KOLLAPS – NEUORDNUNG – KONTINUITÄT

GEPIDEN NACH DEM UNTERGANG DES HUNNENREICHES

Tagungsakten der Internationalen Konferenz
an der Eötvös Loránd Universität,
Budapest, 14. – 15. Dezember 2015

COLLAPSE – REORGANIZATION – CONTINUITY

GEPIDS AFTER THE FALL OF THE HUN EMPIRE

Proceedings of the International Conference
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Hrsg. / Eds
TIVADAR VIDA – DIETER QUAST – ZSÓFIA RÁCZ – ISTVÁN KONCZ

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INHALT / CONTENTS

ENVIRONMENTAL HISTORICAL ANALYSIS OF THE GEPIDIC SETTLEMENT OF RÁKÓCZIFALVA

Beáta Tugya – Katalin Náfrádi – Sándor Gulyás – Tünde Törőcsik – Balázs Pál Sümegi – Péter Pomázi – Pál Sümegi

*We present the results of the environmental historical and geoarchaeological analysis of Rákóczifalva–Bagi-föld and Rákóczifalva–Rokkant-föld (*Fig. 1*) archeological sites in Jász-Nagykun-Szolnok County. They were discovered in the course of several hectares of archaeological excavations related to the migration period, especially the Gepids era. A significant number of Gepids sites and finds*[1] *were found in both the investigated area and the wider area of the site, in the middle reach of the Tisza valley. So the geoarchaeological and environmental historical analysis of the Gepids sites in Rákóczifalva can also provide a model for the settling strategy and lifestyle of the Gepids communities.*[2] *The purpose of our work is to present how geoarchaeological and environmental historical factors impacted local settling and lifestyles in the Gepids communities*[3] *during the migration period. In addition, to demonstrate the relationship of the Gepids communities and their environment in the Rákóczifalva site compared to other Gepids in the Great Hungarian Plain.*[4]

Keywords: Rákóczifalva; geoarcheological analysis; environmentals historical analysis; archaeozoology

Study site

Natural conditions of the area

In terms of the borders of the Rákóczifalva–Bagi-földek and Rokkant-földek sites, it can be said that it is protected from the north, south and west, as it is bordered by the Tisza River and the deeper Tisza alluvium (*Figs 1–5*). It is open only from the eastern direction, because the area is connected eastward to the high river bank of the Tisza River and it extends as a peninsula into the deeper Tisza floodplain. The study site belongs to the Great Hungarian Plain, including the Middle Tisza region, the Nagykunság little region group and the Szolnok-Túri alluvial plain, Szolnok-Alluvial Plain little regions. It lies in the western part of the Szolnok-Túri alluvial plain. The relative relief value of the little region is low, 2m/km^2. The slightly wavy plain in the study site and the floodplain at the edge of the Tisza River can be classified as orographic relief type.[5] Examining a 1:10000 scale map, the deepest point of the area is 79.2 m and the highest is 90 m. Despite the low relative relief value of the Szolnok-Túri alluvial plain, there is a difference of more than 10 m above sea level difference within a short distance in the study area. This value is extremely high in the Great Hungarian Plain, especially if we consider the general nature of the little region.

The above-mentioned little regions have a moderately warm-dry climate, close to the warm-dry climate. The annual sunshine duration is between 1970 and 2010 hours. The average annual temperature is 10.9 °C, the mean temperature of the vegetation period is 17.3-17.4 °C. The frost-free period begins on 7-8th April, the first autumn frosts are expected around 20th October. So the frost-free period is 196 days long. Annual precipitation is 510-540 mm, the growing period's precipitation amount is 300 mm. The aridity index is 1.3-1.38. The area is a dry, heavily anhydrous

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1 Cseh 1986, 1990, 1991, 1992, 1993, 1997, 1999a, 1999b, 2001, 2002; Masek 2014.
2 Cseh 1999c, 2007, 2009, 2013; B. Tóth 1999; Nagy 1999; Masek 2012, 2014.
3 Kovács et al. 2007, 2008; Kovács–Váczi 2007; Masek 2012, 2014.
4 B. Tóth 1999, 2006.
5 Marosi–Somogyi 1990.

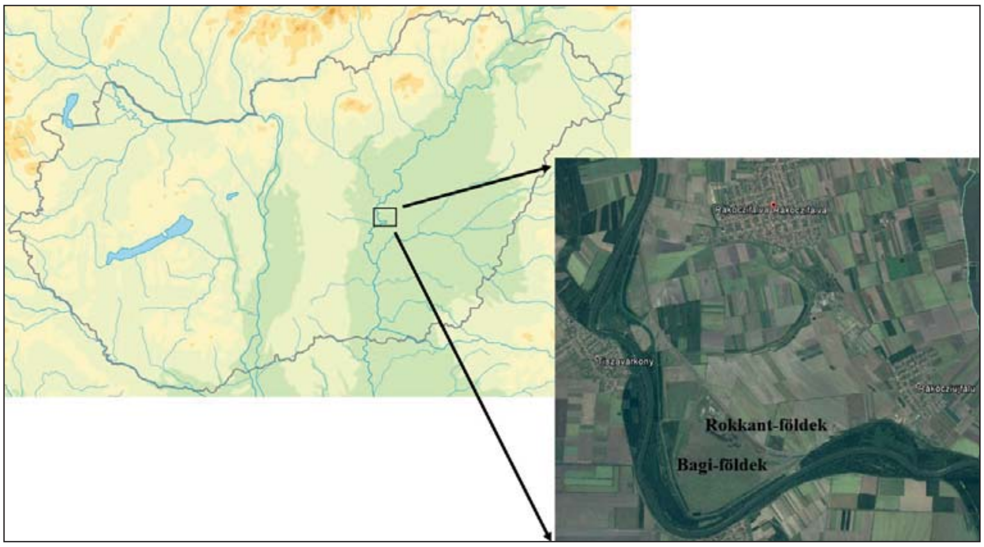

Fig. 1. The location of the study site in Hungary and in GoogleMaps

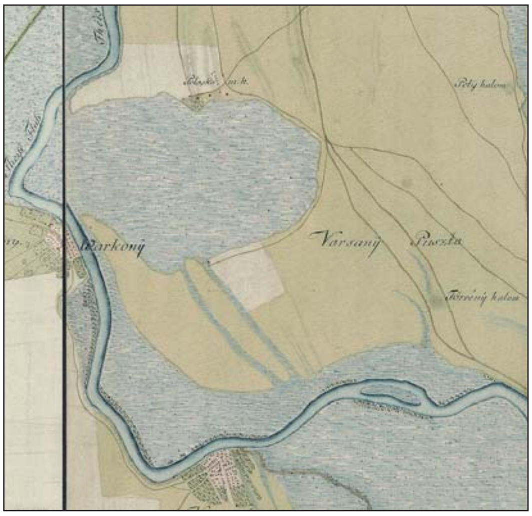

Fig. 2. The morphological conditions and the vegetation of the study site in the First Austrian Military Survey (1782)

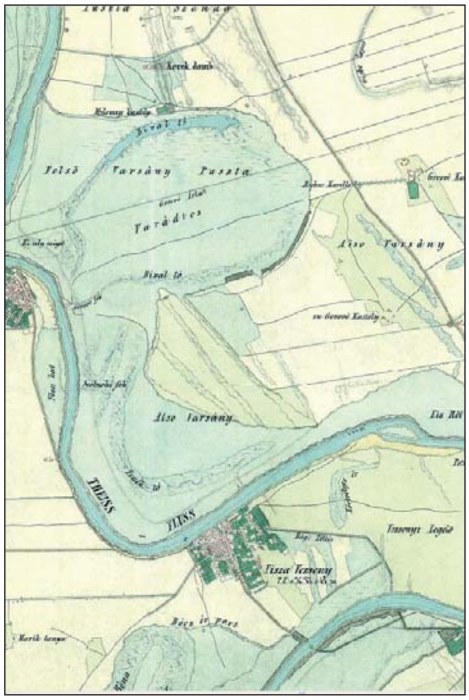

Fig. 3. The morphological conditions and the vegetation of the study site in the Second Austrian Military Survey (1869)

area. Precipitation is 150 mm less than the local value of the potential evaporation.[6] Based on the data of the Szolnok meteorological station and the Walter-Lieth diagram[7], the area belongs to the driest areas of the Great Hungarian Plain. On the basis of the average annual rainfall of 500 mm and the distribution of rainfall (*Fig. 6*), there is a significant risk of drought in the second half of summer

6 Marosi–Somogyi 1990.
7 Walter–Lieth 1960, Fig. 5.

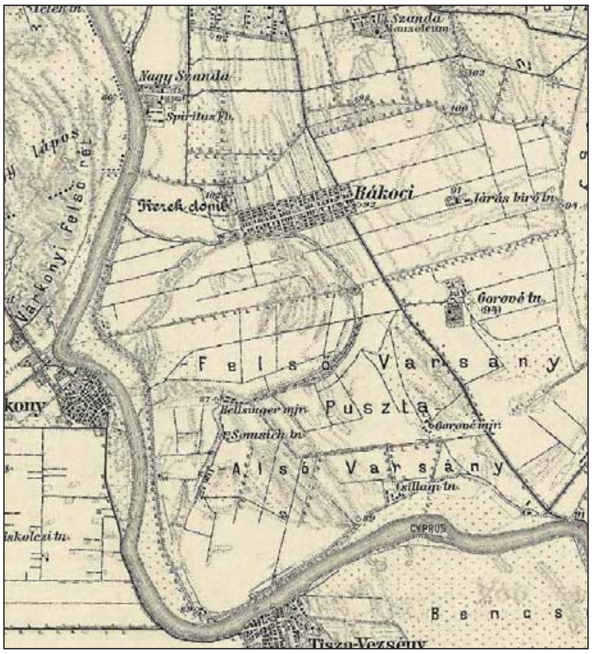

Fig. 4. The morphological conditions and the vegetation of the study site in the Third Austrian Military Survey (1875)

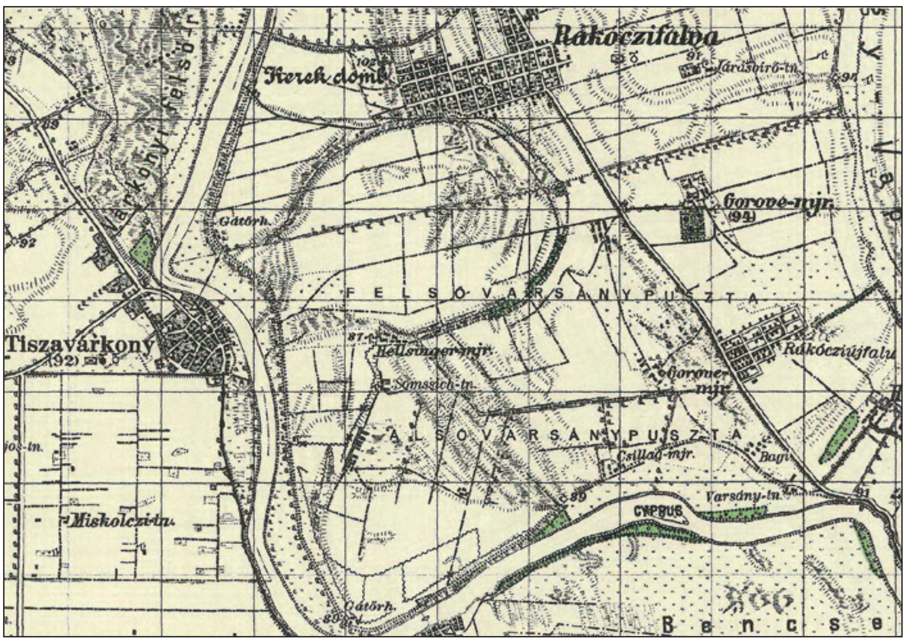

Fig. 5. The morphological conditions and the vegetation of the study site in the Hungarian Military Survey (1943)

and in autumn. This occurs especially when continental and/or sub-Mediterranean climate effects develop resulting maximum monthly temperature conditions (*Fig. 6*) in the examined area. In this

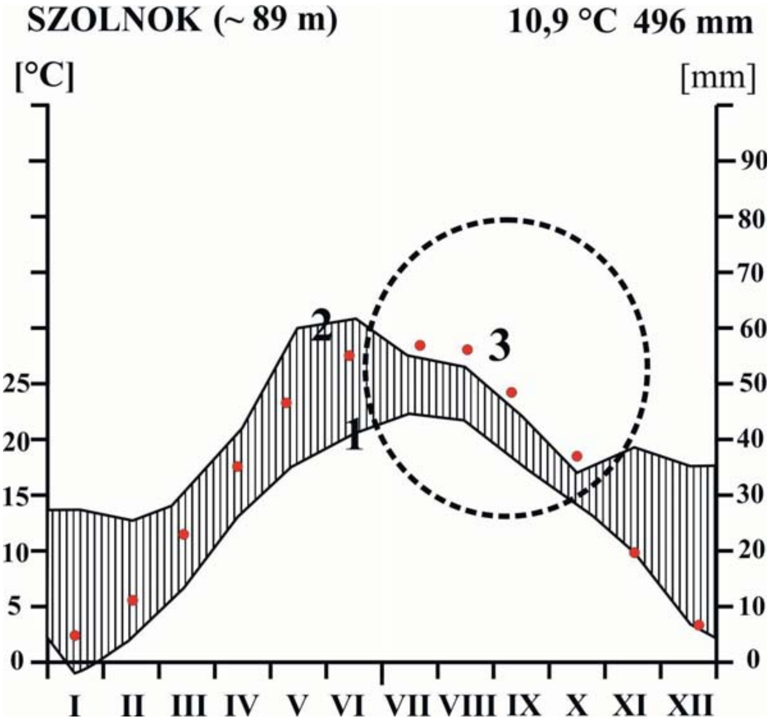

Fig. 6. Walter-Lieth diagram based on the meteorological station in Szolnok
1 = monthly average temperature values, 2 = monthly average precipitation values, 3 = dashed circle, drought period, red circle = monthly maximum temperature values

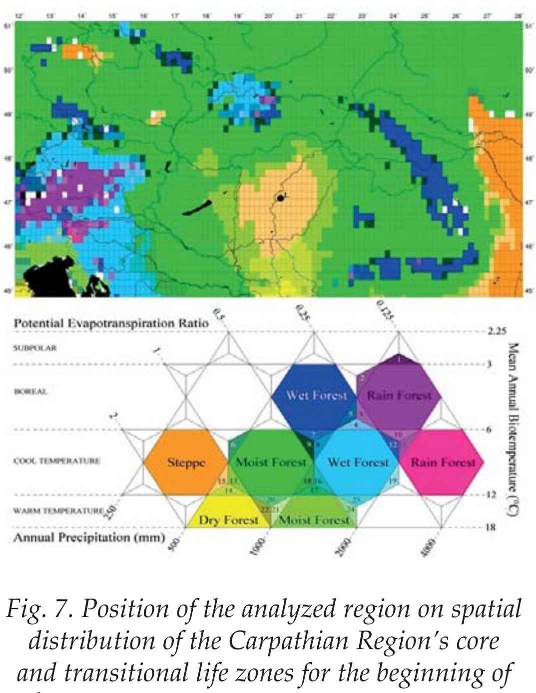

Fig. 7. Position of the analyzed region on spatial distribution of the Carpathian Region's core and transitional life zones for the beginning of 20th century based on the Holdridge modified life zone system (after SZELEPCSÉNYI ET AL. *2014, 2015, 2018)*

Fig. 8. Pedological map of Lajos Kreybig (1937) about the study site (indicated as Felső and Alsó Varsány-puszta in the map) – brown color = chernozem soil, blue color = hydromorphic soil, purple color = alkaline soil, yellow color = sand soil

case evaporation exceeds rainfall at the end of summer and early autumn and periodic steppe climatic conditions develop.

Based on the bioclimatic analysis of the Carpathian Basin[8], the study site belongs to the central part of the Pannonian forest steppe zone (*Fig. 7*). At the same time, the little regions belong to the Tiszántúl flora region. Potential forest associations are willow-poplar-alder gallery forest, oak-ash-elm gallery forest, alkaline oak forest and loess-mantled terrain (*Aceri tatarico-Quercetum*) in the floodplain.[9] Vegetation development and its change will be analyzed later, as we have a pollen core from the area that was revealed by the Department of Geology and Paleontology of the University of Szeged. Based on the recent plant associations the examined area is a cultivated steppe: pastures with weeds, poplar and acacia plantations, in deeper areas swamp vegetation mixed with weeds or with saline plants occur.

On the basis of the cores of the Department of Geology and Paleontology, University of Szeged two types of recent soils can be distinguished in the area. One of them is the chernozem (black earth) soil that can be found on natural elevations, the other is the alkaline meadow soils (*Fig. 8*) which have a significant water effect.

The results of the Kreybig soil mapping (1933) and pedological mapping (*Fig. 8*) were used to characterize the soils of the examined area.[10] In this historical map alluvial meadow, chernozem, alkaline and sandy soil types were identified in the study site, but in a different spatial extension compared to our results.

Geology and evolution of the area

Since only Quaternary formations could be detected on the surface of the examined area (*Figs 9–10*), the geological development history of the area is presented by discussing Quaternary events. The bedrock of these Quaternary formations is Tertiary sediments lying more hundred meters deep from the surface. Among these the most significant layer is the Törteli Formation[11] that developed at the end of the Tertiary, in the last phase of the Pannonian filling up. On the Törteli Formation the Zagyva Formation developed.[12] Thin-layered clay, aleurite and sandstone layers accumulated indicating a delta background, presenting marshy and floodplain environment. Its upper level evolved in an alluvial plain, in a fluviolacustrine environment. After the fluviolacustrine state the water network of the Great Hungarian Plain changed and was significantly different from the current water network: the Tisza river flowed eastern than nowadays. The Danube River met the Tisza at the height of Csongrád.[13] According to the latest data[14] the Tisza valley was formed about 20,000 years ago. The Tisza River, which until then followed the valley of the Körös and Berettyó creeks, bypassed the Nyírség from the north and took its current direction.[15] Thus, in the Tisza region, the Tisza River became significant regarding morphology and sedimentology from the Upper Wurmian (MIS2).[16] Due to tectonic movements sediments (of Tisza origin) of different age in different altitudes can be found in the area.[17] So it is not surprising that the surface is covered by upper Pleistocene-Holocene sediments in Rákóczifalva–Bagi-földek and Rokkant-földek sites

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8 Szelepcsényi et al. 2014, 2018.
9 Marosi–Somogyi 1990.
10 Kreybig 1937.
11 Juhász 1992.
12 Juhász–magyar 1992; Juhász 1992.
13 Sümeghy 1944, 1953; Miháltz 1953; Molnár 1965.
14 Timár et al. 2005.
15 Sümeghy 1944.
16 Sümegi et al. 2018.
17 Rónai 1972; 1985; Timár et al. 2005.

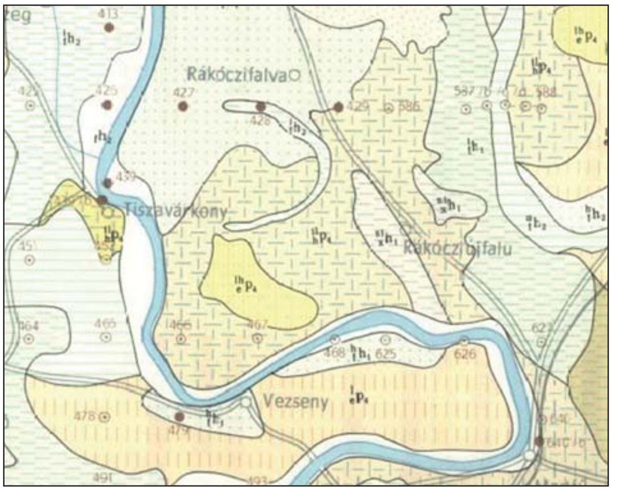

Fig. 9. Geological structure of the study site (based on the 1:100.000 scale geological map of the Hungarian National Geological Institute, 1969)

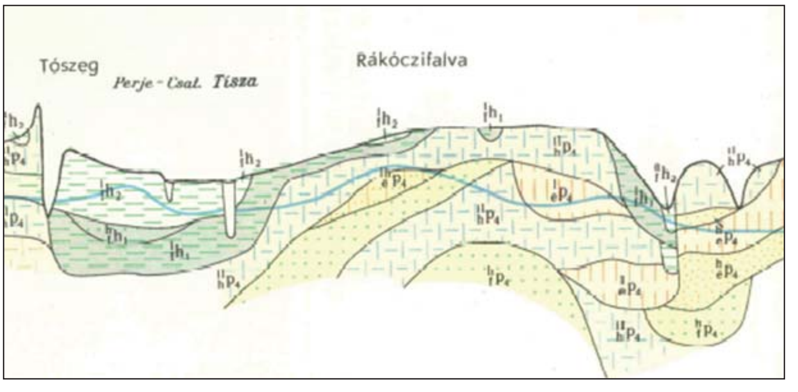

Fig. 10. Geological cross section of the study site (based on the 1:100.000 scale geological map of the Hungarian National Geological Institute, 1969)

and older Pleistocene layers and the Pliocene bedrock sediments (clay, sand) are only known from drilling.[18]

The most widespread upper Pleistocene sediment on the surface is loess; the type of loess that is connected to rivers and floodplains, i.e. a Pleistocene floodplain sediment[19], formerly known as loess like Pleistocene alluvial sediment or better known infusion loess (alluvial loess). Infusion loess differs from typical loess in its porosity, carbonate and clay content and biofacies. [20]

In the Middle Tisza region there was also sand movement, which can be observed today north of the examined area in Szolnok-Szandaszőlős. The sandy area of Tiszaföldvár at the southern part of the Szolnok-Túri alluvial plain is the continuation of the sandy area of the Danube-Tisza Interfluve.[21]

The results of the geological mapping were compared with the results of the geological map of József Sümeghy and András Rónai. The 1:200.000 scale geological map of the Tiszántúl (1941) by Sümeghy and the complex maps of the Great Hungarian Plain (*Fig. 9*), the 1:100.000 scale Szolnok

18 Rónai 1972; 1985.
19 Sümegi 2005; Sümegi et al. 2015.
20 Horusitzky 1898, 1899, 1903, 1905, 1909, 1911; Pécsi 1993; Sümegi et al. 2015.
21 Halaváts 1895; Miháltz 1953; Molnár 1965; Rónai 1972, 1985.

map sheet made by András Rónai. In the Sümeghy's map 'old-Holocene' and 'new-Holocene' alluvial soil surrounded the island-like 'upper Pleistocene lowland loess' formation. The expansion and position of the loess formation in the Great Hungarian Plain is very similar to that of the alkaline soil 'island' surrounded by alluvial soil in the Kreybig map.

The results of the mapping of the Great Hungarian Plain led by András Rónai are similar, although it showed a more inaccurate result in the examined area.[22] Their cross-section of several drillings is slightly south of our study area (*Fig. 10*); two drillings were conducted in the study site (*Fig. 10*). Based on their map, an infusion loess covered (floodplain sediment) surface was explored in the area, and the residual surface was surrounded by deeper Pleistocene and Holocene channels and beds filled with fine grained sediments and still developing alluvial plains (*Figs 9–10*).

The geological surveys before our study pointed to Pleistocene muddy loess and infusion loess (floodplain) sediments in the Rákóczifalva-Bagi- and Rokkant-földek sites. In the middle of this sediment Pleistocene loessy sand was found, according to these maps. In the northern part of the area semi-circular shaped Holocene aleurite appeared (*Fig. 9*). East of this area the residual surface is covered by Pleistocene muddy loess and infusion loess. The southern area is not so uniform in a geological point of view. From east to west the map indicates loess (aleurite rich sediment), muddy loess, infusion loess (floodplain sediment), riverine sand, loessy sand and close to the Tisza River muddy, infusion loess occurs again.

Methods

Analysis of historical maps of the site

Examination of the maps before and after river regulations (1847) is as follows. Although the study site can be recognized in the maps of Ptolemaiosz[23], Tabula Peutingeriana from the end of antiquity[24], Angelino Dulcert from the medieval period (1339)[25] and in the map of Lázár deák from 1528[26], but the first maps that can be evaluated from an environmental historical point of view are the maps from the 18th century (AD). The first (1782), the second (1869) and the third (1875) Austrian military survey and the Hungarian military survey[27] from the second world war were used in our study. We also used the Middle Tisza region map[28] of Lietzner-Sándor (1970) by János Lietzner Keresztelő, the county engineer of Heves-Külső Szolnok. By analyzing historical maps, we tried to reveal the development of the area and the effect of human impact.

Exogenous geological analysis

An EOV map with a scale of 1:10,000 is available from the area. Using this map we have calibrated the measurement points using ArcView 3.2 software. After that we created the digital relief model of the area (1:10000 EOV map) using ArcGis software. The digital relief model was used for the geomorphological analysis of the study site. In addition, we used the aerial photographs prepared by the Institute of Archaeological Sciences of the Eötvös Loránd University to map the local surface of the area. The purpose of the exogenous geological-morphological analysis was to reconstruct the environment of the site as accurately as possible.

22 Rónai 1969, 1972, 1985.
23 Fehér 2004.
24 Tóth 2004.
25 Írás 2013.
26 Török 1996.
27 Stegena 1981; Timár et al. 2006.
28 Sugár 1989.

Geoarcheological analysis

During geoarcheological analysis 300 shallow (3-5 m deep) cores were taken at 5 cm intervals by a spiral drilling machine[29] in Rákóczifalva-Bivaly-tó, Bagi-földek and Rokkant-földek sites. Boreholes were created along geological sections parallel to each other in such a way that all exogenous geological-geological-pedological units were explored. We used the international nomenclature of Troels-Smith[30] during sediment description.

Undisturbed samples were taken by a Russian corer[31] by overlapping technique[32] in a filled up point bar channel at the boundary of the Rokkant-földek and Bagi-földek sites. Samples were cut lengthwise and stored in the usual manner at 4°C.[33] Size distributions, organic material, carbonate content (LOI) and pollen analytical analysis was carried out. In describing the colors of the sediment the Munsell soil color charts were used.[34] Sedimentological analysis was carried out using an Easy Laser Particle Sizer 2.0. laser particle sizer (42 grain fractions) after proper sample preparation.[35]

During magnetic susceptibility analysis the magnetizable element content of the sediment is measured. For this purpose air-dried and powdered samples are prepared to measure the loss of mass. Bartington MS2 Magnetic Susceptibility Meter was used at 2.7 MHz[36] that is suitable for laboratory and field analysis as well. Three measurements were done for each sample and values were averaged.

Dean's method (1974) was used for the determination of carbonate and organic material content. Sedimentological and LOI analysis was carried out and interpreted at 4 cm intervals. We presented the sedimentological data and succession, and the cross section of geoarcheological data using the Psimpoll software by Keith David Bennett (1992).

Pollen analyses

Pollen analytical analysis was carried out on the undisturbed samples of the core deepened in the point bar channel. The retrieved cores were also subsampled at 1-2-4-cm intervals for pollen analysis. A volumetric sampler was used to obtain 2 cm^3 samples, which were then processed for pollen.[37] Lycopodium spore tablets of known volume were added to each sample to determine pollen concentrations. A known quantity of exotic pollen was added to each sample in order to determine the concentration of identified pollen grains.[38] A minimum count of 500 grains per sample (excluding exotics) was made in order to ensure a statistically significant sample size.[39] The pollen types were identified and modified according to Moore et al. (1991), Beug (2004) and Punt et al. (2007), Kozáková–Pokorny (2007), supplemented by examination of photographs in Reille (1992, 1995, 1998) and of reference material held in the Hungarian Geological Institute, Budapest. Percentages of terrestrial pollen taxa, excluding Cyperaceae, were calculated using the sum of all those taxa. Percentages of Cyperaceae, aquatics and pteridophyte spores were calculated relative to the main sum plus the relevant sum for each taxon or taxon group. Calculations, numerical analyses and graphing of pollen diagrams were performed using the software package Psimpoll 4.26.[40] Local pollen assemblage zones (LPAZs) were defined using optimal splitting of information

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29 Sümegi 2001, 2002, 2013.
30 Troels-Smith 1955.
31 Belokopytov–Beresnevich 1955.
32 Sümegi 2001, 2002, 2013.
33 Sümegi 2001, 2002, 2013.
34 Colour 1991.
35 Sümegi et al. 2015.
36 Sümegi et al. 2015.
37 Berglund–Ralska-Jasiewiczowa 1986.
38 Stockmarr 1971.
39 Iversen–Fægri 1964; Fægri–Iversen 1989; Punt 1976-1995; Moore et al. 1991.
40 Bennett 2005.

content[41], zonation being performed using the 20 terrestrial pollen taxa that reached at least 5% in at least one sample. The paleovegetation was reconstructed using the works of SUGITA (1994), SOEPBOER ET AL. (2007), JACOBSON–BRADSHAW (1981), PRENTICE (1985) and MAGYARI ET AL. (2010). Pollen extraction was carried out with the help of Tibor Cserny geologist, in the former laboratory of the Hungarian Geological Institute. We express our gratitude to Tibor Csernyi organizing the pollen extraction.

Macrobotanical analysis

The archeobotanical material (anthracological) was obtained from the samples collected by 4 to 10 cm, flotated from uniformly 2.7 kg of samples. The quantity of the samples is in accordance with the German standards.[42] In obtaining and processing the samples we followed the guidelines of Ferenc Gyulai (2001) regarding the sampling and flotating process. In flotating the samples the dual flotating method and 0.5 mm and 0.25 mm sieves were used.[43]

Charcoal material was analyzed using a Zeiss Jenapol optical microscope at 10, 20, 50 and 100x magnification.[44] Wood identification was carried using using the reference book of GREGUSS (1945, 1972) and SCHWEINGRUBER (1990) and the web based identification work of SCHOCH ET AL. (2004).

Archaeozoological analysis

Large volume of bones, more than 6000 pieces of animal bones occurred from ten archeological cultures in the study sites, from the middle Neolithic (AVK) to the Arpadian Age. So the area was often inhabited for thousands of years. In addition, there were also objects of Copper Age (Tiszapolgár culture, Bodrogkeresztúr culture), Bronze Age (Halomsíros culture, Gáva culture), Celtic, Sarmatian and Avars with more or less vertebrate remains. Most of the finds are well preserved, only some of the prehistoric bones were in poor condition, often heavily laced, which made the determination difficult. Altogether 979 pieces were found in Gepid archeological objects that were in excellent condition. Identification of bones was carried out using the reference books of SISSON (2014) and SCHMID (1972), and the work of VON DEN DRIESCH (1976) for bone size measurement.

RESULTS

Historical maps

The analysis of historical maps (*Figs 2–5*) clearly shows the transformation of landscape utilization in the study sites before and after river regulation processes (1847). Although in the first Austrian military survey (*Fig. 2*) the nomenclature is still very poor and the morphological survey was not entirely accurate, in addition, the mapping of the Tisza coast was rough, it was obvious that in the coastal area of Tisza River (in the Bagi-földek site, according to archeologists) there were only gallery forests suitable for floodplain farming and marshy, boggy areas. It was also clearly visible in the first Austrian military survey (1782; *Fig. 2*) that in the Rokkant-földek (as it is called by archeologists) in the area called Varsány Puszta (in the later survey Alsó Varsány (*Fig. 3*) and Alsó Varsány puszta – *Fig. 4*) there are two periodic creeks between the Bivaly Lake and the Tisza valley. The first Austrian military map does not indicate the name of the Bivaly Lake; only a temporary, swampy area is marked. An abandoned, over-developed, unregulated curve of Tisza River can be reconstructed from its drawing (*Fig. 2*).

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41 BIRKS–GORDON 1985.
42 JACOMET–KREUZ 1992.
43 NÁFRÁDI–SÜMEGI 2013.
44 NÁFRÁDI–SÜMEGI 2015.

In other parts of the area scattered gardens, arable lands, grazing fields representing extensive animal husbandry are indicated in the first Austrian military map (*Fig. 2*). In addition, several mound that helps location identification are shown in the study area (*Fig. 2*).

The second Austrian military survey (1869) is very important in an exogenous geological and morphological point of view (*Fig. 3*). Bivaly Lake has been shown in this map, which clearly shows that it is an earlier over-developed curve of the Tisza River, which was connected to the regulated Tisza River through water outlet (canal) only periodically, during floods (*Fig. 3*). From this area of the Bivaly Lake (Felső (Upper) Varsány puszta), through Alsó (Low) Varsány puszta, four deeper, canal-like formations led to the actively developing valley of the Tisza (called Bagi-földek in our work). There was a lake in the area of Bagi-földek, according to the map Lake Fenék, which was connected to the active Tisza River through the water outlet of Szolnok. Based on the map, the Bagi-földek were a suitable area for fishing, gathering, waterfront farming (gathering of gallery forest crops, sedge, reed, construction and wood utilization for energy) before river regulations. On the basis of exogenous geological characters the Bagi-földek were an point bar series of the unregulated Tisza River (*Fig. 3*).

At the same time, in the second Austrian military map, Rokkant-földek (Alsó (Lower) Varsány) is an older (probably Pleistocene) residual surface, a point bar series rising a few meters above the alluvium of Tisza River and it did not affect the development of the Tisza alluvium at the end of the Pleistocene and during the Holocene, rather it seems to be a terrace level (*Fig. 3*). The second Austrian military map (1869) clearly shows the traces of groundwater regulation, the groundwater drainage ditches and the artificial barrier system along the active riverbed of the Tisza River (*Fig. 3*). At the same time, settlements and the associated gardens and arable lands are extensive, while grazing fields and pasture lands can be observed in smaller regions further from the settlements and are more clearly defined than in the first Austrian military survey (*Fig. 3*).

Based on the map prepared by the Second military survey (1869), it is clear that north from the Bagi-földek, on the alluvium of the Tisza River called Varsány puszta, there is a large abandoned Tisza River channel, the Bivaly Lake, which has been transformed into an oxbow. At the same time, south from the Bagi-földek the point bar series in the riverbed of the Tisza River (that is younger than the Bivaly Lake) is called Fenék Lake (*Fig. 3*). In the Bagi-földek (Alsó – Varsány) in the second military survey) that is emerging from the Tisza alluvium there are more channel like hollows (*Fig. 3*), older point bar channels a few hundred meters apart from each other. Bagi-földek are located in a peninsula-like form in the Tisza alluvium. Its eastern part has already been utilized as a plough land, but the surface above the point bar channels has been utilized as pasture land (*Fig. 3*).

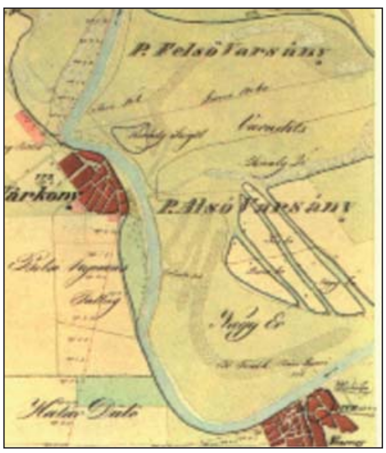

Fig. 11. The map of the study site by Sándor Lietzner (1790)

The third Austrian military survey (1875) shows the impact of river regulation, the drainage channels, the formation of a barrier system along the Tisza River, the development of the floodplain area between the dams and the development of settlements. In addition, the geographical names and the exogenous geological units that were already noticed and described in the second Austrian military survey (*Fig. 4*) can be observed.

In the Hungarian military survey (1943) dam-system protected settlements, roads, the extension of arable lands and garden cultures and the transformed landscape and agricultural system as a result of river regulation and groundwater drainage can be observed (*Fig. 5*). The nomenclature of the Hungarian military survey was used by the geologists of the Hungarian Royal Geological Institute and the Hungarian Geological Institute during the geological and pedological mapping of the Great Hungarian Plain (*Figs 8–10*).

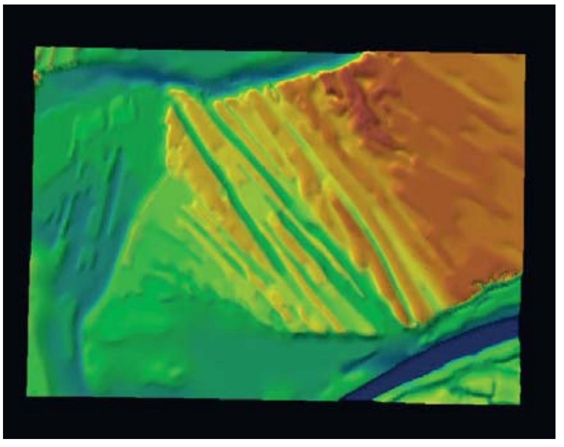

Fig. 12. Digital elevation model of the study site

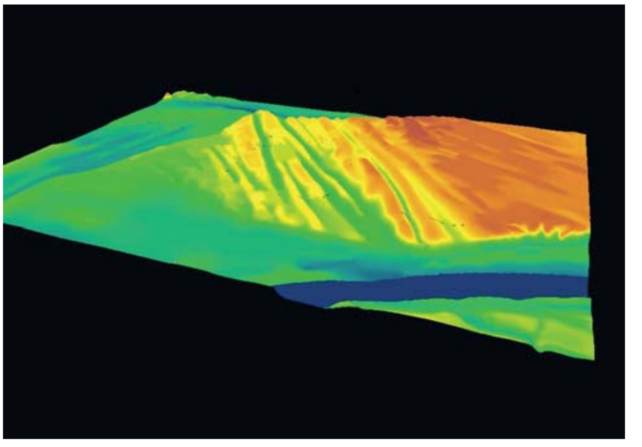

Fig. 13. 3D drawning of the study site on the basis of the digital elevation model

In the Lietzner-Sándor's map of 1790 (*Fig. 11*) the recording of the Middle Tisza region was completed.[45] In this map the emerged location of the point bar structure of the Rokkant-földek and the deeper location of the Bagi-földek associated with the Tisza alluvium can be clearly seen (*Fig. 11*).

In addition to the analysis of historical maps, we prepared the digital elevation model (*Figs 12–13*) of the area to understand the exogenous geological situation and morphological conditions. The 1:10000 scale digital elevation model clearly demonstrates the existence of a point bar series in a deeper position that is related to the unregulated Tisza riverbed and developed in the curve of the Tisza River over a few centuries. To the northeastern direction in an elevated position (residual surface or terrace level) a series of an older point bar can be found (*Figs 12–13*).

Based on the digital elevation model, the Bagi-földek site is located in the deeper and younger alluvium of the Tisza River characterized by good water supply while the Rokkant-földek site in an older residual surface rising above the alluvium. In this older point bar series only periodic flood water flew through the point bar channels from the direction of the Bivaly Lake towards the Tisza alluvium (*Figs 12–13*). So Gepids communities settled in the point bar series of the high and low floodplain. These surfaces provided different farming possibilities for the Gepids communities of the migration period: the utilization of the gallery forest, gatherings in the area of the forests and floodplain, fishing and hunting, extensive animal husbandry on the higher, drier areas and plant cultivation around the settlements and houses.

As our goal was to reconstruct the environmental history of the Gepids settlement as complex as possible, we conducted geoarcheological drillings (*Fig. 14*) along a double geological section that explored the deeper (Bagi-földek) and the higher (Rokkant-földek) point bar series as well (*Fig. 14*). Based on these drillings, the geological and pedological conditions of the exogenous geological and geomorphological units could be mapped and the environmental, geological and pedological characters of the Gepids communities could be specified (*Fig. 14*).

After the formation of the geological profile (*Figs 14–15*) it was confirmed that the point bar series in the Rokkant-földek developed at the end of the Pleistocene. This is proved by the loess-like sediment layers of the point bar channels excavated by drillings, the relatively high position, and the carbonate and coarse aleurite rich sedimentary environment. The deeper geological position of the Bagi-földek is of Tisza alluvium origin, its clay and organic material rich geological layers support its Holocene formation and development (*Fig. 15*).

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[45] SUGÁR 1989.

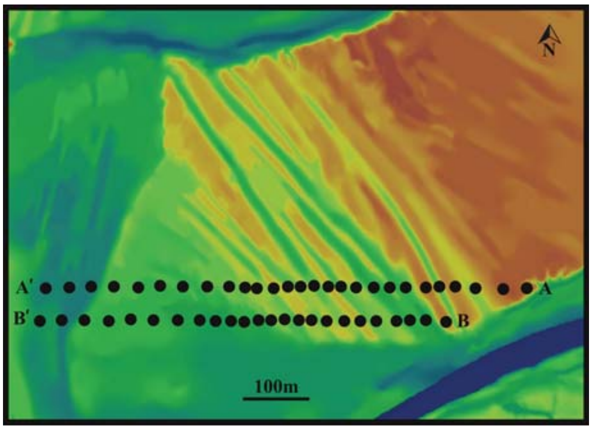

Fig. 14. The location of parallel geological sections and geoarchaeological drilling points in the digital elevation model of the site

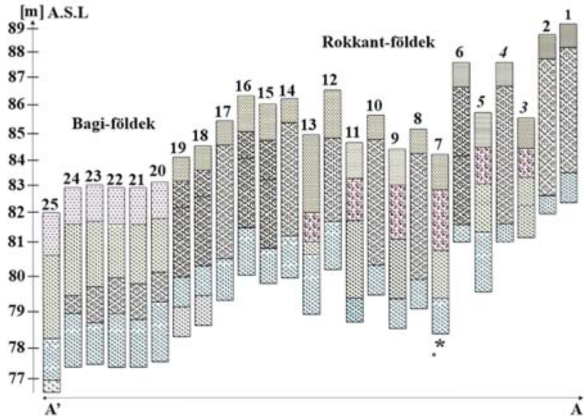

*Fig. 15. Geological section of the Bagi-földek and Rokkant-földek in Rákóczifalva and the layers of the cores (TROELS-SMITH 1955, symbols) A.S.L. =Above Sea Level, * = undisturbed core sequence for pollen analyses, A – A' = geological section*

The Bagi-földek got continuous water supply through the water outlet system of the Tisza, until to the Tisza River regulation processes and dam building; so in the migration period, at the time of the settling of the Gepids, there could not be permanent settlements in this area only in higher elevations (Rokkant-földek), in the semi-peninsula-like Pleistocene point bar series (*Figs 12–15*). Since the Pleistocene higher, flood-free surface is semi-circular, peninsula-like (*Figs 11–14*), the settling of archaeological cultures, including the Gepids houses and settlements in the Rokkant-földek, follows a camber form (*Fig. 16*). So, the Gepids communities lived in the boundary of two different local ecoregions, in the edge of a flood-free area that has good water supply, in a protected, elevated area surrounded by living waters (*Figs 12, 13, 16*). This settling strategy, the closeness of living water, the high position, the flood-free island-peninsula-like Pleistocene residual surface for settling, animal husbandry and plant cultivation in the Great Hungarian Plain was established since the Early Neolithic. The first data on this type of land utilization was published by Tibor Mendöl, a Hungarian social geography researcher in 1928 and 1929, before the recognition and phrasing of the Early Neolithic Körös culture.[46] Mendöl made a colored contour map of Szarvas and its surroundings, including the so-called Érpart within a Neolitic settlement. He recognized the Pleistocene loess covered higher, flood-free surfaces and ascribed them to the area of Neolithic settling, farming and livestock breeding. He also described the periodically flooded floodplains that were covered by reed, gallery forest and tussock sedge and was utilized for hunting and gathering. This theory has been repeatedly reinforced during environmental and geoarchaeological research in the Tisza River and its adjacent valleys.[47] So the Gepids communities utilized one of the most important features of the Great Hungarian Plain, i.e. its local (few hundred m^2 to a few km^2), mosaic-like nature. Thus, the settlements were in a transition zone regarding geomorphological situation (*Fig. 16*). As a result, the elevated chernozem soil covered surfaces (cereal cultivation, gardens) and areas of alluvial soils (floodplain forest management, grazing, gathering, meadows fields), saline soils (sheep grazing), the canal lakes, living waters (fishing) and water outlet channels (wells) were located within 5 km, approximately one hour walk from the Gepids settlements. So, all food-producing areas were reached by the members of the Gepids community within an hour walk

46 MENDÖL 1928, 1929.

47 NANDRIS 1970, 1972; KOSSE 1979; SHERRATT 1982, 1983; CREMASCHI 1992; SÜMEGI 2003, 2004; SÜMEGI–MOLNÁR 2007; SÜMEGI 2012; SÜMEGI ET AL. 2012.

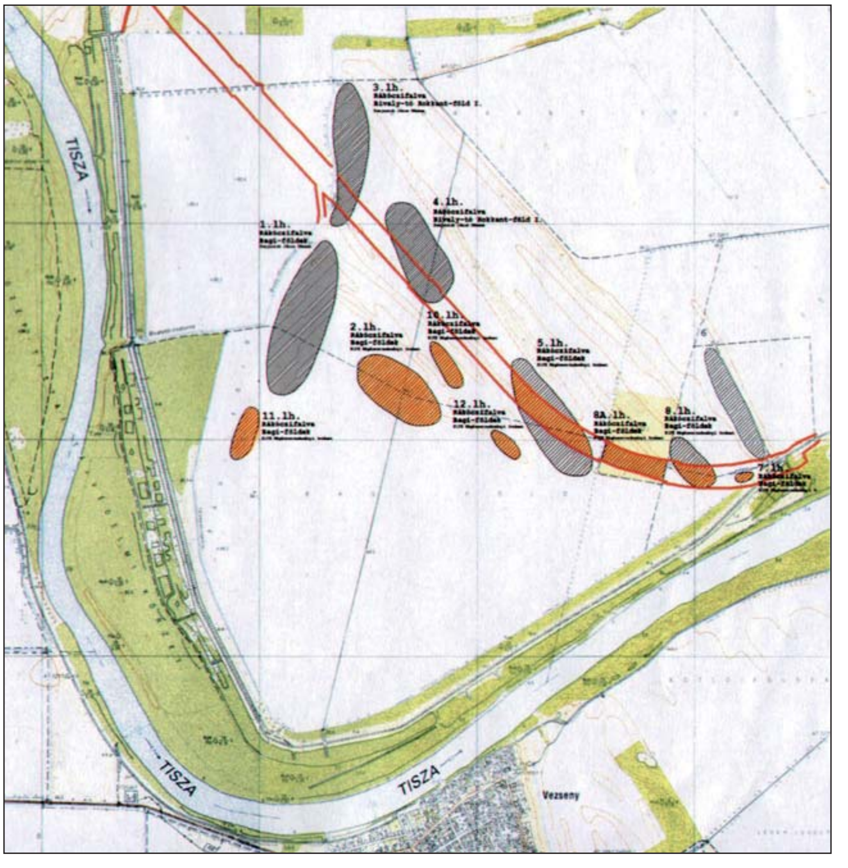

Fig. 16. The location of the archeological sites in Rákóczifalva and the Gepids settlement

(within a 5 km radius). In addition, the semi-circular, peninsula-like settling in the Tisza floodplain and alluvium provided significant protection in the Great Hungarian Plain.

Sedimentological analysis

At the 7th drilling point of the first geological core section a 3 m deep undisturbed core was taken with overlapping technique in the Pleistocene point bar channel. During the drilling, the following layers were described by the method of Troels-Smith (1955). Magnetic susceptibility, particle size analysis, LOI and water soluble element content analysis were investigated. The Late Holocene near surface part that is significant regarding the Gepid age and migration period was sampled at 2 cm intervals for sedimentological and water soluble elements content, while the Pleistocene and Early Holocene bedrock level at 4 cm intervals (*Fig. 17*).

In the bedrock between 300 and 240 cm yellowish grey (Munsell color 10 YR 7/4) slightly cross-laminated sandy aleurite, aleuritic sand developed. The layer gradually transformed towards the surface, parallel laminated structure appeared, fine sandy coarse aleurite, coarse aleuritic fine sand dominated sediment layer developed. In this level carbonate filled root structures appeared, called biogalleries. Grain size indicate coarse grains, although grain size distribution is variable; the organic material content is low and the carbonate content is the highest. Magnetic susceptibility (MS signal) and the sediment and LOI content indicate minimal changes in the development of the

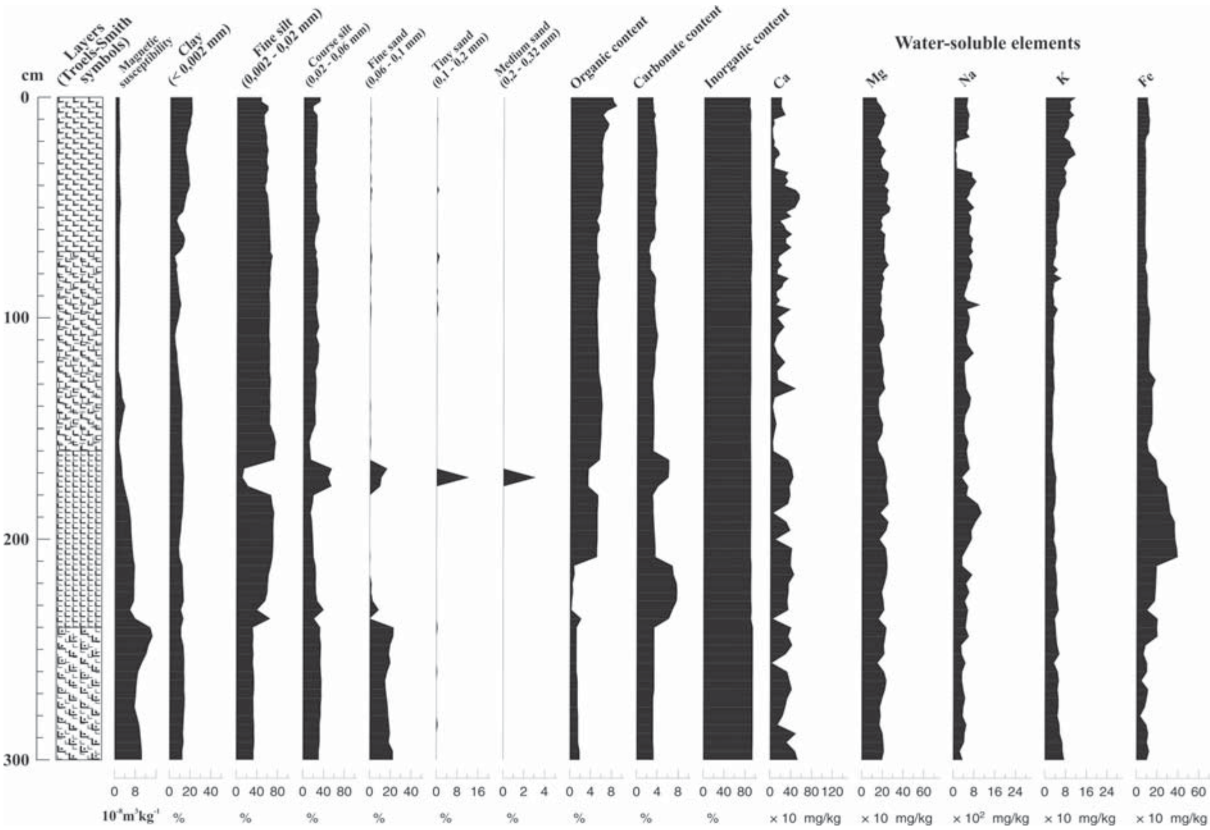

Fig. 17. Sedimentological and geochemical results from the undisturbed core sequence of an infilled point-bar channel in Rokkant-földek at Rákóczifalva

layer, but the changing values of water-soluble elements suggest significant water cover and cyclic drying periods.

The development of laminations occurred at a maximum thickness of 1 cm, and it is likely that in this interval we could have reconstructed stronger cycles of sedimentation and development due to the sedimentological changes of the sample. The development of the layer can be linked to the active evolving stage of the Pleistocene point bar and to the late phase of the channel filling up. Due to its emerged position, its high carbonate content and water-soluble Ca and Mg content, the point bar did not belong to the sedimentation area of Tisza River.[48] Probably the development of the point bar was the result of the development of the catchment area of the Danube River.

Grain size distribution changed between 240 and 160 cm. Sand content decreased in this level of the profile and yellowish brown (10 YR 5/6) fine aleuritic coarse aleurite, coarse aleuritic fine aleurite dominated layer developed. In the near surface part of this level a significant sand fraction rise occurred that can be linked to an extraordinary flood period. The carbonate content increased considerably as well as organic material content, however this latter appeared less in the color of the sediment. De the slightly reddish shade was associated with the increase of water-soluble iron.

Based on the development of the sediment and sediment parameters, the point bar could gradually emerged due to the appearance and incision of the Tisza River. As a result, the active development of the point bar was completed and transformed to a drainage system at the end of the Pleistocene. In this level of the profile a flood cycle could be detected on the basis of a significant sand intercalation according to grain composition analysis. This level developed at the end of Pleistocene; however this whole layer was clearly evolved in a stagnant water environment.

[48] Molnár 1965.

The development, appearance and facies of the sediment are specific to point bar loess, floodplain sediments formed at the end of the Pleistocene.[49]

Between 160 and 70 cm (10 YR 4/2) clayey fine aleurite accumulated. The organic material content increased, the carbonate content was steady indicating major soil formation and weathering at the early stage of Holocene. At the same time among water soluble elements Fe content decreased. This may indicate a deeper groundwater location and post-movement of elements after water regulation processes of the 20th century, and the cyclic change of groundwater level may be indicated by the cyclic change of other water-soluble elements. The development of this sediment layer can be linked to soil formation and more favorable weather conditions at the beginning of the Holocene; in addition, to the leaching of sediments with significant clay and organic material content. However, element composition could have change as a result of groundwater level decrease associated with modern water regulation as well.

Between 70 cm and the surface a slightly polyhedron structured, blackish brown (10 YR 3/1), clay-rich fine aleurite with significant organic material content developed and soil formation have started. This layer may be marshy-eutrophic lake sediment originally, but its element composition has changed as a result of soil formation and modern water regulation. The latter is primarily shown by the reduction of water soluble Fe content and the less significant MS signal. Although the layer where soil formation have started represent hydromorphic soil formation characters (polyhedron structure), the significant water-soluble Na and K content indicate salinisation and an upward moving groundwater system with significant water-soluble elements in the capillary zone. As a result, besides hydromorphic soil formation, saline soil development started in the area as well. These processes were observed already in the 20th century during the geological survey and agrogeological (pedological) mapping of the area.[50]

According to our data, during the migration period, during the existence of the Gepid kingdom[51], an organic material rich lake-swamp system appeared in the examined area. This layer has transformed due to soil formation that was the result of modern river and groundwater regulation.

Pollen analysis

According to the pollen analysis carried out on samples of the point bar channel, 10 pollen units (pollen horizons) were separated in the profile.

The first pollen horizon developed between 300 and 240 cm. Statistically evaluable pollen material did not occur, only a few samples contained scattered Gramineae and *Pinus* pollen indicating drying processes.

The second pollen horizon evolved between 240 and 210 cm. Statistically evaluable terrestrial pollen material were found that reached the minimum of 500 pieces of pollen grains.[52] In this level the non-arboreal pollen (NAP) material exceeded 60% while arboreal pollen (AP) grain ratio was below 40% with Pinus subgenus Pinus taxa, which can spread to significant distances (*Fig. 18*). On the basis of the pollen composition a Pleistocene open parkland with scattered pine trees and willow-alder trees existed. In addition, grassy cold steppe vegetation developed in the environment of the area at this time.

The third pollen zone developed between 210 and 170 cm. Basically, the pollen composition did not change, but the proportion of AP exceeded 50% (*Fig. 18*). This indicates a cold forest steppe[53] at the end of the Pleistocene (*Fig. 18*). The rise of woody vegetation ratio was caused by an increase in

[49] Sümegi et al. 2015.
[50] Sümeghy 1944, 1953; Kreybig 1937.
[51] Nagy 1999; B. Tóth 1999.
[52] Magyari et al. 2010.
[53] Allen et al. 2000; Prentice et al. 1996.

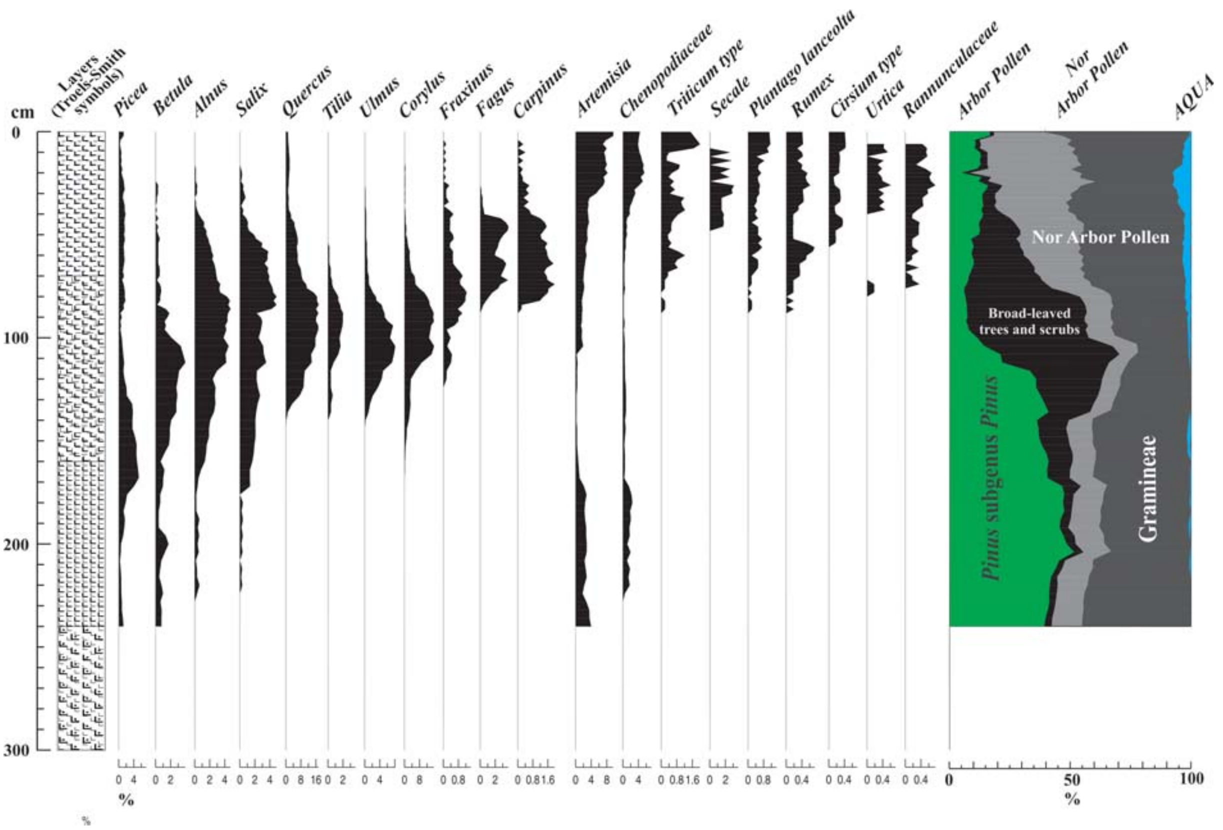

Fig. 18. Pollen analytical results from the undisturbed core sequence of an infilled point-bar channel in Rokkant-földek at Rákóczifalva

the proportion of *Pinus* genus, which can spread to significant distances. Thermo- and mesphillous elements could not be detected among deciduous trees only narrow-leaved trees appeared such as willow and alder with higher tolerance-level. Compared to the previous zone humidity increased.

The fourth pollen horizon developed between 170 and 130 cm. AP ratio was between 50 and 60%; although the amount of deciduous trees and shrubs, especially birch (*Betula*) and hazel (*Corylus*) is higher. Mixed forest steppe developed. Among woody vegetation coniferous trees and birch (*Betula*) dominated while herbaceous taxa indicate grasses-wormwood-pigweed dominated. Cold steppe, forest steppe existed with patches of trees.

The fifth pollen zone developed between 130 and 110 cm. The ratio of coniferous trees remained significant, while the proportion of deciduous trees and shrubs increased, especially the ratio of birch (*Betula*; *Fig. 18*). Thermo-mesophillous (oak, ash, elm, lime) pollen appeared and AP ratio rose to 60-70%, which corresponds to the forest steppe phase[54] and to the northern part of the Euroasian forest steppe zone;[55] in addition to the forest steppe zone mixed with taiga in the drier basins of the Altai region.[56] This pollen horizon corresponds to the transition phase of the Pleistocene and Holocene.

The sixth pollen zone developed between 110 and 80 cm (*Fig. 18*). The ratio of coniferous elements decreased, as well as that of herbaceous taxa. AP ratio decreased to 50-60% that corresponds to a temperate forest steppe[57] at the beginning of the Holocene, similarly to other residual surfaces in

54 Allen et al. 2000; Prentice et al. 1996.
55 Magyari et al. 2010.
56 Sümegi 1996; Sümegi et al. 1999, 2013a; Magyari et al. 2014; Törőcsik–Sümegi 2016.
57 Allen et al. 2000; Prentice et al. 1996.

the Tisza valley.[58] In other words, the climatic, pedological, relief and bedrock conditions in the area led to the development of a mild continental climate, temperate forest steppe development after the cold forest steppe phase at the end of the Pleistocene. These data clearly disprove the theories that forest steppes in the Great Hungarian Plain are the result of human transformation of a forest environment.[59] On the basis of these publications, human impact has been continuously increased in the Great Hungarian Plain from the emergence of Neolithic farming. This led to the creation of cut-off areas in the forest environment that had expanded due to technical development and growing population. So a mosaic-like forest steppe vegetation has stabilized in the Great Hungarian Plain probably already in prehistoric times, before the emergence of land cultivation. Our data from the Rákóczifalva sites together with our previous data[60] clearly demonstrates the natural development of the temperate forest steppe in the Great Hungarian Plain (Pannonian forest steppe biogeographic unit). This pollen horizon is the level of hardwood gallery forest (oak-ash-elm), forest steppe (oak-lime-hazel) and grassy steppe mosaics, without human impact.

The seventh pollen zone developed between 80 and 60 cm (*Fig. 18*) when hornbeam (*Carpinus*) and beech (*Fagus*) appeared and became dominant. Parallel to this, pollen indicating crop production and animal husbandry, cereals and pollen of weeds appeared in the section. It is likely that this pollen level is in accordance with the Neolithic and the beginning of the Copper Age, i.e. with the first plant cultivation and weed vegetation phase.

The eight pollen horizon evolved between 60 and 40 cm (*Fig. 18*). Beech (*Fagus*) and hornbeam (*Carpinus*) pollen dominate among woody vegetation elements. At the same time, weed composition has changed dramatically and the proportion of herbaceous pollen (NAP) exceeded 60%. In this level the natural forest steppe became anthropogenic steppe vegetation, where woody vegetation (in the form of gallery forest) subsisted only in the active Tisza floodplain, in deeper locations with high groundwater level. Both crop production and animal husbandry could have been significantly increased on the basis of the pollen ratio of cultivated plants and weeds. This horizon can be identified with the end of the Copper Age and the entire Bronze Age.

The ninth pollen zone developed between 40 and 25 cm where arboreal pollen ratio decreased to below 30% (*Fig. 18*). This significant change began in the Hungarian Great Plain at the end of the Bronze Age and the beginning of the Iron Age.

The tenth pollen horizon evolved between 25 and 15 cm that is the level of the migration period. The ratio of cultivated plants such as *Triticum* type, *Secale*, cereal show significant fluctuations. At the same time, the proportion of weeds (*Rumex*, *Urtica*, *Plantago lanceolata*, *Ranunculus*, etc.) spreading to trampling, chewing, grazing and the pollen of grasses, wormwood, pigweed has become dominant. AP ratio was below 20% in this level of the profile. The area was continuously inhabited during the migration period and the communities continued to carry out extensive livestock farming and cereal production in varying intensity.

The pollen zone of the medieval period developed from 15 cm to the surface. It is probable that post-medieval levels have dried up and destroyed during soil formation processes. During the Medieval period the impact of crop production is stronger and more stable. Weed vegetation transformed compared to the migration period and as a result mosaics and zones of crop production and animal husbandry could develop and stabilize in the area. It is likely that house groups or farm-like settlements with stable dirty roads evolved in the area during the medieval period.

Interpretation of pollen results

Based on the exogenous geological, geomorphological and sedimentological data, the pollen profile was formed in a Pleistocene residual surface, i.e. in a point bar channel of a point bar series rising

[58] Sümegi et al. 2005.
[59] Bernátsky 1914; Rapaics 1918; Chapman 1994, 1997, 2017; Chapman et al. 2009; Magyari et al. 2012.
[60] Sümegi 1989, 1995, 1996, 2005; Sümegi et al. 2012, 2013b.

above the Tisza alluvium. The Pleistocene point bar is probably of Danube origin and consequently its mineral composition and sedimentological development was separated from the sedimentary systems of the Tisza River. We were able to carry out a comprehensive sedimentological and geochemical study of the full development of the point bar channel. In addition, we could evaluate the development of the study area on the basis of the environment historical analysis of the profile from the end of the Pleistocene to the end of the medieval period. In spite of the outstanding geomorphological and sedimentological results regarding human settlements, the most significant environmental historical data were provided by pollen analytical results. The pollen material was moderately well and well preserved and statistically evaluable from the end of the Pleistocene to the end of the medieval period.

The most important feature of pollen material is that pollen composition indicates forest steppe vegetation[61] from the end of the Pleistocene, through the late glacial/post-glacial transition period until to the early Holocene period. On the basis of our results this pollen composition corresponds to the northern part of the Late Pleistocene Eurasian forest steppe zone mixed with coniferous trees, or to the mixed-leafed taiga forest steppe in the Altai basin.[62]

These pollen data clearly support the models based on quartermalacological data.[63] According to these in some regions of the Great Hungarian Plain, in the Pannonian forest steppe zone, there was a natural shift from cold forest steppe (in the Late Pleistocene) to temperate forest steppe (in the Holocene) on a regional and local level as well.

Thus, the concept that explains the development of the entire forest steppe zone with human effects in the Great Hungarian Plain, although this theory has survived to the present day, cannot be sustained anymore. In areas of hundreds of square kilometers at the regional level and in some square kilometers at the local level, it could be proved that a natural temperate steppe-forest steppe evolved in some parts of the Great Hungarian Plain[64] at the end of the Pleistocene and at the beginning of the Holocene. Based on the previous results and analysis of different areas, due to the mosaic environmental conditions small local temperate steppe regions and patches developed in the forest steppe zone at the beginning of the Holocene; based on our previous data, mainly due to edaphic reasons.[65] In other words, parallel vegetation development evolved in the basin caused by mosaic environmental conditions. Despite increasing human effects, this parallel development has survived until to the 19th century, until to the spread of industrial civilization and water regulation. The parallel vegetation development was, of course, influenced by human effects as well; but their development and the magnitude of human effects were very different from each other and were not homogenous as it was suggested by John Chapman.[66] There was not a general system in the development of the vegetation of the Great Hungarian Plain as a result of the different ecoregions.[67]

The mosaic effect persisted in the vegetation despite the gradually increasing human impact at the beginning of and during the Neolithic. At the same time, as a result of plant cultivation, animal husbandry, human settlings and paths in the study area, a diverse composition of weed vegetation developed between the Neolithic and the medieval period. Cereals, including Triticum type and Secale, indicate a significant fluctuation in the level of the migration period and the level of the Gepidic Kingdom. At the same time, the ratio of weeds (*Rumex*, *Urtica*, *Plantago lanceolata*, *Ranunculus*, etc.) spreading to trampling, chewing and grazing and the amount of grasses, wormwood and pigweed has become dominant. Arboreal pollen ratio was below 20% in this horizon of the profile.

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61 Allen et al. 2000; Prentice et al. 1996; Magyari et al. 2010.
62 Sümegi 1996; Sümegi et al. 1999, 2013a; Magyari et al. 2014; Törőcsik et al. 2015; Törőcsik–Sümegi 2016.
63 Sümegi 1989, 1995, 1996, 2005, 2007.
64 Sümegi 1989, 1995, 1996, 2005.
65 Sümegi 1989, 1996, 2011; Sümegi et al. 2005, 2012, 2013b; Törőcsik et al. 2015; Törőcsik–Sümegi 2016.
66 Chapman et al. 2009; Chapman 2017.
67 Sümegi 1996, 2005, 2011, 2016; Sümegi et al. 2012, 2013b.

During the migration period and the rule of the Gepidic Kingdom the area was continuously inhabited and the alternating communities carried out extensive animal husbandry that was supplemented by cereal cultivation, the latter with varying intensity. These data support the plant remains (millet, wheat, barley) of a Gepidic site called Sándorfalva-Eperjes[68] and the local cereal cultivation[69] in Szolnok-Zagyvapart site.[70] It is likely that the good relief, protective features, the diverse and fertile soil conditions and the proximity of rivers and creeks have played a prominent role in the continuous use of the area. Similar settlements[71] with a completely similar morphological situation can be found in several places in the Middle Tisza region (Tiszapüspöki, Kengyel, Szolnok, Törökszentmiklós). Though, these similar exogenous geological features have so far been ignored in the interpretation of the settling of Gepids.

Based on our data, Gepids settled in a completely altered vegetation environment in the peninsula-like residual surface of the Tisza valley that had a great importance with respect to protection and natural factors. We were not able to determine the Gepids vegetation environment more precisely, even with radiocarbon analysis, because the margin of error of radiocarbon analysis is such wide that it covers the 5th and 6th centuries, the level of Gepids settling. This could only be refined by archeobotanical and archeozoological analysis of samples from Gepids objects, including wells. With the exception of our data, we do not have such comprehensive data regarding Gepids settlements at the moment, only archeozoological[72] and sporadic archeobotanical data.[73]

It is clear from the archeobotanical (anthracological) analysis of Gepids objects of the Rákóczifalva site that construction wood derived from the Tisza alluvium hardwood gallery forest, while archeozoological findings suggest remarkable livestock in the era of the Gepids Kingdom.

At the end of the migration and during the medieval period, the stabilization and increase of land cultivation was observed. As a result, a significant, though diffuse structured settlement and permanent roads could develop in the study area and one of the greatest of human impact evolved in the archaeological site of Rákóczifalva.

Macrobotanical analysis

Although anthracological material has been found in the archaeological sites of Rákóczifalva since the Neolithic, but most of the wood residues were found in the objects of the migration period, from Gepid objects.[74] Anthracological material of the Gepid objects is as follows.

A total of 1069 pieces of charcoal fragments were found and identified in 13 samples of Gepid (6-7th century) objects. 64.4% (688 pieces) of the charcoal fragments belong to oak (*Quercus*) genus. Ash (*Fraxinus*) is also represented in a significant proportion with a value of 29.1% (311 pieces). In addition, the ratio of maple (*Acer*) is lower which accounts for 3.6% (39 pieces) of the total material; the ratio of fir (*Abies*) is 1.7% (18 pieces), while the ratio of elm (*Ulmus*) is 1.2% (13 pieces). Charcoal fragments clearly indicate the presence of a hardwood gallery forest (oak-ash-elm) in the vicinity of the settlements. At the same time, the presence of fir (*Abies*) is a particular surprise, as it is an alien element in the Great Hungarian Plain, especially in its center of warm and dry climate (*Fig. 6*). However, in the eastern part of the Gepidic Kingdom, in the higher mountains encircling the Transylvanian Basin, including the Carpathians and Transylvanian mid-Mountains, there are larger forests of this species at a height of 1300 meters.[75] As a result, the presence of fir charcoal

68 Galántha 1981; Bálint 1991.
69 B. Tóth 2003, 2004.
70 Cseh 1999b.
71 Cseh 1986, 1990, 1992, 1993, 1999b.
72 Szabó–Vörös 1979.
73 Bálint 1991; B. Tóth 2003, 2004.
74 Náfrádi–Sümegi 2015.
75 Feuredean–Willis 2008.

indicate exportation and it cannot be excluded that fir trees (that originate clearly from mountainous areas) have been utilized in connection with a ceremony (settlement, house warming).

Archeozoological analysis

The vertebrate fauna analysis from the Gepidic objects supported the combined use of the deeper Tisza alluvium that has good hydrological characters, oxbows and water outlets, and the flood-free, dry surfaces suitable for grazing fields, animal husbandry and plant cultivation. This is in concordance with the results of pollen analysis.

Most of the mid-size (979 pieces) animal bones of Gepids' objects can be interpreted as kitchen waste. It was hard to find whole bones that indicate that meat and bones were cut together during cooking. In spite of that most of the bones could be identified. Only 28 bones were unidentifiable and found to be remnants of large or small mammals. The finds contained the remains of domestic animals, wild birds that could not be identified on a species level, fish and aquatic animals. That suggests hunting, although antler fragments did not turn up (*Fig. 19*).

Species	**NISP**	**%**	**Minimum number of individuals**	**Maximum number of individuals**
Cattle– *Bos taurus* L.	275	28,9	8	22
Sheep – *Ovis aries* L.	10		2	2
Goat – *Capra hircus* L.	1	31,9	1	1
Sheep or goat – Caprinae G.	292		9	19
Pig – *Sus domesticus* Erxl.	94	9,9	8	18
Horse – *Equus caballus* L.	43	4,5	3	9
Hen – *Gallus domesticus* L.	38	4,0	4	11
Dog – *Canis familiaris* L.	108	11,4	5	5
Cat – *Felis catus* L.	5	0,5	1	1
Domestic species	***861***	***91,1***	***41***	***88***
Goose – Anseridae sp.	8	0,8	1	1
Domestic or wild species	***8***	***0,8***	***1***	***1***
European pond turtle – *Emys orbicularis* L.	2	0,2	1	2
Catfish – *Silurus glanis* L.	2	0,2	1	2
Pike – *Esox lucius* L.	2	0,2	2	2
Fish – Pisces sp.	40	4,2	1	5
Wild species	***46***	***4,8***	***5***	***11***
Rodent – Rodentiae sp.	4	0,4	1	2
Bird – Aves sp.	27	2,9	3	6
Other species	***36***	***3,8***	***5***	***9***
Unidentified mammal	28	–	–	–
Total remains	**979**	**100**	**51**	**108**

Fig. 19. List of species with number of individuals from the Gepidic settlement

This is the one and only archaeological period in the Rákóczifalva site, where neat bones are not the most common; although the amount of neat bones are not much less than the number of small ruminants (sheep and goat). The remnants of all mammalian domestic species were found in the findings. Among them horses were rarely cut off – probably because of their high value. Poultry remains were also found, mostly hen bones, but some goose bones were found as well. In addition to the remains of meat-producing animals, bones of dogs and cats were also discovered. Probably dogs chewed more bones; there are signs of tooth on 16 findings including cattle, small ruminants, pigs and even hens. It is not possible to estimate the number of bones that have been fully ate up. The cartilage bone ends of young poultry, especially hens, could be easily consumed by cats or even by humans that result taphonomic losses. Significant number of fish bones refers to fishing and the extensive use of the alluvium. Fishing covered several species, the larger catfish, pike and smaller fishes.

We calculated for each species the minimal and maximal number of individuals (*Fig. 19*). In the first case we calculated the number of bones for all of the same species of the site, and in case of the maximum number of individuals we took the objects into one-one unit, calculated separately for each object and then summed up the results. The actual number of individuals of each species can be between the two values; the smallest number of individuals is certainly below and the maximum is overestimated.

In the vicinity of the settlement, a grazing livestock of 23-53 individuals (sheep, goats, cattle, horses) was required. These numbers do not seem to be significant, especially since we do not have information about how many years the Gepids' settlement was inhabited. But still the continuous catering, grazing and winter feeding of a few dozen animals could be challenging. It should also be taken into account that not the entire Gepidic settlement was excavated so the number of individuals was definitely higher.

The difference between the number of cattle and small ruminants (sheep and goats) is only 28 bones (the number of small ruminants is higher), so their proportions can be considered as equal. There is little or no difference between the minimum and maximum number of individuals. Small ruminants include sheep and goats. The bones of the two species are so similar that they can hardly be distinguished, only on the basis of some features of some bones. The number of such bones are 11 (10 sheep and 1 goat) in the Gepids findings. In general, sheep remnants are more common in all periods and goats are rarer. There are sheep/goat finds that were chewed by dogs; most of them originate from a meat-rich body part (*Fig. 20*).

	Cattle	Sheep or goat	Pig	Horse	Hen	Goose
Head region	63	46	42	6	2	–
Trunk region	77	44	12	6	2	–
Meaty limb region	44	91	19	19	24	8
Dry limb region	37	42	4	2	10	–
Terminal bones	9	10	–	4	–	–
Teeth	22	25	17	4	–	–
Other bones	23	45	–	2	–	–

Fig. 20. Distribution of the bones according to body region

The age distribution of individuals was diverse (*Fig. 21*). Two sheep and one goat were adults; the age distribution of the only sheep/goat individuals was mixed. Based on the smallest number of individuals, one of them was 1-2 years old, one 1-1.5 years old. Three animals were young (less than 2.5 years old), one nearly adult (2.5-3.5 years) and three adults.

On the basis of the other individual count, the number of the two sheep and one goat did not change. In case of the 19 sheep/goats, young and adult animals were found in nearly half-half ratio: 9 specimens were juvenile (young), one of them was between 1 and 2 years old, one of them less than 1.5 years old and one between 2 and 3 years old. The age of the other 6 young animals could not be identified more precisely, but they are certainly less than 2.5 years old. Three animals were of subadultic age, i.e. nearly mature and 6 were adult specimens. The age of one animal could not

Age categories	Cattle		Sheep and goat		Pig		Horse		Hen		Goose	Dog	Cat
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.			
Neonatus	–	–	–	–	–	–	–	–	–	–	–	1	–
Infantilis	–	–	–	–	1	1	–	–	–	–	–	1	–
Juvenilis	1	7	5	9	4	7	1	2	2	4	–	1	–
Subadultus	1	3	1	3	1	2	1	1	–	–	–	2	1
Adultus	3	7	6	9	2	3	1	6	2	7	1	–	–
Maturus	2	2	–	–	–	–	–	–	–	–	–	–	–
Senilis	1	1	–	–	–	–	–	–	–	–	–	–	–
Unknown		2	–	–	–	5	–	–	–	–	–	–	–
Total	**8**	**22**	**12**	**22**	**8**	**18**	**3**	**9**	**4**	**11**	**1**	**5**	**1**

Fig. 21. The distribution of remains by the age categories of animals

	Cattle	Sheep	Goat	Sheep/goat	Pig	Horse	Dog	Cat	Hen	Goose
Horn	4	–	1	–	–	–	–	–	–	–
Skull	26	1	–	10	9	2	3	–	2	–
Maxilla	13	–	–	11	14	–	2	–	–	–
Jaw	12	–	–	22	18	4	3	–	–	–
Hyoid	4	–	–	–	–	–	–	–	–	–
Tooth	22	–	–	25	17	4	5	–	–	–
Atlas	4	–	–	1	1	–	1	–	–	–
Cervical vertebra	1	–	–	4	–	9	–	–	–	–
Thoracic vertebra	8	–	–	5	1	–	5	–	–	–
Lumbar vertebra	6	–	–	2	–	1	10	3	–	–
Sacrum	–	–	–	1	–	1	1	–	–	–
Lumbosacrale	–	–	–	–	–	–	–	–	1	–
Vertebra	–	–	–	–	2	–	–	–	–	–
Rib	41	–	–	27	6	3	38	–	–	–
Sternum	1	–	–	–	–	–	–	–	1	–
Coracoideum	–	–	–	–	–	–	–	–	2	2
Scapula	7	2	–	7	4	1	–	–	–	–
Pelvis	20	–	–	5	3	–	4	–	1	–
Arm bone	8	4	–	7	6	1	5	–	2	2
Radius	4	–	–	16	3	1	6	–	3	1
Ulna	3	–	–	3	1	1	5	–	3	1
Carpus	4	–	–	1	–	–	–	–	–	–
Metacarpal	8	1	–	13	–	–	–	–	–	–
Femur	12	–	–	16	3	4	4	–	5	1
Tibia	13	–	–	39	3	4	3	–	–	–
Tibiotarsus	–	–	–	–	–	–	–	–	8	1
Fibula	–	–	–	–	1	–	1	–	–	–
Astragalus	6	–	–	3	1	–	–	–	–	–
Calcaneus	4	–	–	–	1	–	1	–	–	–
Tarsus	5	–	–	–	–	–	–	–	–	–
Metatarsus	2	2	–	18	–	1	–	–	–	–

	Cattle	Sheep	Goat	Sheep/goat	Pig	Horse	Dog	Cat	Hen	Goose
Tarsometatarsus	–	–	–	–	–	–	–	–	10	–
Metapodium	2	–	–	1	–	–	11	–	–	–
First phalanx	3	–	–	5	–	1	–	2	–	–
Middle phalanx	3	–	–	3	–	2	–	–	–	–
Distal phalanx	3	–	–	2	–	–	–	–	–	–
Sesamoideum	3	–	–	–	–	1	–	–	–	–
Long bone	22	–	–	45	–	2	–	–	–	–
Flat bone	1	–	–	–	–	–	–	–	–	–
Total	**275**	**10**	**1**	**292**	**94**	**43**	**108**	**5**	**38**	**8**

Fig. 22. The anatomical distribution of remains by species

Fig. 23. Skull– and horn core fragment of cattle

be identified. Interestingly, the bones of very young animals, younger than 1 year, were not found. The cut off of young animals indicates meat production as milk and wool use is only possible in case of adult animals. The majority of the animals were slaughtered in the excavated area of the settlement that is indicated by the anatomical distribution (*Fig. 22*).

The 275 neat bones represent 28.9% of the detectable findings. The bones come from at least 8 up to 22 animals, their age distribution is mixed (*Fig. 21*). Out of the 8 individuals one was juvenile, which is 1-3 years old in case of neat. One was subadult, that is, 3-4 years old, 3 individuals were adults, so over 4 years old. One individual was 6-7 and one was 6-8 years old, already mature. One specimen died or was slaughtered as an old animal.

The age distribution was slightly different in case of the 22 individuals, more heterogeneous. The number of young animals was 7, 3 were nearly adults, 7 were adult, 2 matured, 2 were old, and 2 were undetermined.

A metatarsus bone of a neat could be used to calculate the withers and to determine the sex of the animal. The 236 mm long bone derived from an approximately 126 cm tall cow.[76] This cow is considered to be large compared to other samples from different periods. Bones suitable for withers calculation from Celtic, Sarmatian, Late Sarmatian, bones from the 4^{th}-5^{th} century, late migration period and Arpadian age occurred and were used for calculation; each animal was a cow. The height of the Celtic animal was small, around 107 cm. The Sarmatian cows were 111 and 117 cm tall, the 4^{th}-5^{th} century animals were 114-115 cm, from the late migration period they were

[76] Nobis 1954; Calkin 1960.

106, 114, 116 and 122 cm tall, and the Arpadian age was a small cow, only 108 cm. The fragment of a skull and horn also derived from a cow (*Fig. 23*).

The number of chewed bones was low in the Gepids material. Out of 7 findings there were 4 phalanges, 1 astragalus, 1 calcaneus and 1 tibia. The number of cut beef bones was 2, one is a tibia and the other is a 5 cm long horn and its fragment with parallel trimming and pole-axe traces (*Fig. 19*).

Among meat-producing animals, ruminants are followed by domestic pigs: 94 pig bones account for 9.9% of the findings. Regarding the number of individuals, the lowest number is 8, the highest is 18 (*Fig. 21*). Compared to the amount of bones, this number is very significant, as it approximates the number of small ruminants and cattle. The age distribution of individuals is mixed. In the case of pigs, it is common that very young animal remains appear in the findings, as they are short-lived, fast-growing animals that have more piglets at the same time, making it easy to replace slaughtered animals. Comparing to other domestic species pigs are meat producing animals, there is no other forms of utilization.

Based on the smallest number of individuals, one pig was only ½ years old and one was ¾ years old when it was slaughtered. A 1 year old animal can be considered as young as well. There were a few specimens that could not be precisely defined: one 2-3 years old, a younger than 2.5 years old, one 2.5-3.5 years old and 2 adult pig, including a male animal.

The number of individuals per object (the maximum number of individuals) was as follows. It added 10 animals to the above mentioned: the number of juvenile pigs (less than 2.5 years old) was not one, but 4, there were 2 individuals that were 2.5-3.5 years old and 3 individuals (instead of 2) were adult. The age of 5 animals could not be defined.

On the basis of charcoal analysis, hardwood gallery forest existed in the vicinity of the settlement, mostly with oak trees. Oak acorn served as the basis for pig feeding. In October and November pigs ate fallen acorns up in the forest, while in the case of early snowfall they ate the rest of the acorns during spring.

The number of horse bones is 43 pieces that presents 4.5% of the definable bones. The number of individuals is at least 3 (one juvenile, one subadult and one adult), maximum 9. The age distribution of the 9 individuals indicate 6 adults (6 individuals), 2 young (1-3 years), and one subadult, i.e. nearly mature (*Fig. 21*). Bones for withers calculation could not be found in the bone assemblage.

Although the number of chicken bones (38 pieces) was behind the horses (43 pieces), using the number of individuals calculations (minimum and maximum) it preceded the number of horse individuals. The minimum number of individuals was at least 4, maximum 11. Based on the minimum number of individuals, 2 specimens were not yet mature and there were 2 adults, including one male and one female. Based on the number of individuals per object (maximum number), 11 specimens could be identified (*Fig. 21*), of which 4 were non-mature, 7 were adults including 3 female and one male.

From one object (No. 194, a building) 8 bones of an adult goose-like bird were found. In addition, the number of dogs and cats were the same for both calculations (*Fig. 21*). 5 dog bones were identified. One of them was newborn, one was a puppy, one young and 2 adults. Withers calculation could be done on the basis of a healthy thigh bone (*Fig. 24*). A short, 24-29 cm tall (withers) dog that had slightly curved legs[77] could be identified. Such small dogs are very rare during this period of time and can only be observed in the Roman Empire. The animal can be categorized as small-sized dogs; its weight could be between 4.5 and 11.5 kg, such as sausage-dog, beagles, fox terriers that can be observed nowadays.

The 5 cat bones originate from the same object, a pit, and were identified as adult animals. Their role could be to keep rodents away in the vicinity of houses and crop storage pits. Based on the composition of domestic animals the Gepids settlements were surrounded by extensive pastures,

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77 Koudelka 1885.

Fig. 24. Femur of a small dog

Fig. 25. Vertebra of a catfish (Silurus glanis)

Fig. 26. Mandible of a pike (Esox lucius)

Fig. 27. Bone anvil from a horse's jaw (both sides)

Fig. 28. Bone anvil from a horse's jaw (both sides)

including saline pastures that are more favorable for sheep. Furthermore, the ratio of wet meadows and meadows was also outstanding due to the high number of cattle and horse remains.

The number of fish bone was 44 in the manual collected samples. It would have been possible to multiply this quantity by the sieving of the filling material of the objects. The remains included 2 catfish and 2 pike bones (*Fig. 20*). The catfish is common in rivers and lakes while the pike favor lakes and oxbows with fresh water income and rich vegetation. The catfish is a large fish; its meat is delicious, fat-rich, and bone free. The advantage of the pike is that it does not pit in winter, so it can be fished from leak, its meat is white, clean, tasty, but has bones. The quality of the meat is influenced by the purity of the water and the taste of small fishes ate up by the pike. The minimum number of fish bones was 4, of which 1 catfish (*Fig. 25*), 2 pikes (*Fig. 26*) and a non-definable species could be identified. According to the maximum calculation 2 catfishes, 2 pikes and 5 unidentified fishes were found in the Gepids objects.

The shell remains of the European pond turtle were also discovered. This turtle species – that is the only one native turtle species in the Carpathian Basin – favor shallow, muddy stagnant water that could be found in the vicinity of Rákóczifalva as well. As a reptile, it favors sunny places, dense forest lakes and oxbows with gallery forest. Only turtle shell fragments occurred in the findings, which refers to the consumption of turtle meat.

Bone artefacts did not turn up, but an interesting find, a bone anvil (*Figs 27–28*) was found made from a horse's jawbone. On the flat surface of the jawbone, the mold of sickle teeth blade appears in rows. The bone anvil was used when the sickle teeth was repaired or recovered, or when the broken teeth of a metal anvil was replaced by a bone anvil. This object has already been known in the Mediterranean region from the Greek and Roman period, but in Hungary the earliest bone anvil appeared from the Arpadian age. In Rákóczifalva, besides the Gepids finds, Sarmatian and Late Sarmatian artefacts occurred as well. Their significance is that they carry information about animal husbandry and bone processing, it is an evidence that forge operated in the settlement, where metal tools were maintained and they indicate cereal production as well.[78]

We know very little about the Gepids' animal husbandry and hunting habits so the archaezoological research of as many archeological excavations as possible and the publication of results is very important. In a Southeast Hungarian archeological site, in Battonya, farm-like Gepids settlements were excavated.[79] The archeozoological material of some houses and pits were revealed and the same environmental historical finds were discovered as in the case of Rákóczifalva. The most important livestock was cattle, sheep and goats. Pig breeding was not important in Battonya, but in Rákóczifalva the number of pig bones was significant. Dog, cat and chicken remains occurred in Battonya as well. There is no proof of hunting in Rákóczifalva while in Battonya red deer hunting was observed. Fishing, which could supplement the amount of meat obtained from the slaughter of domestic animals, can be observed in both sites of the Great Hungarian Plain.

Summary

Geoarcheological, archeobotanical and archeozoological analysis have been carried out in the central, one of the hottest parts of the Great Hungarian Plain, in the Tisza valley, where a Gepids settlement and its surroundings was excavated. Based on the results of the digital relief model, maps, historical maps and geoarchaeological analysis of geological drillings, the Bagi-földek are located on a deeper and younger alluvial surface with good water supply and are connected to the development of the Tisza River, while the Rokkant-földek are located on an older residual surface and are rising above the alluvium. The Gepids communities settled on an point bar series located on the high-floodplain and low floodplain in a semi-circular, semi-peninsula-like protected

[78] Tugya 2015, 21–27.
[79] Szabó–Vörös 1979, 228.

area. These surfaces provided different farming possibilities for the Gepids communities of the migration period: the utilization of the gallery forest, gatherings in the area of the forests and floodplain, fishing and hunting, extensive animal husbandry on the higher, drier areas and plant cultivation around the settlements and houses.

Based on the bone composition of the domestic animals, the area was surrounded by extensive grazing fields, including saline pastures favorable to sheep, but the area of wet meadows and meadows was also outstanding indicated by the high ratio of cattle and horse bones in the 6th century, during the Gepids settling. Poultry provided a significant source of meat and eggs. Hunting was not common in the Gepids community based on the archaeozoological remains, but fishing was observable in the Tisza River and in its oxbows. The pond turtle provided meat as well. Shells were collected and seasonally consumed. Bone artefacts are already known from the late Sarmatian period (punch tool, chisels, rubbed bone and skates) in the Great Hungarian Plain, but the presence of bone anvil in the Gepids material is currently a real curiosity.

We know very little about the animal husbandry, hunting habits and meat consumption of the Gepids, so it is necessary to carry out and publish archaeozoological research of as many excavations as possible. In previous works, a farm-like Gepids settlement was discovered at the border of Battonya[80] and by the analysis of bones of some houses and pits we found the same archaeozoological result as in the case of Rákóczifalva. The most important domestic animals were cattle, sheep and goat in both of the sites. Pigs were not significant in Battonya while in the case of Rákóczifalva it was much more important. Based on the number of individuals their importance is almost the same. Dog, cat and chicken remains were also present in the Battonya site.

There is no proof of hunting in Rákóczifalva while red deer hunting was observed in Battonya. Fishing, which could supplement the amount of meat obtained from the slaughter of domestic animals, could be observed in both sites of the Great Hungarian Plain.

According to our data, the inhabitants of the excavated Gepids settlement fully utilized its Tisza valley environment for food production on an organic level in the migration period, in the 6th century. The environment occupied by the Gepids community, the floodplain islands and residual surfaces in the Tisza Valley was inhabited from the early Neolithic. The exploitation of their environment, from settlement strategy to gathering, has a similar system as in the case of the Gepids settlement we have described. However, the ratio of unproductive farming (hunting, fishing, gathering) and productive farming (land cultivation, animal husbandry) was different in the life of these communities.

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80 Szabó–Vörös 1979, 228.

Bone measurements by species (mm)

Abbreviations: b – breadth; Bd – Greatest breadth of the distal end; BF – Breadth of the Facies articularis basalis; BFcd – Greatest breadth of the Facies articularis caudalis; BFcr – Greatest breadth of the Facies articularis cranialis; BFd – Greatest breadth of the Facies articularis distalis; Bp – Greatest breadth of the proximal end; DC – Greatest depth of the Caput femoris; Dd – Greatest depth of the distal end; Dl – Greatest depth of the lateral half; Dm – Greatest depth of the medial half; Dp – Depth of the proximal end; DPA – Depth across the Processus anconaeus; GB – Greatest breadth; GL – Greatest length ; Glm – Greatest length of the medial half; l – length; LA – Length of the acetabulum including the lip; LO – Length of the olecranon; SB – Smallest breadth of diaphysis; SD – Smallest depth of diaphysis; SDO – Smallest depth of the olecranon

CATTLE

		M3 l.	**M3 b.**
194. obj.	Maxilla	28,3	17,7

		P2-M3 l.	**P2-4 l.**	**M1-3 l.**	**M3 l.**	**M3 b.**	**Height of the mandible in front of P2**	**Height of the mandible in front of M1**	**Height of the mandible behind M3**
338. obj.	Mandible	124,8	47,7	78,0			32,4	44,4	81
338. obj.		132,4	47,4	83,6	36,6	15,4	37,7	52,6	

		BFcd
541.obj.	Atlas	85,2

		SB	**SD**
21. obj.	Humerus	20,7	24,4

		Bd
338. obj.	Radius	56,3

		DC
338. obj.	Femur	40,1

		Bd	**Dd**
365. obj.	Tibia	52,4	39,4

		GL	**Glm**	**Dl**	**Dm**	**Bd**
21. obj.	Astragalus	68,1	60,6	36,5	39,8	42,9
338. obj.		56,9	52	30,7	31,6	34,2
541. obj.		59,2	53,9	33,2		38,6

		SB
69. obj.	Metatarsus	23

SHEEP

		SB	**SD**
1. obj.	Humerus	16,4	16,2

		P2-M3 l.	**P2-4 l.**	**M1-3 l.**	**M3 l.**	**M3 b.**	**Height of the mandible in front of P2**	**Height of the mandible in front of M1**
21. obj.	Mandible	76,3	23,1	53,1	22,8	7,3	16,3	23,3
194. obj.	Mandible						13,4	

		SB	**SD**
373. obj.	Tibia	16,4	13,1

		Bp	Dp
194. obj.	Meatacarpus	23,6	15,9

PIG		**M1-M3 l.**	**M3 l.**	**M3 b.**
21. obj.	Mandibula	57,6	28,4	15,2

365. obj.	Mandibula		29,9	14,5									
		SB	**SD**										
338. obj.	Humerus	14,4	20,7										
		LA											
338. obj.	Pelvis	31											
HORSE		**M2 l.**	**M2 b.**	**M3 l.**	**M3 b.**								
365. obj.	Mandible	24	16,7	29,3	14								
		Bd	**Dd**	**BFd**									
365. obj.	Radius	71,4	40,1	61,6									
21. obj.	Tibia		72	45,6									
1. obj.	Phalanx proximalis	**GL**	**Bp**	**Dp**	**SB**	**SD**	**Bd**						
		78	52,5	33,0	19,2	41,8	21,9						
DOG		**BFcr**	**BFcd**	**GB**									
373. obj.	Atlas	28,5	24,2	56,0									
		GL	**Bp**	**Dp**	**SB**	**SD**	**Bd**	**Dd**	**LO**	**SDO**	**DPA**	**LA**	**DC**
373. obj.	Humerus	87,8	21,8	27,6	9,2	10,2	23,6	17,5					
373. obj.	Humerus	87,8	21,7	28	9,3	9,7		17,7					
373. obj.	Radius	77,9	12,7	7,9	9,6	4,7	16,9	9,8					
373. obj.	Radius	77,3	12,3	8,2	9,9	4,9	16,8	9,6					
373. obj.	Ulna	90,5							21,2	**14,9**	17,6		
373. obj.	Ulna								20,9	**14,8**	18,3		
21. obj.	Ulna								32,7	**23,2**	27,1		
373. obj.	Pelvis											16	
373. obj.	Pelvis											16,3	
373. obj.	Femur	97,4	25,3		10,1	10,1	22,5	25,6					12,7
373. obj.	Femur	93,7	25		10,3	9,7	22,6	25,2					12,7
373. obj.	Tibia	87,9		23,5	9,8	8,2	16,4	12,2					
HEN		**GL**	**Bp**	**Dp**	**SB**	**SC**	**Bd**	**Dd**					
225. obj.	Humerus				5,7								
373. obj.	Humerus				6,5		13,7	7,6					
194. obj.	Radius						9,2						
373. obj.	Femur		14,7	8,9									
373. obj.	Femur	71,8	14,8	8,7	6,3		13,6	10,6					
194. obj.	Tibiotarsus						12,5	14,2					
225. obj.	Tibiotarsus	111,2					11,1	11,4					
373. obj.	Tibiotarsus						10,2	10,1					
21. obj.	Tarsometatarsus					5,2	11,4						
69. obj.	Tarsometatarsus					4,8	9,7						
194. obj.	Tarsometatarsus					4,6							
194. obj.	Tarsometatarsus						13,6						
338. obj.	Tarsometatarsus	68,4				5,8							
338. obj.	Tarsometatarsus					6							
373. obj.	Tarsometatarsus		11,5										
373. obj.	Tarsometatarsus	68,3	11,2			5,9	11,6						
GOOSE		**GL**	**Bp**	**Dp**	**SB**	**SD**	**Bd**	**Dd**	**BF**				
194. obj.	Coracoideum								20				

194. obj.	Humerus	138,8	29,1		8,5		21,7	
194. obj.	Humerus	139,1	29,1		8,5		21,4	
194. obj.	Ulna	159,0	13,6	11,9		5,5		
194. obj.	Femur						16,9	15,7

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Dies ist der erste Konferenzband, der sich mit der Geschichte, Archäologie, Namenkunde, Münzprägung, dem Handwerk und den Siedlungen des Königreichs der Gepiden im Theissgebiet, in Sirmien und in Siebenbürgen befasst. Die Aufarbeitung der Hinterlassenschaft der Gepidenzeit wird erleichtert durch die neuen archäologischen Quellen. Einzelne Seiten des kulturellen Beziehungssystems der Gepiden beleuchten die Kontakte zur europäischen und byzantinischen Kultur, ihr Verhältnis zu den Langobarden und die Darstellung ihrer Glaubenswelt und Religion.

This is the first conference volume focused on the history, archaeology, onomatology, coinage, craftsmanship, and settlements of the Gepidic Kingdom in the Tisza Region, Sirmium, and Transylvania. The heritage of the Gepidic period is presented through the most recent archaeological discoveries. Various aspects of the cultural contacts of the Gepids, as discussed in the book, shed light on their connections to European and Byzantine cultures, their relationship with the Langobards, as well as their beliefs and religion.

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