (Satu Mare)
Savaria	Savaria (Szombathely)
SbČSA	Sborník Československé Společnosti Archeologické (Brno)
SCIV	Studii şi Cercetări de Istorie Veche (Bucureşti)
SlA	Slovenská Archeológia (Bratislava)
SMK	Somogyi Múzeumok Közleményei (Kaposvár)
Specimina Nova	Specimina Nova. Dissertationum ex Instituto Historiae Antiquae et Archaeologiae Universitatis Quinqueecclesiensis (Pécs)
SSz	Soproni Szemle (Sopron)
StComit	Studia Comitatensia (Budapest)
SzIKMK	A Szent István Király Múzeum Közleményei (Székesfehérvár)
Terra Sebus	Terra Sebus. Acta Musei Sabesiensis (Sebes)
Tisicum	Tisicum. A Jász-Nagykun-Szolnok Megyei Múzeumok Évkönyve (Szolnok)
UF	Ugarit-Forschungen. Internationales Jahrbuch für die Altertumskunde Syrien-Palästinas (Kevelaer – Neukirchen– Vluyn)
UPA	Universitätsforschungen zur prähistorischen Archäologie (Bonn)
VAH	Varia Archaeologica Hungarica (Budapest)
VetZoot	Veterinarija ir Zootechnika. A scientific journal and the Official Organ of the Veterinary Academy, Lithuanian University of Health Sciences (Kaunas)
VKT	Várak, kastélyok, templomok. Történelmi és örökségturisztikai folyóirat (Pécs)
VMMK	A Veszprém Megyei Múzeumok Közleményei (Veszprém)
VýP	Východoslovenský Pravek (Košice)
WMMÉ	A Wosinsky Mór Múzeum Évkönyve (Szekszárd)
ZalaiMúz	Zalai Múzeum (Zalaegerszeg)
ZbSNM	Zborník Slovenského Národného Múzea. Archeológia (Bratislava)
Ziridava	Ziridava. Studia Archaeologica (Arad)
ZSNM	Zbornik Slovenského Národného Múzea (Ljubljana)

FOREWORD FROM THE EXECUTIVE EDITOR

As with the previous (37th) issue of the Antaeus (Yearbook of the Institute of Archaeology), the present volume brings together a selection of research papers addressing a certain time period; the Bronze Age on this occasion. The current volume, despite containing fewer studies than the previous issues, is in line with the editorial board's ambition to publish a new volume at regular – annual – intervals, even at the expense of the overall length of the publication. With the aim to assemble a broad spectrum of Bronze Age research studies from the territory of Hungary, the current issue touches upon a wide range of themes stretching across the many hundreds of years of the Bronze Age period: from the facial reconstruction of an Early Bronze Age woman, to the domestication of horses and Middle Bronze Age dress ornaments, to the study of the large, Late Bronze Age fortified settlements. These topics cover the key issues of current European Bronze Age research, including the archaeological application of DNA analyses, and the theoretical approaches of political economies, therefore the outcomes presented here will hopefully be of wide international interest. Some of the research was carried out within the framework of the Lendület/Momentum Mobility Research Group launched in 2015, supported by the Hungarian Academy of Sciences at the Institute of Archaeology, Research Centre for the Humanities.

The paper by Ágnes Kustár and her colleagues presents the facial reconstruction of an Early Bronze Age female burial. The work serves as the first facial reconstruction study where DNA data was also considered regarding the pigmentation (eye and hair colour, skin tone) of a Bronze Age individual from present-day Hungary.

The two studies put forward by Eszter Melis and Gabriella Kulcsár as main authors, both discuss the results of micro-regional settlement investigations aimed to explore Early and Middle Bronze Age settlement structures using non-destructive methods. The settlement investigations conducted by Eszter Melis and her team focussed on the region of Nagycenk, nearby Lake Neusiedl. The data published here represents a significant piece of archaeological research as information from the region occupied by the Gáta–Wieselburg culture has been lacking in the past three decades. Furthermore, the site of Nagycenk-Kövesmező is one of the few Gáta–Wieselburg settlements investigated by a modern archaeological excavation.

Gabriella Kulcsár and her team discuss the Middle Bronze Age pit burial of a mature adult female with evidence for multiple physical trauma, from Central Hungary. The study touches upon the interpretation of pit burials in the context of the settlements of Bronze Age communities who otherwise practiced inhumation and cremation as their nominal mortuary tradition.

Géza Szabó's paper examines the so-called Tolnanémedi-type hoard horizon comprised primarily of dress ornament assemblages across to the Middle Bronze Age along with a newly discovered hoard from Mucsi in Tolna county. The publication includes the reconstruction of a costume worn by high status female members of the Transdanubian Encrusted Pottery culture and provides an interpretation of the symbolism of such ornaments.

The study by Gábor Ilon provides an overview of Bronze Age moulds and their distribution in the Carpathian Basin. The paper considers the assemblage as important evidence for local metallurgy, and sheds new light on the organisation and specialisation of bronze production.

Róbert Bozi and Géza Szabó explore the question of horse domestication within the context of Bronze Age cultures in Central and Eastern Hungary, based on the evidence of horse gear made of antler appearing first during the 2nd millennium in the Carpathian Basin. The study relies on newly discovered horse remains and their associated absolute dates.

The paper by Vajk Szeverényi and his colleagues discusses the results of their most recent excavation programme conducted at Csanádpalota; a prime example of a so-called 'mega fort' or large-scale fortified settlement typical in the Late Bronze Age in Southeast Europe. Anna Priskin in her study gives a detailed insight into the production and use of grinding stones recovered at the site.

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GÉZA SZABÓ

THE BRONZE HOARD OF MUCSI
DRESS ORNAMENTS OF A HIGH-STATUS WOMAN

Zusammenfassung: Die Studie beinhaltet weiterführende Informationen zur Veröffentlichung des Hortfundes von Mucsi (Komitat Tolna, Südwest-Ungarn), die dem besseren Verständnis jener Bronzeschätze dienen, die mit dem Volk der inkrustierten Gefäße in Verbindung gebracht werden. Die Fundansammlungen des Schatzhorizonts von Tolnanémedi aus der mittleren Bronzezeit beinhalten Schmuckstücke, die zur Tracht der zeitgenössischen Elite gehörten. Der Verfasser kommt auf Einzelheiten von Herstellungs- und Trachtenart der Gegenstände zu sprechen und schlägt einen Zusammenhang zwischen den im Sinne der früheren Forschung schwalbenschwanzförmig genannten und als Teil des Horts zutage geförderten Anhängern und den Omega-Symbolen auf Abbildungen mesopotamischer, bzw. ägyptischer Fruchtbarkeitskulte vor.

Keywords: Tolnanémedi hoard horizon, bronze hoard, fertility cult, Transdanubian Encrusted Pottery culture, Middle Bronze Age, Western Hungary

In the autumn of 1989, András Hohmann a local enthusiast came across three bronze artefacts in a ploughed field in the vicinity of Mucsi which he promptly brought to the Wosinsky Mór Museum at Szekszárd.[1] Given the artefacts' characteristics, it was feasible to assume that they belonged to a larger assemblage associated with the Transdanubian Encrusted Pottery culture disturbed by agricultural activity, therefore an archaeological investigation of the surrounding area was arranged.

Mucsi is a small *cul-de-sac* village situated on a the Tolna Hills in southern Transdanubia, at the headwaters of the Donát Stream *(fig. 1).* Separated only by a chain of hills from the main waterways of the Kapos River, this valley represents a direct link with the Sió river basin. The Mucsi-Hidas Stream, the other waterway of the village also served as a route down to the Sió (via the Völgység Stream) and from there to the Danube. This is particularly significant as the Sió River represented a boundary between the distribution areas of the Transdanubian Encrusted Pottery and the Vatya culture during the Middle Bronze Age. The hoard was found northeast of the village Mucsi on the left bank of the Donát Stream at the foot of a hill. On the hilltop above, ceramic fragments and metal artefacts were collected indicating the presence of a burial ground associated with the Encrusted Pottery culture.[2]

[1] I would like to express my gratitude here to András Hohmann for his gesture and unrelenting support of the museum's work. I am grateful for László Gucsi for his helpful observations on Bronze Age attires and for preparing the illustrations and reconstructions of the garments described in the text. I would like to thank Borbála Nyíri for the English translation of the manuscript. The study was supported by the Lendület/Momentum Mobility Research; here I would like to express my thanks to Viktória Kiss for her valuable help and advice.

[2] *Kiss 2012a* catalogue site nos. 219–220.

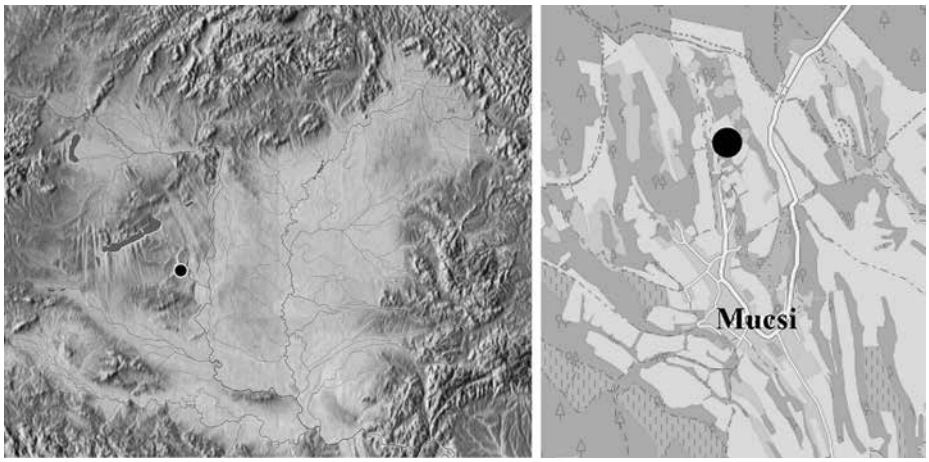

Fig. 1. The location of the Mucsi hoard (©Géza Szabó, ©Csaba Peterdi, ©Zsolt Réti)

András Hohmann showed us the exact location of the hoard in freezing weather conditions in late autumn. The close surrounding area was then investigated by the museum's own metal detector; a device developed by Hungarian engineers. Unfortunately, this did not result in a breakthrough as the grain sown in the field was treated with a chemical of high copper content distorting the signal. However, several bronze artefacts were collected from the ploughsoil evidencing past occupations. The site could only be investigated by a small evaluation trench (1 m × 5 m) at the time targeting a small scatter of ceramics found in the plough soil. The investigation yielded further bronze and ceramic fragments from the ploughed levels, but archaeological features could not be identified. Altogether 60 pieces of bronze ornaments (weighing 480.34 g) – part of an attire of a high-ranking woman – of the Encrusted Pottery culture were documented from the site.[3] Given the finding circumstances of the hoard, it is possible that the assemblage initially contained even more objects. Several artefacts came to light distorted or broken from the plough soil *(fig. 2)*. The photographs published in this paper depict these objects as they were found, while on the drawings we have tried to show their possible reconstructions *(figs. 3–4)*.

The description of the assemblage

Disc-shaped pendant with a cross rib. The object was cast in a mould with two holes added later to aid its attachment. Diameter: 5.6 cm, weight: 38.60 g (Inv. no.: WMM Ö.90.51.1; *fig. 3. 1*). There is a circular rib running parallel with the round edge, and there are additional two ribs crossing in the centre on the frontal plate of the pendant. A burr is visible at the joint where the ribs cross in the middle which was later flattened (probably by hammering) resulting in uneven edges *(fig. 5. 1)*. Furthermore, it is likely that this feature represents the truncated base of the casting sprue (or *engus* – the entry point where molten bronze was poured into the mould) since its central location. Therefore, the circular ribs along the edge of the pendant and the ones meeting in the middle were not only decorative details but could have also served as casting channels aiding the even distribution of the molten bronze. It is feasible to assume that the object was cast in a mould placed in a horizontal position with a casting sprue positioned at the centre, for best access to the casting channels. The remnants of the casting sprue were hammered down indicated by the burrs still present around its edges. The otherwise flat

[3] Wosinsky Mór Museum, Archaeological Collections, Szekszárd, Inv. nos.: WMM Ö.90.51.1–60.

Fig. 2. The Mucsi hoard following conservation (©Géza Szabó)

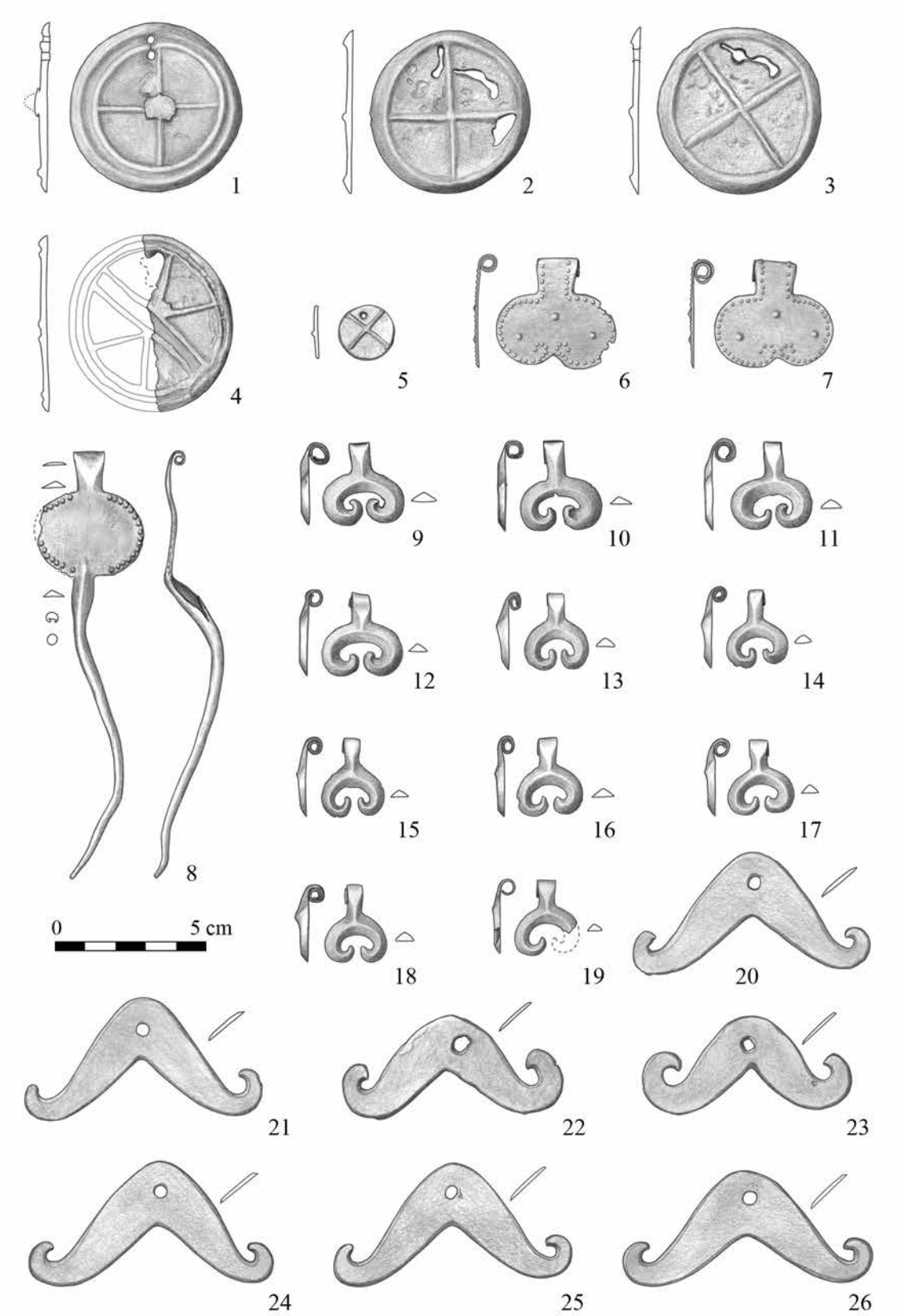

Fig. 3. The hoard of Mucsi (Inv. nos. WMM Ö.90.51.1–26) (©László Gucsi)

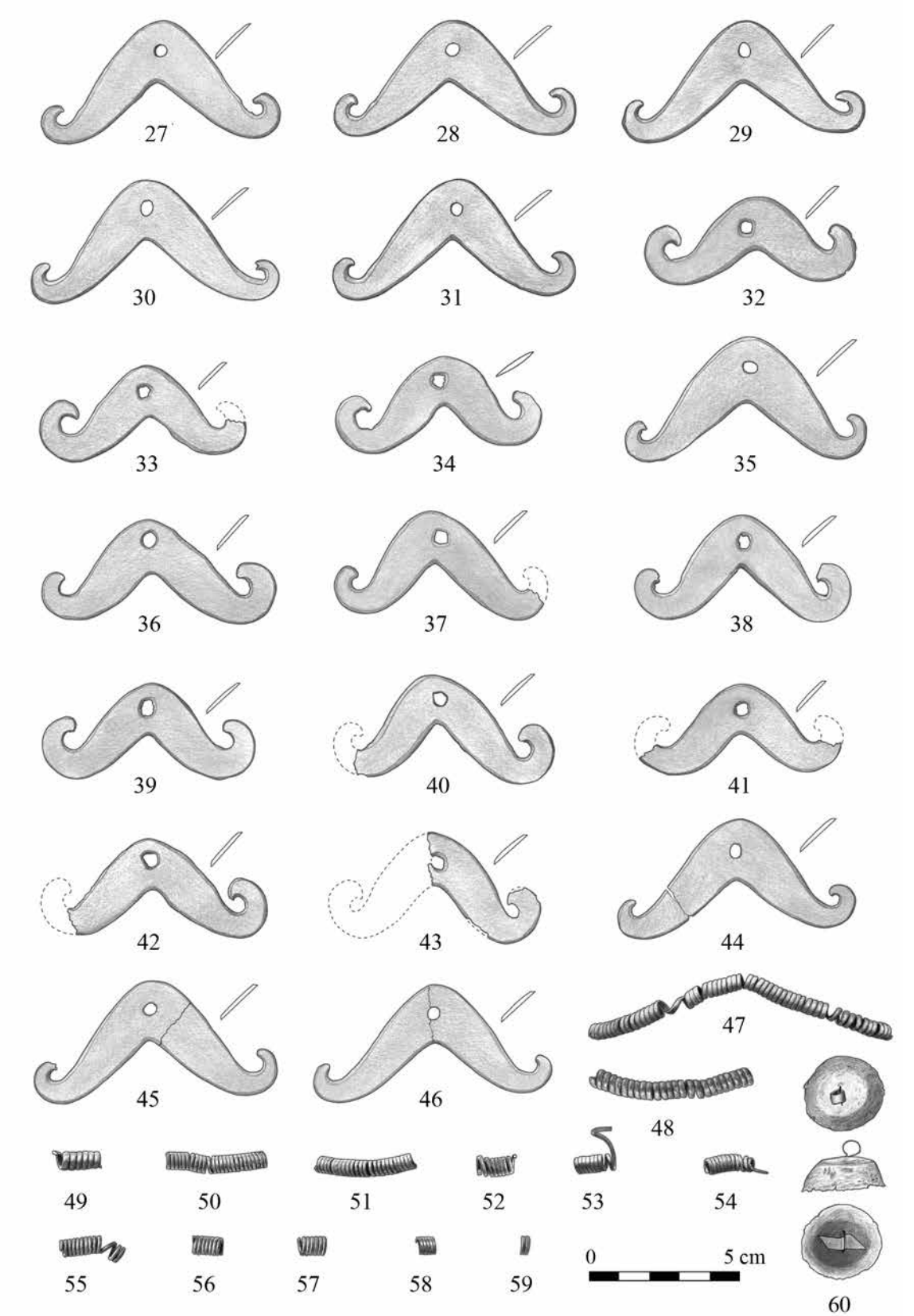

Fig. 4. The hoard of Mucsi (Inv. nos. WMM Ö.90.51.27–60) (©László Gucsi)

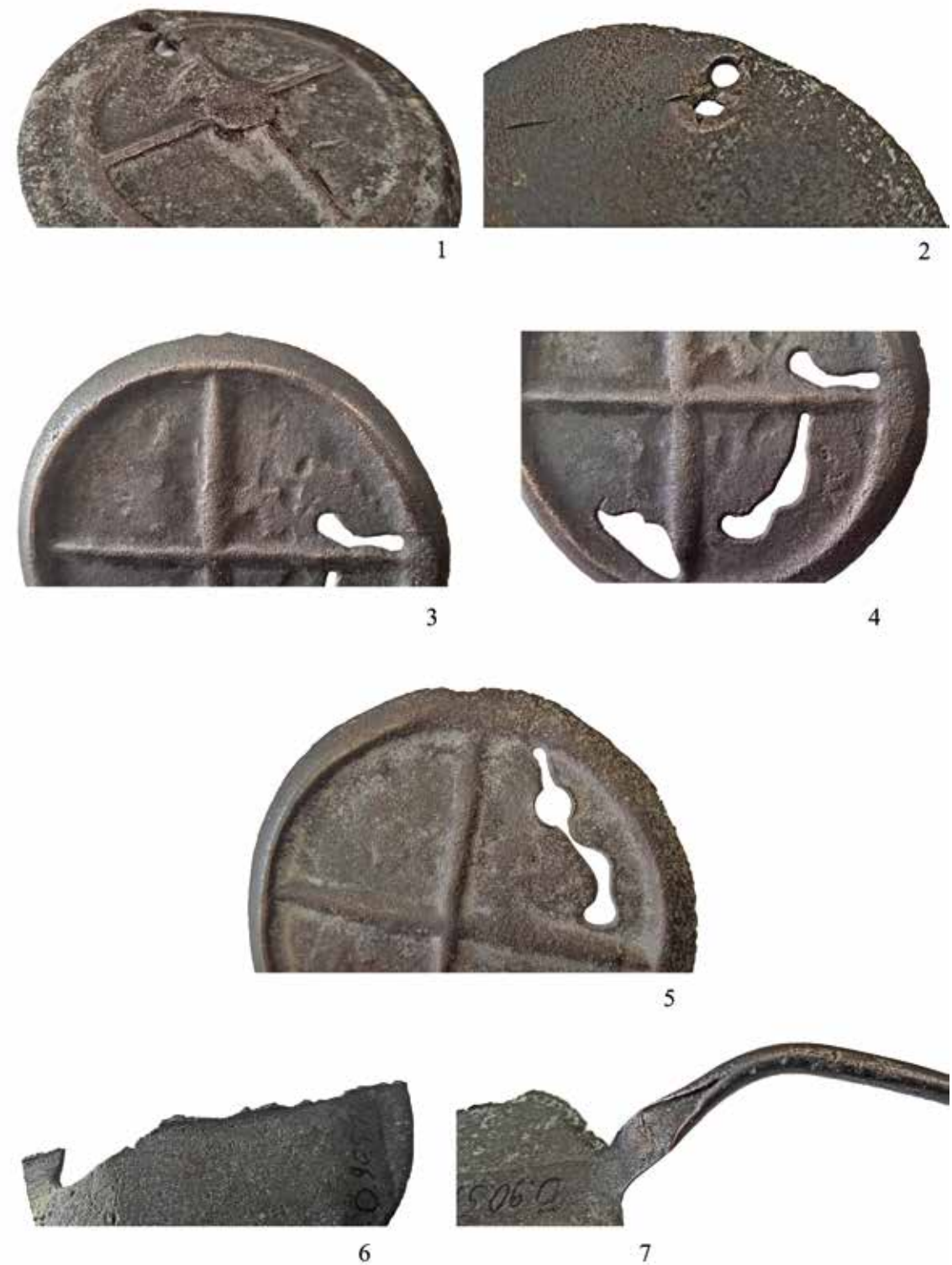

Fig. 5. 1. A flattened base of the casting sprue in the centre of the pendant with a burr still present around the edges (Inv. no. WMM Ö.90.51.1); 2. Additional finishing around the pierced holes on the back of the pendant (Inv. no. WMM Ö.90.51.1); 3. The 'U'-shaped indentation left by the casting sprue on the top edge of the pendant (Inv. no. WMM Ö.90.51.2); 4. Irregular clefts present in the material of the pendant (Inv. no. WMM Ö.90.51.2); 5. The 'U'-shaped indentation left by the casting sprue on the pendant's edge (Inv. no. WMM Ö.90.51.3); 6. Signs of deliberate fracture on the pendant (Inv. no. WMM Ö.90.51.4); 7. Evidence of cold-working on the shaft of the disc-headed pin below the head (Inv. no. WMM Ö.90.51.8) (©Géza Szabó)

surface of the disc is disrupted only by two pierced holes placed right next to the straight rib in the upper section of the object implying that these perforations were added later (from the front to the back). The action of perforation resulted in the creasing of the material on the back *(fig. 5. 2)*.

Disc-shaped pendant with a cross rib. The placement of the ribs is slightly off centre, the casting is faulty with three irregular clefts left in the material. Diameter: 5.4 cm, weight: 22.60 g (Inv. no.: WMM Ö.90.51.2; *fig. 3. 2)*. The artefact was cast in a mould positioned vertically, the molten bronze was poured in through the casting sprue *(engus)*. The 'U'-shaped indentation left by the casting sprue is visible on the pendant's edge *(fig. 5. 3)*, in close proximity to the ribs running along the edge and crossing in the centre indicating that beyond their decorative function the ribs may also have served as channels to receive and spread the molten metal. In three out of the four quarter segments of the pendant the bronze did not distribute evenly and solidified forming irregular clefts, which made it possible for the object to be worn without drilling additional holes *(fig. 5. 4)*. The casting fault was probably due to the incorrect sizing of the casting channels, or to the composition of the alloy or the incorrect temperature of the molten metal and/or the mould, however to establish the exact cause further scientific investigations would be required.

Disc-shaped pendant with a cross rib. The placement of the ribs is off centre, with a casting fault leaving a long, irregular cleft in the material. Diameter: 5.2 cm, weight: 24 g (Inv. no.: WMM Ö.90.51.3; *fig. 3. 3*). The artefact was cast in a mould positioned vertically, molten bronze was poured in through the casting sprue *(engus)*. The 'U'-shaped indentation left by the casting sprue is visible on the pendant's edge *(fig. 5. 5),* in close proximity to the ribs running along the edge and crossing in the centre indicating that beyond their decorative and function the ribs may have also served as channels to receive and spread the molten metal. In one out of the four quarter segments of the object the material did not distribute evenly and solidified forming an irregular cleft. However, the cleft on its own was not large enough for a cord to pass through, therefore it was widened by drilling from both the front and the back. The size, decoration and slightly off-centre ribs indicate that it was cast in the same mould as pendant WMM Ö.90.51.2, further supported by only the fractional difference in the pendants' weight.

Disc-shaped pendant with a cross rib, broken into half. Two parallel ribs run along the pendant's round edge and across its centre. Four additional ribs (two in each half) divide the frontal plate into six segments. A fault in the casting left at least one irregular cleft in the material. Diameter: 5.7 cm, weight: 10.55 g (Inv. no.: WMM Ö.90.51.4; *fig. 3. 4*). The artefact was cast in a mould positioned vertically, the ribs running along the pendant's edge and crossing in the centre could have also served as casting channels to receive and spread the molten metal evenly. However, in at least one segment of the pendant the material did not spread evenly and solidified forming an irregular cleft *(fig. 5. 6)*. A sharp edge left by the fracture on both sides indicates that the object was folded and then broken deliberately.

Small, disc-shaped pendant with a cross rib. The cross ribs on the frontal plate divide the pendant into four segments. There is a small hole pierced in one of the sections. Cast piece. Diameter: 1.75 cm, weight: 1.9 g (Inv. no.: WMM Ö.90.51.5; *fig. 3. 5*).

Heart-shaped pendant. Small, impressed dots running along the pendant's edge, including the hanger part which was folded twice. The impressed dots stop at the bottom between the two semi-circular lobes, and curve backwards forming a spiral. There are three larger impressed dots (impressions were made from the back) visible on the frontal plate of the object. Height: 3.6 cm, width: 3.9 cm, weight: 5.4 g (Inv. no.: WMM Ö.90.51.6; *fig. 3. 6*).

Heart-shaped pendant. Small, impressed dots running along the pendant's edge, including the hanger part which was folded twice. The impressed dots stop at the bottom between the two semi-circular lobes, and curve backwards forming a spiral. There are three larger impressed

dots (impressions were made from the back) visible on the frontal plate of the object. Height: 3.5 cm, width: 3.8 cm, weight: 5.69 g (Inv. no.: WMM Ö.90.51.7; *fig. 3. 7*). It could have been cast using the same mould as the previously described pendant (WMM Ö.90.51.6).

Disc-headed pin. A line of small, impressed dots run along the edges of the round disc-head that continue on the folded hanger part too. Length: 14 cm, width of the disc-head: 3.7 cm, weight: 16.16 g (Inv. no.: WMM Ö.90.51.8; *fig. 3. 8*). The pin was shaped by hammering and cold-working following the casting process, traces of which are clearly visible on the pin's shaft. The disc-head was probably cast into a round shape initially and hammered into a disc later *(fig. 5. 7)*. It is likely that the hanger part may have served as a casting sprue, and was later worked into a flat sheet then folded up. The use of a single-sided mould, covered by a flat lid for the casing caused the shaft of the pin to be flat on one side, which was then hammered into a cylindrical shape. This is clearly evidenced on the shaft below the disc-head where the material creased and the cracked lengthways.

Crescent-shaped pendant. The object consists of two segments, the two arms bend inwards, towards the centre forming three quarters of a circle. It was cast, the casting sprue had been hammered into a hanger which was folded twice. Height: 2.7 cm, width: 2.6 cm, weight: 6.11 g (Inv. no.: WMM Ö.90.51.9; *fig. 3. 9*).

Crescent-shaped pendant. The artefact consists of two segments, the two arms bend inwards, towards the centre forming two thirds of a circle. It was cast, the casting sprue had been hammered into a hanger which was folded twice. Height: 2.9 cm, width: 2.7 cm, weight: 6.1 g (Inv. no.: WMM Ö.90.51.10; *fig. 3. 10*).

Crescent-shaped pendant. The two arms of the object bend inwards, towards the centre forming two thirds of a circle. The pendant was cast, and the casting sprue hammered into a hanger then folded twice. Height: 2.9 cm, width: 2.7 cm, weight: 5.63 g (Inv. no.: WMM Ö.90.51.11; *fig. 3. 11*). Since its weight and the slight asymmetry in shape is almost identical to pendant WMM Ö.90.51.10, it is likely that the same mould was used for casting this object as well.

Crescent-shaped pendant. The two arms of the object bend inwards, towards the centre forming two thirds of a circle. The pendant was cast, and the casting sprue hammered into a hanger then folded twice. Height: 2.7 cm, width: 2.7 cm, weight: 5 g (Inv. no.: WMM Ö.90.51.12; *fig. 3. 12*). Since its weight and the slight asymmetry in shape is almost identical to pendant WMM Ö.90.51.9, it is likely that the same mould was used for casting this object as well.

Crescent-shaped pendant. The two arms of the object bend inwards, towards the centre forming two thirds of a circle. The pendant was cast, and the casting sprue hammered into a hanger then folded once and a half. Height: 2.5 cm, width: 2.2 cm, weight: 4.36 g (Inv. no.: WMM Ö.90.51.13; *fig. 3. 13*).

Crescent-shaped pendant. The two arms of the object bend inwards, towards the centre forming two thirds of a circle. The pendant was cast, and the casting sprue hammered into a hanger then folded twice. Height: 2.8 cm, width: 2.9 cm, weight: 4.63 g (Inv. no.: WMM Ö.90.51.14; *fig. 3. 14*).

Crescent-shaped pendant. The two arms of the object bend inwards, towards the centre forming two thirds of a circle. The pendant was cast, and the casting sprue hammered into a hanger. Height: 2.1 cm, width: 2.6 cm, weight: 3.7 g (Inv. no.: WMM Ö.90.51.15; *fig. 3. 15*).

Crescent-shaped pendant. The two arms of the object bend inwards, towards the centre forming two thirds of a circle. The pendant was cast, and the casting sprue hammered into a hanger then folded once and a half. Height: 2.5 cm, width: 2.2 cm, weight: 4.09 g (Inv. no.: WMM Ö.90.51.16; *fig. 3. 16*). Since its weight and the slight asymmetry in shape is almost identical to pendants WMM Ö.90.51.17–18, it is likely that the same mould was used for casting this object as well. The weight is similar to pendants WMM Ö.90.51.13–15. too.

Crescent-shaped pendant. The two arms of the object bend inwards, towards the centre forming two thirds of a circle. The pendant was cast, and the casting sprue hammered into a hanger then folded once and a half. Height: 2.5 cm, width: 2.2 cm, weight: 3.97 g (Inv. no.: WMM Ö.90.51.17; *fig. 3. 17).*

Crescent-shaped pendant. The two arms of the object bend inwards, towards the centre forming two thirds of a circle. The pendant was cast, and the casting sprue hammered into a hanger then folded once and a half. Height: 2.5 cm, width: 2.1 cm, weight: 4.8 g (Inv. no.: WMM Ö.90.51.18; *fig. 3. 18*).

Crescent-shaped pendant. The two arms of the object bend inwards, towards the centre forming two thirds of a circle. The pendant was cast, and the casting sprue hammered into a hanger then folded once and a half. Height: 2.5 cm, width: 2.7 cm, weight: 3.34 g (Inv. no.: WMM Ö.90.51.19; *fig. 3. 19*).

Omega-shaped pendant.[4] Thin, cast metal sheet, intact. Height: 3.8 cm, width: 7.9 cm, weight: 12.11 g (Inv. no.: WMM Ö.90.51.20; *fig. 3. 20*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later. It is very similar in shape to pendants WMM Ö.90.51.21–31, thus it is likely that it was cast using the same mould as for pendants WMM Ö.90.51.24–27, and WMM Ö.90.51.29–31. Pendants WMM Ö.90.51.22–23. were cast in different moulds given the curvature of their stems. Furthermore, there is a difference in weight as well, pendant WMM Ö.90.51.28. is heavier than the rest, while pendants WMM Ö.90.51.22– 23. are much lighter.

Omega-shaped pendant. Thin, cast metal sheet, bent. Height: 3.8 cm, width: 7.9 cm, weight: 12.00 g (Inv. no.: WMM Ö.90.51.21; *fig. 3. 21*). There is an irregular shaped hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, bent. Height: 3 cm, width: 7.4 cm, weight: 9.07 g (Inv. no.: WMM Ö.90.51.22; *fig. 3. 22*). There is a slightly squarish shaped hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, bent. Height: 3 cm, width: 6.9 cm, weight: 8.73 g (Inv. no.: WMM Ö.90.51.23; *fig. 3. 23*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, bent. Height: 3.5 cm, width: 6.8 cm, weight: 11.89 g (Inv. no.: WMM Ö.90.51.24; *fig. 3. 24*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, intact. Height: 3.8 cm, width: 7.9 cm, weight: 12.03 g (Inv. no.: WMM Ö.90.51.25; *fig. 3. 25*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, bent. Height: 3.4 cm, width: 7.9 cm, weight: 12.19 g (Inv. no.: WMM Ö.90.51.26; *fig. 3. 26*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

[4] This object type is referred to as swallowtail-shaped pendant *(Schwalbenschwanzförmige Anhänger)* in the archaeological literature (cf. *Kiss 2012a; Honti – Kiss 2013).*

Omega-shaped pendant. Thin, cast metal sheet, bent. Height: 3.6 cm, width: 7.9 cm, weight: 12.59 g (Inv. no.: WMM Ö.90.51.27; *fig. 4. 27*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, slightly bent. Height: 3.6 cm, width: 7.9 cm, weight: 13.00 g (Inv. no.: WMM Ö.90.51.28; *fig. 4. 28*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, slightly bent. Height: 3.6 cm, width: 7.9 cm, weight: 11.61 g (Inv. no.: WMM Ö.90.51.29; *fig. 4. 29*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, slightly bent on the right-hand side. Height: 3.6 cm, width: 6.8 cm, weight: 12.05 g (Inv. no.: WMM Ö.90.51.30; *fig. 4. 30*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, slightly bent on the left-hand side. Height: 3.5 cm, width: 7.2 cm, weight: 12.72 g (Inv. no.: WMM Ö.90.51.31; *fig. 4. 31*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, folded. Height: 2.7 cm, width: 5.9 cm, weight: 8.32 g (Inv. no.: WMM Ö.90.51.32; *fig. 4. 32*). There is a round hole that shifted slightly to the right of the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later. Pendants WMM Ö.90.51.32–46. are clearly different from the ones described above since their smaller size. Unfortunately, the majority of these objects are broken, bent or incomplete, therefore the characteristics of their casting and the mould used to produce them cannot be studied closely (however, given their weight around 8 grams, it is possible that pendants WMM Ö.90.51.31–34., and WMM Ö.90.51.36–41. were cast using the same mould – *fig. 6*). Especially, that in certain cases the difference in size can be as large as 50% (such as in the instance of pendant WMM Ö.90.51.35).

Omega-shaped pendant. Thin, cast metal sheet, the stem on the right-hand side is missing. Height: 2.7 cm, width: 7 cm, weight: 8.12 g (Inv. no.: WMM Ö.90.51.33; *fig. 4. 33*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, bent. Height: 3 cm, width: 6.5 cm, weight: 7.89 g (Inv. no.: WMM Ö.90.51.34; *fig. 4. 34*). There is a irregular shaped hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, folded multiple times. Height: 2.7 cm, width: 5.5 cm, weight: 12.44 g (Inv. no.: WMM Ö.90.51.35; *fig. 4. 35*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, folded once. Height: 4 cm, width: 2.4 cm, weight: 9.15 g (Inv. no.: WMM Ö.90.51.36; *fig. 4. 36*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, bent. Height: 4 cm, width: 2.8 cm, weight: 8.04 g (Inv. no.: WMM Ö.90.51.37; *fig. 4. 37*). There is a round hole that shifted slightly to the right of

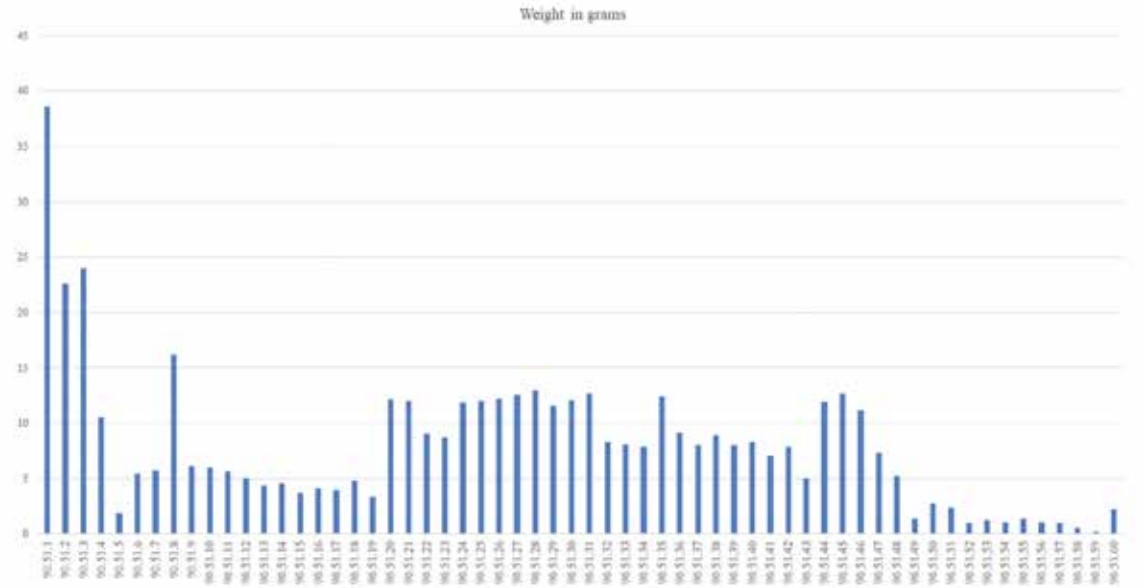

Fig. 6. The weight of each artefact contained by the Mucsi hoard
(data by Viktória Kiss, diagram ©Géza Szabó)

the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, bent. Height: 3 cm, width: 6.8 cm, weight: 8.93 g (Inv. no.: WMM Ö.90.51.38; *fig. 4. 38*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, folded multiple times. Height: 3 cm, width: 5.5 cm, weight: 8.03 g (Inv. no.: WMM Ö.90.51.39; *fig. 4. 39*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, bent, its stem on the left-hand side is missing. Height: 3 cm, width: 5.5 cm, weight: 8.32 g (Inv. no.: WMM Ö.90.51.40; *fig. 4. 40*). There is a round hole that shifted slightly to the right of the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, bent, the ends of both stems are missing. Height: 3.1 cm, width: 3.7 cm, weight: 7.07 g (Inv. no.: WMM Ö.90.51.41; *fig. 4. 41*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, bent, the end of the stem on the left-hand side is missing. Height: 3 cm, width: 6.5 cm weight: 7.91 g (Inv. no.: WMM Ö.90.51.42; *fig. 4. 42*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, bent, the stem on the left-hand side is missing. Height: 3.5 cm, width: 4.2 cm, weight: 5.03 g (Inv. no.: WMM Ö.90.51.43; *fig. 4. 43*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, broken into two halves. Height: 3.8 cm, width: 7.9 cm, weight: 11.09 g (Inv. no.: WMM Ö.90.51.44A–B; *fig. 4. 44*). There is a round hole

placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, broken into two halves. Height: 3.8 cm, width: 7.9 cm, weight: 12.69 g (Inv. no.: WMM Ö.90.51.45A–B; *fig. 4. 45*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Omega-shaped pendant. Thin, cast metal sheet, broken into two halves. Height*:* 3.8 cm, width: 7.9 cm, weight: 11.18 g (Inv. no.: WMM Ö.90.51.46A–B; *fig. 4. 46*). There is a round hole placed along the central axis on the upper part of the pendant, which seems to have been part of the casting process, its rough edges filed down later.

Fragment of a tubular spiral bead. Made of a flat strip of bronze wire coiled into a cylindrical spiral. Diameter: 6 mm, length: 8.1 cm, weight: 7.32 g (Inv. no.: WMM Ö.90.51.47; *fig. 4. 47*).

Fragment of a tubular spiral bead. Made of a flat strip of bronze wire coiled into a cylindrical spiral. Diameter: 6 mm, length: 5.1 cm, weight: 5.22 g (Inv. no.: WMM Ö.90.51.48; *fig. 4. 48*).

Fragment of a tubular spiral bead. Made of a flat strip of bronze wire coiled into a cylindrical spiral. Diameter: 6 mm, length: 1.3 cm, weight: 1.38 g (Inv. no.: WMM Ö.90.51.49; *fig. 4. 49*).[5]

Fragment of a tubular spiral bead. Made of a flat strip of bronze wire coiled into a cylindrical spiral. Diameter: 5.5 mm, length: 3.4 cm, weight: 2.81, g (Inv. no.: WMM Ö.90.51.50; *fig. 4. 50*).

Fragment of a tubular spiral bead. Made of a flat strip of bronze wire coiled into a cylindrical spiral. Diameter: 5.5 mm, length: 3.4 cm weight: 2.35 g (Inv. no.: WMM Ö.90.51.51; *fig. 4. 51*).[6]

Fragment of a tubular spiral bead. Made of a flat strip of bronze wire coiled into a cylindrical spiral. Diameter: 6 mm, length: 1.65 cm, weight: 1 g (Inv. no.: WMM Ö.90.51.52; *fig. 4. 52*).

Fragment of a tubular spiral bead. Made of a flat strip of bronze wire coiled into a cylindrical spiral. Diameter: 6 mm, length: 1.3 cm, weight: 1.26 g (Inv. no.: WMM Ö.90.51.53; *fig. 4. 53*).

Fragment of a tubular spiral bead. Made of a flat strip of bronze wire coiled into a cylindrical spiral. Diameter: 5.3 mm, length: 2.1 cm, weight: 1.05 g (Inv. no.: WMM Ö.90.51.54; *fig. 4. 54*).

Fragment of a tubular spiral bead. Made of a flat strip of bronze wire coiled into a cylindrical spiral. Diameter: 6 mm, length: 2.1 cm, weight: 1.40 g (Inv. no.: WMM Ö.90.51.55; *fig. 4. 55*).

Fragment of a tubular spiral bead. Made of a flat strip of bronze wire coiled into a cylindrical spiral. Diameter: 6 mm, length: 1 cm, weight: 1.07 g (Inv. no.: WMM Ö.90.51.56; *fig. 4. 56*).

Fragment of a tubular spiral bead. Made of a flat strip of bronze wire coiled into a cylindrical spiral. Diameter: 6 mm, length: 0.8 cm, weight: 1.97 g (Inv. no.: WMM Ö.90.51.57; *fig. 4. 57*).

Fragment of a tubular spiral bead. Made of a flat strip of bronze wire coiled into a cylindrical spiral. Diameter: 5.5 mm, length: 0.6 cm, weight: 0.52 g (Inv. no.: WMM Ö.90.51.58; *fig. 4. 58*).

Fragment of a tubular spiral bead. Made of a flat strip of bronze wire coiled into a cylindrical spiral. Diameter: 5.5 mm, length: 0.25 cm, weight: 0.23 g (Inv. no.: WMM Ö.90.51.59; *fig. 4. 59*).

Bronze stud with a hanger. The stud was made of a bronze sheet hammered into a hemispherical shape. The hanger was shaped from a thin bronze strip and was threaded through the opening on the top of the stud before securing the ends on the interior. It is possible that it could have functioned as a little bell.[7] Diameter: 2.6 cm, weight: 2.23 g (Inv. no.: WMM Ö.90.51.60; *fig. 4. 60).*

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[5] The width and the colour of the patina suggests that fragments WMM Ö.90.51.48–49. were originally part of the same artefact.

[6] The width and the colour of the patina suggests that WMM Ö.90.51.51, Ö.90.51.54, Ö.90.51.56–59. belonged to the same object.

[7] Based on its shape and manufacturing technique it is possible that it was not part of the assemblage but belonged to a later chronological horizon.

Technological observations

All 60 items contained by the hoard were made of bronze.[8] In terms of their manufacturing technologies the ornaments can be divided into two groups: 1) hammered objects: tubular spiral beads, studs, disc-headed pin, and 2) cast artefacts: heart-, crescent-, and omega-shaped pendants. Among the disc-shaped pendants with a cross rib there is one which was cast in a horizontally positioned mould (while the rest was cast vertically). The joint of the ribs in the centre of pendant WMM Ö.90.51.1. (frontal page) was hammered down following the casting, indicated by the burrs left behind *(fig. 5. 1)*, which may have also been the spot where the casting spure was fitted. This is further supported by its central location and the lack of evidence for a casting sprue *(engus)* elsewhere on the pendant. However, it is possible that a particular fault which occurred during the casting process was later rectified this way. The pendant is significant since so far all the artifacts linked to this metallurgical horizon were cast in a vertical position. Further archaeometallurgical examinations required to explore the exact stages of casting processes – here, I could only draw attention to this unusual detail.

Typological and chronological interpretation

Several object types contained by the Mucsi assemblage – such as the tubular spiral beads – are generic forms utilised widely across a large geographical area throughout the entire span of the Early Bronze Age.[9] However, there were a number of ornament types typically in use in the regions west of the Danube. Disc-shaped pins[10] for instance can be found in the Vatya culture's territories as well,[11] although their use was more characteristic within the distribution of the Gáta–Wieselburg culture.[12] This overlap in preferences has been observed before by other researchers,[13] a detail that is even more significant in light of the Gáta–Wieselburg community's taste for Dentalium shell necklaces (i.e. molluscs that continue to inhabit the Atlantic and the North Sea, but also occur in Miocene geological strata in Austria)[14] just like the one documented from Bonyhád, the site associated with the Transdanubian Encrusted Pottery culture.[15] Heart-shaped pendants were described by István Bóna as the products of the early Vatya culture's sheet-working metallurgical tradition, a technique which then spread into neighbouring cultural complexes as well.[16] Bóna assumed similar origins and distribution for the cast, crescent-shaped pendants too.[17] Based on this the chronological classification of hoards containing crescent-shaped

[8] Supported by the preliminary XRF examinations carried out by the research group led by Wayne Powell and Arthur Bankoff (City University of New York, Department of Earth and Environmental Science, USA, in July, 2022). The detailed data concerning the composition of the objects will be published after all non-destructive examinations are completed, the data cleaned and evaluated accordingly.

[9] The research history and typological questions of the Encrusted Pottery culture's metallurgy have been discussed in detail by Viktória Kiss in several studies in recent years (*Kiss 2012a* 89–150; *Kiss 2013*), therefore in this paper I focus on the production, utilisation and the potential meaning of the Mucsi ornaments only.

[10] Disc-headed pins were documented in six assemblages of the Encrusted Pottery culture; from burials at Gyirmót-Kölesdomb, Simontornya, and Szekszárd-Vígh telek; and from hoards at Esztergom-Ispita-hegy, Ipoly Valley, and Zalaszabar (*Kiss 2012a* 123).

[11] E.g. Kisapostag, Dunakeszi, Dunaújváros. *(Mozsolics 1942; Bóna 1975* Taf. 55. 5, 13, Taf. 80. 7).

[12] E.g. Gáta, Oroszvár *(Bóna 1975* Taf. 275. 1–2, Taf. 277. 1–3, Taf. 280. 21, Taf. 281. 3).

[13] *Mozsolics 1967* 70–71.

[14] *Nagy – Figler 2009.*

[15] *Szabó 2010* 102, 104, T. 3, inhumation burials nos. 156 and 200.

[16] *Bóna 1975* 54–55, 285–286.

[17] *Bóna 1975* 284–285.

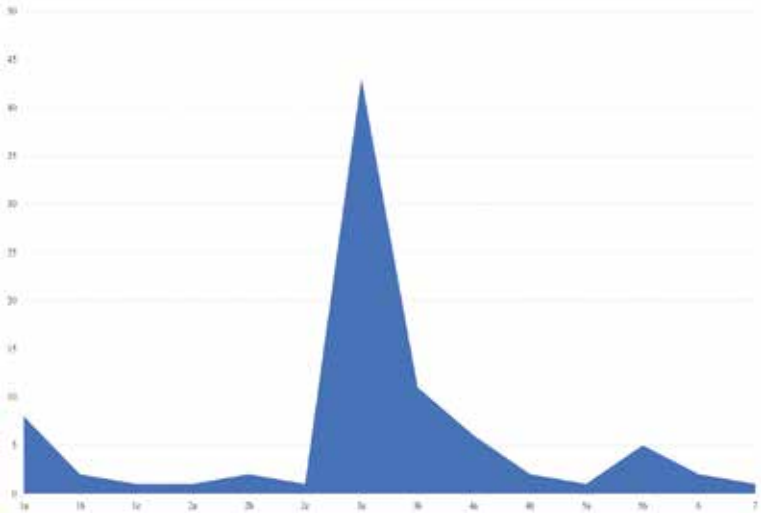

Fig. 7. Types of disc-shaped pendants in various hoards (after *Kiss 2012a* fig. 32, diagram ©Géza Szabó)

pendants and the use of these ornaments can be considered in a broad time frame stretching from the Vatya I period[18] to the Koszider phase in the distribution of the Encrusted Pottery culture.[19]

The minor differences in the shape and decoration of the crescent- and omega-shaped pendants contained by the Mucsi assemblage indicate that at least two moulds were used for casting these ornaments. This is most apparent in the length of the hanger parts and the position of the holes.

Disc-shaped pendants with a cross rib are thought to be the characteristic object types of the Encrusted Pottery culture.[20] Most recently Szilvia Honti and Viktória Kiss distinguished six groups of disc-shaped pendants which were later divided into 13 subtypes based on their shapes and decorations.[21] Two of the Mucsi hoard's disc-shaped pendants (WMM Ö.90.51.2–3) correspond with the Honti–Kiss 3a type, and one (WMM Ö.90.51) with 3b type. On a pendant broken into half the pattern on the frontal plate was divided into six segments (instead of four quarters), which so far stands without an analogue. Therefore, I suggest to add this seventh type to the already existing catalogue.[22] It is apparent from the analyses that pendants over 40 mm diameter occur in various forms, but more than two thirds of them belong to group 3, with cross ribs dividing the frontal plate into four quarters *(figs. 7–8)*. The number of disc-shaped pendants in hoards ranges between three and six on average, only the assemblage of Bonyhád (8 pieces),[23] and Zalaszabar (11 pieces)[24] contained more *(fig. 9)*. However, even in the case of the Zalaszabar hoard, there were four different types of disc-shaped pendants documented. This suggests – as it has been observed in relation to the crescent- and omega-shaped pendants – that the discs were produced in small batches, the same mould was used for producing a small number of ornaments.[25] This indicates several possible scenarios; firstly that within the distribution of the Encrusted Pottery culture, metallurgical production was low-scale and sporadic, generating only small batches of objects. Small, temporary metal workshops could be assumed, perhaps

[18] *Vicze 2011* 219, Pl. 75. 11–14.
[19] *Bóna 1975* 214–220; *Mozsolics 1967* 124–125; *Kiss 2013; Kiss 2012a* 89.
[20] *Bóna 1975* 214–220.
[21] *Honti – Kiss 2000* Abb. 4; *Kiss 2012a* 97–101, fig. 32.
[22] *Kiss 2012a* fig. 32.
[23] *Hänsel – Hänsel 1997* 112–113.
[24] *Honti – Kiss 2013.*
[25] In the case of the Zalaszabar hoard which contained 11 disc-shaped pendants, only four could have been cast in the same mould. Compositional analyses carried out on the ornaments indicated that the majority of them were produced at different times and assembled as a hoard at a later point (*Kiss 2012b* fig. 2; *Kiss – Barkóczy – Vizer 2013* 79, fig. 3).

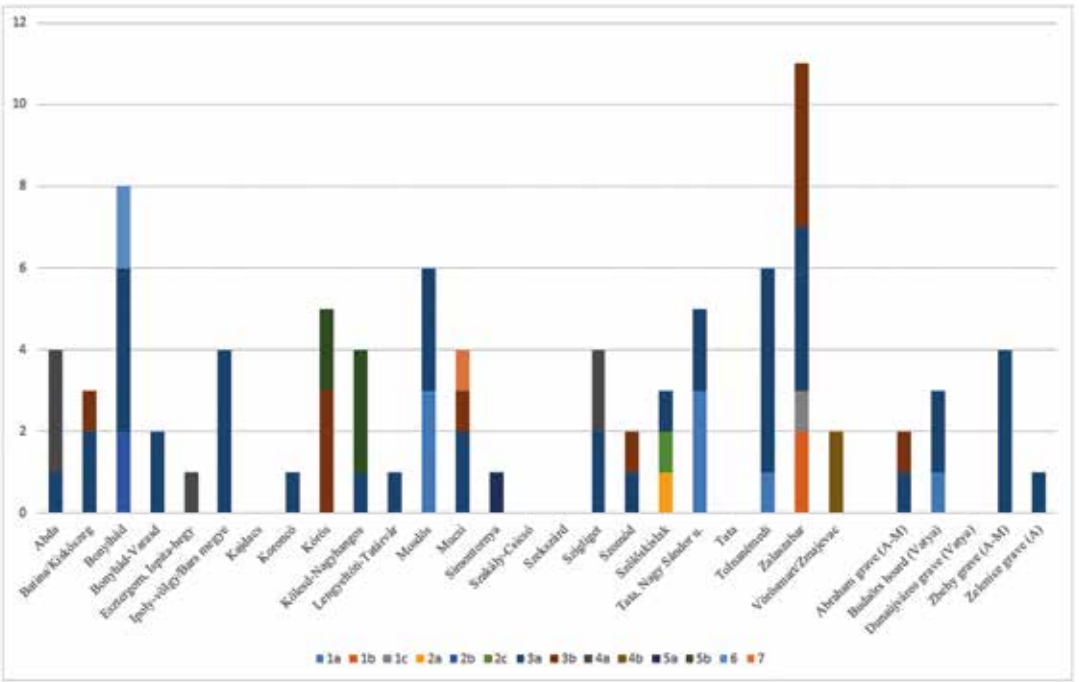

Fig. 8. The typological distribution of disc-shaped pendants
(after *Kiss 2012a* fig. 32, (A): Aunjetitz/Únětice, (A-M): Aunjetitz/Únětice-Maďarovce;
diagram ©Géza Szabó)

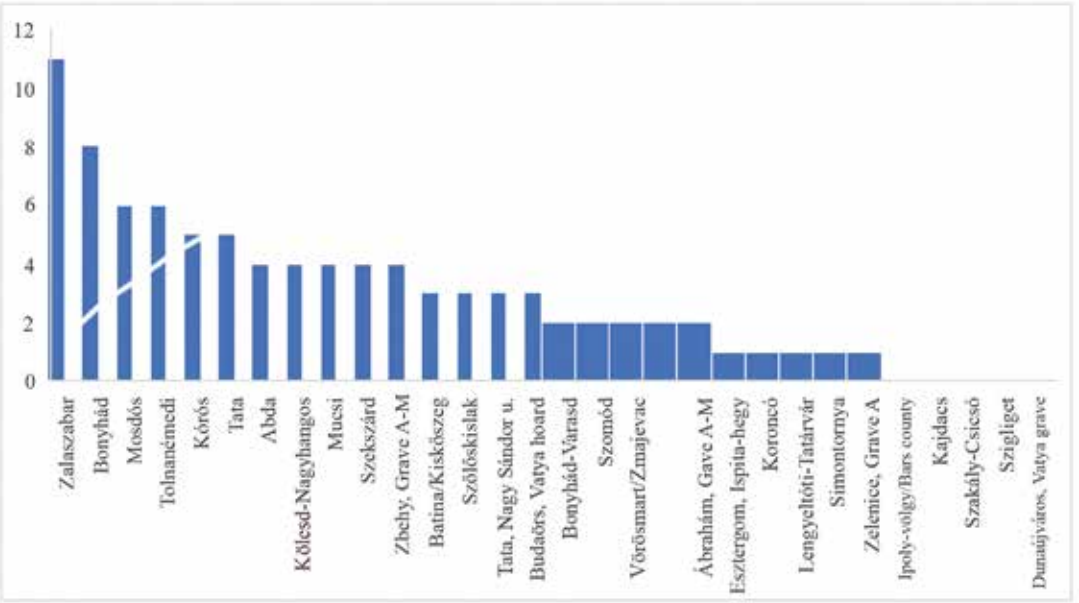

Fig. 9. The number of disc-shaped pendants in various hoards
(after *Kiss 2012a* fig. 32, diagram ©Géza Szabó)

with itinerant craftspeople manufacturing specific artefacts suitable for local tastes,[26] such as disc-, omega-shaped pendants and the so-called anthropomorphic or comb-shaped ornaments occurring in assemblages. Secondly, in the case of the Mucsi hoard, it is very likely that at least two disc-shaped pendants were cast using the same mould (WMM Ö.90.51.2–3); these objects stand without analogues so far. Therefore, it is feasible to assume that within the distribution of the Encrusted Pottery culture disc-shaped pendants – and other artefacts associated with the population – reflect a collective preference, expectation and a system of beliefs manifesting through these ornaments, while the pieces were tailored and manufactured for the rank or personality of a specific individual. This assumption is further supported by the relatively similar composition of hoards directly associated with the Encrusted Pottery culture.

So far about two dozen hoards similar to the Mucsi assemblage are known from the territory of Hungary. The characteristic set of objects repeatedly occurring in these hoards suggests that the items were selected and deposited deliberately, probably linked to a certain event, rather than scampered together and hidden in a haste.[27] Furthermore, the similarity between the ornaments themselves within each hoard across a large geographical area indicates that the artefacts were not only decorative items but were assembled according to a set of rules and conveyed a particular meaning to their owner's social environment.

Archaeometallurgical analyses have shown evidence for secondary heat exposure on certain ornament types, indicating that these pieces were part of the funerary attire or shroud and were placed on the pyre with the deceased,[28] while there were other types where the hardness indicators signalled no evidence for secondary burning.[29] The archaeological examination of hoards and contemporary bronze grave goods have demonstrated that there is only a partial overlap between the composition of hoards and mortuary assemblages. Heart-shaped pendants for instance occurred both in the Zalaszabar hoard[30] and along the cremation burials of Bonyhád (BB114QJ4, BB114QJ17),[31] but despite of belonging to the same typological cluster, there were significant differences in the biographies of these objects: while the heart-shaped pendant in the hoard was exposed to high temperatures due to the manufacturing techniques involved in its production, the piece found along a cremation burial has shown signs for secondary burning. The latter exposure can clearly be linked to the process of the cremation, and it also indicates that the deceased was placed on the funerary pyre wearing his/her ornaments. In the light of this, the following question can be raised: did assemblages such as the Mucsi hoard contain items which were treated separately even during the mortuary process, and if so, what could have been the possible reason for it?

Inhumation burials – which on rare occasions occur in cemeteries of a community that otherwise followed the tradition of cremation as their normative mortuary rite – and anthropomorphic clay figurines have the potential to shed more light on ways these ornaments were worn in the Bronze Age. According to these, the small studs were worn on the head (probably attached to a strap, hat or a scarf), the heart- and crescent-shaped pendants along with the tubular spiral beads ornamented the neck area, while the disc-headed pin could have held the garment together on the shoulders.[32] The disc- and omega-shaped pendants were sewn onto or were hung from the garment indicated

[26] *Bóna 1975* 214–220. The presence of moulds implies a local workshop, e.g. at the site of Mucsi (Lengyel)-Sánc (*Kiss 2012a* fig. 37. 1–2).

[27] The more recently discovered hoards support Viktória Kiss' observation that the Tolnanémedi-type hoards were deposited farther away from settlement sites but still in the surrounding areas of habitation (*Kiss 2012a* 146–147).

[28] *Kovács et al. 2019.*

[29] *Kiss – Barkóczy – Vízer 2013* 80.

[30] *Kiss 2012a* Pl. 62. 2–14, fig. 2.

[31] *Kovács et al. 2019* 187, figs. 8–9.

[32] *Kiss 2012a* 111–112; *Szabó – Hajdu 2011* figs. 6–7.

by their small holes. It is intriguing, however, that the omega-shaped pendants occur very rarely in burials, while other components of hoards (head and neck ornaments: studs, heart- and crescent-shaped pendants, tubular spiral beads, neck rings with spiral ends) are found regularly along with cremations at Bonyhád (BBQ235J2).[33] A similar trend can be outlined for the entire distribution of the Encrusted Pottery culture in Transdanubia: disc-shaped and omega-shaped pendants were scarcely part of the funerary attire or placed in the grave with the deceased.[34]

History of wear and the meaning of ornaments

The examinations which compared the physical anthropological information of the Bonyhád individuals and the decorative motifs on their ceramic grave goods have shown that the depictions on the mortuary vessels corresponded surprisingly well with the age, sex and social standing of their owners. Thus, it may be considered that these decorated vessels depicted the deceased and his/her main social attributes. The consistent use and placement of certain symbols on mortuary vessels could be regarded as a kind of 'script' and was probably widely understood in the community, testified by numerous archaeological assemblages.[35] Some of these depictions are easy to identify (body parts, ornament types: *fig. 10*) while others are more obscure.

Therefore, it seems important to examine the culturally specific ornament types of the Mucsi hoard within the symbolic context of the Encrusted Pottery culture; their possible meaning(s) and the messages these artefacts conveyed. Given their characteristic form, the disc- and omega-shaped pendants are relatively easy to identify on depictions. This also raises the question: is it possible that the role of disc- and omega-shaped pendants stretched beyond being signifiers of economic/social ranks? Could it be that the combinations and different configurations of these ornaments were strictly prescribed by the community reflecting the status and identity of their owners? Given the symbolic framework depicted on the ceramic vessels, could the messages be still comprehensible to us in the 21st century?

The majority of depictions featuring disc- and omega-shaped pendants (*fig. 11:* HI7, MV4i1, MV5n, MV5o, MV5p, MV6i, MV6j, MV7ja, MV7g1, MV7g2, MVII6k, MVX1ab, MXIII8b2, SVI4) – occurring on mortuary ceramic vessels and anthropomorphic figurines – illustrate these ornaments on the waist or attached to a skirt.[36] On closer examination, it becomes clear that the use of these two pendant types were linked to each other and seem to form a symbolic unit. The row of several omega-shaped pendants was hung vertically and usually closed by a single disc-shaped pendant. The number of omega-shaped pendants in a vertical row ranges between two and eight, the number of rows can vary between one and three. Sometimes the rows finish in two discs (MV4i1, MV5n, MV6j, MV7g1, MVII6k). It is apparent however, that the number of components and their combinations only loosely adhered to a pattern, and it is not as consistent as it would be expected, for example, of a calendar.

The interpretation of the Mucsi hoard is further hindered by the nomenclature of the omega-shaped pendants used in the archaeological literature. These pieces – as opposed to ornament types like the crescent-shaped pendants whose form can directly be associated with a universally recognisable phenomenon – are described by a number of different terms such as anchor-, swallowtail- or mustache-shaped pendants, while their function and potential roles remain

[33] *Szabó 2010* Tab. 4. 2; *Kovács et al. 2019* fig. 2.
[34] *Kiss 2012a* 103, Pl. 63. 7–9: Vörs-Papkert, burial „B" CXI.
[35] *Sørensen – Rebay-Salisbury 2008* fig. 6; *Szabó – Hajdu 2011* figs. 6–7; *Hajdu et al. 2016* fig. 7.
[36] *Reich 2006; Hajdu et al. 2016* fig. 7; *Kiss 2019* fig. 4.

Fig. 10. Depiction of a neck ring with spiral ends *(Ösenhalsring)* on the neck of an urn (Bonyhád, Biogáz üzem/Biogas Factory) (©Géza Szabó)

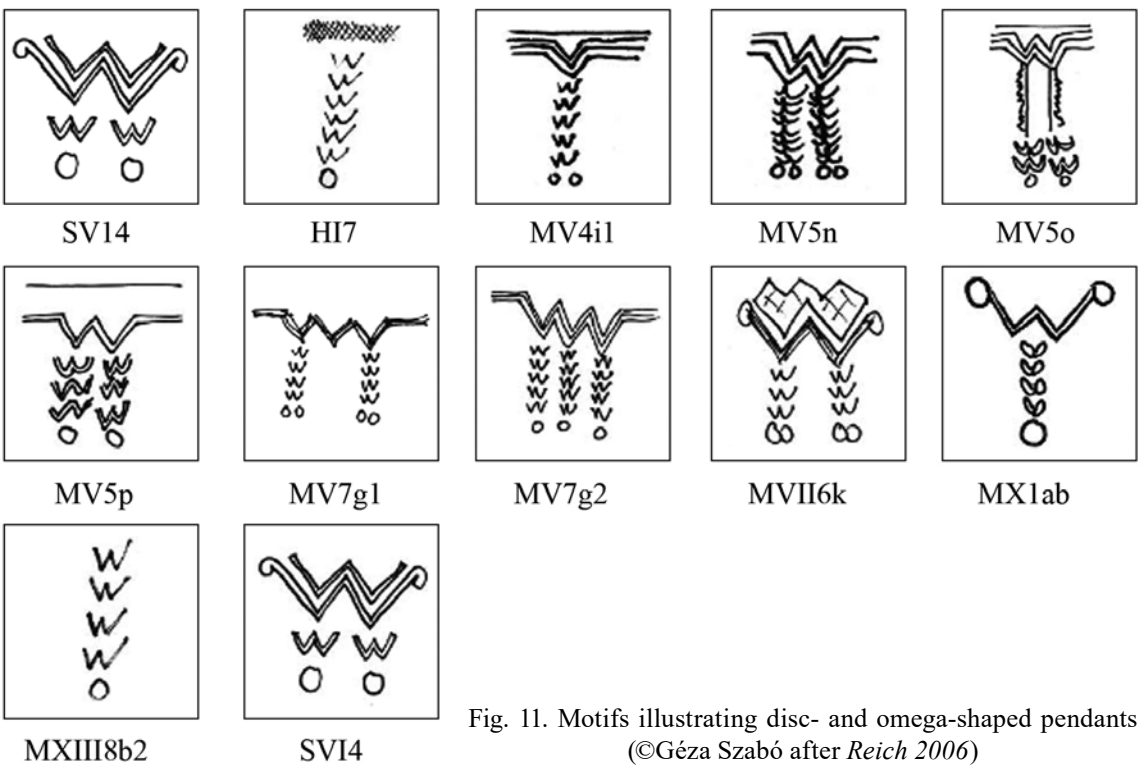

Fig. 11. Motifs illustrating disc- and omega-shaped pendants (©Géza Szabó after *Reich 2006*)

opaque.[37] Nevertheless, it would be important to sketch out the roles of these ornaments could have played in order to better understand the reasons behind hoard depositions, and to interpret the differences between the composition of hoards and burial assemblages. In terms of their shape and structure – symmetrical, thicker in the middle, thinning towards the ends that curve backwards at the terminals – and considering the economic environment of the Encrusted Pottery culture,[38] it may be thought that these pieces resemble a cow's uterus. Such imagery may have symbolised fertility, birth and abundance, as analogues from Mesopotamia imply. From the middle of the 5th millenium BCE following the Ubaid period in Mesopotamia, omega-shaped depictions were associated with the female deity Ninhursag (**Ω**).[39] On many images the the presence of the goddess is rendered to the symbol of 'Ω', represented on an altar.[40] Therefore, at this point I would suggest the terminology of 'uterus-shaped pendants' as it is referred to by international research to be used in the future or 'omega-shaped pendants' as an alternative in reference to these objects *(fig. 12)*.

Similar symbols of fertility can be seen on the Cybele/Artemis statues adorned with bulls' testicles (previously interpreted as breasts) which are attached to the deity's ceremonial garment. A similar function of the omega-shaped pendants can be assumed in the Encrusted Pottery culture, reflected by their position on the garment: either sewn onto the dress or worn separately on a string perhaps during ceremonies or at other festive events. This further implies that the ornaments were on display for a specific audience and conveyed a distinct meaning to the observers, within the framework of a ritual or ceremony. Therefore, these pendants could be considered not as a property of a certain individual but signifiers of a particular rank, title or office within society. This could provide a possible explanation as to why other dress ornaments (e.g. studs, heart- and crescent-shaped pendants, tubular spiral beads and neckrings with spiral ends) occur regularly in rich burials, while omega- and disc-shaped pendants[41] – if we accept that they served as the material signifiers of prestigious ranks or offices, therefore were not part of the mortuary attire – escaped the process of cremation. It is very possible, as information gleaned from burials and the decorations on clay figurines, that these ornaments were closely linked to the spiritual roles or the social ranks held by women, and were assembled and passed down through many generations.

In this light, the so-called comb-shaped or anthropomorphic pendants – which may also have been part of a festive attire – may be viewed as representations of a cow's uterus placed on an altar as well, and based on the previously mentioned analogues from the Ancient Middle East could symbolise the goddess of fertility. This might also explain why these pieces were depicted on the skirt, hanging from the belt.[42] Furthermore, the anthropomorphic pendants as a group of objects

[37] *Kiss 2012a* 101. István Bóna drew attention to a similar, omega-shaped pendant made of bone from the territory of the Szőreg–Perjámos culture that occupied the southern region of the Great Hungarian Plain (Deszk, burial no. 21). This indicates that the use of such pendants was not exclusive to the communities of the Encrusted Pottery complex, and could be made of different materials other than bronze (*Bóna 1975* 215, Taf. 85. 17). For the bone precursors, see *Szathmári 2000; Kiss 2012a* 137.

[38] For an extensive overview, see: *Kiss 2012a* 216–217; *Dani et al. 2019* fig. 16.

[39] *Black – Green 1992* 132, fig. 109, 138, 146, fig. 119.

[40] *Steinert 2017.* The broader historical context of the 'Ω' symbol is discussed extensively in my forthcoming study focusing on the cemetery of the Encrusted Pottery culture at Bonyhád-Biogáz (Biogas Factory). Neckrings with spiral ends *(Ösenhalsringe)* also resembling an 'Ω' symbol were present and were being used since the Early Bronze Age Koban culture across large swathes of the Middle East, which along their roles as units of measurements/raw materials (ingots), in this new light, have the potential to be acknowledged as objects linked to a fertility cult as well.

[41] C.f. *Kiss 2012a* 147, this idea was first proposed by Gábor Vékony. The interpretation of such attire is based on contemporary anthropomorphic depictions, such as the recently published figurine from Izmény (*Kiss 2019* fig. 2. 1).

[42] *Kiss 2012a* fig. 33.

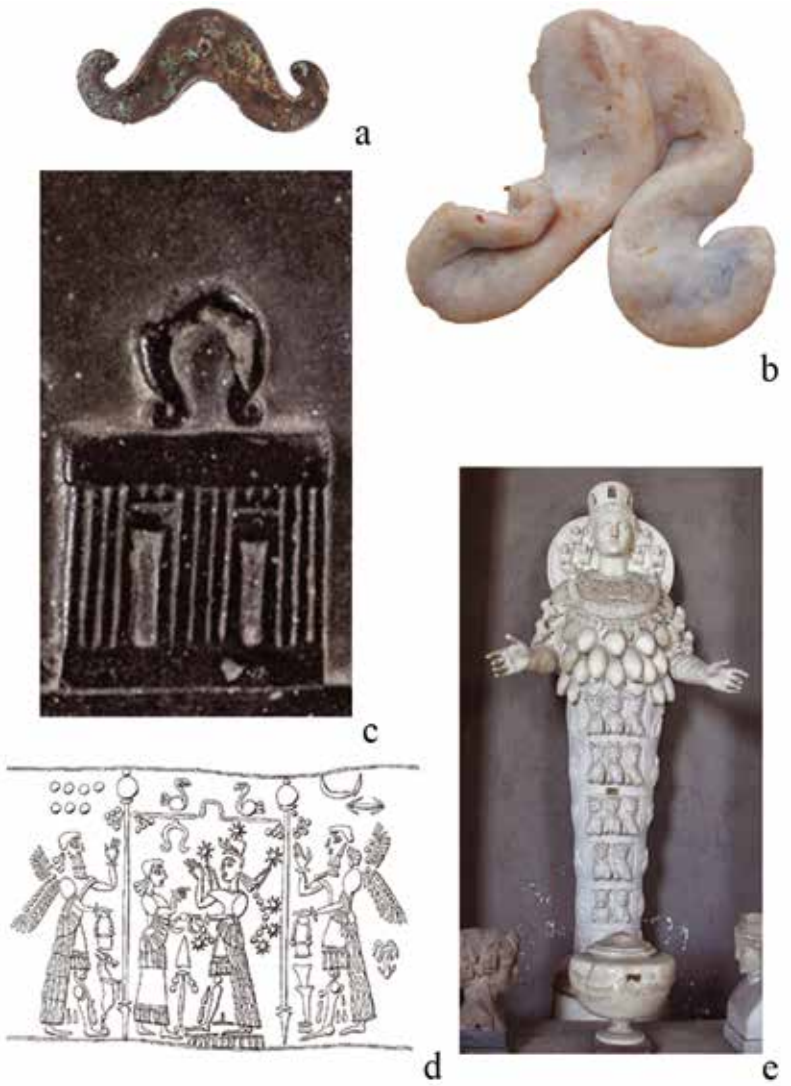

Fig. 12. a. Omega-shaped pendant from the Mucsi hoard; b. Cow's uterus; c–e. Similar depictions on reliefs and statues from the Ancient Middle East (©Géza Szabó)

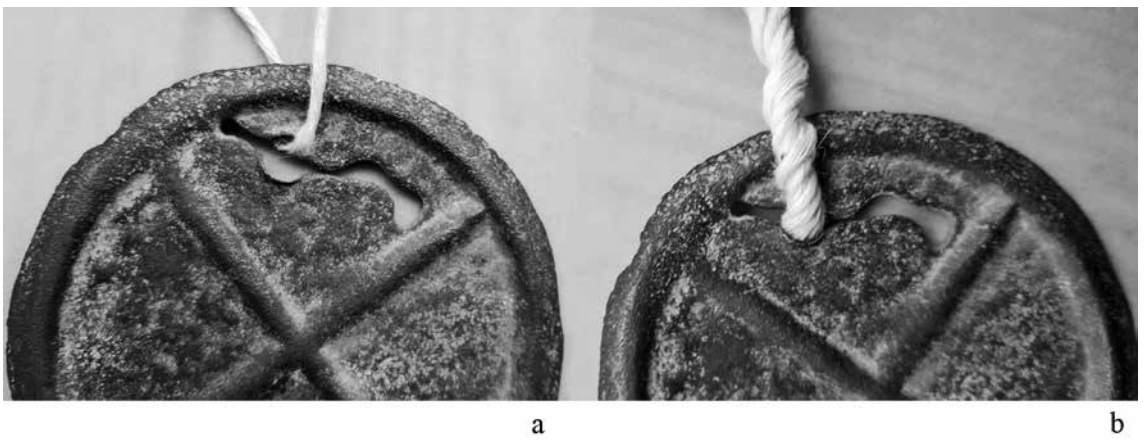

Fig. 13. a. An example for a strong enough cord for the attachment of disc-shaped pendant through a hole (Inv. no. WMM Ö.90.51.3); b. An 8-ply cord fits the hole of disc-shaped pendant perfectly (©Géza Szabó)

may as well be linked to the tradition of bull/cow's head pendants worn around the neck in later periods.

Besides the depictions on ceramic vessels and clay figurines (e.g. Izmény) there is another detail connecting the disc- and omega-shaped pendants: the hole aiding attachment. It is apparent that the craftsperson producing the ornaments aimed to create holes of 4 mm in diameter on all pendants. This is evidenced by disc-shaped pendant WMM Ö.90.51.3, where the cleft left by the insufficient distribution and solidification of the molten bronze should have been enough on its own to serve this purpose, however, the opening was later shaped into a regular hole similar to the ones on the rest of the disc- and omega-shaped pendants *(fig. 9)*. Given the weight of these ornaments (especially when worn in a set) they were likely to have been threaded onto a spun yarn, cord or leather strap *(fig. 13. a–b)*. This also suggests that the pendants were not attached or sewn onto the garment directly but were worn separately as accessories *(fig. 14)*. This set of accessories could have taken the shape of a belt-like item, similar to the ones visible on the previously mentioned Cybele/Artemis statue or to the ones still being used by shamans of certain ethnic groups.[43] Wearing the pendants this way was practical since the skirt or garment is not pulled down by the ornaments (in the case of the Mucsi hoard it is estimated to weigh nearly half a kilo), and it also allowed the easy incorporation of new pieces in the collection. Furthermore, considering the observation according to which the pendants were manufactured at different times supports the idea that the items could have functioned as offerings or votive objects.[44] The ad-hoc number of disc- and omega-shaped pendants in hoards may also reflect that communities associated with each of these assemblages were in different stages of acquiring such objects, and assembled or compiled them in their own unique way.

Fig. 14. Omega- and disc-shaped pendants hanging in a row on an 8-ply cord (Inv. no. WMM Ö.90.51.3) (©Géza Szabó)

As the motifs depicted on vessels and on clay figurines suggest that the elements of the festive attire were consistent across the entire horizon, the number and placement of certain ornaments varied from assemblage to assemblage. The festive female attire, exemplified by the Mucsi hoard, could have been used during special events across the entire distribution of the Encrusted Pottery culture. However, despite of following a certain prescription, such assemblages also attest for

[43] *Fodor 2014* fig. 10.

[44] Similar, continuous adornment of the goddess' earthly representative has been a well-known practice from the civilisations of Ancient Greece until present-day Christianity. Votive objects could include tools, equipment and dress ornaments related to the cult.

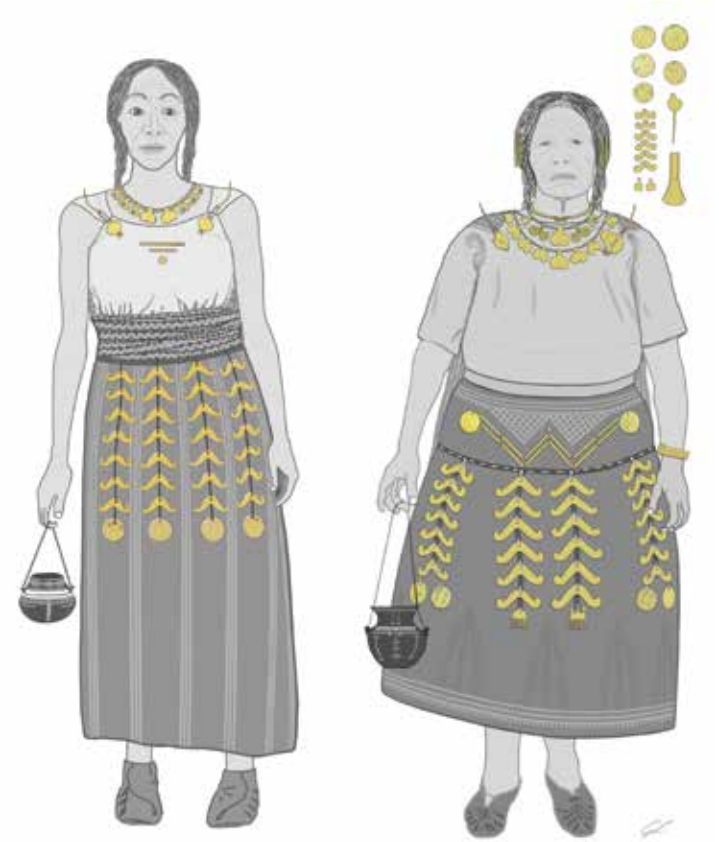

Fig. 15. Reconstruction of the costumes worn by women of special social standing in the community of the Encrusted Pottery culture. The reconstruction is based on the hoard of Zalaszabar (the additional ornaments on the right depict the pieces present in the assemblage but not included in the reconstruction) (©Géza Szabó, ©László Gucsi)

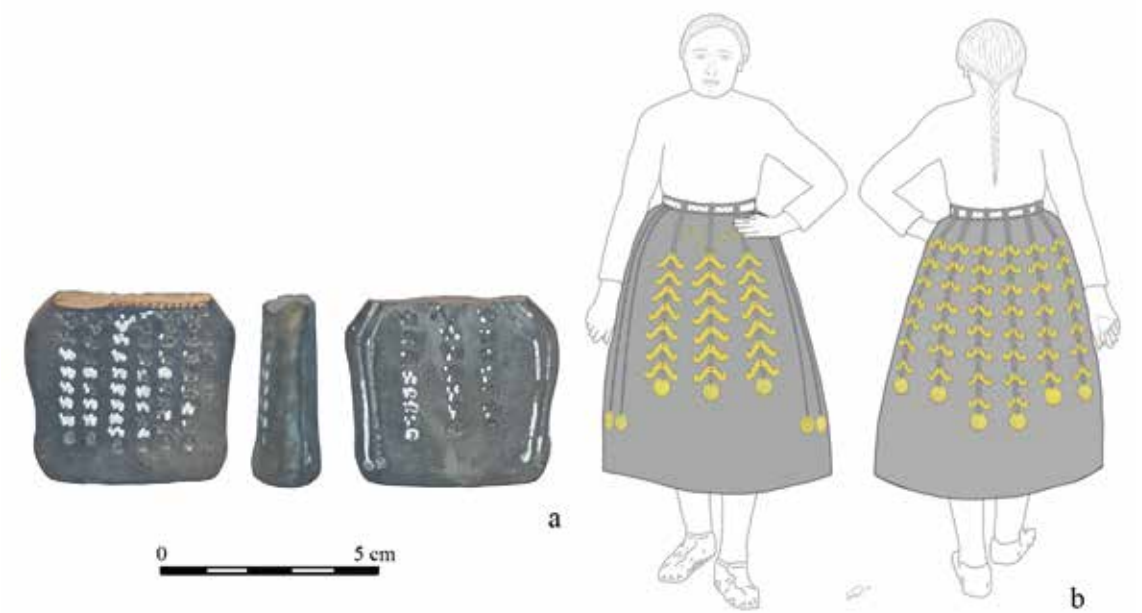

Fig. 16. a. Female clay figurine fragment from Izmény (after *Kiss 2019*);
b. Reconstruction of a high-ranking woman's attire (©Géza Szabó, ©László Gucsi)

customization; some items may have even been cast for a certain occasion or an individual on the spot *(fig. 15)*.[45]

The varying number of pendants in hoards and the motifs depicted on ceramic vessels all indicate that the ornaments were arranged into one to three strands containing two to eight pendant pieces. The female attire could have ranged from simple to elaborately decorated garments as it is represented by the clay figurine unearthed at Izmény *(fig. 16. a)*.[46] On this figurine not only the front of the garment but the back is decorated as well: the pendants were arranged into strands of six and three including six to eight omega-shaped pendants. The strands were always closed by a disc-shaped pendant at the bottom end *(fig. 16. b)*.

This also implies that, in contrast to previous assumptions,[47] the Zalaszabar hoard containing 11 disc-shaped and 32 omega-shaped pendants belonged to a single but very lavishly ornamented garment. It is possible given the unusually large number of disc-shaped pendants in the assemblage, that there may have been more than one of these ornaments attached at the end each vertical row of omega-shaped pendants (*fig. 11:* motifs MV4i1, MV5n, MVII6k).

Despite of the broad distribution and relatively lengthy duration of the Encrusted Pottery culture, the number of hoards (like the one from Mucsi) that can be linked directly to the population is small. The scarcity of such assemblages suggests that the ornaments were acquired in stages, throughout a long period of time and passed down through generations before their final deposition due to an unknown reason. Although the composition of the ornaments was most probably prescribed reflecting the office or social rank held by the owner, the composition of the assemblage was flexible enough to express personal preferences or tastes. Since the acquisition and possession of the disc- and omega-shaped pendants continued for generations, it is likely that a long time had passed between the production and the deposition of these pieces. This potential chronological gap is the cause of an ongoing discussion between archaeologists,[48] namely whether the so-called Tolnanémedi-type hoards can be dated to the second half of the Middle Bronze Age (RB A2b–c), or to be considered within the – now rather broad – Koszider period (1700/1600–1450 cal BC, RB B).[49] István Bóna classified the Tolnanémedi-type hoards consistently to the phase prior to the Koszider period,[50] while Amália Mozsolics considered it as part of the Koszider horizon.[51] Research today is still divided along these two opinions.[52] However, the ornaments included in the Mucsi hoard underscore the idea that the pieces of the Tolnanémedi-type hoards were continued to be produced and assembled throughout a long period of time, from the second half of the Middle Bronze Age onwards. The assemblages where crescent-shaped pendants also appear among the disc- and omega-shaped pendants may be dated more towards the established Koszider period. Based on the above, given the composition of the Mucsi hoard, it can also be considered within the Koszider period. More research is required to explore whether the assembly of such hoards were due to spiritual motivations or whether there were practical considerations in play as well, linked to the socio-economic changes taking place during the end of the Middle Bronze Age in the Carpathian Basin.

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[45] This assumption is further supported by the wide-ranging results of the compositional and typological analyses carried out on the Zalaszabar hoard. Homer's Iliad furthermore describes an event where the craftsperson prepared ornaments and other accessories necessary for the funerary attire right next to the pyre.

[46] *Kiss 2019* fig. 2.

[47] For an overview, see *Kiss 2019.*

[48] *Kiss 2012a* 89.

[49] *Szabó 2017.*

[50] *Bóna 1958* 224; *Bóna 1975* 214–220, 226; *Bóna 1992* 41–42.

[51] *Mozsolics 1967* 124, Abb. 36.

[52] *Vadász – Vékony 1979* note 126; *Kovács 1994a; Kovács 1994b* 159; *Honti – Kiss 2013* 750; *Kiss 2009* fig. 7.

REFERENCES

Black – Green 1992 J. A. Black – A. Green: Gods, Demons and Symbols of Ancient Mesopotamia. An Illustrated Dictionary. London 1992.

Bóna 1958 I. Bóna: Chronologie der Hortfunde vom Koszider-Typus. ActaArchHung 9 (1958) 211–243.

Bóna 1975 I. Bóna: Die mittlere Bronzezeit Ungarns und ihre südöstlichen Beziehungen. ArchHung 49. Budapest 1975.

Bóna 1992 I. Bóna: Bronzezeitliche Tell-Kulturen, in: W. Meier-Arendt (Hrsg.): Bronzezeit in Ungarn. Forschungen in Tell-Siedlungen an Donau und Theiss. Frankfurt am Main 1992, 9–42.

Dani et al. 2019 J. Dani – K. Köhler – G. Kulcsár – I. Major – E. Melis – G. Szabó – T. Hajdu – I. Futó – R. Huszánk: Case Studies on the Dating of Bronze Age Cremation Burials in Hungary, in: N. Palincaş – C. C. Ponta (eds.): Bridging Science and Heritage in the Balkans: Studies in archaeometry, cultural heritage restoration and conservation. Proceedings of the Fifth Balkan Symposium of Archaeometry 2016, Sinaia, Romania. Oxford 2019, 29–37.
https://doi.org/10.1017/RDC.2018.41

Fodor 2014 I. Fodor: Honfoglalás kori korongjaink és párhuzamaik (Die altungarischen Zierscheiben [10. Jh.] und ihre Analogien). FolArch 56 (2014) 133–185.

Hajdu et al. 2016 T. Hajdu – A. György-Toronyi – I. Pap – W. Rosendahl – G. Szabó: The chronology and meaning of the Transdanubian encrusted pottery decoration. PZ 91/2 (2019) 353–368.
https://doi.org/10.1515/pz-2016-0024

Hänsel – Hänsel 1997 A. Hänsel – B. Hänsel (Hrsg.): Gaben an die Götter. Schätze der Bronzezeit Europas. Bestandkataloge 4. Berlin 1997.

Honti – Kiss 2000 Sz. Honti – V. Kiss: Neuere Angaben zur Bewertung der Hortfunde vom Typ Tolnanémedi. ActaArchHung 51 (2000) 71–96.

Honti – Kiss 2013 Sz. Honti – V. Kiss: Bronze hoard from Zalaszabar. New data on the study of the Tolnanémedi horizon. Part 2, in: A. Anders – G. Kulcsár (eds.): Moments in Time. Papers Presented to Pál Raczky on His 60th Birthday. Ősrégészeti tanulmányok / Prehistoric Studies 1. Budapest 2013, 739–755.

Kiss 2009 V. Kiss: The life cycle of Middle Bronze Age bronze artefacts from the Western part of the Carpathian Basin, in: T. L. Kienlin – B. Roberts (eds.): Metals and Societies. Studies in Honour of Barbara S. Ottaway. UPA 169. Bonn 2009, 328–335.

Kiss 2012a V. Kiss: Middle Bronze Age Encrusted Pottery in Western Hungary. VAH 27. Budapest 2012.

Kiss 2012b V. Kiss: Arany, réz és bronztárgyak kutatása a középső bronzkorig. Az archeometallurgia aktuális kérdései (The study of gold, copper and bronze artefacts until the Middle Bronze Age. Current questions of archaeometallurgy). Archeometriai Műhely 9 (2012) 61–74.

Kiss 2013 V. Kiss: Problems of the Koszider period in Transdanubia, in: M. Vicze – I. Poroszlai – P. Sümegi (eds.): Koszider: Hoard, Phase, Period? Round Table Conference on the Koszider Problem. Matrica Museum. Százhalombatta 2006, 61–96.

Kiss 2019 V. Kiss: Bronze Age anthropomorphic and zoomorphic representations in Hungary, in: E. Bánffy – J. P. Barna (Hrsg.): Prähistorische Forschungen in Südwestungarn (5500–500 v. Chr.) – Prehistoric Research in South-Western Hungary (5500–500 BC). Castellum Pannonicum Pelsonense 7. Budapest – Leipzig – Keszthely – Frankfurt/M. – Rahden/Westfalen 2019, 237–251.

Kiss – Barkóczy – Vízer 2013 V. Kiss – P. Barkóczy – Zs. Vízer: A zalaszabari bronzkincs archeometallurgiai vizsgálatának előzetes eredményei [Preliminary results of the archaeometallurgical analysis of the bronze hoard from Zalaszabar]. Gesta 13 (2013) 72–82.

Kovács 1994a T. Kovács: Újabb adatok a mészbetétes kerámia kultúrájának fémművességéhez (Neuere Beiträge zur Metallkunst der Kultur der inkrustierten Keramik). VMMK 28 (1994) 119–132.

Kovács 1994b T. Kovács: Chronologische Fragen des Überganges von der Mittel- zur Spätbronzezeit in Transdanubien. ZalaiMúz 5 (1994) 159–172.

Kovács et al. 2019 R. L. Kovács – Sz. Gyöngyösi – P. Barkóczy – L. Juhász – G. Szabó – V. Kiss: Technológiai megfigyelések kora és középső bronzkori fém tárgyakról (Technological observations of Early and Middle Bronze Age metal objects), in: M. Vicze – G. Kovács (eds.): ΜΩΜΟΣ 10. Őskori technikák, őskori technológiák. Őskoros Kutatók X. Összejövetelének konferenciakötete. Százhalombatta, 2017. április 6–8. Százhalombatta 2019, 184–197.

Mozsolics 1942 A. Mozsolics: A kisapostagi korabronzkori urnatemető (Der frühbronzezeitliche Urnenfriedhof von Kisapostag). ArchHung 26. Budapest 1942.

Mozsolics 1967 A. Mozsolics: Bronzefunde des Karpatenbeckens. Depotfundhorizonte von Hajdúsámson und Kosziderpadlás. Budapest 1967.

Nagy – Figler 2009 M. Nagy – A. Figler: Dentáliumékszerek a Gáta–Wieselburg kultúra temetkezéseiben (Dentalium jewellery in the burials of the Gáta–Wieselburg culture), in: G. Ilon (ed.): ΜΩΜΟΣ 6. Nyersanyagok és kereskedelem. Őskoros Kutatók VI. Összejövetelének konferenciakötete. Kőszeg, 2009. március 19–21. Szombathely 2009, 255–266.

Reich 2006 C. Reich: Das Gräberfeld von Szeremle und die Gruppen mit inkrustierter Keramik entlang mittlerer und unterer Donau. BBV 13 (1–2). Berlin 2006.

Sørensen – Rebay-Salisbury 2008 M. L. S. Sørensen – K. Rebay-Salisbury: Landscapes of the body. Burials of the Middle Bronze Age in Hungary. EJA 11/1 (2008) 49–74. https://doi.org/10.1177/1461957108101241

Steinert 2017 U. Steinert: Cows, women and wombs, in: D. Kertai – O. Nieuwenhuyse (eds.): From the Four Corners of the Earth. Studies in Iconography and Cultures of the Ancient Near East in Honour of F. A. M. Wiggermann. Alter Orient und Altes Testament 441. Münster 2017, 205–258.

Szabó 2010 G. Szabó: Dunántúli mészbetétes edények népe kultúrájának kialakulása és belső időrendje a Bonyhádon feltárt temetőrészlet tükrében (Ausgestaltung der Kultur und innere Zeitordnung des Volkes der inkrustierten Gefäße vom Transdanubien – im Spiegel des in Bonyhád freigelegten Friedhofteiles). WMMÉ 32 (2010) 101–128.

Szabó 2017 G. Szabó: Problems with the periodization of the Early Bronze Age in the Carpathian Basin in light of the older and recent AMS radiocarbon data. Archeometriai Műhely 14/2 (2017) 99–116.

Szabó – Hajdu 2011 G. Szabó – T. Hajdu: A mészbetétes edények díszítésének szimbolikája a bonyhádi vegyes rítusú bronzkori temető embertani leleteinek feldolgozása tükrében (Symbolism of the ornaments of encrusted pottery in the light of anthropological finds from the Bronze Age mixed-rite cemetery at Bonyhád). AnthrK 52 (2011) 85–108.

Szathmári 2000 I. Szathmári: Bronze Age bone pendants in the Carpathian Basin. ActaArchHung 51 (2000) 35–42.

Vadász – Vékony 1979 É. Vadász – G. Vékony: Tata története a jégkorszak végétől a római foglalásig [The History of Tata from the end of glacial period to the beginning of the Roman Age], in: E. Kovács (ed.): Tata története 1. Az őskortól 1727-ig. Tata 1979, 49–77.

Vicze 2011 M. Vicze: Bronze Age Cemetery at Dunaújváros-Duna-dűlő. DissPan 4/1. Budapest 2011.

Zentai 1996 L. Zentai: A Kárpát-medence és környékének domborzata [Topography of the Carpathian Basin and its surroundings]. https://mek.oszk.hu/00000/00092/ (last accessed: 29.12.2022.)

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