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THE IRON-AGE-DANUBE DATABASE – HUNGARY'S EARLY IRON AGE RELICS IN REGIONAL COMPARISON

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The Iron-Age-Danube Database (Fig. 1) was created as a part of the project entitled "Monumentalized Early Iron Age Landscapes in the Danube River Basin" funded by the EU. Its goal is to provide an overview of the state of research, tourism utilization, protection and possible endangerment of Eastern Hallstatt culture sites in the territories of Austria, Croatia, Hungary and Slovenia according to a uniform system of considerations.

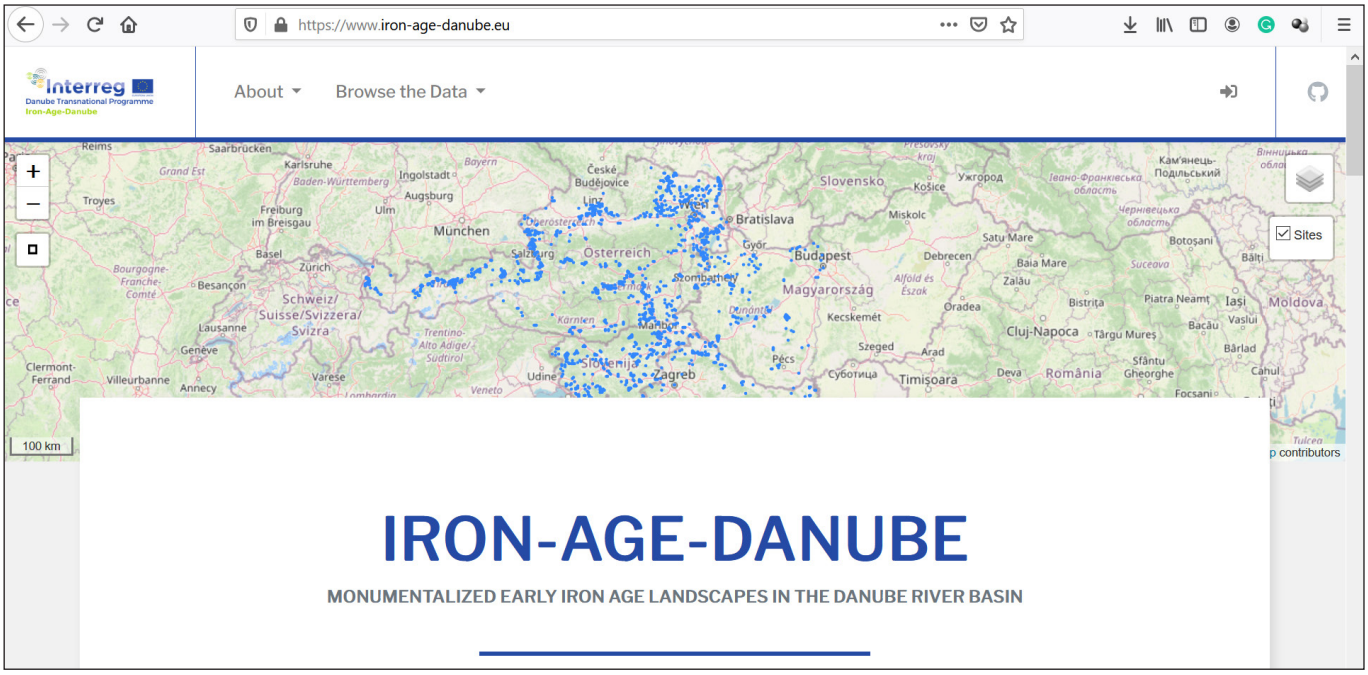

Fig. 1. The front page of the database

INTRODUCTION

It ensues directly from the focus of the Iron-Age-Danube project that the open access database does not completely cover the entirety of the four countries participating in the research project, only relating to those regions that belonged to the eastern sphere of the Hallstatt culture (*Fig. 2*). Therefore, it is only those Early Iron Age relics found in the inland area of Croatia, while in the case of Hungary only those found in the Transdanubian region that have been included in the database developed by the Austrian Academy

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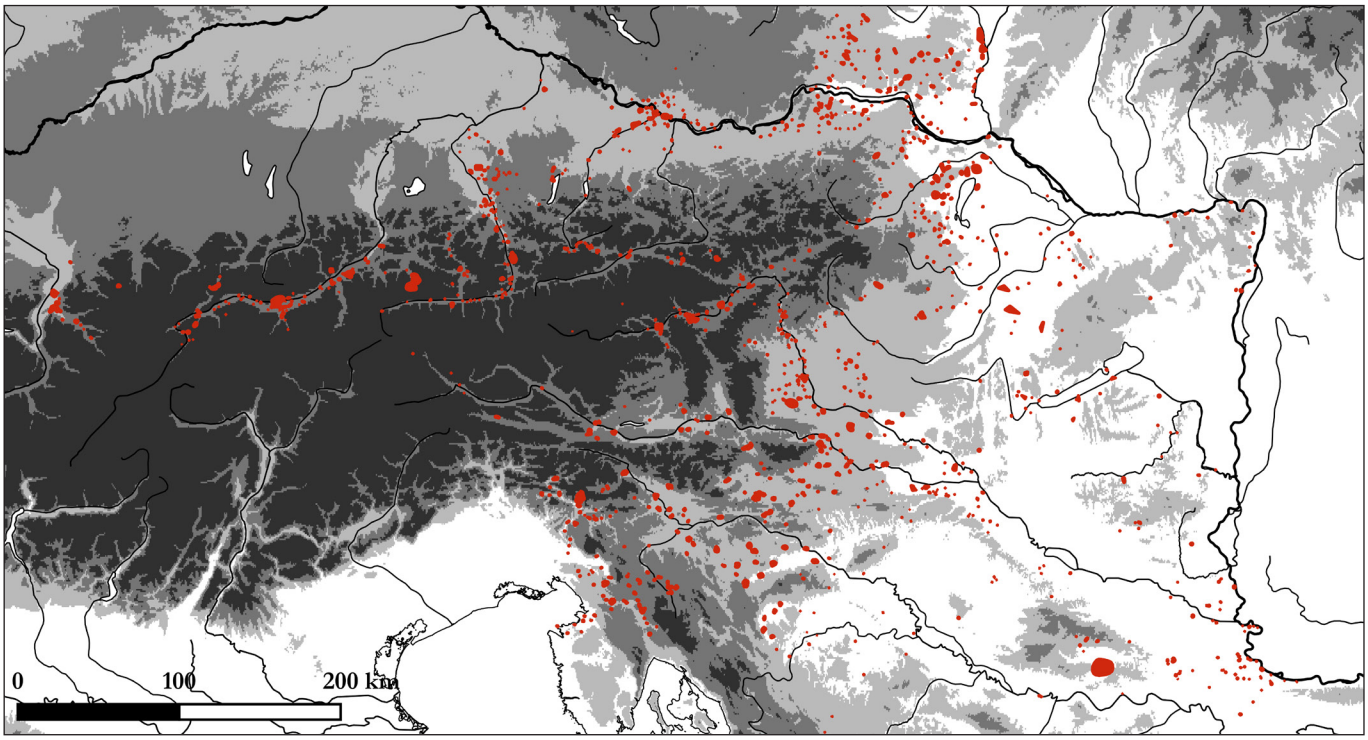

Fig. 2. The Iron-Age-Danube Database Early Iron Age sites with Hungarian data that has gone through a multilevel authentication process (map: B. Soós)

of Sciences Digital Human and Cultural Heritage Center.[5] This registry that organizes the data from 1,046 archaeological sites currently includes 632 Austrian, 165 Slovenian, 153 Croatian and 98 Hungarian entries (cf. Mele & Štuhec 2019). Naturally, the overall profile depends to a significant degree on the state of research, the availability of the data and the geographic conditions of the areas. It is worthwhile to note here in connection with the Hungarian entries that numerous sites were consciously left out of the database. This was in part to protect mounds that seem untouched from the attention and dubious discretion of looters and in part because it has not always been possible to confirm the chronological categorization of sites presumed to be from the Iron Age in the public scholarly debate.

In absolute dates, the earliest possible date for the beginning of the Iron Age accepted by the working group dealing with the database was 800 BC, with the note that this could even mean 750 BC, but certainly cannot be placed any later than 720 BC. This is in accordance with the chronological position of Hungary's Late Urnfield period finds (Ilon 2015, 248, 250, Taf. 22) and the traditional and radiocarbon dating of the earliest datable relics that can be connected to the Hallstatt culture (Patek 1993, Abb. 34; Ďurkovič 2015, Fig. 9:2). More significant regional differences appear at the end of the early period of the Iron Age. In the northwestern part of Transdanubia, the appearance of Late Iron Age finds with La Tène characteristics can be placed at around 450 BC (Jerem 1981, 108; 1996; Schwellnus 2011, 366; Szabó 2019, 18), while in the areas to the south of Lake Balaton, the late Hallstatt–La Tène change in material culture can only be shown a few generations later, starting from the 4th century BC (Jerem 1968, 194, Fig. 18; Jerem 1973, 84; Szabó 2012, 359–360; Gáti 2014, 115–124).

[5] Colleagues at the University of Vienna Institute of Prehistoric and Historical Archaeology, Martin Fera and Seta Štuhec coordinated the work within the Iron-Age-Danube project. The construction of the database took place within a system of working groups separated into sub-topics. The sub-topic related to chronology was led by Anja Hellmuth-Kramberger (Universalmuseum Joanneum Graz), and the Hungarians participating in this were Zoltán Czajlik (Eötvös Loránd University), Szabolcs Czifra (Hungarian National Museum), András Jáky (Eötvös Loránd University), Erzsébet Jerem (Archaeolingua) and Katalin Novinszki-Groma (Eötvös Loránd University). Seta Štuhec led the sub-topic related to data collection, and the Hungarian side was represented by Zoltán Czajlik, István Gergő Farkas (Archaeolingua), András Jáky és Bence Soós (Eötvös Loránd University /Hungarian National Museum). The heritage preservation sub-topic was led by Katalin Wollák (Archaeolingua), and the work on behalf of the Hungarians was performed by Szabolcs Czifra, Szilvia Fábián (Hungarian National Museum), Eszter Fejér and Katalin Novinszki-Groma.

THE STRUCTURE OF THE DATABASE AND THE CONCEPT OF ARCHAEOLOGICAL SITES

The Iron-Age-Danube Database can be accessed by the general public on the project homepage, and in the present essay we are providing information on its structure and background. The database is built upon the framework system of the Django open source code, and the data it manages is recorded in full-text, single, multivariate or expandable hierarchical dictionaries (*taxonomy*), the GPS data are portrayed on Open Street Map-based interactive maps, and the polygons are stored in the GeoJSON form. Citations from professional literature are managed by the Zotero external application. A point of interest is that the platform is also suited to responsive, mobile display. The database creates cross-links on the level of archaeological sites amongst the data sets organized according to the four main categories mentioned in the introduction (archaeological units, research activities, tourism utilization and historic preservation/nature conservation) (*Fig. 3*). The system's highest logical and conceptual unit is the *site*. The description of these contains data on the archaeological site that are important from the aspect of tourism (for example, visibility, accessibility, infrastructure, etc.) in addition to administrative and geographical information. The sites themselves may be comprised of one or more *archaeological entities*, whose description include their types (e.g. settlement, burial site, industrial site, etc.), period of use and geographical extent. It was possible to detail the sources of the knowledge and their certainty at the question of research activities, touching upon the goals and methodology used in each project. Data related to the level of *monument protection* is also included in the virtual data sheet for every site, which provides information on the status of cultural heritage protection and nature conservation, as well as presenting the possible sources of endangerment. In ideal cases, it was possible to define the geographical extent of individual categories (site, archaeological entity, research activity and protection), and it was possible to display this on the map.

From this rough introduction it can be sensed that the crucial element of the database is the site, and in particular its range of interpretations as well as its dimensions in time and space. Furthermore, since we prepared to draft site conservation recommendations based on the information organized in the database, it was of outstanding importance to verify the authenticity and durability of the data thoroughly. In Hungarian practice, the scientific definition and public discussion of the concept of an archaeological site came up in conjunction with the legislation of the heritage preservation guidelines enforcing the Malta Convention (Markó 2000; Mester 2001; Horváth & H. Simon 2002; Raczky 2006), and this matched the concept of *archaeological entity* in the database system. Therefore, the most important issue when uploading the sites in our compilation was how to define the site complexes (*sites* in the database) comprised of an organic unit of the period's characteristic fortified settlements and the related open settlements, tumuli and flat grave cemeteries, or in other words, what considerations would we use to make associations between sites in the Transdanubian region. In particular, the main consideration in the case of lesser-known sites that have not been investigated to a significant degree was the distance between sites and the topographical relationships. We supplemented these with data related to the chronological overlap of the sites. Furthermore, in certain cases we took into account the "traditions" in professional literature. For example, although the distance of approximately 3 km between the Alsópáhok–Hévízdomb settlement and the Hévíz–Egregy grave is less than that measured between Sághegy and the tumuli at Kismező (ca. 5 km), the former does not represent a site complex in the database, while the latter does. The reason for this is primarily due to the time difference between

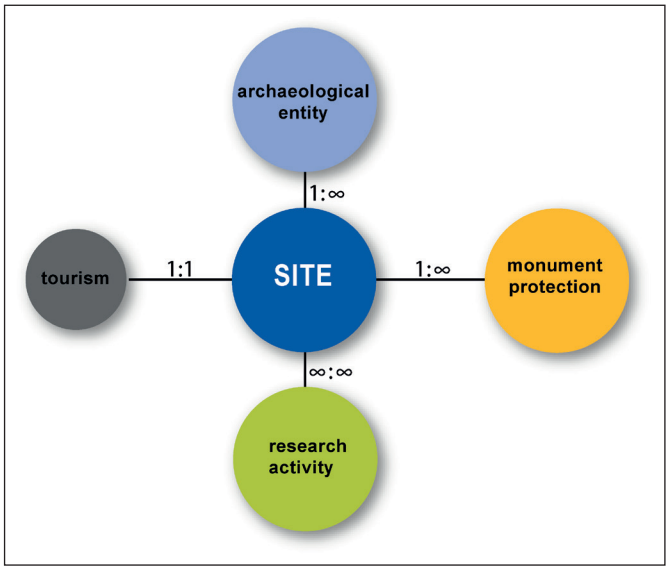

Fig. 3. Linking schemes in the database

them. Hévíz–Egregy can be dated to the Ha C1 period (Horváth 2014, 66, 72) based on the diagnostic funerary objects, while the Alsópáhok settlement can be linked to the Ha D2 period (Horváth 2015, 247). This means, according to our current information, there is a difference of approximately a century and a half between the two sites.

In many cases, the *site* overlaps with the category of *archaeological entity*, and in these cases, we used the boundaries registered at the authority for both of these as the geographical data in the database (128 cases). If we did not have this official data, then we used the georeferenced cartographic data of the publications to determine the boundaries, or we uploaded the administrative borders of modern towns as a last resort. In the case of site complexes comprising several individual units, we generated convex two-dimensional figures containing the individual polygons. Due to heritage preservation considerations, we only made the data on the extent and location of the sites public if they had already been published. The ownership information related to the territories of the sites is not included in the database, since that information is not freely accessible.

CADASTRAL SURVEY OF HALLSTATT CULTURE SITES IN HUNGARY

The cadastral survey of Early Iron Age sites in the Transdanubian region has been ongoing for 25 years at the Eötvös Loránd University, Faculty of Humanities, Institute of Archaeological Sciences, Geoinformatics Research Laboratory in connection with Act LIII of 1996 on nature conservation and the aerial photography topographical survey programs. This involves both tumulus cemeteries (Czajlik 2004) and as fortified settlements (Nováki et al. 2006). The first important step in this process was providing coordinates for the topographical data of the sites that could be collected from the professional literature. This was prepared partially based on EOTR 1:10000 topographic maps, but since that was not fully available at the end of the 1990s, maps with national or Gauss-Krüger coordinate system – sometimes including deliberately false information – or other topographical maps were also used. At that time, we did not yet have the financial or technical support for on-site verification. Due to the aerial photography programme that began in the 2000s, it was possible to gain more precise spatial data, primarily in open areas. In many cases our information on burial mounds was increased and previously unknown tumuli were identified (Winkler & Czajlik 2018). Researchers from Pécs also contributed to this work through their reports (Kővágótöttös, Bertók & Gáti 2014, 132; Nagyberki–Szalacska, Szabó 2016a, 168–169; Szabó 2016b, 338). In the last decade, the Google Earth system has become an important aid for us in both the planning of flights and in pinpointing the aerial photographs. Through this we were also able to make a part of our coordinate data more accurate. The sites located in areas covered with forest or scrubland vegetation can only be researched to a very limited extent based on aerial or satellite photographs. In general, aerial photography of hilltop settlements is only effective in wintery, snowy seasons. Due to this, terrain models that can be made based on aerial laser scanning (ALS) are of outstanding importance. These do not only facilitate archaeological cartography, but also can provide important information about the condition of ramparts and mounds as well as being suitable for other analyses (e.g. visibility). The following are the Transdanubian Hallstatt sites and tumulus burials that have published terrain models: Sopron–Várhely, tumulus cemetery, Czajlik et al. 2012; Bakonytamási–Hathalom, tumuli, Stibrányi 2012, 10; Kővágótöttös–Halomi-hegy, tumuli, Bertók & Gáti 2014, 133; Pécs–Jakabhegy, fortified settlement and tumulus cemetery, Gáti 2017; Tihany–Óvár alja, tumuli, Soós 2017a; Süttő–Nagysánctető, Nagysánc, Kissánc and Sáncföldek, hilltop settlements and the northern groups of tumuli, Czajlik et al. 2019b; Érd/Százhalombatta, Early Iron Age settlement and tumulus cemetery, Czajlik et al. 2019a.

Despite applying modern methods, a significant portion of the spatial data for Transdanubian sites that can be connected to the Hallstatt culture are based on traditional topographical research or excavations. Due to this and taking into account the aforementioned antecedents, we compiled a preliminary list of sites that were included in the official registers of historic monuments and archaeological sites and in the Hungarian National Museum's Arcaheological Database developed in connection with the ARIADNE project that

were indicated as being from the Iron Age in preparation for uploading the Hungarian Early Iron Age sites to the database.

Although in our digitized world, the automated data migration from the aforementioned databases and central official records (IVO) would seem to be an easy solution, the evaluation of the list of hits from a quick search was sobering. It was clear that the majority of the sites listed were to the east of the Danube. One of the possible sources for this error was the fact that this system, which was carefully planned and created through many years of strenuous work, were listing based on old data and chronological classifications. It was characteristic of these sites that the archaeological activities that served as the basis of the uploadeddata (primarily field walks, site inspections, and, to a lesser extent, excavations) took place in the '50s and '60s. In certain cases, the evaluation of surface finds collected during topographical work in the '70s and '80s also expanded this group. At that time, the Early Iron Age was associated with the Ha A/B periods, in contrast to the current Central European system that connects this period with the Late Bronze Age. The majority of mistakenly recorded sites based on imprecise data are found in Borsod-Abaúj-Zemplén and Pest counties, but sites listed with the wrong cultural designation can also be found scattered in the territories of Szabolcs-Szatmár-Bereg, Békés, Csongrád-Csanád and Hajdú-Bihar counties.

Due to the errors detailed here, the list had to be narrowed down, first to those Transdanubian sites that can be dated to the Early Iron Age according to the information in the registries or that can be linked to the Hallstatt culture. For the next step, we classified the individual sites according to a three-scale division depending the extent to which the site's chronological determination is supported by reliable data. The first category included sites where their location and find materials are known from scholarly publications. Later, mostly only the professional literature dealing with these individual sites in greater detail were recorded in the database. The second group included sites for which we were able to find related data in the professional literature, but the site location, character, find materials or precise dating were not fully provided. The third group was made up of sites that could be identified primarily by unpublished data from field walks. It was mainly sites from the first two groups that were then placed in the database. Our hypercritical approach was widely justified by the reports of our colleagues that were brought in to review the find materials in the museums,[6] which in many cases made the data in the registry more precise. Although the review primarily extended to the cultural classification of the sites, the refreshed records of the county/municipal museums provided important information related to the extent of the sites and their level of development and endangerment, as well as clarifying and correcting the dating in the case of several sites (often finds described as Early Iron Age proved to be Late Bronze Age). The review brought several problems to our attention, which included: find materials obtained as fragments from field walks are often difficult to date, and can be easily mixed up without a specialized knowledge of the period; there is only scanty data related to the extent and precise type of the sites; and the official central registries for archaeological sites and historic properties had not been continuously updated and maintained up until recent times.

THE ISSUE OF THE STATE OF RESEARCH

The result of this very careful collection of Hungarian recorded data was that in the Transdanubian region, which encompasses 36,612 km^2, there were only 2.67 sites per 1,000 km^2. This contrasts with significantly higher values in Slovenia (8.14) and Austria (7.53). However, when the more thoroughly researched counties are examined, the difference is not as great. There are 29 sites from Győr-Moson-Sopron County, which considering its area of 4,208 km^2 comes to 6.89 sites per 1,000 km^2. Further details in the distribution of Hallstatt period sites can be seen on a micro-regional level. The density of site concentration is noticeable in the general vicinity of Lake Fertő, which has been researched since the 19th century, as well as along the route of the M1 motorway and its linking roads (Molnár 2013, Abb. 1; Ďurkovič 2016, Fig. 5) (*Fig. 4*). Just as noticeable is the hiatus in the areas of Zala and Somogy counties bordering the Slovenian and Croa-

[6] Bálint Havasi, Csilla Száraz (Zala County), Gábor Ilon (Vas and Veszprém counties), Attila Mrenka, Ferenc Ujvári (Győr-Moson-Sopron County), Gábor Szilas, and Farkas Márton Tóth (Budapest).

tian sections of the Drava and Mura rivers. Since the terrain of Transdanubia provides significantly better conditions for Iron Age settlement when compared with Austria and Slovenia, it is conceivable that the significant regional differences can be chalked up to a lower level of research. At the same time, it is worth noting that not a single Early Iron Age site was found along the route of the M7 and M70 motorways in Zala County. Taking the indicator of Győr-Moson-Sopron County as a basis, there may have been nearly 700 Hallstatt period sites in Transdanubia, although this cannot at all be considered to be archaeologically verified. This number instantly sheds light on how the human resources necessary to create the monumental architectural remains characteristic of the period were mobilized (Soós 2017b).

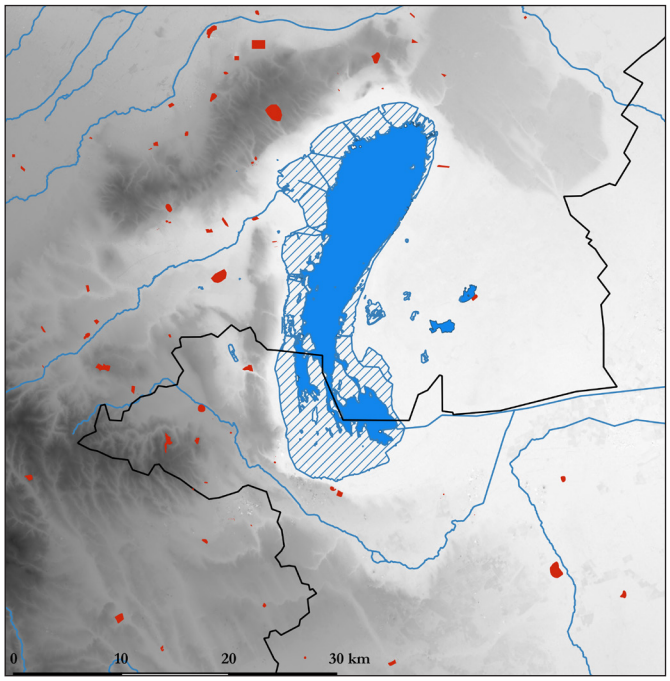

Fig. 4. Early Iron Age sites in the Lake Fertő region (basic data: database; cartographic visualization: B. Soós)

The interdisciplinary investigation of the Iron Age centres at Süttő and Százhalombatta drew attention to the fact that modern site diagnostic procedures increase the body of knowledge available about sites to levels never seen before. This is how we could learn about the possible traces of further fortifications outside the central fortified settlements, the possible details of the former road network, and ditches surrounding known tumuli as well as new traces of tumuli (Czajlik et al. 2019a, 2019b). The handbook written as a part of the project provides a detailed overview of the research possibilities for the monumental Iron Age remains (Czajlik et al., 2019c). The methods presented in this can in essence be divided into two main categories: invasive and non-invasive investigations. In regional comparison, the popularity of archaeological excavations cannot be questioned for the time being, since there have been excavations of varying extent on nearly 70% of the Iron Age sites in the four countries. In contrast with this, less than 10% of the sites have been researched using methods of remote sensing. Although the spread of geophysical researches is undeniable, the percentage ratio of its use shows similar indicators to remote sensing examinations. In contrast, field walks can be considered a decidedly favoured method, since except for Slovenia, which shows an indicator of less than 25% for this, more than 40% of the Iron Age sites have been investigated in this manner.

SITE PRESERVATION AND UTILIZATION FOR TOURISM

We gathered information related to access to the sites, their visibility and the infrastructure and tourism characteristics in their vicinity from various cartographic and other sources, while we entered data related to the character of the area and factors endangering the sites into the database based on satellite images. Perhaps the value of the source materials collected in this manner cannot be fully appreciated presently, but it cannot be stated that it has not had a practical use. An association was already registered this summer that accepted the task of fostering the Iron Age cultural thematic route program.[7] When surveying the current and possible future sites for the route, the listed characteristics were taken into account. Naturally, the accessibility and visibility of the sites, as well as the character of the wider environs, was given central consideration during the elaboration of the revitalization plans for the Hungarian sites (Sopron and Süttő).[8] The most plentiful offerings for visitors at any of the four countries' Iron Age sites has been created

[7] More information on this initiative can be found at the Iron Age Danube Route home page.

[8] The tangible result of the plans are the renovated Sopron Archaeological Education Trail and the tourist information signs set up at Süttő (Fejér & Novinszki-Groma 2020).

around the Százhalombatta site complex. The Open-Air Museum and Archaeological Park was created on a part of the 2,700-year-old tumulus cemetery in front of the earthen fortifications. The everyday life of the period is displayed in the authentic building interiors of the reconstructed Iron Age village section, while one of the large tumuli erected for the deceased members of the ruling class can be visited from the inside through a combination of in-situ conservation and modern architectural solutions (Poroszlai, 1999; Morgós et al., 2006). The existence of this museum, which has been operated continuously since 1996, will undergo a dramatic transformation if the drastic changes heralded recently are actually implemented by its financial supporter.

Fig. 5. Százhalombatta (Pest County), Matrica Museum, Archaeological Park. Trunk of the Early Iron Age tumulus (second half of the 7th century, beginning of the 6th century b.c.e.) (aerial photograph by Z. Czajlik, 22 January 2018)

We judged the sites to be fully protected from the aspects of heritage preservation and nature conservation if every element of the site complex (*site*) were under heritage preservation or nature conservation protection based on the geographical data in the official registry, or if the entire area of the site was within a Natura 2000 zone. If only partial coverage could be determined, we indicated partial protection in the database (*Fig. 5*). Of the Danube Basin countries examined, about 20% of the Iron Age sites in Austria and Slovenia have some kind of protection. In contrast, this is only true for less than 10% of the sites in Hungary and Croatia. Theoretically, archaeological sites enjoy state protection independent of their level of recognition. However, in everyday practice this is only true for those that are listed on the official central archaeological and historic property register overseen by the Office of the Prime Minister (Wollák 2007, 75–76; 2009, 56).

CLOSING REMARKS

Although archaeological research always strives to eliminate differences caused by the prevailing political-administrative borders, the Iron-Age-Danube project revealed both the necessity and difficulties related to coordinating cadastral surveys, topographical research and registering data on a regional level. In their current forms, these collections of archaeological sites often mirror the technical options available in the given country and the archaeological understanding related to dating and cultural categorization at the time that the information was obtained. Due to this, the thorough planning of the database created in the program, the synchronization of the individual sub-systems to the greatest extent possible and the careful collection of data was important.

The uploading of data on the Eastern Hallstatt culture sites in the Transdanubian region with a critical approach was accompanied by a serious lesson from the aspect of scientific research, which is that there is still a great need for registry data alongside the employment of the most modern topographical surveying methods. This is true even though we detected numerous problems connected to the chronological classifications and the determination of archaeological cultures that we were primarily examining. These errors can be corrected in both the official public records and in the Archaeological Database of the Hungarian National Museum. At the same time, in many cases even despite this, the information on archaeological sites handed down to us for the most part from before 1990 is still the best starting point in terms of location. An important result of the uploading of data checked by specialists was that while not as much Hungarian data was recorded as previously expected, this data was more reliable.

At the same time, it should be noted that in contrast to the registration systems, it is not yet possible to update or provide maintenance for the Iron-Age-Danube project database. However, this naturally does not affect the utility of the system for scholarship, tourism or revitalization projects.

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Bibliography

Bertók, G. & Gáti, Cs. (2014). *Old Times – New Methods*. Budapest: Archaeolingua.

Czajlik, Z. (2004). Régészeti-természetvédelmi örökségünk: A magyarországi földépítmények – pusztuló halomsírmezők [Our archaeological-natural heritage. The Hungarian earthen constructions – decaying fields of burial mounds]. *Magyar Múzeumok* 2004 (4), 28–30.

Czajlik, Z., Király, G., Czövek, A. Holl, B. & Brolly, G. (2012). The Application of Remote Sensing Technology and Geophysical Methods in the Topographic Survey of Early Iron Age Burial Tumuli in Transdanubia. In S. Berecki (ed.), *Iron Age Rites and Rituals in the Carpathian Basin. Proceedings of the International Colloquium from Târgu Mureş, October 2011* (pp. 65–76). Bibliotheca Musei Marisiensis seria archaeologica 7. Cluj: Mega.

Czajlik, Z., Fejér, E., Novinszki-Groma, K., Jáky, A., Rupnik, L., Bödőcs, A., Csippán, P., Gergácz, R., Holl, B., Király, G., T. Németh, G., Puszta, S. & Soós, B. (2019a). Before and After: Investigations of Prehistoric Land Use in Relation to the Early Iron Age Settlement and Tumulus Necropolis on the Érd/Százhalombatta-Plateau. In M. Črešnar & M. Mele (eds.), *Early Iron Age Landscapes of the Danube Region* (pp. 161–184). Graz–Budapest: Archaeolingua.

Czajlik, Z., Fejér, E., Novinszki-Groma, K., Jáky, A., Rupnik, L., Sörös, F. Zs., Bödőcs, A., Csippán, P., Gergácz, R., Györkös, D., Holl, B., Király, G., Kürthy, D., Maróti, B., Merczi, M., Mervel, M., Nagy, B., Puszta, S., B. Szöllősi, Sz., Vass, B.& Czifra, Sz. (2019b). Traces of Prehistoric Land Use on the Süttő Plateau. In M. Črešnar & M. Mele (eds.), *Early Iron Age Landscapes of the Danube Region (*pp. 185–219). Graz–Budapest: Archaeolingua.

Czajlik, Z., Črešnar, M., Doneus, M., Fera, M., Hellmuth Kramberger, A. & Mele, M. (2019c). *Researching Archaeological Landscapes across Borders. Strategies, Methods and Decisions for the 21st Century*. Graz–Budapest: Archaeolingua.

Ďurkovič, É. (2015). Structure of the Early Iron Age Settlement Excavated at Győr–Ménfőcsanak. In L. Borhy, K. Tankó & K. Dévai (eds.), *Studia archaeologica Nicolae Szabó LXXV annos nato dedicata* (pp. 113–148). Budapest: L'Harmattan.

Ďurkovič, É. (2016). The settlement structure of the North-Western part of the Carpathian Basin during the middle and late Early IronAge. The Early Iron Age settlement at Győr–Ménfőcsanak (Hungary, Győr-Moson-Sopron county). *Dissertationes Archaeologicae* 3 (4), 417–425. https://doi.org/10.17204/dissarch.2015.417

Fejér, E. & Novinszki-Groma, K. (2020). Revitalization of the Early Iron Age archaeological site of Süttő: Developing an archaeological-cultural educational trail . *Hungarian Archaeology* 9 (1), 77–83.

Gáti, Cs. (2014). On the Crossroads of Cultures. Cultural and Trade Connections of the Site of Szajk in South Transdanubia in the Sixth-Fourth Centuries BC. In S. Berecki (ed.), *Iron Age Crafts and Craftsmen in the Carpathian Basin. Proceedings of the International Colloquium from Targu Mureş 10–13 October 2013* (pp. 115–138). Bibliotheca Musei Marisiensis seria archaeologica 7. Târgu Mureş: Mega.

Gáti, Cs. (2017). The potential of Airborne Laser Scanning (ALS) in archaeological investigations at Jakab-hegy, Pécs, Southern Hungary. *Hungarian Archaeology* 6 (3), 11–20.

Horváth, L. (2014). Early Iron Age graves from Keszthely and its environs (Data publication). In O. Heinrich-Tamáska & P. Straub (Hrsg.): *Mensch, Siedlung und Landschaft im Wechsel der Jahrtausende am Balaton* (pp. 63–97). Castellum Pannonicum Pelsonense 4. Budapest–Leipzig–Keszthely: Leidorf.

Horváth, L. (2015). Középső vaskori öntőformák Alsópáhokról (Middle Iron Age moulds from Alsópáhok). *Archaeologiai Értesítő* 140, 229–255.

Horváth, L. A. & H. Simon, K. (2002). Hozzászólás a régészeti lelőhely fogalmához [Terms and concepts. On the concept of archaeological site]. *Ősrégészeti Levelek* 4, 111–113.

Ilon, G. (2015). Zeitstellung der Urnenfelderkultur (1350/1300–750/700 BC) in West-Transdanubien. Ein Versuch mittels Typochronologie und Radiokarbondaten. In E. R. Németh & B. Rezi (eds.), *Bronze Age Chronology in the Carpathian Basin. Proceedings of the International Colloquium from Târgu Mureş 2–4 October 2014* (pp. 223–296). Bibliotheca Musei Marisiensis seria archaeologica 8. Târgu Mureş: Mega.

Jerem, E. (1968). The Late Iron Age cemetery of Szentlőrinc. *Acta Archaeologica Academiae Scientiarium Hungaricae* 20, 159–208.

Jerem, E. (1973). Zur Geschichte der späten Eisenzeit in Transdanubien. Späteisenzeitliche Grabfunde von Beremend. *Acta Archaeologica Academiae Scientiarium Hungaricae* 25, 65–86.

Jerem, E. (1981). Zur Späthallstatt- und Frühlatènezeit in Transdanubien. In C. Eibner & A. Eibner (Hrsg.), *Die Hallstattkultur. Bericht über das Symposium in Steyr 1980* (pp. 105–136). Linz: Kommission beim Oö. Landesverlag.

Jerem, E. (1996). Zur Ethnogenese der Ostkelten – Späthallstatt- und Frühlatènezeitliche Gräberfelder zwischen Traisental und Donauknie, In E. Jerem, A. Krenn-Leeb, A. Neugebauer & O. H. Urban (Hrsg.), *Die Kelten in den Alpen und an der Donau. Akten des Internationalen Symposium St. Pölten, 14–18. okt. 1992* (pp. 91–110). Studien zur Eisenzeit im Ostalpenraum 1. Budapest–Wien: Archaeolingua.

Markó, A. (2000). Gondolatok az „őskori régészeti lelőhely" fogalmáról [The concept of "Paleolithic archaeological site"]. *Ősrégészeti Levelek* 2, 76–78.

Mele, M. & Štuhec, S. (2019). Evaluation of data in the Iron-Age-Danube database. Supporting document for the development of the Iron Age landscapes strategies in the Danube region (Output 3.2). https://doi.org/10.5281/zenodo.3601142

Mester, Zs. (2001). Fogalom-alkotás. Mi is az az „őskori régészeti lelőhely" (ha egyáltalán van olyan)? [Terms and concepts. What is a 'Paleolithic archaeological site' (if exists at all)?]. *Ősrégészeti Levelek* 3, 64–66.

Molnár, A. (2013). Neuere Ausgrabungen hallstattzeitlicher Siedlungen in der Umgebung von Győr (Nové výskumi halštatských sídlisk v okolí Győru). *Zbornik Slovenskeho Narodneho Muzea – Archeologia* 23, 185–198.

Morgós, A., Holport, Á., Lukács, K., Gelesz, A. & Poroszlai I. (2006). On-site conservation/reconstruction of an Iron Age tumulus with timber grave chamber, Százhalombatta, Hungary. *Conservation and Management of Archaeological Sites* 7 (3), 139–162.

Nováki, Gy., Czajlik, Z. & Holl, B. (2006). Kataster der prähistorischen Erdburgen Ungarns – Versuch einer umfassenden Datenerfassung zum Schutz des kulturellen, archäologischen und naturräumlichen Erbes. In A. Krenn-Leeb (Hrsg.), *Wirtschaft, Macht und Strategie. Höhensiedlungen und ihre Funktionen in der Ur- und Frühgeschichte* (pp. 125–139). Archäologie Österreichs Spezial 1. Wien: Österreichische Gesellschaft für Ur- und Frühgeschichte.

Patek, E. (1993). *Westungarn in der Hallstattzeit*. Quellen und Forschungen zur prähistorischen und provinzialrömischen Archäologie 7. Acta Humaniora. Weinheim: VCH.

Poroszlai, I. (1999). Archaeological Park in Százhalombatta. In E. Jerem & I. Poroszlai (eds.), *Archaeology of the Bronze and Iron Age. Experimental Archaeology, Environmental Archaeology, Archaeological Parks. Proceedings of the International Archaeological Conference Százhalombatta, 3-7 October 1996* (pp. 377–385). Budapest: Archaeolingua.

Raczky, P. (2006). A régészeti lelőhely fogalmának tudományfilozófiai alapon történő axiomatikus meghatározása [Axiomatic definition of the concept of archaeological site on a philosophical basis]. *Archaeologiai Értesítő* 131, 246–247.

Schwellnus, F. (2011). Die Siedlung von Sopron-Krautacker (Westungarn) in der späten Hallstatt- und frühen Latènezeit. *Archäologisches Korrespondenzblatt* 41 (3), 359–373.

Soós, B. (2017a). Early Iron Age burials from Tihany, Hungary. *Dissertationes Archaeologicae* 3 (5), 113–206. https://doi.org/10.17204/dissarch.2017.113

Soós, B. (2017b). Labour Investment and the Elite in the Eastern Hallstatt Zone. *Hungarian Archaeology* 7 (3), 1–10.

Stibrányi, M. (2012). Lelőhely-azonosítási módszerek. [Methods of site identification]. In Stibrányi M., Mesterházy G. & Padányi-Gulyás G. (ed.), *Régészeti feltárás előtt – vagy helyett* (pp. 10–15). Budapest: Magyar Nemzeti Múzeum Nemzeti Örökségvédelmi Központ.

Szabó, M. (2019). Les Celtes orientaux. In M. Szabó, L. Borhy, Th. Olajos, N.-Y. Tonnerre & I. Zimonyi, *La bassin des Carpates avant l'arrivée des Hongrois. Celtes, Romains, peuples barbares du haut Moyen Âge dans le bassin du Danube 400 av. J.-C. – 895 apr. J.-C* (pp. 17-146). Rennes: Presses Universitaires Rennes.

Szabó, M. (2012). Celtes et Pannons dans le sud-est de la Transdanubie. *Acta Archaeologica Academiae Scientiarium Hungaricae* 63, 351–366.

Szabó, M. (2016a). *Archaeology from Above. Episodes from the History of the Aerial Archaeological Archive of Pécs*. Budapest: Archaeolingua.

Szabó, M. (2016b). Légirégészeti kutatások Magyarországon 2011-ben (Rövid beszámoló a PTE – Pécsi Légirégészeti Tékában folyó munkáról) – Aerial archaeological research in Hungary in 2011 (Brief report on the work of Pécs University – Pécs Aerial Archaeological Archives. *Régészeti kutatások Magyarországon – Archaeological Investigations in Hungary 2011–2014* (2016), 323–338.

Winkler, M. & Czajlik, Z. (2018). Die Untersuchung von hallstattzeitlichen Hügelgräbern aufgrund Luftbilder. Neue Angaben von Nordwestungarn. In L. Benediková & M. Horňák (eds.), *Zborník štúdií o dobe bronzovej a dobe halštatskej k 75. narodeninám Ladislava Veliačika* (pp. 323–336). Nitra: Vrútky.

Wollák, K. (2007). The Protection of Cultural Heritage by Legislative Methods in Hungary. In E. Jerem, Zs. Mester. & R. Benczés (eds.), *Archaeological and Cultural Heritage Preservation Within the Light of New Technologies* (pp. 73–82). Budapest: Archaeolingua.

Wollák, K. (2009). Listing – precondition of protection? In P. A. C. Schut (ed.), *Listing Archaeological Sites, Protecting the Historical Landscape* (pp. 53–61). EAC Occasional Paper 3. Bruxelles: Archaeolingua.