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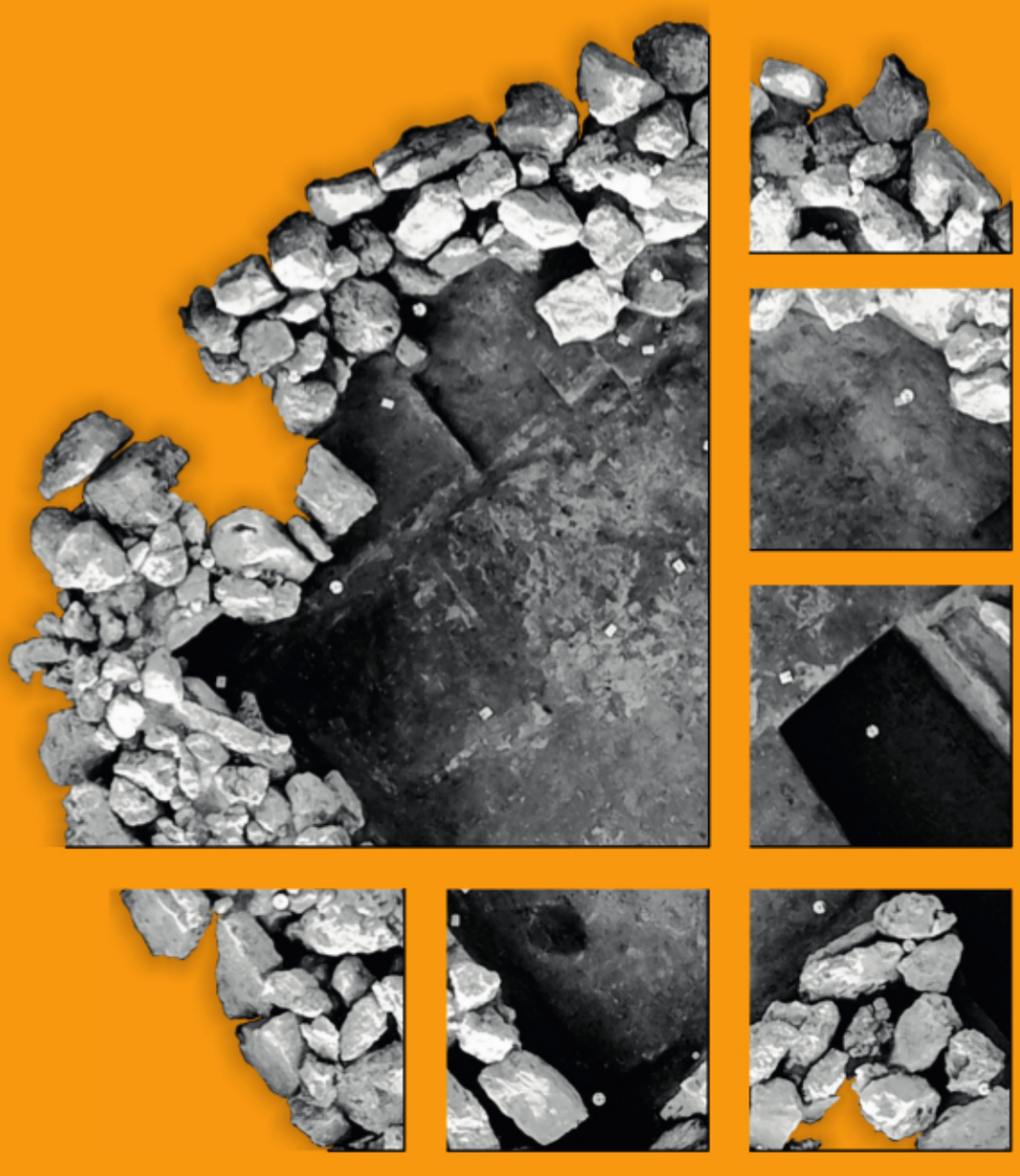

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Short report on the archaeological research of the Late Iron Age cemetery at Gyöngyös

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Abstract

In the foreground of Mátra Mountains – a few kilometres to the west from the recently published Celtic necropolis of Ludas-Varjú-dűlő 1 – several graves of a Late Iron Age cemetery were discovered by the cooperation of István Dobó Castle Museum (Eger) and Eötvös Loránd University (Budapest) during the winter of 2015–16. At the site of Gyöngyös-Külső-Mérges-patak 1, a biritual cemetery of the La Tène period was unearthed. The necropolis contained both cremation and inhumation graves and also two symbolic graves – a proportion which corresponds to other La Tène cemeteries in Northeastern Hungary. The unearthing of 154 burials from the La Tène period is an unexpected result, and the cemetery of Gyöngyös should be considered among the important Celtic necropolises of Hungary according to the richness and high quality of finds.

The mountainous region of the Mátra in Northeast Hungary is particularly rich in archaeological finds from the Late Iron Age.[1] It is hard to find a present day settlement within the administrative area of which no Celtic artefacts or burials are known. Among the many sporadic data the first remarkable excavation of a cemetery was carried out during 1957–1958 in connection with the construction of Road 21 in the vicinity of Mátraszőlős. During the excavation Pál Patay saved 62 cremation and inhumation graves on the site named Királydomb.[2] In 2003, close to the cemetery a few sunken-floor buildings were unearthed from the same period. The settlements ceramics recovered here represent both the western traditions of the Celts as well as the conventional pottery making of Scythian origin.[3] As it had already been well

1 Hunyadi 1957, 161–175; Patay 1956, 186–191; Hellebrandt 1999, 147–182; Almássy 2010, 195–203.
2 Patay 1972, 353–358.
3 Tankó – Vaday 2010, 137–157.

demonstrated in the case of the Sajópetri settlement[4], the co-existence of Celts and a local population featuring Scythian characteristics was also proved by the analysis of the ceramic material in Mátraszőlős.[5] The rescue excavation of the Ludas necropolis in 2001–2002 was an important milestone of Late Iron Age research in Hungary.[6] The analysis and publication of the 82 graves was a major step forward in the recognition of the military society of Celts in this region.[7]

The site

In the foreground of the Mátra Mountain – approximately 10 kilometres to the west from the recently published Celtic necropolis of Ludas-Varjú-dűlő[8] – several graves of a Late Iron Age cemetery were discovered during the winter of 2015–2016. The first Iron Age burial came to light during the course of an archaeological inspection carried out on the site Külső-Mérges-patak no. 1 just outside Gyöngyös. First a bended iron sword and a spearhead were found with the help of a metal detector used in the recovering and disposal process of an unexploded ordnance. The finds were in the agriculturally cultivated topsoil; no data of their archaeological context was recorded. The company in charge of the topsoil stripping, Hyginett Ltd., notified the Department of Building and Cultural Heritage of the Eger District Authority as well as the István Dobó Castle Museum in Eger. This latter was commissioned by the Department of Cultural Heritage to monitor the topsoil stripping of the area of approximately two hectars prior to the construction of an industrial building camp at the Eastern Industrial and Commercial Park in Gyöngyös.

The archaeological site is situated in the contact zone of the Northern Mountainous Region and the Great Hungarian Plain on a southern slope of the Mátra Mountain *(Fig. 1)*. It lies along the Külső-Mérges Stream, at the point where the stream drops down from the southern slope of the Mátra Mountain onto the lowland and begins to meander over its flood plain. The present landscape, dominated by intensively cultivated agricultural fields, wineyards, industrial properties, the M3 motorway and other roads, makes it difficult to visualise how the environs of the site at Gyöngyös might have looked in the past. However, based on the undisturbed areas, it seems that the immediate surroundings of the site were determined by the south-north valley connecting to the southern flood plain and the small alluvial mounds in front of the slope along the eastern side of the valley. The Iron Age burials came to light on one of the alluvial mounds alongside the Külső-Mérges Stream, where Procter & Gamble lounched an industrial construction approximately 11 kilometres to the south-east of Gyöngyös.

After the discovery of the first finds and the archaeological inspection which revealed the proximity of more graves, rescue excavation started at the southern end of the cemetery in December of 2015. The black humus topsoil was intensively cultivated for decades, therefore it was stripped by backhoe, resulting in a ground surface about 30-70 cm lower than the surrounding modern ground level *(Fig. 2, above)*. Despite the stripping of the agricultural cultivated topsoil a number of archaeological features survived to be exposed during the continuous inspection.

4 Szabó 2007; Szabó – Tankó – Szabó 2007.
5 Tankó 2010, 321-325.
6 Domboróczki 2004, 5–23; Szabó – Tankó 2006.
7 Szabó – Tankó 2012.
8 Szabó et al. 2012.

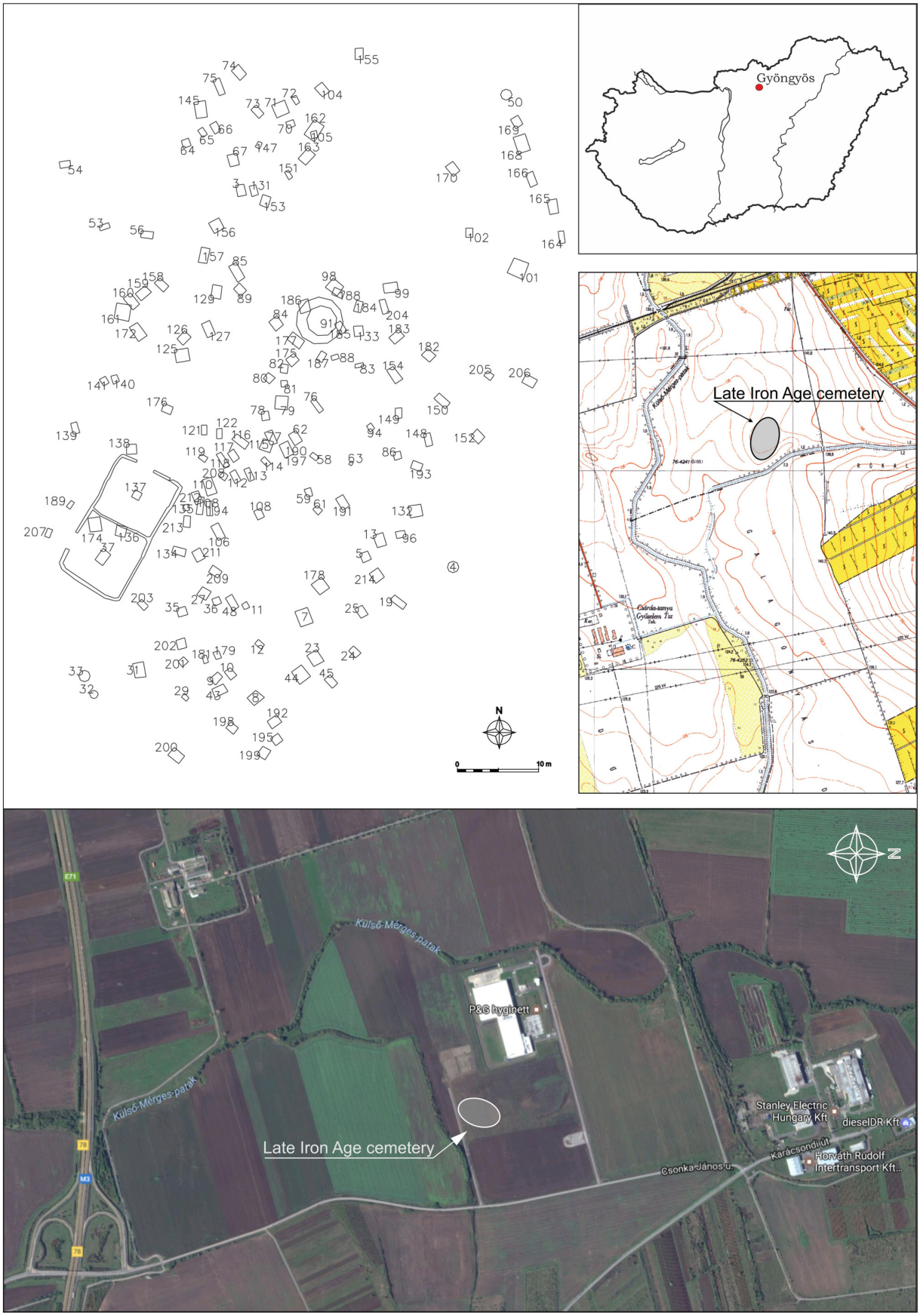

Fig. 1. Gyöngyös – Külső-Mérges-patak 1. Excavation plan and topographical situation of the Late Iron Age cemetery (Drawing: K. Tankó).

After the removal of the black humus, rectangular graves appeared on the ground surface *(Fig. 2, below)*. The burial pits were usually backfilled with the brown-black topsoil or a mix of humus and subsoil which was removed when the original pit was digged out. Some parallelly running ditches were also observed on the site which could be associated with medieval and later cultivation.

The first stage of the campaign, performed by the staff of the István Dobó Castle Museum, uncovered 13 Celtic graves and identified 52 features on the ground surface. Due to the infavourable weather conditions in the winter of 2015, the excavation was suspended until the early months of 2016. It became obvious at an early stage of the project that the graves are richer and have a higher number as formerly expected. Therefore at the end of February 2016 the excavation became a joint operation involving staffs from both the Institute of Archaeological Sciences and the MTA–ELTE Research Group for Interdisciplinary Archaeology at the Eötvös Loránd University.

The results of the excavation

At the site of Gyöngyös a biritual cemetery (containing both primary inhumations and cremation burials) of the La Tène period was unearthed. The 154 graves of the cemetery contained 125 cremations, 19 inhumations as well as 2 symbolic graves. These ratios correspond to other La Tène cemeteries uncovered in Northeastern Hungary. Across this region, the dual ritual burial tradition dominates the Celtic cemeteries throughout the period. It seems to be tendentious that the number of inhumations is significantly lower than the number of cremations. For instance at Mátraszőlős, similarly to Ludas, hardly any inhumations were documented.[9] In terms of burial practice, Vác and Sajópetri are slightly different since here more than one-third of the burials were cremations.[10] However, some graves were strongly disturbed at Gyöngyös. The inhumation graves were mostly shallow and thus often destroyed by the ploughing cultivation also disturbed a few cremation burials on the higher part of the hill. Beside the traces of agricultural activity, grave robbers and quasi contemporary posthumous manipulations could also be observed in certain burials.

A special feature of the cemetery were two quadrangular ditches which enclosed graves *(Fig. 1–2)*. These ditches were connected to eachother forming a coherent system, while they had two separate entrances: one on the northeast and the other on the northwest side. Unfortunately we have no information the richness of the graves enclosed by the ditches as they were formerly robbed. Only some animal bones and pottery fragments came to light from the fillings of these disturbed burials. This phenomenon was not unique as other entirely robbed graves were also documented in the necropolis. We believe that because of the apparent mounds the exact places of the burials were easy to guess at for a long time even after the Celts abandoned the graveyard. According to a research of belgian sites, the backfilling of burial pits with the topsoil and the gravelly subsoil must have been deliberate as it formed a more stable base for a burial mound.[11]

9 Patay 1972, 353; Tankó – Tankó 2012, 250.
10 Hellebrandt 1999, 84; Szabó 2005, 62
11 Cahen-Delhaye 1974, 8.

Fig. 2. Gyöngyös – Külső-Mérges-patak 1. Topsoil stripping on the site (above) and the ground surface of the Late Iron Age cemetery (below) (Photos: K. Tankó).

Another analysis also indicated significant soil compression in the fillings of graves, which suggested the presence of a considerable burden over the burial at some stage, possibly the material of the mound.[12] However if mounds indeed existed, they would have been effectively destroyed by furrow cultivation from the medieval to the recent period, evidence for which survived on some areas of the site.

At Gyöngyös, approximately one-sixth of the graves represent the inhumation rite. The skeletal remains recovered from the site were very poorly preserved as a result of various chemical reactions in local soils and microbial degradations.[13] Often only the imprint of the bones and the teeth could be documented. In the graves which were dug deeper into the sandy undersoil bones were better preserved. The main orientation of the inhumation burials was south-north. There were only a few graves with a slightly different south/southeast-north/northeast directions. Traces suggesting coffins could be observed in many cases. In the early La Tène necropolises the deceased were commonly buried laying extended on their back. In the case of the biritual cemeteries of the La Tène B2/C1 period the inhumation rite certainly implies the reflection of an earlier Celtic tradition.[14]

A few burials called our attention with their peculiar assemblage of grave goods. For instance grave no. 113 deserves special mentioning *(Fig. 3a)*, in which a skeleton of a young girl was laid appareled with a rich set of jewellery. A three-row bronze necklace, two amber ring-beads and many glass beads decorated her neck *(Fig. 3d)*. A bronze bracelet was found on her right forearm, while a sapropelit ring was on her left forearm *(Fig. 3c)*. There was a silver fingering on her left hand and she wore an iron belt on her waist. She also had a pair of anklets made of bronze *(Fig. 3b)*. An interesting artefact was found beside the skeleton: a spherical clay rattle *(Fig. 3c)*, which has rare but close analogies in other children's graves of the La Tène culture.[15]

In Gyöngyös, the cremated remains *(Fig. 4, 7)* were recovered from diverse archaeological contexts. Cremations were generally placed into a rectangular-shaped grave pit with straight walls and a flat bottom. The remains were either scattered on the bottom or were piled up in a little heap. This heap of bone fragments could be round, oval or rectangular. The burnt and deformed metal ornaments were found mostly among the human remains, or – occasionally – separately. In some cases the human remains were put into an urn. Alternatively, the calcinated bones were scattered all over the bottom or in the filling of grave. At least one of the cremation graves contained a double burial. The remains of the cremation grounds have not been found on the site so the question of their location must remain open, although they were probably situated inside the cemetery or nearby. Similarly to the former observations made at Ludas[16] and Sajópetri[17] the grave assemblage of cremation burials consisted of ceramic vessels, animal offerings and iron knifes beside the personal belongings such as jewellery and weapons. The latter were found in a separate heap or mixed with the human ashes *(Fig. 4b)*.

12 Carter et al. 2010, 34–35.
13 Mays 2010, 23–27.
14 Bujna 1982, 320–321; Szabó 2006, 62.
15 Ilon 2008; Ilon – Nagy 2010, 77; Horváth 2009; Horváth 2010.
16 Szabó – Tankó 2006; Szabó – Tankó 2012.
17 Szabó 2006.

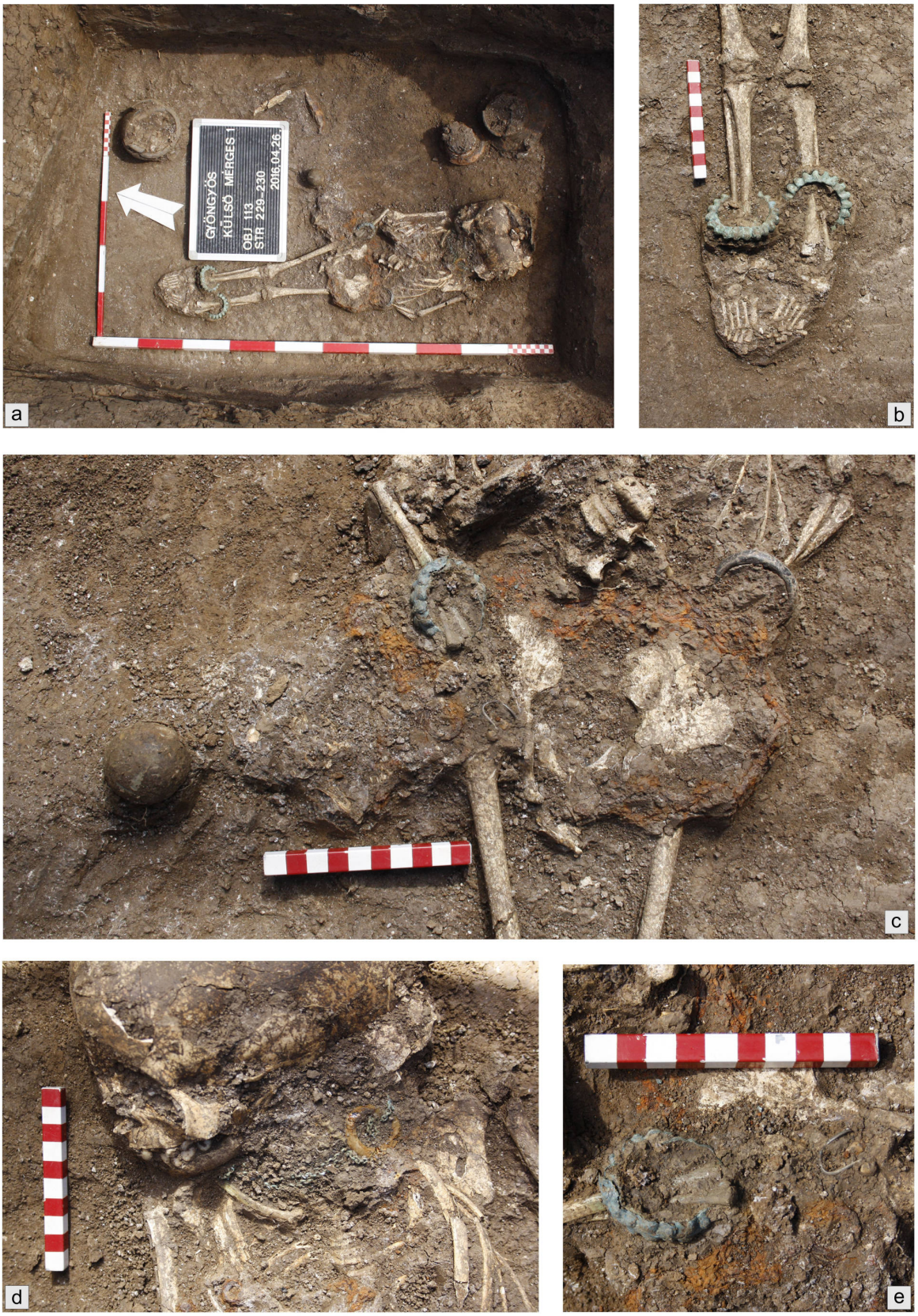

Fig. 3. Gyöngyös – Külső-Mérges-patak 1. Inhumation grave No. 113 (Photos: K. Tankó).

The weapons and the jewellery recovered from the graves attest to a relative welfare. Bronze bracelets, anklets, glass or sapropelit jewellery, finger-rings, different types of iron and bronze fibulae, rarely bronze torques or small chain-necklaces with amber ring-beads came to light from the female burials *(Fig. 4b, 4f)*. In the cremation graves of men we often found bended iron swords in scabbards with a suspension chain-belt, spearheads and shield buckles *(Fig. 4c)*. Based on the artefacts showing traces of fire it can be concluded that the deceased were cremated wearing a full costume as well as jewellery or other items of clothing.[18] The metal finds recovered from the necropolis are characteristic La Tène types. However, the iron objects were in a very fragile condition and often the thin iron jewellery perished completely in the wet clay subsoil. In some cases the conservators advised against further exposure of some iron objects *in situ*, which were left in soil blocks to be lifted at the end of the excavation and excavated in controlled conditions in the conservation laboratory at the Conservation Department of the Hungarian University of Fine Arts. The wooden, leather and textile fragments only survived in a mineralised form where they had been in contact with iron or bronze objects. Therefore a metal detector survey was also carried out prior to and during the excavation. This was to flag up the position of possible buried metal objects in order to allow a gentle approach to their recovery. The area around the burials was also re-examined prior to excavation for evidence of any associated features.

Ceramic vessels and animal bones found in the graves testify for the custom of depositing food and drink for the deceased *(Fig. 4a, 4d, 4e)*. These also bear testimony to the Celtic belief in the afterlife and a consistent funerary practise at the Gyöngyös cemetery. Same as in the above mentioned Iron Age graveyards, the majority of tombs contained ceramic vessels, which belonged to a dinner set. In its most common form – similarly to Ludas[19] – ceramic sets consisted of a larger pot, a smaller pot and a bowl. Only a few graves were without pottery, for instance grave no. 201. Similar to Sajópetri[20], preliminary analyses show that the inhumation burials in Gyöngyös can also both be linked with males and females while warriors were always cremated. We did not find any inhumation graves containing weapons at Gyöngyös.

The analysis of the knob-footed bronze fibulae with or without plastic ornaments confirm that the horizon of appearance of the Celts in the region of the Mátra Mountain can be dated to the beginning of the La Tène B2 period in the end of the 4th century BC. On the other hand the iron wire fibulae and their bronze analogies form the cemetery can be dated to the La Tène C1 period.[21] This means that the establishment of the necropolis unearthed at Gyöngyös probably goes back to the end of the 4th century BC, it was mainly used in the 3rd century BC and abandoned at the beginning of 2nd century BC. In some cases the burials can be connected without doubt to the population of the Vekerzug Culture (or Alföld Group) featuring Scythian characteristics. This is not suprising since the excavation of the Late Iron Age settlement at Sajópetri– Hosszú-dűlő, where according to the finds a significant population of Scythian origin lived beside the Celts during the La Tène period.[22] A similar co-existence is also presumable in the Mátra Region.

18 Similar to other cemeteries: Dizdar 2013, 35.
19 Szabó – Tankó 2012, 138–140, Fig. 183.
20 Szabó 2006, 63.
21 Szabó – Tankó 2006, 330–334; Szabó – Tankó 2012, 141–142.
22 Szabó et al. 1997, 81–86, 182–183; Szabó 2007, 325–327.

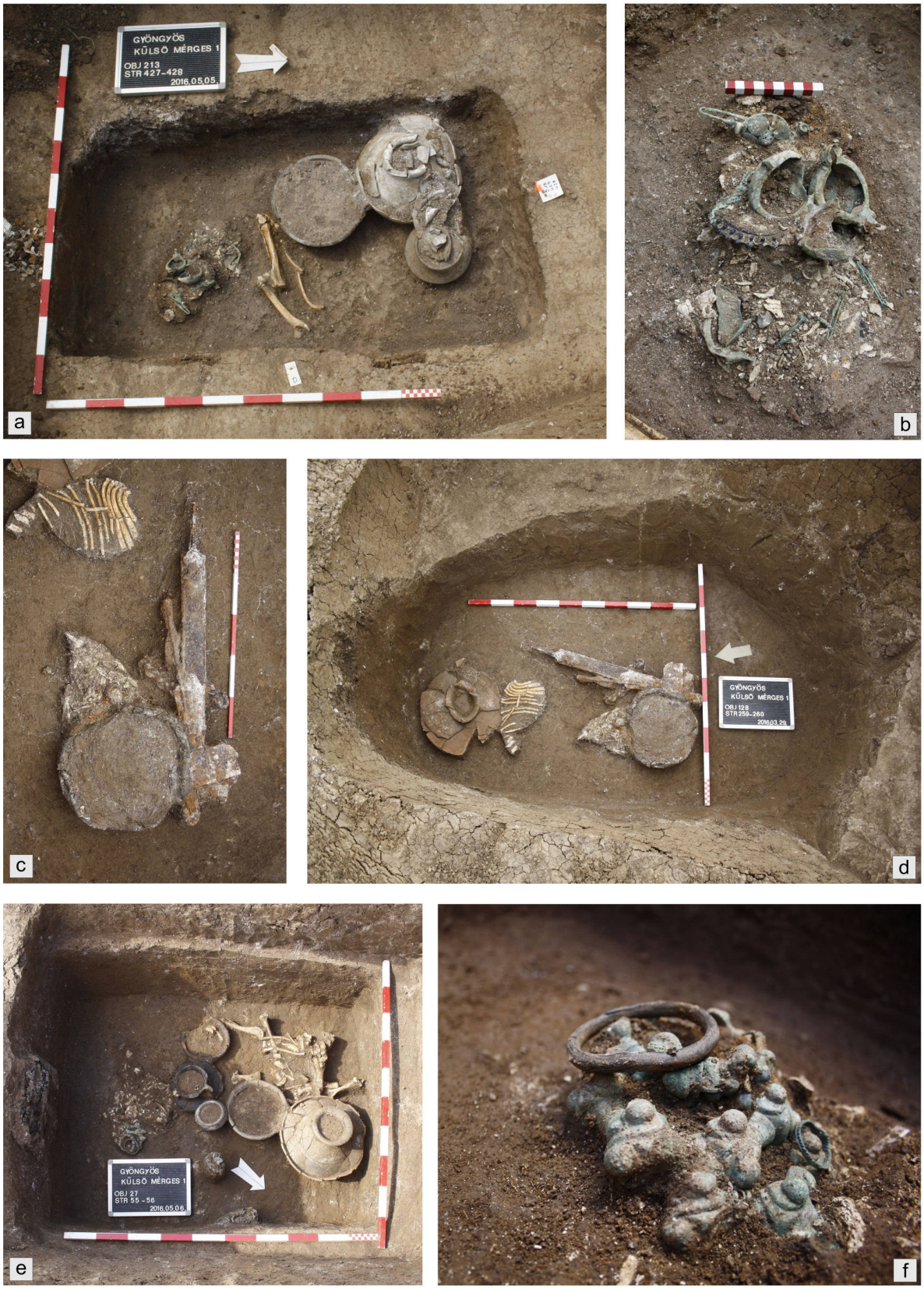

Fig. 4. Gyöngyös – Külső-Mérges-patak 1. Cremation grave No. 213. (a-b), No. 128. (c-d) and No 27. (e-f) (Photos: K. Tankó).

Fig. 5. Gyöngyös – Külső-Mérges-patak 1. Part of the excavation on the aerial photo made by a drone (Photo: István Dobó Castle Museum).

Magnetic survey

On the 5th April 2016, an experimental magnetic survey took place in the southern zone of the excavation of the Celtic cemetery, on a 40 by 20 metres section. The approximately 50 cm thick humus layer was previously removed from the area for the excavation, and the archaeological features were already marked. The survey was affected by a container at the southwest corner, cars parking at the southeast corner, and an iron rod construction as temporary coverage for the graves, as well as the spoil heaps in northeast direction to the measured field *(Fig. 6)*.

The survey was carried out with GSM-19 Overhauser magnetometers, owned by the István Dobó Castle Museum in Eger. The lower probes were 50 cm, the upper ones were 210 cm over the ground. The survey was carried out by Sándor Puszta, Zoltán Czajlik, Csaba Bálint and Ágnes Benedekfy in a 1×1 meter raster grid, which was staked out by Sándor Tanyi. The data were processed by Sándor Puszta (reduction to pole, downward continuation, band pass filtering), and the results were matched with the feature-map by László Rupnik and Károly Tankó.

Before evaluating the magnetic map, it is important to note that the distance between the probes and the undisturbed layer of the archaeological features were much less than usual due to the previous removal of the topsoil on the entire surface. This resulted in a much sharper, detailed anomaly map. In fact, objects with a disturbing effect could have remained on the surface in spite of the attempt to remove all iron nails in connection with the excavation work. This problem is indicated by some magnetic anomalies with no connection to archaeological features at the

northern part of the surveyed area. As for the most outstanding anomaly (close to the 717903; 267117 EOV-coordinates) the possibility that it indicates an unexcavated feature cannot be excluded due to the lack of a verification excavation beyond the level of the documented graves.

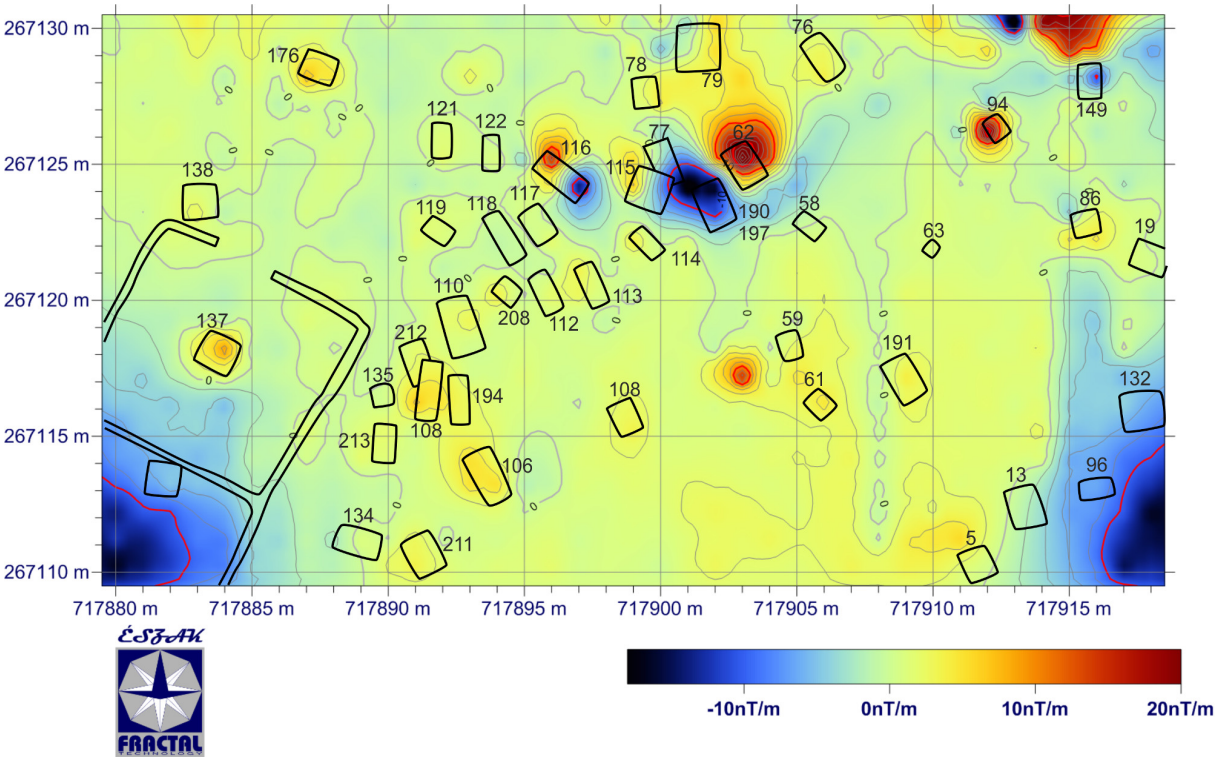

Fig. 6. Gyöngyös – Külső-Mérges-patak 1. Part of the excavation plan with the magnetic map (Plan: S. Puszta, L. Rupnik, K. Tankó).

Considering the above mentioned factors we can state that the magnetic and excavation maps correspond well. We should point out that this actually means a correspondence with the objects with magnetic effect placed in the graves (in our assumption, smaller or larger grave goods made of iron), rather than a correspondence with the outline of the features. Graves no. 115 and 116 with swords should be highlighted – in the case of the latter, a strong dipole indicates the position of the magnetic agent, namely the Celtic sword. Cremation grave no. 62, containing only an iron bracelet, is also remarkable, as this artefact caused a strong anomaly as a result of the shallowness of the grave. Cenotaph grave no. 94, which contained several iron weapons, also gave the signal of a spectacular magnetic anomaly.

Presumably the effect of larger fired clay vessels such as urns should also be detected on the anomaly map, although this would need further detailed analysis. It should also be noted that graves situated close to eachother sometimes gave a combined anomaly as a result (for example in the case of graves no. 108 and 212 in superposition, and grave no. 194 next to them).

Graves no. 176 and 137 were robbed, therefore the anomaly they caused can be assigned to the grave pit (as they were lacking iron objects), which indicates that they have been open for a long time and filled up slower than the other graves. It is noticeable however that the ditch frame of grave no. 137 does not appear on the anomaly map, which reflects the lack of any magnetic effects of this narrow and shallow feature.

Creating the detailed anomaly map corresponding with the excavation plan was unquestionably beneficial from a methodological point of view, although we have to emphasize that the circumstances were ideal as most of the Late Iron Age graves at Gyöngyös contained iron objects. Therefore, it is necessary to gain more experience in the future for accurate analyses, with detailed magnetic surveys on further excavation surfaces with different types of archaeological features.

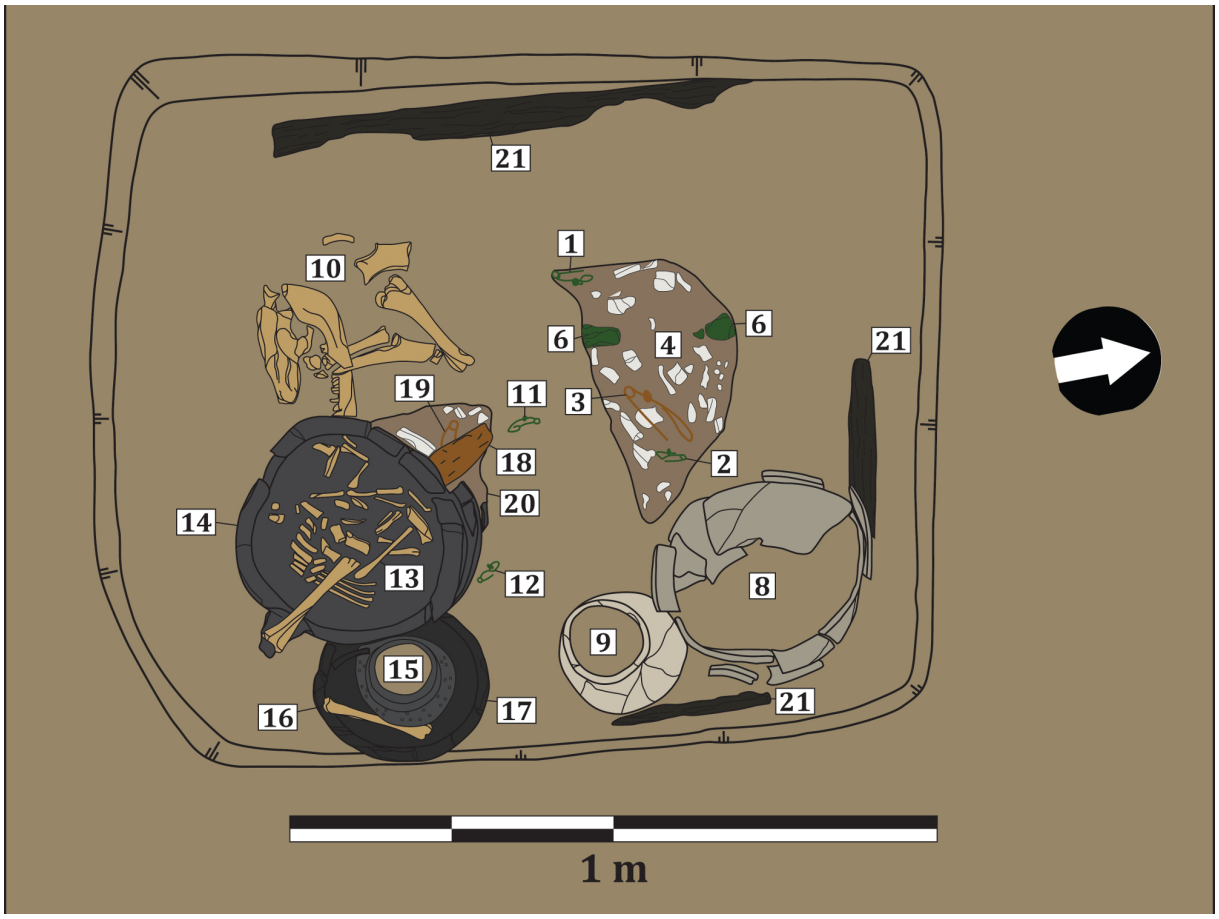

Fig. 7. Gyöngyös – Külső-Mérges-patak 1. Grave No. 155 (Drawing: L. Rupnik).

Documentation of the graves using 3D photogrammetry: first results

The methods to generate three dimensional models based on a series of photographs have recently received increasing attention. The description of its development and all details is beyond the limits of this paper, but its importance as a tool of documenting the archaeological heritage has been pointed out by several researchers.[23] Due to the spread of RPAS technology, the affordable digital cameras and the user-friendly image processing softwares, 3D photogrammetry has become a common part of the toolkit used by archaeologist around the world. The new method has also been successfully implied in Hungary.[24] This was the first time that it was employed by the Eötvös Loránd University, thus our primary goal was to learn and gather experience with the new technique.

23 For example: Torres et al. 2012; De Reu et al. 2013; De Reu et al. 2014.
24 Balogh et al. 2014; Balogh – Kiss 2014; Vágvölgyi et al. 2016.

The availability of data acquisition has been limited by the fact that the excavation was to be carried out as fast as possible. However we have done all we could to get the best possible results at the same time. A hand-held Canon EOS 1000D digital camera mounted with a Canon Zoom Lens EF-S 18–55 mm objective has been used for capturing the photos. Neither a tripod nor a pole have been applied. We were taking photographs around and above the graves with a high percentage of overlapping *(Fig. 8)*. This means 30 to 60 pictures per burial which form a dome-like structure surrounding the archaeological feature. In the case of deeper graves, additional exposures were taken inside the pit in order to avoid blind spots and improve the quality of further processing. Four ground control points measured by RTK GPS device have been set along each side of the graves so that the images could be georeferenced later. In order to speed up the excavation work, an excavator was used and the removed soil was not carried away from the site. These circumstances have led to a moon-like bumpy surface which in several cases made it hard to move around the graves. We were also not able to wait for the best light conditions with taking the captures, thus shadows and highlighted areas might have influenced the quality of the processing in a negative way. Nevertheless, we concluded that the method can be a feasible and affordable part of the documentation. It does not need an expensive capturing device and the acquisition can be applied even beside unfavourable terms in the hope of an acceptable result.

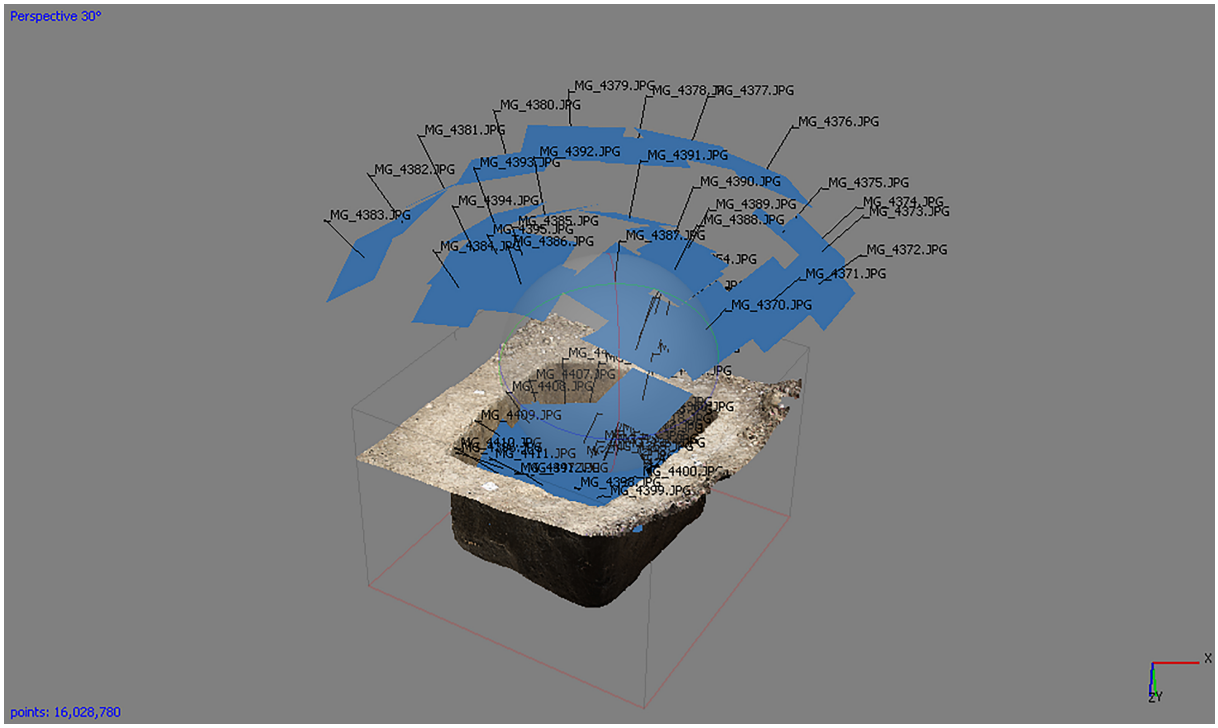

Fig. 8. Gyöngyös – Külső-Mérges-patak 1. Photo positions of the grave No. 155 (Generated by L. Rupnik).

The evaluation of the data is still in progress, but the 3D models of some graves have been created using basically two softwares: Agisoft PhotoScan Professional Edition (Vers. 1.2.6) and MeshLab 2016.12. The basic workflow of the PhotoScan consists of four main stages: creation of a sparse point cloud with aligning the images, producing a dense point cloud, building a mesh and generating a 3D model texture. The steps of the process can be seen on *Fig. 9* on the example of grave no. 155. The final model was exported for further modification and

visualisation with the help of MeshLab *(Fig. 9–10)*. The 3D model of the grave is not only a spectacular element, but it also helps us to understand other details of the documentation. Our final objective is to imply the same process for all possible graves and in the end, to create the complete model of the whole cemetery.

Summary

The extent of the cemetery significantly surpassed our preliminary expectations. The unearthing of 154 burials from the La Tène period is an unexpected result, which ranks Gyöngyös among the most important Celtic necropolises of Hungary. After the above mentioned previous research results it is easy get a picture of the richness of the Gyöngyös cemetery and the high quality finds even before the beginning of restauration work. Allthough the necropolis in Gyöngyös is not a unique discovery for Northeast Hungary, and the graves have many close parallels in the Ludas, Mátraszőlős or Sajópetri cemeteries, it still is a site of considerable importance in the Iron Age of the Carpathian Basin.

Acknowledgment

The rescue excavation was financed by Procter & Gamble. The archaeomagnetic survey was funded by the National Research Fund (project ID: NKFIH 111058). The archaeological research was realised by the István Dobó Castle Museum (Eger) with the collaboration of the Institute of Archaeological Sciences, Eötvös Loránd University and the MTA-ELTE Research Group for Interdisciplinary Archaeology (Budapest). The research of Károly Tankó was supported by the János Bolyai Research Scholarship of the Hungarian Academy of Sciences.

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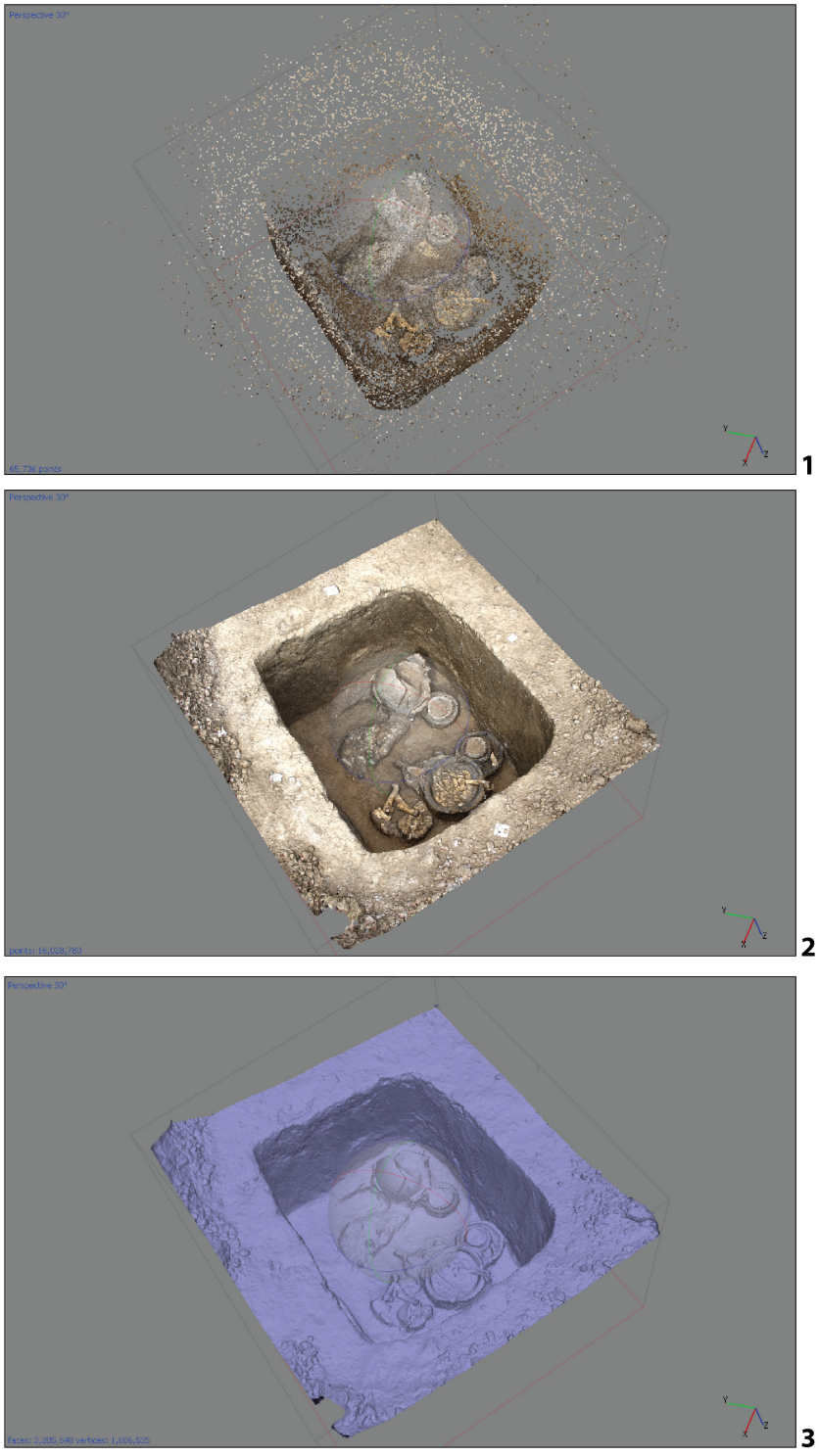

Fig. 9. Gyöngyös – Külső-Mérges-patak 1. Documentation of the grave No. 155 using 3D photogrammetry (Generated by L. Rupnik).

Fig. 10. Gyöngyös – Külső-Mérges-patak 1. Documentation of the grave No. 155 using 3D photogrammetry (Generated by L. Rupnik).

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