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Proceedings of the conference held between 17th and 18th of December 2014

Ősrégészeti Tanulmányok / Prehistoric Studies

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Series Editors

Alexandra Anders, Gábor Kalla, Viktória Kiss,
Gabriella Kulcsár and Gábor V. Szabó

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Edited by

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with

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New Results in the Study of the Late Bronze Age and Iron Age Körös Region (Southeastern Hungary)

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In the study area (Békés County, Southeastern Hungary) an economic change is observable in the period ranging between the Late Bronze Age and the end of the Iron Age. In contrast to the resources of riparian and low floodplains, the increasing importance of high, flood-free areas and fertile loess soil is visible. The Gáva culture could both use persistently inundated, rich and dense grazing lands and meadows (wet pastures), as well as dry pastures located on high floodplains and ridges. In contrast, populations of the Vekerzug and the La Tène cultures could primarily graze animals on extensive dry pastures, which may have simultaneously resulted in an increase in livestock. Coinciding with the aforementioned process, farming activity spread at higher soil quality, flood free areas that may have meant the prevalence of agricultural activity in the period.

Settlement intensity changed remarkably in the period ranging between the second half of the Late Bronze Age and the end of the Iron Age. The number of settlements with significant intensity decreased gradually. The number of low-intensity settlements did, however, show a significant increase. It appears that fewer and fewer settlements played central role in the settlement network.

Fortified settlements of various sizes could have been important centres of the Late Bronze Age settlement system. Within the study area, Újkígyós-Örök-Földek and Sarkad-Vár-tábla is presumably of Late Bronze Age origin. In order to confirm or disprove this assumption, we accomplished the preliminary analysis of the Sarkad site in 2014. The research included field survey, remote sensing techniques, shallow geological corings and excavation as well.

A vizsgált területen (Békés megye, Délkelet-Magyarország) a késő bronzkortól a vaskor végéig terjedő időszakban egy olyan gazdálkodásbeli változás figyelhető meg, amely során a folyókhoz közeli és az alacsony árterek területeinek erőforrásait mind kevésbé, a magasabb ármentes részek biztonságát és a löszhátságok termékeny talajait viszont egyre inkább előnyben részesítették. A Gáva-kultúra feltételezhetőleg az időszakosan elöntött, dús legelőket és kaszálókat (nedves legelők) valamint a magas árterek és hátságok száraz legelőit egyaránt hasznosította állatállományainak tartására. Ezzel szemben a Vekerzug- és a La Tène-kultúra népessége elsősorban a nagyobb kiterjedésű száraz legelőkön legeltethette állatait, ami egyben az állatállomány növekedését is jelenthette. A fenti folyamattal párhuzamosan a szántóföldi művelés helyszínei egyre inkább a jobb minőségű és árvíztől nem fenyegetett területek felé tolódtak el, ami a mezőgazdasági művelés kiterjedésére és fejlődésére utalhat.

A késő bronzkor második felétől a vaskor végéig terjedő időszakban a települések intenzitása számottevően megváltozott. A jelentős és közepes intenzitású települések száma folyamatosan csökkent, a gyenge intenzitású települések száma viszont jelentős mértékben növekedett. Úgy tűnik, hogy az időben előre haladva egyre kevesebb település töltött be központi vezető funkciót a településrendszeren belül.

A kisebb és nagyobb erődített települések a késő bronzkori települési hálózat fontos központjai lehettek. Az általunk vizsgált területen feltételezetten két erődített település köthető a késő bronzkori időszakhoz (Sarkad-Vár-tábla, Újkígyós-Örök-Földek). 2014-ben előzetes vizsgálatokat kezdtünk Sarkad-Vár-tábla lelőhelyen. Ennek során terepbejárást, műszeres vizsgálatokat, sekély földtani fúrásokat és ásatást végeztünk. Elsődleges célunk az erődítés késő bronzkori eredetének igazolása vagy elvetése volt.

INTRODUCTION[1]

In addition to the analysis of settlement systems, there is a growing emphasis on reconstructing the relationship between former ecological conditions, the factors influencing the conditions of the establishment of prehistoric settlements and social changes in the Körös region (Kosse 1979; Bóka 2008a; 2012; 2013; Duffy 2008; 2010; 2014; Gyucha 2009; 2015; Gyucha–Duffy 2008; Gyucha–Parkinson 2008; Parkinson 2006; Parkinson–Gyucha 2007; Salisbury 2008; 2013). Former environmental features had a profound impact on settlement location and subsistent conditions. Proximity to former watercourses and resources, soil quality in the settlements' surroundings and their presence on various reliefs were of crucial importance.

The importance and representative examples of changes in the Late Bronze Age and Iron Age settlement history of the Körös region were emphasized by many in the last decade (Gyucha 2001; 2002; V. Szabó 2004; 2017; Bóka 2008b; 2012; 2013). Settlements associated with the Gáva, Vekerzug and La Tène cultures in Békés county were identified by regional field surveys between 1968 and 2000, within the framework of the *Magyarország Régészeti Topográfiája* [Hungarian Archaeological Topography] (henceforth MRT 6; 8; 10).[2] 393 settlements of the Gáva culture, 553 of the Vekerzug culture and 299 of the La Tène culture were registered. The chronological evaluation of the sites were based on various amount of undoubtedly determinable surface material.[3]

SPATIAL LOCATION OF THE SETTLEMENTS

Access to natural resources consistent with the subsistence strategy applied and the particularities of social organization represent the most crucial factors for settlement, the formation and development of the settlement network (Gyucha–Parkinson 2008, 83).

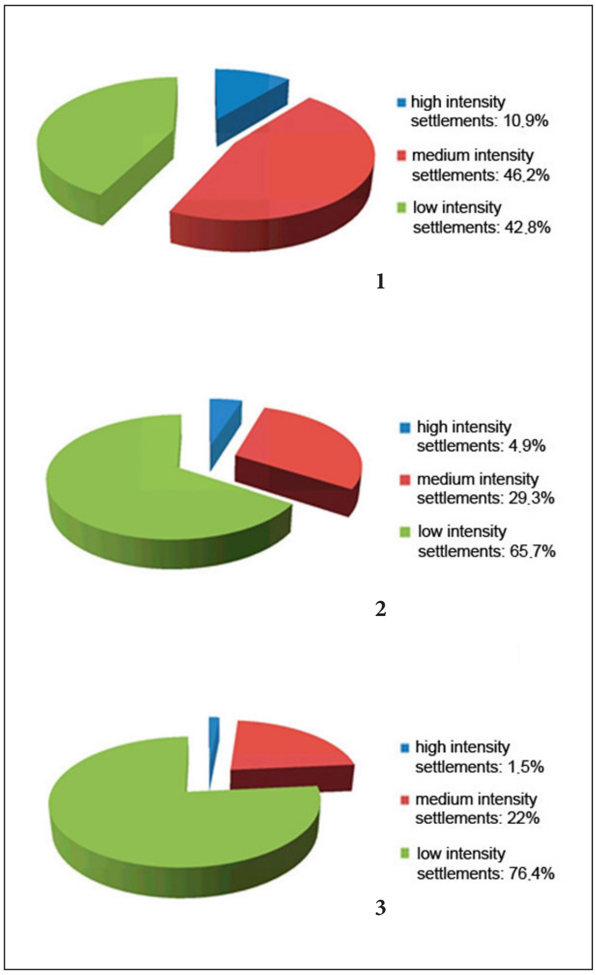

Fig. 1. Changes in settlement intensity in the study area – 1: Gáva culture, 2: Vekerzug culture, 3: La Tène culture

Three cultural/chronological periods can definitely be distinguished within the investigated time frame (14–1st century BC): Gáva culture (Ha A2–Ha B1, 12–10th century BC), Vekerzug culture (Ha C2–LT A/LT B1, 7–5th century BC) and La Tène culture (LT B1–LT D, 4–1st century BC).[4] The spatial distribution of settlements in each period represent several centuries – similarly to the Late Neolithic and Early Copper Age. Within this, it is impossible to distinguish between the settlements that existed at the same time (contemporaneously) using the available field survey data (Gyucha–Parkinson 2008, 83). It is unlikely that the currently

[1] The first part of the paper includes Gergely Bóka's summary on transforming settlement system and economic "regime change" in the Late Bronze Age and Iron Age Körös region.

[2] Results of the excavations conducted in the vicinity of Gyula (Békés County) have not been published yet. I owe thanks to Imre Szathmári for the descriptions and the material specification of the sites.

[3] Sites with indecisive find material were disregarded.

[4] The (ceramic) assemblages that were collected during the archaeological field surveys are not suitable for fine chronological determinations, therefore periods of pre- and proto-Gáva ceramic style (14–12th century BC, RB D–Ha A1) and the Mezőcsát culture (Ha B2–Ha C1) could not be included.

acknowledged settlement network represents invariable social group relations through the entire period of time and space under analysis (Gyucha–Parkinson 2008, 83).

Settlements identified during field surveys can be classified primarily on the basis of their extension and the number and diversity of collected finds. Internal borders among territories separating cultures of a multi-period site cannot be determined from the descriptions of the settlements identified by the MRT surveys. We can categorize them by size exclusively by means of more recent surface surveys. Due to the high number of settlements (1,245 sites), however, we have to differentiate between sites by another method. The settlements, whatever their age, are not uniform. Extensive settlements of central position that utilized/exploited the advantages of landscape or environmental resources to greater extent, fortified sites defended by ditches/ramparts, tell sites and village-like flat sites of greater or lesser degree, as well as small farm- or lodging-like dwellings consisting of few features are all present in the study area and period. Based on the intensity – i.e. amount and diversity – of archaeological artefacts, rural settlements in the timeframe could be classified into three groups: low-, medium- and high-intensity sites (Bóka 2013).

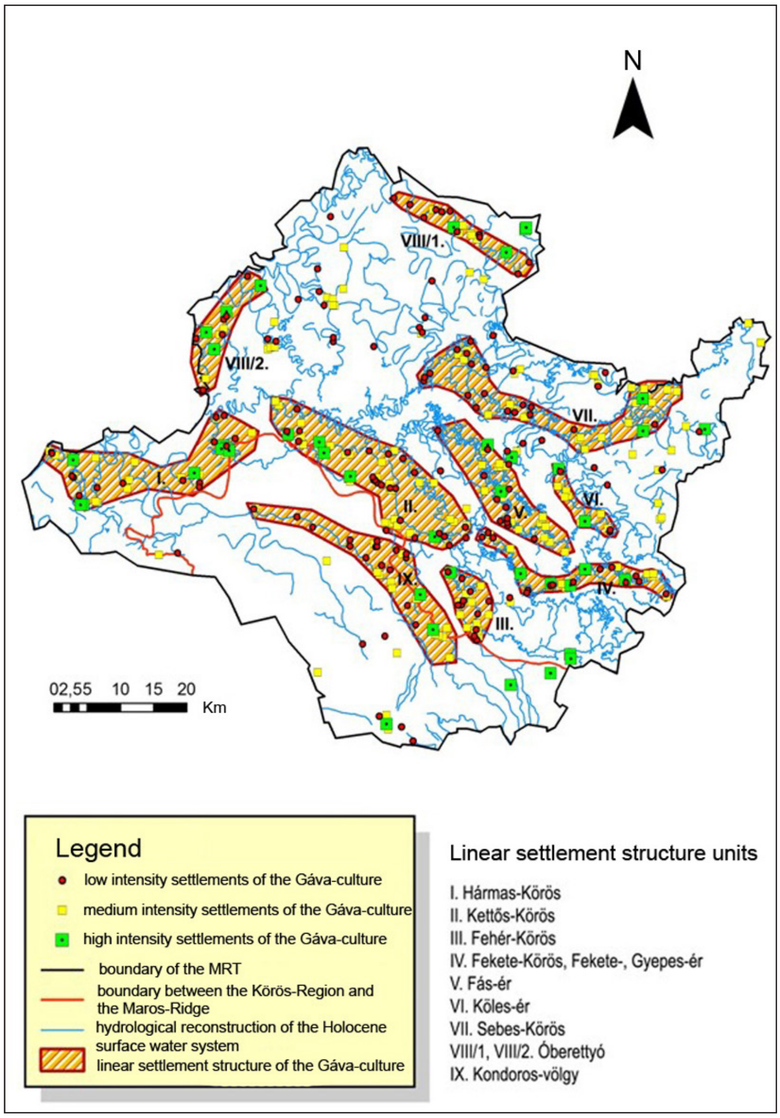

Fig. 2. The settlement system of the Gáva culture in the study area

Between the second half of the Late Bronze Age and the end of the Iron Age, settlement density had remarkably changed *(Fig. 1)*. The number of significant intensity settlements had gradually decreased (Gáva culture: 10.9%, Vekerzug culture 4.9%, La Tène culture 1.5% in relation to the total amount of settlements of the given period) similarly to medium-intensity sites (Gáva culture: 46.2%, Vekerzug culture: 29.3%, La Tène culture: 22%). Whereas the number of low-intensity settlements had significantly grown (Gáva culture: 42.8%, Vekerzug culture 65.7%, La Tène culture: 76.4%). It appears that gradually fewer settlements played central, leading role within the settlement network. A kind of centralization began in the Middle Iron Age (settlement blocks, 28 sites), which continued to intensify and was completed in two central blocks of settlements in the Late Iron Age. It seems that besides (a decreasing number of) larger villages (blocks), remarkably smaller farmsteads and dwellings had become the bases of the settlement system. This process assumes social differentiation, a shift from a heterarchical towards a hierarchical settlement network, and the spread of a new economic model based on the colonization of the *terra incognita* (marginal zones, e.g. loess ridges), as well as the economic and social utilization of their fertile lands, excellent for arable farming and grazing. With the village-like settlements appearing on the ridges, the given society assumed less risk. The possession,

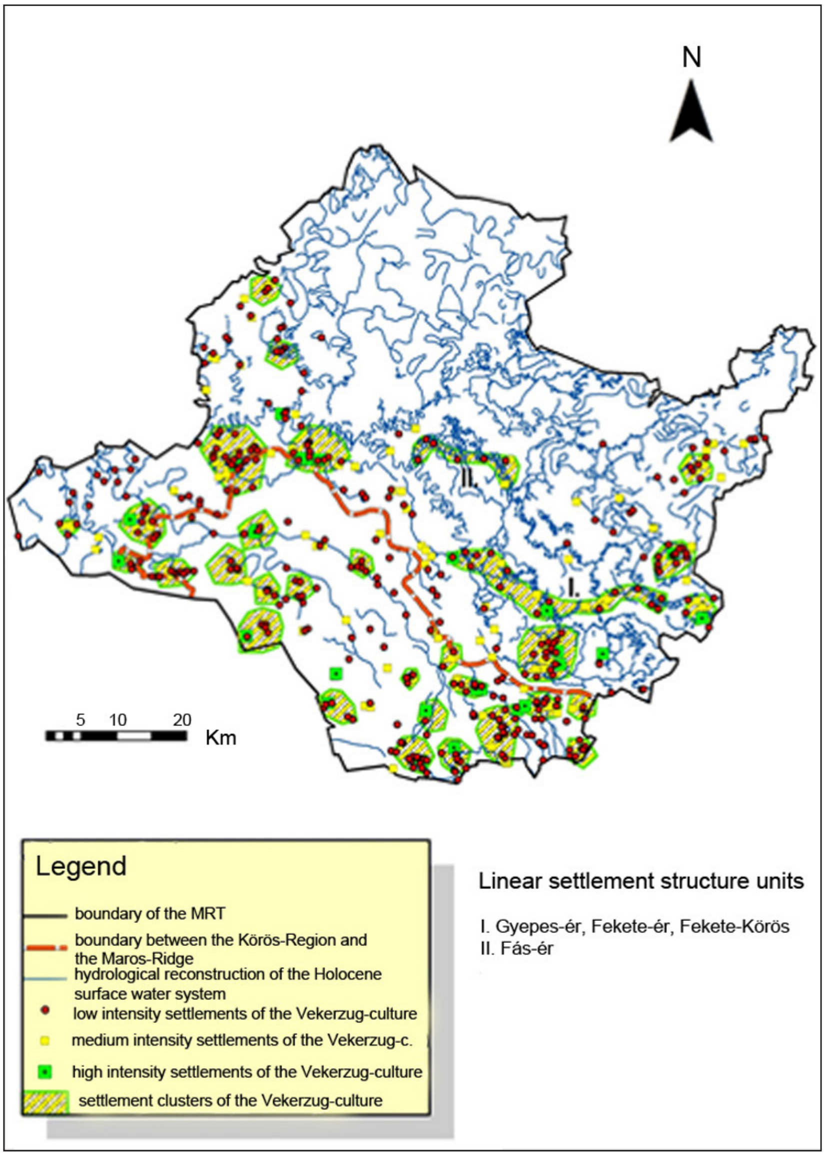

Fig. 3. The settlement system of the Vekerzug culture in the study area

accessibility and maintenance of larger grazing and arable lands were easier by means of developing more mobile seasonal lodging-like settlements.

In the case of settlement structures (or settlement networks), we can distinguish between linear and clustered structures, both of which can form regular and irregular shapes. Regular shape settlement structures are rare and can be hardly identified. Clustered settlement structures comprise irregular, regular and so-called linear clustered shapes. Within the linear type, we can also distinguish irregular, regular and the clustered linear shape subtypes (Roberts 1996, 20, Fig. 2. 1). Based on the analyses, characteristic settlement systems of both the Gáva and the Vekerzug, as well as the La Tène cultures are represented among the aforementioned types of settlement structures. The settlement structure of the Gáva culture can be identified with irregular linear shape, that of the Vekerzug culture with irregular clustered shape and La Tène culture with the linear clustered shape (Bóka 2013).

The main population area of the Gáva culture was the Körös region, similarly to the preceding periods. The Maros River Alluvial Fan can be considered a secondary habitation zone in this sense. Data on settlement density mark smaller, local clusters of settlements, however the typical settlement network of the entire region is predominantly characterized by the fact that human habitats are linearly located along major watercourses (rivers, streams) active during the Holocene *(Fig. 2)*.

As opposed to the settlement network comprising the so-called irregular linear shaped settlement structural units of the Gáva culture, which were built along watercourses, that of the Middle Iron Age was characterized by a fundamentally different structure in terms of environment, economy and society *(Fig. 3)*. Unique features of the Scythian Age Vekerzug culture's settlement structure formed in the Körös region have already been recognized (Gyucha 2001; 2002; Bóka 2008b; 2012). Settlements of this period in the Körös Valley and on the Maros Fan were characterized by extensive riverside clusters consisting of several large, village-like formations (of great intensity) that were surrounded by smaller, permanent settlements (of medium intensity) and small, habitation-like sites (of small intensity) around them (Gyucha 2001). The clusters comprised different number of settlements each.[5] Their size ranged between smaller

[5] The coexistence of the settlements cannot be verified unambiguously, since Vekerzug culture has no periodization based on an accepted ceramic typology.

blocks of five–six settlements and vast formations of 35–40 settlements (e.g., the blocks at Gyula and Gyomaendrőd) *(Fig. 3)*.

Another structure can be outlined in the third period under analysis, which developed in the Late Iron Age. The fundamentals of the so-called clustered linear settlement system in this case is represented by the border area of the Fehér-Körös, the Kettős-Körös and the Hármas-Körös Rivers and the Maros Fan, which was intensely annexed by Celtics. Besides the extensive linear block, examples of linear settlement structure can be found along smaller tributaries, close to the Kondoros Valley (I), the Gyepes and the Fekete Streams (II) and the Óberettyó River (III/1, III/2). Settlements (of medium and dominantly low-intensity) located in irregular and sporadic patterns are present in both the Körös region and on the Maros Fan *(Fig. 4)*. We can distinguish between two frequented blocks (centres) in the core of the settlement territory that consists of one or two settlements of significant density and several others of medium and low-intensity resembling to the Scythian Age.

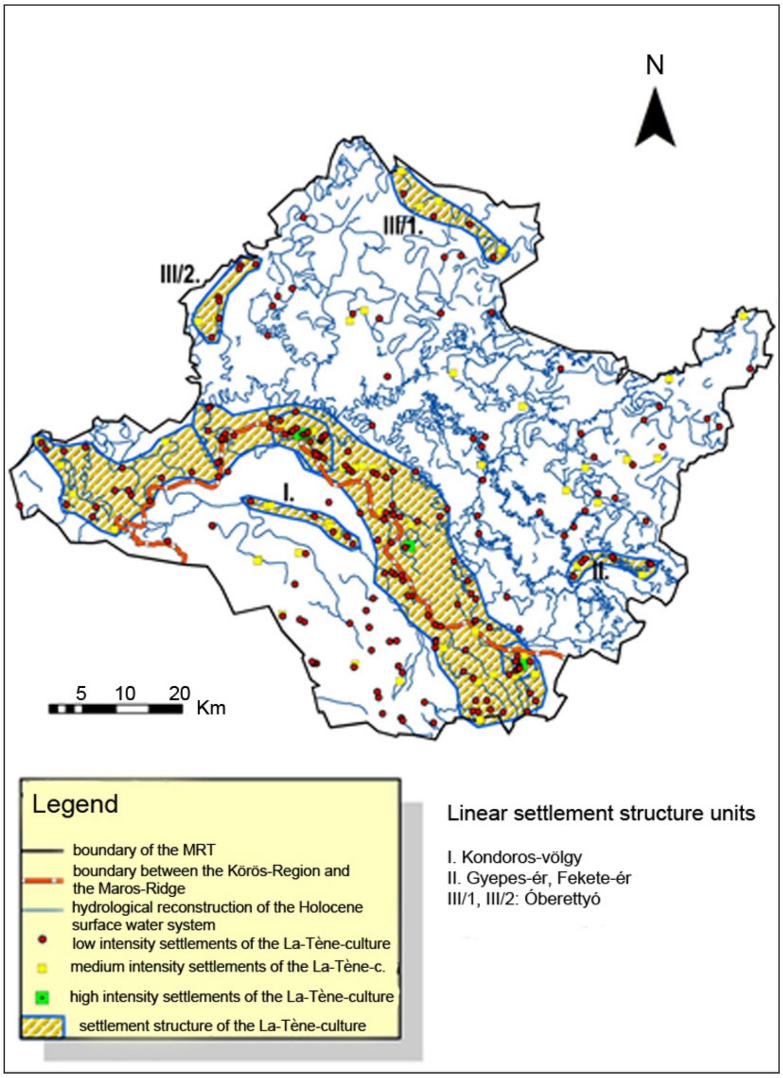

Fig. 4. The settlement system of the La Tène culture in the study area

PALEOECOLOGICAL ANALYSIS OF THE SETTLEMENTS

Two types of economic activity could have been applied prior to river regulations as a consequence of geomorphological distinctions of the area in question. Lands in the Körös region were suitable for the so-called floodplain husbandry whereas pastoralism and arable farming were expedient on the Maros Fan. These are the types of landscape use and soil cultivation that may have resulted in the highest utilization of the invested work under given circumstances. Different periods of land use have been identified in the valleys of Tisza and Körös Rivers which changed continuously under anthropogenic influences (desolation of villages, river regulations) (Bellon 2003, 13). Numerous factors were taken into account when choosing the location of a settlement. Water supply, defensibility, geomorphology and accessibility were all crucial circumstances (Roberts 1996, 33). The order of importance could change from settlement to settlement, region to region. Furthermore, economic resources beyond the closer surroundings were also of key importance in terms of location, e.g. arable lands, meadows, fields, forests, local and regional communication capabilities, proximity to watercourses and lakes.

In the course of floodplain management, different sources were reached and could be utilized: livestock watering, fishing, transport of people, clothes cleaning, reed and rush harvesting, herbs, picking and growing fruits, timber and firewood, waterway transport of goods, mast-feeding in

Economic/husbandry zones (Bellon 2003)		Geological reliefs (Bóka 2012)
'A'	river's level	= riparian zones
'B'	floodplain	= low floodplains
'C'	flood-free area	= high floodplains
'D'	sand and loess ridges	= terrace sediments/alluvial

Fig. 5. The relation between the economic/husbandry zones and reliefs

forests, beekeeping, animal husbandry, meadows, hunting (Brown 1997, 282; Bellon 2003, 15). People living in the floodplain had to take into account positive and negative factors when choosing a place to live. Flood basins provide numerous non-livelihoods, for instance proximity of fords and ferries, log rafting; rivers often form a natural boundary or line of defense, and the cultic and religious role of rivers must also be emphasized (Brown 1997, 286–288). Among negative factors, we can mention flood risk, as well as epidemics spreading easily in swampy wetlands, e.g., bubonic plague or cholera. Historical evidence shows that abandonment of settlements were, however, extraordinarily rare even after disastrous events claiming lives (floods, epidemics). Rather, they left their settlements when the environmental conditions for subsistence and farming had ceased to exist. The equilibrium between negative and positive factors was constantly changing from time to time in compliance with environmental, social and economic processes (Brown 1997, 297).

Husbandry in riparian areas of the Great Hungarian Plain was being practiced "zonally", on more levels *(Fig. 5)*:

'A': The lowest is the level of a river. The rivers drink animals, gain water supply, clean clothes, fish, transport people and goods sideways and lengthways there.

'B': The second level is the floodplain. It consists of fields, pastures, floodplain forests. It has diverse, mosaic-like landscape, with backwaters, bogs, willow, alder and poplar trees, hardwood groves and rich undergrowth. Meadows present the scene for grazing, while higher ridges accommodate orchards and smaller sporadic arable lands. Rich wildlife and avifauna characterize it.

'C': Flood-free areas. Settlements and economic units (gardens, farmsteads) are established on the edges of those areas. Arable landslips of two–three round width are also situated there.

'D': The fourth level is represented by sand and loess ridges enclosing rivers. Loess ridges were the earliest to be involved in cultivation, but they left areas abundantly for pastures, too. We call them dry grasslands (Bellon 2003, 15–17).

In the following model, we managed to match the different, so-called economic zones characterizing the floodplain management of the Great Hungarian Plain with the classified geological reliefs of the Körös region *(Fig. 5)*. The joint analyses on the relations between the settlements' location identified during archaeological field surveys (MRT) and the reliefs, as well as between the reliefs and husbandry zones bring us closer to the everyday life, subsistence practices and types of farming of each culture – presuming that the inhabitants of the given area utilized their environmental resources in an optimal manner.

Far greater percentage of the Gáva culture settlements are found in economic zone 'B' (low floodplains) than those of the Iron Age Vekerzug and La Tène cultures. All three cultures inhabited zone 'D' (terrace sediments/alluvia) by and large in the same proportion, similarly to zone 'A' (riparian zones). Zone 'C' was mostly annexed by the Vekerzug and La Tène cultures, while Gáva culture was the least present there *(Fig. 6)*.

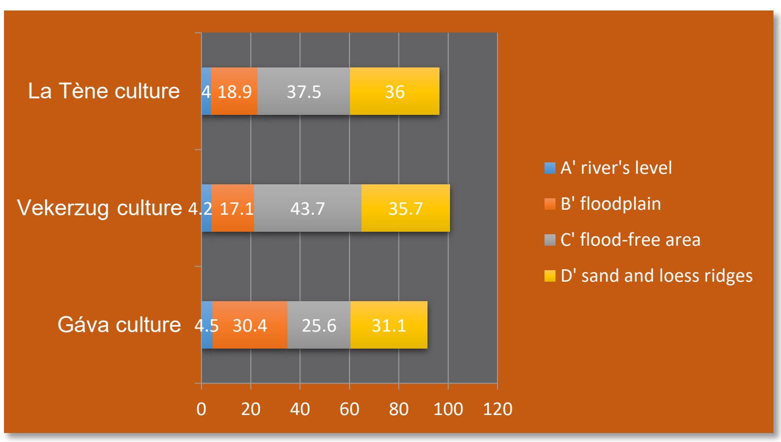

Fig. 6. The relation between the economic/husbandry zones and settlements in the study area

In case of the Gáva culture we experience a relative proportionality among the economic zones 'B', 'C' and 'D' with respect to their population and utilization of the resources. The number of its settlements in zone 'B' is, however, outstanding in comparison with the Iron Age cultures. The pastures and meadows (wet pastures), which provided the basis for feeding livestock, could play an important role in the husbandry. Forests provided timber for building houses, firewood for heating and cooking, as well as fuel for the kilns of the bronzesmiths who prospered in the Late Bronze Age. (Moreover, rich bird fauna and wildlife represented an important supplementary food source in the zone.) Temporary inundations and poor or medium soil conditions results in an arable land cultivation of low efficiency. Gáva culture compensated suchlike deficiencies by involving dry areas of higher floodplains (zone 'C') in the surroundings of its settlements and the loess fans (zone 'D') of excellent soil quality. Loess meadows *(Festucetum rupicolae)* and grassland steppes dry pastures were even suitable for keeping larger livestock *(Fig. 6)*.

The use of economic zone 'B' was significantly overshadowed, while the utilization of zone 'C' increased remarkably, while that of zone 'D' increased moderately. This shift can be explained by an economic "regime change": the population of Vekerzug culture primarily inhabited high floodplains and loess ridges whose soils are suitable for arable cultivation due to their higher fertility and extensive soils, and by means of extensive dry grasslands for keeping greater animal stocks. Although, their settlements occurring in zone 'B' reflects that they did not give up the benefits of the low flood plains, but rather found additional resources for their economy there. The Late Iron Age La Tène culture settled in the four main zones with less variations but in similar proportions to the Vekerzug culture *(Fig. 6)*.

Fortified settlements and fortification systems occurring in various sizes and with structures in the Great Hungarian Plain were important centres of the settlement network forming in the second half of the Late Bronze Age. A great majority of them were built on higher reliefs (fans) outside the river valleys. In the following example, however, the preliminary results of the analysis of a fortification located right in the core of the Körös region – along the onetime Fekete-Körös River – are presented.

PRELIMINARY RESULTS OF THE ARCHAEOLOGICAL INVESTIGATIONS AT SARKAD-VÁR-TÁBLA SITE

Due to the investigations in Békés (H), Csongrád (H), Arad (RO), and Timiş/Temes (RO) counties, numerous new fortified settlements were identified in the past few years. These were dated to the second half of the Late Bronze Age, such as sites in the southern portion of the Great Hungarian Plain: Végegyháza-Zsibrik domb (Lichtenstein–Rózsa 2008; Milo et al. 2009), Csanádpalota (Priskin et al. 2013; 2014; Szeverényi–Priskin–Czukor 2014; Szeverényi et al. 2015), Makó (Czukor et al. 2013; 2017), Sântana/Újszentanna (RO) (Rusu–Dörner–Ordentlich 1999; Sava–Gogâltan 2010; Gogâltan–Sava–Mercea 2013) and Corneşti-Iarcuri/Zsadány (RO) (Micle–Măruia–Dorogostaisky 2006; Micle–Török–Măruia 2008; Heeb–Szentmiklósi–Wiecken 2008; Szentmiklósi et al. 2011) sites.[6] Besides them, several other fortifications and ramparts were also revealed in Békés County, whose accurate dating is still to be done (Lichtenstein–Rózsa 2007).[7] Only a couple of fortifications were classified into this group earlier on: Orosháza-Nagytatársánc (Banner 1939), Szentes-Donátvár (Kemenczei 1984; B. Hellebrandt 2004) and Hódmezővásárhely-Kútvölgy (B. Hellebrandt 2004). Today however, along with the Transylvanian and Transcarpathian highlands, the Late Bronze Age fortifications in the Southern Great Hungarian Plain can be considered as a characteristic feature of the pre-Gáva period and of the Gáva culture.[8]

[6] Fortified settlements/hillforts of similar period were also identified in the North Hungarian Mountains, and in Hajdú-Bihar and Szabolcs-Szatmár-Bereg counties (V. Szabó 2017, 248).

[7] A good summary of the research on the Late Bronze Age fortifications cp. Czukor et al. 2017.

[8] Fortified settlements that had been investigated by archaeological excavations (Csanádpalota-Földvár, Makó-Rákos-Császárvár and Corneşti/Zsadány-Iarcuri, Sântana/Újszentanna-Cetatea Veche) were dated to the pre-Gáva period based on the recovered assemblages without any exception (Czukor et al. 2013; 2017; V. Szabó 2017, 248–249). Upon these Gábor V. Szabó assumes that fortified settlements ceased to exist in the subsequent period (Gáva culture), and a new settlement structure developed (V. Szabó 2017, 249). In our opinion we cannot clearly state that fortified settlements cease to operate in the Gáva culture's period. Only few absolute data can be matched with a *ca.* 40 known fortified settlements, and the structural development of them has not been clarified properly yet. Further investigations may contribute to a better understanding of this issue.

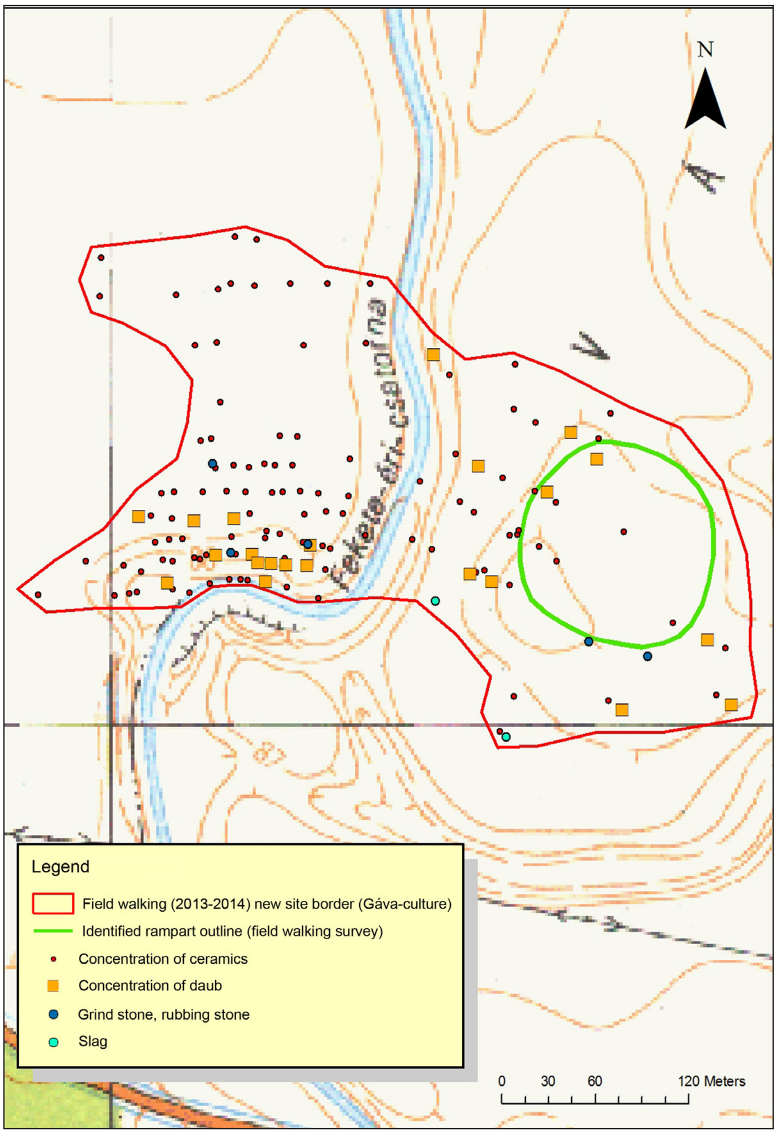

Fig. 7. Sarkad-Vár-tábla and Doboz-Kékfű, Borostyán — overall results of the field survey in 2013–2014

Smaller and larger fortified settlements could have been important centres of the Late Bronze Age settlement system. They might have been parts of a hierarchic settlement structure, to which areas of different size and strength belonged (V. Szabó 2017, 249). Within the study area (MRT areas in Békés County), it was presumed that two fortified settlements (Újkígyós-Örök-Földek, Eperjesi-tanya I [ID No. 60307] and Sarkad-Vár-tábla, földvár [ID No. 50059]) were of Late Bronze Age origin. Among the two fortifications, Sarkad is located in the Körös region, while that of Újkígyós is situated on the alluvial fan of the Maros, similarly to the aforementioned fortified settlements (Csanádpalota, Makó, Orosháza, Végegyháza). We accomplished the preliminary analysis of the Sarkad site in 2014. We applied field survey, remote sensing techniques, shallow geological corings and excavation. Our primary aim was to confirm or reject the fortification's Late Bronze Age origin.

The Sarkad-Vár-tábla site is located north of the road between Doboz and Sarkad, on the plateau enclosed by the Fekete-éri Channel, and north of the arid riverbed of the Fekete-Körös River. The former fortification can be easily identified on the arable land's recently tilled surface, which is currently under cultivation. In comparison with the dark brown soil of the surrounding area, the remnants of the rampart's line is yellow, yellowish brown. Slight surface distinction can be experienced in its neighbourhood. The fortification itself is situated in the southern portion of the site *(Fig. 7)*.

In compliance with our research plan we primarily completed a structural identification and dating of the fortification and the settlement, an analysis of the land use history (Kiss et al. 2017), and gathered samples for further laboratory analyses as well. Therefore, we had performed field surveys, which concluded unequivocally that the area had been inhabited most intensely by the people of the Late Bronze Age Gáva culture. Artefacts from the Late Iron Age (Vekerzug culture), the Roman Imperial Period (Sarmatian) and the Árpádian Age were also found within the site. We located the finds by using a portable GPS device during the field surveys (field walking), and we could also localize the fortification's outline. The contour of the fortification is clearly visible on former, military purpose orthophotos available in the FÖMI (*Földmérési és Távérzékelési Intézet*/Institute of Geodesy, Cartography and Remote Sensing) database as well as on Google Earth images as well. The fieldwork revealed that the neighbouring Late Bronze Age Doboz-Kékfű, Borostyán archaeological site formed a unit with Sarkad-Vár-tábla *(Fig. 7)*.

Geophysical surveys covered a total area of *ca*. 33,000 m², during which we could identify the ditch system of the fortification and further archaeological features. In the meantime, we were conducting geological mapping and coring in frequented areas outlined by the geomagnetic survey. The research was completed with the excavation of a cross-section of the ditch. The 1×10 meter-large test trench (Trench 2) was divided into three test sections of 1×2 meters each (6 m²). Samples were collected at 20 cm intervals of the cross-section profile of Section 2/C for future pedological, archaeobotanical and pollen analytical analyses. The excavation revealed a layered ditch of 2 m depth and 7 m width, filled with a dense mixture of wattle-and-daub pieces, ceramic sherds and charcoal.

Former research results have been partially justified. It was presumed during the MRT surveys that the site might have been been a Late Bronze Age fortification or a fortified settlement. Based on the results of our investigations in 2014 the fortified and the surrounding settlement might be associated with the Late Bronze Age Gáva culture. It is a perplexing circumstance, though, that ceramic sherds dated to the 9–10th century AD were also found in the ditch besides Late Bronze Age and Iron Age assemblages. We assume that people who settled down here in the Late Avar Age and the Hungarian Conquest period cleared the ditch and put it into service again. The latter is confirmed by the results of radiocarbon dating conducted by the Institute for Nuclear Research, Hungarian Academy of Sciences in Debrecen as well.

Field survey

During the field surveys conducted at the Sarkad site and at the neighbouring Doboz-Kékfű, Borostyán site (ID No. 694; located on the opposite bank of the Fekete-éri Channel and connected to the site Sarkad-Vár-tábla in the Late Bronze Age) we collected and located various Late Bronze Age finds and concentrations ceramic sherds, wattle-and-daub fragments in medium visibility conditions, by using portable GPS device. Furthermore, we marked animal bone remnants, grinding stone/millstone fragments and slag in the database too *(Fig. 7)*. A blue glass bead decorated with white painted stripes, dated to the Early or Middle Iron Age was also recovered. Moreover, we could identify the outline of the former rampart on the freshly harrowed surface of the arable land.

Geophysical survey[9]

We used Sensys (DLM type) fluxgate sensors for our survey. We determined the corner reference points of the geophysical survey with (horizontal) positional accuracy of centimetre by using GPS device equipped with Leica VIVA GS08plus GNSS receiver. We detected 33,200 m² during the survey of the fortified settlement.

The ditch enclosing the settlement is clearly identifiable on the geophysical survey, whose outline is perfectly visible, however it is interrupted on both western and eastern sides. A large anomaly with indefinite outlines is located on the internal side of the circular ditch's northern section. It presumably refers to an archaeological phenomenon, and can be associated with erosion processes due to soil cultivation in the area. The survey, partly within the circular price and partly beyond its boundary, identifies further longer or shorter ditch sections, but their age is unknown. We should pay attention to a circular ditch west of the great circular ditch, the location of which may suggest that this is not a fortification-related feature *(Figs 8–9)*.

Anomalies referring to archaeological settlement phenomena occur intensely inside the circular ditch and west of it. Among them, we may identify a building located in the centre of the fortified settlement. In other cases, however, formal features of the anomalies referring to archaeological phenomena prevented us from identifying further buildings. At the same time, the occurrence of further buildings is likely to be expected. Whereas the number of anomalies north and east of the circular ditch that refer to archaeological features decreases, and settlement features can only be identified sporadically *(Figs 8–9)*.

Great amounts of recent metal contaminations can be observed in dispersed pattern in the analysed area, particularly in its northwestern and southeastern portions as a consequence of land cultivation.

Geoarchaeological survey[10]

A series of targeted hand operated gouge auger observations were planned in order to gain an insight into the pedological and stratigraphic conditions of

[9] The implementation and assessment of geophysical investigations was done by Máté Stibrányi.

[10] The implementation and assessment of geoarchaeological survey was done by Ákos Pető.

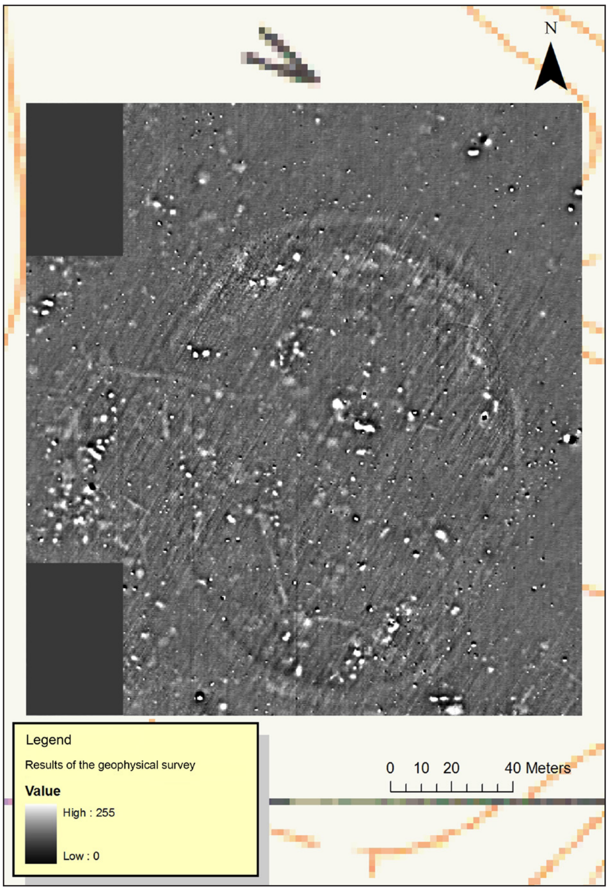

Fig. 8. Sarkad-Vár-tábla – results of the geophysical survey (made by Máté Stibrányi)

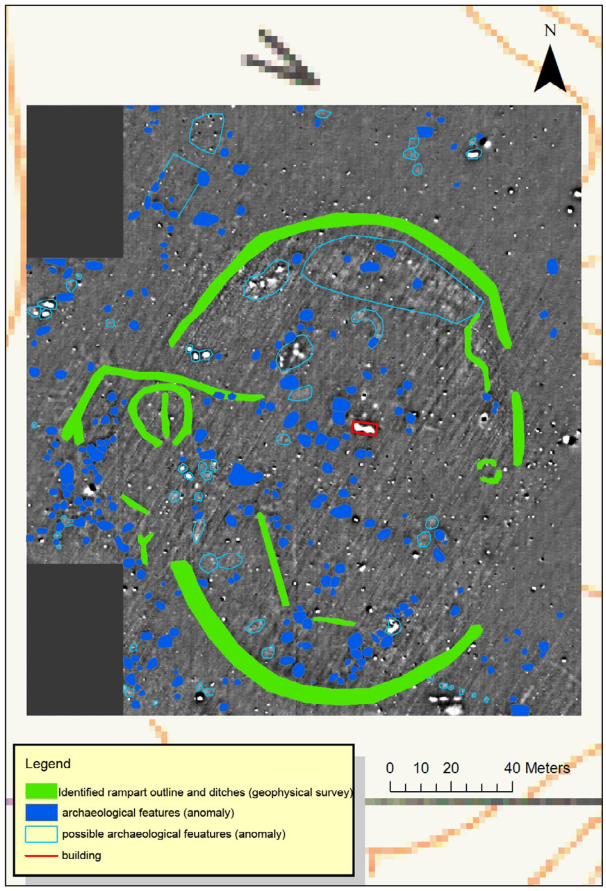

Fig. 9. Sarkad-Vár-tábla – evaluation of the geophysical survey results (made by Máté Stibrányi)

the Sarkad-Vár-tábla site. Based on the geomagnetic survey that covered the entire site, the following protocol was designed *(Fig. 10)*:

1) North–south shallow geological cross-section of the site (SVT-01 to 07);
2) Cross-section profile of the northern ditch of the site (SVT-10 to 14);
3) Cross-section profile of one of the central archaeological features of the site (SVT-04–SVT-08–SVT-09)

The three cross-sections consist of 14 pieces of individual gouge auger observations. An Eijkelkamp hand-operated auger equipped with piston sampler was used at specific points and to various depth. The soil profile observations were done until the characteristic parent material of the surface soil was reached. The following brief summary of the geoarchaeological survey can be given:

The site is covered by meadow soil developed under water surplus. In general, it can be characterised by an A–B–C horizon stratigraphy. A disturbed ploughed layer (A_p), whose relative depth is 25–30 cm, can be detected in the heavy textured[11] blackish brown (10YR 2/2) uppermost soil horizon.[12] The transition between the humic A-horizon and the B-horizon can be defined as diffuse, both in terms of both texture[13] and colour. The parent material of the modern soil cover is composed of a yellowish brown (2.4Y 5/6) sediment complex with features of water surplus effects (e.g., redox features, iron and manganese concreations like gley).

Traces of human-induced surfaces are represented in the soil profile by wattle-and-daub fragments, ceramic sherds, charcoal and ash patches. Based on the drawings of the shallow geological cross-sections made upon the north–south course series, the Late Bronze Age occupation surface and the debris layer of the once existed settlement can be approximately

[11] The uppermost A-horizon of the site is clay according to the Arany-type soil texture co-efficient of sample (K_A=50).

[12] Humus content at this same place (H) = 2.4%

[13] K_A = 52 (clay)

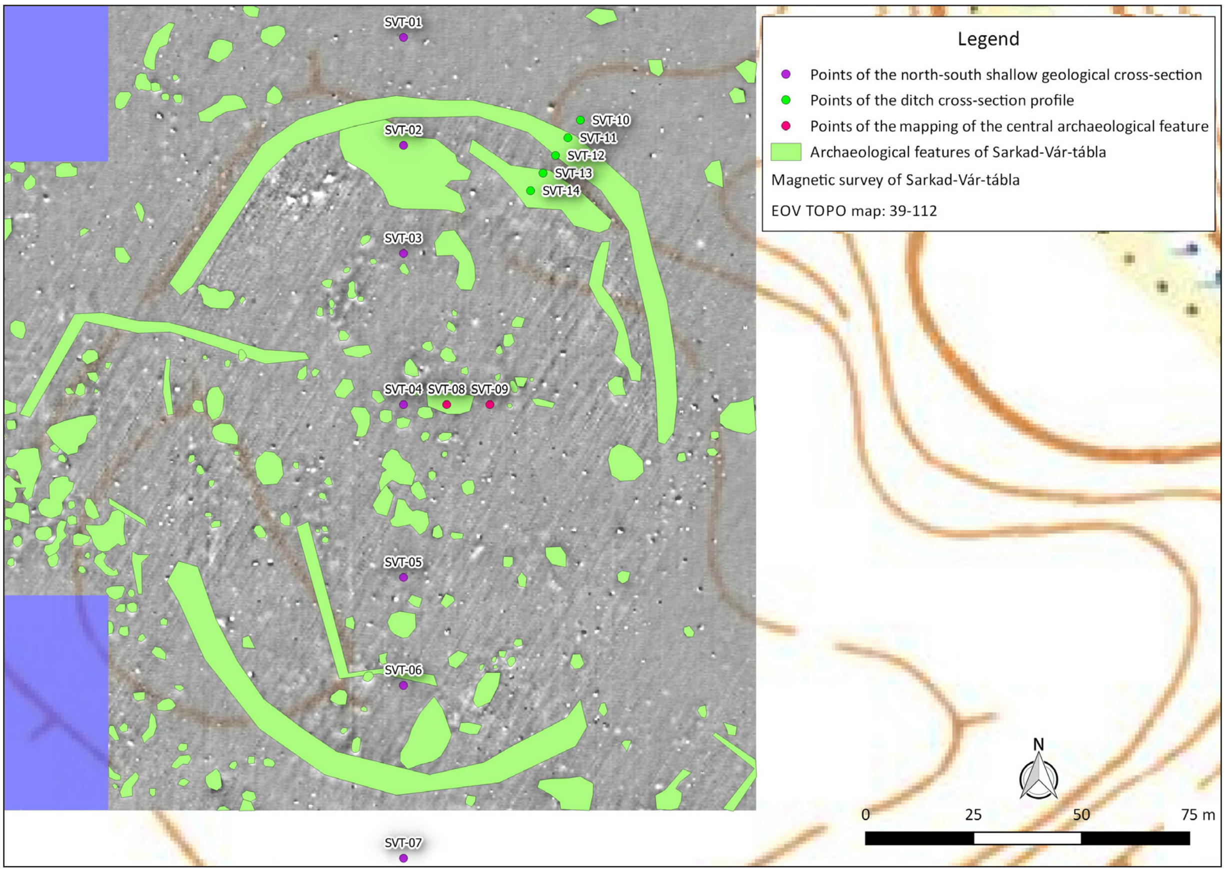

Fig. 10. Sarkad-Vár-tábla – points of the geoarchaeological mapping

associated with the depth of B-horizon of the modern soil. The so-called anthropogenic particles first appear at the relative depth of 40–80 cm.

Test excavation

We had planned to cut across the fortification at the most clearly definable southern part (Trench 2). We divided the test trench into three, 1×2 m large test sections. We managed to reveal the northernmost and southernmost edges in the two end sections (2/A and 2/E), and we found its deepest point in section 2/C *(Fig. 11)*. Under the disturbed, 40 cm thick topsoil we found four, clearly separate stratigraphic units (strata). They contained wattle-and-daub fragments and charcoal remains in different proportions. Besides Late Bronze and Iron Age ceramic sherds, pottery fragments from the 9–10th century AD were also recovered from most strata. We divided the cross section of the northern part to 20 cm thick units and took samples for archaeobotanical, pollen and radiocarbon analyses *(Fig. 12)*. We discovered a *ca.* 7 m wide, 2 m deep stratified ditch filled with a dense mixture of wattle-and-daub pieces, ceramic sherds and charcoal.

Results of radiocarbon dating[14]

Soil samples collected during the sectioning of the ditch and the geological corings consisted of great amounts of charred seed and wooden remains, which proved to be suitable for radiocarbon analyses *(Fig. 12)*. Based on the results, we assume that the settlement deriving from the Late Bronze Age was last inhabited in the Late Avar Age. The ditch was gradually filled during a period of *ca.* 150–200 years between the end of the 8th century AD and the second half of the 10th century AD *(Table 1)*.

CONCLUSION

The topographic location of Sarkad-Vár-tábla site and its environment was suitable for establishing a larger defended area. The north–south course plateau was surrounded by watercourse (former Fekete-Körös River) from each direction. The fortification had been established in that

[14] The implementation and assessment of radiocarbon (14C) dating was done by Mihály Molnár.

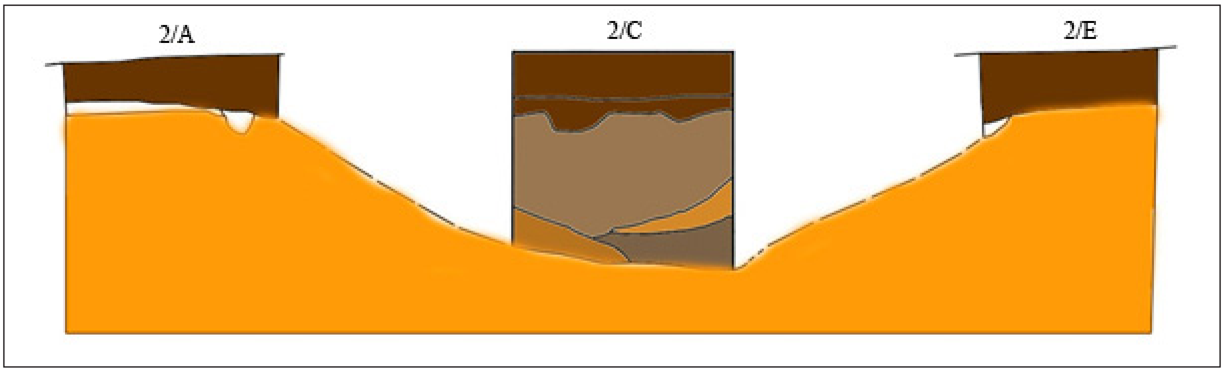

Fig. 11. Sarkad-Vár-tábla — cross-section of the ditch (Trench 2)

Lab. code	Context	Mate-rial	conv. 14C age (yr BP)	calibrated age range cal AD (1 sigma)
DeA-5650	Trench 2/C 0–20 cm	seed	1221±21	770–870
DeA-5651	Trench 2/C 20–40 cm	seed	1103±24	890–980
DeA-5652	Trench 2/C 60–80 cm	wood	1116±20	890–970
DeA-5653	Trench 2/C 100–120 cm	seed	100±20	1690–1730 and 1810–1920
DeA-5654	Trench 2/C 140–160 cm	wood	173±20	1670–1690 and 1730–1810 and 1930–1960

Table 1. Sarkad-Vár-tábla — results of the radiocarbon dating (0 cm is the deepest point in the Trench 2/C) Calibration according to Stuiver et al. 2009; Calib 6.1.1 (www.calib.org)

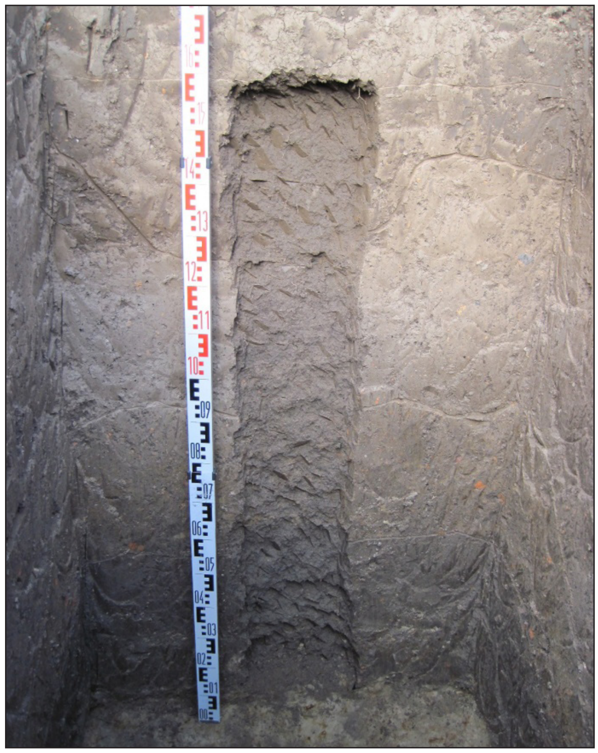

Fig. 12. Sarkad-Vár-tábla — the northern section of the ditch and the place of sampling (Trench 2/C)

slightly elevated, flood-free area probably in the Late Bronze Age. The oval-shaped fortified core itself is surrounded by a Late Bronze Age settlement that can be traced westward beyond the Fekete-éri Channel *(Fig. 7)*.

The Late Bronze Age origin of the fortified settlement is far from being unequivocal on the basis of the mixed artefacts recovered from the ditch, nonetheless it is well comparable with Late Bronze Age examples concerning the size and shape (e.g., Csanádpalota and Újkígyós: Priskin et al. 2013; Makó: Czukor et al. 2013; the internal ditch systems at Végegyháza: Lichtenstein–Rózsa 2007). The prevalence of Late Bronze Age settlement features based on the surface finds is obvious, however, further analysis is needed to arrive at a decisive conclusion.

Radiocarbon dating concluded that the ditch was last used and cleaned in the middle of the 8th century AD. Subsequently, it was half filled with humus rich soil mixed with ceramic sherds, animal bones, and charcoal and wattle-and-daub fragments, during a period of 150–200 years. The radiocarbon dating did not confirm the Late Bronze Age origin of the fortification that had been previously suggested by the surface survey and geophysical prospections. Although, the oval shape of the Sarkad fortification system was widespread among the fortified settlements of the Great Hungarian Plain in the Late Bronze Age (cp. Csanádpalota, Makó, Újkígyós, Végegyháza: Czukor et al. 2017, 2, Fig. 5). The 160 m diameter of the ditch outline does not contradict a Late Bronze Age origin, nor do the ditch's width (7 m) and depth (2 m). In case of the Újkígyós site, the diameter is 170 m (after Google Earth image), the ditch at Makó site is characterized by a diameter of 170 meters, a width of 3 meters and a depth of 1.8–2 meters (Czukor et al. 2017). In case of fortified settlements covering greater areas, the diameter of the internal ditch is 340 m (Csanádpalota) and 350 m (Végegyháza), however, the parameters are ranging between 3–7 m (width) and 1.5–2.1 m (depth) (Czukor et al. 2017), which resemble to those of Sarkad.

One cannot credibly exclude or verify the Late Bronze Age origin of the fortification at Sarkad. In order to refine dating results, we need to collect and analyse samples from the Late Bronze Age features inside the fortification.

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