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PROSPECTION RESULTS IN THE ŽITAVA VALLEY[1]

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Kľúčové slová: Požitavie, prospekcia, geomagnetika, vŕtanie ručným vrtákom, analýzy pXRF, staršia doba bronzová, štruktúra osídlenia

In the spring of 2014, a joint German-Slovak prospection of the Žitava Valley was conducted with the intent of extending archaeological knowledge from Vráble-Fidvár to other sites in the Žitava Valley, an area in the Carpathian foothills which included a chain of Early Bronze Age fortified settlements. A series of 14 different known or suspected Early Bronze Age sites were evaluated, on three of which we decided to carry out further surveys (Maňa-Veľká Maňa, Bešeňov-Žitavský hon, Hul-Kratiny), including field walking, augering and geomagnetics. Despite very comparable surveying conditions, these three sites yielded very different results attributable to the different states of preservation and functions of the sites. In Maňa-Veľká Maňa, a slope of up to 7% was recognized which contributed to the strong erosion and bad preservation of subsoil features. According to the geomagnetic results, the site at Bešeňov was not fortified. It seems likely that it was settled only intermittently or for a short period of time during the Early Bronze Age. The prospection in Hul yielded the best results. A fortification consisting of a ditch was detected by magnetometry. According to the pXRF-analyses, there was no human impact on the filling of the ditch, which suggests that the site was inhabited only for a very short period of time. In addition to the Žitava Valley work, a field walking campaign was carried out in Vráble-Fidvár. The distribution and density of the collected finds correlates well with the prospection completed in 2007. In February 2015, additional augerings were performed there to collect sediment from the topsoil at approximately 40 cm beneath the surface. According to pXRF analyses, the concentration of phosphorus correlates with the pottery density.

INTRODUCTION

Over the course of a week-long surveying campaign in southwest Slovakia's Žitava Valley, team members from the international DFG Vráble Project (jointly organized by the Romano-Germanic Commission, Frankfurt, Department of Archaeology, Faculty of Arts, Comenius University, Bratislava and the Institute of Archaeology of the Slovak Academy of Sciences, Nitra) engaged in a variety of different survey methods at the Vráble Project's principle area of concentration in Fidvár near Vráble (i. e. a three-period fortified settlement and graveyard which dates to the Early Bronze Age) as well as a series of nearby prospective Bronze Age settlement sites in the Žitava Valley.

Although work in this region is ongoing, the spring 2014 survey campaign sought to extend archaeological knowledge from Fidvár near Vráble to those other sites within the Žitava Valley which, like Vráble, formed a chain of Early Bronze Age fortified settlements which traced the southern border of the Carpathians (*Bátora et al. 2012*, 111). Indeed, perhaps due to the rich copper, gold and tin deposits within that very mountain range, this important region and its fecund loess soils has acted as an interface and communication node from prehistory through into the Middle Ages (*Bátora/Rassmann 2008*, 89). The purpose of the current project is to unravel the nature of those connections, especially in terms of economy, settlement structure and the political and social organization of Vráble in relation to its surroundings.

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Although part of the 2014 survey campaign did concentrate on the principle site of Vráble (see below), much time and effort was spent examining other potential sites near to the Žitava Valley which were either known or suspected by the archaeological record. The methodological spectrum of research included geomagnetics, surface collection by different kinds of field walking and augering. Following the documentation of the cores, the resulting soil samples (taken at 10 cm intervals) were prepared and analyzed with a Thermo Scientific Niton XL3 t handheld pXRF analyzer at the Romano-Germanic Commission's XFA Laboratory, Frankfurt am Main.[2]

SITE PROSPECTION IN THE SURROUNDINGS OF FIDVÁR NEAR VRÁBLE

In total, a series of 14 different known or suspected Early Bronze Age sites within a 38 km traveling distance from Vráble were evaluated: (1) Lúčnica nad Žitavou-Kopanice, (2) Vráble-Dyčka, (3) Veľký Cetín-Šaškaj, (4, 5) Maňa-Veľká Maňa, (6) Beša, (7) Čifáre-Kapustniská, (8) Tajná-Horné lúky, (9) Dvory nad Žitavou, (10) Bajč-Piesočník, (11) Bajč-Göböljárás, (12) Bajč-Vlkanovo-Medzi kanálmi, (13) Hul-Kratiny and (14) Bešeňov-Žitavský hon (Fig. 1). Of these, 11 were only cursorily inspected to get an overview if more intensive prospections would be possible at all. At three sites we decided to carry out further surveys; these were Maňa-Veľká Maňa, Žitavský hon near Bešeňov and, extremely profitably, Kratiny near Hul.

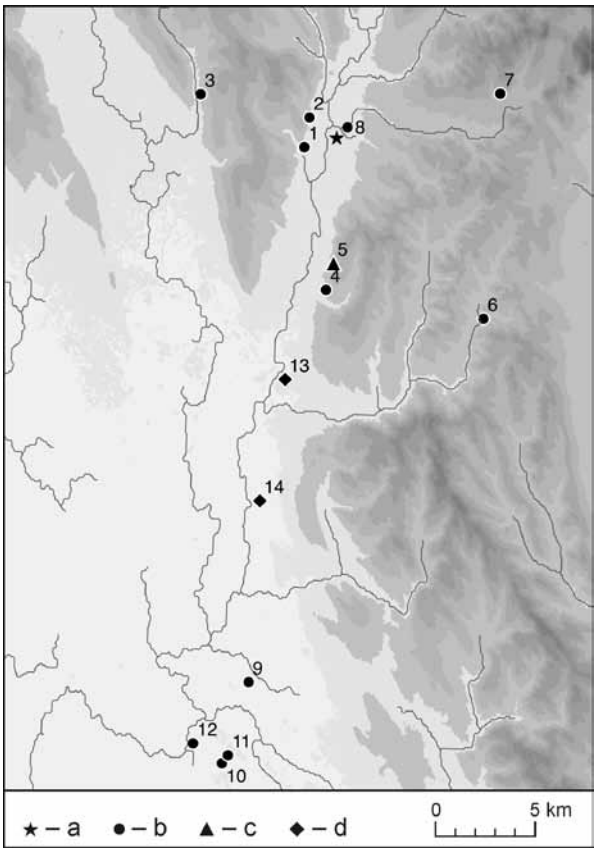

Fig. 1. The Žitava Valley with the sites mentioned in the text: 1 – Lúčnica nad Žitavou-Kopanice; 2 – Vráble-Dyčka; 3 – Veľký Cetín-Šaškaj; 4, 5 – Maňa-Veľká Maňa; 6 – Beša; 7 – Čifáre-Kapustniská; 8 – Tajná-Horné lúky; 9 – Dvory nad Žitavou; 10 – Bajč-Piesočník; 11 – Bajč-Göböljárás; 12 – Bajč-Vlkanovo-Medzi kanálmi; 13 – Hul-Kratiny; 14 – Bešeňov-Žitavský hon. The extension of the map corresponds to the grey area in the inset showing the outline of Slovakia. The elevations range from 110 to 350 m above sea level in 25 m steps (projection: UTM 34N; data source: SRTM 90). Legend: a – Vráble-Fidvár; b – cursory surveying; c – geomagnetics, augering; d – geomagnetics, augering, fieldwalking.

Several sites located loosely to the west of Vráble were examined: Lúčnica nad Žitavou-Kopanice (Fig. 1: 1), Vráble-Dyčka (Fig. 1: 2) and Veľký Cetín-Šaškaj (Fig. 1: 3). Lúčnica nad Žitavou-Kopanice is located in a side Valley of the Žitava which is locally referred to as the Salt Valley (Slaná dolina). In terms of the archaeology, the site seems entirely appropriate for the needs of Early Bronze age settlements. However, despite the fact that the field had just recently been ploughed, cursory examination of the site revealed no prehistoric ceramics. As the site is in elevation, it is possible that prehistoric traces have already eroded away.

A complete Early Bronze Age vessel was recovered in 2001 at Vráble-Dyčka. However, the exact location of the find spot is currently unknown. Moreover, the fields at Vráble-Dyčka which were suspected of being the location of the vessel find were rendered inaccessible by the presence of a vineyard as well as winter wheat seedlings. Nonetheless, as mentioned above, both sites seemed good potential locations for Early Bronze Age settlements: they are near to water and posses the somewhat enhanced view of the surrounding landscape, traits which are typical of settlements within the region during this period (*Hårde 2006*, 342).

Near the site Veľký Cetín-Šaškaj, on the other bank of the Kadaň Creek some ditch-like structures probably dating to the Bronze Age were discovered by aerial survey and geophysics (*Blažová/Kuzma/Rajtár 1998*, 35; *Hanzelyová/Kuzma/Rajtár 1996*, 199; *Kopecký/Kuzma/Rajtár 1990*, 101, 102; *Kuzma/Tirpák 1998*,

[2] Many thanks are due to A. Scheffler and A. Sosnowski for their help in the pXRF laboratory in Frankfurt/Main.

216, fig. 16; *Tirpák 2007*, 47, fig. 15). Several hundred meters from this location by archaeological excavation recovered stray finds (including a cup and a bronze needle) of the Maďarovce culture, coming probably from a disturbed grave (*Cheben/Ruttkayová/Ruttkay 1994*, 180, fig. 4). Cursory examination of the site revealed definitive traces of prehistoric pottery (Neolithic, LBK and possibly EBA) as well as some medieval and modern material. Both geomagnetics and/or field walking would be possible at this site. However, due to time constraints, neither of these were conducted during this survey.

Further sites examined were located to the northeast, east, southeast and (especially) south of Vráble.

The site of Tajná-Horné lúky (Fig. 1: 8) is supposedly an open settlement of the Kosihy-Čaka-Makó culture (J. Bátora, oral information). Cursory examination of the fields revealed the presence of worked limnosilicite (possibly from Žiarska kotlina Hollow) as well as sherds identifiable to both the Bronze Age as well as the Neolithic. Both field walking and geomagnetics would be possible at this site (lying on a slight slope looking over a small stream). However, due to the large extent of the ceramic spread with no clear observable concentrations, these surveying methods would have to be larger in scope than would otherwise be the norm.

The site of Čifáre-Kapustniská (Fig. 1: 7) has been described as a potential Maďarovce culture settlement (*Bátora 1981*, 31). Certainly, due to the situation of the site (on a slope above a steam), the location of Čifáre would be typical for prehistoric settlements within this period and region. However, cursory surveying yielded only some Bronze Age (but mostly Neolithic) sherds with no definitive areas of concentration.

At Beša (Fig. 1: 6), finds made during past construction work lead to the description of this site as a potential Maďarovce culture open settlement (*Lichardus/Liptáková 1962*, 77). What was clear from the situation of the site is that the back side of the field (and thus the potential settlement) was highly eroded, as evidenced by a steep drop-off. Although quite a few prehistoric sherds were found during cursory surveying, none were of undisputed Early Bronze Age origin. Furthermore, the field had just been ploughed (deeply), which removed the application of geomagnetic survey from the realm of possible survey methods.

Dvory nad Žitavou (Fig. 1: 9) which is recorded as an open Maďarovce or Kosihy-Čaka-Makó culture settlement/Únětice culture burial ground whose extent is partially covered by a modern factory (*Dušek 1957*, 851; *Točík 1979*, 48; *Vladár 1966*, 256), Bajč-Piesočník and Bajč-Göböljárás (Fig. 1: 10, 11), a possible open settlement of Maďarovce culture and Bajč-Vlkanovo-Medzi kanálmi (Fig. 1: 12), a Kosihy-Čaka-Makó culture settlement (*Čaplovič/Cheben/Ruttkay 1988*, 39; *Nevizánsky 2001*, 26) all appear to be potential sites for future geomagnetics and/or field survey. Unfortunately, all sites were densely covered by winter wheat, thereby preventing determination of whether there were clear concentrations of cultural material at the surface.

Maňa-Veľká Maňa (Fig. 1: 4, 5) has been registered as an open or fortified Maďarovce culture settlement (*Bátora 2009*, fig. 4; *Janšák 1931*, 53; *Točík 1964*, 273). However, we did not examine this site in closer detail because of winter wheat seedlings which had just begun to germinate. However, following a hint by Mayor Ing. Igor Sádovský an area to on a slope overlooking the valley just at the northern entrance to Maňa-Veľká Maňa was examined.

PROSPECTIONS AT MAŇA-VEĽKÁ MAŇA
(Fig. 1: 4, 5)

At Maňa-Veľká Maňa, on a comparatively steep slope at about 160 m a. s. l. (Fig. 2) sherds dating to the Early Bronze Age were found (*Janšák 1931*, 53; *Točík 1964*, 273). Due to the atypical situation of the site (i. e. at the crest of a hill overlooking the valley), both geomagnetic survey as well as a few trial augerings within the pits revealed by the geomagnetics were conducted.

Altogether, an area of 2.3 ha was surveyed geomagnetically (Fig. 3). In the resulting picture a number of archaeologically relevant features were apparent. Particularly conspicuous are some linear features in the northwest and south; the longest measures nearly 70 m. However, their purpose and dating remain obscure. Especially in the upper half of the center, the many roundish negative anomalies probably represent pits. The large blurry features in the north, west and the center are probably of geological origin.

In the western half of the site (where the concentrations of pottery lay) drillings were made by Pürckhauer into four of the roundish anomalies. None of the drillings revealed cultural layers of

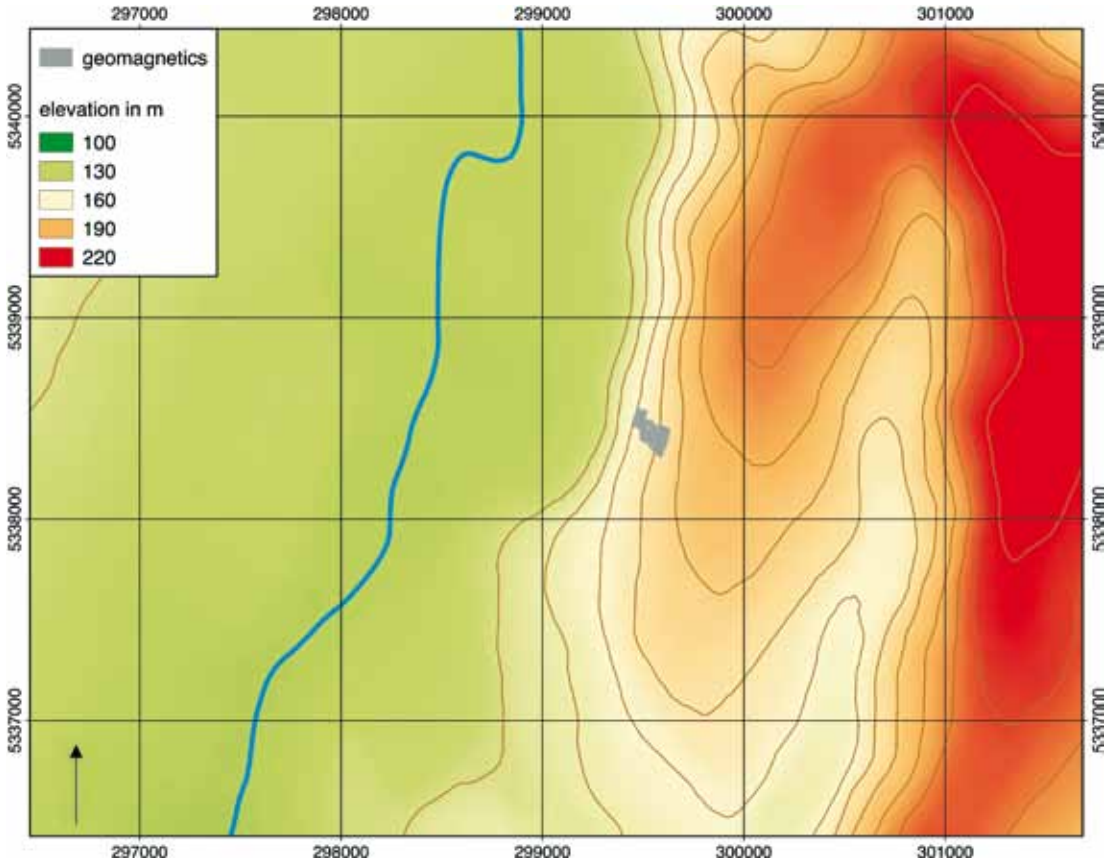

Fig. 2. The surroundings of the site at Maňa. The geomagnetically-measured area is marked in grey (projection: UTM 34N; data source: SRTM 90).

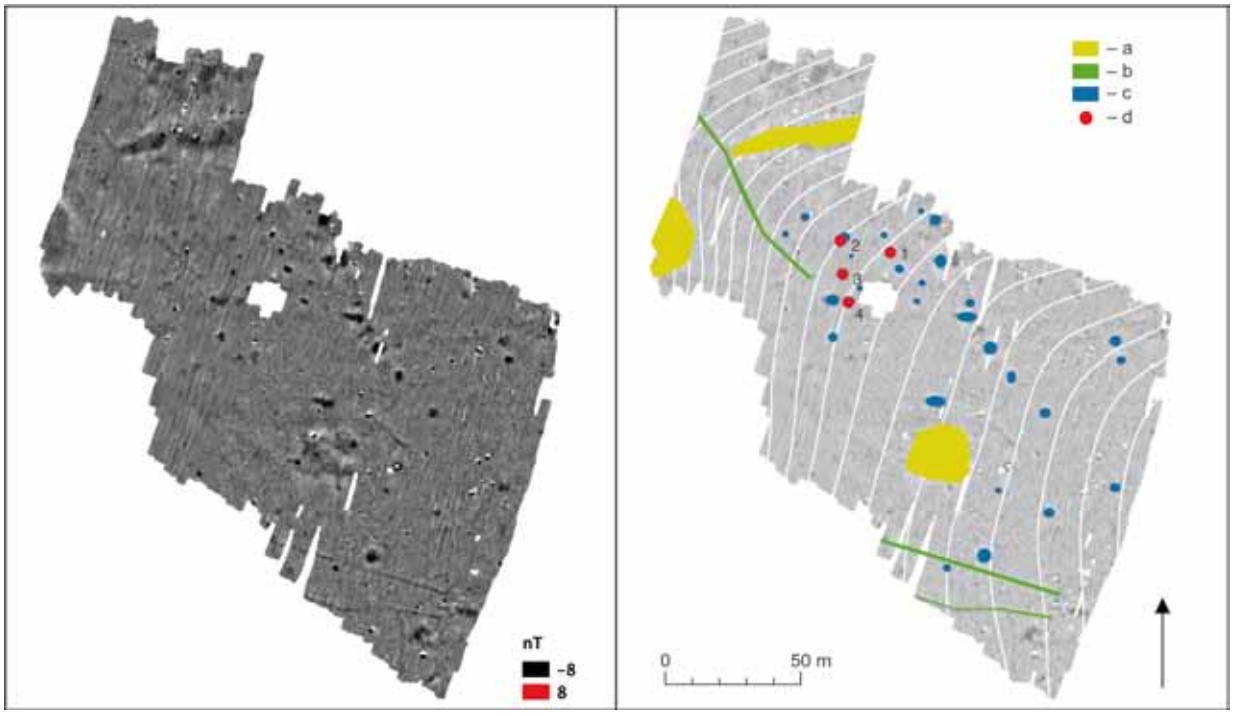

Fig. 3. Maňa. The geomagnetic picture (left) and its interpretation (right). The locations of the augering holes are also marked. The isolines derive from high-resolution DGPS and are one metre apart. Legend: a – geological; b – linear; c – pit; d – drilling.

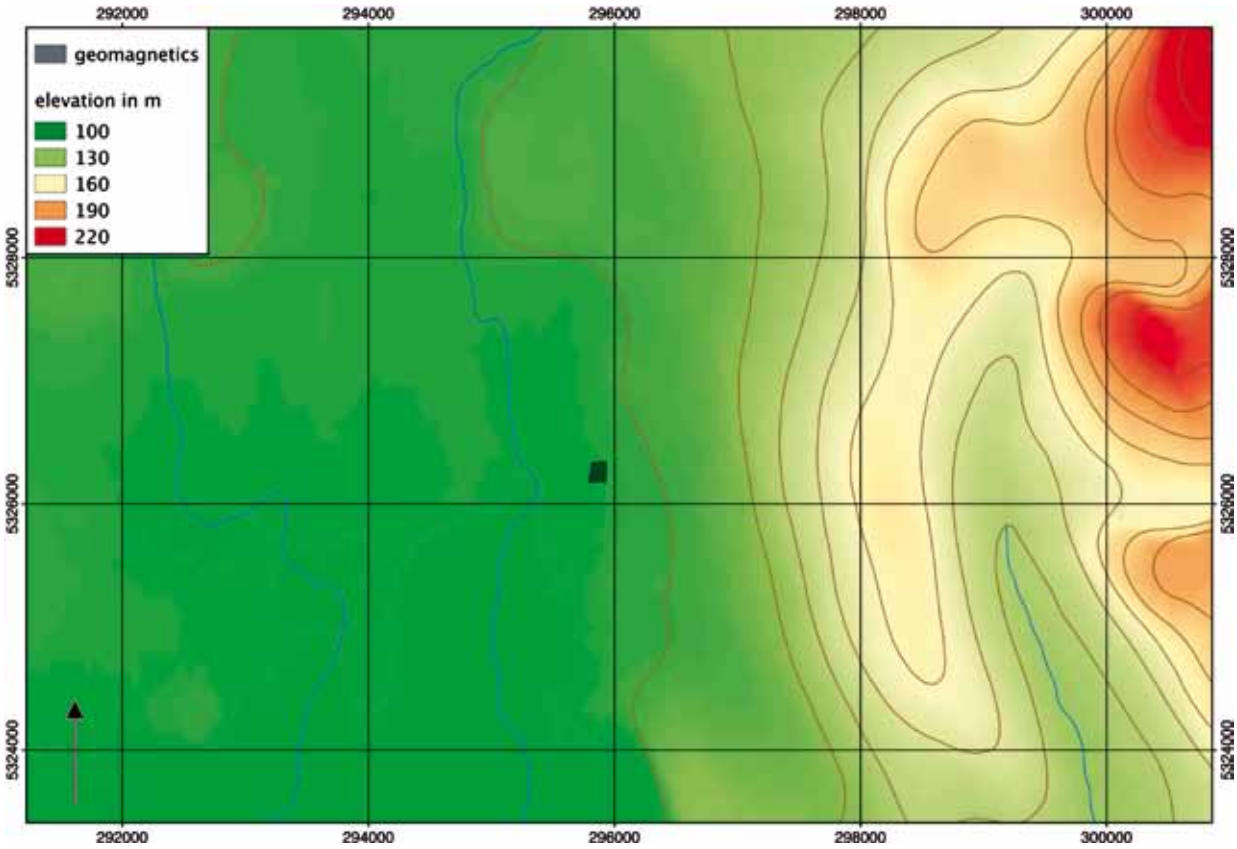

Fig. 4. The surroundings of the site at Bešeňov. The geomagnetically-measured area is marked in grey (projection: UTM 34N; data source: SRTM 90).

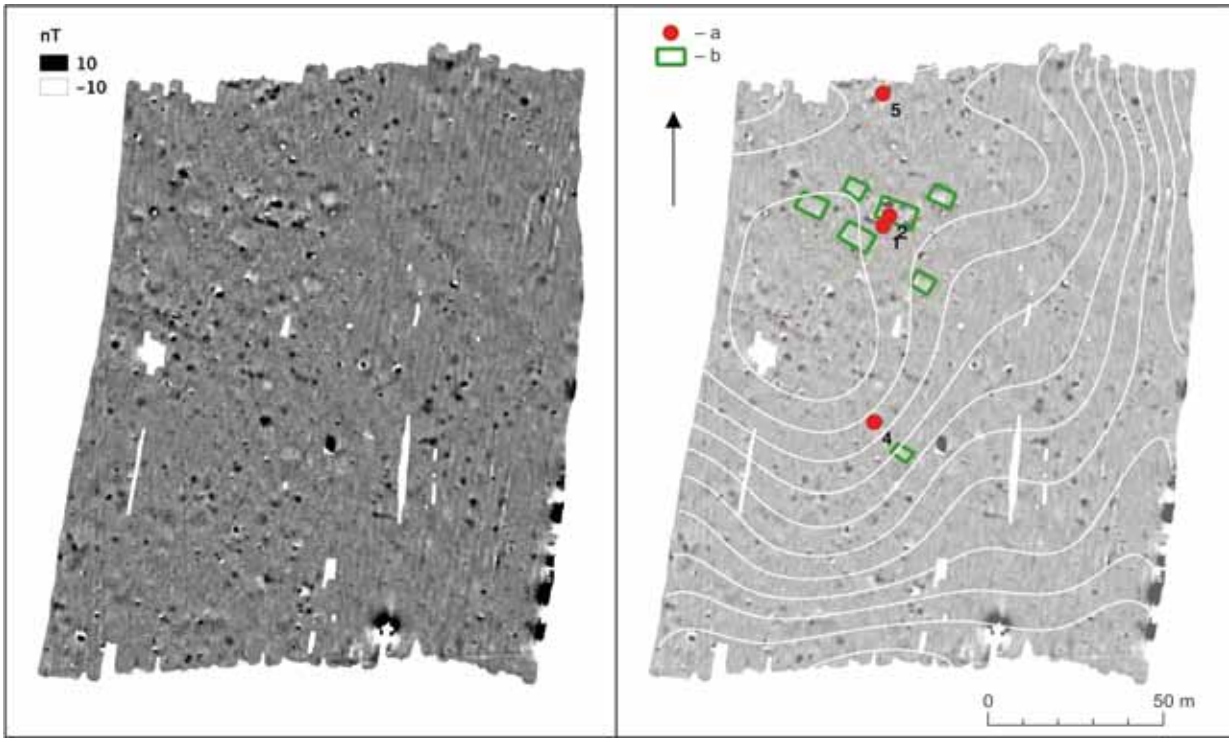

Fig. 5. Bešeňov. The geomagnetic picture (left) and its interpretation (right). The locations of the augering holes are also marked. The isolines derive from high-resolution DGPS and are 0.2 metres apart. Legend: a – augering; b – interpretation.

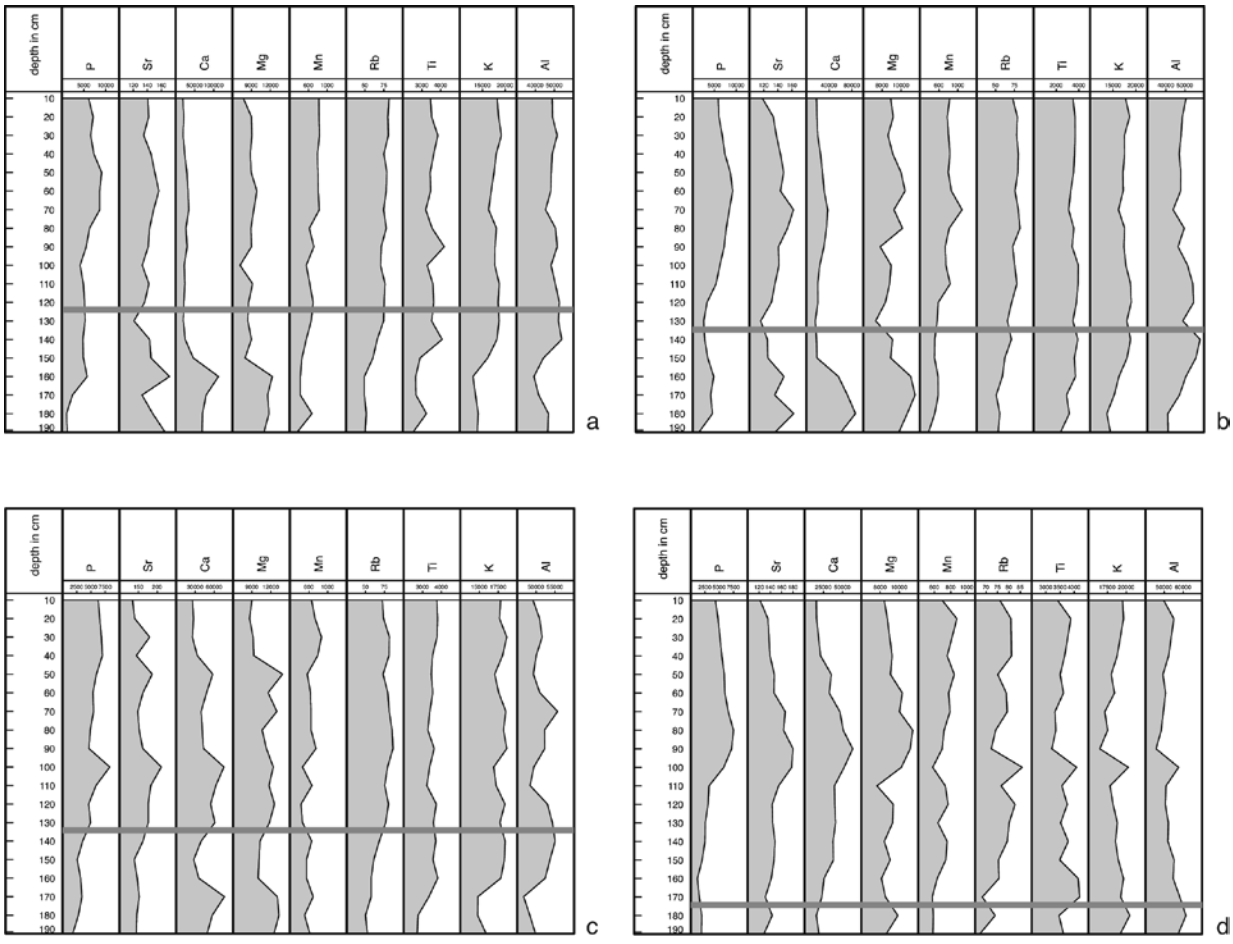

Fig. 6. Bešeňov. Measurements with pXRF. a – Augering hole 1; b – Augering hole 2; c – Augering hole 4; d –Augering hole 5. The border between cultural layers and natural soil is marked with a grey line.

a certain thickness. In all four drillings, the natural soil was reached within the first 60–80 cm. This interpretation is also strengthened by pXRF analyses which were taken at 10 cm-intervals in order to determine the elemental components of the soils they contained. Taking the modern ploughing zone of the first 30–40 cm into account, it becomes clear that there is hardly any archaeological substance left at Maňa-Veľká Maňa.

PROSPECTIONS AT BEŠEŇOV
(Fig. 1: 14)

Bešeňov is listed as an open Maďarovce culture settlement (*Szőke/Nemeskéri 1954*, 106; *Točík 1964*, 262) and located on a terrace close to the eastern bank of today's stream of the Žitava at about 119 m a. s. l. (Fig. 4). However, from aerial photography (e. g. Google Earth) it is clear that due to the fairly flat landscape both the Nitra – today only 3.5 km further to the west – and the Žitava must have changed their river beds extensively in the past so it cannot be said how far away the river was during the Bronze Age. Today, its highest point rises at most 2 m above its surroundings. During field walking a second concentration of ceramics 600 m to the south of the recorded Maďarovce settlement was discovered. Closer study of the few ceramics collected were clearly Bronze Age in date (potentially dateable to the Early Bronze Age).

In Bešeňov initial field walking revealed concentrations of ceramic sherds, probably mostly of Bronze Age origin, which covered an area of roughly 100 x 80 m. In the core of this area and extending to the south and east to make sure that any fortifications which might have existed were detected, we comple-

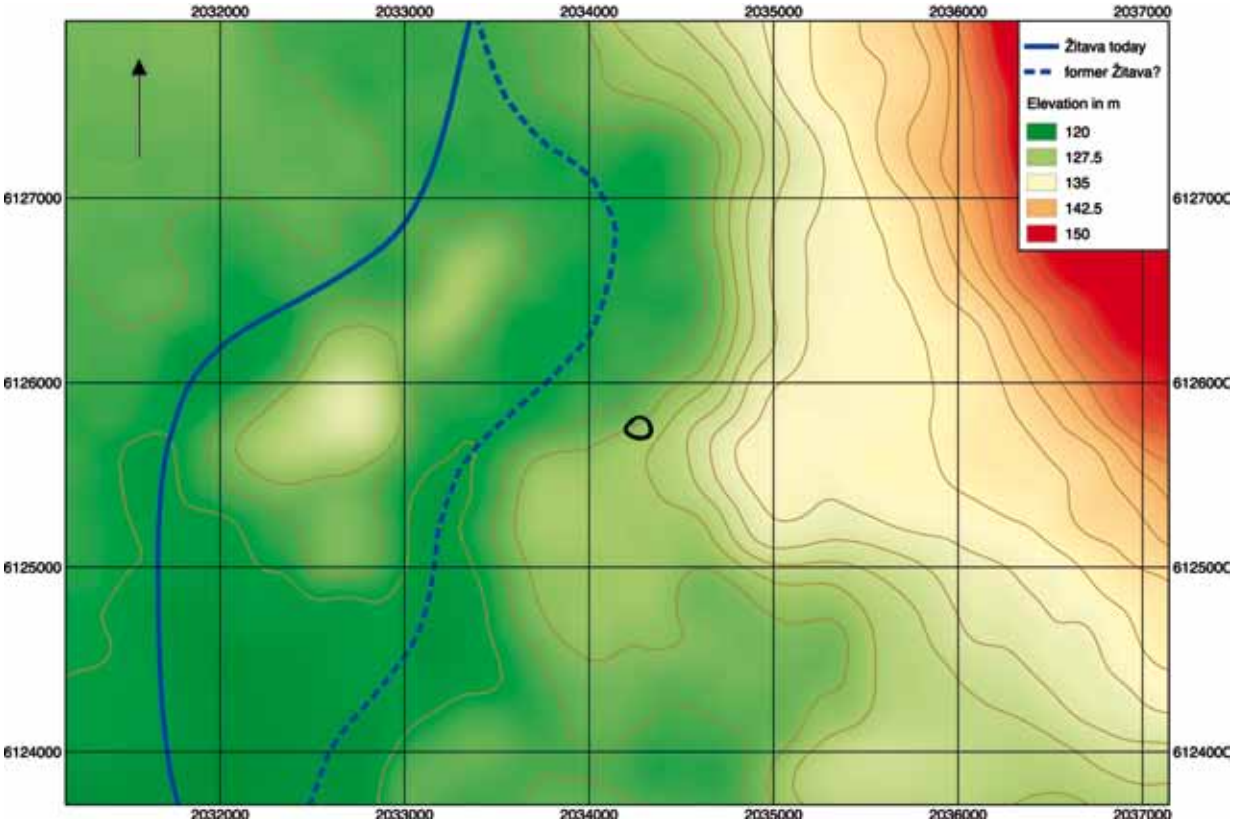

Fig. 7. The surroundings of the site at Hul. The ditch is marked in black (projection: UTM 34N; data source: SRTM 90).

ted a geomagnetic survey of an area measuring 2.4 ha (Fig. 5). Later, four of the features identified in the geomagnetometry were drilled by Pürckhauer.

On the geomagnetic pictures at Bešeňov several more or less rectangular features in the northwestern part of the site spring to eye. They cover areas of roughly 25 to 70 m^2 and seem orientated west-northwest to east-southeast. Apart from the clearest six of these (marked on the map), several other areas especially to the south with attached linear features could very well contain similar structures. All of these structures could, for example, represent pit houses.

Drillings 1 and 2 were located near one of the potential pit houses, while drillings 4 and 5 were aimed at two of the roundish anomalies. Virgin soil was reached after 120 cm, 130 cm, 130 cm and 170 cm, respectively. The profiles of drillings 1 and 2 (Fig. 6: a, b) are very similar as was to be expected as they were only 3.5 m apart from each other. The filling does not appear to be very structured. There are high P and Sr-values around a depth of 60 cm but they show no particular peak. In contrast, at drilling 4 (Fig. 6: c) the maximum of P, Sr and Ca is located at -100 cm very close to the bottom of the anomaly. In this case, it seems likely that the filling consisted of a deliberate infilling of rubbish. In drilling 5 (Fig. 6: d), however, the bottom shows very low concentrations of those elements signaling human impact; only in the upper half of the filling do the values of P, Sr and Ca go up. Obviously, the filling of this feature was first dominated by natural processes and after an event which perhaps coincides with the peak of Rb, Ti, K and Al at -100 cm (flooding?) human impact becomes visible.

KRATINY NEAR HUL
(Fig. 1: 13)

The site of Kratiny near Hul was originally also listed as a Maďarovce open settlement (*Samuel 1995*, 117). It is located at about 130 m a. s. l. on a terrace above what seems to be an old stream of the Žitava (Fig. 7). A plethora of scattered finds in the field denote intensive activities throughout the ages. The majority of sherds recovered dated predominately from the Neolithic and Early Bronze Age. Especially

noteworthy is a zoomorphic handle sherd (Fig. 8) as well as sporadic mussel shells. After an initial geomagnetic survey (see below), augering (of the ditch discovered by the geomagnetic results) and systematic field walking were conducted.

Very important for the dating of the ditch discovered at Hul is the fact that a prehistoric sherd typical of the Únětice or Maďarovce culture was found in the bottom of drilling 1. It seems likely, therefore, that the ditch can be dated to this period as well. This is also implied by the results of field walking (see below).[3]

Fig. 8. Hul. Ceramic sherd with zoomorphic handle belonging to the middle Neolithic Želiezovce group. Photo P. Tóth.

Typical for other Early Bronze Age examples of this type, the ditch at Hul is located very close to the edge of a terrace which protrudes into the Žitava Valley. While the Žitava runs ca. 2000 m further to the west at present, it seems likely that the river flowed much closer to the site (perhaps only 200 m away) during the construction of the ditch. On the other hand, both the geomagnetic results as well as the high resolution digital terrain model suggest that the terrace suffered heavy erosion following the Bronze Age, resulting in the fact that the terrace edge is closer to the ditch at present than it was during the Early Bronze Age.

Geomagnetics

An area of about 2.6 ha was geomagnetically measured (Fig. 9a). The survey revealed a quantity of anomalies very likely of prehistoric origin of which the most prominent is a ring ditch (Fig. 9b). This ditch is also very faintly visible in a Google Earth aerial picture recorded on 2013/08/11. It is elliptical in shape and measures 98 x 80 m. The ditch exhibits values of up to +10 nT; the presence of values of up to -6 nT towards the inner part of the ditch are probably not remnants of a wall but are rather "shadows" of the ditch itself.

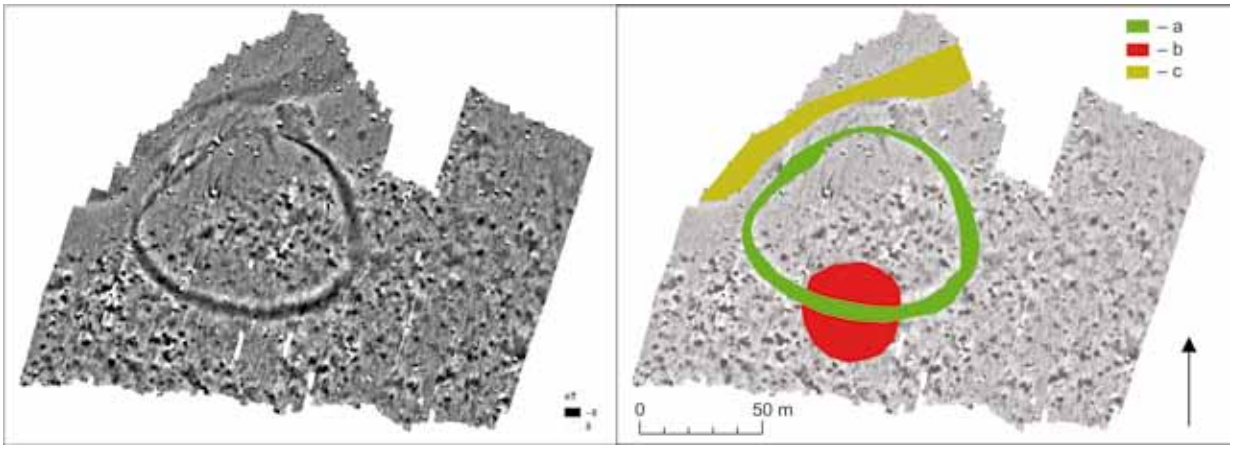

Fig. 9. Hul. The geomagnetic picture (left) and its interpretation (right). Legend: a – ditch; b – open space; c – geology.

While the southern and eastern parts of the ditch seem to have a maximal width of 6–7 m, the width thins considerably (to 2 m and less) to the north and west. This is almost certainly due to heavy erosion. Today, almost half of the ditch is located beyond the terrace edge where the terrain has a c. 5 m slope. The ditch exhibits substantial thinning exactly at this edge. This hypothesis finds further substantiating

[3] In the meantime, the Geographic Institute of the Ruprecht-Karls-University of Heidelberg has conducted several campaigns of drilling lead by G. Schuhkraft on this site. One C14-date stemming from one of the drillings of the ditch falls within the Early Bronze Age (pers. comm. G. Schuhkraft).

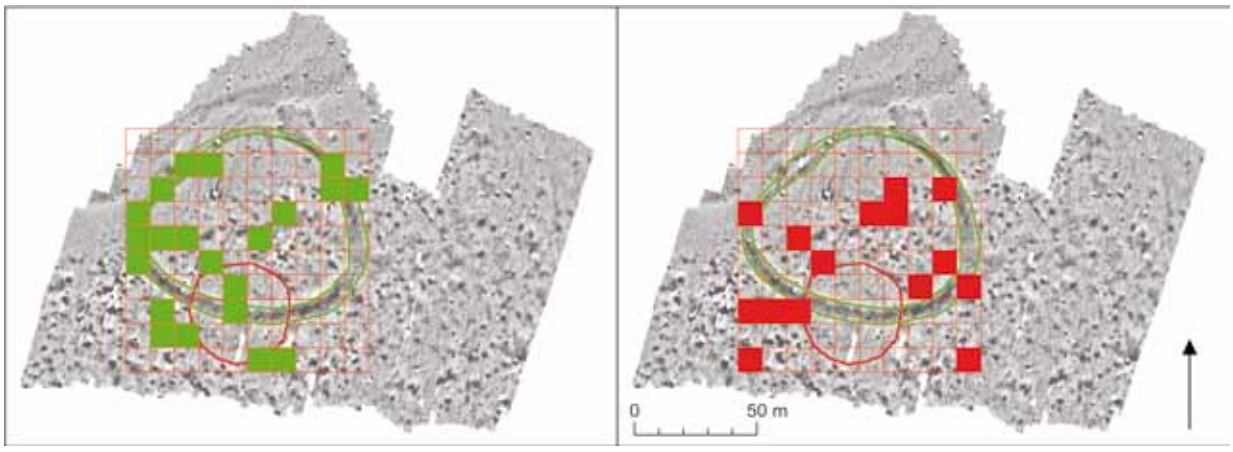

Fig. 10. Hul. Preliminary analysis of the sherd distribution. Field walking proceeded on 10 x 10 m-grids. Left – Early Bronze Age; right – Linear Bandkeramik and Lengyel.

evidence in the fact that all anomalies seem to stop more or less abruptly at the edge. If one assumes that these anomalies were pits, the erosion must have been dramatic indeed.

The ditch shows no clear entrances; only in the northwestern part is there a peculiar situation in which the ditch seems to be parted. It remains unclear whether this has to do with an entrance or with a renewal phase. Unfortunately, this area also lies within the region which suffered heavy erosion.

Additionally, there is a faint anomaly (only +2 nT) just to the north of the ditch. As it runs parallel to the terrace edge, it seems likely that it represents a former channel or terrace edge of the Žitava.

Many round or sub-round anomalies appeared along the southern part of the geomagnetic results. As these do not appear to have been positioned in respect to the ditch, it is likely that, at least in part, the ditch and the anomalies were not concurrent. Naturally, their relative chronological position cannot be determined; they could be younger and/or older as the ditch (see below). While anomalies seem to thin out towards the northeastern edge of the geomagnetically surveyed area, for this trend to be certain, a larger area should be surveyed. Nonetheless, this pattern would coincide with surface finds, as most of the latter were concentrated in the west. Exhibiting values that vary between +1 and +15 nT, these anomalies quite probably represent prehistoric pits. Whether this wide range is due to differential purposes for the pits or whether it has to do with differing ages remains uncertain.

In the southern part of the surveyed area is a circular area (approximately 40 m in diameter) which remains largely free of obvious anomalies, excepting the ditch which bisects it. It seems possible that this free area could have functioned as an open square within the settlement to which the pits belonged. Conversely, this would mean that most of the pits date more or less to the same prehistoric period. As it seems unlikely that a square would be put where a former ditch was situated, this would also imply that the pits are mostly older than the ditch.

Field walking

Following geomagnetic prospections, the site was subjected to aan intensive, comprehensive and systematic field walking survey. The main goal in engaging in field walking at Hul was not only to glean information about a site which would (presumably) act as an excellent foil to the data obtained from nearby Vráble, but also to gain a handle on the density of finds and the chronology of the central part of the settlement itself. An area of 100 x 100 m, covering the ditch in its entirety, was subdivided into 100 10 x 10 m grids. In contrast to Vráble (see below), every find at Hul was collected. Subsequent find processing and measuring was completed in the Department of Archaeology, Comenius University in Bratislava and Archaeological Institute of Slovak Academy of Sciences, Nitra.

The find pattern of ceramic sherds dating probably to the Early Bronze Age (Fig. 10a) shows a strong correlation with the ditch, especially in those areas where it has been highly eroded. The find scatters do not respect the region in the south which is largely devoid of geomagnetic anomalies and were interpreted as “open space” (see above). This Bronze Age pattern contrasts to that of the sherds which were

dated to the Middle and Late Neolithic (LBK and Lengyel culture; Fig. 10b). For these finds there is no apparent correlation with the ditch, and there are no finds of that period within the "open space". This can certainly be taken as a hint towards its dating and shows that it is possible to come to probable datings of geophysical features by intersecting them with the find patterns of surface collections.

Augering and Soil Analysis

We then proceeded to take 14 cores from central points within seemingly significant geomagnetic features, either with a larger, geological augerer with a 10 cm-wide sample diameter or with the manual Pürckhauer (Fig. 11; 12). At drill 1, the bottom of the ditch seems to have been reached at 125.8 m a. s. l., 3.3 meters below today's surface; at drill 15, the bottom lay at 123.9 m, 2 meters below the surface, and at drill 17 these values were 124.9 m and only 0.7 m. Thus, it seems that the ditch was either not of the same depth throughout its course or,

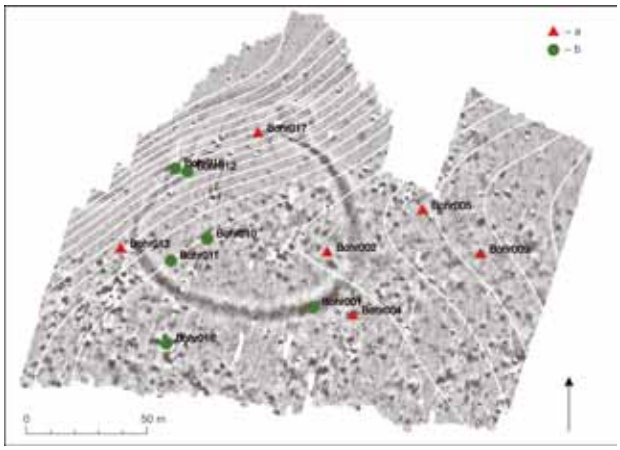

Fig. 11. Hul. Locations of augering holes. Green points represent cores drilled with the geological augerer; red triangles represent cores drilled manually with the Pürckhauer. The isolines derive from high resolution DGPS and are 0.5 m apart. Legend: a – pürckhauer manual augering; b – percussion drilling.

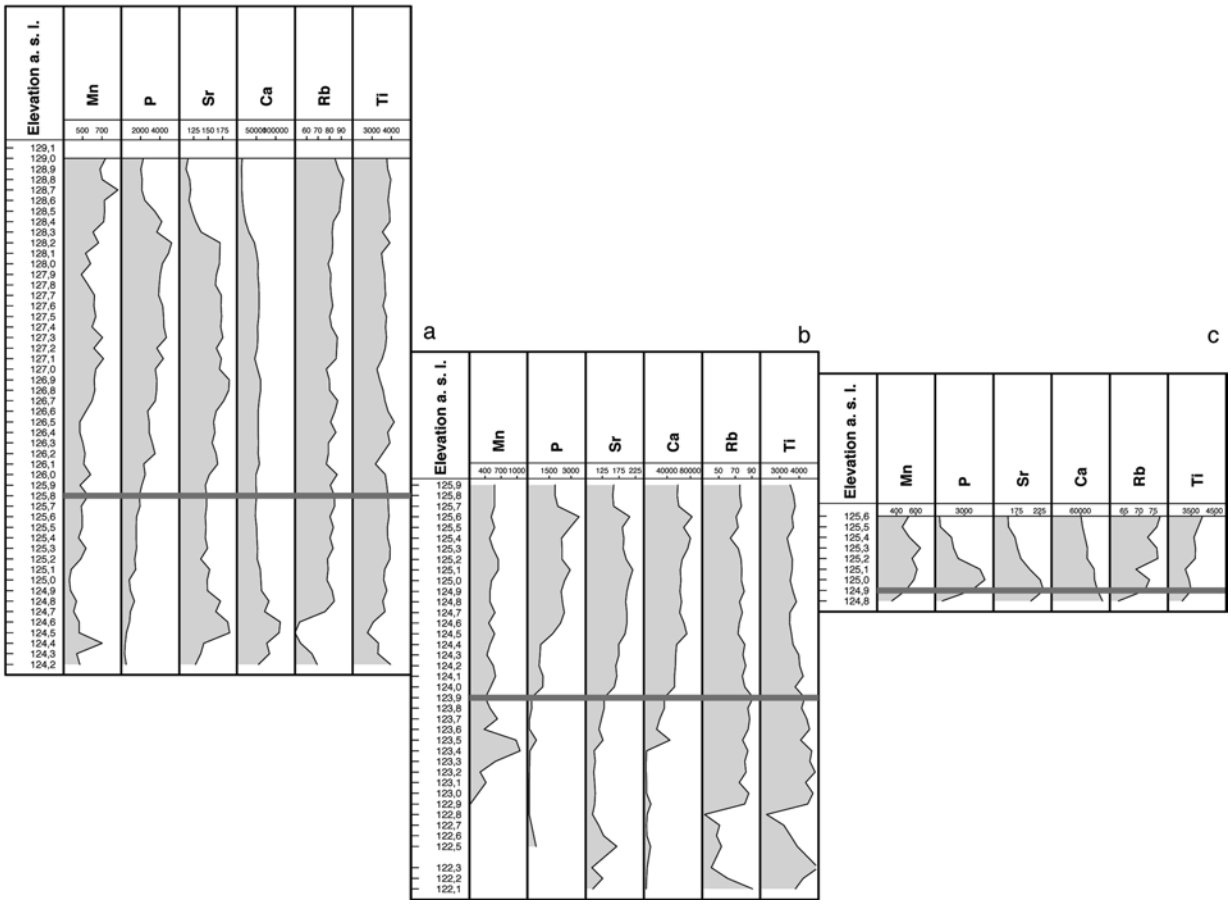

Fig. 12. Hul. Measurements with pXRF. a – drilling 1; b – drilling 15; c – drilling 17. The diagrams are arranged in such a manner that the elevation above sea level correspond to each other. The border between cultural layers and natural soil is marked with a grey line.

more likely, that the differences in absolute height are attributable to the terrain having already sloped in the Bronze Age. If this is correct, the surrounding of drilling 15 would have been the lowest point of the terrain during the Bronze Age, around 2 m below drilling 1 and 1 m below drilling 17. Drilling 17, on the other hand, would have been only 1 m below drilling 1, and not 3.5 meters, as it is today. This is an additional hint that the micro relief of the site has changed dramatically in the past 4000 years.

The P, Sr and Ca values from this site are indiciation of human impact (Fig. 12). Drilling 1 and 15 both show a steady decline in phoshorus which seems to imply a slow and steady refilling of the ditch without much human intervension, especially when compared to results from Vráble-Fidvár (*Gauss et al. 2013*). This is supported by the fact that the P-values do not rise much above 4000 ppm. This figure contrasts with that recorded at Vráble-Fidvár (10000; see *Gauss et al. 2013*) or Bešeňov (see above). The P, Sr and Ca results from drilling 15 all correspond in support of a slow and steady gradual refilling of the ditch. Unfortunately, drilling 17 shows only a very short sequence. It is possible that the high degree of erosion suffered by this area of the site caused a washdown effect for these readings.

FIELD WALKING AT VRÁBLE-FIDVÁR

Additionally to the work on the surrounding sites of the Žitava Valley, a field walking campaign was carried out at Fidvár near Vráble. A prior intensive, comprehensive and systematic fieldwalking survey campaign completed in 2007 by the University of Würzburg had shown areas of higher ceramic density outside the fortifications of the main settlement (*Falkenstein et al. 2008*). Said results correlate with the results of geomagnetic prospections. Naturally, the question which remained was how these concentrations should be interpreted in functional and social terms and, with regard to the fortified part of the settlement, how they relate to the features underground (for a comprehensive treatment of this question see *Rassmann et al., in press*).

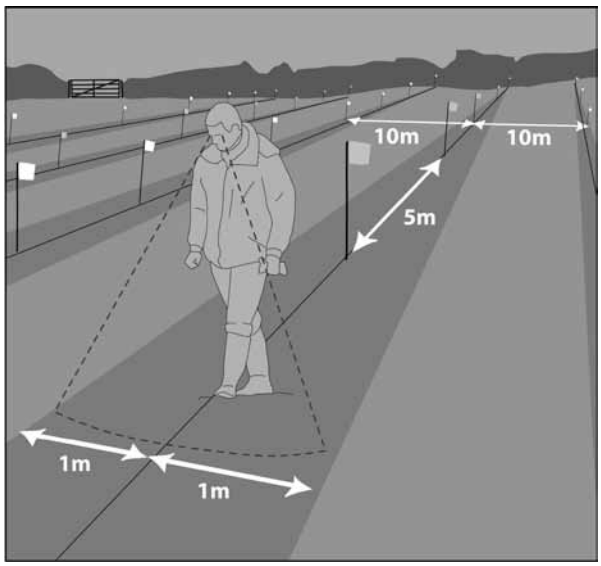

Fig. 13. Fidvár near Vráble. Fieldwalking setting according to the coverage by a walker (adapted from *Brady 2002*, 9).

One idea is, that the various ceramic concentrations represent independent house groups of closed social communities which were in some way associated with the main settlement. The main goal of the survey campaign in spring 2014 was very much centered on this idea. It focused therefore on closing the gaps within the distribution and density map of ceramic finds from 2007 in order to gain a complete picture of outer part of the site.

Based on the known distribution of finds, the geomagnetic measurements and the generally high number of finds at Vráble, again a systematic, but more extensive, sample-based survey method was applied for the whole outer area of the site. Within a raster of 50 x 50 m grids, team members walked parallel 10 m transects. Each transect consisted of 10 regular sample areas measuring 4 m² every 3 m. The width of 2 m thereby respects the general visual range of a walker (Fig. 13). In each sampling area, the number of ceramic sherds were counted. In contrast to 2007, the finds were not collected, as only their distribution and density were pertinent to the research question at hand. In four days, a joint German-Slovak team covered a total area of 52 grids, covering 13 ha. Said field walking was undertaken under slightly less than ideal conditions as the fields already had a light covering of winter wheat (Fig. 14). Although visibility was somewhat impeded, the efficacy of the team was still remarkable; they recorded a maximum count of 29 sherds per sample area (= 4 m²). Via interpolation, however, the maximum sherd count shrinks to 17. Given that the area observed measured approximately 4 m², an average of 0–4 sherds were found per square meter. The earlier examination of the same site mentioned above (*Falkenstein et al. 2008*, 45, fig. 6; 7) estimated an approximate range between 0 and 30 g per square meter.

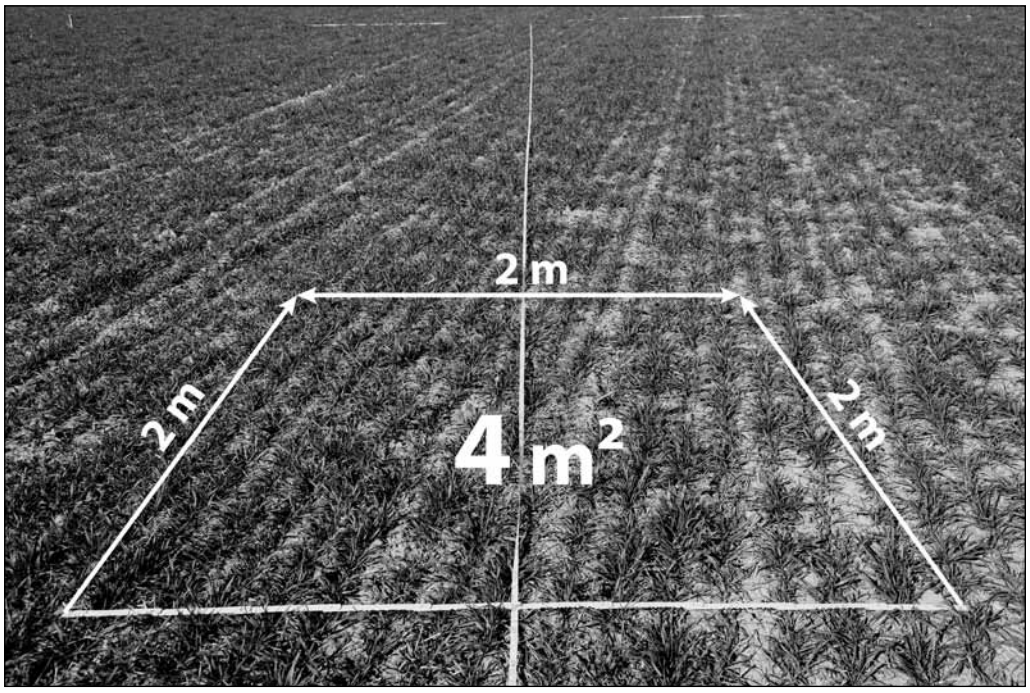

Fig. 14. Fidvár near Vráble. Impression of a 4m² – sample area. Note the slight covering of winter wheat which, however, did not effect the general fieldwalking result.

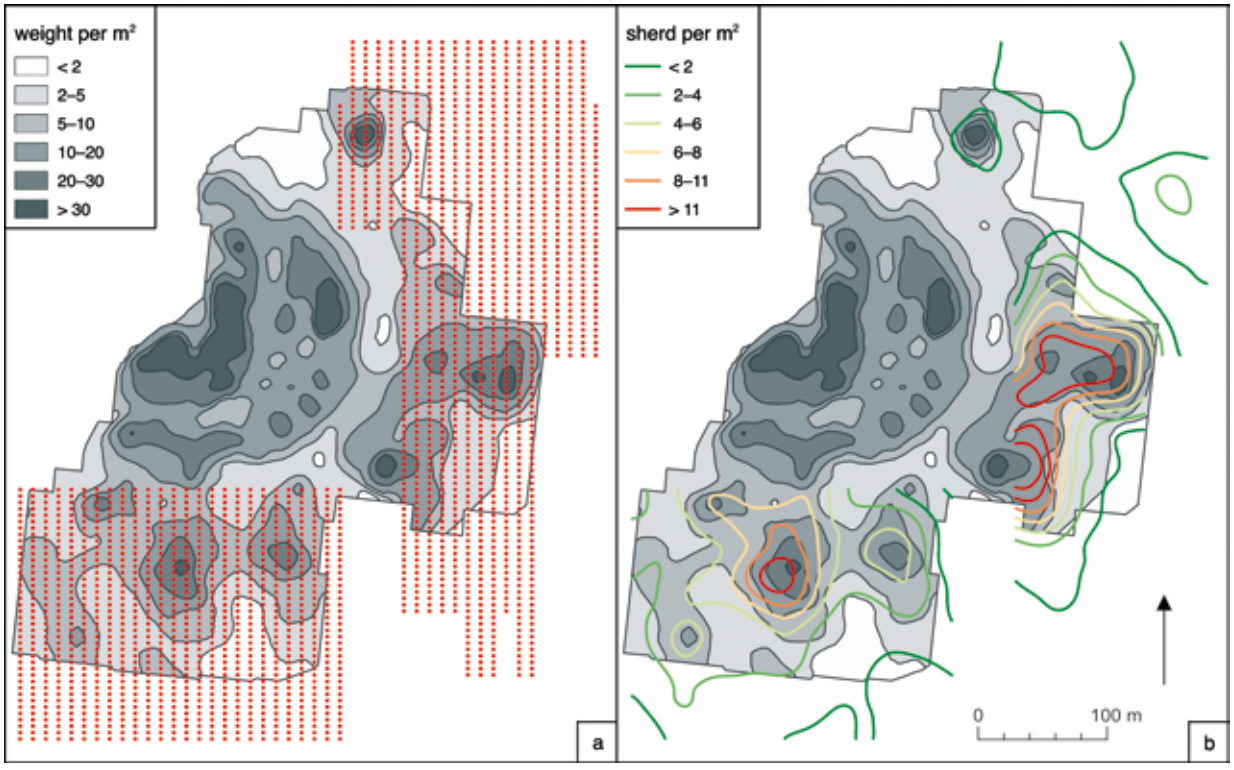

Fig. 15. Fidvár near Vráble. The interpolated ceramic density by weight from 2007 (a); after *Falkenstein et al. 2008*, 45, fig. 6; 7) compared to the interpolated ceramic density by number from 2014 (b). In a, also the 4 m² – sample areas of 2014 are shown. In b, the interpolation was carried out with the module v.surf.bspline of GRASS 6 (settings: east-west length = 20; north-south length = 10; type of interpolation: Bicubic; Tykhonov regularization paramter: 1.0).

The values obtained by the recent reduced sampling campaign at Vráble correlate well in order of magnitude with those gleaned from the older, weight-related collection (Fig. 15). Furthermore, as previously mentioned, all finds in 2007 were collected. It follows then, that the ceramic sherds counted during the spring campaign in 2014 came to the surface within the past seven years. The fact that they still show exactly the same distribution is another proof of the relevance of the recent values. The results of the different approaches can now be compared and contrasted with each other in order to develop survey methods for future investigations in the Žitava Valley.

PLOUGHZONE SAMPLING AT FIDVÁR NEAR VRÁBLE

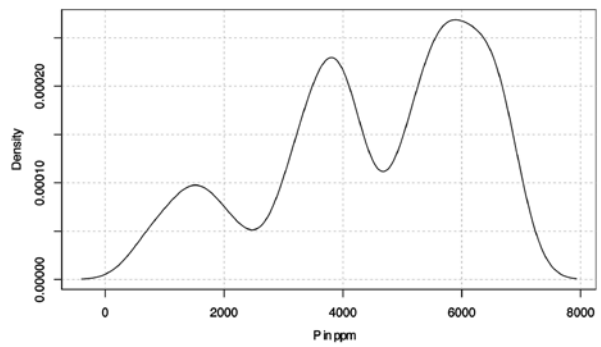

Fig. 16. Fidvár near Vráble. Kernel density diagramm of the P-content from the topsoil (Kernel: Gaussian, Band width: 400; compiled online at *Wessa 2015*).

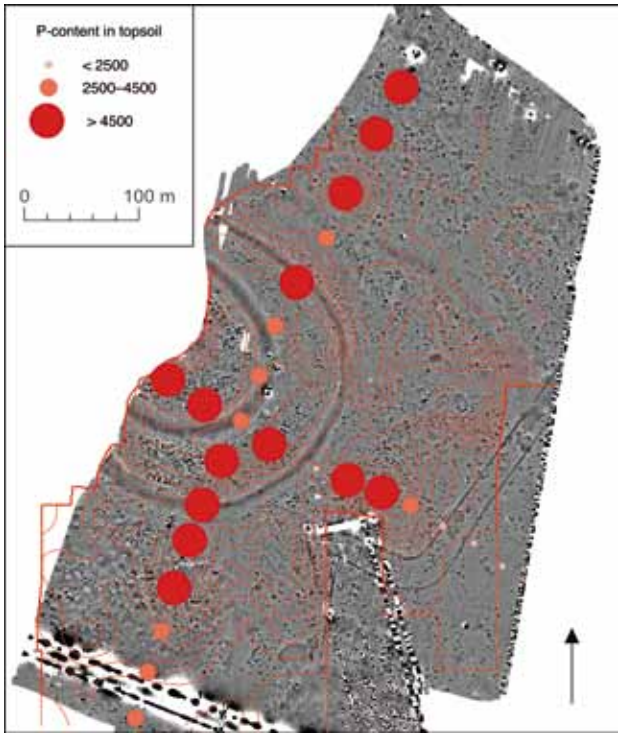

Fig. 17. Fidvár near Vráble. Phosphor-value of the topsoil samples compared to the combined ceramic distribution of the surveys of 2007 and 2014 (for algorithm and settings see Fig. 15). The geomagnetic picture is shown below both. The categorization of Phosphor correlates with the peaks in Fig. 16.

In February 2015, additional drillings were performed with a small soil sampling auger to collect sediment from the topsoil, approximately 40 cm underneath the surface. The samples were again tested on their P-content using our pXRF analyzer. The phosphorus content (P) shows a very clear tripartite division in the Kernel Density diagram (Fig. 16). There are peaks at 1500, 4000 and 6000 ppm. These peaks in Fig. 17 obviously correlate with areas defined by the density of ceramics (cf. Fig. 17). It follows that the composition of the topsoil mirrors the past human impact within the area and allows conclusions on the archaeological features beneath it. Modern fertilization does not distort the outcome (*Gauss et al. 2013*). Here, as presumably at many other sites, the topsoil represents a valuable archaeological archive to be explored. The common practice of removing the topsoil without further study has therefore to be rethought.

DISCUSSION

Although more detailed analysis of the natural and cultural processes which led to the ceramic distribution at Fidvár near Vráble is needed, the results of the recent campaign confirm the value of large-scale field walking surveys based on statistical sampling (contrary to criticism by *Doneus 2013*, 143). The distribution clearly mirrors zones of more intensive activity surrounding of the main settlement. By extending the surveyed area, another such zone was discovered in the northeast.

Despite very comparable means of surveying, the three sites Maňa-Veľká Maňa, Bešeňov and Hul have yielded very different results, which is attributable to – on the one hand – different states of preservation, but also different functions of the sites. For both reasons, the research conducted there is, therefore, of relevance for the potential of similar sites in the Žitava Valley and beyond.

In Maňa-Veľká Maňa a slope of up to 7% was recognized. Therefore, and in spite of the find scatters on the surface, the geomagnetic anomalies were proven by drillings to be only preserved for a few decimeters. If we assume that originally the pits there had a depth of 2–3 m, as is the case in, for example, Fidvár, then in the past 4000 years around 2 m of topsoil must have been eroded away. Therefore, very little can be said in regard to the role this site played in the context of the settlements of the Žitava Valley, however, it is in comparison with other sites in the valley remoter locations that it becomes significant. In the future, more attention should be paid to such out-of-the-way sites as Maňa-Veľká Maňa.

In contrast, at Bešeňov there was only a moderate slope of 1.6% and the geomagnetic anomalies were preserved to depths of up to 170 cm. However, an important general insight of the drillings at Bešeňov was the fact that at the bottom of each drilling the virgin soil consisted of packed sand which perhaps represents a deposition of a former stream of the Žitava and which seems not very suitable for digging the typical deep storage pits found, for example, at Fidvár. This leads to the question of what kind of settlement was represented by the site at Bešeňov. According to the magnetometry it was not fortified like Vráble or Hul. Because there is only a slight elevation, if not the site itself, then at least its surroundings would probably have been covered by water during spring flooding. So, it seems likely that Bešeňov was settled only intermittently or for a short period of time during the Bronze Age.

The site of Hul shows, on the other hand, that even on a very small scale, one must reckon with very different erosion rates. In the south of the site there was perhaps an erosion of 1 m. In the northwest, where today the terrain shows a heavy slope, the loss of topsoil was at least 3 m, if not more. The erosion of the post-Bronze Age was so severe that even basic location parameters were affected: Today the site is exposed to the northwest and shows an average slope of up to 7%; however, during the Bronze Age, the site was probably more oriented to the west, and the slope added up to only 2%. This shows very clearly that the reprojecting of contemporary conditions is not without problems.

Because the geomagnetic prospection of Hul yielded the best picture of all three sites discussed here in greater detail, it also allows us to draw more far-reaching conclusions. The inner part of the ditch measured 98 x 80 m or roughly 0.4 ha. If we suppose that the earth removed for the ditch was used to build a rampart in the adjoining to the ditch, this space becomes even more confined. Assuming a berm of 1 m and a breadth of the rampart of 5 m, an inside area of only 0.3 ha would remain. This is in very good accord with the sizes of the site of Rybník (*Bátora/Rassmann 2008*) or the house groups of Fidvár (*Bátora et al. 2012*). Therefore, it might be safely assumed that a social group of 60–80 individuals settled at Hul. According to the pXRF-analyses there was no major human impact on the filling of the ditch which could hint that Hul was inhabited only for a very short period of time.

The function of Hul seems obvious from its position in the landscape (cf. Fig. 1; 7). In spite of the fact that the fortification of Rybník was even more exposed, they share their location on a promontory. The settlement of Hul might have controlled access to the upper part of the Žitava Valley. Furthermore, one of the east-west-routes might have lead from the Nitra Valley over Hul to the Hron Valley. Thus, Hul would be located in the intersection of two important communication corridors.

SUMMARY

Our survey in the Žitava Valley has yielded important results which are of relevance for the understanding of the settlement structure within the Žitava Valley, but also for its main site Fidvár. On the one hand, sites on less favourable locations like at Bešeňov (close to the flood plain) and at Maňa-Veľká Maňa (in hilly surrounding) beg the question what the actual function of these sites and their relationship to Fidvár was. Unfortunately, we were not able to gain datable material from the drillings, so the chronological relationship remains unclear. This is a clear desideratum for future research.

Even more intriguing is the tie between Fidvár and Hul: In contrast to Fidvár, the settlement of Hul showed no increase in size at all. Thus, it appears as if Hul represents an early developmental phase of Fidvár and thus could contribute substantially to our understanding of the latter site. Therefore, we have planned to continue our work at Hul. In this regard, the results of the field survey at Fidvár

are of particular importance as they pave the way to a more general appreciation of the interplay between topsoil and subsurface archaeological structures (see *Rassmann et al., in press* for an in-depth discussion). With the sherd counting methodology even very large sites of more than 10 ha can be submitted to field walking within a very manageable time span. Sediment samples from the plough-zone can contribute valuable additional information about the extent and "hotspots" of the whole site in question. When combined with selective collecting of finds it should be possible to gain detailed insights of the distribution of finds and the structuration of the settlement even at multi-phase sites like Hul.

Acknowledgments

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Výsledky prospekcie v povodí rieky Žitava

Nils Müller-Scheeßel – Jozef Bátora – Samantha Reiter – Kai Radloff – Peter Tóth

SÚHRN

Na jar v roku 2014 sa uskutočnila archeologická prospekcia povodia rieky Žitava v spolupráci Rímsko-germánskej komisie vo Frankfurte nad Mohanom, Archeologického ústavu SAV v Nitre a Katedry archeológie Filozofickej fakulty Univerzity Komenského v Bratislave. Cieľom prospekcie bolo aplikovať poznatky, získané archeologickým výskumom na Fidvári vo Vrábľoch, aj na ďalšie lokality na Požitaví, ktoré tvorili sústavu opevnených sídlisk zo staršej doby bronzovej na južnom predhorí Karpát.

Prieskum bol realizovaný na 14 lokalitách, ktoré boli datované alebo sa ich datovanie do staršej doby bronzovej len predpokladalo: (1) Lúčnica nad Žitavou-Kopanice, (2) Vráble-Dyčka, (3) Veľký Cetín-Šaškaj, (4–5) Maňa-Veľká Maňa, (6) Beša, (7) Čifáre-Kapustniská, (8) Tajná-Horné lúky, (9) Dvory nad Žitavou, (10) Bajč-Piesočník, (11) Bajč-Göböljárás, (12) Bajč-Vlkanovo-Medzi kanálmi, (13) Hul-Kratiny a (14) Bešeňov-Žitavský hon (obr. 1). Na troch z nich bol vykonaný podrobnejší prieskum (Maňa-Veľká Maňa, Bešeňov-Žitavský hon, Hul-Kratiny), spojený s povrchovým zberom, vŕtaním ručným vrtákom a magnetometrickým meraním. Vzorky z vrtných jadier boli odoberané po 10 cm intervaloch a boli analyzované ručným pXRF analyzérom Thermo Scientific Niton XL3 t v XFA v laboratóriu Rímsko-germánskej komisie vo Frankfurte nad Mohanom.

Všetky tri bližšie skúmané lokality poskytli rozličné výsledky, na ktorých sa prejavil rôzny stav zachovania a funkcia lokalít. V Mani-Veľkej Mani bola geomagnetickým meraním preskúmaná plocha 2,3 ha (obr. 2; 3). Na výslednom pláne sú zrejmé archeologicky relevantné štruktúry, ktorých datovanie a účel je nateraz neznámy. Pomocou vŕtania ručným vrtákom sa podarilo zachytiť kultúrnu vrstvu siahajúcu do hĺbky 60–80 cm. V dôsledku sklonu svahu (7 %) a poľnohospodársky intenzívne využívanej krajiny sú podpovrchové objekty veľmi zle zachované.

Povrchová prospekcia v Bešeňove (obr. 4) na ploche asi 100 x 80 m odhalila koncentráciu črepov, ktoré boli datované zväčša do doby bronzovej. Následne bolo realizované geomagnetické meranie, ktoré pokrýva plochu 2,4 ha (obr. 5). Zrejmé sú na nej viaceré anomálie pravouhlého tvaru orientované v smere ZSZ-VJV, ktoré by mohli predstavovať pôdorysy domov. Stopy opevnenia sa zachytiť nepodarilo. Vysoký obsah P, Sr a Ca vo vrte 4 v hĺbke 100 cm (obr. 6c) pravdepodobne indikuje udalosť spojenú s úmyselným vyplnením objektu bežným sídliskovým odpadom. Naproti tomu v spodnej časti vrtu 5 (obr. 6d) je koncentrácia týchto prvkov veľmi nízka, čo by mohlo signalizovať ľudský impakt. Zdá sa, že lokalita bola v rámci staršej doby bronzovej osídlená zriedka alebo len krátku dobu.

Najlepšie výsledky poskytol prieskum v katastri obce Hul (obr. 7; 9). Magnetometrickým meraním bola preskúmaná plocha o rozlohe 2,6 ha, na ktorej sa okrem početných anomálií podarilo zachytiť aj priebeh kruhovej priekopy oválneho pôdorysu o rozmere 98 x 80 m (obr. 9). Šírka priekop sa pohybovala v rozmedzí 6–7 m. Stopy po vstupoch na pláne viditeľné nie sú. V SZ časti fortifikácie sa zdá, že priekopa je zdvojená. Nie je však jasné, či ide o vstupy alebo stopy po obnovení priekopy. Okrem toho sa táto časť lokality nachádza v oblasti postihnutej silnou eróziou. Súčasne s magnetometrickým prieskumom bola uskutočnená aj povrchová prospekcia na ploche 100 x 100 m. Táto plocha bola rozdelená do štvorcov o veľkosti 10 x 10 m, v rámci ktorých sa realizoval samotný zber artefaktov.

Hustota črepov, ktoré sa nachádzali na povrchu a boli datované do staršej doby bronzovej (obr. 10a), poukazuje na silnú koreláciu s priebehom priekopy, obzvlášť v oblastiach postihnutých eróziou. S týmto pozorovaním ostro kontrastuje priestorová distribúcia črepov datovaných do stredného a mladého neolitu (obr. 8; 10b).

Na lokalite bolo realizovaných 14 vrtov ručným alebo geologickým vrtákom (obr. 11; 12), ktoré poukázali na to, že priekopa bola pozvoľne zapĺňaná bez výraznejšieho zásahu človeka.

Zároveň sa s prospekciou vybraných lokalít na Požitaví realizoval nový povrchový prieskum na Fidvári vo Vrábľoch (obr. 13; 14). Priestor mimo fortifikáciu (13 ha) bol rozdelený do 52 štvorcov s veľkosťou 50 x 50 m, z ktorých každý bol ešte delený na menšie úseky. Archeologický materiál zbieraný nebol, zisťoval sa len jeho počet a hustota. Výsledky prieskumu veľmi dobre korešpondujú s povrchovým zberom, ktorý na lokalite prebehol v roku 2007 (obr. 15; *Falkenstein et al. 2008*).

Vo februári 2015 boli v areáli fortifikácie, ale aj mimo nej, realizované nové vrty menším ručným vrtákom za účelom získania vzoriek sedimentu z hĺbky asi 40 cm pod dnešným povrchom. Výsledky pXRF analýz (obr. 16; 17) poukazujú na to, že koncentrácia fosforu koreluje s hustotou keramiky nájdenej na povrchu lokality.

Zdá sa teda, že zloženie ornice odzrkadľuje minulý vplyv človeka na lokalite a dovoľuje odvodzovať závery o archeologických kontextoch, nachádzajúcich sa pod ornicou.

Prieskumy v Požitaví poskytli výsledky, ktoré sú relevantné nielen pre pochopenie štruktúry osídlenia v povodí rieky Žitava, ale aj pre samotnú lokalitu Vráble-Fidvár.

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