

János Dani – Ibolya M. Nepper

# SÁRRÉTUDVARI-ÖRHALOM TUMULUS GRAVE FROM THE BEGINNING OF THE EBA IN EASTERN HUNGARY

## *The History of the Research*

Sárrétudvari-Örhalom is situated in Eastern Hungary (Hajdú-Bihar County), in the Sárrét region (Fig. 1. 1). The Örhalom near the border of Sárrétudvari and

Szerep next to the Körtvélyes brook was disrupted in 1986 (Fig. 1. 2; Fig. 9. 1). The aim was to fill up the lower lying areas of the village by the soil taken from the tumulus situated near Szerep. In the course of the disruption human bones appeared, thus the secondary



Fig. 1. 1: Sárrétudvari in Hungary; 2: Localization of the Örhalom site

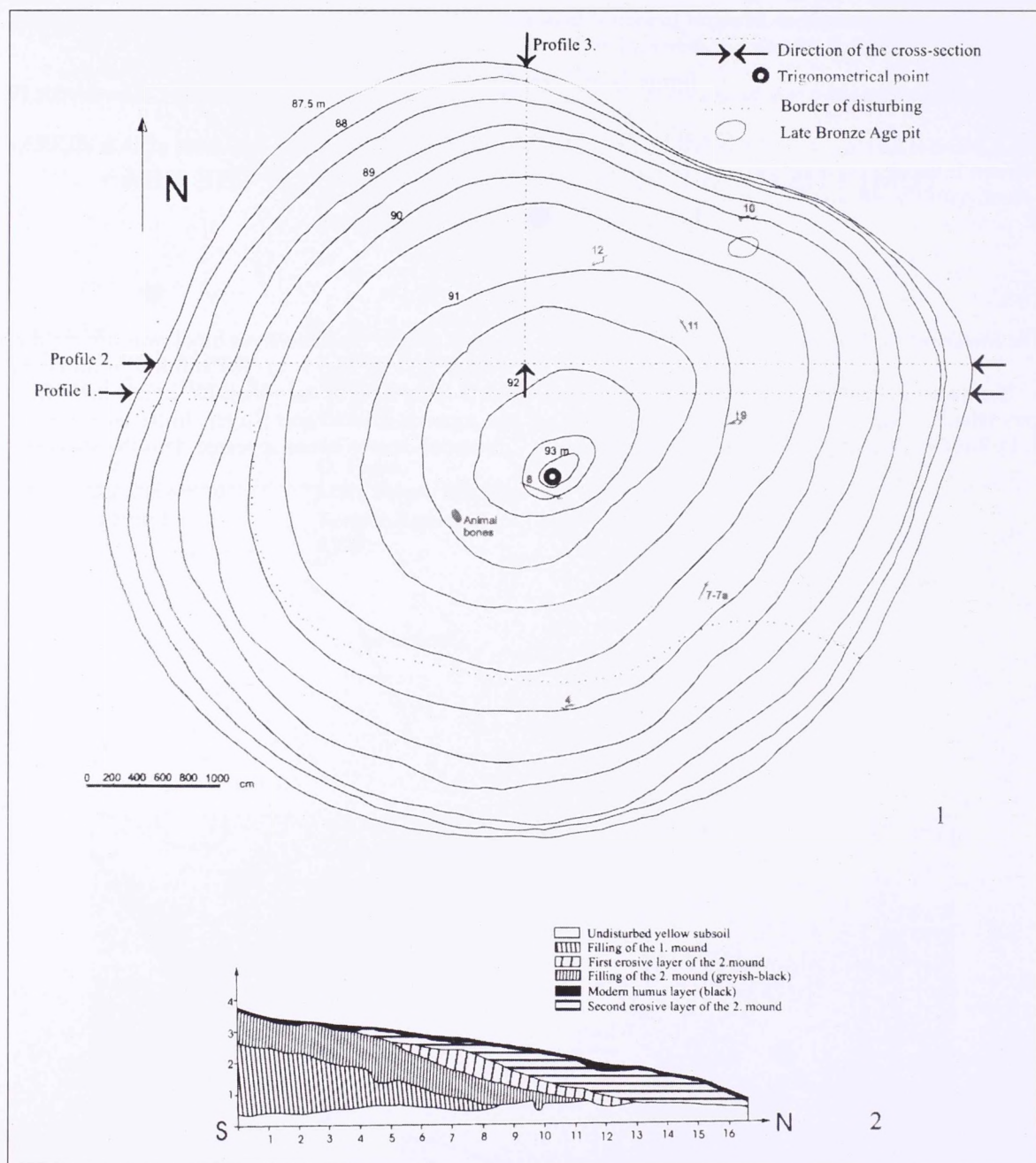


Fig. 2. 1: Contour map of the kurgan with the cross-sections and the graves; 2: S-N Profile 3.

use of the kurgan was presumable. Owing to the endangerment of the tumulus Ibolya M. Nepper started rescue excavations in July 1986. In 1986 graves 1 oriented towards NW-SE dug into the surface of the tumulus from the time of the Hungarian Conquest were excavated. The rescue excavations continued in the summers of 1987, 1988, and 19892, in the course of

which the strata conditions of the tumulus were clarified, and the Early Bronze Age graves which were dug into the fill-up of the first tumulus were also unearthed. In the summer of 1998, with the exception of the trigonometrical point in the current middle, the tumulus and the base burial from the Copper Age under the first tumulus were completely unearthed. I. M.



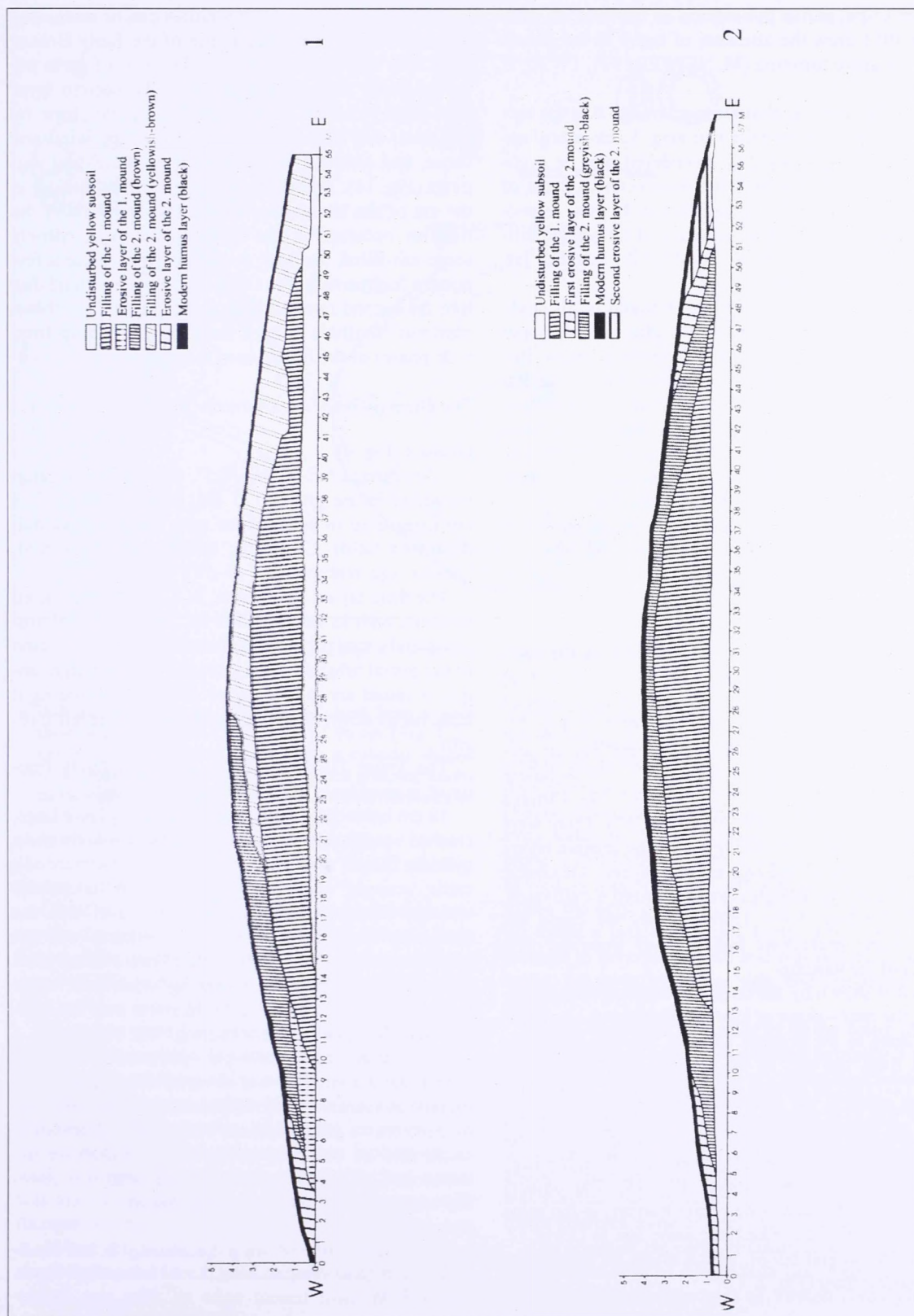


Fig. 3. 1: W-E Profile 1.; 2: W-E Profile 2. of the Örhalom kurgan



Nepper's first, partial publication on the tumulus written in 1991 drew the attention of many to the graves with rich grave furniture (M. NEPPER 1991, 19–20, T. II–V).

J. Vladár and J. Lichardus mentioned<sup>3</sup> it as the earliest burial place where the hair-ring /Lockenring/ appears. Chronologically they considered it to be even-aged with the Makó-Glina III-Schneckenberg B era, or with the Catacomb culture in Eastern Europe respectively, and placed it at the beginning of the second millennium BC (LICHARDUS – VLADÁR 1996, 31, Taf. 1).

N. Kalicz also dealt with the Órhalom in his study on the Eastern connections of the Hungarian Copper Age. He considered the graves to be the youngest Pit-Grave (Jamnaja) burials. He emphasized the Makó-Schneckenberg-Glina III character of the vessels in the graves as well as the Eastern parallels of the metal grave furniture. Thus, actually he too argued for dating the graves to the Early Bronze Age (KALICZ 1998, 174, Abb. 11–13, KALICZ 1999, 94).

G. Kulcsár mentioned the kurgan among the burial place of the Makó culture (KULCSÁR 1998, 43).

#### *The Stratigraphic Aspects of the Tumulus*

During the unearthing of the tumulus on the basis of the cross-sections (Fig. 2. 2; Fig. 3. 1–2; Fig. 9. 2) we managed to differentiate between two phases of the tumulus (Fig. 2. 2; Fig. 3. Fig. 10. 1–2; Fig. 11. 1–2). Such multiple phased tumuli were dug up several times before, e.g., Kétegyháza – Török-halom (kurgan 3) (ECSEDY 1979, 23, Fig. 13–14), Tárnava (tumulus 1) (ALEXANDROV 1995, 257). There were two main phase of the filling and some erosive layers (the second phase had two erosive layers). Of course on the top of the tumulus we had found a cultivated, disturbed humus layer. Unfortunately we could not separate the prehistoric humus layer from the first mantle of the tumulus.

As it is shown by the three dimensional reconstruction<sup>4</sup>, the first – more or less regular shaped – tumulus was raised to the original surface, above a Pit-Grave burial from the end of the Copper Age (Grave 12) (Fig. 12–13). The former regular shape of the first tumulus was kept due to the fact that further considerable amount of earth was brought above the Early Bronze Age burials, which protected it from the high volume above-ground erosion (Fig. 14). The object<sup>5</sup> on the South-Western side of the kurgan, in the same depth as Grave 12 is likely the same age as Grave 12. It contains animal bones, which might be remainders of a funeral feast (Fig. 2. 1).

The second phase of the tumulus can be connected with the burials in the beginning of the Early Bronze Age, thus they developed from the layer of earth put on the Early Bronze Age graves. The second layer (last phase) showed a much more irregular shape by our time, due first of all to the erosion by wind and water, and secondly to the later disruptions and diggings (Fig. 14). Before the above mentioned burials in the era of the Hungarian Conquest disruptions of the tumulus occurred in the Late Bronze Age, namely some ash-filled, shallow, round pits containing a few pottery fragments of the Gáva-culture were found dug into the second tumulus (Fig. 2. 1). Apart from these, scattered Neolithic pottery fragments turned up from both phases of the filling-in of the kurgan.

#### *The Description of the Graves*

##### *Grave 4 (Fig. 4)*

Direction: ENE-WSW 18,5°. Size of the skeleton measured in the grave: 177 cm. Relative depth: 138 cm (measured in comparison with the ploughed and depressed field). Condition: quite poorly preserved. Gender, age: mature man (40–59).

The dead lay on its left side, in a slightly contracted position, with its knees pulled up. His left arm almost completely straight; extended almost as a continuation of the genial tubercle. His right arm, bent in a right angle, is rested across the center of the chest; the right hand hangs down next to the inner side of the left forearm.

The lower 2/3rd of the leg was completely fractured, it must have been disrupted by animals.

18 cm behind the skull of the dead body lay a large, crashed vessel on its side. It had a spherical body and a cylinder shaped neck. We discovered the fragment of a cattle scapula above the vessel; it is undecided whether the bone found on the same level with the bottom of the grave was a grave furniture, or it got there secondarily. Above the right mastoid of the skull a thick, silver hair-ring /Lockenring/ was found, while under the skull, on its left side, likewise near the mastoid a golden hair-ring /Lockenring/ was discovered.

The bottom of the grave-pit – presumably even the area under the vessel – was covered with some sort of organic substance, which appeared as a brownish red or dark brown pigmentation. The same pigmentation could also be observed in the area 7 cm above the skeleton. This could indicate that the dead was covered with a sheet of hide during the burial.

##### *Grave furniture: 7*

– Solid, round, silver hair-ring /Lockenring/ in bad condition (corroded). Weight: 3.9 g. h.: 2.16 cm, w.: 2.06 cm. (Fig. 4. 3)



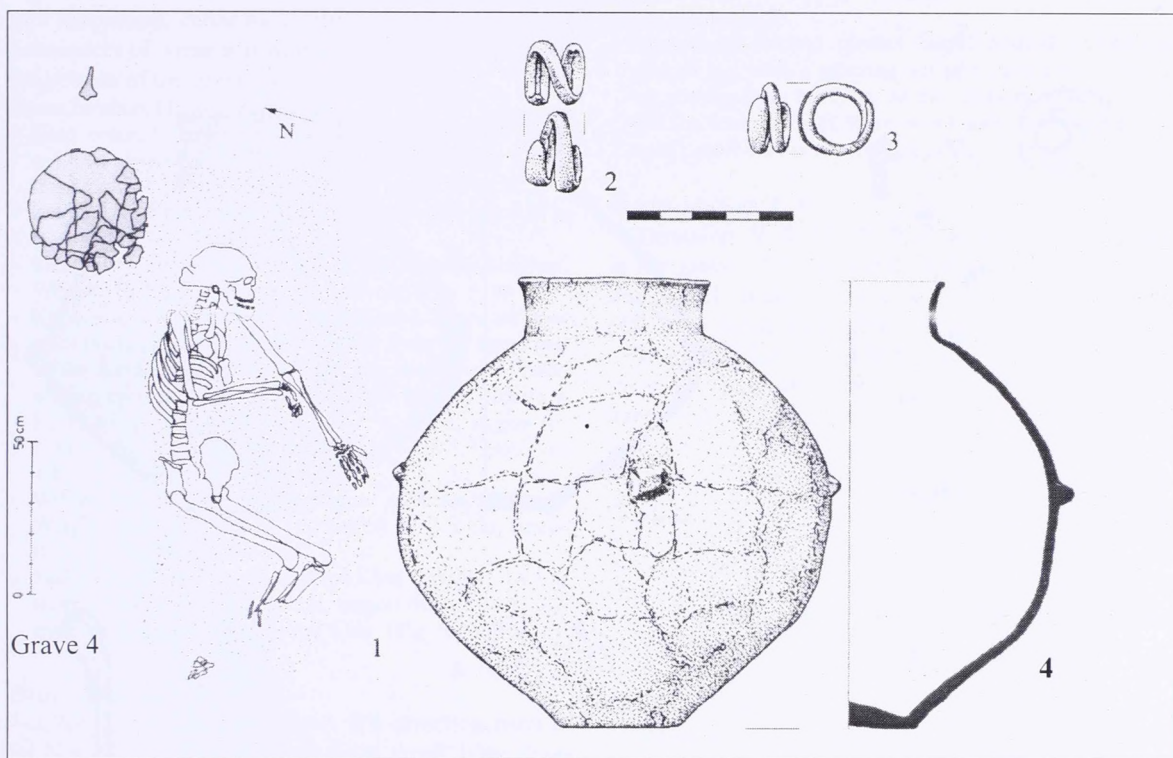


Fig. 4. Sárrétudvari-Örhalom, Grave 4.

- Hollow, oval hair-ring /Lockenring/ bent from a gold sheet. Weight: 6.1 g. h.: 2.25 cm, w.: 1.96 cm. (Fig. 4. 2)
- Large, spherical bodied vessel with a cylinder shaped neck, and four symmetrically positioned grasping knobs on the body of the vessel. There are worn, vertical lines on the lower part of the vessel's body. (Fig. 4. 4)
- Animal bone (animal bone grave furniture?).

#### Grave 7, and 7a (Fig. 5)

Direction: NE-SW 26°. Size of the skeleton measured in the grave: -. Relative depth: 135–110 cm. Condition: quite poorly preserved. Gender, age: mature man (40–59), buried next to him a 5–7-year-old child (Grave 7a).

The grave turned up in a very disrupted condition, therefore its position is very hard to determine (he might have been lying on his back?). There was a 5–7-year-old child buried next to him. Only a fragment of the child's skull and a few of his smaller bones were found. The adult skeleton was rather incomplete as well. A large, tubby bodied, cylinder necked vessel was placed into the NW-ern corner of the grave, with its right side up.

Above the skull lay a golden hair-ring /Lockenring/. Before the face /*Cranium viscerale*/ there was a copper axe with its edge turned towards the face.

There remained a small portion of the former wooden handle inside the handle-tube, preserved by the corrosion of the metal. The analysis of the wooden remainders showed that the handle was made out of beech (*Fagus sylvatica*)<sup>8</sup>, which is the hard wood most used even today to make handles. In that age (Beech I. phase – 2500-800BC) beech was current in the Plains as well. A copper dagger with spiked grasp was placed across the edge of the axe, at the point of the dagger we found a fashioned ochre lump, which was drilled through in several places<sup>9</sup>, and was originally shaped round, but now flat on one side, and cambered on the other.

The X-ray diffraction analysis of the ochre showed that it consists of poorly christallized hematite ( $\text{Fe}_2\text{O}_3$ ) in 85–95%, a small amount of quartz, and unidentifiable clay minerals<sup>10</sup>. Apart from the drillings and the regular shape, the physical characteristics of the ochre (finely granuled, regular granule size, homogeneity, and solidity) seem to indicate that the extracted mineral was handled (sedimentated in water, separating from rough granules, slow drying) and fashioned.

The origin of the ochre is unsure, the closest deposits area: the area of Rudabánya (the Aggtelek-karst), the Tokaj-hills and the area of Vaskóh (Transylvania:

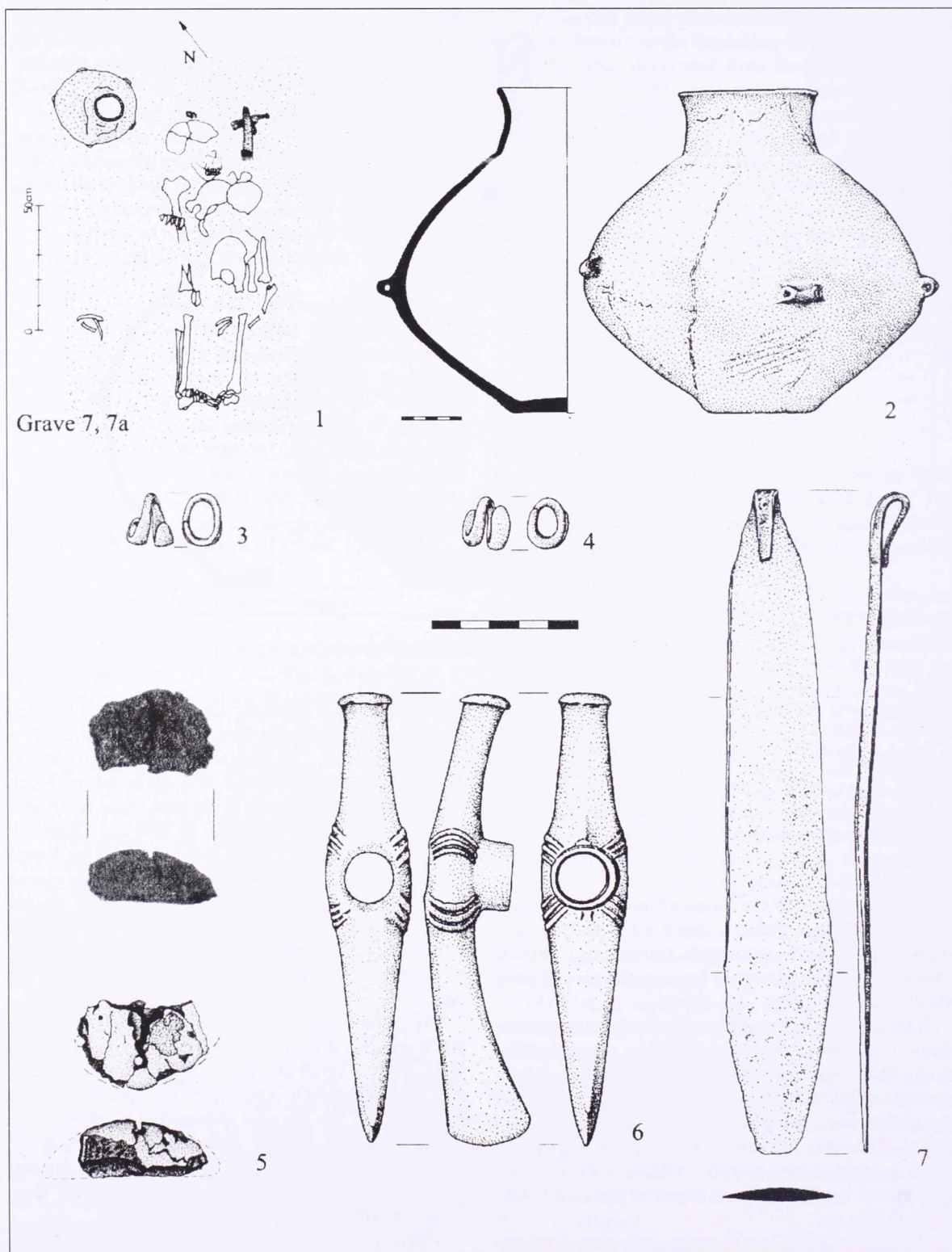


Fig. 5. Sárrétudvari-Örhalom, Grave , 7, 7a



Béli mountains, Bihar mountains). In this case too the remainders of some sort of organic substance covered the bottom of the grave-pit.

Grave furniture11:

- Sand colored vessel with flattened spherical body, and cylinder shaped neck. There are five, horizontally drilled through knob ears on the body of the vessel. (Fig. 5. 2)
- Solid, prolate gold hair-ring /Lockenring/. Weight: 8.37 g. h.: 1.8 cm, w.: 1.43 cm. (Fig. 5. 3)
- Solid, thick, somewhat oval, silver hair-ring /Lockenring/. Weight: 10.1 g, h.: 1.67 cm, w.: 1.45 cm; (Fig. 5. 4)
- Knob ended copper axe with handle-tube. There are three coils made up of plastic ribs running from the upper part of the handle-hole to the start of the handle-tube, intersecting each other at the handle-tube. Weight: 308.43 g, h.: 15.45, largest w.: 2.8 cm, edge w.: 2.75, largest th.: 2.94 cm, diameter of the handle-hole: 1.65-1.7 (top) and 1.83-1.9 cm (bottom). (Fig. 5. 6)
- Willow leaf shaped copper dagger with spiked grasp. Weight: 202.5g, h.: 22.77 cm, largest w.: 3.7 cm, largest th.: 0.57 cm. (Fig. 5. 7)
- Fashioned, drilled through ochre clod. Weight: 14.3 g, fragmentary size: 4.2x2.98 cm, largest th.: 1.71 cm, diameter: could have been around 5 cm. (Fig. 5. 5)

Grave 8 (Fig. 6)

Completely disrupted grave. It's direction used to be NW-SE or SE-NW. Only very small bone fragments turned up from the grave, however, the bulrush mat the dead was lain on was preserved in a very good condition. A brownish, silky, organic substance was observed in the grave, which is probably the remainder of the hide (?) used to cover the dead.

Grave 9 (Fig. 7, 1)

Direction: NNW-SSE (?). Size of the remaining skeleton measured in the grave: 155 cm. Relative depth: 145-150 cm. Condition: well preserved. Gender, age: adult man (23-30).

The shape of the grave was oval, prolate. Rather disrupted grave. The dead lay on his back, his legs were spread in a frog fork. The arm of the dead was in an almost straight position, at a slight distance from the body. The right arm must have been bent at the elbow, the hand must have been rested on the pelvis. The right foot lay close to the left heel, the right foot was in a pressed down, which gives ground to the assumption that there was some sort of shoe on it. An eared jug was put with its mouth on the ground into the NE corner of the grave. The bottom of the grave-pit was covered with an organic substance (hide?), which was sporadically observable. Due to the disruption only the mandible remained from the skull.

A dog's tooth turned up from the filling-in of the grave.

Grave furniture12:

- Black-sand colored spotted barrel bodied, cylindrical necked jug, with a splaying out edge, and a wide ribbon ear starting from the edge. At the intersection of the body and the neck there are three twin knobs consisting of two small, mole-like sections. (Fig. 7. 2)

Grave 10 (Fig. 7. 3)

Direction: W-E 52°. Size of the skeleton measured in the grave: 175 cm. Relative depth: 180 cm. Condition: well preserved. Gender, age: mature man (44-50), ochred atlas epistropheus.

The dead lay on its right side, in a slightly contracted position. Both arms were bent at the elbow, the hands were placed in a praying (orans) position before the face. There were flat grinding stones placed under the bottom of the top of the skull. We found bone fragments of cattle (os ph. II, 2 fragments of astragalus), and horse (fragment of the right side femur proximalis) in the filling-in of the grave.

Grave furniture13:

- Grey grinding stone made of amphibol candesite. (Fig. 7. 4)

Grave 11 (Fig. 8. 1)

Direction: NW-SE (?). Size of the skeleton measured in the grave: 65 cm. Relative depth: 95 cm. Condition: rather poorly preserved. Gender, age: adult man (?) (23-39).

The grave is strongly disrupted by animal paths, therefore the positioning of the dead cannot be safely determined (he could have been lying in a contracted (?) position). The dead was placed on a smoothed down bench. There was a tubby bodied, cylindrical necked vessel placed with its right side up into the NW corner of the grave. There was 20-30 cms of loosely structured filling-in above the grave14. Cattle bones were also found in the filling-in of the grave (petrosal, upper molaris, ulna).

Grave furniture15:

- Brick colored amphora, with egg-shaped body and spout neck. There are two horizontally positioned ribbon ears on the abdomen. A rib, articulated by pressing in runs around on the bottom of the neck. There are some irregular scratches here and there on the lower portion of the vessel. (Fig. 8. 2)

Grave 12 (Fig. 8. 3)

Direction: NW-SE 44°. Size of the skeleton measured in the grave: 149 cm. Relative depth: 4.4 m. Condition: well preserved. Gender, age: juvenile (15-17).

Grave buried under the first tumulus from the end of the Copper Age. The dead was placed into the rounded down rectangular shaped grave-pit. It lay on its left side, in a strongly contracted position. Both arms were bent at the elbow, the hands were put side-by-



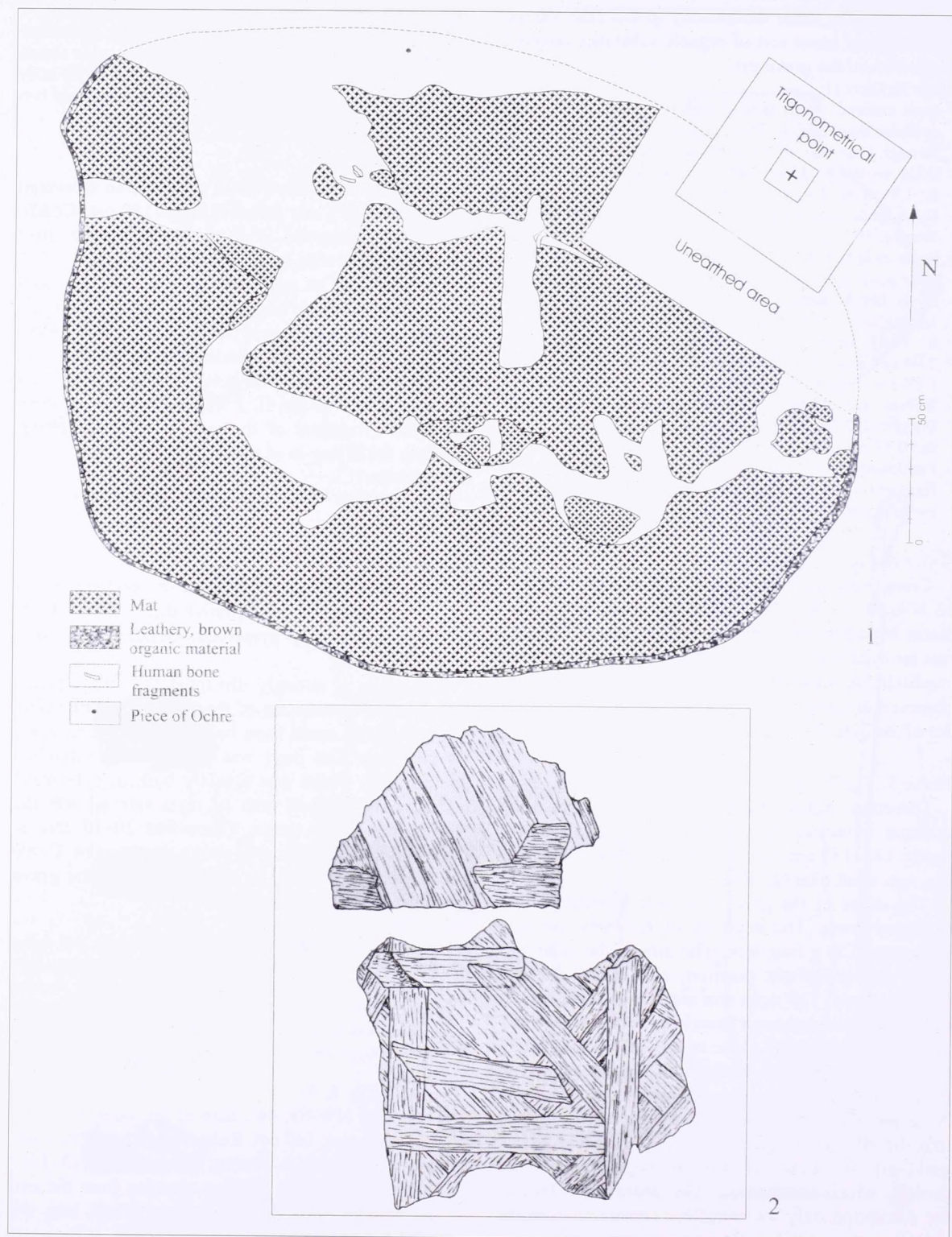


Fig. 6. Sárretudvari-Örhalom, Grave 8. 1: The outrobbed, destroyed grave with the bulrush mat; 2: Sample from the bulrush mat



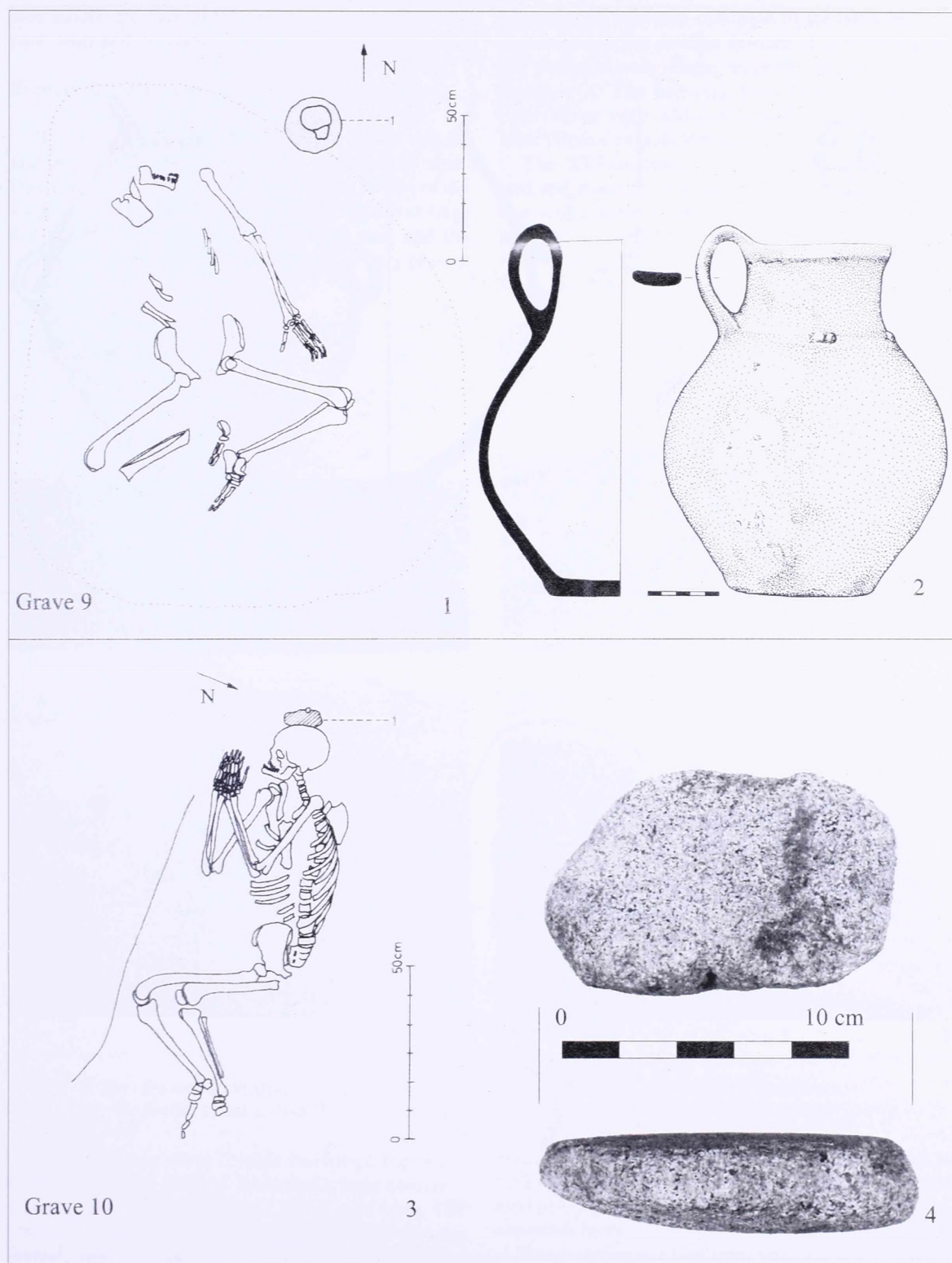


Fig. 7. 1, 2: Sárrétudvari-Örhalom, Grave 9.; 3, 4: Sárrétudvari-Örhalom, Grave 10.



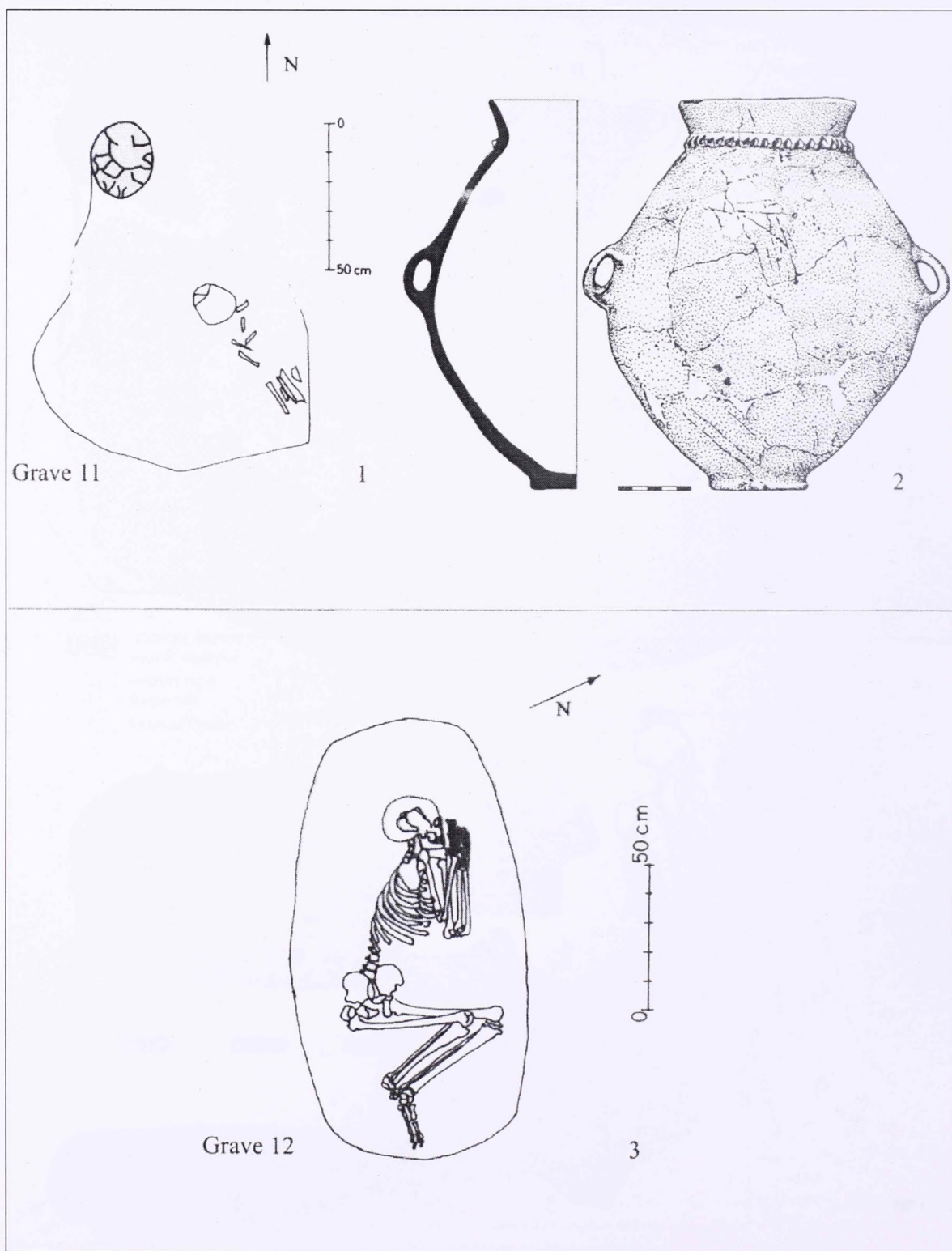


Fig. 8. 1, : Sárrétudvari-Örhalom, Grave 11.; 2: Sárrétudvari-Örhalom, Grave 12.

side before the face, the forearms were parallel with each other and the chest. There was no grave furniture.

#### *Evaluation of the results of the metal analysis<sup>16</sup>*

Based on the results of the analysis of the dagger and the axe that both objects were made out of unalloyed copper (Cu) (99.2% of the axe, and 99.9% of the dagger). The 0.43% iron (Fe), the 0.01% silver (Ag) and the 0.35% lead (Pb) found in the axe, and the 0.02% silver (Ag) found in the dagger are only present as pollution.

The strongly corroded condition of the latter hair-ring is referable to the smaller amount of noble metal and the comparatively larger quantity of copper to be found in it. The hair-ring from Grave 7 was made from silver with additional gold, but probably the other (from Grave 4) was alloyed with copper.

The XRF-analysis could not detect any trace of lead and mercury in both objects, in spite of this fact one – of course the main – component could be cupelled silver (PERNICKA 1995, 58; PRIMAS-WANNER-BOLL 1998, Tab. 1). The silver spiral from Sion, Le Petit-Chasseur /Valais, Switzerland/ (PRI-



1



2

Fig. 9. 1: The view of the Örhalom; 2: The situation of the Profile 1. and 2. from West

One of the two silver colored hair-rings, the small, massive one from Grave 7 contained a large amount – 88.6% – of silver (Ag), and 11.3% of gold (Au). The other one from Grave 4 was lighter, but larger than the former, was in very bad condition. Apart from the 76.3% silver (Ag) and the 8.7% gold (Au), it contained a significant amount – 14.9% – of copper (Cu).



1



2

Fig. 1. 1: Profile 1. from West;  
2: Profile 1. from East

MAS 1996b, 56–57, Abb. 2, Tab. 1; PRIMAS-WANNER-BOLL 1998) is a good example for a special kind of Early Bronze Age jewellery used inhomogeneous noble metal.

Summarizing our hair-rings are special alloys made from silver and gold respectively silver, gold and copper.



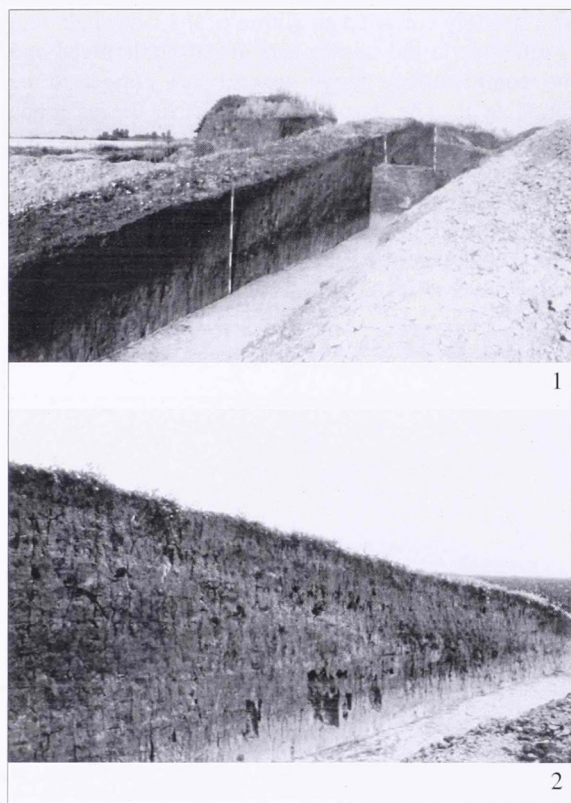


Fig. 11. 1: Profile 2. from West;  
2: Profile 2. from East

The solid gold colored hair-ring /Lockenring/ from Grave 7 apart from the 53.0% gold (Au) contained 34.2% silver (Ag), and a comparatively large amount of – 12.6% – copper (Cu). The golden sheet bent into a hair-ring in Grave 4 contained a larger amount of gold (Au): 77.4%, and less silver (Ag) and copper (Cu): 20.1% and 2.3% respectively. When comparing the color of the two objects the lighter (paler) color of the hair-ring in Grave 7 shows its higher silver content.

Comparing the results of our metal analysis with those achieved by the analysis of the gold objects found in the tumulus burials of Velika Gruda and Mala Gruda (Kotor, Montenegro) leads to surprising similarities in the composition of the component elements. The 1st, and 2nd “Leukas-type” hair-rings (1st: 77.7% Au and 22.5% Ag; 2nd: 77.1% Au and 22.9% Ag) of the Velika Gruda tumulus grave have similar composition to the gold hair-ring of grave 4, although typologically they can be put into completely different groups (PRIMAS 1995, Fig. 5, Table 4; PRIMAS 1996a, Abb. 6. 4-5, 77-80). The composition of the hair-ring in Grave 7 is very close to that of the triangu-

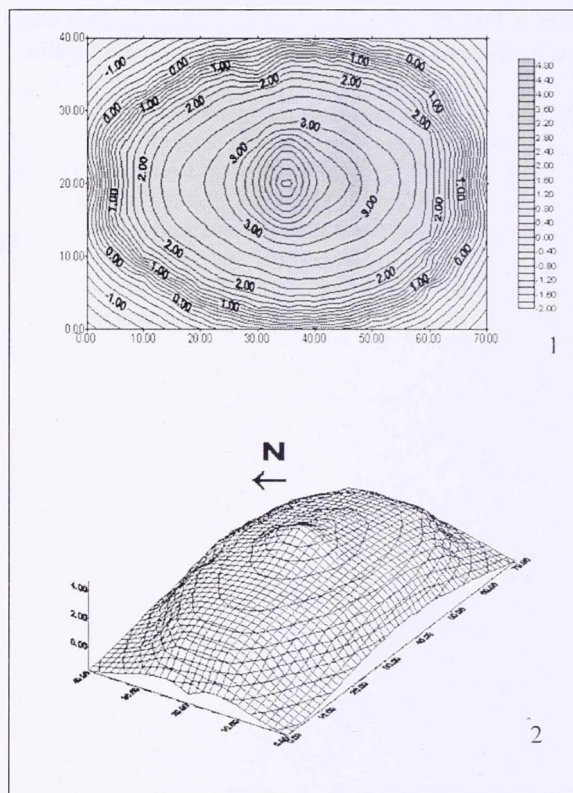


Fig. 12. Contour map and 3D reconstruction of the 1st phase of the Orhalom kurgan before the erosion and formation of top-soil

lar dagger (60% Au, 35% Ag, and 5% Cu) of the Mala Gruda tumulus burial, although that one has a somewhat lower copper (Cu) and a higher gold (Ag) content (PRIMAS 1995, Fig. 4. 1, Tab. 4; PRIMAS 1996a, Tab. 6. 2, Abb. 6. 13-14). To M. Primas's mind this composition is a special alloy, which provides greater hardness to the dagger (PRIMAS 1996a, 89). However in the case of a piece of jewellery the hardness is not a required feature. At the same time, a spiralling (A 4348) from Poliochni-Giallo shows similar composition (PRIMAS 1996a, 89, Tab. 6. 6). It can be an interesting question why these pieces of jewellery were made of such kind of alloy...

Based on the similar metal composition of the objects it can be assumed that at least the raw material – gold, in this case – originates from the same place.

The raw-material of gold objects does not contain tin. This kind of gold was considered so called “Berg-gold” by A. Hartmann (HARTMANN 1968, 20).

The comparison of the shape of the hair-rings /Lockenringen/ permits us to come to chronological and typological deductions. It can be observed that, on the one hand, solid hair-rings and ones bent from



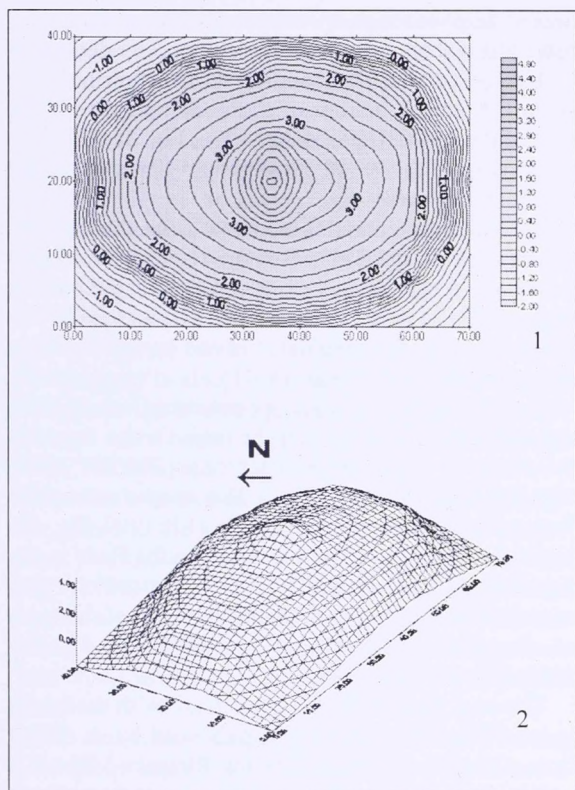


Fig. 13. Contour map and 3D reconstruction of the 1st phase of the Örhalom kurgan after erosion

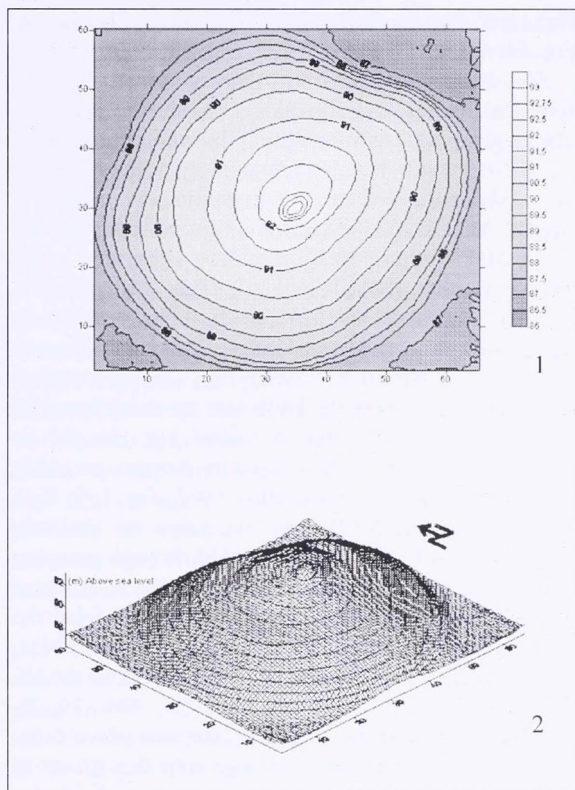


Fig. 14. Contour map and 3D image of the Örhalom kurgan's nd phase before the disturbing and the excavation

metal sheets, and on the other hand, that differently sized and shaped (round, oval, prolate) hair-rings appear from the same time period, therefore the different techniques, sizes and shapes are not necessarily connected to different time horizons.

#### *Evaluation of the finds*

The best parallels with the eared jug of Grave 9 are to be found in Transylvania. We know of a jug with a similarly pulled-up ear found on the Ampoita-Peret /Kisompoly/ site as a grave furniture in the T VIII/2 tumulus grave from the Early Bronze Age, and also as a fragment from the filling-up of the T IV tumulus grave (ANDRIȚOIU 1992, Pl. 14–16, 19; CIUGUDEAN 1991, Abb. 20. 11, Abb. 23. 18; CIUGUDEAN 1996, Fig. 31. 4, Fig. 34. 18). A similar type, but somewhat differently shaped jug is known from Grave 3 of the T I. tumulus in Livezile-Baia /Vladháza/. The publication dated this together with the material of the settlement to the beginning of the Transylvanian Early Bronze Age, to the P. Roman IIa phase /based on calibrated radiocarbon data: 2700–2580 BC, 2780–2580

BC/ (CIUGUDEAN 1997, 21–22, Fig. 21. 1; CIUGUDEAN 1998, 72; CIUGUDEAN 1996, 139–143, Fig. 20. 4). A similar vessel turned up at an excavation at the Cicău-Săliște settlement (CIUGUDEAN 1991, Abb. 25. 3; CIUGUDEAN 1996, Fig. 49. 3; ROTEA 1993, Pl. X. 3). A similar jug decorated with fishbone design on the edge and under the neck is also known from the Grave 7a of the Meteș-La Meteșel tumulus burial (CIUGUDEAN 1996, Fig. 46. 1).

Thus, this type of pottery was generally widespread in the Livezile group (West Transylvanian Tumular graves), although it lived on in the finds of the Copăceni-group and the Șoimuș group (CIUGUDEAN 1996, Fig. 64. 4, Fig. 83. 7 – Gligorești-La Holoame). The two round knobs on the return of the jug are well known decorative elements<sup>17</sup> in the finds of the Livezile- and Copăceni groups. H. Ciugudean extensively treated the origin and the spread of this decorative element, and he showed that it was frequent in both singular and twin variations in the pottery craft of the Cernavodă II-Foltești-, Zimnicea-, Zăbala- and the Schenkenberg cultures. (CIUGUDEAN 1991, 94, 102–103, 107–108; CIUGUDEAN 1996, 88–89, 99,



Fig. 11. 3, Fig. 31. 3, Fig. 37. 3, Fig. 41. 5, Fig. 43. 18, Fig. 54. 4, Fig. 57. 3, Fig. 62. 3, Fig. 63. 1–2).

The large vessels, from Graves 4 and 7, with spherical bodies, cylindrical necks, and horizontally placed grasping knobs or drilled through knob ears on the abdomen side have parallels in the pottery craft of the Makó culture from the beginning of the Early Bronze Age. Similar vessels were found in many urns of the Makó culture, thus the vessels excavated in the Oros-Belterület (KALICZ 1968, Taf. XVI. 9; KALICZ 1984, Taf. XXVII. 5), or the large vessels unearthed from the graves in Hódmezővásárhely-Gorzsa (KALICZ–SCHREIBER 1991, Fig. 18. 6), although there the small ears or the knob ears are to be found on the neck or the shoulder. A vessel just like this is known from Budapest XI.- Budaörs-Airport, probably also from a grave (SCHREIBER 1972, Fig. 1. 9; KALICZ 1984, Taf. XXII. 14). We know of similarly shaped large vessels with not drilled through grasping knobs on the abdomen from the Kiskánya urn grave of the culture (CSALOG 1941, VI. t. 2), and from the 6/61 object of its Cseke /Čaka/ site, although on these, together with the knobs, there is a plastic rib on the abdomen of the vessel (VLADÁR 1966, Abb. 14. 2). The large vessel of the scattered cremated grave excavated in Vágsellye /Šaľa/ belongs into this group as well. This vessel is decorated with concentric circles on its shoulder and the small ears are between the two parallel ribs on the return of the arched biconic body (VLADÁR 1966, Abb. 30. 1). Of the above analogies the bottoms of the vessels from Gorzsa and Budaörs are scratched with broom.

The spout necked amphora decorated with articulated ribs from Grave 11 represents a rare type. The amphora was frequent among the finds of the Makó culture – even in an earless variation – but not with spouted edge and articulated decoration on the neck (VLADÁR 1966, 283–285, Abb. 12. 2, Abb. 13; Abb. 14. 6, 8, Abb. 24; KALICZ 1968, 83, Taf. X. 8; FIGLER 1994, Abb. 5. 14). The amphora was a generally widespread vessel type in the Early Bronze Age (DANI 1999, 60–61).

Recently F. Gogáltan published on two vessels that are similar to our vessel in form, these spout necked, spherical bodied vessels were found in two Makó graves (objects 8 and 115) excavated in Kompolt-Kisté. The vessel of object 8 is an amphora with four ears on its shoulder, the large vessel of object 115, on the other hand, has and no ears, and is decorated with broom scratches on the bottom, and plastic ribs on its neck and shoulder (GOGÁLTAN 1999, 17. t. 2, 8).

Still, the best analogies for the vessel type are from the finds of the Livezile group. Among the finds of the Livezile-Dealul Sârbului tumulus there is a spout

necked amphora with articulated rib decoration on the neck and ribbon ear on the abdomen. It is decorated with three vertical ribs hanging down from the horizontal rib on the bottom of the neck ranging till the start of the ear (CIUGUDEAN 1996, Fig. 21. 12). The proportions of the vessel are slightly different from the Őrhalom amphora.

The other fine parallel is known from the finds of the tumulus of the Telnă-Rupturi II: a spout necked amphora with articulated rib decoration on the bottom of the neck, on which there are two symmetrically positioned ears on the shoulder, and one on the abdomen (CIUGUDEAN 1996, Fig. 38. 11).

The fragments of similar spout necked vessels with articulated rib decoration on the neck can be found in the finds of the Gyula-Roşia group (EMŐDI 1985, Fig. 8. 6, Fig. 16. 1), they may also appear among the finds of the Gîlna-culture (SCHUSTER 1997, Fig. 55. 1). It is comparatively frequent among the finds in the Jigodin culture's Leliceeni-Muntele cu piatră site that an articulated rib is put on the neck region of this type of vessels (ROMAN–DODD–OPRIŢESCU–JÁNOS 1992, Taf. 105. 3–6, 7–8).

The best parallel for the copper axe with the handle-tube found in Grave 7 was published by A. Vulpe from Hunyad County (Museum Rîmnicu-Vîlcea) – unfortunately without exact description of the site and find-context, as a sporadic find – and he dated it to the Early Bronze Age (VULPE 1970, 22, Taf. 56, C 3). This, however, has no real handle-tube, rather the copper handle terminates in a wheel, which serves to secure it as well. There is ribbing around the handle-hole of this one too, but it is parallel instead of diagonal.

A copper axe similar to that of Őrhalom, with a horizontally ribbed shaft-hole and a rounded plain back is known from the area southwest of the Ural Mountains, the so-called Kargaly region, from Grave 2 of kurgan 1 at the site of Niznepavlovka V. The kurgan contained the burial of the people of the so-called Pit Grave culture, and the grave in question can be firmly dated to the beginning of the third millennium BC (CHERNYKH–AVILOVA–ORLOVSKAYA 2002, Fig. 7. 24, 93; ЧЕРНЫХ–АВИЛОВА–ОРЛОВСКАЯ–КУЗЬМИНЫХ 2002, Рис. 7. 24). Another good eastern analogue of the axe published here comes from Grave 2 (with a stone cist) of the so-called “Klady” kurgan, excavated near Novosvobodnaya, in the North Caucasus. Although the area around the shaft-hole is plain, it has a mushroom-shaped termination comparable to the ones from Őrhalom and County Hunyad. The grave contained the burial of a member of the elite of the Maikop culture (CHERNYKH 1992, 69, Pl. 2. 2). A similar axe is also known from Grave 15, kurgan 9 of Cuconeşti Vechi



II, Moldavia, identified by V. Dergachev as a Caucasian import based on its analogues and dated to the middle of the third millennium BC (DERGAČEV 2002, 100-101, Taf. 18.R).

Diagonal scratching imitating tying around the handle-hole also appears on the Silesian-type stone hatchet from the Moravian and the Silesian Cord-decoration pottery. These hatchets are mostly excavated from graves (MACHNIK 1977, 14, Taf. I. A/6; BUCHVALDEK 1978, 53, Obr. 7. SSM).

The axe with a handle-hole dated to the Copper Age, published from Herrsching am Ammersee (Oberbayern) is also a relatively good parallel. Here, similarly to the Hunyad County axe, there is parallel ribbing on both sides of the handle-hole (PÁSZTHORY-MAYER 1998, 19, Taf. 1. 1).

The Eschollbrücken-type copper axe, with handle-tube, dated to the end of the Copper Age has similar shape. It is known in faceted and plain versions (KIBBERT 1980, 24-25, Taf. 1. 1-2). The main difference is in the size, and mostly in the weight, while the axe from the Őrhalom weighs only 308 grams, the axes from West Germany are sometimes heavier than 1000 grams!

The hair-rings found in the Graves 4 and 7 belong to the group identified by E. Zaharia as types A and B (ZAHARIA 1959, 107). L. Nikolova classified this type of hair-rings as "Half to two spirals" (Type 4.1) (NIKOLOVA 1999, 306, Fig. 15. 7.). This type of hair-ring (made of gold, silver and copper) is well known from the Goran-Slatina kurgan group, and from Târnava, Gurbănești, Madara, Mednikarovo, Troyanovo kurgan burials (NIKOLOVA 1999, 306-307).

The round and oval rings found in the same grave prove that the two types were used together in this period. A similar hair-ring to the round hair-ring /Lockenring/ was found in the ochre grave kurgan of Plenița, the ends of this, however, are not thickened (ZAHARIA 1959, Abb. 4. 2;). The kurgans uncovered in the Hungarian Plains are mostly made of poor quality silver, and as far as it can be determined based on the fragmentary finds, they are not the same type as our rings (ECSEDY 1979, Fig. 16. 1-3, 43-44).

Parallels to the hair-rings can be found in the Preslav Grave 1/13 (HÄUSLER 1974, 167, Taf. 38. 15) of the Catacomb-culture, where it was found on the skull. A bronze hair-ring (HÄUSLER 1974, 150, Taf. 41. 12) was found also on the skull in the 8/2 catacomb grave of Ilmen. On the skull of the Pit-Grave burial of Nikopol (1/1938/15) 2 silver hair-rings were found (HÄUSLER 1974, 174, Taf. 47. 3 – the top). Finally we know of the best parallel from the Akkermen I. 20/1 catacomb grave, where the silver hair-ring lay before the face (HÄUSLER 1974, 191, Taf. 72. 3).

One hair-ring was also found on both sides of the skull in the pit-grave burial of the kurgan 60/1 in Jackowica (HÄUSLER 1976, 116, Taf. 22. 10). Gold hair-rings of similar form were found in some of the burials of the Goran/Slatina kurgan-group (PRIMAS 1995, 82-83, Fig. 3A; KITOV et al. 1991).

Later such massive silver hair-rings appeared in the graves of the Zimnicea culture, as well (ALEXANDRESCU 1974, Pl. 9. 1-2).

This type of hair-rings were not in use in this period in South-East Europe, where the heart shaped "Leukas-type" hair-rings – known from the 3rd tumulus in Ampoția-Peret (Grave 1), the 1st tumulus in Târnava (Grave 8), the R15 tumulus in Steno (Leukas) (15 B pithos grave) and from the 1st grave in Velika Gruda –, or the stamp-ended "Mala Gruda-type" hair-rings /Lockenringen/ – known from the Velika Gruda and from the tumulus grave in Mala Gruda – were wide-spread (CIUGUDEAN 1996, 33, 142, Fig. 31. 8-9; MARAN 1998, 330-331, Taf. 20-21).

We know of metal object similar to the copper dagger in the area of Eastern Europe from kurgan burials, such as, the 4/6 pit-grave belonging to the Poltavka group in Ch. Stepan Razin (HÄUSLER 1974, 139, Taf. 13. 12); the catacomb grave under the 1st kurgan in Ch. Chrjaščevskogo (HÄUSLER 1974, 146, Taf. 15. 22); the 5/2 pit-grave burial in Kopački (HÄUSLER 1974, 141-142, Taf. 18. 3); the 30-6/9 central burial in the pit-grave site in Ch. Popova and the 3/8 central pit-grave in Solenoe (HÄUSLER 1974, 145, 146, Taf. 24. 9, 13); the 1/5 catacomb grave in Čerevkov (HÄUSLER 1974, 154, Taf. 29. 7), the 1/10 pit-grave burial in Careva Mogila (HÄUSLER 1976, 92, Taf. 20. 15-16); the 520/a pit-grave in Zlatopol (HÄUSLER 1976, 124, Taf. 24. 6); the 3/6 central pit-grave in Zamožnoe (HÄUSLER 1976, 153, Taf. 47. 12). These are mostly described as bronze or copper spear-heads.

It is notable that even in the case of the perfectly intact Őrhalom specimen it is only the point that is shaped into a sharp edge (the edge and the blunt part is separated by a hardly noticeable shoulder), while the sides are blunt and thick in comparison to the dagger. This kind of fashioning of the edge is characteristic of one of the dagger-types of the catacomb-culture, S. N. Korenevskij (С. Н. Кореневский) puts these into the 2nd group in his summary on the knives of the Jamnaja-, Catacomb-, Poltavka cultures. This dagger type, however, turns up not only in the finds of the Catacomb-culture in Eastern Europe, but also appear in the Poltavka-culture, moreover, among the finds of the Culture-of-the-many-ribbed-vessels, therefore, it is fair to call it a long-lived type (КОРЕНЕВСКИЙ 1978, 36-40, 46, Рис. 4, 11-43, Рис. 5).



At the same time, M. Primas's and M. Kuna's analyses showed that this simple, flat dagger type, with spiked grasp appeared first among the finds of the Pit-grave- and Catacomb-grave-cultures in Eastern Europe, then it spread in SE-Europe, as well, at the end of the Late Copper Age and the period of the Early Bronze Age (KUNA 1981, 30–32, Taf. XXV; PRIMAS 1996a, 98–100, Abb. 7. 7).

### *Absolute Chronology*

Based on the results of the radiocarbon ( $^{14}\text{C}$ ) measurements carried out by the Institute of Nuclear Research of the Hungarian Academy of Sciences, Laboratory of Environmental Studies, we can differentiate between two, or rather three phases inside the kurgan.

Grave 12 belongs to the first phase, the calibrated  $^{14}\text{C}$  age of which (deb-6869, 3346–3309 BC, or 3234–3115 BC, respectively) fits in well with the calibrated radiocarbon results of the older Pit-grave burials of Romania, the Ukraine, Bulgaria, and Serbia (FORENBAHER 1993, 241, 247, Fig. 7; BOYADZIEV 1995, 176; KALICZ 1999, 94; BOYADZIEV 1992, 405; GÖRSDORF–BOJADZIEV 1996).

Based on the results of the measurements, Grave 10 (deb-6639; 3004–2960 BC, or 2949–2908 BC, respectively) is considered to be a slightly later, but still end-of-Copper Age in-burial into the kurgan. The relative age of the grave could not have been determined through archeological means based on the only grave furniture, a polished grinding stone. If we consider the arc made up by Early Bronze Age burials, then this grave definitely does not belong to this period, therefore this fact corroborates the earlier dating, too.

The Early Bronze Age burials and the soil brought upon them comprise the last, or third phase. The age of Grave 4 (deb-7182; 2859–2801 BC, or 2760–2620 BC respectively) and Grave 9 (deb-6871; 2637–2489 BC) belong to the same time-horizon with the dates of the West Transylvanian Tumular graves /Livezile group/ and the EH II. "R"-graves of Steno (Leukas) (CIUGUDEAN 1996, 145–147; CIUGUDEAN 1998, 72; MANNING 1995, Fig. 2), which was recently proven by J. Maran's typological analyses (MARAN 1998, 322, 330–335, Taf. 19–22, Taf. 81).

### *Summary*

Based on the analysis of the stratigraphic conditions and the find material, we separated two main phases of the kurgan. The first phase of the kurgan was raised above a Pit-grave burial in the end of the Copper Age (Grave 12).

The tumulus was used as a burial site in the beginning of the Early Bronze Age (Graves 4, 7–7a, 8, 9, 11), and connected to this, it was heightened by another layer of earth. The analysis of the finds showed that the communities using this burial site had strong Transylvanian (Livezile) and Eastern European ties. This is confirmed by the rite too, as the first local culture of the Early Bronze Age, the Makó usually buried its dead with a cremating rite.

The analysis of the metallic material demonstrated the impact of the Eastern European Catacomb-culture.

The radiocarbon measurements completely corroborated the traditional archeological dating. It emerged of the typologically undateable Grave 10, that it must have been buried into the kurgan not much after the base burial (1st phase), still in the Pit-grave period.

There are numerous stratigraphic observations which lead us to think that the People of the Pit-Grave Kurgans saw the beginning of the Early Bronze Age in the Carpathian Basin (ECSEDY 1979, 52).

The kurgans of Mezőcsát–Hörsögsös and Tiszavasvári–Gyepáros published by N. Kalicz were raised after the cemeteries of the Copper Age Baden-culture ceased (KALICZ 1998, 170, Abb. 8–10; KALICZ 1999, 84–85, 3. kép, 17. kép).

At the Jabuka-Tri Humke site the Baden layer is followed by the Kostolac-culture, then the Pit-grave kurgan was built on the next aeneolithic humus level (BUKVIĆ 1979, 14–17; TASIĆ 1995, 161).

In the cases of Perlez-Batka and Padej-Barnahát the kurgan was raised above the settlement of the Baden-culture (GIRIĆ 1982, 102).

Just as in the case of Debrecen-Dunahalom, where the Baden shards found in the filling-up of the kurgan mean "*terminus post quem*" in terms of its age (ECSEDY 1979, 16, Pl. 1: 2–8; KALICZ 1998, 169).

Thus, the graves excavated under the kurgan of Sárrétudvari-Órhalom confirm the conception that Eastern European steppe – late Pit-grave (Jamnaja) and Catacomb-grave – influences, maybe even concrete ethnic elements (?) took part in forming the Early Bronze Age in NE-Hungary.

At the same time, as the analysis of the finds attest that the Transylvanian (Livezile) connections also had a significant influence in the first period of the Bronze Age in the area. Showing a connection between the pottery material of the Órhalom graves and the West Transylvanian Tumular graves (Livezile), gives an indirect possibility to find parallels with the similarly rich graves of S-, SE-Europe and the EH II (Early Helladic) period.



## Notes

- 1 Graves number 1, 2, 3, 5, 6. These are under publishing in Corpus of Graves from the period of Hungarian Conquest in Hajdú-Bihar County by Ibolya M. Népér.
- 2 With collaboration of Zsigmond Hajdú (Archaeologist, Museum Déri, Debrecen)
- 3 Instead of Sárrétudvari-Örhalom they incorrectly call it Sárrétudvari-“Ökörhalom.”
- 4 The 3 D reconstructions are made by Pál Sümegi (University of Szeged; Department of Geology and Palaeontology) and József Lóki (University of Debrecen; Department of Natural Geography). We would like to thank them for their work.
- 5 It contained 21 pieces of cattle, 6 pieces of sheep, and 6 pieces of aurochs bone fragments. The classification of the animal bones was carried out by István Vörös (Hungarian National Museum, Department of Archeology). We would like to thank him for his work!
- 6 The drawings are made by Ágoston Dékány. The object photos are made by Rezső Rák (Archaeological photographer in Museum Déri). We would like to express our special thank to them for their work.
- 7 Inv.No.: IV.92.58.1–3
- 8 The wood sample was identified by Edina Rudner. We would like to thank her for her work.
- 9 Two drillings can be seen in its present fragmentary state.
- 10 The analysis of the ochre was carried out by Sándor Szakáll (Museum Ottó Herman, Miskolc). We would like to thank him for his work.
- 11 Inv.No.: IV.92.59.1–5
- 12 Inv.No.: IV.92.60.1
- 13 Inv.No.: IV.92.62.1. The identification of the stone was carried out by Pál Sümegi, too.
- 14 On the basis of the original observations and notices made on the site near the long bones metal turned up. It means rests of green patina.
- 15 Inv.No.: IV.92.61.1.
- 16 The metal analyses were carried out by Miklós Kis-Varga (Institute of Nuclear Research of the Hungarian Academy of Sciences). We would like to thank him for his work. The short summary of his research is to be found in the Appendix.
- 17 H. Ciugudean calls this type of decorative element “Manschette” or “Manschettenkeramik” (CIUGUDEAN 1991, 94).

## BIBLIOGRAPHY

- ALEXANDRESCU 1974 A. D. ALEXANDRESCU, *La nécropole du Bronze ancien de Zimnicea (départ. De Teleorman)*. Dacia 18 (1974) 79–93.
- ANDRIȚOIU 1992 I. ANDRIȚOIU, *Civilizația tracilor din Sud-Vestul Transilvaniei în epoca bronzului*. – *Die Zivilisation der Thraker im Südwesten Transylvaniens. Die Bronzezeit*. Bibliotheca Thracologica II, București 1992.
- BOYADZIEV 1992 J. BOYADZIEV, *Probleme der Radiokohlenstoffdatierung der Kulturen des Spätäneolithikums und der Frühbronzezeit*. SP 11-12 (1992) 389–406.
- BOYADZIEV 1995 J. BOYADZIEV, *Chronology of Prehistoric Cultures in Bulgaria*. In: (Eds: D. W. Bailey–I. Panayotov) *Prehistoric Bulgaria. Monographs in World Archaeology* 22, Madison 1995, 149–191.
- BUCHVALDEK 1978. M. BUCHVALDEK, *Otázka kontinuity v českomoravském mladším eneolitu*. – *Zur Frage der Kontinuität im jüngeren Äneolithikum in Böhmen und Mähren*. Praehistorica 7 – Varia Archaeologica 1, Praha 1978, 35–64.
- BUKVIĆ 1979 L. BUKVIĆ, *Results of the Researches of the mound near Jabuka. A contribution to the study of the culture of graves under tumuli*. AI XIX (1979) 14–18.
- CHERNYKH 1992 E. N. CHERNYKH, *Ancient metallurgy in the USSR. The Early Metal Age*. Cambridge 1992.
- CHERNYKH—AVILOVA—ORLOVSKAYA 2002 E. N. CHERNYKH—L. I. AVILOVA—L. B. ORLOVSKAYA, *Metallurgy of the Circumpontic Area: from unity to disintegration*. In: (Red.: Ü.Yalçın) *Anatolian Metal II. Der Anschnitt. Zeitschrift für Kunst und Kultur im Bergbau*. Beiheft 15, Bochum 2002, 83–100.
- ЧЕРНЫХ—АВИЛОВА—ОРЛОВСКАЯ—КУЗЬМИНЫХ 2002 E. Н. ЧЕРНЫХ—Л. И. АВИЛОВА—Л. Б. ОРЛОВСКАЯ—С. В. КУЗЬМИНЫХ, *Металлургия в Циркумптийском Ареале: от единство к распаду*. Российская Археология 2002, No. 1, 5–23.
- CIUGUDEAN 1991 H. CIUGUDEAN, *Zur frühen Bronzezeit in Siebenbürgen im Lichte der Ausgrabungen von Ampoia, jud. Alba*. PZ 6 (1991) 78–118.



- CIUGUDEAN 1996 H. CIUGUDEAN, *Epoca timpurie a bronzului în centrul și sud-vestul Transilvaniei. The Early Bronze Age in Central and South-Western Transylvania*. Bibliotheca Thracologica XIII, București 1996.
- CIUGUDEAN 1997 H. CIUGUDEAN, *Cercetări privind epoca bronzului și prima vârstă a fierului în Transilvania. – Studies on the Bronze and first Iron Age in Transylvania*. Bibliotheca Musei Apulensis VII, Alba Iulia 1997.
- CIUGUDEAN 1998 H. CIUGUDEAN, *The early Bronze Age in Western Transylvania*. Bibliotheca Musei Apulensis VIII, Alba Iulia 1998, 67–83.
- CSALOG 1941 CSALOG J., *A "Vučedol-Zóki" típusú kerámia lelőhelyei Tolna vármegyében. – Fundorte der Vučedol-Zóker Keramik in dem Komitate Tolna*. ArchÉrt. III/II (1941) 6–14.
- DANI 1999 DANI J., *A kora bronzkori Nyírség-kultúra települései Polgár határában. – Siedlungen der frühbronzezeitlichen Nyírség Kultur in der Umgebung von Polgár*. DMÉ 1997–1998 (2000), 49–128.
- DERGAČEV 2002 V. DERGAČEV, *Die äneolitischen und bronzezeitlichen Metallfunde aus Moldavien*. PBF XX, 9, Stuttgart 2002.
- ECSEDY 1979 ECSEDY, I., *The peoples of the pit-grave kurgans in Eastern-Hungary*. Fontes ArchHung Budapest 1979.
- EMÖDI 1985 I. EMÖDI, *Asupra începutului epocii bronzului în Bihor. – Zu den Anfang der Bronzezeit im Bihor-Gebiet*. Thraco-Dacica 6, București 1985, 123–144.
- FIGLER 1994 A. FIGLER, *Die Fragen der Frühbronzezeit in Nordwest-Transdanubien*. ZM 5 (1994) 21–38.
- FORENBAHER 1993 S. FORENBAHER, *Radiocarbon dates and absolute chronology of the central European Early Bronze Age*. Antiquity 67 (1993) 218–256.
- GIRIĆ 1982 M. GIRIĆ, *Über die Erforschung der Grabhügel in der Wojwodina*. In: Atti del X Simposio Internazionale sulla fine del Neolitico e gli inizi dell'età del Bronzo in Europa. Lazise-Verona 1980, Verona 1982, 99–105.
- GOGÂLTAN 1999 F. GOGÂLTAN, *A bronzkori lelőhely értékelése*. In: Kompolt-Kistér; Újkőkori, bronzkori, szarmata és avar lelőhely. Leletmentő ásatás sz M3-as autópálya nyomvonalán. (Szerk.: Petercsák T.–Szabó J. J.) – A Neolithic, Bronze Age, Sarmatian and Avar site. Rescue excavation at the M3 motorway. (Red: Petercsák T.–Szabó J. J.) HMRK 1999.
- GÖRSDORF—BOJADŽIEV 1996 J. GÖRSDORF—J. BOJADŽIEV, *Zur absoluten Chronologie der bulgarischen Urgeschichte*. Berliner 14C – Datierungen von bulgarischen archäologischen Fundplätzen. Eurasia Antiqua 2 (1996) 105–173.
- HARTMANN 1968 A. HARTMANN, *Spektralanalytische Untersuchungen bronzezeitlicher Goldfunde des Donaupraumes*. Germania 46/1 (1968) 19–27.
- HÄUSLER 1974 A. HÄUSLER, *Die Gräber der älteren Ockergrabkultur zwischen Ural und Dnepr*. Berlin, 1974.
- HÄUSLER 1976 A. HÄUSLER, *Die Gräber der älteren Ockergrabkultur zwischen Dnepr und Karpaten*. Berlin 1976.
- KALICZ 1968 N. KALICZ, *Die Frühbronzezeit in Nordost-Ungarn*. ArchHung. XLV, Budapest 1968.
- KALICZ 1984 N. KALICZ, *Die Makó-Kultur*. In: (Red.: N. Tasić) *Kulturen der Frühbronzezeit des Karpatenbeckens und Nordbalkans*. Beograd 1984, 93–108.
- KALICZ 1998 N. KALICZ, *Östliche Beziehungen während der Kupferzeit in Ungarn*. In: (Hrsg.: B. Hänsel – J. Machnik) *Das Karpatenbecken und die Osteuropäische Steppe. Nomadenbewegungen und Kulturaustausch in den vorchristlichen Metallzeiten (4000–500 v.Chr.)*. Prähistorische Archäologie in Südosteuropa 12. München 1998, 163–177.
- KALICZ 1999 KALICZ N., *A késő rézkori Bádén kultúra temetője Mezőcsát-Hörsöngösön és Tiszavasvári-Gyepároson. – Das Gräberfeld der spätkupferzeitlichen Badener Kultur in Mezőcsát-Hörsöngös und in Tiszavasvári-Gyepáros*. HOMÉ 37 (1999) 57–101.
- KALICZ—SCHREIBER 1991 KALICZ N.,—SCHREIBER R., *A Somogyvár-Vinkovci kultúra Dél-Északi irányú közvetítő szerepe a korabronz korban. – Die Vermittlungsrolle in Süd-*



- Nord Richtung der Somogyvár-Vinkovci-Kultur in der frühen Bronzezeit. *BudRég* 28 (1991) 9–43.
- KIBBERT 1980 K. KIBBERT, *Die Äxte und Beile im mittleren Westdeutschland I*. PBF IX, 10, München 1980.
- KITOV et al. 1991 G. KITOV—I. PANAYOTOV—P. PAVLOV, *Mogilni nekropoli v Loveshkiya kraj. Ranna bronzova epokha (Nekropolut Goran-Slatina)*. Razkopki i Prouchvaniya 23, Sofia 1991.
- КОРЕНЕВСКИЙ 1978 С. Н. КОРЕНЕВСКИЙ, О металлических ножах Ямной, Полтавинской и Катакомбной культур. — *Les couteaux en metal des cultures de Poltavkino et a inhumations en fosse et en catacombe*. SA 1978/2, 33–48.
- KUNA 1981 M. KUNA, *Zur neolitischen und äneolitischen Kupferverarbeitung im Gebiet Jugoslawiens. — O neolitskoj i eneolitskoj obradi bakra na području Jugoslavije*. Godišnjak 19, 1981.
- KULCSÁR 1998 G. KULCSÁR, *The distribution of the Makó culture in South-Eastern Hungary*. Bibliotheca Musei Apulensis VIII, Alba Iulia, 1998, 31–53.
- LICHARDUS—VLADÁR 1996 J. LICHARDUS—J. VLADÁR, *Karpatenbecken-Sintašta-Mykene. Ein Beitrag zur Definition der Bronzezeit als historischer Epoche. The Carpathian Basin- Sintašta-Mycenae. Contribution to defining the Bronze Age as a historical epoch*. SIA 44-1 (1996) 25–94.
- MACHNIK 1977 J. MACHNIK, *Frühbronzezeit Polens (Übersicht über die Kulturen)*. Prace Komisji Archeologicznej 15, Wrocław-Warszawa-Kraków-Gdańsk 1977.
- MANNING 1995 S. W. MANNING, *The absolute chronology of the Aegean Early Bronze Age. Archaeology, Radiocarbon and History*. Monographs in Mediterranean Archaeology 1, Sheffield 1995.
- MARAN 1998 J. MARAN, *Kulturwandel auf dem griechischen Festland und dem Kykladen im späten 3. Jahrtausend vor Chr. Teil I-II*. UPA 53 (1998).
- M. NEPPER 1991 M. NEPPER I., *Sárrétudvari és környéke a XIII. századig*. Berettyóújfalu, 1991.
- NIKOLOVA 1999 L. NIKOLOVA, *The Balkans in Later Prehistory. Periodization, Chronology and Cultural Development in the Final Copper and Early Bronze Age (Fourth and Third Millenia BC)*. BAR – IS 1999, 791.
- PÁSZTHORY—MAYER 1998 K. PÁSZTHORY—E. F. MAYER, *Die Äxte und Beile in Bayern*. PBF IX, 20, Stuttgart 1998.
- PERNICKA 1995 E. PERNICKA, *Gewinnung und Verbreitung der Metalle in prähistorischer Zeit*. JRGZM 37,1 (1990) 1995, 21–129.
- PRIMAS 1995 M. PRIMAS, *Gold and silver during the 3rd Mill.cal.BC* In: *Prehistoric Gold in Europe. Mines, Metallurgy and Manufacture* Ed. by: G. Morteani–J. P. Northover, Dordrecht-Boston-London, 1995
- PRIMAS 1996a M. PRIMAS, *Velika Gruda I. Hügelgräber des frühen 3. Jahrtausends v. Chr. Im Adriagebiet – Velika Gruda, Mala Gruda und ihr Kontext. Tumulus burials of the early 3rd Millenium BC in the Adriatic – Velika Gruda, Mala Gruda and their context*. Bonn 1996.
- PRIMAS 1996b M. PRIMAS, *Frühes Silber*. In: (Hrsg.: T. Kovács) *Studien zur Metallindustrie im Karpatenbecken und den benachbarten Regionen. Festschrift für Amália Mozsolics zum 85. Geburtstag*. Budapest 1996, 55–59.
- PRIMAS—WANNER—BOLL 1998 M. PRIMAS—B. WANNER—P. O. BOLL, *The interpretation of metal analysis: a case study based on the silver spiral from Sion (Valais, Switzerland)*. In: *L'atelier du Bronzier en Europe de XXe au VIIIe siècle avant notre ère. Actes du colloque international "Bronze" 96* Neuchâtel et Dijon, 1996. Tome I (session de Neuchâtel). Les analyses de composition du métal: leur apport à L'archéologie de L'Âge du Bronze (Édité par: C. Mordant, M. Pernot, V. Rychner) Paris 1998, 53–62.
- ROMAN—OPRITESCU—JÁNOS 1992 P. ROMAN—A. D. OPRITESCU—P. JÁNOS, *Beiträge zur Problematik der Schnurverzierten Keramik Südosteuropas*. Mainz am Rhein 1992.



- ROTEA 1993 M. ROTEA, *Contribuții privind bronzul timpuriu în centrul Transilvaniei. – Contributions à l'étude du bronze ancien dans la Transylvanie centrale.* Thraco-Dacica 14 (1993) 65–86.
- SCHREIBER 1972 SCHREIBER R., *Adatok Budapest környékének korabronzkorához. – Data to the Early Bronze Age of Budapest.* ArchÉrt 99 (1972) 151–166.
- SCHUSTER 1997 C. SCHUSTER, *Perioada timpurie a epocii bronzului în bazinele Argeșului și Ialomiței Superioare. – Die Frühbronzezeit im Argeș- und Ialomița-Becken.* Bibliotheca Thracologica XX, București 1997.
- TASIĆ 1995 N. TASIĆ, *Eneolithic cultures of Central and West Balkans.* Belgrade 1995.
- ZAHARIA 1959 E. ZAHARIA, *Die Lockenringen von Sărata-Monteoru und ihre typologischen und chronologischen Beziehungen.* Dacia 3 (1959) 103–134.
- VLADÁR 1966 J. VLADÁR, *Zur Problematik der Kosihy-Čaka-Gruppe in der Slowakei.* SlA 14 (1966) 245–336.
- VULPE 1970 A. VULPE, *Äxte und Beile in Rumänien I.* PBF IX, 2, München 1970.

J. Dani  
Déri Múzeum  
Debrecen, Déri tér 1.  
H-4026

I. M. Nepper  
Déri Múzeum  
Debrecen, Déri tér 1.  
H-4026

Andrea Zsuzsanna Szántó–Mihály Molnár–Éva Svingor–Magdolna Sándorné Mogyorósi

#### RADIOCARBON ANALYSIS OF THE SÁRRÉTUDVARI-ÖRHALOM'S GRAVES

|    | Code     | Name of sample                  | $\delta^{13}\text{C}(\text{PDB})$<br>[‰] | Conventional<br>radiocarbon<br>age (BP) | Calendar date<br>cal BC |
|----|----------|---------------------------------|------------------------------------------|-----------------------------------------|-------------------------|
| 1. | deb-6871 | Sárrétudvari-Örhalom, 9. grave  | - 19.53                                  | 4060 ± 50                               | 2637-2489               |
| 2. | deb-7182 | Sárrétudvari-Örhalom, 4. grave  | - 19.58                                  | 4135 ± 60                               | 2859-2801<br>2760-2620  |
| 3. | deb-6639 | Sárrétudvari-Örhalom, 10. grave | - 19.98                                  | 4350 ± 40                               | 3004-2960<br>2949-2908  |
| 4. | deb-6869 | Sárrétudvari-Örhalom, 12. grave | - 19.82                                  | 4520 ± 40                               | 3346-3309<br>3234-3115  |

#### deb-6871

Radiocarbon Age BP 4060 ± 50

(Stuiver et al. 1998)

50 year moving average

cal AD/BC age ranges (cal ages as above) from probability distribution (Method B):

| % area enclosed | cal BC age ranges  | relative area under probability distribution |
|-----------------|--------------------|----------------------------------------------|
| 68.3 (1 sigma)  | cal BC 2637 - 2489 | 1.000                                        |
| 95.4 (2 sigma)  | cal BC 2856 - 2806 | .091                                         |
|                 | 2752 - 2729        | .029                                         |
|                 | 2710 - 2470        | .080                                         |