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The stone implements and wrist-guards of the Bell Beaker cemetery of Budakalász (M0/12 site)

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In this article I investigate the stone finds of the Bell Beaker cemetery of Budakalász from archaeological and petrographic points of view. For the first time in Hungary I describe the finds in the terms of international typology, and compare the inventory with other

published Hungarian and European Bell Beaker sites.

Keywords: Early Bronze Age, Bell Beaker Culture, Budapest-Csepel group, stone implements, biritual cemetery.

1. INTRODUCTION

In this article¹ I investigate the stone implements of the Bell Beaker site of Budakalász.² The site consists of two parts: a cemetery with 1070 graves (biritual inhumations, urngraves and scattered urngraves, empty gravepits / symbolic burials or cenotaphs), and the settlement part.³

I describe and evaluate the stone finds of the cemetery from archaeological and macroscopic petrographic points of view. Because of the large distribution area of the Bell Beaker Culture, I have made my analyses at the levels of the site, the region (Budapest-Csepel group / Budapest district) and the country (Hungary) and also considered the whole distribution area (northern Africa and Europe) of the Bell Beaker and compared the results with each other (analysed the results at micro- and macroscopic levels).⁴

¹ The article was supported by the Lise Meitner fellowship (project M 2003-G25 / AM 0200321) of FWF (*Fonds zur Förderung der wissenschaftlichen Forschung*).

² Site no. 12 of the M0 motorway excavation, excavation campaign: 2005; excavator: Katalin Ottományi; excavated territory: 40000 m². The topographical name of the site is Budakalász-Csajerszke.

³ Czene 2008; Horváth 2013. I would like to thank András Czene, who assessed the site and allowed me to work on this assemblage and provided me with useful information on the site.

⁴ See a similar comparison for the Late Copper Age: Horváth 2012.

The structure of the article follows the typological groups of the finds:

1. Grinding equipment; 2. Pebbles (polishing pebbles, choppers / hard hammers, hand stones, anvils, whetstones made of pebbles with minimal or no shaping); 3. Axes and celts; 4. Polishers/Moulds; 5. Wrist-guards; 6. Chipped stones; 7. Amber.

After their description I summarize and evaluate them, compare them with other published finds from the region and the finds of Hungary, and also with finds, publications and methodologies in Europe.

2. SHORT DESCRIPTION OF THE BELL BEAKER CULTURE

The Bell Beaker Culture spread on the coastal parts of northern Africa, in maritime Europe (its Atlantic and Mediterranean parts) and along larger rivers in Europe (Danube, Elbe, Oder, Vistula, Morava) – in general on lowlands, but in certain cases in mountainous regions as well (northern Italy, Switzerland, Sardinia) (see Fig. 1 after Care 2004).

Looking at this map we can see that, as in the cases of the Boleráz and Baden Cultures of the Late Copper Age, this distribution is not even: smaller and larger occupational areas were separated, and are situated far away from each other.⁵ The easternmost, larger occupation area is situated along the River Vistula, in the Polish Lowlands,⁶ but sporadic occupations appear towards the upper part of the Dnieper and the catchment basin of the Dvina.⁷ Most researchers agree that the Bell Beaker Culture emerged in the Iberian Peninsula and spread from this area.⁸ Investigating the whole distribu-

⁵ Horváth 2009. It is possible that, if we are able to separate the early and the late sites from each other in the whole distribution area of the Bell Beaker, we could observe further differences and could understand the Bell Beaker better. This was the case with the Baden Culture, formerly assumed to be unified.

⁶ Czebreszuk, Szmyt 2003.

⁷ Czebreszuk 2003, 175.

⁸ Care 2004.

tion area from typological and chronological points of view, researchers have introduced several subdivisions: Marc van der Linden created five so-called polythetic groups;⁹ Marie Besse distinguished eastern, southern, northern and western Bell Beaker domains.¹⁰

The Bell Beaker Culture is considered to be a Late Neolithic culture – or, in another international terminology, a Late Copper Age culture – that survived in the transitional phase of the Early Bronze Age.¹¹ Studies often emphasize the role of several local/native elements, the continuity of former and distinct Eneolithic traditions, which affected the formation of the Bell Beaker.¹² The various local former traditions, their influence on the emerging Bell Beaker, the possible continuity of indigenous cultures and their interactions with Bell Beaker communities and other neighbouring cultures resulted in differences among the regional groups of the Bell Beaker.¹³ On the Atlantic and Mediterranean seacoasts Megalithic traditions survived; on the eastern and the Mediterranean borderline Bell Beakers adopted some steppean traditions.¹⁴

Looking at the spread of the Bell Beaker Culture in Hungary, its occupation along two riverlines is certain: Danube and Rába (Fig. 2). Thanks to older and more recent research along the Rába River we have knowledge of more and more sites belonging to the Bell Beaker.¹⁵ Following the flow of the Danube we can find some very sporadic sites between Almásfüzitő and Pilismarót, unfortunately as stray finds, connecting the

⁹ Van der Linden 2004, Fig. 6.

¹⁰ Besse 2004, Fig. 8.

¹¹ On the basis of its metallurgy: Bertemes, Heyd 2002: copper tools from *Fahlerz*, Reinecke A0 horizon, see also Reményi et al. 2006 for the Hungarian finds.

¹² Besse 2004; Strahm 2008.

¹³ E.g. with Corded Ware Culture, Wien-Essling: Zimmermann 2003; Egeln-Bleckendorf: Müller 1999.

¹⁴ Especially in the burial rites: e.g. tumulus/kurgan, frog position of the body, stele erection: see Turek 2006, Turek 2006a, Harrison, Heyd 2007; Dimitriadis 2008; Włodarczak 2008; Robb 2009.

¹⁵ In the vicinity of Szombathely: Károlyi 1972, 172-185; Ilon 2004, 42; Reményi, Dobozi 2012; in the vicinity of Győr: Patay 1960.

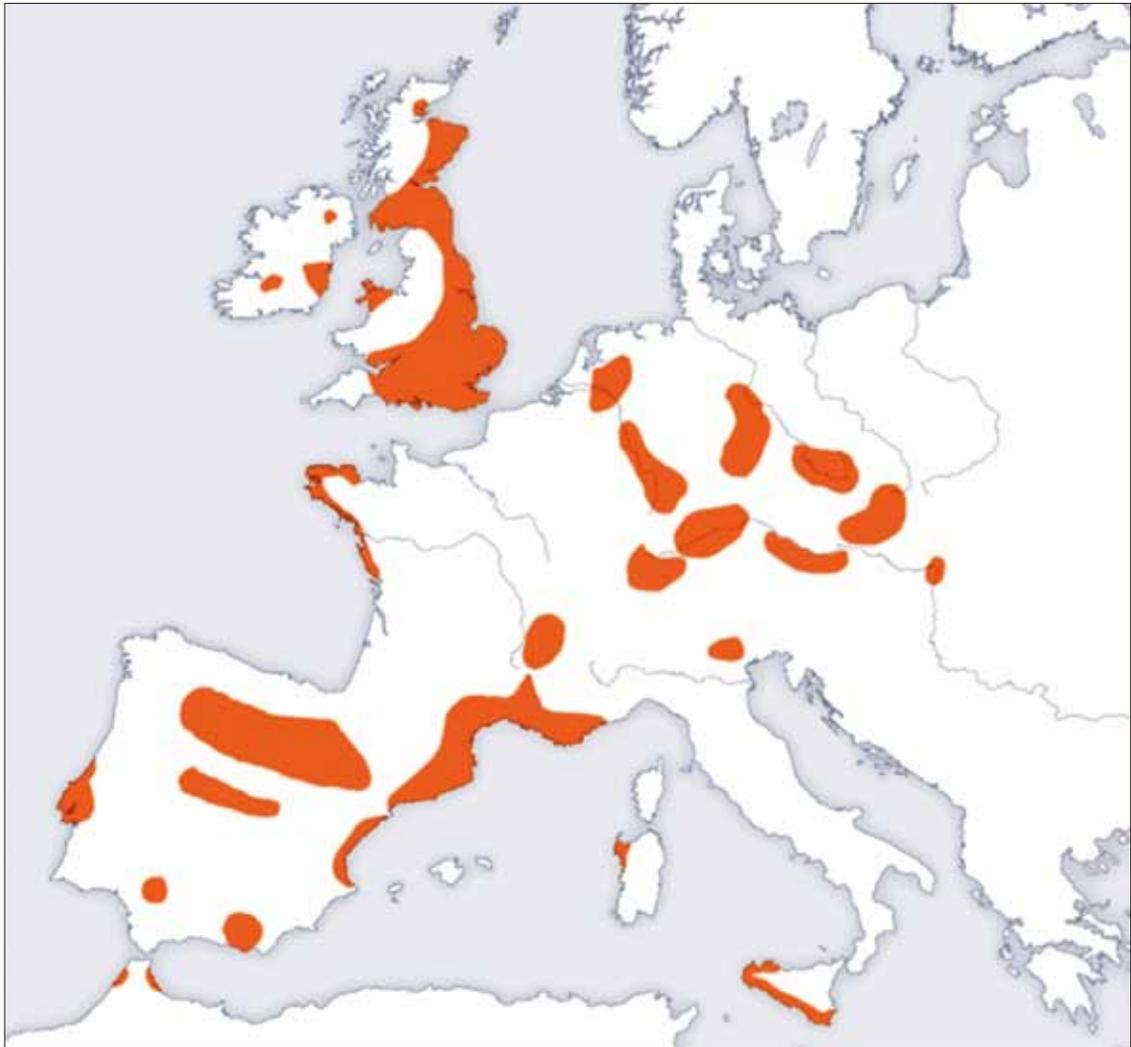


Fig. 1. The distribution of the Bell Beaker Culture (after Care 2004, source: <https://www.google.at/search?q=Bell+Beaker+culture+map&safe=active&tbm=isch&tbo=u&source=univ&sa=X&ved=0ahUKEwiQjIjw27PWAhXIJ8AKHaLqC6QQsAQIQw&biw=1024&bih=473#imgrc=PViyA5K3VExIoM>).

Rába region to the Csepel region with short-lived occupational areas.¹⁶ The second-largest settled area is the Budapest–Csepel region.¹⁷ According to new research, even though based on scattered urn-grave Bell Beaker-like import or imitation vessel finds from Panyola–Vásármező-domb (excavated by Katalin Almássy and Eszter Istvánovits in 2003), a possible distribution or contact along the River Tisza can also be assumed.¹⁸

¹⁶ Patay 1960.

¹⁷ The southern part of Szentendre Island, Gázgyár and Hajógyár Islands, the northern part of Csepel Island: Kalicz, Schreiber 1997; Kalicz-Schreiber, Kalicz 2001; Endródi 2003.

¹⁸ Dani, Tóth 2014.

The Hungarian material grouped into two parts: NW-Hungary along the River Rába was mainly influenced by the western Bell Beaker, while the central part of Hungary along the Danube (Budapest–Csepel) was mainly influenced by southern cultures (esp. Makó, Somogyvár–Vinkovci and early Nagyrév Cultures, since these overlapped each other in space and time). In a European perspective, the Hungarian Bell Beaker shows tighter bonds with Lower-Austrian and Moravian Bell Beaker groups.¹⁹ The Hungarian Bell Beaker is an

¹⁹ Kalicz-Schreiber, Kalicz 1999, Kalicz-Schreiber, Kalicz 1998–2000, 45, 47; Kalicz-Schreiber, Kalicz 2001.

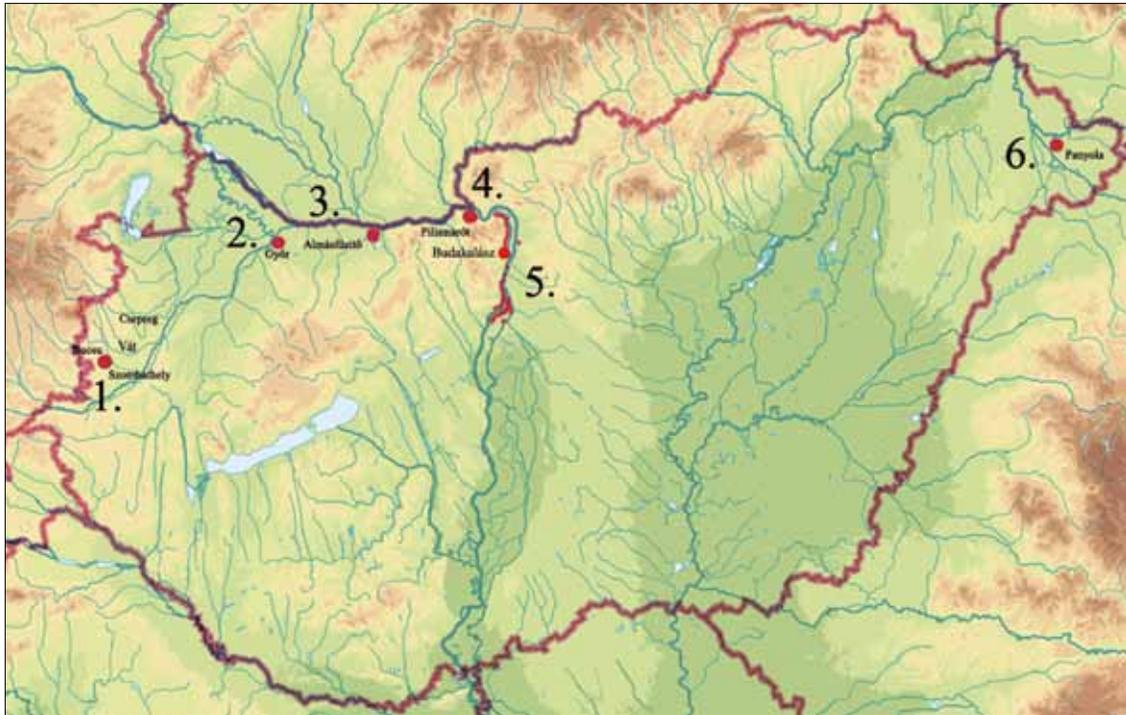


Fig. 2. The local distribution of the Bell Beaker Culture in Hungary with the main sites. 1. Environment of Szombathely along the River Rába, 2. Győr in the confluence of three rivers: the Danube, Rába and Rábca, 3. Almásfüzitő, 4. Pilismarót, 5. Budakalász, and 6. Panyola along the river Tisza.

Early Bronze Age culture in the Hungarian terminology.²⁰ The Austrian Bell Beaker sites were listed in three chronological phases without sharp boundaries.²¹ Synchronized with the Hungarian terminology: the Austrian I phase is the classic Bell Beaker; second phase: Common Ware/Accompaniment pottery (EBA IIa phase in Hungary); third phase: so-called Oggau-Wipfing–Ragelsdorf–Oberbierbaum group in the Reinecke Bronze Age A1, which was contemporary with the Hungarian EBA IIb phase.²² The elements of the classic Beaker Package and Beaker Set by this final phase had disappeared, and the Common Ware became dissolved in the local Early Bronze cultures.

The recently discovered large cemeteries in the Budapest region are dated 2500–1900

BC (Budakalász–Csajerszke, M0 / Site 12), Szigetszentmiklós 2500–2200 BC.²³ In the cemetery of Szigetszentmiklós there is a chronological gap between the Bell Beaker and the Early Nagyrév graves: Nagyrév is a little later. This is the first scientific evidence on the chronological situation of the Bell Beaker and Early Nagyrév at a common site without overlapping! Another date from this region is a radiocarbon date of Dunakeszi–Székes-dűlő from a proto-Nagyrév grave.²⁴ The Proto-Nagyrév horizon should be contemporary with the Bell Beaker Culture according to relative chronology; however, this date is much later in absolute chronology.

Another older radiocarbon date is available from Budapest–Farkas-rét (B-4709: 3470 BP \pm 80, recalibrated: 1890–1690 calBC, 1 σ),

²⁰ EBA phase II: Bóna 1994; Harangedény–Csepel group, EBA IIa: Kalicz–Schreiber, Kalicz 1999, 86 and Fig. 20; EBA IIa, IIb: Reményi 2009.

²¹ Neugebauer, Neugebauer–Maresch 2001; Heyd 2000, 358–388.

²² Reményi, Dobozi 2012, 123.

²³ Budakalász–M0 / Site 12: Czene 2008; Szigetszentmiklós–Felső Űrge-hegyi dűlő: Patay 2008; Patay 2009, 224 and footnote 42.

²⁴ 2010–1910 calBC, 1 σ , Grave 391: Endrődi, Pásztor 2006, 16.

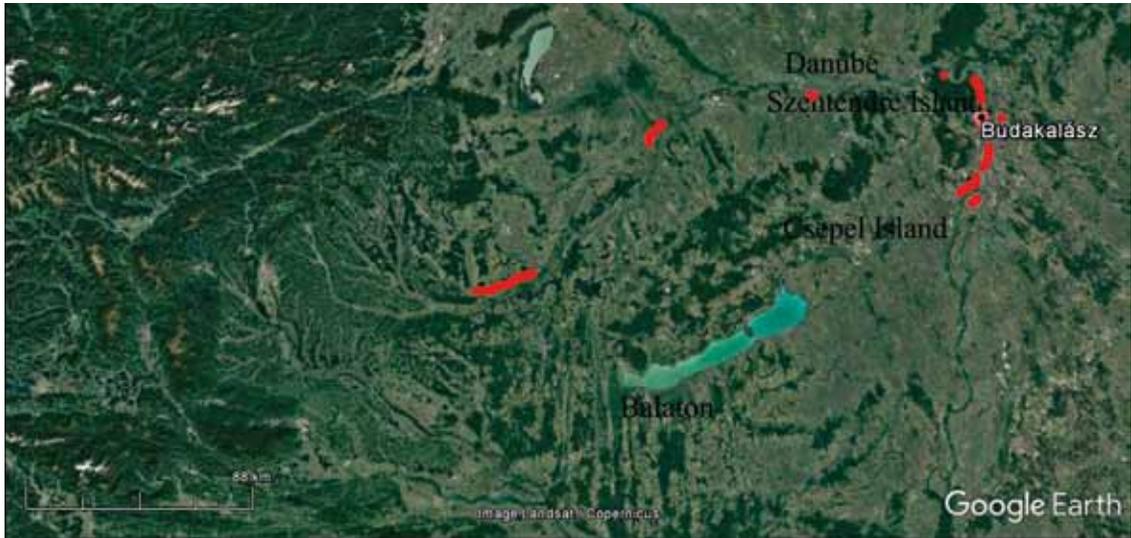


Fig. 3. Budakalász: the site in several map-types:

1. The Danube on the GoogleEarth map with greater perspective. Distribution of Bell Beaker along the Rába and Danube rivers in Hungary is red colored.
2. On a GoogleEarth map with the two sites from the Late Copper Age and Early Bronze Age.
3. Budakalász on the First Military Map, 1763-1787, signed the both (LCA and EBA) sites.

which was formerly connected with Bell Beaker hornstone mining at the site: it is also later; therefore it cannot be associated with Bell Beaker mining.²⁵

New dates are later, suggesting an earlier appearance of the Bell Beaker in the central region of the country than has previously been assumed. The earliest date, 2500

²⁵ T. Biró 2002, 131.

calBC, represents the transitional period of the EBA I/II phases in Hungary. The appearance of the earliest or so-called Makó 1 Culture in this central region is doubtful both typologically and chronologically. We do not know Makó dates earlier than 2600 BC from Hungary.²⁶ Therefore, it is justifiable to consider a transitional phase between the Copper and Bronze Ages between 2800 and 2600 BC, and start the Bronze Age at 2600 BC.²⁷ The former date for the 1st phase of the Early Bronze Age²⁸ would imply that the Baden Culture survived in this region,²⁹ therefore the beginning of the Early Makó 1 Culture cannot be placed in this period in this region. However, the assumed contemporaneity of the surviving Baden Culture after the Late Copper Age and the appearance of the Bell Beaker is not supported by new radiocarbon dates. There is a gap of more than a hundred years between the end of the surviving Baden in the Budapest region³⁰ and the earliest date of the Bell Beaker.³¹ The two cemeteries are 500 m apart from each other (Fig. 3).³²

3. DESCRIPTION AND EVALUATION OF THE SITE

3.1. Grinding equipment

There are very few stone implements connected with grain grinding that could possibly be explained by the site's character (as it is a cemetery). One fragment from a grinding slab was in Pit 151, and two handstones came to light from urn graves (mul-

tiple tools for grain grinding and pounding, chopping, Fig. 4: 3–4). One was secondarily used and remade from an original axe or weight. The geological source of the pebbles was potentially the Danube and its tributaries, while the sandstone came from the Hárshegy Sandstone Formation in the central-southern part of the Buda Mountains. Both are local or regional quarries.

3.2. Pebbles: choppers, polishing pebbles, handstones, anvils on natural pebble forms

The four unworked natural pebbles without shaping show use-wear (Features 135, 683 and 1219: 2 pcs). They could have served as ad-hoc sharpeners, grinders, polishers of ceramic vessels, stone and metal tools. They could also serve as anvils, choppers/hammers and as multiple ad-hoc tools (Fig. 4: 1, 5–6).

3.3. Axes and celts

There were three axes/celts in the inventory. Two were celts from one feature (Grave 1118), with similar function but different in size (Fig. 4: 11–12). The function of the third could not be determined; perhaps it was a fragment from a shaft-hole axe (Fig. 4: 14). Two other fragments were possibly also axes/celts. In Grave 1118 there may have been three celts originally. (In the diary of János Kalmár there were three.) Grave 1118 is a child's urngrave with chipped stones, a polisher and a wrist-guard near the celts. Features 249 and 1118 are graves; other finds came to light from round ditches. The raw materials of the celts suggest far-distance exchange (greenschist or blueschist and serpentinite from the Carpathians), but their exact source is yet to be clarified: we should use more complex investigation alongside microscopic analyses to clarify this.

In Bell Beaker cemeteries the axes/celts are very rare grave goods. Jerzy Kopacz and his colleagues investigated Central European finds, and from 31 cases they found only one such find.³³ On the basis of their research

²⁶ Horváth 2012.

²⁷ Dani, Horváth 2012.

²⁸ After Reményi 2009: 2800/2700–2500 BC.

²⁹ Budakalász–Luppa-csárda, Baden cemetery, located now at Budakalász–Dunai-Kis földek: Siklósi 2009; Horváth 2012, 2013.

³⁰ The latest date from the cemetery of Budakalász–Luppa-csárda Baden cemetery is VERA-3544: Grave 158, 2820–2740 calBC, 1 σ , 2890–2620 calBC, 2 σ : Siklósi 2009, 462.

³¹ Budakalász M0 / Site 12 located now at Budakalász–Csajerszke. The earliest dates are: Deb-13930, Feature 303, human bone, 3945 BP \pm 50, 2551–2350 calBC, 1 σ ; and VERA-4724, human bone, 3940 BP \pm 35, 2500–2300 calBC, 1 σ .

³² For the complex relation between the Late Copper Age Baden and the Early Bronze Age Bell Beaker cemetery see also Horváth 2013, Figs 1-2.

³³ Kopacz, Přichystal, Šebela 2009, 105.

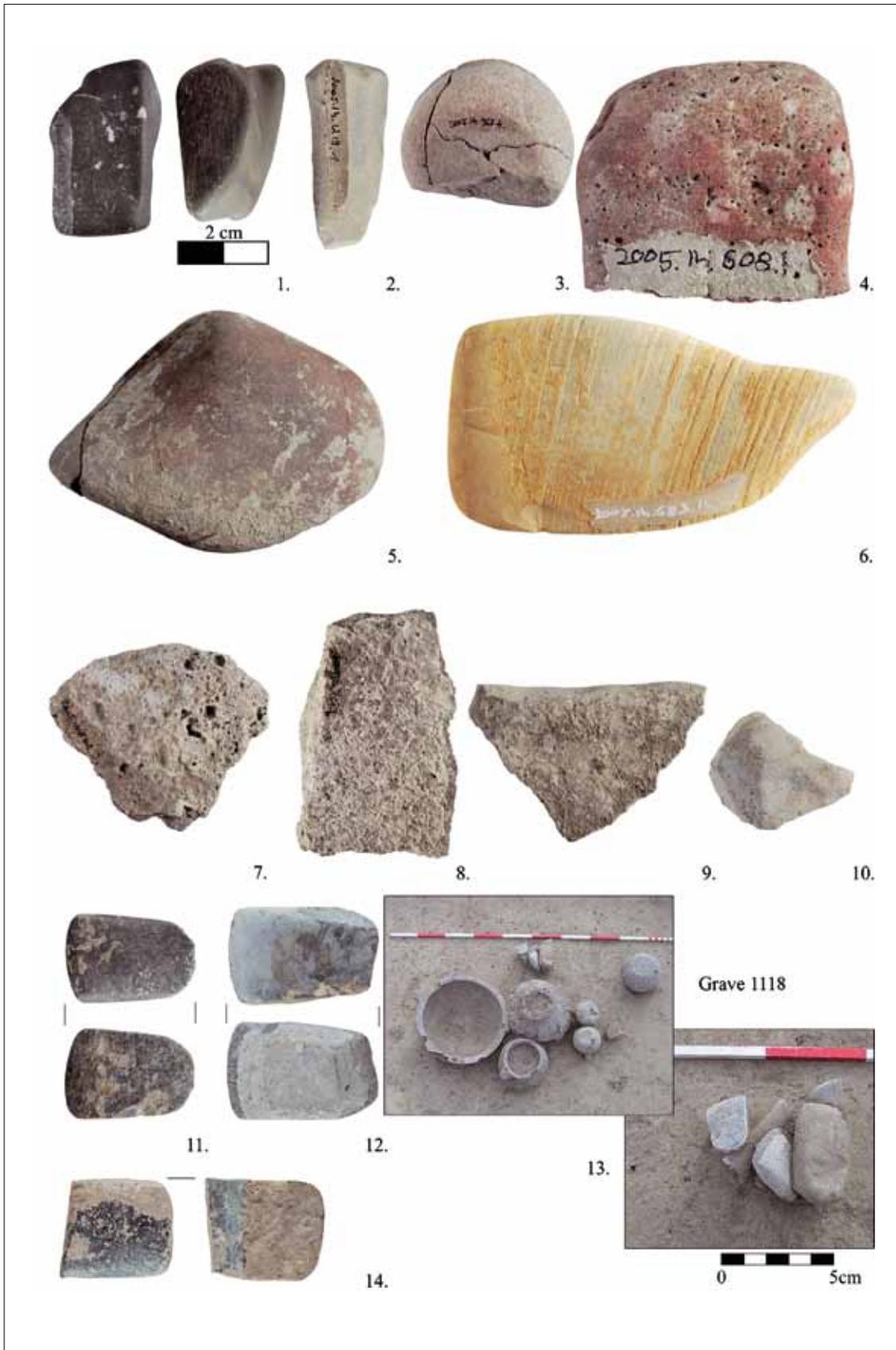


Fig. 4. Stone tools from the site: polishers, handstones, anvils and celts.

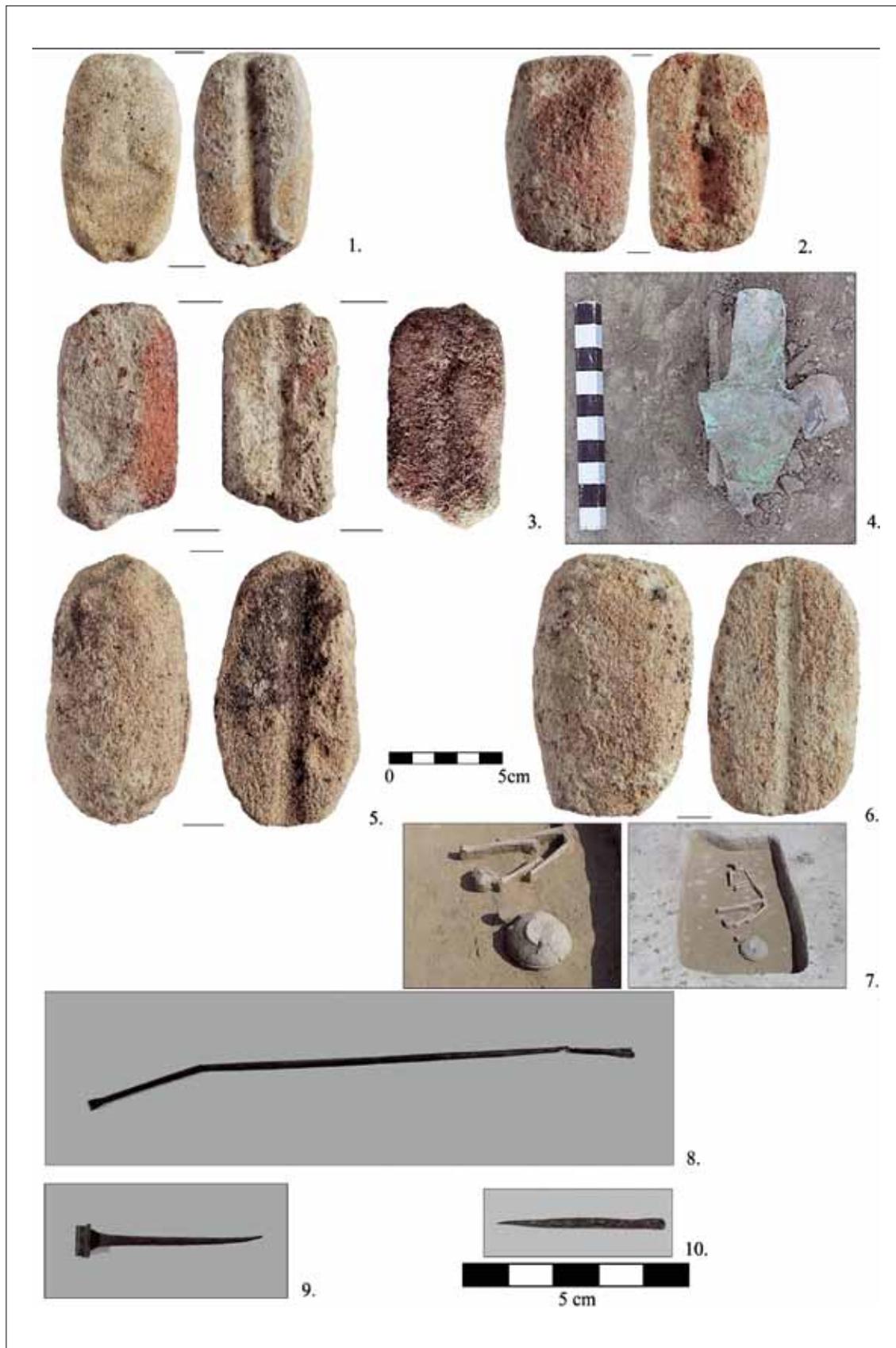


Fig. 5. Stone cold moulds and their possible products from copper at the site.

the most frequent raw material type of this central European region is amphibole and amphibole-type rocks (e.g. metabasites, diorite, porphyry). The finds at Bell Beaker sites have wholly polished bodies; they are oval in cross-section and have chisel-edges. The authors suggested that they could have been prestige or symbolic objects rather than real tools.

3.4. Polishers (Moulds?)

The uniform tool type (5 pcs), appearing in similar sizes and form, and with similar use-wear, and also with incisions of metal finds, could be a multiple tool type and used for purposes other than polishing (Fig. 5: 1–3, 5–6). Perhaps it was suitable to shape wrist-guards (see the half-made product from Feature 1192, Fig. 8: 11), or moulding/smithing in cold or hot fashion, shaping, sharpening and resharpening metal products. The needle-head incision in the one from Feature 702 is similar to that of the copper needle from Grave 467 (2005.14.467.13) (Fig. 5: 10); the incision in the tool from Feature 1118 is similar to the shape of the copper needle from Feature 1034 (2005.14.1034.3) (Fig. 5: 9). The size of the copper needle from Grave 1034 is identical to the size of the incision in the tool from Grave 1118. The latter, however, could be misleading, because metal products changed their original size during hot or cold shaping, hammering and use. Thus, for example, the size of the mould from Grave 467 is smaller than the metal product from Grave 1082 (2005.14.1082.4) (Fig. 5: 8), but on the use surface of the mould, only the head of the needle was observable. The incision in a tool from Feature 105 was not from a needle: rather it forms a dagger; its size is quite similar to the copper dagger from Grave 847 (Fig. 5: 4).

The metal products (copper and bronze) of the Bell Beaker Culture found in Hungary were made similarly to the Spanish Bell Beaker metal finds, but Hungarian metal

finds were made by the long process (casting + cold working + annealing + cold working: a long *chaîne opératoire*).³⁴ The so-called polishers were used as moulds in cold working/hammering processes, and perhaps in the following, tempering/heating process. 'Cold' moulds with the hammered metal products were put into the fire/furnace to facilitate easier forming. The black coating on the surface of the find from Feature 276 suggests a similar procedure. (This technical process, among others, was also used in the Middle Bronze Age.³⁵)

The raw material of the stone finds is red or grey sandstone. Their possible source is the Buda Mountains, their central-southern part (Hárshegy Sandstone Formation). Their bases are flat and worn, suggesting that they were used as hand tools, and on a flat surface as well. The sandstones have 1–2 hardness on the Mohs scale. There were two pieces in Grave 276: they were placed in the southern part of the gravepit with pots, near a bowl. Grave 276 was an inhumation of a 23–40-year-old man. Grave 1118 was a scattered urngrave of a 1–7-year-old child. One piece was excavated in a round ditch.

3.5. Wrist-guards

The description of the wrist-guards (1 part-finished, Fig. 8: 11, and 34 finished pieces or fragmented ones, Figs. 6–9) is based on the papers of Woodward, Kuijpers and Turek. I also used the petrographic determination of geologist János Kalmár, from 2006, although his study contained only very few Bell Beaker finds.³⁶

³⁴ Reményi *et al.* 2006.

³⁵ See Horváth 2004, Figs. 3: 3, 4: 2, Figs 7-12, Fig. 14: 2, Figs 15-16; Horváth 2012a, Figs. 6, 7: 2, 8: 1, 9: 1, Figs 14-15.

³⁶ András Czene did not support the further destructive petrographic investigations of the lithic finds after their initial description made by J. Kalmár (which was part of the regulated preliminary excavation report of the site). After all, in the case of world-wide stone raw materials (like clay, aleurolite/siltstone, sandstone, schist, quartzite etc., not quarry- or mine-specific raw materials) occurring on this site, these methods can not apply successfully and efficiently. In generally their potential geological sources are close to the archaeological site.

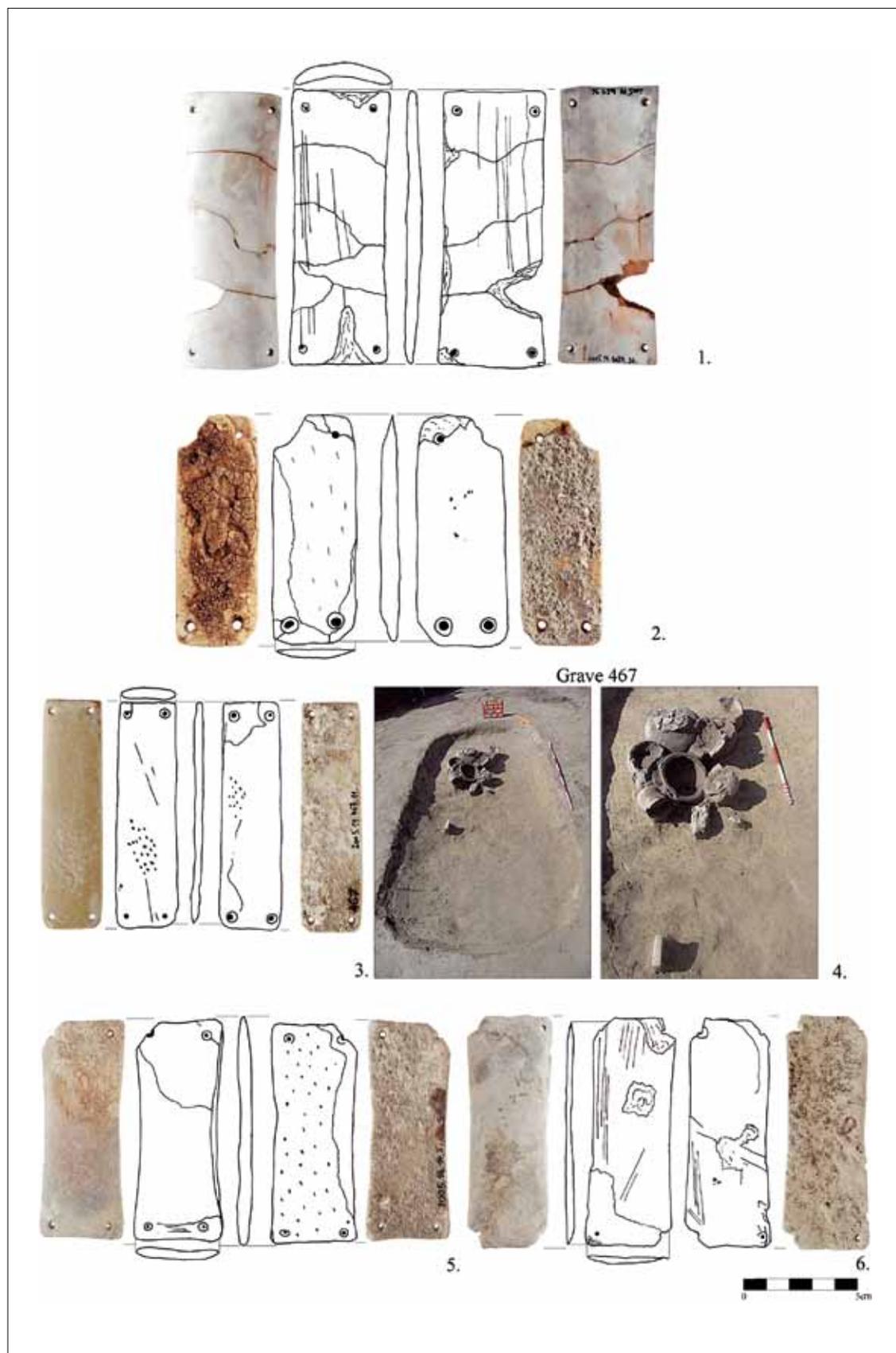


Fig. 6. Wrist-guards.

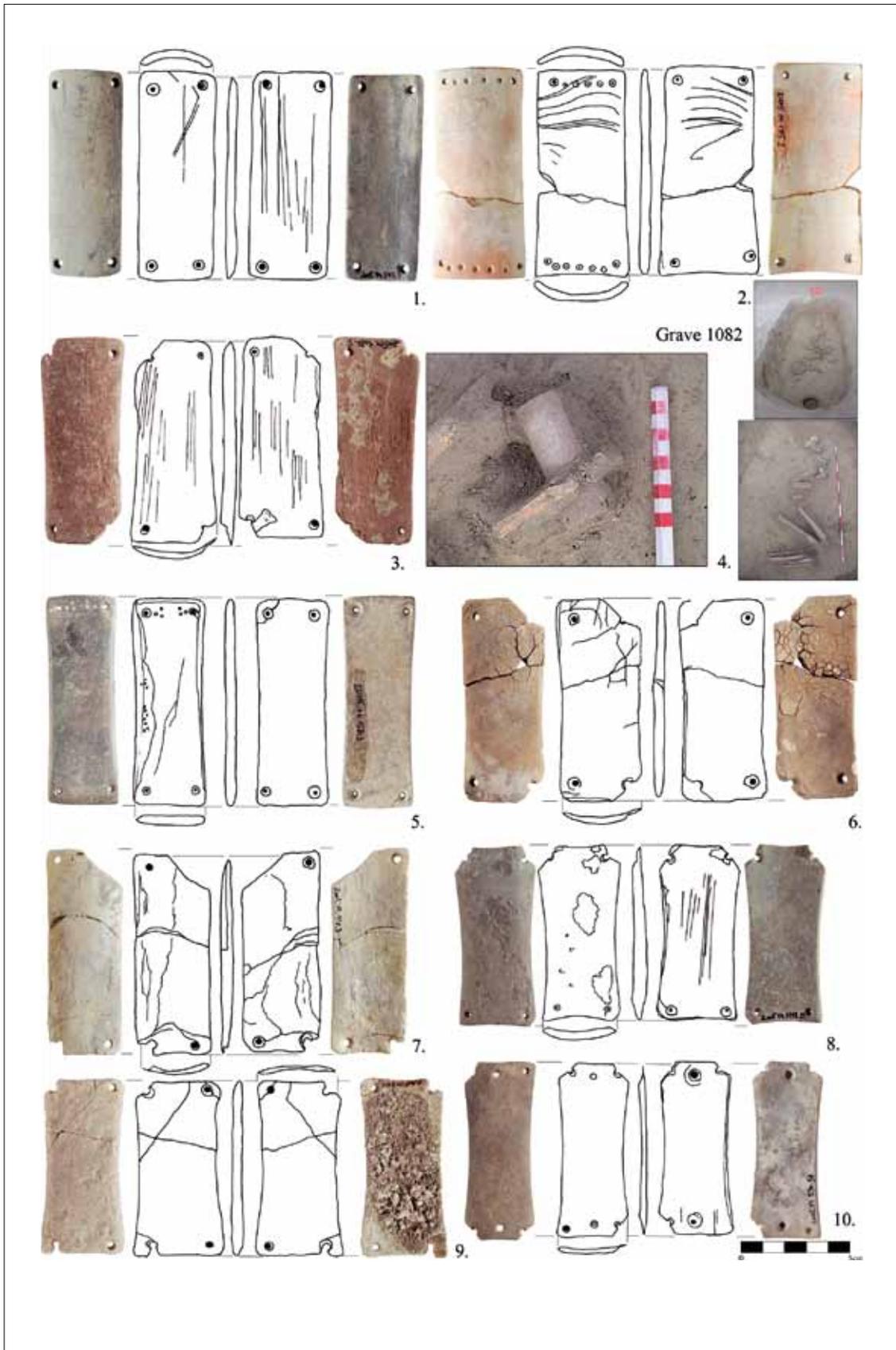


Fig. 7. Wrist-guards.

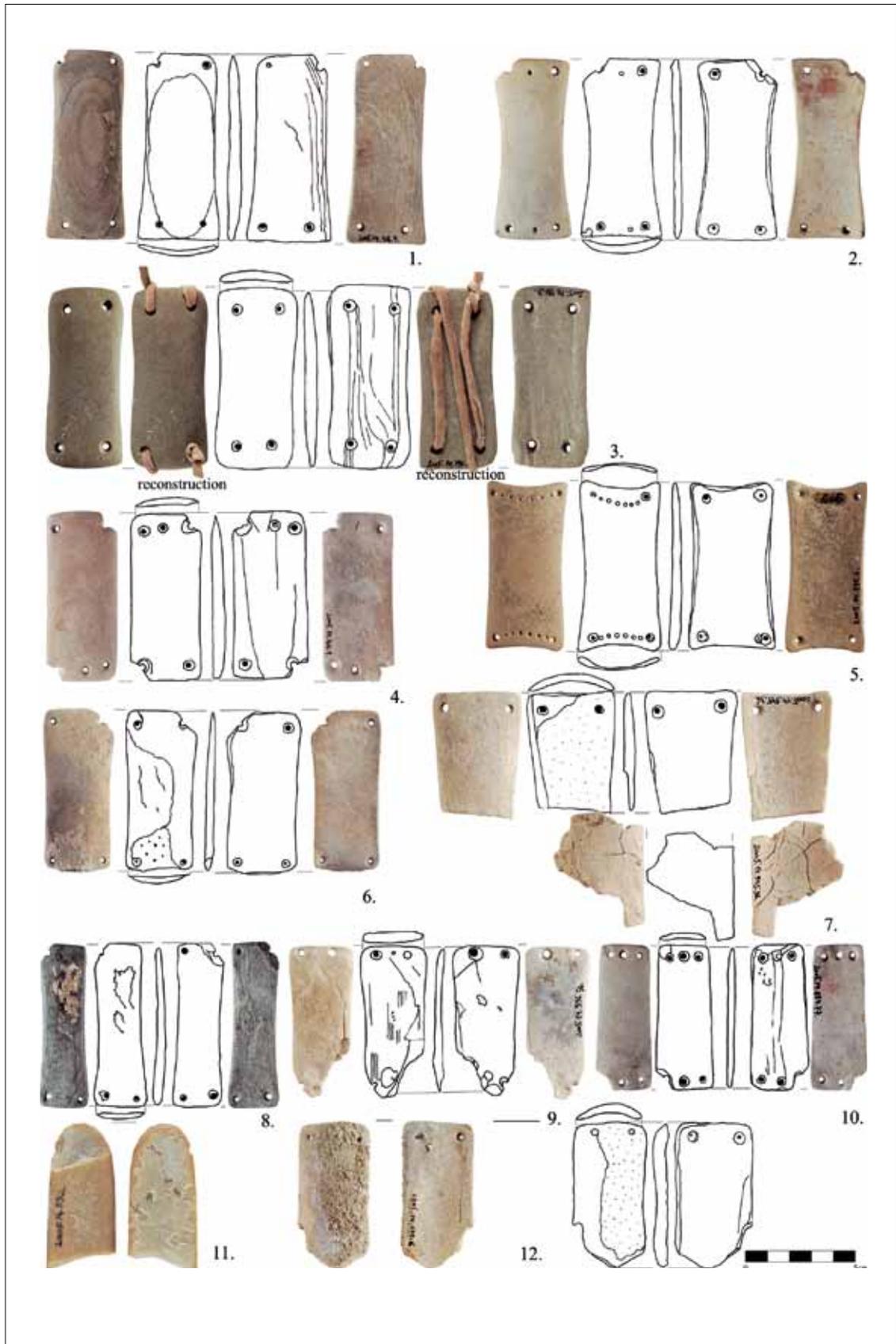


Fig. 8. Wrist-guards.

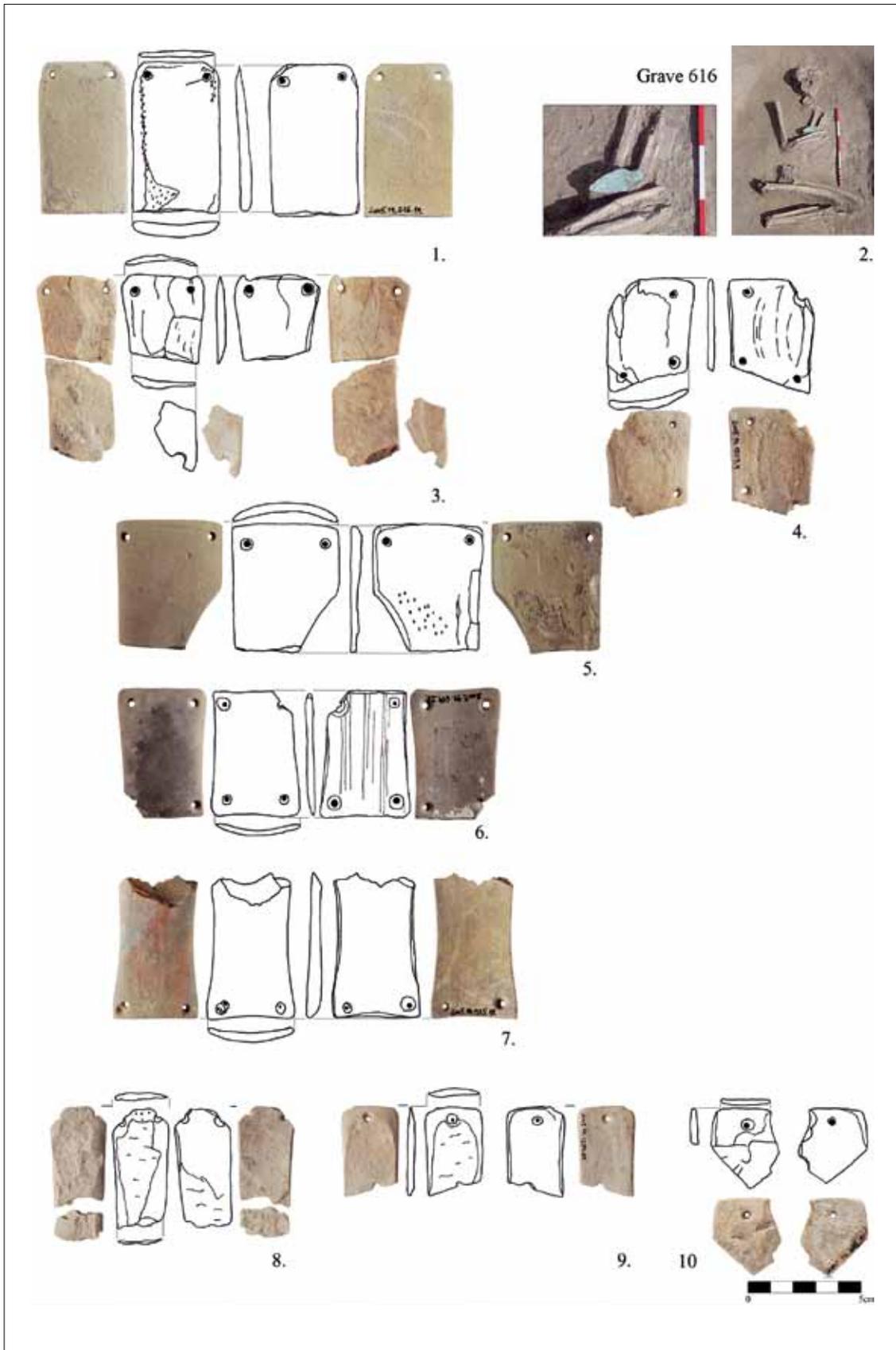


Fig. 9. Wrist-guards.

I have grouped and classified the finds according to the following aspects:

3.5.1. Form:

- Trapezoid: Features 14, 106, 107, 157, 185, 196, 285, 347, 467, 530, 551, 847, 884, 901, 936, 979, 990, 1024, 1082, 1118, 1118/10;
- Rectangular: Features 278, 1265/2;
- Square: Features 614, 1259, 1274, 1288?;
- Narrow: Features 467, 1265/2, 1265/3;
- Uncertain fragment: Features 171, 203, 484, 616, 925, 945, 1265/3.

3.5.2. Cross-section:

- Rectilinear (flat-flat/'pp'): Features 157, 203, 467, 616, 936, 1265/2;
- Bi-convex ('bc'): Feature 936;
- Flat-convex ('pc'): Features 157, 285, 467, 901, 1118/10, 1274;
- Concavo-convex ('cc'): Features 14, 106, 107, 171, 185, 196, 278, 347, 484, 530, 551, 614, 616, 847, 884, 925, 945, 979, 990, 1024, 1082, 1118, 1259, 1265/2, 1265/3, 1288.

3.5.3. Size:

- Small (less than 60 mm): Features 614, 945, 1259.4, 1288;
- Small-medium (60–70 mm): Feature 884;
- Medium (70–80 mm): Features 106, 171, 196, 278, 347, 530, 936, 1118/29, 1118, 1265;
- Medium-large (80–100 mm): Features 14, 107, 157, 185, 285, 467, 551, 616, 847, 925, 990, 1082;
- Large (100–120 mm): Features 901, 1024.

The largest find was in Feature 1024 (119 mm, grave of an adult man, Fig. 6: 1); the smallest was in Feature 614 (54 mm, adult's urn grave, Fig. 9: 6). There is no visible relationship between the size of the wrist-guard and the deceased's age or gender or the height of its former owner.

3.5.4. Number of fixing holes:

- Two, in the middle on the upper and the lower part: Features 203, 1274, 1288?;
- Four: Features 14, 107, 157, 171?, 185, 196, 278, 285, 347, 467, 484, 551, 614, 616?, 847, 901, 936, 945?, 979, 990, 1024,

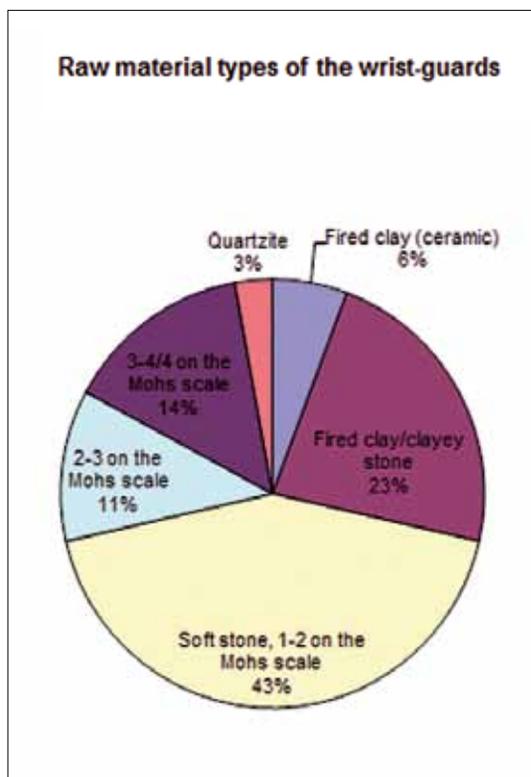


Fig. 10. Raw-material types of the wrist-guards: 35 pieces.

1082, 1118, 1118/10, 1259, 1265/2, 1265/3, 1288?

- Five: Feature 106;

- Six: Features 530, 884.

3.5.5. Raw material:

- Fired clay/ceramic, hardness 1–4 on the Mohs scale: 2 pieces: Features 185, 990;

- Fired clay/ceramic or natural clayey stone (cremated?): 8 pieces: Features 107, 347, 551, 925, 936, 1024, 1082, 1118.29;

- Soft stones, hardness 1–2 on the Mohs scale (e.g. sandstone, aleurolite): 15 pieces: Features 285, 847, 945: schist; 196, 203, 278, 484, 530, 616, 979, 1259, 1265, 1274, 1288: aleurolite; 901: not amber;

- Stones, hardness 2–3 on the Mohs scale: 4 pieces: Features 14, 106, 614, 1118.10;

- Stones, hardness 3–4 or 4 on the Mohs scale: 5 pieces: Features 171, 157, 467, 884, 1265.

- Quartzite (hardness 6–7 on the Mohs scale): 1 piece: Feature 1192.

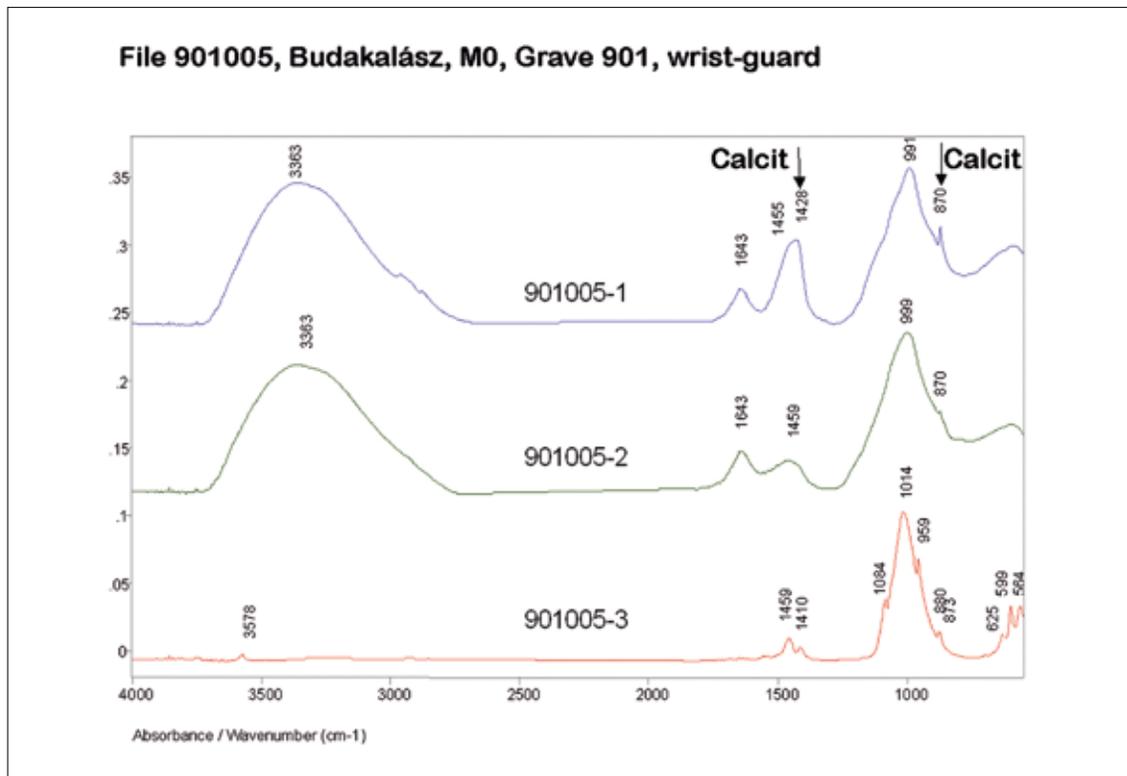


Fig. 11. Wrist-guard of Grave 901. ATR FTIR spectra. 901005-1: outer decoration; 901005-2: raw material of the find; 901005-3: greyish-white layer on the body.

Owing to the fact that holes needed to be drilled in the wrist-guards, their makers generally used soft materials (stones, fired clay) up to hardness 3–4 on the Mohs scale. In this site these are local raw materials, except the part-finished piece from Feature 1192 (Fig. 8: 11). This long, narrow quartzite pebble was sawn along its long axis, but it broke. Quartzite is harder (6–7), and perhaps it was too hard to be finished: in this material, hole drilling is very labour-intensive.

According to the available literature, the majority of wrist-guards were made from non-local raw materials.³⁷ In the case of Budakalász such a statement cannot be made without special provenance studies of raw materials. Macroscopic analysis is not enough to distinguish between local and non-local raw materials, because the shaping (grinding, polishing of the surface, secondary burning during the cremation, etc.) caused radical changes to the finds' surfac-

es; therefore petrographic observations are often difficult to make. In many cases, it was even difficult to distinguish natural and artificial materials from each other, that is to distinguish stones from ceramics or clayey materials. (I have tried to use a simple hardness scale to do this). Furthermore, we have to say that, in the case of pebbles, we were not able to distinguish between local and non-local materials either, because both types are present in the sediments of the Danube and its tributaries.

In the case of find 2005.14.901.5 the question was whether it was lightly cremated amber (Fig. 6: 2).³⁸ FTIR spectra of the find show that it was made of non-organic materials (calcite and carbonated silicate); thus, the amber hypothesis was excluded (Fig. 11).³⁹ We sampled the burnt inlay, supposedly amber, from the outer layer of the outer face and compared it with the calcined

³⁸ Similar to finds from 2900–2700 BC in the Globular Amphorae, Corded Ware, Funnel Beaker and Złota Cultures; see: Czebreszuk 2003, Fig. 10; Furholt 2008.

³⁹ Special thanks to Judith Mihály for the analysis.

³⁷ Kuijpers, Fokkens, Achterkamp 2008, 124; Woodward *et al.* 2006.

inner face. The latter was bone, and the amber-like material of the outer face was probably a heavily transformed (during cremation) substance of the original stone.

3.5.6. Fire traces:

It was interesting that fire traces occurred not only on the finds from urn graves or scattered urn graves: Feature 616, for example, was an inhumation, and fire traces and calcined bone layers are clearly visible on the finds. Of course, most finds were in cremated graves, and fire traces were caused by the cremation process. This secondary transformation in the raw materials' structure in many cases hindered the determination of the raw materials: it could not be determined whether they were originally fired clays (ceramics) which were fired again, or they were some kind of natural clayey stone that was exposed to high temperature during the cremation.

3.5.7. Repairing, use-wear:

The most vulnerable parts of the wrist-guards are their corners, where the fixing holes are situated. When the corners were damaged or broken [it happened frequently because this part is often in contact with other things (dressing, skin, weapon etc.)], they tried to drill a new hole near the damaged one (e.g. Feature 925, Fig. 9: 7) if there was a place for a new hole. If not, the hole was drilled in the middle (e.g. Feature 106, Fig. 8: 4; Feature 278, Fig. 8: 2; Feature 530, Fig. 7: 10; Feature 936, Fig. 8: 9), or the wrist-guard was reshaped into a smaller one and new holes were drilled in its corners (Features 945, Fig. 8: 7; 1259/4, Fig. 9: 4; 1288/5, Fig. 9: 5) or in the middle (Feature 1274, Fig. 9: 9).

– Secondary shaping: Features 106, 614, 925, 945, 1259, 1274. Part-finished pieces: Features 925, 1265/2. Without holes: Feature 1265/2 (Fig. 8: 8). Secondarily-drilled/repared: Feature 925 (Fig. 9: 7). Holes in the corners and in the middle: Features 106 (Fig. 8: 4), 530 (Fig. 7: 10), 884 (Fig. 8: 10). Holes only in the middle:

Features 203 (Fig. 9: 10), 1274 (Fig. 9: 9).

– Fixing, wearing traces: on the inner face: Feature 196, with reconstruction of the straps (Fig. 8: 3); Features 106, 847, 884, 1082.2; on the outer face: Features 467, 1118.10, 1259.4.

3.5.8. Point decorations:

– Feature 979 (Fig. 8: 5).

– In a line, on the upper part of the outer face: in the middle: Feature 936 (Fig. 8: 9), in composition: Feature 157 (Fig. 7: 5), fragmented: Feature 1265/3 (Fig. 9: 8).

– In a curved line, on the upper and lower parts of the outer face: Features 185 (Fig. 7: 2), 979 (Fig. 8: 5), in the middle: Feature 278 (Fig. 8: 2).

– Green patina/copper trace on the surface: Feature 157 (Fig. 7: 5); on the outer face: Feature 936 (Fig. 8: 9); neither grave contained metal finds!

3.5.9. Wrist-guard with metal finds or other associated finds in the grave:

– With dagger: Features 14, 107, 278?, 285, 616, 847, 1108?, 1288?;

– With metal sheet (from a dagger or from other finds): Features 278, 1108, 1288;

– With needle: Features 467, 1082;

– With points or arrowheads (lithic): Features 285, 467, 616, 945, 1082.

3.5.10. In-situ observation of wrist-guards in inhumations:

– Feature 616: on the left radius with dagger;

– Feature 847: on the outer side of the arm approximately at its middle, above the wrist; under it there were chipped stones and a dagger;

– Feature 1082: on the left arm turned from its original position by 90°, not in in-situ position.

3.5.11. Two pieces in one grave:

– Features 1024, 1118, 1265. The anthropological description indicates the remains of only one person in the features.

3.5.12. With chipped stone:

– Features 284/285: urn graves; Feature 467: empty grave/cenotaph: artisan's grave(?); Feature 616: inhumation, adult woman; Feature 847: inhumation, adult man; Features 884, 945: urn grave of an adult man; Feature 1082: inhumation, adult; Feature 1118: scattered urn grave of a child; Features 1274, 1288: empty graves.

In 25 cases, wrist-guards were found in cremations (scattered or simple urn graves), in 3 cases they occurred in inhumations, and in 2 cases in other feature types. In 6 cases the anthropologist determined women (Features 14, 196, 484, 530, 616, 990), in 1 case a child (Feature 1118), in 9 cases men, in 4 cases the graves were empty (or symbolic/cenotaph), and in 12 cases the sex of the deceased could not be determined.

On the basis of some in-situ inhumations at the site, the wrist-guards could have been functional and/or decorative parts of clothing.⁴⁰ Unfortunately, from the Bell Beaker occupational area we do not know unambiguous finds referring to the way costumes were worn. The only representation appears on the steles of Sion:⁴¹ on four or five steles, decorations made of points are observed on people's wrist, which can be interpreted as wrist-guards or tattoos. In the in-situ cases of the site of Budakalász (five and three observations), in most cases we found copper daggers near the wrist-guards. Perhaps the wrist-guards were also used to sharpen the daggers (the copper's hardness is 2.5–3 on the Mohs scale: since wrist-guards are harder, they could have been used for this purpose). There were only five cases where the wrist-guards were excavated with chipped stones, esp. arrowheads or points, indicating that wrist-guards may have been part of the archer's equipment. Since wrist-guards are more commonly associated with daggers than with arrowheads/points, it is suggested that their function is related to that of daggers: they could have been parts of warrior sets.

⁴⁰ Kuijpers, Fokkens, Achterkamp 2008, 2008.

⁴¹ Harrison, Heyd 2007, 152-159.

WRIST-GUARDS IN HUNGARY, ESPECIALLY IN THE BUDAPEST REGION

Published finds:

– Tököl;⁴² Békásmegyer;⁴³
Szigetszentmiklós.⁴⁴

We know many more finds, but they are unpublished. The published finds were discussed only as culture-specific finds, not as individual finds or graves with individual descriptions and documentation. The publications focused on the ceramics and funerary rites. This is the first Hungarian publication where I try to group the Hungarian finds typologically by applying international methodology, and describe their primary geological and archaeological data.

WRIST-GUARDS IN THE GLOBAL DISTRIBUTION AREA

This special find type in the Hungarian nomenclature is called wrist-guard, similar to the English, German, French, Spanish and Italian Bell Beaker terminologies (wrist-guard/wrist-protector/wristlet/bracer). In the international terminology wrist-guards are also called arm-guards/armlets, wristbands, bracelets/gauntlets, archer's guard / bow guards).⁴⁵

The classification of the finds is based on their form, cross-section and number of fixing holes. The combinations of these three parameters are used in international coding and classification of the finds.⁴⁶ The classification of their form distinguishes three major categories: 'W' (waisted), 'S' (straight), 'T' (tapered). I have supplemented these categories with a narrow and a secondarily reshaped rectangular/square form.

⁴² Tompa 1942, Pl. 3: 2; Schreiber 1975, Fig. 14: 9: Grave 70 and Fig. 15: 4: stray find.

⁴³ Kalicz-Schreiber 1981, Abb. 13: 1: Grave 128 and Abb. 18: Grave 128; Kalicz-Schreiber, Kalicz 2001, Fig. 5: 4: Grave 471; Fig. 6: 2: Grave 471; Fig. 10: 3: Grave 128; Fig. 11: 2: Grave 471.

⁴⁴ Kalicz-Schreiber 1981, Abb. 16: 2.

⁴⁵ Kuijpers, Fokkens, Achterkamp 2008,, 110.

⁴⁶ Kuijpers, Fokkens, Achterkamp 2008,, 112.

Their cross-section is described by four categories: biconvex ('bc'), plano-plano or flat-flat ('pp'), plano-convex ('pc') and concavo-convex ('cc'). The number of fixing holes does not depend exclusively on the function of the wrist-guard. There were specimens with two or four holes even within one site, near each other, but the two-hole version is more common in the Mediterranean-Atlantic Region.

The broad ones more often occur in the central European Region (Bohemia, Moravia, Hungary); the narrow ones mainly appear in other European regions.⁴⁷ In considering their cross-sections, the three frequent basic versions are the 'pp', 'pc' and 'cc', which may be related to the way they were worn and to craftsmen's traditions: the 'cc' version is easier to wear but harder to make. In Britain there is a correlation: the more fixing holes they have, the higher their manufacturing standard is.⁴⁸ The straight forms with two holes occur only in central Europe, and the ones with four holes are also most common in this region. In England and Scotland 'Wcc' types are the most common, while in Ireland the Atlantic types with two holes.

The exact position of the finds is rarely known: in most cases we have to rely on inappropriate documentation and memories of excavators, which influence new interpretations. The excavators of Amesbury in their first publication, for example, reconsidered their own detailed documentation so as to fit in accepted trends about the use of these objects.⁴⁹ On the basis of authentic observations we can say that wrist-guards were not only on the inner side of the arm, but most frequently appear on the outer side of the arm;⁵⁰ the most frequent is the B3-position (in 11 graves on the outer side of the arm but under the bone).

The position of the wrist-guards could be

functional or decorative; the latter seems more possible. There were only 31 cases where their position could be determined, and only the British and Scottish finds were classified on the basis of their positions.⁵¹ The position of the finds could also be secondary, since their position may have been changed after the burial. Many researchers exclude this possibility. They argue that Bell Beaker graves are narrow and closed places where this could not happen. However, this type of funeral rite (cist grave or wood-frame construction) is not present in Hungary. In most cases wrist-guards were fixed on the lower left arms, on their outer side.⁵² Most finds were fixed to the wrist most probably with leather or sinew straps.⁵³ Most finds have two holes: we do not know how they were fixed properly. It is very interesting that in Moravia there are wrist-guards without holes.⁵⁴ The most possible reconstruction for these is that they were fixed on a larger leather bracelet.⁵⁵

In our site, in the cases of the three inhumation graves, the finds were on the left lower arms (they were left-handed archers or they used their left hand to stabilize the bow that they held in their right hand). In one case the find touched the radius, in another case the middle of the arm, and in one case it unfortunately moved after the burial. In the first and second cases the wrist-guard appeared with a copper dagger; in Grave 847, with arrowheads and a copper dagger. It is also important that, in three cases (Features 1024, 1118, 1265), there were two wrist-guards in one feature. It must be noted that it was only Feature 1265 where clearly there were two urn graves inside the feature; thus, the two wrist-guards could have belonged to two people. In the other two features, each person could have worn two wrist-guards. In these cases it is very unfortunate that these are cremations, so

⁴⁷ Kuijpers, Fokkens, Achterkamp 2008, 2008, 110; Turek 2015.

⁴⁸ Kuijpers, Fokkens, Achterkamp 2008, 2008, 112.

⁴⁹ Kuijpers, Fokkens, Achterkamp 2008, 114.

⁵⁰ Kuijpers, Fokkens, Achterkamp 2008, 112. Reconstruction: Kuijpers et al. 2008, 113 and Fig. 2.

⁵¹ Woodward *et al* 2006; Kuijpers, Fokkens, Achterkamp 2008, 115.

⁵² Kuijpers, Fokkens, Achterkamp 2008, 116.

⁵³ Kuijpers, Fokkens, Achterkamp 2008, 118.

⁵⁴ Kuijpers *et al.* 2009, 105.

⁵⁵ Kuijpers, Fokkens, Achterkamp 2008, 118.

we have no information on the in-situ positions of the wrist-guards, and anthropological data are also poorer than in the case of inhumation graves. Former finds made from gold, copper and bronze, considered to be wrist-guards, are now viewed as other object types, and not wrist-guards.⁵⁶

Ethnographic literature also mentions many examples of wrist-guards, but not for archers.⁵⁷ Therefore, modern archaeological articles suggest that Bell Beaker wrist-guards could have had symbolic meaning, and they may not have been connected with archery at all.

The question is who wore wrist-guards: hunters, warriors, or both? Anthropological data indicate that wrist-guards also occurred in the graves of women and children. Bow, arrow and archery in the Neolithic, Copper and Bronze Ages were part of a masculine character and ideology, in contrast to hoes and plough marks, which were female characteristics. Kuijpers and his colleagues consider that wrist-guards were functional, but at the same time they had cosmological and ideological connotations, and may have marked higher rank in the society, similar to swords in the Late Bronze Age. They had a functional role on the inner side of the arm, but on the outer side it was decoration and had a masculine aspect perhaps connected to archery, and in this regard it protected the arm. But as grave goods they could have held further meanings: offering or gift for the ancestors, token, elite or chieftain symbol, symbol of archery and its associated values, exchange of object between people and the supernatural, etc.⁵⁸

Who were the people with wrist-guards? Were they hunters or warriors, chiefs or ancestors? There is standardisation in the funerary rites and grave goods of the Bell Beaker culture: the wrist-guards are on the wrist with a dagger, or on the chest showing a standard position and status/prestige of

the objects.⁵⁹ Whatever social status these objects may signify, it seems to be a standardised status. Such similarity in positioning these items is difficult to explain from a prestige-good perspective alone. It would imply that elites dressed more or less similarly all over Europe. It is beyond the scope of the present article to elaborate on this point, but we suggest that the grave goods that accompany Beaker people, both men and women, may have been used to construct representations of an ideal person or people, or indeed ancestors.⁶⁰

The ancestors of the wrist-guards can probably be found in a pre-Beaker Eneolithic culture in Portugal: especially in the Lisbon region, in the Alentejo culture, stone sheets appeared in several shapes and with decorations, which could have inspired later Bell Beaker wrist-guards.⁶¹ The so-called classic group of these hanging objects is similar to the Bell Beaker finds. The function of the finds is also questionable; there are many interpretations similar to what we find in recent publications about the Bell Beaker wrist-guards.⁶²

Wrist-guards, with their undetermined function, are the most characteristic find types of the Bell Beaker Culture and part of the BB-set.⁶³ Although it is a characteristic culture-specific find, there are rare examples that it occurred in other Early Bronze Age cultures as well.⁶⁴ These finds could be indicative of interactions between overlapping/neighbouring cultures or Bell Beaker

⁵⁹ Cf. Anthony 2007, 137-38, 378-379; in the Late Copper Age: Dani, Horváth 2012, 96 and footnote 139.

⁶⁰ Kuijpers, Fokkens, Achterkamp 2008, 125.

⁶¹ Care 2004, 26-28.

⁶² Thomas 2011, 47-52.

⁶³ Heyd 2007.

⁶⁴ Novotná, Novotný 1984, Pl. LXXXI: 11: Ch'opice-Veselé Culture; P. Fischl, Kulcsár 2011, 64 and footnote 16: Kiskundorozsma-Hosszúhát-halom, Grave 66, early Maros Culture; Soltvadkert-Felső-csopor, Tiszainoka Grave I, Tószeg-Lapos-halom: Nagyrév Culture; and finally a modified piece, a secondarily reshaped find from Kakucs-Balla-domb, and from the Middle Bronze Age, Vatyakoszider Phase: Horváth 2004, footnote 75; Horváth 2012, Fig. 10: 7.

⁵⁶ Kuijpers, Fokkens, Achterkamp 2008, 117-118.

⁵⁷ Kuijpers, Fokkens, Achterkamp 2008, 119-123.

⁵⁸ Kuijpers, Fokkens, Achterkamp 2008, 123-124.

immigrants, people who moved into a foreign culture/society, or craftsmen's tradition that survived in the subsequent cultures.

3.6. Chipped stones

Chipped-stone finds (52 tools, 34 debitage flakes: sum 86 finds, Fig. 12) occurred in the following features:

– Feature 177: adult's urn grave; Feature 213: adult's urn grave; Feature 271: adult's urn grave; Feature 233: adult's urn grave; Features 284–285: adult's urn grave + wrist-guard + another BB-set; Feature 467: empty gravepit (cenotaph?) + wrist-guard + another BB-set; Feature 525: adult man's urn grave; Feature 532: adult man's urn grave; Feature 616: adult's (female?) inhumation grave + wrist-guard + another BB-set; Feature 655: adult's urn grave; Feature 668: urn grave; Feature 801: adult man's urn grave; Feature 847: adult's inhumation grave + wrist-guard + another BB-set; Feature 945: adult's urn grave + wrist-guard; Feature 1076: adult female's urn grave; Feature 1082: adult's urn grave + wrist-guard; Feature 1118: child's urn grave + 2 wrist-guards + polisher; Feature 1274: empty gravepit (cenotaph?) + wrist-guard; Feature 1318: adult man's urn grave.

3.6.1. Raw materials

Among the finds, Buda hornstone dominates, but in several colours, indicating several types and sources/quarries in the Buda Mountains. Further raw materials were possibly acquired from the pebble wash of the Danube: lydite (1), radiolarite (1), limnoquartzite (4 pieces). Only further scientific studies would shed light on their provenance.

3.6.2. Size and classification

The size classification follows the work of Jerzy Kopacz and his colleagues (2009): medium-long (ML), 23–27.5 mm; long (L), 27.5–32 mm; very long (VL), over 32 mm. Further new categories for the site exam-

ined have also been introduced: short (S), 20–23 mm; and very short (VS), under 20 mm. Three are very short, 10 are short, 14 are medium-long, 10 are long and 2 are very long. The description of the arrowheads and points is based on the work of Robin Furestier (2004, 2008) and Maxence Bailly (2014).

Arrowheads:

- Tanged and barbed, triangular-shaped: 467.42 (Fig. 12: 38) and 467.36 (Fig. 12: 35) – part-finished pieces(?).
- Triangular with concave or very concave base: in general, the ventral surface of the find is flat or not accurately retouched; the dorsal surface is concave with accurate retouching. In most cases the right barbs of the arrowheads are damaged or broken (except 285/9 (Fig. 12: 7) and 467/52-53 (Fig. 12: 28–29): these are damaged on their left barb – perhaps left-handed people used them). When we find more pieces in one feature, their size and type differ, and in many cases their raw materials are also different (Features 285, 945, 1076, 1082, 616, 467). There was one piece in Features 177, 217, 532, 655, two finds in Features 285 and 945, four in Feature 1076, five in Feature 1082, seven in Feature 616 and eight in Feature 467. Tanged types occurred only in a part-finished state on the site.
- Triangular with flat base: 467.48 (Fig. 12: 27).

Points:

- Triangular, slim with oblique base: 467.46 (Fig. 12: 33), 467.47 (Fig. 12: 34).
- Triangular, slim with hollow base: 467.45 (Fig. 12: 32).
- Flat, geometric with transversal shear: 467.39 (Fig. 12: 37), 467.51 (Fig. 12: 31), 467.49 (Fig. 12: 40); part-finished: 467.38 (Fig. 12: 36).



Fig. 12. Chipped stones from the site.

TYPE	TRIANGULAR ARROWHEAD WITH CONCAVE BASE	TRIANGULAR ARROWHEAD WITH FLAT BASE	TRIANGULAR ARROWHEAD, TANGED	FLAT GEOMETRIC POINT WITH TRANSVERSAL SHEAR	TRIANGULAR ARROWHEAD WITH TRANSVERSAL BASE	TRIANGULAR ARROWHEAD, SLIM	ATYPICAL BORER	SAW
PIECES SUM: 86	30	1	2	4	2	1	2	3
% SUM: 100	34.8	1.16	2.32	4.64	2.32	1.16	2.32	3.48

Table 1. Chipped stone tool types on the site

3.6.3. Type list (Table 1)

There were 29 triangular arrowheads and points with concave base (1 part-finished); four were flat, geometric with transversal shear (two among them were part-finished), two slim, and one slim with a hollow base. Borers: two pcs (467.43, Fig. 12: 42; and 1318/4). Saws/cutting edges: two pcs (467.34, Fig. 12: 43; 1118, Fig. 12: 48) and a part-finished piece (467.40, Fig. 12: 45). Fragment from a blade: one piece (Feature 1082). Flakes: seven pieces (Features 213, 467, 616, 847, 1082, 1118). Segment: one piece. Thirty-four debitage flakes, atypical flakes, chips (39.44%). Sum: 86 pieces (100%).

In general, the finds were in the urns or near the urn; in inhumation graves they were situated around the hand or the pelvis, and in empty graves in the southern part of the grave-pit with other finds. Grave 467 is an exception.

– Grave 467: ‘artisan’s grave’. It was an empty pit (without human bones) described by the excavator as a symbolic grave or cenotaph. Near the chipped stones there was a Bell Beaker, two needles and a wrist-guard. Among the chipped stones we found some part-finished pieces. This is the only grave where we identified raw materials not locally available, and this is also the earliest grave in the cemetery (phase IIa, on the basis of the types of the chipped stones). The closest analogy to the grave is the artisan’s

grave from the Late Copper Age Baden cemetery at Budakalász–Luppa-csárda (Grave 91).⁶⁵ On the basis of a recent assessment in 2009, the authors described it to be a bone-worker’s grave rather than that of a knapper. The tool-kit included ad-hoc and part-finished tools as well as finished tools. This was the reason why Éva Cs. Balogh initially considered that the person was a knapping master, but the quality and number of stone tools in the grave forced her to reconsider this and regard the grave to be that of a bonemaster. Among the bone tools, no. 1 and no. 23 were retouchers (soft hammer/percussion for knapping); the others were antler tusks used as jewellery (9–25), and not bone tools.

The technology and the raw materials of stone tools were very similar in the Late Copper and Early Bronze Ages in the district of Budapest.⁶⁶ The local, but very low-quality, Buda hornstone was used in both periods, and pebble raw materials were shaped by splinter technology. This method often resulted in ad-hoc or atypical basic forms made on regular nodules and cores instead of regular flakes and blades.⁶⁷ In this regard both graves could belong to flint-knapping artisans.⁶⁸

⁶⁵ Korek 1986; Cs. Balogh 2009, 399–400. Description of the grave: Bondár 2009, 68–70 and Pl. XLI.

⁶⁶ Horváth 2004a; Horváth 2009; Zandler, Horváth 2010; Horváth 2012b; Zandler, Horváth, 2014.

⁶⁷ Kopacz, Přichystal, Šebela 2008.

⁶⁸ Horváth 2013.

BELL BEAKER FINDS IN HUNGARY

Szigetszentmiklós–Felső Űrgehegyi-dűlő⁶⁹

– Settlement: sum 65 pieces: raw materials: Szentgál, Hárskút and Gerecse radiolarite types, Buda hornstone, lydite, limno-quartzite (Szurdokpüspöki/Püspökhatvan type), obsidian (Carpathian 1 type). Among the finds there were only six tools: one retouched blade, one end-scrapers, one truncated flake, 27 unretouched flakes, four blades and debitage flakes.

– Cemetery: sum 354 pieces, among them 50 tools (34 arrowheads, 10 bifacial retouched saws and blades with saw-like edge with sickle shine, 251 flakes, ten blades – one retouched and one truncated – scrapers and end-scrapers). Similar raw materials occurred in the cemetery and settlement, but in the cemetery new types also appeared: northern flint and Carpathian 2 obsidian (Tolcsva type). The lithic finds in general were placed under the skull, near the skull, near the arms, legs and spine in the inhumation graves. In the urn graves they were near the urn, and in scattered urn graves they were in vessels or among the bones. In symbolic graves they were by the vessels or near the wrist-guard.

– Szigetszentmiklós–Üdülő-sor:⁷⁰ sum 66 pieces, 37.9% are Buda hornstone; unretouched flakes and a point. Among the raw materials andesite, obsidian (Carpathian 1), a Cracowian Jura flint saw and an arrowhead from the Gerecse Mountains or Carpathian radiolarite also occurred.

Other Bell Beaker lithic finds in Hungary: depot finds in pots, from settlement pits at Albertfalva: 81% were Buda hornstone, with heating treatment on some finds, Feature 1014: 22 flakes and blades in a jug.⁷¹ Other depot finds: Csepel–Hollandi út, Csepel–Rákóczi út, Feature 12.⁷²

⁶⁹ Zandler 2012.

⁷⁰ Cs. Balogh 1992.

⁷¹ T. Biró 2002.

⁷² Cs. Balogh 1993.

CHIPPED STONES IN THE WHOLE DISTRIBUTION AREA OF THE BELL BEAKER CULTURE

On the bases of some larger, regional summaries, we can say that the lithic finds of the Bell Beaker Culture can be classified in some way (as opposed to other opinions), but these finds are not unified: there are considerable regional, spatial and temporal differences.⁷³

Analyses in the territory of Southern France have shown that the main types are: hollow-based arrowhead, tanged arrowhead, triangular-shaped flat geometric point with transversal shear, bifacial flat retouched tool, geometric tool, and former types which were used in the Eneolithic (e.g. *Grand Pressigny*).

The summary of the Moravian finds shows that the main type is the segment, but, as with pottery types, there is also syncretism among the lithic finds.⁷⁴ Artisans used local raw materials without standardised technical and typological forms mainly based on Eneolithic traditions, generally focusing on the practical usability of the tools. Among several knapping technological methods, the Moravian, Bohemian, Slovakian, Polish and Hungarian Bell Beakers used splintering technology and block-reduction technology.⁷⁵ In the region of Budapest, its special local raw material, the Buda hornstone, was used, and it broke into slices. The most general types were the arrowheads, segments, end-scrapers, scrapers, knife-like tools, retouched blades, truncated blades, borers, saws and burins. Regarding the bases of the arrowheads and points, they can be classified into several types (concave, trapezoid, tanged, double tang, oblique/convex). The most important and most frequently used raw materials were local, easily quarried stones, which were sometimes very unsuitable for knapping (general sources: Moravian Gate, Little Poland,

⁷³ Furestier 2004; Bailly 2014.

⁷⁴ Kopacz, Přichystal, Šebela 2008.

⁷⁵ Kopacz, Přichystal, Šebela 2009.

Moravian-Slovakian border, Transdanubian radiolarites). Far-distance imported stones occur rarely.

Possible far-distance imported stones occurred among the arrowheads and points; these are characteristic of the early phase of the Bell Beaker. More recently, in the later phases, mainly local stones were used. The assumed imports were not really imported in the early phase – these were non-local materials at a new place where a Bell Beaker community had settled. In these new places, far from their former settlement, many raw materials seem to be imports, but were originally local. Grave 467 then belongs to the IIa early phase, and could have been a flint-knapper's grave.

3.7. Amber

– 1025. (Fig. 12: 46).

Flat, slightly asymmetric disc with a hole in its middle; its surface is eroded; d=9 mm, d of the hole 3 mm.

Feature 1025: adult's urn grave; the bead was at the bottom of the urn. The amber find is reddish-brown, fragmented, not restored. Burnt(?).

Infrared spectra have been recorded, applying attenuated total reflection (ATR) technique (Fig. 13). A Varian Scimitar 2000 Fourier-transform infrared spectrometer equipped with an MCT (Mercury-Cadmium-Telluride) detector and a single reflection 'Golden Gate' ATR accessory (with diamond ATR element) was used. The ATR method allows fast investigation of very small samples (500–1000 micrograms) without any further sample preparation. Perfect contact between the sample and the ATR optical element was assured by a sapphire anvil with a constant 60cNm torque. The investigated wavenumber region was 4000–550 cm^{-1} . Due to the absorption of the diamond ATR element, the region between 2300 and 1900 cm^{-1} is very noisy; this spectral region, however, does not contain significant bands, so the evaluation of the IR spectra

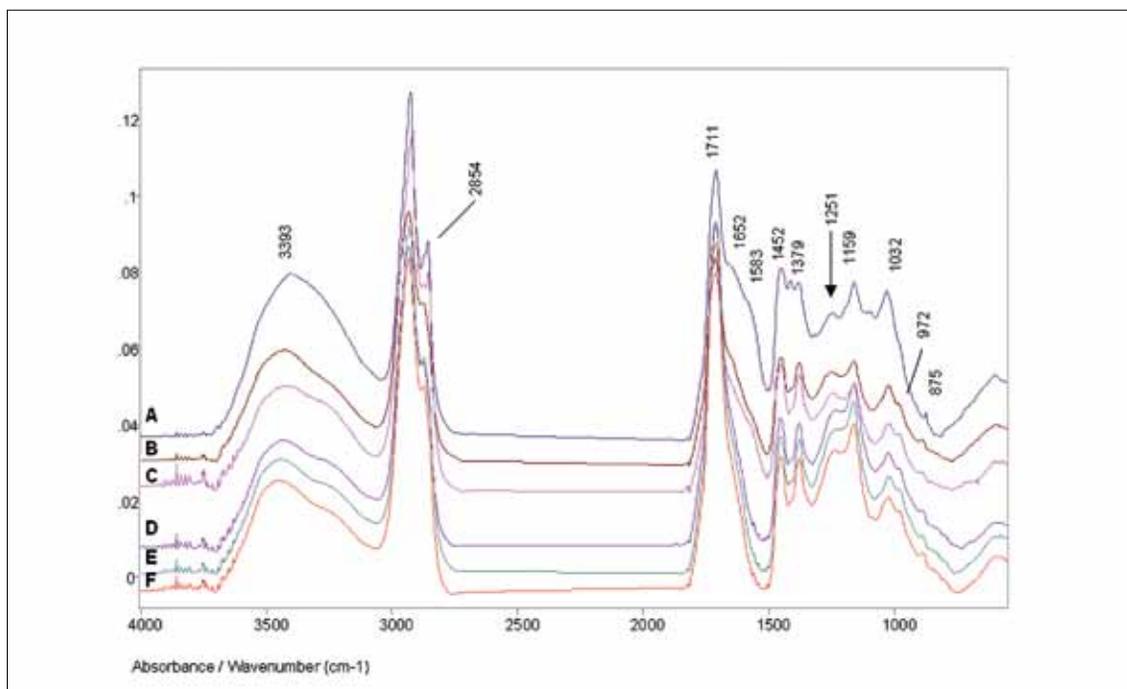


Fig. 13. Amber finds from the Hungarian Bronze Age: ATR FTIR spectra. A-653211 (Kötegyán, depot find, bead); B-1025 (Budakalász M0/S-12, Grave 1025, bead); C-46194868 (Füzesabony-Öreg-domb, settlement layer, bead); D-3195232 (Hernádkak, gravegood, bead); E-11952188 (Megyaszó, Grave 121, bead); F-11952152 (Megyaszó, Grave 95, bead).

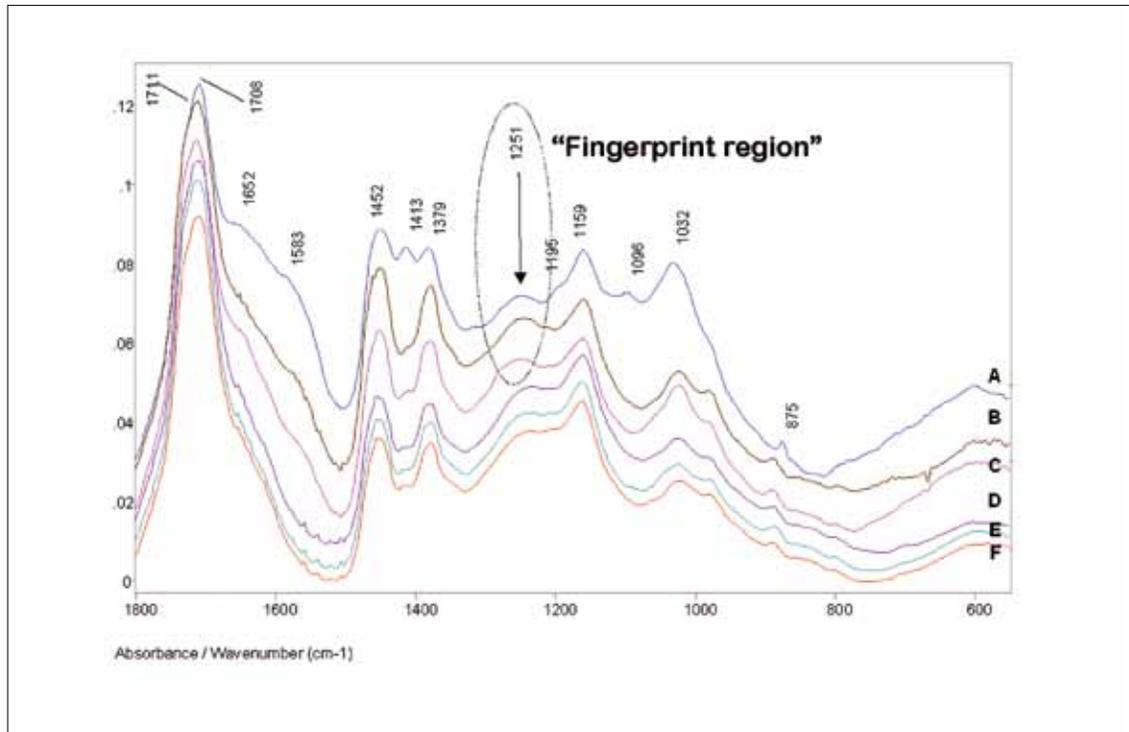


Fig. 14. ATR FTIR spectra of amber finds found in Hungary with the so-called Baltic shoulder around the 1200 cm^{-1} region ('fingerprint region'). A-653211 (Kötegyán); B-1025 (Budakalász M0/S-12, Grave 1025); C-46194868 (Füzesabony-Öregdomb); D-3195232 (Hernádkak); E-11952188 (Megyaszó, Grave 121); F-11952152 (Megyaszó, Grave 95).

is not affected. In all cases, the spectra are ATR-corrected, so comparison with reference transmission spectra is also possible (Figs 13–14).⁷⁶

While the group frequency region ($4000\text{--}1300\text{ cm}^{-1}$) is very similar for all amber samples, the so-called 'fingerprint region' of the spectra between 1300 and 700 cm^{-1} shows some differences. Several studies have used FTIR spectroscopy to analyse ambers found in archaeological sites, in particular to distinguish Baltic ambers from ambers with other origins. Curt W. Beck and co-workers (1964) showed that Baltic amber has a characteristic "Baltic shoulder" in the IR spectrum: a horizontal shoulder between 1250 and 1110 cm^{-1} is followed by a well defined band at 1159 cm^{-1} . This band at 1159 cm^{-1} can be related to C-O stretching bands of ester groups (likely succinic acid diesters). Bands at 1032 and 972 cm^{-1} also belong to different C-O stretching vibrations.

The IR spectra of the samples analysed show the characteristic bands of amber. The amber sample from Kötegyán (File 653211, sample from the depot find of Gyulavarsánd/Otomani Culture, bead) shows a slightly different spectrum. The additional spectral bands may originate from conservation and/or degradation products from the sample surface. However, a difference in its chemical composition due to its possible Transylvanian origin may also be reasonable. (This sample has the easternmost provenance.)

The magnified fingerprint spectral regions of samples from Megyaszó and Hernádkak (cemeteries of Füzesabony Culture, grave goods, beads) unambiguously show the so-called 'Baltic shoulder' between 1250 and 1110 cm^{-1} . In the spectra of samples from Füzesabony-Öregdomb (settlement of Füzesabony Culture, bead in the settlement layer) and Kötegyán, the 'Baltic shoulder' is not obvious: the plateau between

⁷⁶ See Horváth *et al.* 2015.

1250 and 1110 cm^{-1} is not horizontal, but a new, moderately intense band around 1252 cm^{-1} appears, likely assigned to aromatic ether groups. The shoulders at 1652 and 1583 cm^{-1} in the Kötegyán, Budakalász and Füzesabony-Öreg-domb amber spectra can be related to C=C stretching.

In summary, we can state that, by comparing the ATR-FTIR spectra of amber samples from different sites and cultures of the Hungarian Early Bronze Age, the samples from Megyaszó and Hernádkak are unambiguously Baltic ambers. Samples from Kötegyán, Füzesabony-Öreg-domb and Budakalász show slightly different spectral features (additional C=C and aromatic C-O vibrational bands). Precise resolution of this difference (differences in conservation methods, in natural decomposition products and/or geographic provenance, in this case perhaps from Transylvania) needs further investigation.

4. EVALUATION AND SUMMARY

Evaluating and summarising all lithic finds from the site, classifying them on the bases of feature types, archaeological and anthropological descriptions of the graves, they occurred in the following features:

- Scattered urn-graves: Features 157, 185, 213, 233, 278, 484, 655, 683, 789, 979, 1118, 1216, 1259: 13 cases;
- Urn-graves: Features 14, 107, 171, 177, 196, 217, 249, 284-285, 347, 367, 525, 530, 532, 551, 614, 668, 789, 801, 884, 901, 925, 936, 945, 990, 1024, 1025, 1076, 1108, 1263-1264, 1318: 30 cases;
- Uncertain graves: Features 105, 203: two cases;
- Empty gravepits / symbolic graves or cenotaphs: Features 106, 467, 608, 1219, 1274, 1288: six cases;
- Inhumation graves: Feature 42, child; Feature 276, adult man; Feature 616, adult woman(?); Feature 847, adult man; Feature 1080, adult man; Feature 1082, adult: six cases;

- Children's graves: Features 42, 367, 1118: three cases;

- Men's graves: Features 171, 233, 276, 347, 525, 532, 551, 801, 884, 901, 925, 936, 1024, 1025, 1080, 1318: 16 cases;

- Women's graves: Features 14, 196, 484, 530, 616, 683, 990, 1076: eight cases;

- Other feature types: Features 151, 203, 402, 1039, 1192: five cases.

In the site's assemblage we find characteristic Bell Beaker finds, which are very typical grave goods: most of the stone finds were chipped stones (mainly arrowheads and points) and wrist-guards. Axes or adzes were very rare, just as grinding stones, natural hammers and special stones for metalwork (cold moulds?). Comparing our data with data available from the whole distribution area of the Bell Beaker Culture, the number of stone types and the number of tools from our site is quite similar to other regions. Unfortunately, the comparison of our site with other Hungarian sites is the poorest, because the majority of Hungarian sites are unpublished.

Without financial support I was not able to use special provenance studies and petrographic analyses to characterise the raw materials more precisely. My assessment is based on macroscopic descriptions supplemented by the assessment given by geologist János Kalmár. Distinguishing between natural and artificial raw materials (e.g. artificial clay/ceramic and natural clayey stones, e.g. aleurolite) was very problematic, because most of the stone finds occurred in urn-graves, and these finds were in the pyre and went through drastic heat treatment.

The general view suggests that on Bell Beaker sites there are many imported raw materials, but in the case of our site it is difficult to decide which raw materials may have been imported. There are a few finds which could be far-distance imports, but it is also a possibility that these are alluvial deposits of the Danube that came from distant lands (lydite, schists, quartzites) and were de-

posited by the river in the Budapest region. Because we lack thin-section petrographic or geochemical data it is also possible that the assumed imports were local or regional raw materials (e.g. Gerecse or Carpathian radiolarite). The third possibility is that far-distance raw materials became local when their users settled in the region under examination. The first and earliest Hungarian amber finds (after the Palaeolithic) from the Bronze Age (Reinecke Bz, A0 horizon), from this cemetery, are not typical Baltic ambers, according to FTIR analyses.

It is not evident whether the wrist-guards were part of the archers' equipment or not. The finds from our site occurred most frequently with copper daggers, chipped points or arrowheads, implying that they were part of something else (e.g. polisher of copper dagger?). This is the first site where it has been proved that wrist-guards were also made from fired clay. These new types offer different explanations: clay wrist-guards are imitations of stone objects, and the former substitutes the latter in the graves. It is also possible that clay objects were used in everyday life instead of stone ones. Investigating the hardness of the finds, I found many ceramic wrist-guards which are harder than those made from soft stones. Therefore, we can assume that ceramic wrist-guards were able to serve the same function as stone ones. Artificial materials were perhaps easier to remake, reuse or repair than stones. The problem with interpreting these ceramic finds lies in that they suffered a secondary heat treatment during the cremation (secondarily fired), which probably changed their hardness. Therefore, their original quality cannot be assessed. In many cases, wrist-guards also appeared in females' and children's graves. This fact shades further our assumptions that wrist-guards were part of the hunter/warrior archer's set. Nevertheless, there could also have been children and women hunters and/or warriors who used these objects, mainly if we consider that in pre-history children became 'adults' sooner, and

we should also bear in mind the accounts of amazons.⁷⁷ It is a fact that wrist-guards associated not only with men and adults. Neither does their size show any kind of correlation with the size of their wearer: the largest finds do not only appear in adult graves. These new observations strengthen the symbolic or decorative functions of wrist-guards.

Among the points and arrowheads there were some new, western-European variants/types, which did not occur in the Hungarian prehistoric material prior to Bell Beakers (e.g. the tanged and barbed ones and the flat, geometric with transversal shear).⁷⁸ In general, Central European types dominate in the assemblage: the typical raw materials are local, low quality stones were used, tools were made by splintering and with bifacial retouch, and there are common main types in the Moravian, Polish, Slovakian and Hungarian materials. I registered a certain kind of continuity between the Late Copper Age Baden and Early and Middle Bronze Age cultures (Nagyrév, Vátya) and the Bell Beaker in the Budapest region in terms of technology, types and raw materials. It is very interesting that symbolic Grave 467 contained many part-finished finds; therefore it is considered to be an artisan's grave, but no human remains were found in the grave.

It is also a new observation that sandstone polishers/moulds are connected with special metalworking practices of the Bell Beaker.

⁷⁷ Turek 2015, 38.

⁷⁸ Bailly 2014: "This division, however, actually hides an ever-increasing number of paradoxes and contradictions. By investigating the geographical spread of arrowhead types in Bell Beaker contexts, several observations emerge, namely: 1) there is not a single Beaker arrowhead type (or a pair of types), but instead several types across Europe; 2) one of these is probably the Palmela point, made of copper; 3) these arrowhead types belong to several long-standing traditions of arrowhead manufacture in Neolithic Europe; 4) the origins of the barbed-and-tanged and the triangular hollow-based traditions are not to be found neither in the Mediterranean, nor in the putative area of origin for the Bell Beaker phenomenon as a whole – an area that has been sought, over several decades, in various parts of Europe (i.e. the Iberian Peninsula, the Netherlands, and the Corded Ware area)."

Very few finds can be connected with grain grinding and food preparation, but this perhaps should not come as a surprise, since we were assessing cemetery material: such finds are more frequent on settlements. Nevertheless, the small number of such finds may imply that the economy

depended less on plants and more on animal husbandry.

The spatial distribution of lithic finds within the cemetery shows some kind of pattern, but at present this pattern cannot be interpreted.

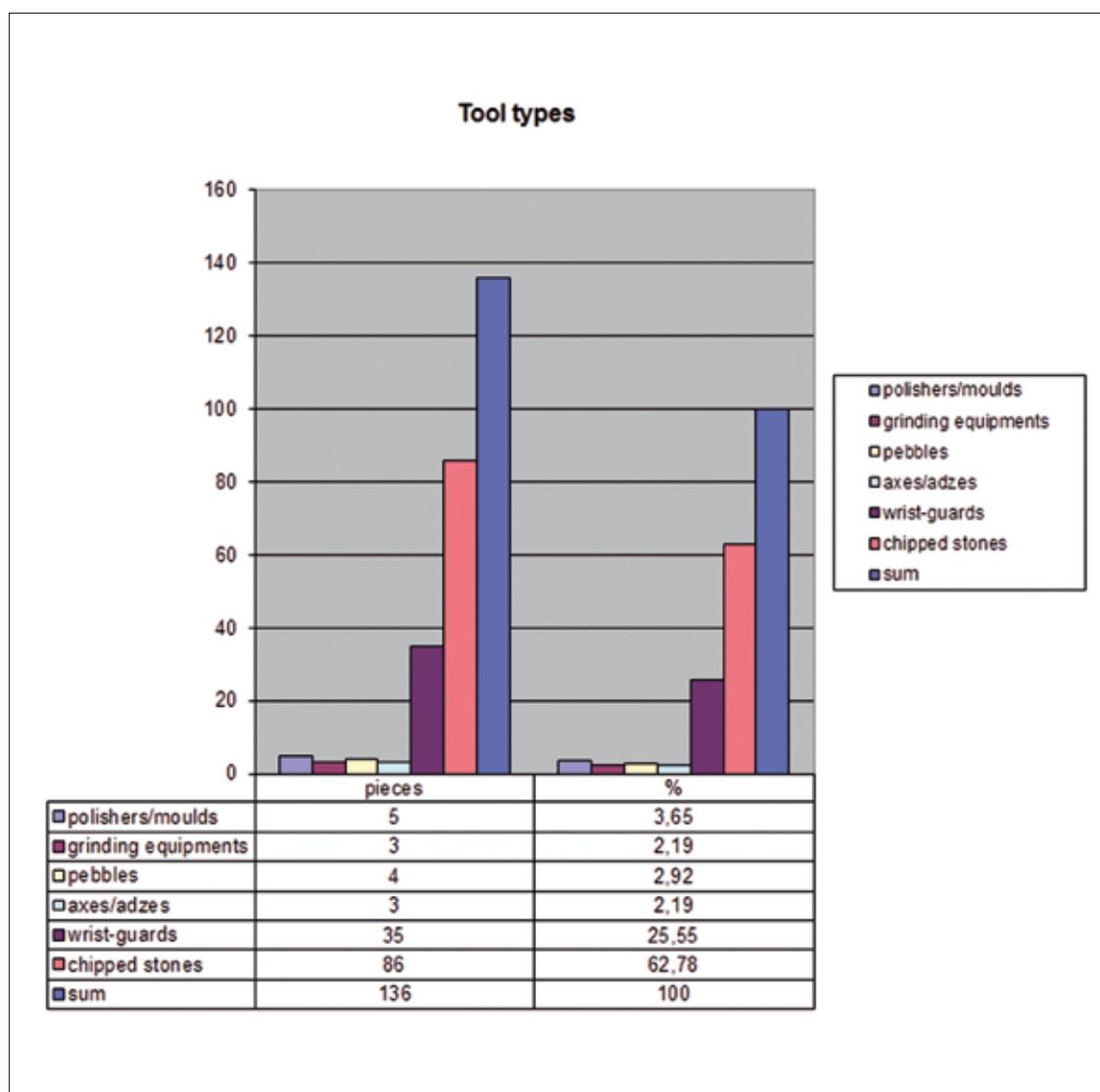


Fig. 15. Stone-tool types of the site.

Table 2. Described stone implements correlated with the features

FEATURE NUMBER	DESCRIPTION	CHIPPED	GRINDER	POLISHER	PEBBLE	WRIST-GUARD	AXE/ADZE	OTHER BB-SET
14	Urn grave, ♀, 23-x yr					×		Dagger
42	Inhumation, child,							Stone fragment
105	Urn grave?			×				
106	Empty gravepit with pots: cenotaph?					×		
107	Urn grave, 23-x yr					×		Beaker Dagger
151	Pit/Posthole?		×					
157	Scattered urn grave					×		
171	Urn grave, ♂, 23-x yr					×		
177	Urn grave, 23-x yr	×						
185	Scattered urn grave				×	×		
196	Urn grave, ♀, 23-x yr					×		
203	Grave? Pots in round ditch No. 183					×		
213	Scattered urn grave, 23-x yr	×						
217	Urn grave, 23-x yr	×						
233	Scattered urn grave, ♂, 23-x yr	×						
249	Urn grave						×?	
276	Skeleton, ♂, 23-40 yr			××				
278	Scattered urn grave					×		Bronze fragments
284-285	Urn grave	××				×		4 Beakers
347	Urn grave, ♂, 30-50 yr					×		
367	Urn grave, child?		×					
402-380	Round ditch						402: ×	
467	Empty gravepit: cenotaph?	31×				×		2 Beakers, 2 bronze needles
484	Scattered urn grave, ♀, 23-59 yr					×		
525	Urn grave, ♂, 23-x yr	×						
530	Urn grave, ♀?, 23-39 yr					×		
532	Urn grave, ♂, 23-x yr	×						
551	Urn grave, ♂, 23-x yr					×		
608	Empty gravepit?		×					
614	Urn grave, 23-x yr					×		
616	Inhumation, ♀?, 23-59 yr	10×				×		Dagger

FEATURE NUMBER	DESCRIPTION	CHIPPED	GRINDER	POLISHER	PEBBLE	WRIST-GUARD	AXE/ADZE	OTHER BB-SET
655/4	Scattered urn grave, 23-x yr	x						
668	Urn grave	xx						
683	Scattered urn grave, ♀, 23-x yr				x			Beaker
702-712	712: round ditch, stone packing on its end: 702			702: x				
788/1-789-791-792	Scattered urn grave and urn grave 788-792: round ditches 789: double grave, 791: animal bones, skull						788: x	
801	Urn grave, ♂, 23-39 yr	x	x?					
847	Inhumation, ♂, 23-x yr	xxx				x		Dagger
884	Urn grave, ♂, 23-x yr	x				x		
901	Urn grave, ♂, 23-x yr					x		
925	Urn grave, ♂, 23-x yr					x		
936	Urn grave, ♂, 23-x yr					x		
945	Urn grave, 23-x yr	xx				x		
979	Scattered urn grave					x		2 Beakers
990	Urn grave, ♀, 23-x yr					x		
1024	Urn grave, ♂, 23-59 yr					x		
1025	Urn grave, ♂, 23-30 yr							Amber
1039	Pit		x					
1076	Urn grave, ♀, 23-x yr	xxxx						
1080	Inhumation, ♂, 23-x yr			x?				
1082	Inhumation, adult	9x				x		2 Bronze needles
1108	Urn grave					x?		Dagger
1118	Scattered urn grave, 1-7 yr	7x		x		xx	xxx	
1192-(1080)	Round ditch		x			x half-ready		
1216	Scattered urn grave?						x	
1219	Empty gravepit: cenotaph?				xx			
1259	Scattered urn grave, 23-x yr					x		
1265?	1265: Pit, 1263-1264 Urn graves					xx		
1274	Empty gravepit: cenotaph?	6x				x		
1288	Empty gravepit: cenotaph?	x				x		Beaker, bronze sheet
1318	Urn grave, ♂, 23-x yr	xxx						



Fig. 16. Map of the site.

APPENDIX

1. Grinding equipment

Lower grinding slabs

- Inv. No. 2005.14.151.1. Middle fragment of a grinding slab with use surface.

Raw material: grey sandstone-pebble conglomerate with medium grainsize, on its base with larger pebbles, red iron-oxide grains are identified in the fabric.

Description: The base and the sides of the fragment are flaking; the tool was originally a saddle-shaped grinding slab or a slanting standing grinding slab with rectangular use surface. Its use surface is smooth, slightly oval in plan.

Size: use surface: 65×111, tool: 112×73×54 mm

Feature 151: pit or post-hole.

Upper grinding stones: handstones

- 2005.14.367.4. Discoidal handstone with cornered sides (Fig. 4: 3).

Quartzite pebble with patina on its side.

Broken, 1/3 piece is missing, fire traces on its side, the use surface is smooth.

76×65×55 mm

Feature 367: urngrave of a 1–7-year-old child with stone packing above the urn.

- Feature 608: discoidal handstone with cornered sides, secondary product (Fig. 4: 4).

Quartzite pebble.

Broken, the upper part shows vertical cracks and pointed damage. The upper side is oval in plan and hollowed from the long use life (size: 62×55, 40×30 mm). Along the rup-

ture a drilling hole is clearly visible, which is unfinished: it was not drilled through to the opposite side. The initial product was a shaft-hole axe or a weight; after it had broken it was used secondarily as a handstone. 61×57×47 mm

Feature 608: fragment from a polisher.

Grey, fine-grained sandstone.

Worn, smooth use surface.

130×42×50 mm

Feature 608: empty grave with urn, without bones.

2. Pebbles: choppers, polishing pebbles, handstones, anvils on natural pebble forms

Feature 42: inhumation grave.

Micaceous, yellow sandstone nodule without shaping.

50×37×12 mm

- 2005.14.185.3. Multiple tool: chopper-hammer and polisher-sharpener anvil (Fig. 4: 5).

Quartzite pebble with black, burnt and smoky surface.

Heavy, handfit, broken on its end, on its side there is a black worn patch with thin stripes for sharpening.

145×103×51 mm

Feature 185: Scattered urngrave in a rectangular grave.

- 2005.14.638.14. Anvil(?) (Fig. 4: 6).

Limestone pebble, worn, soft; on the Mohs scale its hardness is 2.

Larger, natural form, handfit with one smoother side with use-wear.

168×90×33 mm

Feature 683: scattered urngrave in a rectangular grave with a 23-x-year-old woman with pots; the stone was among the calcined bones.

- 2005.14.1080.4. Two stone tools (Fig. 4: 9).

- 1. Flat stone, not a tool, 95×76×11 mm.

- 2. Perhaps a polisher with one smooth side and short, sharp scratches.

111×67×28 mm

Feature 1080: situated in round ditch No. 1192; the stones were at its end, Grave 1080: inhumation grave of a 23-x-year-old man(?).

- 2005.14.1216.4. (Fig. 4: 10).

White, flat limestone.

151×172×24 mm

Feature 1216: scattered urngrave.

- 2005.14.1219.2. Sharpener (Fig. 4: 1).

Soft (2 on Mohs scale), black lydite pebble, handfit with worn traces created by fingers on its side.

On one of its short sides there are thin, dense scratches: sharpening channels.

73×47×15 mm

- Feature 1219/1: polishing pebble.

Rough pebble with white cortex on its lower side.

Upper side is smooth, its surface worn, handfit with worn traces created by fingers: ceramic polisher(?).

75×35×29 mm

Feature 1219: urngrave without bones, with two pebble tools, which have natural forms; they were probably ad-hoc stone tools.

3. Axes and celts

- 2005.14.249.4. Fragment with a polished side from an axe/celt(?).

Greenschist(?).

54×34×18 mm

Feature 249: scattered urngrave.

- 2005.14.402.25. Fragment from an axe(?).

Grey, amorphous, unworked.

Limestone(?).

On its breaking line there seems to be the line of a possible shaft-hole, but its surface is rough, thus its function is uncertain.

37×44×23 mm

Feature 402 = round ditch No. 380.

- 788.4. Shaft-hole fragment from an axe with its side (Fig. 4: 14).

Greenschist(?).

Fragment from its butt, the side is nicely polished.

49×40×20 mm

Feature 788: round ditch.

- 2005. 14.1118/5. Trapezoid celt (Fig. 4: 12).

Blueschist(?). According to János Kalmár it is basalt.

Medium-sized, robust celt; its backpage is flat; the front is concave; its bit is a chisel-edge, more worn than its back; set use-wear

is visible on its front and back: in the middle of both sides traces of glue are visible; the front with the side is well polished from use; the butt is also worn.

60×40×23 mm

- 2005.14.1118/5. Trapezoid celt (Fig. 4: 11).

Dark grey with light-green patches: diorite(?). According to János Kalmár it is serpentinite.

There is a little cortex-patch on its front, towards the chisel-edge bit. Small, flat, its backpage and butt are damaged; it is a secondary product made from a larger celt that had broken previously; therefore it is thin in cross-section; its front is concave, the back flat, the chisel-edge intact and sharp; the body of the celt is nicely polished.

56×36×10 mm

Feature 1118: scattered urngrave of a 1–7-year-old child.

4. Polishers (Moulds?)

- 2005.14.105.4. Polisher/mould (Fig. 5: 2). Reddish-grey, medium-grained sandstone with white cortex on its surface.

Its surfaces are polished; its base is worn as a result of long use life. The use surface shows an incised negative of a small dagger. Its width is 11–18 mm; its depth is 4 mm.

Feature 105: empty, rectangular gravepit.

- 2005.14.276.2. Polisher/mould (Fig. 5: 6).

Red, fine-grained, micaceous sandstone with white and black coating on its surface. Small, semicircular tool; its front is flat; its use surface shows sharpening grooves in its middle; its sides and base are flat. The black coat on its use surface is perhaps a kind of organic (fatty) material used during the melting process.

The size of the stone: 95×56×34 mm, the size of the grooving: 8 mm wide and 2–3 mm deep.

- 2005.14.276.4. Polisher/mould (Fig. 5: 5). Greyish-red micaceous sandstone.

There is a black coating (organic material?) on the use surface and the right side; on its front the use surface is cracked (as a result of fire?). On the use surface there is an incision of a needle with its head and leg.

The size of the stone: 105×55×30 mm; the size of the incision: 12–14 mm wide and 2–3 mm deep.

Feature 276: inhumation grave of a 23- to 40-year-old man; in the south corner of the gravepit there were ceramic vessels; the polisher was on a bowl.

- 2005.14.702.1. Polisher/mould (Fig. 5: 3). Reddish-grey, medium-grained sandstone with a white patina on its surface.

Its base is damaged; its left side is worn from long use. On the use surface/front there is an incised form of two needle heads opposite each other.

The size of the stone is 83×45×35 mm; the incisions are 22 mm wide and 2–3 mm deep. Feature 702: the stone was in round ditch No. 712.

- 2005.14.1118.28. Polisher/mould (Fig. 5: 1).

Grey, fine-grained sandstone.

Its base is worn, with fan-shaped striae on its sides; the upper left side is broken. The front/use surface shows the incised form of a needle: head and leg.

The size of the stone: 83×46×29 mm, the size of the incision: 10–12 mm wide and 3–4 mm deep.

Feature 1118: see the description of the feature above.

5. Wrist-guards⁷⁹

Half-finished piece

- Feature 1192. (Fig. 8: 11).

Long, narrow quartzite pebble, half-broken in its cross-section; it was sawn along its long axis. It is a base form of a wrist-guard. Sawing was also initiated on the outer face, but the saw broke and stuck in the sawn line.

32×67×9 mm

Feature 1192: round ditch with Grave 1080.

Finished pieces

- 2005.14.14.5. (Fig. 6: 5).

Wrist-guard, one of its corners broken. 4Wcc/rectangular.

⁷⁹ Their descriptions are provided by increasing inventory numbers using the terms of Ann Woodward and her colleagues, Maikel Kuijpers and his colleagues, and Jan Turek (Woodward et al. 2006; Kuijper et al. 2008; Turek 2015). The illustrations are in increasing size.

Raw material: undetermined stone(?).

Reddish brown, it has hardness 2–3 on the Mohs scale, secondarily burnt during the cremation.

Medium-large-sized, rectangular, concavo-convex in cross-section. Remains of calcined bones appear on its inner face; the upper corner on the outer face is worn; the holes were drilled from both sides.

97×38×4 mm

Feature 14: urn grave of an adult woman (?) with a small mug at the bottom of the urn and with a wrist-guard and a copper dagger with two nails.

- 2005.14.106.1. (Fig. 8: 4).

Wrist-guard, the upper right and lower left corners broken. 4ScC/rectangular.

Raw material: reddish-brown, micaceous stone.

Medium-sized, rectangular with straight sides; the cross-section is concavo-convex; on its upper side there is a hole just as in its middle; the holes were drilled from both sides; on the backpage it is burnt; there are visible traces of use-wear (impression of fitting belts).

76×32×7 mm

Feature 106: scattered urn grave in a grave-pit; the wrist-guard was among the burnt bones.

- 2005.14.107.4. (Fig. 8: 1).

Wrist-guard, one of its corners damaged. 4Wcc/trapezoid.

Raw material: greenish-grey, micaceous, hardness 1 on the Mohs scale; it could not be determined whether it is stone or ceramic.

Medium-sized, trapezoid with waisted sides, concavo-convex in cross-section; the inner face is rough; the holes were drilled from both faces; the outer face is oval; the inner face is worn along its long axis from long use life.

84 × 36–31 × 3 mm

Feature 107: urngrave of an adult with copper dagger; the finds were in the urn(?).

- 2005.14.157.3. (Fig. 7: 5).

Wrist-guard, intact. 4Wpc/rectangular.

Raw material: stone, hardness 4 on the Mohs scale.

Medium-large-sized, rectangular with waisted sides, plano-plano in cross-section; there are incised decorations on its outer face among the holes: 3 points in groups opposite each other. There is green copper patina on the outer face; the left holes were drilled from both sides.

93×32×5 mm

Feature: 157: urngrave; the wrist-guard was outside the urn on its east side, near Feature 158. In the grave there were no metal finds.

- 2005.14.171.6. (Fig. 8: 12).

Wrist-guard, broken in its lower part. Originally it was 4Wcc(?).

Raw material: grey stone, hardness 4 on the Mohs scale; there is rough, white cortex on its outer face.

Medium-sized, strongly concavo-convex in cross-section; on the inner face it is cracked (fire trace?); the upper holes were drilled from the inner face. The outer face shows marks of post-excavation cleaning.

66×33×6 mm

Feature 171: urn grave of an adult man; the wrist-guard was near mug no. 3.

- 2005.14.185.2. (Fig. 7: 2).

Wrist-guard in two pieces (broken during cremation); a small part of it is missing. 4ScC/trapezoid.

Raw material: reddish-grey fired clay, hardness 2 on the Mohs scale.

Medium-large-sized, trapezoid with straight sides, strongly concavo-convex in cross-section; it shows pointed decoration on its outer face among the holes on both sides; the holes were drilled from both sides, but mainly from the inner face.

93 × 42–40 × 3 mm

Feature 185: scattered urn grave in a rectangular grave-pit; ceramic and stone finds were in the southern part of the pit.

- 2005.14.196.3. (Fig. 8: 3).

Wrist-guard, intact; there are wear traces on its inner face. 4Wcc/rectangular.

Raw material: greenish-brown, hardness 2 on the Mohs scale; it could not be determined whether it is stone or ceramic.

Medium-sized, rectangular with waisted sides, concavo-convex in cross-section;

the holes were drilled from both sides, but mainly from the inner face. From the wear traces it could be reconstructed how it was fitted by belts.

81×35×3 mm

Feature 196: urn grave of an adult woman; the wrist-guard was outside the urn, at its western side.

- 2005.14.203.2. (Fig. 9: 10).

Raw material: yellowish-pink, it could not be determined whether it is stone or ceramic.

Broken, original form was 2pc/(?).

It is an upper part of a wrist-guard. It is uncertain whether it was a wrist-guard or it was reshaped secondarily from a larger wrist-guard into a smaller one: the hole is in the middle, drilled from the outer face.

34×31×3 mm

Feature 203: there were some pots together; it is not a real feature or grave.

- 2005.14.278.1. (Fig. 8: 2.)

Wrist-guard, intact, its upper left corner damaged, 4Wcc/rectangular.

Medium-sized, rectangular with waisted sides, strongly concavo-convex in cross-section, decorated among the holes with 1-1 hole-like points on the upper and lower parts; the holes were drilled from both sides, but mainly from the inner face.

81×35×4 mm

Feature 278: scattered urn grave in a grave-pit without bones; the grave was in superposition with another feature. Metal plates and the wrist-guard were on top of pots.

- 285/10. (Fig. 6: 6).

Wrist-guard, broken at its three corners. 4Wpc/trapezoid.

Raw material: grey, it could not be determined whether it is stone or ceramic. It has hardness 1 on the Mohs scale.

Medium-large-sized, slightly trapezoid with waisted sides, plano-convex in cross-section; the inner face is flat with black organic material; the outer face is shiny and worn. On both pages there are thin, vertical and, on the outer face, slanting use-wear lines from long use life. The holes were drilled from the inner face.

98 × 37–35 × 4 mm

Feature 285: Feature No. 284 was an empty grave-pit, with pit No. 285: these two were probably one archaeological feature. The wrist-guard was in pit No. 284 while two arrowheads were in feature No. 285.

- 2005.14.347.4. (Fig. 7: 9).

Wrist-guard, one of its corners damaged, restored. 4Wcc/rectangular.

Raw material: it could not be determined whether it is stone or ceramic. It is greyish with red patches; on the inner face there is a strongly burnt thick bone layer.

Medium-sized, rectangular with waisted sides, its cross-section is concavo-convex; the holes were drilled from both sides.

79×38×6 mm

Feature 347: urn grave of a 23- to 50-year-old man; the wrist-guard was inside the urn among the bones and was cremated together with the dead.

- 2005.14.467.11. (Fig. 6: 3–4).

Wrist-guard, intact, 4Spc/trapezoid, narrow.

Raw material: stone(?). Brown; it has hardness 3–4 on the Mohs scale.

Medium-large-sized, slightly trapezoid, long and narrow form with straight sides; its cross-section is plano-convex; the holes were drilled from both sides; the inner face is flat with a calcined bone layer; the lower side of the outer face is worn from long use life.

98 × 27–25 × 5 mm

Feature 467: empty grave-pit with 31 pieces of chipped stones and a wrist-guard: 'artisan's grave'.

- 484.5. (Fig. 9: 3).

Upper fragment of a wrist-guard in three separate pieces. Broken, its original form was 4Wcc/trapezoid(?).

Raw material: yellowish-pink, very light, stone(?), fired(?). It has hardness 2 on the Mohs scale.

The two remaining holes on the upper side were drilled from the inner face.

33×33×5, 42×28×4, 33×18×3 mm

Feature 484: scattered urn grave of a 23- to 59-year-old woman with some pots; the wrist-guard was among the bones.

- 2005.14.530.56. (Fig. 7: 10).

Wrist-guard, broken at its three corners, 6Wcc/trapezoid.

Raw material: brownish-grey, stone(?). It has hardness 4 on the Mohs scale.

Medium-sized, slightly trapezoid with waisted sides, concavo-convex in cross-section; there are holes for fixing in the corners and in the middle part of the upper and lower sides; they were drilled from the inner face. The holes in the middle were drilled secondarily after the ones in the corners were damaged. The inner face is burnt from the cremation.

78 × 34–32 × 3 mm

Feature 530: urn grave of a 23- to 39-year-old woman; the wrist-guard was in the urn.

- 2005.14.551.56. (Fig. 7: 6).

Wrist-guard, damaged at its three corners, broken in half, restored; the upper, smaller part is more damaged and burnt. 4Wcc/trapezoid.

Raw material: reddish-grey natural or processed clay, secondarily burnt during the cremation. The white, probably calcareous, inclusions and micaceous sand in its fabric could be naturally present or added as tempering materials.

Medium-large-sized, slightly trapezoid with waisted sides, strongly concavo-convex in cross-section; the holes were drilled from both pages.

90 × 38 × 4 mm

Feature 551: urn grave of an adult man; the wrist-guard was at the bottom of the urn, underneath the burnt bones.

- 2005.14.614.21. (Fig. 9: 6).

Wrist-guard, broken at its upper left corner. Secondarily shaped 4Wcc/trapezoid/square.

Raw material: micaceous greyish-brown stone, hardness 1–2 on the Mohs scale.

Small-sized, slightly trapezoid / almost square with waisted sides, strongly concavo-convex in cross-section, secondarily shaped from a broken, larger wrist-guard. On the inner face there are thin, horizontal use-wear striae; the holes were drilled from both sides.

54 × 38 × 4 mm

Feature 614: adult's urn grave.

- 612/2: 2005.14.616.14. (Fig. 9: 1.)

Wrist-guard upper fragment, half-broken. Its original form was 4Spp/rectangular(?).

Raw material: yellowish-brown, stone(?). It has hardness 1 on the Mohs scale.

Large-sized, rectangular with straight sides; the outer face is concave, the inner face is flat; plano-plano in cross-section, there is a calcined bone layer on its edge.

67 × 39 × 5 mm

Feature 616: inhumation grave of a 23- to 59-year-old woman (?) in contracted position; there was a copper dagger on her left hand; the wrist-guard was on her left arm; 7 chipped arrowheads and 3 blades were near the pots. The wrist-guard was in situ on the radius.

- 847/3: 2005.847.7. (Fig. 7: 1).

Wrist-guard, intact, 4Sc/rectangular.

Raw material: grey, micaceous stone. It has hardness 1 on the Mohs scale. According to János Kalmár it is a Danube pebble, sericite-chlorite schist.

It is rectangular with straight sides, strongly concavo-convex in cross-section; on the outer face there are slanting striae from use wear, while on the inner face the striae are horizontal and thin; the holes were drilled from both sides.

94 × 34 × 3 mm

Feature 847: inhumation grave of a 23-x-year-old man in contracted position; there were pots on his legs; the wrist-guard was on his left side on a copper dagger; the dagger was under his left arm; under them there were stones. The wrist-guard was in situ on the outer side of his arm, in the middle, a bit higher than his wrist.

- 2005.14.884.77. (Fig. 8: 10).

Wrist-guard, intact, broken at its lower left corner, 6Sc/rectangular.

Raw material: greenish-grey stone.

Small-medium-sized, slightly trapezoid with straight sides, slightly concavo-convex in cross-section; the fixing holes are in its four corners and in the middle on the upper and lower parts; the holes were drilled from both sides; there is a red spot and use-wear signs of fixing belts on the inner face.

65 × 26–23 × 4 mm

Feature 884: urn grave of an adult man; an arrowhead and the wrist-guard were at the bottom of the urn.

- 2005.14.901.5. (Fig. 6: 2).

Wrist-guard, damaged at its upper-left and lower-right corners, 4Spc/trapezoid.

Raw material: corroded/decomposed or burnt material: stone(?). Its raw material could not be specified, but FTIR-spectra show that it is not amber (Fig. 11).

Large-sized, slightly trapezoid with straight sides, plano-convex in cross-section; the holes were drilled from both sides; the upper ones were mainly drilled from the inner face; on the inner face there is a calcined bone layer.

100 × 37–39 × 6 mm

Feature 901: urn grave of an adult man; the wrist-guard was in the urn.

- 2005.14.925.18. (Fig. 9: 7).

Wrist-guard, half-broken, lower fragment. It was 4Wcc(?) originally.

Raw material: reddish-grey fired clay, hardness 2 on the Mohs scale; it shows schist-like layered texture caused by the cremation; the inner face shows wood-texture resulting from the long-lasting high temperature.

It was originally medium-large-sized, concavo-convex in cross-section, repaired: the lower, left hole was drilled again secondarily; it was drilled from both sides, but the repairing hole was drilled from the outer face.

Feature 925: urn grave of an adult man.

- 2005.14.936.56. (Fig. 8: 9).

Wrist-guard, damaged in its lower part, burnt: on its inner face there is a grey, burnt layer; 4Wbc/trapezoid.

Raw material: fired clay(?). White, layered and worn texture (3 layers are visible in cross-section, possibly as a result of cremation); it has hardness 1 on the Mohs scale.

Medium-sized, slightly trapezoid with waisted sides, bi-convex in cross-section, decorated on its outer face(?). Among the fitted holes there is another point-like hole, which seems to be a decoration; the holes were drilled from both sides; the outer face is slightly concave, the inner face is flat; in

the middle of the outer face there is a greenish patch; horizontal thin striae also appear on the outer face; the inner face is worn from long use-life.

68×29×6 mm

Feature 936: urn grave of an adult man.

- 2005.14.945.36. (Fig. 8: 7).

Wrist-guard, half-broken into two pieces, but there are missing parts. Secondarily shaped, the original form was 4Wcc/trapezoid, now it is a half-finished product: 2/trapezoid or 4/square.

Raw material: yellowish-grey sandstone(?). It is trapezoid in shape(?), concavo-convex in cross-section, the original surface remaining only at the upper left corner; the other parts are damaged. The upper holes were drilled from both sides, but mainly from the inner face; it was originally a large-medium-sized wrist-guard; the intact lower fragment was reshaped into a smaller wrist-guard, and its maker started to drill a hole in its upper corners, but the drill broke in the hole.

56×40×5, lower: 51×39×3 mm

Feature 945: urn grave of an adult; there was an arrowhead outside the urn; the wrist-guard pieces were at the bottom of the urn, placed opposite each other.

- 2005.14.979.6. (Fig. 8: 5).

Wrist-guard, intact, 4Wcc/trapezoid.

Raw material: brown, stone(?). It has hardness 1 on the Mohs scale.

Medium-sized, slightly trapezoid with waisted sides, strongly concavo-convex in cross-section; the outer face is shiny, worn; on the inner face there are thin, horizontal striae (use-wear); the outer face is decorated with points in line; the fitting holes were drilled from both faces.

75×36×3 mm

Feature 979: scattered urn grave in a pit with some pots; the wrist-guard was among the bones.

- 2005.14.990.3. (Fig. 7: 7).

Wrist-guard, broken at its upper-right and lower-left corners, half-broken, restored, 4Wcc/trapezoid.

Raw material: grey, fired clay, hardness 1 on the Mohs scale.

Large-medium-sized, slightly trapezoid with waisted sides, strongly concavo-convex in cross-section; the holes were drilled from both sides, but mainly from the inner face. The left side of the tool is more damaged/worn; perhaps it often slipped to this side when it was used.

90 × 34–36 × 4 mm

Feature 990: urn grave of an adult woman; the wrist-guard was among the bones at the bottom of the urn.

- 2005.14.1024.36. (Fig. 6: 1).

Wrist-guard, fragmented, restored from several pieces, but some pieces are still missing; it was burnt during the cremation; 4ScC/rectangular.

Raw material: fired clay, secondarily burnt(?). Its cross-section is red, the surface greyish-brown; no tempering could be identified. It has hardness 2 on the Mohs scale.

Large-sized, rectangular with straight sides, strongly concavo-convex in cross-section. The four holes were drilled from both pages; both ends are shiny from long use. On the outer face outer face there is use-wear of sharp horizontal striae. Its edge is chipped as a result of high temperature during the cremation.

119×42×6 mm

Feature 1024: urn grave of a 23–59-year-old man.

- 2005.14.1082.5. (Fig. 7: 3–4).

Wrist-guard, broken at its upper-left and lower-right corners, 4ScC/trapezoid.

Raw material: red, fired clay, hardness 1 on the Mohs scale.

Medium-large-sized, slightly trapezoid with straight sides, strongly concavo-convex in cross-section; the holes were drilled from the inner face; both pages are horizontal; both sides show sharp striae (use-wear).

91×39×3 mm

Feature 1082: inhumation, adult in contracted position in round ditch No. 1019; the wrist-guard was near the left arm, across the bone, not in in-situ position. There were arrowheads, copper needles and chipped stones just by the right pelvis. In the south corner of the grave-pit there was a posthole with stones.

- 2005.14.1118/10. (Fig. 8: 6).

Wrist-guard; it is a whole piece, but damaged at its upper right corner, 4Wpc/trapezoid.

Raw material: yellowish-grey stone(?). Its hardness is between 1 and 3 on the Mohs scale; according to János Kalmár it is ceramic. On its outer face outer face there is a burnt bone layer, which cemented to the wrist-guard during the cremation.

Small-medium-sized, trapezoid with waisted sides, plano-convex in cross-section; the inner face is flat; the holes were drilled from both pages.

73 × 33–30 × 5 mm

- 2005.14.1118/29. (Fig. 7: 8).

Medium-sized, slightly trapezoid with waisted sides, concavo-convex in cross-section; the outer face is worn, the inner face is shiny from long use; it shows sharp horizontal striae; the fixing holes were drilled mainly from the inner face.

80 × 38–34 × 3 mm

Feature 1118: scattered urn grave of a child; the two wrist-guards were south of the pots, among stones such as chipped stones, polishers and celts: all stone implements were in one group.

- 1259/3: 2005.14.1259.4. (Fig. 9: 4).

Wrist-guard, half-broken, secondarily reshaped into a smaller one, 4ScC/trapezoid; the original was 4Wcc(?).

Raw material: micaceous stone, hardness 1–2 on the Mohs scale.

Small-sized, secondarily reshaped find; the original was much larger, concavo-convex in cross-section; the holes were drilled from both pages; the upper left corner is broken, the lower left corner is damaged; both pages are worn; the lower side is slanting; the wrist-guard is unfinished.

46×37×4 mm

Feature 1259: scattered urn grave of an adult in a grave-pit with several pots; the wrist-guard was among the pots.

- 1265/3. (Fig. 9: 8).

Wrist-guard, broken; the original find was 4ScC/narrow, trapezoid(?).

Raw material: grey sandstone or aleurolite, hardness 2 on the Mohs scale, burnt(?).

Medium-sized, narrow, slightly trapezoid with straight sides; its outer face is fragmented, the inner face is concave; slightly concavo-convex in cross-section; the holes were drilled from both pages; on the upper side of the outer face there are point decorations between the fixing holes.

51×24×3 mm

- 1265/2. (Fig. 8: 8).

Wrist-guard, its upper left corner damaged, 4Wcc/rectangular, and narrow.

Raw material: greenish-grey stone: serpentinite or greenschist(?).

Medium-small-sized, long, narrow, rectangular with waisted sides, slightly concavo-convex in cross-section, it has cortex on its outer face; one of the fixing holes is not completely drilled: half-finished; the others were drilled from both pages.

73×23–20×3 mm

Feature 1265: grave-pit with two graves but without bones; the two wrist-guards were in the eastern side, in the top layer.

- 1274/7: 2005.14.1274.21. (Fig. 9: 9).

Wrist-guard, half-broken, secondarily reshaped, S?pc/trapezoid-square, originally Wcc/trapezoid(?).

Raw material: grey, micaceous stone, hardness 1 on the Mohs scale.

After the original piece had broken, it was reshaped into a smaller one; the fixing holes are not in the corners, but in the middle of the upper and lower sides; they were drilled from both pages. The places of the original fixing holes – where it broke – were polished. The wrist-guard is plano-convex in cross-section, small-medium-sized; the outer face is damaged.

39×24×3 mm

Feature 1274: rectangular grave-pit without bones; the wrist-guard was at the side of the pit where the arm would be if there was a skeleton in the grave.

- 1288/5. (Fig. 9: 5).

Wrist-guard, upper fragment, secondarily reshaped, now 2Scc/square.

Raw material: brownish-grey, hardness 2 on the Mohs scale.

After the original piece had broken, it was reshaped into a smaller one: the lower side is half-finished, not completely polished,

strongly concavo-convex in cross-section; the two fixing holes were drilled from both pages; on the inner face there is a calcined bone layer.

57×47×5 mm

Feature 1288: empty grave-pit without stones; there were two pots in the middle of the pit, under them an arrowhead, a metal plate and a wrist-guard. The excavation diary also mentions another arrowhead, but it is not in the inventory.

6. Chipped stones

Points and arrowheads

One piece in one feature

- 2005.14.177.4. (Fig. 12: 1).

Buda hornstone with cortex.

Arrowhead: S/triangular. Broken at its distal end, the ventral surface is flat; the dorsal surface is convex with fine retouches, on its edge with bifacial retouches. Its base is strongly concave with use-wear shine. Size: 18×20×4 mm.

Feature 177: adult's urn grave; the finds were in the urn.

- 2005.14.217.4. (Fig. 12: 2).

Buda hornstone, burnt.

Small arrowhead: S/triangular. Its background is flat, its dorsal surface convex, its base strongly concave. Size: 18×18×4 mm.

Feature 217: adult's urn grave.

- 2005.14.525.10.

Buda hornstone.

Arrowhead: M-L/triangular. Both surfaces are concave; its form is slim, long, with concave base. At the base, at its right end, it is broken. Size: 24×14×5 mm.

Feature 525: adult's urn grave; the finds were outside the urn.

- 2005.14.532.1. (Fig. 12: 3).

Buda hornstone.

Arrowhead: S/triangular. Both surfaces are concave, small-sized; its base is rectangular, slightly concave. The right end of its base is broken. Size: 20×16×3 mm.

Feature 532: adult's urn grave.

- 2005.14.655.11. (Fig. 12: 4).

Buda hornstone, white version (porcelanite).

Arrowhead: L/triangular. Long, slim form with strongly concave base; its dorsal surface is concave, its ventral surface flat; the right end of its base is broken; slight use-wear shine is visible on its right edge on the dorsal surface and at its distal end. Size: 28×16×4 mm.

Feature 655: adult's scattered urn grave; the finds were among the stones.

Two pieces in one feature

- 285/8. (Fig. 12: 6).

Buda hornstone.

Arrowhead: M-L/triangular. Very slim, flat, but its ventral surface is quite convex; its base is concave, asymmetric; its right end is broken; there are use-wear traces on the right edge of its ventral surface. Size: 25×21×2 mm.

- 285/9. (Fig. 12: 7).

Buda hornstone.

Arrowhead: S/triangular. Small, its base is strongly concave, broken at its left barb (left-handed?); its dorsal surface is concave, its ventral surface flat. Size: 22×17×5 mm.

Feature 285: empty grave-pit, together with Feature 284.

- 2005.14.945.36. (Fig. 12: 8).

Buda hornstone, greyish-white version.

Arrowhead: S/triangular. Small, its ventral surface flat; its distal end is blunt. There is use-wear shine on the right edge of its dorsal surface; its base is very concave, slightly asymmetric. Size: 17×18×3 mm.

- 2005.14.945.37. (Fig. 12: 9).

Buda hornstone.

Arrowhead: M-L/triangular. Longer, slim form with less-articulated concave base. Its ventral surface is flat, its dorsal surface shiny; use-wear is stronger on its right edge; the base is broken at its right barb; its distal end is slightly blunt, broken. Size: 27×17×4 mm.

Four pieces in one feature

- 2005.14.1076.25. (Fig. 12: 10).

Buda hornstone, light version.

Arrowhead: M-L/triangular, hollow-based. Its base is concave, asymmetric; its dorsal surface is concave, its ventral surface flat.

Size: 27×20×3 mm.

- 2005.14.1076.26. (Fig. 12: 11).

Buda hornstone, dark version.

Arrowhead: S/triangular, hollow-based. Its dorsal surface is concave; its ventral surface is flat, smaller sized with slightly concave base. Size: 21×19×4 mm.

- 2005.14.1076.27. (Fig. 12: 12).

Buda hornstone.

Arrowhead: M-L/triangular, hollow-based. Its base is concave, asymmetric, broken at its right corner; its dorsal surface is concave, its ventral surface flat. Size: 25×17×3 mm.

- 2005.14.1076.28. (Fig. 12: 13).

Buda hornstone.

Arrowhead: L/triangular, hollow-based. Large, its base is slightly concave; its dorsal surface is concave, its ventral surface flat. Size: 28×20×5 mm.

Feature 1076: adult female's urngrave; the finds were among the bones.

Five pieces in one feature

- 2005.14.1082.5. (Fig. 12: 14).

Buda hornstone, white version.

Arrowhead: M-L/triangular, concave-based. Its dorsal surface is concave; its ventral surface is flat. Size: 24×17×6 mm.

- 2005.14.1082.6. (Fig. 12: 15).

Buda hornstone.

Arrowhead: M-L/triangular. Slim, long form with narrow, flat surfaces; its base is asymmetric and very strongly concave. Size: 23×15×2 mm.

- 2005.14.1082.7. (Fig. 12: 16).

Buda hornstone.

Arrowhead: L/triangular. Slim, longer form, large and narrow; its base is asymmetric and concave; both surfaces are flat. Size: 29×17×2 mm.

- 2005.14.1082.8. (Fig. 12: 17).

Buda hornstone.

Arrowhead: M-L/triangular. Slim, longer form, its base is concave, asymmetric; its dorsal surface is concave, its ventral surface flat. Size: 25×16×3 mm.

- 2005.14.1082.9. (Fig. 12: 18).

Buda hornstone with cortex on its dorsal surface.

Arrowhead: S. Its base is slightly concave, asymmetric; the dorsal surface is concave, the ventral surface flat. Size: 21×16×3 mm.

A further 4 chips (Fig. 12: 19):

- Buda hornstone, proximal fragment of a blade; its distal end was truncated in line; there is one ridge on its dorsal surface, no bulb; the platform is diedre with cortex; a soft hammer was used for hitting; 28×16×4 mm.

- Buda hornstone, blade-like atypical flake; there is one ridge on its dorsal surface; 31×17×9 mm.

- Buda hornstone, flake, unworked; the platform is diedre; the bulb is large; 22×30×3 mm.

- Buda hornstone, atypical flake, 30×29×7 mm.

Feature 1082: adult's inhumation grave.

Seven pieces in one feature

- 2005.14.616.15. (Fig. 12: 20).

Buda hornstone.

Arrowhead: L/triangular. Its dorsal surface is concave, its ventral surface flat; the base is concave and asymmetric. Size: 29×17×3 mm.

- 2005.14.616.16. (Fig. 12: 21).

Buda hornstone, white version.

Arrowhead: M-L/triangular. Its dorsal surface is concave, its ventral surface flat, its base slightly concave, asymmetric. Size: 25×18×6 mm

- 2005.14.616.17. (Fig. 12: 22).

Buda hornstone.

Arrowhead: VS/triangular. Small with a strongly concave base, its dorsal surface is concave; its ventral surface is flat. Size: 17×16×3 mm.

- 2005.14.616.18. (Fig. 12: 23).

Buda hornstone, purple version (burnt?)

Arrowhead: M-L/triangular, slightly concave-based. Small, robust, its ventral surface is flat; its dorsal surface is perhaps half-finished without retouches; only the edges are retouched. Size: 23×16×6 mm.

- 2005.14.616.19. (Fig. 12: 24).

Dull, red radiolarite with stripes: Carpathian, or from the Gerecse Mountains(?). Very light: burnt(?).

Arrowhead: M-L/triangular. The base is strongly concave; the dorsal surface is concave, the ventral surface flat. Size: 25×16×3 mm.

- 2005.14.616.20. (Fig. 12: 25).

Szentgál radiolarite.

Arrowhead: M-L/triangular. Slim, longer form, its ventral surface is flat; its base is strongly concave. Size: 23×14×3 mm.

- 2005.14.616.21. (Fig. 12: 26).

Black lydite pebble.

Arrowhead: S/triangular. The base is strongly concave; the dorsal surface is concave, the ventral surface flat. Size: 21×15×3 mm.

Further debitage, Buda hornstone (Fig. 12: 5):

- Two atypical flakes: 34×22×9 and 23×15×6 mm; one typical flake, the platform is diedre; the bulb is small, 27×23×6 mm.

Feature 616: 23–59-year-old female's(?) grave, inhumation, contracted; the arrowheads were near the pots; the wrist-guard was on the left arm.

Grave 467: The 'artisan's grave': 31 chipped stones (Fig. 12: 5).

Longer, slim bifacial points made from orange-white transparent pebble limno-quartzite:

- 2005.14.467.45. (Fig. 12: 32).

Intact point on blade: L/slim, triangular, hollow-based. On the dorsal surface there is one ridge; the edge was bifacially retouched; on the right edge there is bifacial use-wear shine. Size: 34×17×5 mm.

- 2005.14.467.46. (Fig. 12: 33).

Point: broken or truncated at its base: L/slim, triangular. Size: 31×14×6 mm.

- 2005.14.467.47. (Fig. 12: 34).

Point, broken at its distal and proximal ends: M-L/slim, triangular. Asymmetric with rough retouches, on its edge the retouch is a little finer. Size: 26×18×5 mm.

Chip from the same raw material with a hole in its middle (Fig. 12: 44). Size: 28×29×7 mm.

Bifacial, triangular arrowheads with concave base of Buda hornstone:

- 2005.14.467.36. (Fig. 12: 35).

Arrowhead pre-form, slim, atypical flake

with cortex on its dorsal surface: L/triangular, concave-based. Size: 28×23×3 mm.

- 2005.14.467.38. (Fig. 12: 36).

Arrowhead pre-form: VL/triangular. Flat, triangular, atypical flake with concave base and original pebble platform. Size: 42×35×6 mm.

- 2005.14.467.39. (Fig. 12: 37).

Arrowhead pre-form: L/triangular. Flat, geometric with transversal shear. Blade-like, slim, atypical flake segment. Size: 28×14×4 mm.

- 2005.14.467.41. (Fig. 12: 39).

Arrowhead pre-form, triangular with rectangular base, atypical flake. Size: 48×36×14 mm.

- 2005.14.467.42. (Fig. 12: 38).

Arrowhead pre-form: VL/triangular. Robust, tanged arrowhead, pre-form on atypical flake with original pebble platform at its proximal end. Size: 40×28×8 mm.

- 2005.14.467.48. (Fig. 12: 27).

Arrowhead: M-L/triangular, flat-based. It has a flat ventral surface, does not have a concave base. Size: 25×19×6 mm.

- 2005.14.467.49. (Fig. 12: 40).

Half-finished arrowhead or saw: S/triangular, flat, geometric with transversal shear / denticulated edge(?). Crescent-shaped atypical flake with edge retouch on its left side on its dorsal surface. Size: 23×16×6 mm.

- 2005.14.467.50. (Fig. 12: 41).

Arrowhead pre-form(?). Blade-like flake fragment. Size: 16×14×2 mm.

- 2005.14.467.51. (Fig. 12: 31).

Arrowhead: L/triangular, flat, geometric with transversal shear. Triangular-shaped, atypical flake with one ridge on its dorsal surface, and original pebble platform on its base. Size: 30×20×7 mm.

- 2005.14.467.52. (Fig. 12: 28).

Arrowhead: VS/triangular. Very flat, the left barb is shorter; its base is asymmetric and very concave. Left-handed(?). Size: 20×16×3 mm.

- 2005.14.467.53. (Fig. 12: 29).

Arrowhead: S/triangular. Its dorsal surface is concave, its ventral surface flat, asymmetric; the left barb is shorter; it has a

strongly concave base. Left-handed(?). Size: 23×16×4 mm.

- 2005.14.467.54. (Fig. 12: 30).

Arrowhead: VS/triangular. Its ventral surface is flat; the base is concave, symmetric. Size: 20×15×3 mm.

Chips, debitage of Buda hornstone:

- 2005.14.467.24. Atypical initial flake from the core with cortex on its dorsal surface, 41×28×11 mm.

- 2005.14.467.25. Atypical blade-like segment, 34×26×11 mm.

- 2005.14.467.26. Atypical flake, 33×45×7 mm.

- 2005.14.467.27. Atypical flake, 41×29×6 mm.

- 2005.14.467.28. Atypical flake, 35×21×7 mm.

- 2005.14.467.29. Pebble fragment, 46×27×12 mm.

- 2005.14.467.30. Atypical flake, initial from the core with cortex on its dorsal surface, 33×34×10 mm.

- 2005.14.467.31. Flake; its platform is smooth; the bulb is small; 26×22×4 mm.

- 2005.14.467.32. Blade-like atypical segment with cortex on its dorsal surface, 35×23×8 mm.

- 2005.14.467.33. Atypical segment with cortex on its dorsal surface, 27×18×7 mm.

- 2005.14.467.34. Blade-like atypical flake with retouches on its right-lower edge: saw, 24×17×6 mm.

- 2005.14.467.35. Atypical segment with pebble cortex on its dorsal surface, 32×30×7 mm.

- 2005.14.467.40. Blade-like flake; the bulb is in the middle; the platform is diedre; 22×21×4 mm.

- 2005.14.467.43. (Fig. 12: 42). Atypical borer on long, blade-like flake, 42×16×10 mm.

Feature 467: empty gravepit; the finds were in the south end of the pit with pots, a bronze needle and a wrist-guard.

Atypical finds, chips and debitage of Buda-type hornstone

- 213/3. Typical flake; the platform is diedre; the bulb is small, 44×32×6 mm.

Feature 213: scattered urn grave of an adult woman; the find was among the bones.

- 2005.14.233.2. Atypical flake, 32×25×8 mm.

Feature 233: scattered urn grave of an adult man.

- 668.2. 1. Atypical flake, 25×28×5 mm. 2. Atypical flake, 35×18×4 mm.

Feature 668: urn grave(?); the finds were near the pot.

- 801.5. (Fig. 12: 47). Atypical, D-shaped segment with cortex on its dorsal surface, 46×31×13 mm.

Feature 801: urngrave of a 23–39-year-old man; the finds were in the urn.

- 847/5. Flake; the platform is diedre; the bulb is large, 29×30×7 mm.

- 847/7. Blade-like atypical flake with cortex, 36×24×10 mm.

- 847/6. Atypical flake, 38×26×9 mm.

Feature 847: inhumation grave of a 23–x-year-old man with a wrist-guard.

- 1118. (Fig. 12: 48). Four atypical flakes of Buda hornstone: 30×28×8, 31×18×8, 30×17×7, 32×17×7 mm; 1 of limnoquartzite: 39×18×13 mm.

One saw on an atypical flake, Buda hornstone; broken at its ends, it has bifacial re-touches on its edge; 33×18×6 mm.

Flake from a pebble; the bulb is large; the platform is smooth; 30×39×10 mm.

Feature 1118: There were two wrist-guards, a polisher and two axes in the grave.

- 1274. (Fig. 12: 50).

Six atypical flakes, burnt: 31×24×7, 30×20×12, 28×19×7, 28×18×8, 28×17×8, 24×20×7 mm.

Feature 1274: empty gravepit with a wrist-guard.

- 1318/4. Two atypical flakes: 37×42×6 and 36×40×13 mm. Atypical borer: 40×21×9 mm.

Feature 1318: urn grave of an adult man; the finds were under the urn.

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