Tertiary & Quaternary

STRATA

Online natural science journal of the Herman Ottó Museum
A miskolci Herman Ottó Múzeum természettudományi online folyóirata

All the creatures of this World...
Memorial volume for Katalin Simán (1955–2023)

A világ minden teremtménye...
Simán Katalin (1955–2023) emlékkötet

Miskolc

2025 [Volume 3]

All the creatures of this World...
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A világ minden teremtménye...
Simán Katalin (1955–2023) emlékkötet

Omnis mundi creatura
quasi liber et pictura
nobis est in speculum:
nostrae vitae, nostrae mortis,
nostri status, nostrae sortis
fidele signaculum

Alain de Lille

"All the creatures of this world
are like a book and a picture for us,
and a mirror; a faithful sign
of our life, of our death,
of our state, of our fate."

Translated by Alastair McEwen

„A világ minden teremtménye,
Mint egy könyv s egy kép az égre,
Tükör nekünk;
Életünknek és halálunknak,
Sorsunknak és állapotunknak
Hűséges jele."

Sík Sándor fordítása

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Katalin Simán and László Laki-Lukács on the excavation of the Borsod Hillfort. Photo by Mária Wolf, 1998.

Simán Katalin és Laki-Lukács László a borsodi földvár ásatásán. Fotó: Wolf Mária, 1998.

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In Memoriam Katalin Simán, PhD (1955–2023)

It is strange to think about how there are people who can peer into the past, several tens or hundreds of thousands of years, and are capable of deciphering the oldest secrets of our history from almost invisible signs and phenomena, and yet they still have no better control over time than the rest of us. The pulsating moments in the life of an archaeologist researching the Palaeolithic suddenly fall into several small pieces, testimonies to her existence: objects that she used, photos she appears on and the memories of her that keep stirring in our heads in a multitude of ways. These 'finds', correlations, conclusions, secrets and stories are all that we are left with, pieces of evidence which then we, as 'good archaeologists', can attempt to excavate and preserve as best as we can, in order to briefly immortalize the individual.

After a long illness endured with patience, the vibrant moments of Kati shattered into the proofs of her life on 3 December 2023. She was not only an outstanding archaeologist and museologist specializing in Palaeolithic research, but also a seasoned, expert translator and naturopath.

She graduated from the Faculty of Humanities of the Eötvös Loránd University in 1979 with a degree in English and Russian, then archaeology, specializing in the Palaeolithic. We may never know when and where in her childhood or youth was she ultimately mesmerized by chipped stones emerging from beneath the earth. However, her thesis on the finds connected to the extraction of lithic raw materials and study of the lithics processing workshop at Avas Hill in Miskolc, based mainly on her own excavation findings, may be a tell-tale sign. After university, she became an archaeologist at the Herman Ottó Museum, where she was able to prove part of an exceptional team of female archaeologists (Magdolna Hellebrandt, Judit Koós, Emese Lovász and, Mária Wolf) during the course of several archaeological field surveys and excavations up until 1985:

- 1978: Miskolc – Avas, Avas-tető; Miskolc – Avas, Felsőszentgyörgy; Rudabánya, trafóháztól DNy-ra (southwest from the transformer building);
- 1979: Alsóvadász – Várdomb, Miskolc – Avas, Alsószentgyörgy;
- 1980: Mezőzombor – Vasúti delta (Railway delta);
- 1981, 1982: Bódvarákó – Esztramos, Szentandrási-barlang (Szentandrási Cave);
- 1982: Sajószentpéter – Nagykorcsolás;
- 1983: Encs – Kelecsény;
- 1983, 1984, 1985(-86?): Korlát – Ravaszlyuk-tető and Hidasnémeti – Borház-dűlő.

After her years in Miskolc, she was transferred to the Archaeological Institute of the Hungarian Academy of Sciences as a scientific secretary. One of the highlights of her professional career was when she became the director of the Kubinyi Ferenc Museum in Szécsény, which managed the archaeological collections of the museums of Nógrád County. It was during her years in Szécsény that she returned to the county where her career began, as a participant in the excavation programme of Viola Dobosi at the site Megyaszó–Szelestető (1993, 1994). She regularly conducted systematic field surveys in several regions of Borsod-Abaúj-Zemplén County, including the Hernád Valley, which she carried out in collaboration with Mária Wolf. She developed and maintained excellent relations with the conservationists and cavers in the county.

After 1997, she worked as an independent researcher. During this period, she passed the certification exams for professional translation and naturopathy. In spite of her drifting away from archaeology, former co-workers, colleagues and members of the newer generations could always rely on her vast knowledge, expertise and help, both in formal and informal collaborations alike. Precisely executed fieldwork was always a special experience for her.

Kati Simán belonged to the generation of 'stone' archaeologists of the 1980s who were relatively small in number and showed a preference for the problem-sensitive approach of the English school of archaeology over the more rigid practices of the Prussian school. They were responsible for paving the way for the introduction of methodologies such as archaeometry in the field of Hungarian archaeology. The first success of this new archaeological direction was the organization of the 1st International Conference on Prehistoric Flint Mining and Lithic Raw Material Identification in the Carpathian Basin (Budapest, Sümeg, 20–22 May 1986).

For 28 years, she regularly published high-quality scientific results in domestic and international professional journals, in Hungarian, English and French. She also made technical translations of nearly 80 works.

She raised and represented several notions throughout her professional career which have disciplinary, transboundary importance and significance that continue to this day. Her works directly related to archaeometric research primarily focused on raw material use and origin investigations, the interpretation of absolute dating, the compilation of Hungarian paleoanthropological data, workshop and mine research, terminology and methodology. Her excellent insights and suggestions live on in the definition and categorization of the Palaeolithic Szeleta Culture as well as in the interpretation and reconstruction of the Palaeolithic settlement network in Hungary.

Her merits should not be forgotten. We cherish her work and memory and carry on her legacy with, among other things, this collection of studies.

Péter Szolyák – Katalin T. Biró

Dr. Simán Katalin (1955–2023) emlékére

Milyen különös belegondolni, hogy az, aki tízezer vagy százezer éveket képes visszatekinteni a múltunkba, és szinte láthatatlan jelekből, jelenségekből fejti meg történelmünk legrégebbi titkait, a valóságban nem uralja jobban az időt, mint bármely más halandó. A paleolitikumot kutató régész életének lüktető pillanatai egyszer csak az életét bizonyító kisebb darabokra esnek szét: tárgyakra, melyeket használt, fotókra, melyeken szerepel, emlékfoszlányokra, melyek elménkben ezerféleképpen keringenek tovább. „Leletek", összefüggések, következtetések, titkok, történetek... Mi, az itt maradók, „jó régész" módjára megpróbáljuk e bizonyítékdarabokat minél pontosabban feltárni és konzerválni, azaz legalább ideig-óráig halhatatlanná tenni a halandót.

Kati lüktető pillanatai, türelemmel viselt hosszú betegség után, 2023. december 3-án estek szét életének bizonyítékaira. Nemcsak kiváló régész–muzeológus, és azon belül őskőkorkutató volt, de tapasztalt szakfordító és természetgyógyász is.

Egyetemi diplomát az Eötvös Loránd Tudományegyetem Bölcsészettudományi Karán 1979-ben szerzett angol-orosz, majd régészet szakon, paleolitikum speciális képzéssel. Hogy ifjú- vagy akár gyermekkorának melyik pillanatában és hol igézték meg véglegesen a föld alól előkerülő pattintott kövek, talán már sosem tudhatjuk meg. Árulkodó nyom lehet viszont, hogy szakdolgozatát a miskolci Avas nyersanyagkitermelő és -feldolgozó műhelyének anyagából írta, jelentős részben saját ásatási eredményeire építve. Az egyetem után a miskolci Herman Ottó Múzeum régész munkatársa lett, ahol egy kiváló női régészcsapat (Hellebrandt Magdolna, Koós Judit, Lovász Emese, Wolf Mária) tagjaként 1985-ig számos régészeti terepbejáráson és ásatáson bizonyította rátermettségét:

- 1978: Miskolc – Avas, Avas-tető; Miskolc – Avas, Felsőszentgyörgy; Rudabánya, trafóháztól DNy-ra;
- 1979: Alsóvadász – Várdomb, Miskolc – Avas, Alsószentgyörgy;
- 1980: Mezőzombor – Vasúti delta;
- 1981, 1982: Bódvarákó – Esztramos, Szentandrási-barlang;
- 1982: Sajószentpéter – Nagykorcsolás;
- 1983: Encs – Kelecsény;
- 1983, 1984, 1985(-86?): Korlát – Ravaszlyuk-tető és Hidasnémeti – Borház-dűlő.

A miskolci évek végén áthelyezéssel a Magyar Tudományos Akadémia Régészeti Intézetébe került tudományos titkári pozícióba. Szakmai karrierjének egyik csúcspontja volt, amikor a Nógrád megyei múzeumok régészeti gyűjteményét gondozó szécsényi Kubinyi Ferenc Múzeum igazgatója lett. Már a szécsényi évek peregtek, amikor visszatérve a karrierjét indító megyébe, részt vett Dobosi Viola Megyaszó-szelestetői ásatási programjában (1993, 1994). Rendszeresen végzett szisztematikus terepbejárásokat is Borsod-Abaúj-Zemplén több régiójában, így például a Hernád-völgyben, Wolf Máriával közösen. Kitűnő kapcsolatokat épített ki és ápolt a megyei természetvédőkkel és barlangászokkal.

1997 után már független kutatóként dolgozott. Ebben az időben először szakfordítói, majd természetgyógyászati szakvizsgákat tett. Annak ellenére, hogy élete távolodni kezdett a régészettudománytól, a korábbi munkatársak, pályatársak és a feltörekvő új generációk tagjai továbbra is számíthattak rendkívüli tudására, szakértelmére, segítségére, formális és informális együttműködésekben egyaránt. A precízen kivitelezett terepmunka láthatóan mindig különleges élményt jelentett számára.

Simán Kati a „köves" régészeknek azon – nem túl nagy létszámú – generációjához tartozik, akik már az 1980-as években az angolszász iskola problémaérzékeny szemléletét részesítették előnyben a merevebb porosz iskola helyett. Ezzel a magyar régészetben ők nyitottak utat pl. az archeometriai kutatások számára. Az új régészeti irány első nagy sikere az 1986-ban Sümegen megrendezett nemzetközi konferencia (*1st International Conference on Prehistoric Flint Mining and Lithic Raw Material Identification in the Carpathian Basin: Budapest, Sümeg, 20–22 May, 1986*) lett.

Tudományos eredményeit 28 éven át rendszeresen és magas színvonalon tette közzé hazai és nemzetközi szakmai folyóiratokban egyaránt, magyar, angol és francia nyelven. Szakfordításainak száma közel 80 tételt számlál.

Szakmai életútján számos olyan gondolatot vetett fel és képviselt, aminek máig ható diszciplináris, határokon túlmutató súlya, jelentősége van. Az archeometriai kutatásokhoz közvetlenül kapcsolódó munkái elsősorban a nyersanyagfelhasználás és -eredet vizsgálatok, az abszolút kormeghatározás értelmezése, a magyarországi paleoantropológiai adatok összegyűjtése, műhely- és bányakutatások, terminológia és módszertan voltak. Kiváló meglátásai, felvetései élnek tovább pl. az őskőkori Szeleta kultúra meghatározásával, besorolásával vagy az őskőkori településhálózat értelmezésével, rekonstrukciójával kapcsolatban.

Érdemei elévülhetetlenek. Munkásságát, emlékét szeretettel őrizzük és visszük tovább, többek között e tanulmánykötet segítségével is.

Szolyák Péter – T. Biró Katalin

The Archaeological Assemblage from Szurdokpüspöki–Derzsi Hill and the Middle Palaeolithic Evidence from its Surroundings

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In the memory of Katalin Simán (1955–2023)

"A domino effect typically starts with one significant event, which then sets off a chain reaction of similar events. In other words, the first event creates a sequence of events, each of which is set off by the previous event in the sequence."
—The principle of the domino effect

Abstract: *Between 1985 and 1989, agricultural engineer László Tóth identified several Palaeolithic and later prehistoric sites near Szurdokpüspöki The finds were later analysed by the recently deceased Katalin Simán. Subsequent surveys by Simán and Tóth, and later by Mónika Gutay, yielded further material, though much of it remained unpublished. In July 2025, the authors re-examined these assemblages, clarified earlier confusions concerning the site's name and location, and integrated new field survey results. The lithics, technologically and typologically, are comparable to the side-scraper-rich Mousterian of the Bükk Mountains but also show evidence of the presence of independent Middle Palaeolithic industries in the Mátra region, mainly relying on local raw materials. Together with recent discoveries in the Gyöngyöspata Basin, these results significantly expand the known distribution of Middle Palaeolithic workshop sites in Northern Hungary.*

1. Introduction

László Tóth conducted surface collections in the area of Szurdokpüspöki between 1985 and 1989. During his surveys, he identified several important Palaeolithic sites, as well as many later prehistoric sites. The collected finds were handed over to the Kubinyi Ferenc Museum in Szécsény (now known as the Forgách–Lipthay Castle Museum). The material delivered by Tóth was catalogued in 1990 under the site name Szurdokpüspöki–Derzsi Hill by Sára Kató, then the museum's archaeologist. The recently deceased Katalin Simán analyzed the finds. She immediately recognized the significance of the Palaeolithic material from the site and briefly referred to it in her article presenting Palaeolithic finds from Nógrád County (Simán 1993). During joint field surveys in the Szurdokpüspöki area, Simán and Tóth discovered additional material at the Derzsi Hill site, but these finds were never processed or published. In July 2025, the authors had the opportunity to study the entire assemblage and, in the process, to partly clarify misunderstandings concerning the site's name and location. The authors also examined the finds collected by archaeologist-museologist Mónika Gutay (Dobó István Castle Museum, Eger) during her field surveys in 2005 around Szurdokpüspöki–Derzsi Hill (Raczky 2006b; Gutay 2007). Based on the Middle Palaeolithic finds contained in these assemblages, several lithic workshop sites of similar character likely occur in the area. The material, both technologically and typologically, is comparable to the side-scraper-rich Mousterian assemblages of the Bükk Mountains (Mester 1989; 1995; 2004; 2006; 2022; Mester–Moncel 2006; Mester–Patou-Mathis 2016; Mester *et al.* 2023). Furthermore, numerous Mousterian and Micoquian assemblages have been found during the authors' systematic field surveys over the past two years, especially in the Gyöngyöspata Basin. These sites rely mainly on local raw materials, suggesting the presence of Middle Palaeolithic industries independent of those operating in the Bükk Mountains, where a much more diverse raw material utilization was attested.

2. History of research of the environment

The presumed source of misunderstandings concerning the location of the Szurdokpüspöki–Derzsi Hill site lies in the inconsistencies found on among various maps depicting the area. On the nineteenth-century cadastral map of the Habsburg Empire (Sketch of the cadastral community of SZURDOK=PÜSPÖKI, National Archives of Hungary, S79 – No. 483/2.), the area appears as boundary section no. XXVIII under the name "Derzsi." However, this designation does not appear on either the Second Military Survey of the Habsburg Empire, Hungary (1819–1869), or the Third Military Survey of the Habsburg Empire (1869–1887, 1:75,000). On the EOV 1:10,000 scale map, the area is unnamed, but the southwestern end of the "Bánya allyi" (Bányaalja) boundary section of the nineteenth-century cadastral map is indicated as "Derzsi Hill." Based on his agro-topographic map, it is evident that the proper name of the boundary section corresponding to the site was known to Tóth. On this basis, Simán catalogued the assemblage collected by Tóth under the name "Derzsi". There is, however, no evidence that Tóth collected material on the present-day Derzsi Hill.

The Palaeolithic site has the identifier of 41770 at the National Office of Cultural Heritage (KÖH – Kulturális Örökségvédelmi Hivatal), where it is incorrectly recorded under the name "Drezsihegy." The given EOV geographical coordinate is 699867, 279956, which approximately corresponds to the centroid of the 12,124.593 m² (1.212 ha) polygon (699866.688, 279955.928). According to the site description, László Tóth collected artefacts in the area between 1985 and 1989.

In 2005, Mónika Gutay, during field surveys conducted in the Zagyva Valley for her thesis, visited the site (Raczky 2006b; Gutay 2007). According to her description, surface finds were collected from wild boar digging on a grass-covered area of a steep-sided plateau along the valley of the Diós Stream. The site is situated along the Diós Stream valley, at the highest point on the hill, at an elevation of about 290 m above sea level. The archaeological assemblage includes knapped stone tools, flakes, and worked raw material fragments. Along the field road that crosses the plateau, Bronze Age ceramics were collected, separated from the lithic material. In her thesis, Gutay did not provide the total number of finds but illustrated five artefacts: an inversely retouched blade (Table XXI, 5), the mesial fragment of a microblade (Table XXI, 3), a partially retouched flake (Table XXI, 7), a blade (Table XXI, 1), and a combined end-scraper–burin tool (Table XXI, 2). The area surveyed by Gutay is registered under the identifier 53460 at KÖH, with the designation "Szurdokpüspöki 18" The given EOV geographical coordinate is 699784, 279948, which approximately corresponds to the centroid of the 3,863.499 m² (0.386 ha) polygon.

The distance between the sites (or maybe rather findspots or artefact concentrations) identified by Tóth and Gutay is 82.5 m, with an elevation difference of 5–6 m. Theoretically, it is therefore possible that the finds collected by Gutay may have partly slid down from Tóth's "Derzsi" site. The immediate surroundings of the sites, together with the sites referred to later in the text, are shown in *Fig. 1*.

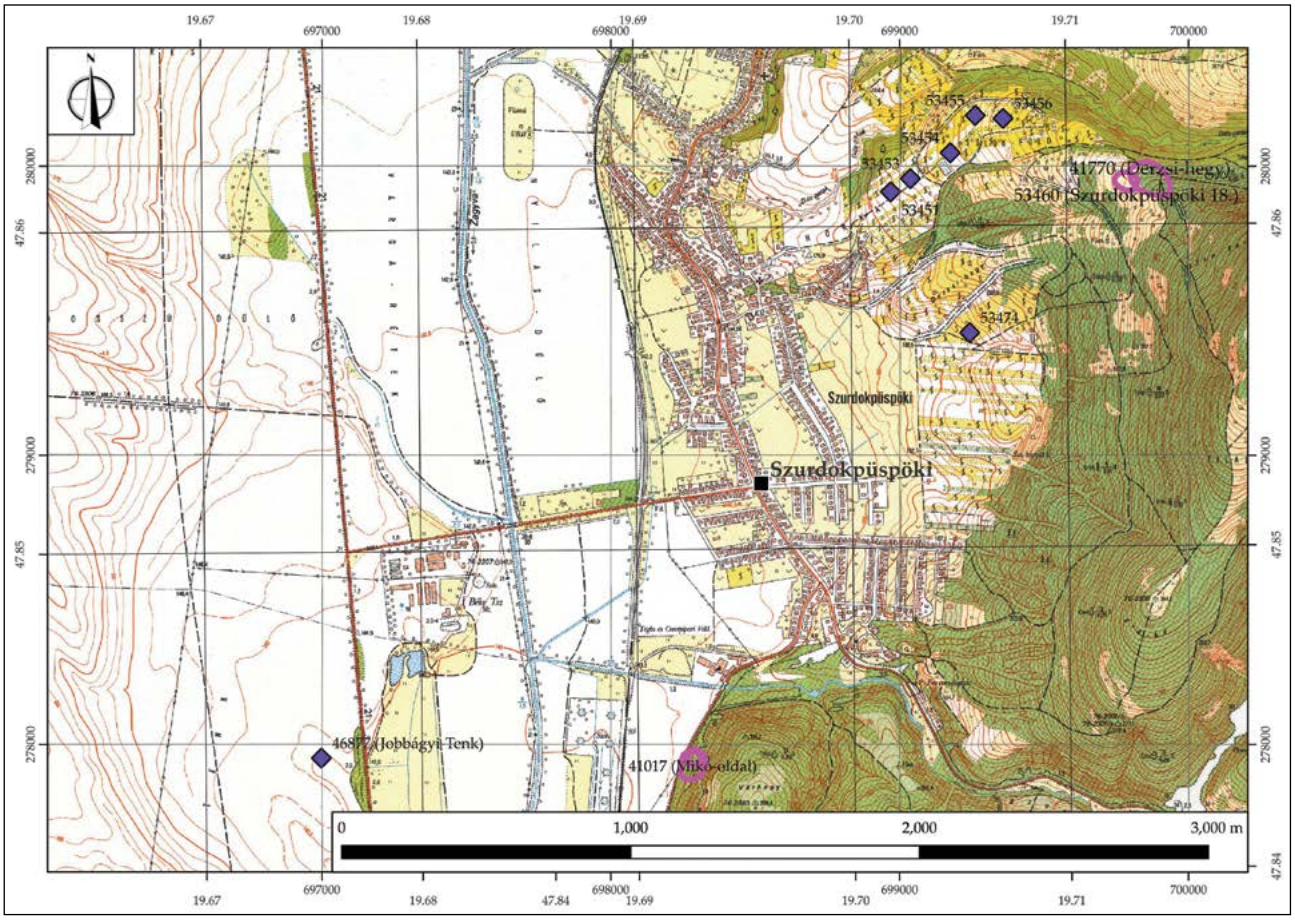

Fig. 1. *The immediate surroundings of the Szurdokpüspöki–Derzsi Hill site, with the findspots referred to in the text.*

A series of site-identification field surveys in the wider surroundings of the Szurdokpüspöki–Derzsi Hill site have been carried out by the present authors. During these field surveys, the assumed area of the site was visited two times, on June 20 and July 11, 2025. These visits established unambiguously that both Tóth's Derzsi site (KÖH 41770), situated in a wooded area, and Gutay's Szurdokpüspöki 18 site (KÖH 53460), located in an overgrown, weed-covered area, are currently no longer available for surface collection. Along the surrounding dirt roads, a total of nine undiagnostic archaeological finds were recovered: eight small flakes and one abandoned flake core. Most of the sites, reported on earlier by Gutay in the border areas known as "Horka" and "Tök-föld", are likewise uncollectable. Some of these were verified by the authors through a few stray finds discovered on the dirt roads adjacent to the sites. Surprisingly, no raw material occurrences were observed along the dirt roads that would justify the existence of nearby lithic workshops. Therefore, it is highly likely that at least part of the raw material used originated from the alluvial deposits of the nearby Diós Stream.

3. The archaeological assemblage of the site

The so-called "box method" was used (Debénath–Dibble 1994, 19), to take the linear measurement of the artefacts, the maximum length and width measurements (Dogandžić *et al.* 2015, 7, Fig. 3b). The maximum length represents the distance from the point of percussion to the distal end, following the axis of percussion (the debitage axis *sensu* Inizan *et al.* 1999). Maximum width is taken at the widest point perpendicular to the length axis, and maximum thickness is recorded at the thickest point along the third dimension.The measurements were made with a digital calliper, and the millimetre data were rounded to one decimal place.

3.1. The archaeological material collected by Tóth

According to Simán's description, Tóth succeeded in collecting 196 stones from the surface at the Szurdokpüspöki–Derzsi Hill site (Simán 1993, 248). She noted that one of the peculiarities of the Szurdokpüspöki sites is the frequent use of volcanic rock in addition to limnoquartzite. Limnoquartzite is a fine-grained, silica-rich sedimentary rock formed in diverse freshwater environments as a result of hydrothermal processes attributable to post-volcanic activity. It is not clear which volcanic raw material Simán was referring to, since andesite use is virtually absent in the chipped stone assemblages from the direct surroundings. The quantity of finds from Derzsi Hill, as well as the composition of the technological groups—13 blades, 175 waste products (57 flakes and 118 discarded raw material fragments), and six retouched tools—indicate the presence of a substantial lithic workshop. In her opinion, the assemblages from Parád–Marhád Hill (Bíró 1984, 6, 8, Fig. 2; Ringer 1983, 132) and Szurdokpüspöki–Derzsi—especially the pieces presented in *Fig. 3* of her article (two unfinished bifacial tools and a side-scraper with a convex curved edge)—are most closely related to the Eger leaf-point industry (*Fig. 8,* after Simán 1993, 253, *Fig. 3.1–3.*).

While studying the assemblage from the Derzsi Hill site, the authors established the following. The finds delivered by Tóth were catalogued in 1990 by archaeologist Sára Kató under four general inventory numbers. Based on the chipped stones (inv. nos. 90.9.1–90.9.3) and the seven ceramic pieces (inv. nos. 90.9.4–7), the assemblage can be attributed to several archaeological periods: the Middle Palaeolithic, the Upper and/or Epipalaeolithic, and the later prehistoric (Neolithic and Bronze Age). Compared to the 196 artefacts reported in Simán's article, 201 chipped stones were found during the authors' examination. No explanation could be found for the difference in the numbers of finds. The chipped stone artefacts are primarily made of locally sourced limnic silicite (Gyöngyöspata and Gyöngyöstarján). Non-local raw materials are represented by an end-scraper on metarhyolite from Bükkszentlászló and a small radiolarite flake. Among the nine tools, two of the three end-scrapers made on flakes are atypical and probably of Middle or Upper Palaeolithic origin *(Fig. 3, 3–4; Fig. 9, 2)*. The metarhyolite end-scraper *(Fig. 2, 3; Fig. 9, 1)* has a broken base and a curved distal end. This working edge and both lateral edges bear fine marginal retouch. The tool is either Middle or Upper Palaeolithic. Of the three Middle Palaeolithic side-scrapers, one simple side-scraper with a curved edge was made on an off-axis (*déjeté*) flake. The left edge is retouched; its dimensions are 64.1 x 57.1 x 16.4 mm (*Fig. 4, 2*; Simán, 1993, p. 253, *Fig. 3, 3*). Another, a simple straight-edged side-scraper, was manufactured on a raw material fragment; its dimensions are 59.7 x 27.9 x 18.1 mm *(Fig. 2, 2)*. The curved-edged simple side-scraper was produced on a core fragment. Its dimensions are 62.0 x 40.6 x 33.1 mm *(Fig. 4, 1;* Simán, 1993, p. 253, *Fig. 3, 1)*. A Middle Palaeolithic bifacial preform, roughly worked due to the poor quality of the raw material, broke during the elaboration. The currently triangular fragment measures 53.8 x 52.6 x 19.5 mm (*Fig. 4, 3*; Simán, 1993, p. 253, *Fig. 3, 2*). Another atypical end-scraper-like piece was produced on the distal end of a flake by a few small removals. Dimensions: 65.3 x 33.1 x 14.8 mm *(Fig. 3, 2)*. One straight denticulated piece measures 39.9 x 33.5 x 9.9 mm *(Fig. 2, 1)*.

3.2. The archaeological material collected by Simán and Tóth

The exact details of the joint site-identification field surveys are not known, as Simán's notes have been lost. Among the assemblages catalogued by Simán in 1993 are finds from four sites that Tóth had regarded earlier as Palaeolithic. The material collected at the Szurdokpüspöki–Derzsi Hill site consists of 15 chipped stones (inv. nos. 93.45.1–93.45.3) and three ceramic sherds (inv. nos. 93.45.4–6). As with the finds previously collected by Tóth, these artefacts represent several archaeological periods. A straight-edged transverse side scraper made on a large limnic opalite flake is clearly of Middle Palaeolithic origin. Dimensions are 63.1 x 75.1 x 24.8 mm *(Fig. 2, 4; Fig. 9, 3)*. An intensely patinated limnic silicite flake is most probably of Middle Palaeolithic origin. Its dimensions are 45.1 x 51.7 x 13.4 mm *(Fig. 3, 1)*. The four large raw material fragments of limnic opalite may be of geological or possibly Middle Palaeolithic origin. These pieces, lacking any traces of modification, are entirely covered with an intense glossy patina, the result of silica deposition in the soil. This type of patina has not been observed on artefacts from either the Cserhát Mountains or Bükkalja open-air Palaeolithic sites of the same age. The three blades, two flakes, and four fragments of débitage products are made from limnic silicite and are most probably of later prehistoric (Neolithic or Bronze Age) origin.

3.3. The archaeological material collected by Gutay

Altogether 31 finds from the site Szurdokpüspöki 18, registered under accession number Gy/402, were packed by the collector into two separate paper bags at the Kubinyi Ferenc Museum,. The bag considered more relevant by the collector contained seven chipped stones. There was a non-hierarchical, irregular-shaped flake core; a plunging flake (this piece was published by Gutay 2007, Table XXI, 1, where it was identified as a blade); a retouched and shallowly notched flake (Gutay 2007, Table XXI, 7); and a small mesial fragment of a microblade (Gutay 2007, Table XXI, 3).

During the authors' revision of the findings, some minor, non-significant differences were revealed compared to the original descriptions.The illustrated tool, made on a the raw material fragment and identified by the collector as an end scraper–burin combination did not seem convincing to the present authors (Gutay 2007, Table XXI, 2). The supposed end-scraper edge formed by a single removal is atypical, although it could certainly have been suitable for some unknown working function. In the case of the alleged angled burin, the irregular removal line indicated in the drawing as a burin spall is more likely a natural fracture surface. The short transverse removals also shown in the figure could be considered burin blows. The raw material of the above chipped stones is limnic silicite. The inversely retouched blade (Gutay 2007, Table XXI, 5) is the proximal fragment of a blade or flake with an asymmetrical triangular cross-section. The left lateral edge in the illustration is inversely retouched; the opposite edge bears small splinterings that are most likely use-wear traces. The raw material is metarhyolite from the Bükk Mountains. A small flake fragment is made from the same raw material. The use of metarhyolite is not culture-specific in itself, nor was it limited to any Palaeolithic period; there is one tool from this raw material in the assemblage collected by Tóth.

The second bag contained 24 archaeological finds, including 21 chipped stones, all made of local limnic silicite. Of the three larger flakes (greater than 25 mm), one shows traces of partial black manganese dioxide deposition on its surface. Among the 16 smaller flakes (less than 20 mm), some are retouch flakes. A mesial fragment of a blade with a trapezoidal cross-section bears use-wear traces on both edges; two flakes show partial retouch. There is also one small fragment of radiolarite, macroscopically originating from the Bükk Mountains, and one single thick-walled ceramic sherd.

4. Discussion

Very little information exists about the Palaeolithic period in the Mátra Mountains. One of the first sources of information is Katalin T. Biró's brief description of flint artifacts (T. Biró 1984). The finds found around Mátraháza–Sombokor Hill are, according to T. Biró, and in the opinion of the present authors, of late Upper Palaeolithic character based on the illustrations. The scattered find, a large tool (118.5 x 67.5 x 26.0 mm) made of metarhyolite from Parád-Marhád-tető is undoubtedly Middle Palaeolithic. It was discovered by the geologist Gyula Varga during geological mapping, T. Bíró (1984) identified the tool as a Bockstein-type scraper-knife (*cf.* Bosinski 1967). According to the description, the scraper-knife is a characteristic Middle Palaeolithic type, worked with surface retouch on both edges. It has a flat, slightly asymmetrical form; on the ventral surface (lower face), the retouch is steeper and continuous along the right edge, while on the left edge, it is more blunted and intermittent. Below the right edge, steep "alternating retouch" is visible from the dorsal side (upper face). The tool is considered a key find (fossile directeur) of the leaf-scraper–leaf-point complex, which in Hungary was identified through the work of Miklós Gábori (Gábori 1976) and which was analysed by Árpád Ringer in his doctoral dissertation (Ringer 1983).

Simán mentioned the tool from Parád–Marhád-tető in her 1993 article and also referred to Árpád Ringer's description of the tool in her publication.The authors of this article also agree with Ringer's description and interpretation of the tool. Based on that description, the artefact is a large Quina-type, bifacially worked side-scraper (*racloir à reetouche biface*). Ringer noted that "*Auf Grund des Types und der Bearbeitung müssen wir ernsthaft mit dem Erscheinen von Bábonyien auch im Mátra-Gebirge rechnen. Darauf machte schon der Rohstoff eines in Sajóbábony–Kövesoldal 1969 gefundenen Werkzeuges (Jaspis aus dem Mátra-Gebirge) aufmerksam*." Ringer regarded the Bábonyian industry as a manifestation of the East European Micoquian.

The reanalysis of the entire Derzsi Hill assemblage suggests that Simán's interpretation of cultural connections with the Eger region needs to be revised based on new information garnered over past decades.

The complete assemblage from the various surface collections described above (Tóth, Simán and Tóth, and Gutay) comprises 216 chipped stone artefacts, including 10 tools. The lithic debitage (based on Andrefsky's definition (2005, 16) considered to be the by-products of stone tool production or core reduction), cannot be assigned to any cultural tradition. Among the tools, the four side-scrapers and the bifacial preform are certainly of Middle Palaeolithic character, and are likely to be classified as Mousterian, based on the absence of the asymmetrical, elongated hand-axes and bifacial knives characteristic of the Micoquian industry. The end-scraper of metarhyolite can also most likely be included in this group. Two end-scrapers are possibly of Upper Palaeolithic or Epipalaeolithic origin; the retouched flake and the retouched raw material fragment are not relevant for cultural assignation. In the small toolkit, none of the tools indicates a connection with the leaf-point industries of the Eger region, nor do they suggest cultural links between the two areas because of the absence of leaf- points or leaf-shaped tools at Derzsi Hill.

According to the artefact descriptions and drawings in Gutay's thesis, a substantial part of the Szurdokpüspöki 18 assemblage likely dates to the Epipalaeolithic or later prehistoric periods. It does not contain unambiguously Middle Palaeolithic finds and is therefore partly independent of the assemblage collected by Tóth. In the case of an informal tool, a small inversely retouched fragment or the proximal end of a blade, a Middle Palaeolithic origin cannot be ruled out *(Fig. 5.1)*, especially if the metarhyolite scraper in Tóth's collection is considered as such. The lithic material as a whole is similar to the assemblages that Gutay found in the nearby "Horka" and "Tök-föld" boundary areas. There are altogether nine lithic concentrations, Szurdokpüspöki 12 (KÖH 53451), Szurdokpüspöki 13 (KÖH 53453), Szurdokpüspöki 14 (KÖH 53454), Szurdokpüspöki 15 (KÖH 53455), Szurdokpüspöki 16 (KÖH 53456), Szurdokpüspöki 17 (KÖH 53457), Szurdokpüspöki 19 (KÖH 53462), Szurdokpüspöki 20 (KÖH 53463), and Szurdokpüspöki 28 (KÖH 53479).

The processing of the assemblages from these sites (hereafter referred to as artefact concentrations) by the

authors confirmed this assumption. However, in some of these concentrations *(Fig. 1)*, several Middle Palaeolithic artefacts were also identified. Since these finds have not been previously examined and published, we will discuss them in more detail below. A small, worn, retouched piece with a rolled edge was found in the Szurdokpüspöki 12 ("Horka") concentration. The raw material is reddish limnic silicite. Dimensions are 43.8 x 27.8 x 14.9 mm *(Fig. 5, 4)*. In the Szurdokpüspöki 13 ("Horka") concentration, two artefacts do not belong to the otherwise undistinguished later prehistoric assemblage, both technologically and due to the intensity of their glossy patina *(Fig. 5, 2, 3)*. A bifacial preform was found in the Szurdokpüspöki 14 ("Tök-föld") concentration. Due to flaws within the raw material, the tool was left unfinished. After a hinge flake detachment, indicated with a black arrow in the illustration, the shaping was abandoned because the protruding edge part could not be removed. Dimensions are 58.8 x 46.8 x 23.8 mm *(Fig. 6, 1; Fig. 9, 6)*. A small flake made of siliceous pebble, probably originating from the Cserhátalja or the Cserhát Mountains, is also present *(Péntek 2021)*. A large oval-shaped siliceous pebble flake tool should be highlighted from the Szurdokpüspöki 15 ("Tök-föld") concentration. The upper face is unworked and retains its pebble cortex; the base is worked, with the striking platform and bulb removed. At the distal end is a narrow, steep, renewed end-scraper front with a curved line. Both lateral edges were semi-abruptly retouched, reminiscent of a Quina-type side-scraper. Dimensions are 59.4 x 47.9 x 16.7 mm *(Fig. 5, 6; Fig. 9, 8)*. A slightly irregular end-scraper with a curved edge was produced from a raw material fragment, a. The end-scraper edge is steep due to several renewals. Dimensions are 23.7 x 39.4 x 11.5 mm *(Fig. 6, 2; Fig. 9, 7)*. On a large quartzite pebble slice, retouch is visible on the left side of the distal end, while use-wear traces occur on the right lateral distal end. Dimensions are 65.4 x 59.9 x 26.4 mm *(Fig. 6, 3)*. The assemblage also includes a large, unworked, broken quartzite pebble. Due to the geological conditions of the area, even this unworked quartzite pebble must be considered of anthropogenic origin. In the Szurdokpüspöki 16 ("Tök-föld") concentration, there is a large Levallois-like off-axis flake. Its dimensions are 57.2 x 43.3 x 10.3 mm *(Fig. 5, 5; Fig. 9, 5)*.

About 800 m in a straight line from the Szurdokpüspöki–Derzsi Hill site and 550–750 m from the above-mentioned find concentrations, the Szurdokpüspöki 23 find concentration (KÖH 53474) is located along the stony dirt road running on the southern and southeastern edge of the sloping hillside marked as "Derzsi Hill" on the 1:10,000 scale EOV map. Among the Epipalaeolithic and early prehistoric finds, two tools belong to the Middle Palaeolithic. Both pieces are worn, rolled, and were almost certainly found in a secondary position. One tool is a large piece of limnic silicite raw material with a sub-triangular cross-section, slightly curved outline, and irregularly retouched edge that may have functioned as a side-scraper-like tool. Its dimensions are 82.4 x 49.7 x 26.2 mm *(Fig. 7, 1)*. A small, quadrangular-shaped flake or raw material piece has all its edges semi-abruptly retouched. This tool, reminiscent of a "raclette," measures 28.7 x 24.0 x 11.0 mm.

We have little information regarding the Middle Palaeolithic lithic assemblages and stray finds from the Zagyva Valley. In chronological order, the earliest finds, which are likely Middle Palaeolithic, were recovered from the Jobbágyi–Mikó-oldal site. The site is now registered under the identifier 41017 at the KÖH. However, the presumed site is rather problematic and raises numerous questions, which could only be clarified by a validating excavation. Ferenc Lendvai, a teacher from Jobbágyi, collected worked, heavily patinated andesite flakes, a discoid core made of hydroquartzite, and fossil bones from the wall of a sand pit dug into the Holocene terrace on the left bank of the Zagyva River. During a site identification survey carried out following Lendvai's report, Viola T. Dobosi and István Vörös located the bone accumulation layer, without any stones, and collected mammoth bones (T. Dobosi–Vörös 1988). In their opinion, however, it is uncertain whether the knapped stones and the bones belong together or if they are merely deposits accumulated by the Pleistocene Zagyva. Similarly, the origin and cultural affiliation of the andesite flakes is questionable, for which a comparison was made with the Lower and Middle Palaeolithic industry excavated near Királyháza–Korolevo (Gladilin 1989; Kulakovskaya 1989; Tkachenko 1989; Koulakovska 2001). It should be noted that several occurrences of mammoth remains are documented from the Jobbágyi area (Halaváts 1899; Jánossy–Vörös 1979, 38; Szilágyi *et al.* 2014). A Middle Palaeolithic origin for the andesite finds is conceivable. In the early 2000s, a Palaeolithic industry using andesite raw material was postulated at the Galgagyörk–Csonkás Hill site in the Galga Valley (Markó *et al.* 2002; Markó 2004). Concerning this fact, the processing of the finds from the Jobbágyi–Mikó-oldal site area certainly seems necessary.

During his field survey in July 2004, András Markó did not find any knapped stones in the area, which by then had become completely overgrown with weeds. In the wall of the quarry, at two separate locations not connected to any bone concentrations, he found scattered mammoth bones and other animal bone remains (András Markó, personal communication, 22. 07. 2025).

In 2005, during her field surveys, Gutay visited the site and reported on it in the research protocol under the name Jobbágyi 1. She described the artifacts she found in detail. From the central part of the sand-extraction pit, about 5–6 m below the recent surface, fossil bones (a piece of mammoth tusk, a limb bone fragment, and a heel bone of a wild horse) were recovered, without any lithic material. Gutay mentioned several stone artefacts coming from the central part of the site. Prehistoric pottery sherds were found (Raczky 2006a; Gutay 2007) above the reddish-brown layer, in the humus. In July 2025, the authors of this article re-examined the finds collected by Gutay, housed in the collection of the Forgách-Lipthay Castle Museum. Apart from the mammoth tusk fragment, due to the poor, porous condition of the small bones, even family-level identification did not prove possible. A total of three lithic finds have been identified as archaeological artefacts. Among them, a flake core is undoubtedly of Palaeolithic, even Middle Palaeolithic origin. The raw material of the core, apart from a single quartz vein, is relatively homogeneous limnic silicite. The flaking process was abandoned and the core was discarded. Its maximum dimensions are 70.1 x 61.8 x 47.1 mm *(Fig. 7, 2)*.

In 2014, during the expansion of Route 21 into a four-lane road, at the multi-period site of Szurdokpüspöki–Hosszú-dűlő 3 ("Tenk", KÖH 46877, 53431; M21 05. site), located on the western high bank of the Zagyva, a Middle Palaeolithic double side-scraper, made of limnic silicite was unearthed in the wall of a Late Bronze Age grave pit (Fülöp–Váczi 2015). The find is in the collection of the Dornyay Béla Museum in Salgótarján, the inventory number is 2015.1.1631.

The reddish-brown artefact is intensively patinated (glossy patina, due to soil-related natural chemical causes, see Howard 2002). The distal end had been broken long ago (the fracture surface is also patinated), so the original form cannot be reconstructed *(Fig. 6, 4; Fig. 9, 4)*.

The above-mentioned finds can be linked both technologically and typologically to the assemblage from the Szurdokpüspöki–Derzsi Hill site. Thus, in the surrounding area—at least within the territories of Jobbágyi and Szurdokpüspöki—further Middle Palaeolithic lithic workshops can certainly be expected. This conclusion seems evident in light of the abundant local availability of limnic silicite and limnic opalite raw materials, which results in most assemblages having a "workshop-like" character, with large amounts of raw material waste. The Middle Palaeolithic workshops have been partly destroyed by erosion and partly obliterated by the traces of workshops from later periods.

Since the Middle Palaeolithic components of the Szurdokpüspöki–Derzsi Hill site and the stray finds mentioned above display similarities with the Mousterian industry, it is necessary to briefly discuss the picture that has emerged so far about this industry. We will not deal with the Mousterian industry characterized by intensive use of quartzite pebbles, as this raw material appears only sporadically as an archaeological find in the studied area of the Zagyva Valley.

A comprehensive overview of the Palaeolithic of Hungary was provided by Jenő Hillebrand in his extensive study (Hillebrand 1935). In it, he also briefly described the cave sites of the Bükk Mountains. Publications about the excavations of the most archaeologically significant caves in the Bükk Mountains, the Büdöspest and Subalyuk caves, have been published since the 1910s (Kadič 1916; 1940a; 1940b; Bartucz *et al.* 1938). Concerning the Mousterian industry in general, but especially the Mousterian material of the caves in the Bükk Mountains, the publications of László Vértes (Vértes 1955; 1959; 1960; 1965) and Miklós Gábori (Gábori 1976; 1977; 1982) must be mentioned first.

In 1989, Zsolt Mester published a re-evaluation of the Middle Palaeolithic industries of the Subalyuk Cave (Mester 1989). The first detailed publication on the industry, discussing both earlier results and the research history of the Bükk Mountains, was in Mester's candidate dissertation (Mester 1994). Unfortunately, the entire find material has not yet been processed here, and part of the find material from Subalyuk was mistakenly added to the material from the Büdöspest Cave. Thereafter, Mester dealt with the Mousterian industry of Hungary in numerous other publications (Mester 1995; 2004; 2006; 2022; Mester–Moncel 2006; Mester–Patou-Mathis 2016; Mester *et al.* 2023). A brief characterization of the Mousterian industry of the Bükk Mountains—based primarily on the excavation of the Subalyuk Cave—includes an earlier side-scraper-rich typical Mousterian facies, followed by a later Quina-type Mousterian, which can be classified into the family of East European Charentian industries.

In the assemblages of numerous Palaeolithic sites around Eger (Eger–Kőporos-tető, Egerszalók–Kővágó-dűlő, Ostoros–Rácpa), traces of the Mousterian industry occur only sporadically. Based partly on earlier publications (Vértes 1951; 1953; 1954; 1965; Fodor 1984; T. Dobosi 1995), Krisztián Zandler studied and reviewed these assemblages in his thesis and later published the main results of his analysis (Zandler 2006; 2012). In a somewhat simplified manner, he classified assemblages containing leaf-shaped tools and bifacial implements as Szeletian, while with Upper Palaeolithic-type tools were assigned to Aurignacian industries.

As part of a Hungarian–Polish research program, excavations were carried out at the Egerszalók–Kővágó-dűlő site in 2006 (Kozłowski *et al.* 2009) and the Eger–Kőporos-tető site in 2009 (Mester 2010; Kozłowski *et al.* 2012). No intact cultural layers were uncovered during the excavations; nevertheless, the analysis of the finds provided a more nuanced picture of Palaeolithic settlement in the area. On typological and technological grounds, Middle Palaeolithic Mousterian, Szeletian with leaf tools, Initial Upper Palaeolithic Macroblade Industry, and Upper Palaeolithic Aurignacian, as well as later prehistoric assemblages were distinguished, complemented by the results of the test excavations at Andornaktálya (Kozłowski *et al.* 2009; Mester 2010; Kozłowski *et al.* 2012; Mester *et al.* 2021).

5. Conclusion

Seemingly minor details can trigger a chain reaction of discoveries that fundamentally reshape our understanding of a given subject. One such sequence of events was basically triggered by Simán's article, previously somewhat neglected, and set in motion by the processing of the finds collected by Tóth, Simán, and Gutay. Subsequently, these authors carried out a series of site identification field surveys in the wider vicinity of the Szurdokpüspöki–Derzsi Hill site.

Regardless of the Szurdokpüspöki–Derzsi Hill site and its immediate surroundings, in recent years, intensive field research has been carried out in the western Mátra and the Gyöngyöspata Basin. Further research continued on previously identified sites, while new sites and site complexes were also identified. For all intents and purposes, the results have laid the foundations for research into the Middle Palaeolithic period in the area under investigation.

Within these assemblages, both the Mousterian culture (also using the Levallois method, which has so far only rarely been demonstrated at Hungarian open-air sites) and the Micoquian technocomplex (which in Hungary had previously been documented at the sites of Sajóbábony–Méhész-tető (Ringer 1983), Gyöngyöstarján 10 (Mulató Hill) (Gutay *et al.* 2010; Gutay–Kerékgyártó 2021; Vadász 2024; Gutay–Mester 2024), Galgahévíz–Bika Lake (Markó–Péntek 2002-2003), Legénd–Káldy Farm (Markó–Péntek 2003-2004), and Galgagyörk–Csonkás Hill (Markó *et al.* 2002; Markó 2004; Zandler *et al.* 2021; 2023) are represented by culture-specific finds and diagnostic artefacts. Near the Szurdokpüspöki–Derzsi site, at a distance of approximately 1,500–1,700 m in a straight line, the recently published Mousterian assemblages of Szurdokpüspöki–21 ("Lapos-tanya") and Szurdokpüspöki–16 ("Tilalmas-tető").

Several open-air sites display a mixture of industries —containing some typical Mousterian tools as well—have become known in the Szomolya and Bogács areas, thanks to the work of independent researcher Ferenc Cserpák. Some of these sites are in the Bükkalja region near Miskolc, only 5–8 km away from the well-known Subalyuk Cave, discovered in the last century. During the verification of these sites, new open-air Mousterian localities were also identified in the Tard region. Their processing and publication are currently underway (Péntek *et al.* in prep.).

Together, these finds significantly revise our understanding of the Palaeolithic in the northern

Hungarian mountains. The results fill an obvious gap in Hungarian Palaeolithic research, and demonstrate that the Mátra region was not a marginal zone but an independent Middle Palaeolithic territory, complementing the better-known Bükk Mountains record. Further systematic research at these sites and stratigraphic test excavations of at least some of them, where possible, would certainly be desirable.

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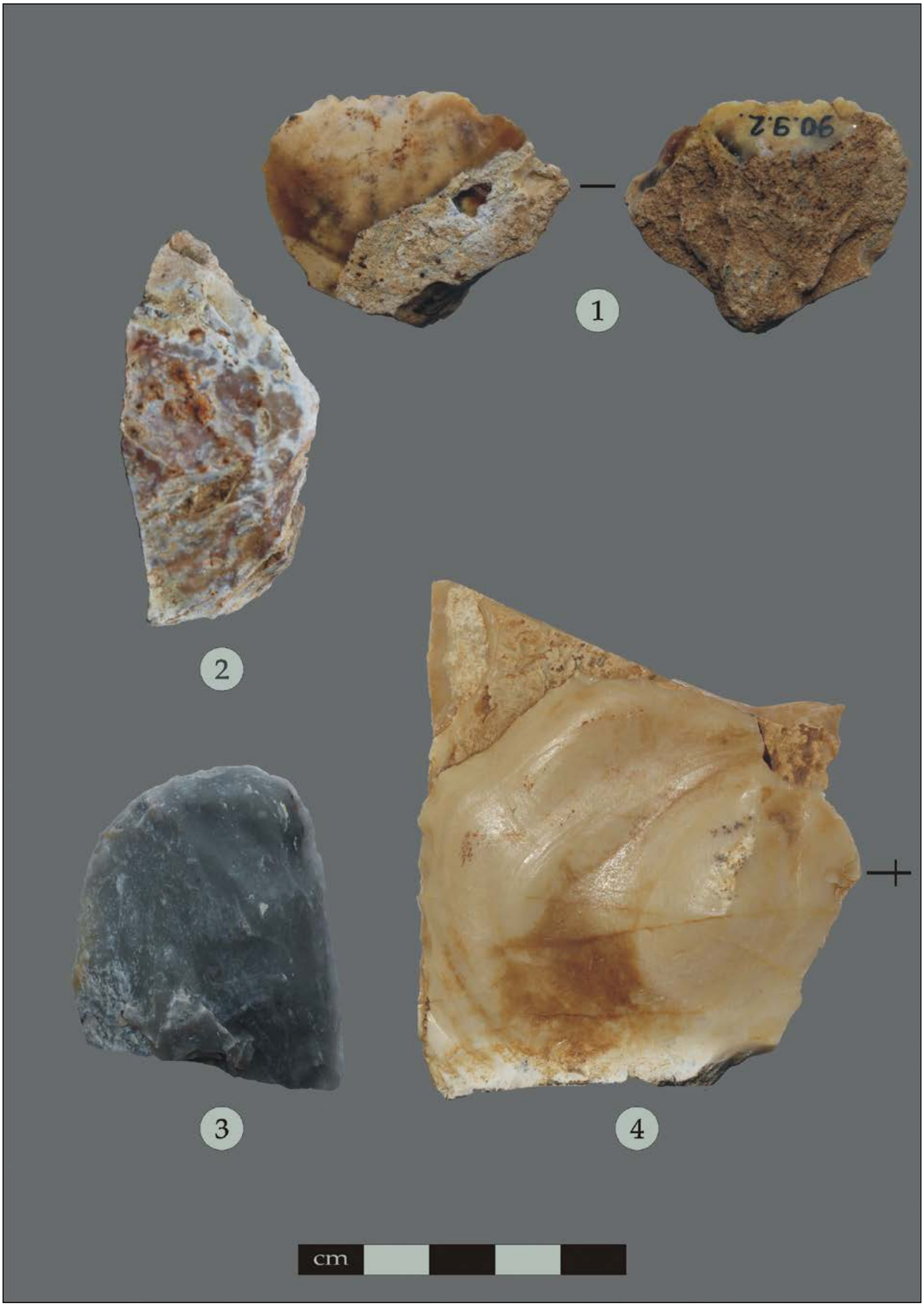

Fig. 2. 1–3. *Selected tools from Tóth's collection at the site.* ***4.*** *Side-scraper collected by Simán and Tóth.*

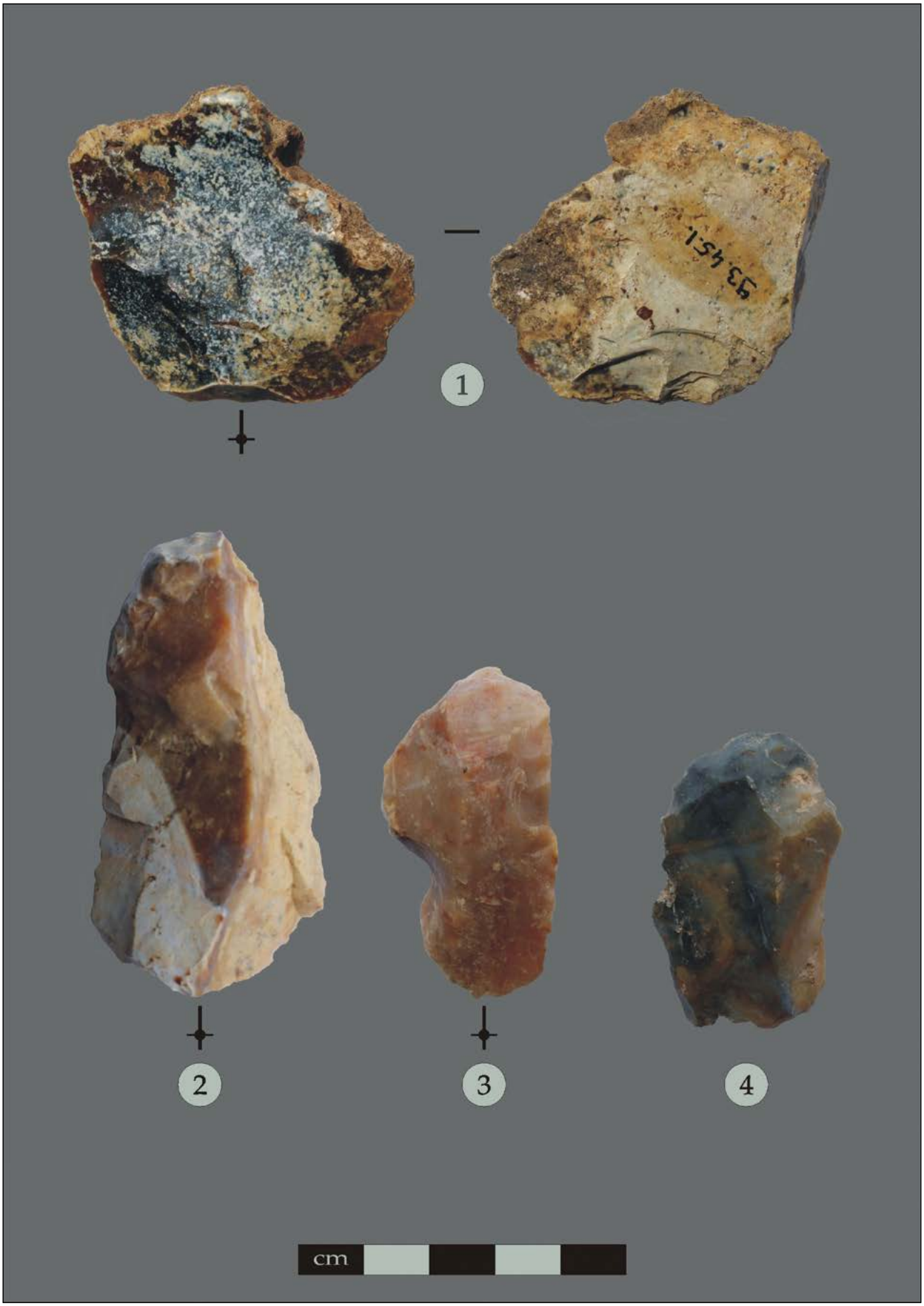

Fig. 3. *Selected artefacts from Tóth's collection at the site.*

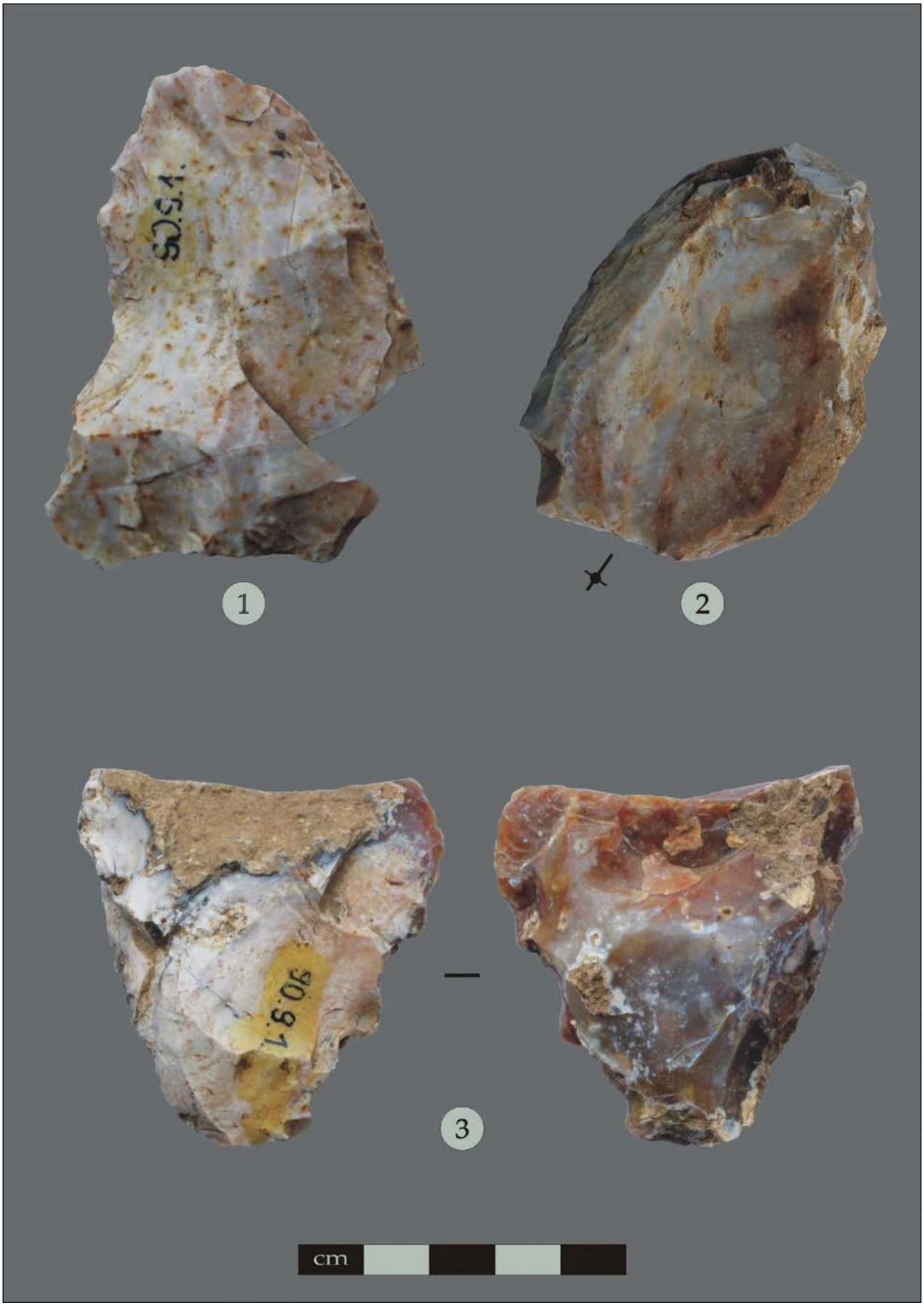

Fig. 4. *Selected artefacts from Tóth's collection at the site.*

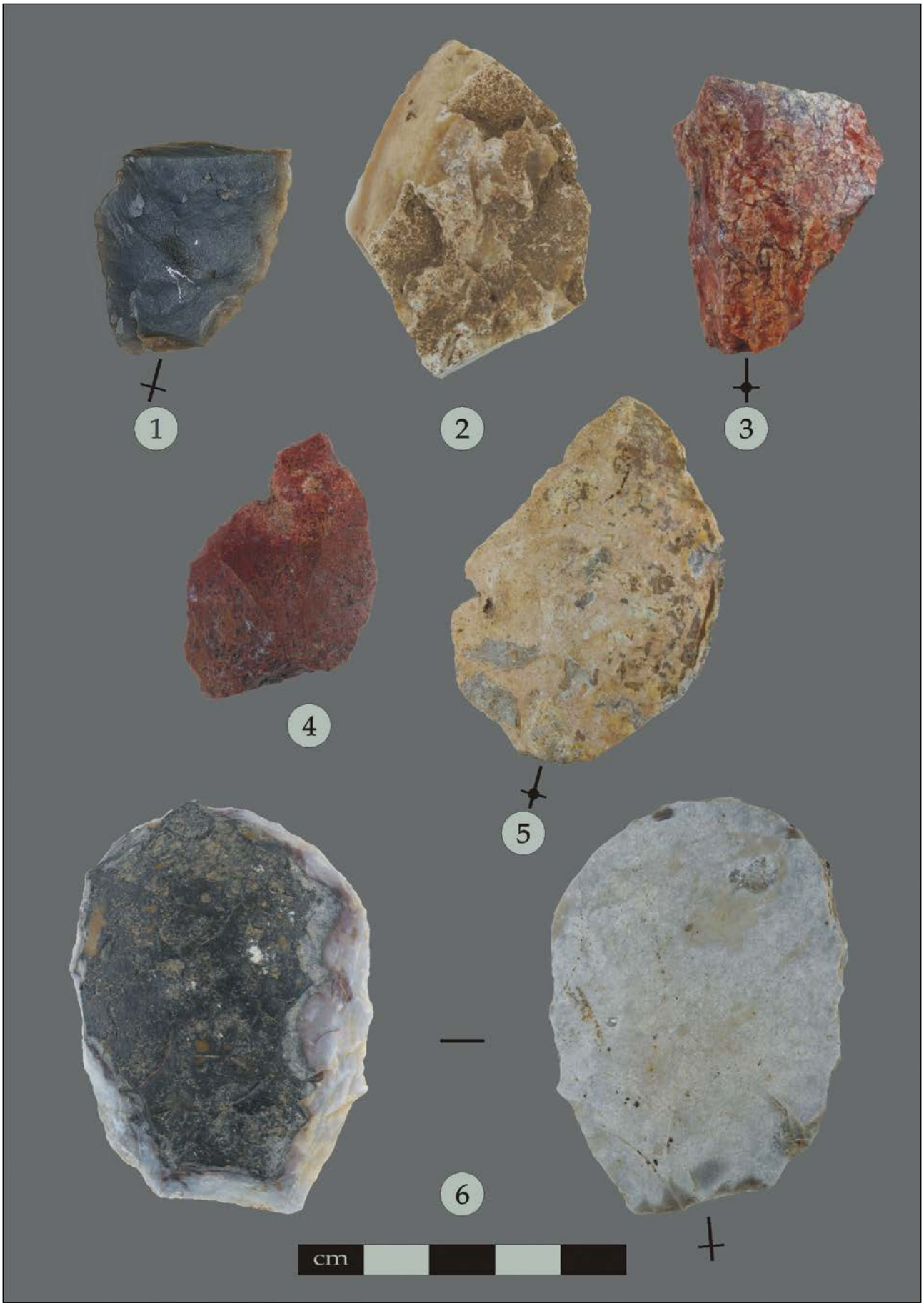

Fig. 5. 1. *An informal tool collected by Gutay at the site.* ***2–6.*** *Artefacts collected by Gutay at several findspots in the vicinity of the site.*

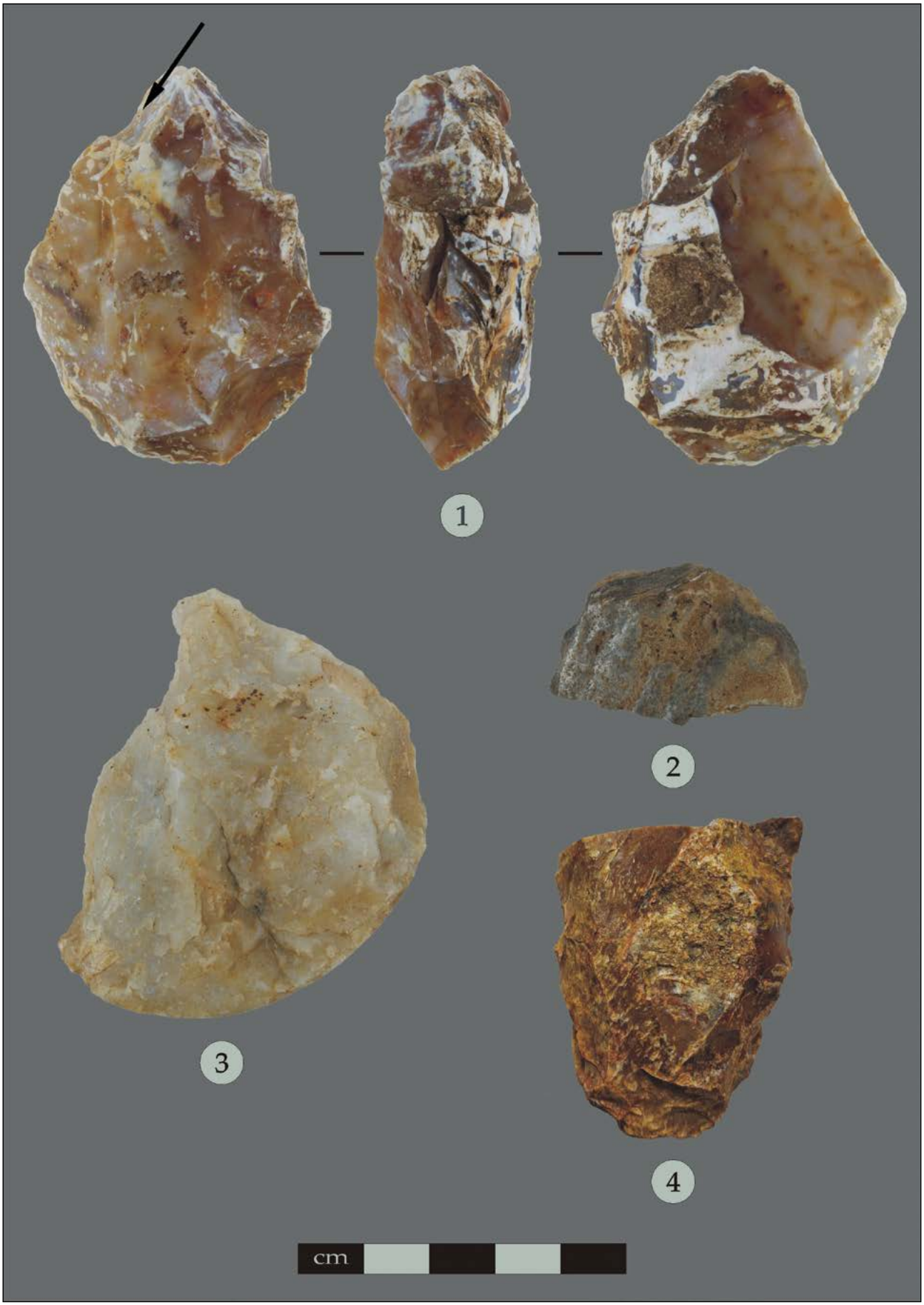

Fig. 6. *Artefacts collected by Gutay at several findspots in the surroundings of the site.*

Fig. 7. *Artefacts collected by Gutay at several findspots in the surroundings of the site.*

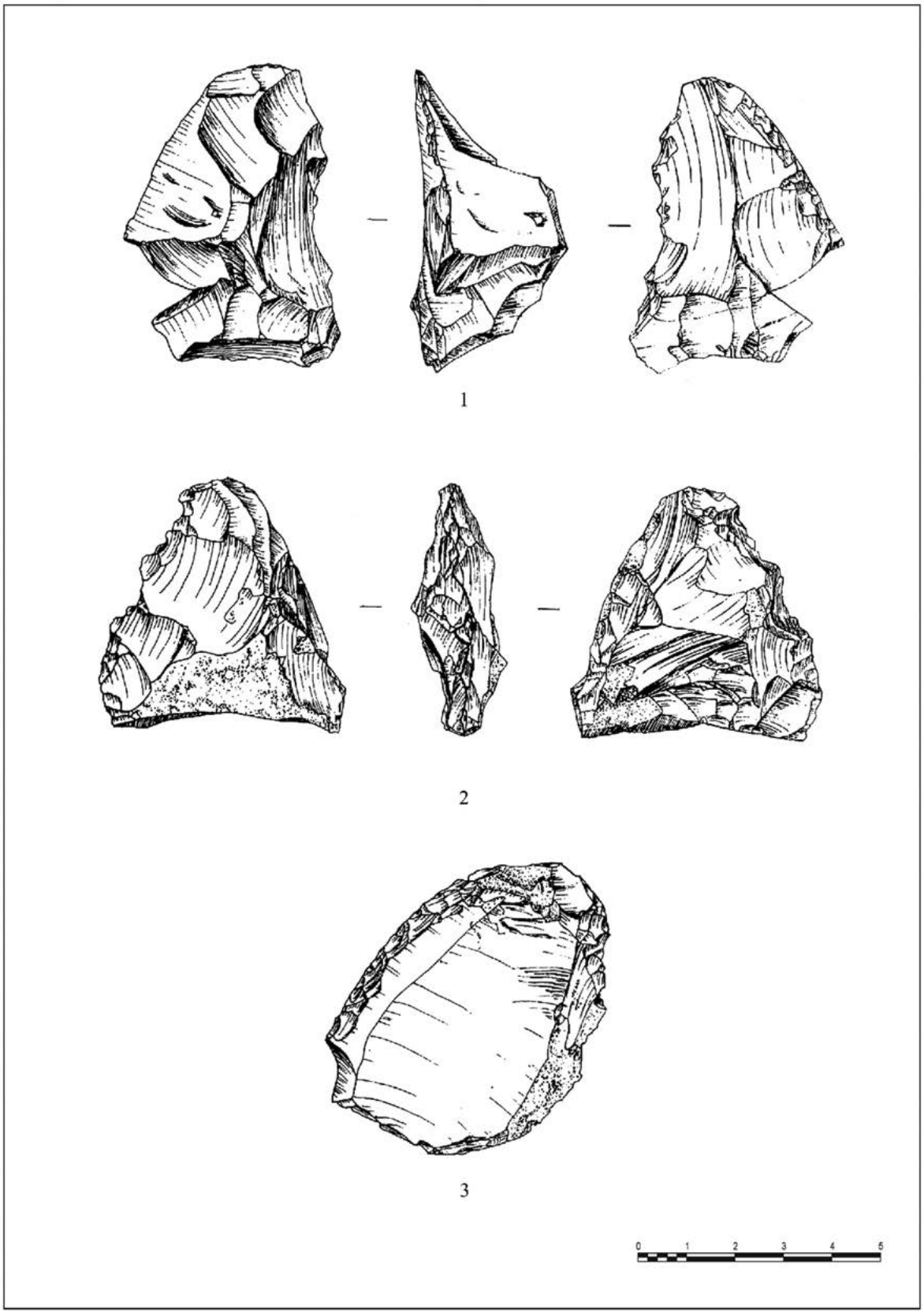

Fig. 8. *Selected tools from the site. After Simán, 1993, Fig. 3.*

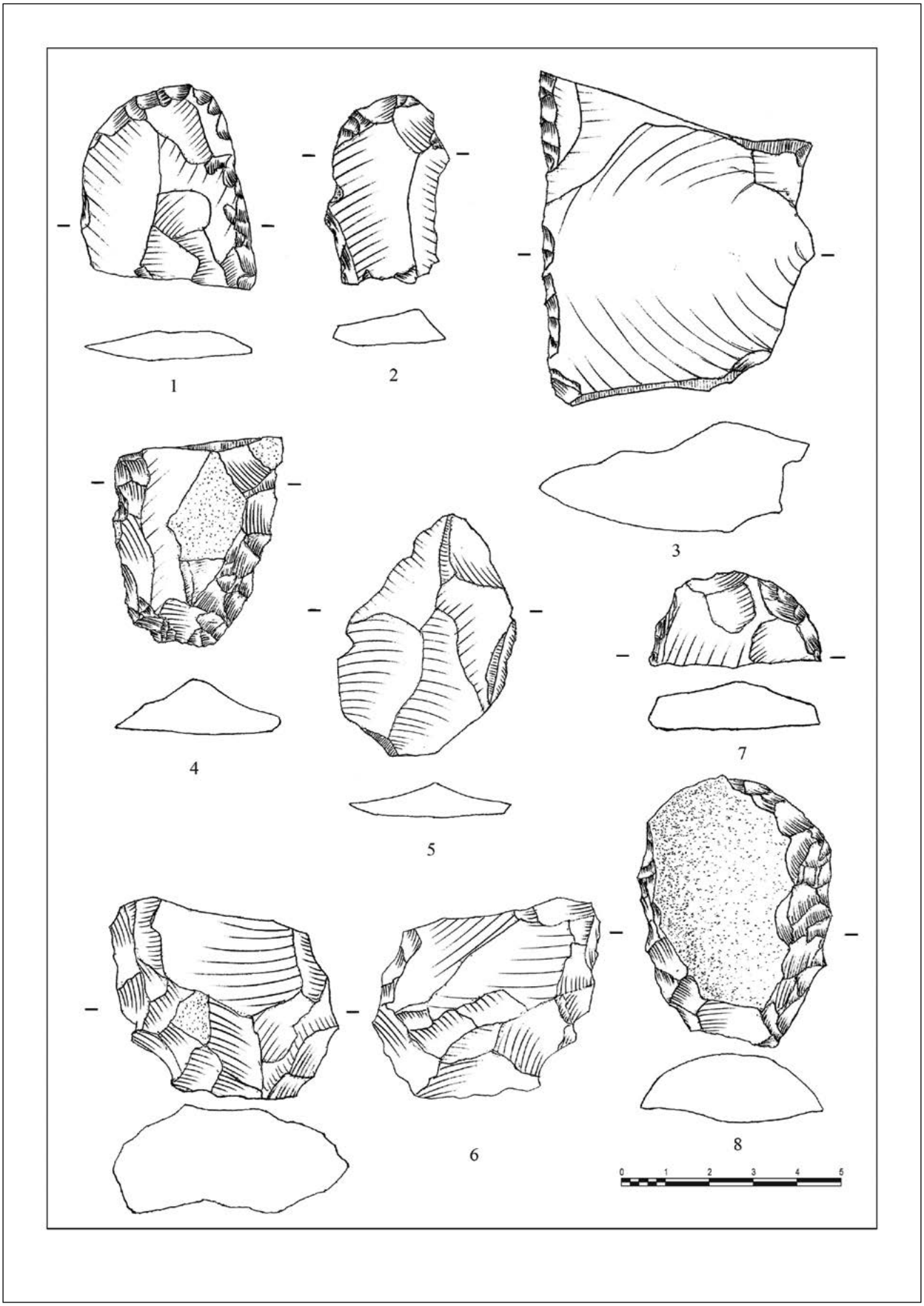

Fig. 9. *Selected tools from the site and its surroundings. Drawn by K. Zandler.*

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Preliminary report on the Middle Palaeolithic Site of Galgagyörk–Csonkás Hill

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Abstract: *The Middle Paleolithic assemblage from the Csonkás Hill near Galgagyörk (Cserhát region, Northern Hungary) was originally classified as belonging to the Bábonyian entity. During the excavations, however, no characteristic tool types of this industry (bifacial backed knife, hand-axe, small circular scraper) were found.*
The raw material types present in the excavated assemblage are dominated by poor quality local rocks as hydrothermal siliceous rocks and andesite; the extra-local raw materials are represented by metarhyolite and obsidian. The typological spectrum is dominated by side-scrapers, with some bifacially worked tools, including a typical leaf-shaped point.
As a classification, we suggest using the Late Middle Paleolithic 'leaf point industry' ("Blattspitzenindustrie") instead of the poorly defined Bábonyian.

Keywords: *Bábonyian, leaf point industry, metarhyolite, andesite, obsidian, side scraper*

1. Introduction

The questions concerning the lithic industries with leaf shaped implements and, more generally, the transition from the Middle to the Upper Palaeolithic are central problems of Palaeolithic research in the Carpathian Basin. For a long time, the Szeleta Cave (Bükk Mountains, Northeastern Hungary), as the first authentic Palaeolithic locality in Hungary was the starting point of these investigations. The two thick but poor artefact-bearing layers, namely the *Early* and *Evolved Szeletian* (or earlier, *Proto-* and *Hochsolutréen*) were interpreted as two stages of a single entity (Kadić 1915; Vértes 1965). Since the beginning of the 1980s the surface collected assemblages from the open-air plateau localities lying close to the Szeleta Cave, have been defined by Á. Ringer (1982) as belonging to the Middle Palaeolithic *Bábonyian* industry, with the eponymous site of Sajóbábony–Méhész-tető located to the north of Miskolc. This entity was originally identified as the local variant of the Central European *Micoquian* (or *Keilmessergruppe*), tentatively dated to the last Interglacial and it was interpreted by Ringer as the antecedent of the industries of the Szeleta Cave. Later artefacts from the same industry were also recognized in the Szeleta Cave itself, along with other, basically very problematic industries (Ringer–Mester 2001).

At the beginning of the 1990s Katalin Simán was the first to classify the *Evolved Szeletian* of the Szeleta Cave, unique in the Hungarian record as belonging to the *Gravettian* entity and to compare it to the assemblage excavated at Trenčianske–Bohuslavice (Váh Valley, western Slovakia – Simán 1990, 190-192). At the same time, she interpreted the *Bábonyian* localities as open-air workshop sites, belonging to the 'real *Szeletian*', *i.e.* the *Early Szeletian*, known from the lower layer of the eponymous cave. Finally, Simán concluded that the artefacts of Middle Palaeolithic character from the open-air site were made from metarhyolite (earlier known as felsitic porphyry, quartz porphyry, ash-grey chalcedony, or, simply, 'Szeleta raw material'), while rock types of hydrothermal origin were used to manufacture Upper Palaeolithic tools (Svoboda–Simán 1989, 306-307).

Over the last decades the Cserhát region (West-Central parts of northern Hungary) became an important region for studies consecrated to the Middle Palaeolithic and the Middle-to-Upper Palaeolithic transition with several well-preserved archaeological localities. One of the first assemblages was published from Csonkás Hill near Galgagyörk (Markó *et al.* 2002), recognized in 2001 during field surveys by A. Péntek. The small surface collected lithic assemblage including a hand axe, an asymmetric bifacial knife, several side scrapers and some circular scrapers, compared to the type called *groszak*, it was originally classified as a *Bábonyian* industry site (Markó *et al.* 2002).

In 2004 further artefacts including a hand-axe shaped tool made of andesite, a bifacially manufactured, but heavily damaged obsidian tool and a finely elaborated leaf shaped point from metarhyolite were published from the same site. Originally this later piece was compared to the artefacts from the Upper ('*Evolved Szeletian*') layer of the Szeleta Cave (Markó 2004), suggesting the presence of a possible multi-layer locality on top of the hill.

The rich and important surface collected assemblage from the nearby Legénd – Káldy farmsted (tanya) locality was also published as a *Bábonyian* locality (Markó–Péntek 2005). The assemblages from Legénd and Galgagyörk were compared to the published data from Miskolc–Kánás on the basis of the presence of circular scrapers (*groszak*) and the end scrapers made on blade-like flakes on the one hand, and the absence or sporadic occurrence of hand axes, as well as the low number of leaf shaped tools (at least

compared to the excavated assemblage from the nearby site of Vanyarc, see Markó 2007; 2011) on the other. On a larger scale, the artefacts of the *Bábonyian* assemblages in the Cserhát region were compared on typological grounds to pieces known from the radiocarbon dated layer 6a at the Kůlna Cave, in the Moravian Karst (Valoch 1988).

At the same time, the similarities in the raw material procurement strategies, reflected in these assemblages and the Vanyarc-type Middle Palaeolithic industry, especially, the elevated ratio of extra-local metarhyolite was also emphasized (Markó 2009).

2. The excavations at Csonkás Hill near Galgagyörk

Before the first excavations at the Csonkás Hill site the main question was the chronology of the human occupation. Namely, were the lithic tools 100 or 50 thousand years old, or, alternatively, did they belong to the last Interglacial and the Early Würm period (MIS 5) as suggested by Á. Ringer (1983) or the Interpleniglacial (MIS 3, see Markó–Péntek 2005). Another focus of the field work was to clarify the character of the human occupation, namely, if the *Bábonyian* entity can be regarded as an independent Middle Palaeolithic industry, as defined by Á. Ringer (1983), or rather as a workshop facies, as it was suggested by K. Simán (1990).

During surface collection work at Galgagyörk, most of the lithics were found on the western slope of Csonkás Hill, with only a few artefacts found on the plateau, suggesting that the artefact-bearing layer (or layers), most probably not disturbed by modern agricultural activities wer pushed out onto the slope. In the hope of documenting the stratigraphic position of two archaeological industries within a clear layer sequence, the first trenches were located at the inclination point of the plateau, close to place, where the '*Evolved Szeletian*' leaf point and obsidian bifacial tool (Markó 2004) were found.

During the first season in 2008, some 260 lithics were found at the depth of 61-80 cm beneath the present-day surface, in the uppermost horizon of a brown fossil soil and partly in the overlying yellowish-brown loam, containing numerous carbonate concretions ('loess doll-layer'). Moreover, in the stratigraphic sound, several wedges and polygonal structures, discovered by geomorphologist B. Bradák *(Fig. 1)* were documented, demonstrating the complexity of the assemblage formation. Finally, and rather surprisingly, a section of a later prehistoric feature with heavily eroded ceramic fragments and lithics from 'fresh' (*i.e.* not patinated) raw material were also excavated.

After a long break, in 2018, we had an opportunity to continue the excavations at Galgagyörk, when stratigraphic and OSL samples were also collected. As a total 21 m^2 have been excavated to date Altogether 437 lithics dated to the Palaeolithic period were collected. In the small trenches, 354 pieces were plotted in three dimensions.

Unfortunately, due to the unfavourable soil conditions, a single very poorly preserved fragment of a *Bison* tooth represents the palaeontological material from the site (analysed by I. Vörös, HNM).

3. Stratigraphic position of the Palaeolithic artefact-bearing layer *(Fig. 1)*

The layer sequences in the documented sections were not uniform, but basically, beneath the ploughed horizon, a reddish-brown Holocene humic soil, undisturbed by agricultural activities was found. In the underlying yellowish-brown level ('loess loam'), several dark brown lenses, probably documenting the sediment redeposition, were observed. A brown fossil soil was found beneath this layer. Finally, a pale, greyish yellow sandy sediment was excavated in the lowermost part of the stratigraphic sections. It was dissected by the wedge-shaped structures, as well as by biogalleries, both filled with material from the fossil soil. The polygonal structure was deformed along the direction of the slope *(Fig. 1)*.

The genetics of the 'loess doll layer' observed in the lower part of the yellowish-brown loam, as well as in the upper level of the underlying dark brown fossil soil, is not sufficiently clear: it may be interpreted as a feature of the Holocene pedogenesis, or, alternatively, it may be the carbonate accumulation level of a fossil forest soil missing from the studied sections, most probably due to erosion.

The artefacts, also covered with a thick carbonate layer came to light in the accumulation level, at a maximum depth of 75-100 cm beneath the present-day surface. Unfortunately, the available luminescence dates only yielded a very broad time range for the human occupation: ca. 40 ka for the yellowish-brown loam overlying the carbonate concretion level as well as the artefact-bearing layer and 95 ka for the underlying sediment.

4. Evaluation of the excavated artefacts

Several flakes of andesite, pieces of unpatinated ('fresh') lithics, including short end-scrapers and a polished flat axe in the assemblages collected from the surface were identified as belonging to the later prehistoric period, probably to the Neolithic (Markó *et al.* 2002). Rather unexpectedly, during excavations, a section of a feature, cutting the Palaeolithic artefact-bearing layer was documented. Only two 'fresh' hydroquartzite, a flake of andesite and a few very small and weathered sherds were found in the infilling of the pit. Due to these atypical finds, the age of the pit is not known exactly although it probably dates to the Neolithic or Copper Age.

4.1. Questions of lithic taphonomy

The redeposition of the sediments, documented by the presence of lens-like sedimentary units, the possible erosion or complete washout of a Pleistocene fossil soil indicated only by the carbonate concretion layer, the presence of the polygonal system resulting from cryoturbation or extremely arid conditions and, finally, the solifluction documented by the deformed polygonal system clearly show, that the artefact scatters were affected by a number of factors after the abandonment of the site as well as after the sedimentation of the artefact-bearing layer.

Moreover, the presence of the thick carbonate layer covering the lithics, the dissolution of the bones during the pedogenesis, as well as the very poor preservation of the single tooth fragment suggest the possibly complex taphonomic history of the artefacts and the biofacts. An important question is the extent of these factors, namely, does the preservation of the artefact-bearing layer allow the chronological and cultural questions to be answered or not?

During field work, the in situ fragmentation of the lithics was observed several times *(Fig. 2a-b)*, partly due to the low quality of the raw material that had been used. The distance of the conjoined fragments was, however, only a few centimetres, suggesting that only a slight horizontal displacement of the artefacts can be demonstrated.

Fig. 1. *Galgagyörk – Csonkás Hill: wedges and polygons excavated in 2008. Photo by András Markó.*

Furthermore, of the 319 lithics, when the orientation of the piece was documented during the field work, 161 artefacts were excavated in a vertical position, 69 pieces in an oblique position and finally, 89 lithics were found lying in a horizontal position, suggesting that cryoturbation may have affected the layer containing the artefacts (Lenoble–Bertran 2004, 466: with further references).

Altogether, although the artefacts and the artefact-bearing layer were affected by numerous factors, in our view, the lithic industry excavated in a relatively thin layer (ca. 25 cm) is fragmented, but basically well preserved and could be excavated in a *'quasi in situ'* position.

4.2. Raw material groups (Table 1, Fig. 3)

The most important local raw material types known from the Cserhát region are medium to low quality siliceous rocks of hydrothermal origin (hydrosilicite and limnic silicite, or, following the petrographic terminology used in Hungary, hydroquatzite and limnic quartzite). It is known that the nearest sources for these rocks lie in the vicinity of Csonkás Hill, at Püspökhatvan in the Galga valley (Markó 2005). Moreover, further outcrops were identified east of Galgagyörk village, at the archaeological locality called 'Komárka'. Further sources of this rock type have also been found in the vicinity of Bér and Buják villages.

One unusual features of the assemblage is the intensive utilisation of glassy basaltic andesite (Judik *et al.* 2001), originally linked to Neolithic ground stone axe production (Markó *et al.* 2003). During the excavations, however, it became evident, that this same raw material was also used during the Middle Palaeolithic with evidence of local raw

Fig. 2. *In situ fragmentation of lithic artefacts (refit groups 3 and 4). Photo by András Markó.*

raw material	n	%
hydroquartzite (hydrosilicite)	264	60.41%
andesite	96	21.97%
silicieous pebble	4	0.92%
radiolarite pebble	1	0.23%
quartzite pebble	6	1.37%
metarhyolite (felsitic porphyry, 'quartz porphyry')	56	12.81%
obsidian	4	0.92%
burned silex	6	1.37%
Total	**437**	**100.00%**

Table 1. *Raw material distribution of the Palaeolithic artefacts excavated at Csonkás Hill (2008, 2018).*

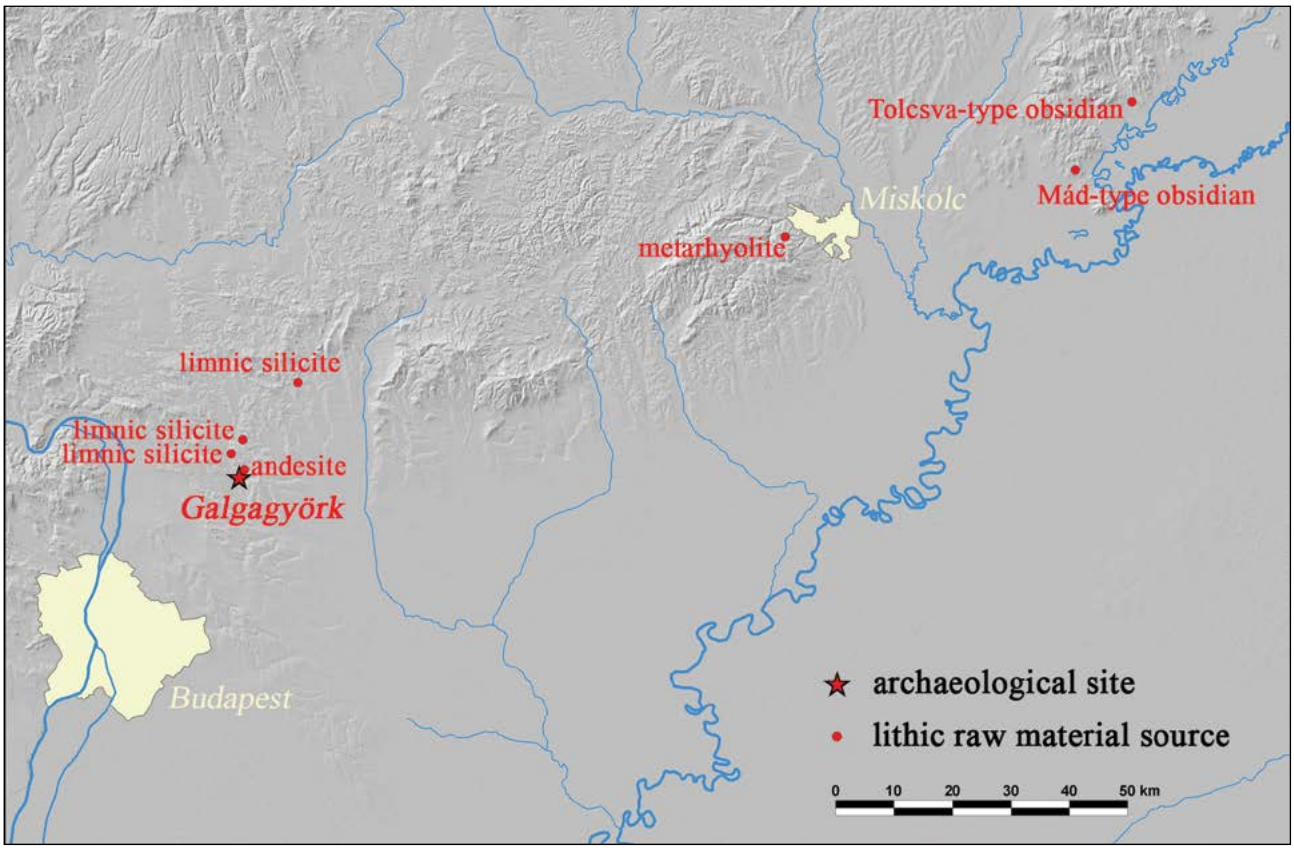

Fig. 3. *Raw material sources exploited in the excavated assemblage. Map by Balázs Holl, Hungarian National Museum.*

material exploitation *(Fig. 4)*, including two cores *(Fig. 6)*, as well as typical retouched tools *(Figs. 7-8)*. The source of this peculiar rock was identified only few hundred metres from the Csonkás Hill site, on the western part of Ecskend Hill, where volcanic bombs of this special variant was found in an abandoned quarry.

Large pebble scatters of Miocene/Oligocene age have been found in the Galga valley, close to the locality. However, in the Csonkás Hill assemblage, radiolarite, quartzite and not specific siliceous pebbles played a subordinate role in lithics production: beside the flakes and fragments, a single core of radiolarite pebble *(Fig. 10, 4)* and a side scraper of quartzite are worth mentioning.

The most important extra local raw material in the Cserhát Middle Palaeolithic assemblages is the metarhyolite. There is a single outcrop in the southeastern area of the Bükk mountains, lying 100 km from the Csonkás Hill site. In the studied assemblage, this raw material represents more than 10% of the excavated assemblage and includes three side scrapers, two end scrapers and two bifacially retouched pieces.

Obsidian is another characteristic raw material from the Carpathian Basin, represented by four pieces in the excavated assemblage. Three of them are of the non-transparent grey coloured variant with the source area lying east of Mád (150 km from Csonkás Hill) and a single piece of the black Tolcsva variant, imported to the site from 165 km away.

Finally, during the excavations, no clear evidence of fireplaces were documented and only a few charcoal grains were found. However, traces of burning were observed on six artefacts. Possibly, features connected to fire did not fall into the same location as the small trenches. Alternatively, the fine cracks observed on the surface of the pieces were possibly caused by the water content of the poor-quality rock and frost.

During field work, several artefact-concentrations were partly documented. The Mád type obsidian artefacts were found in the less dense scatters, while the Tolcsva-type chip came to light in an otherwise isolated place *(Fig. 5)*. The metarhyolite artefacts are also underrepresented in the most important find concentration, dominated by the pieces of local limnic silicite and andesite. In the future these preliminary observations concerning the differences in the raw material groups should be checked by further excavations.

4.3. Preliminary technological observations

In the assemblage there are eight cores and core-like pieces. Five, made of hydrosilicite, are in fact, pieces with a few scars, occasionally on-site fragmented in several pieces *(Fig. 2a)*. The two andesite cores are characteristic pieces following the discoidal and subdiscoidal (or, bifacial and unifacial discoidal) concept *(Fig. 5)*. Finally, the only artefact made of radiolarite is a unidirectional core with a prepared platform of a small pebble *(Fig. 10, 4)*.

Moreover, two thinning flakes of metarhyolite and a working edge rejuvenation flake of limnic quartzite document on-site tool manufacture and rejuvenation of both the local and non-local raw materials in the assemblage.

4.4. Typological evaluation (Table 2)

During the excavations 27 retouched pieces and several fragments were collected. Generally, side scrapers dominate the small tool kit. Five are simple side scrapers made from andesite, metarhyolite *(Fig. 7; 10, 3)* and quartzite. Double scrapers are represented by four pieces of limnic silicite, metarhyolite and andesite *(Fig. 9, 4; 12, 4-5)*. The inverse side scraper *(Fig. 8)*, as well as two retouched flakes, classified after the non-continuous secondary modification along one of the edges were also made of andesite. The transversal scraper of metarhyolite was made on a plunging flake *(Fig. 12, 2)*, and finally, there is a convex side scraper *(Fig. 9, 1)*, a bifacial side scraper *(Fig. 11, 4)* and a convergent tool *(Fig. 9, 5)* both of limnic silicite in the assemblage.

In the assemblage end-scrapers are represented by six pieces. Two were made on short flakes of Mád-type (grey) obsidian and metarhyolite *(Fig. 10, 2)*. Their morphology clearly differs from the *groszak* type, also known from the surface collection at Galgagyörk and Legénd (Markó *et al.* 2003; Markó–Péntek 2005). Instead, the shortness of the tools is rather the result of the blank fragmentation of the extra-local rock. Two end-scrapers were thinned on their ventral face *(Fig. 10, 1; 11, 3)* and finally, the retouched edge of a single end scraper of limnic silicite (or, possibly, siliceous pebble) was formed along the lateral edge of a thick flake *(Fig. 11, 2)*. A similar piece, clearly different from the convex side scrapers, was collected during field surveys on the plateau site near Debercsény, in the northern part of the Cserhát region (Markó 2009a). Finally, a fragment of limnic silicite end scraper was also found during the excavations.

Bifacial tools, and especially, asymmetric backed knifes and hand-axes are characteristic elements of the industries belonging to the *Micoquian / Keilmessergruppe* circle. Although characteristic pieces were collected during surface collection, these characteristic forms are absent from the excavated assemblage.

A finely elaborated bifacially worked, but unfortunately, fragmented point was made from metarhyolite *(Fig. 12, 1)*. Another piece of the same raw material is a limace-shaped tool worked bifacially only along the right edge. This tool is also fragmented, as the step-like scars on the proximal part of the piece show *(Fig. 12, 3)*.

The leaf shaped scraper *(Fig. 11, 2)* of limnic silicite was found in a vertical position during excavation. It was fragmented after sedimentation without spatial displacement. The last bifacial tool, a half made implement of very low quality limnic silicite was shaped by using the characteristic *Micoquian* method (WGK: *Fig. 11, 1*). However, the distal part of this tool was fragmented and the interpretation of the manufacture of the ventral side is rather problematic, because of the nonintentional chips caused by the cleavage planes and mineral inclusions in the raw material.

5. Discussion

After the short overview, it is obvious that the characteristic tool types of the *Bábonyian* (*i.e. Micoquian / Keilmessergruppe*) such as the *groszak*, backed knife and hand axe are absent from the excavated assemblage from the Galgagyörk–Csonkás Hill site.

On the basis of a few dozens of surface-collected typical tools (Ringer 1983), the assemblage was identified as the Bábony type, Middle Palaeolithic entity. Although numerous excavations were carried out on the eponymous site of this industry, at Sajóbábony–Méhész-tető (1974: V. Dobosi, 1986, 1991: Á. Ringer, 1997-1998: Á. Ringer and B. Adams, 2019-2022: A. Lamotte and Zs. Mester), with the exceptions of the field work led by V. Dobosi (1987-1988), no detailed reports have been published until now. Some

	hydroquartzite	andesite	metarhyolite	obsidian	quartzite	Total
leaf-shaped point			1			**1**
leaf-shaped scraper	1					**1**
limace			1			**1**
half-finished bifacial tool	1					**1**
Bifacially retouched implements	*2*		*2*			***4***
simple straight side scraper		3	1		1	**5**
simple convex side scraper	1					**1**
inverse side scraper		1				**1**
transversal scraper			1			**1**
double side scraper	1	1	2			**4**
convergent scraper	1					**1**
bifacial side scraper	1					**1**
Side-scrapers	*4*	*5*	*4*		*1*	***14***
retouched flake		2				**2**
end-scraper on short flake			1	1		**2**
lateral end-scraper	1					**1**
end-scraper with ventral thinning	1		1			**2**
fragment of end-scraper	1					**1**
End-scrapers	*3*		*2*	*1*		***6***
Total	**8**	**9**	**7**	**1**	**1**	**27**
fragment of retouched edge	4	1	1	1		**7**
fragment of bifacially retouched edge	1					**1**

Table 2. *Typological composition of the excavated Csonkás Hill assemblage (2008, 2018).*

Fig. 4. *On-site exploitation of andesite raw material (refit group 2). Photo by András Markó and József Rosta, Hungarian National Museum.*

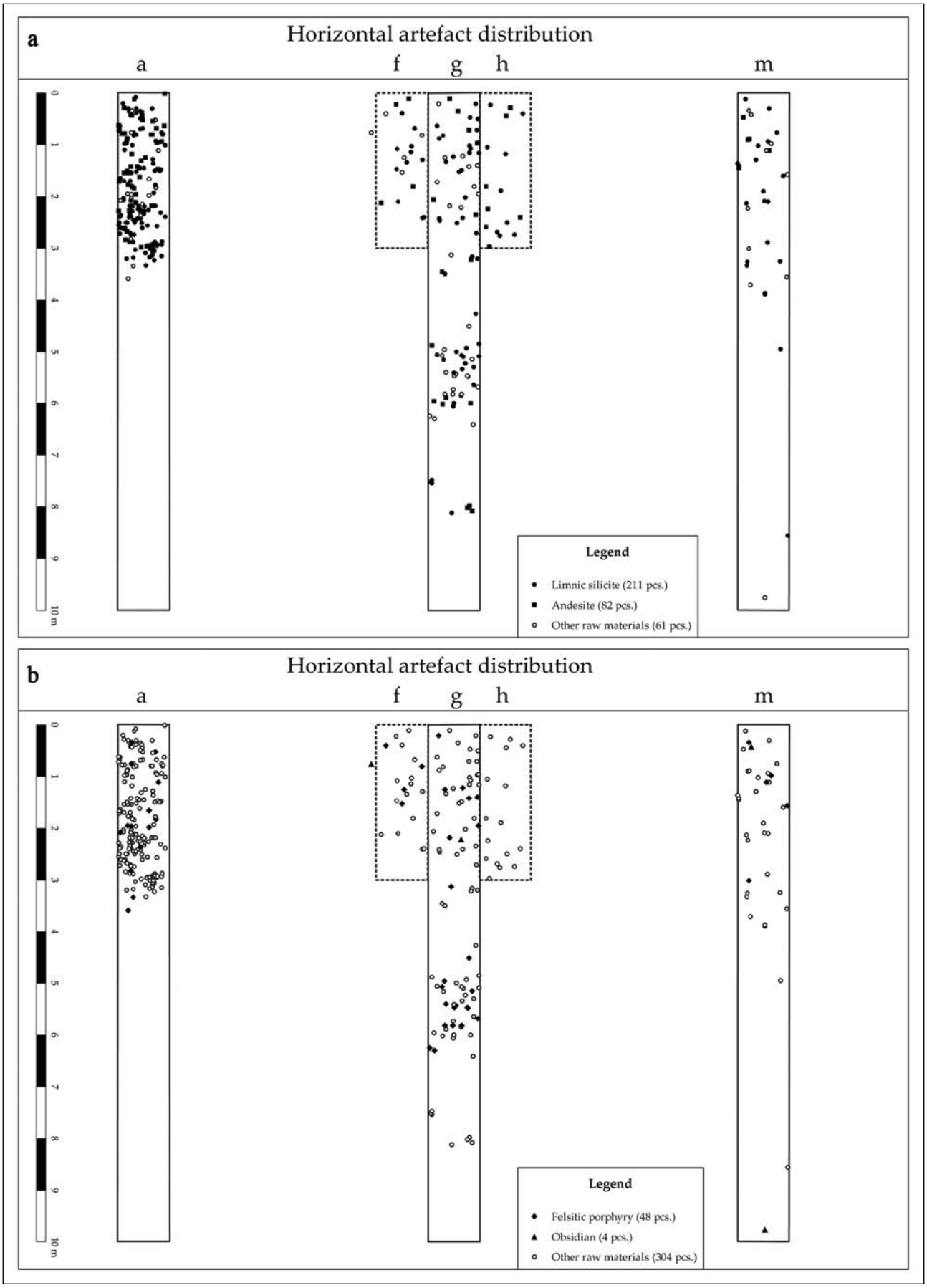

Fig. 5. *Spatial distribution of the artefacts made from local (a) and extra-local (b) raw material. Ground plan by Attila Péntek.*

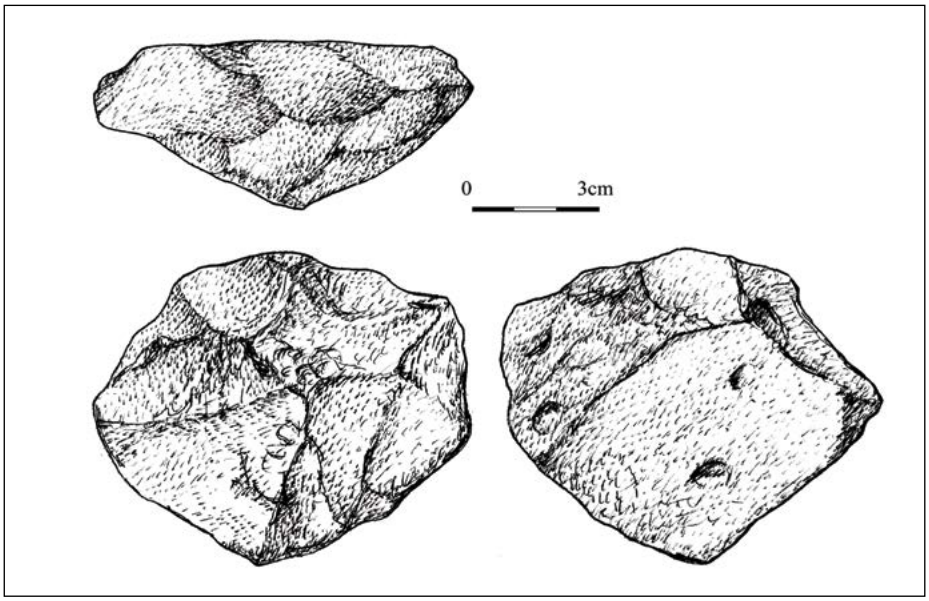

Fig. 6. *Discoidal andesite core excavated at Csonkás Hill. Drawn by Katalin Nagy.*

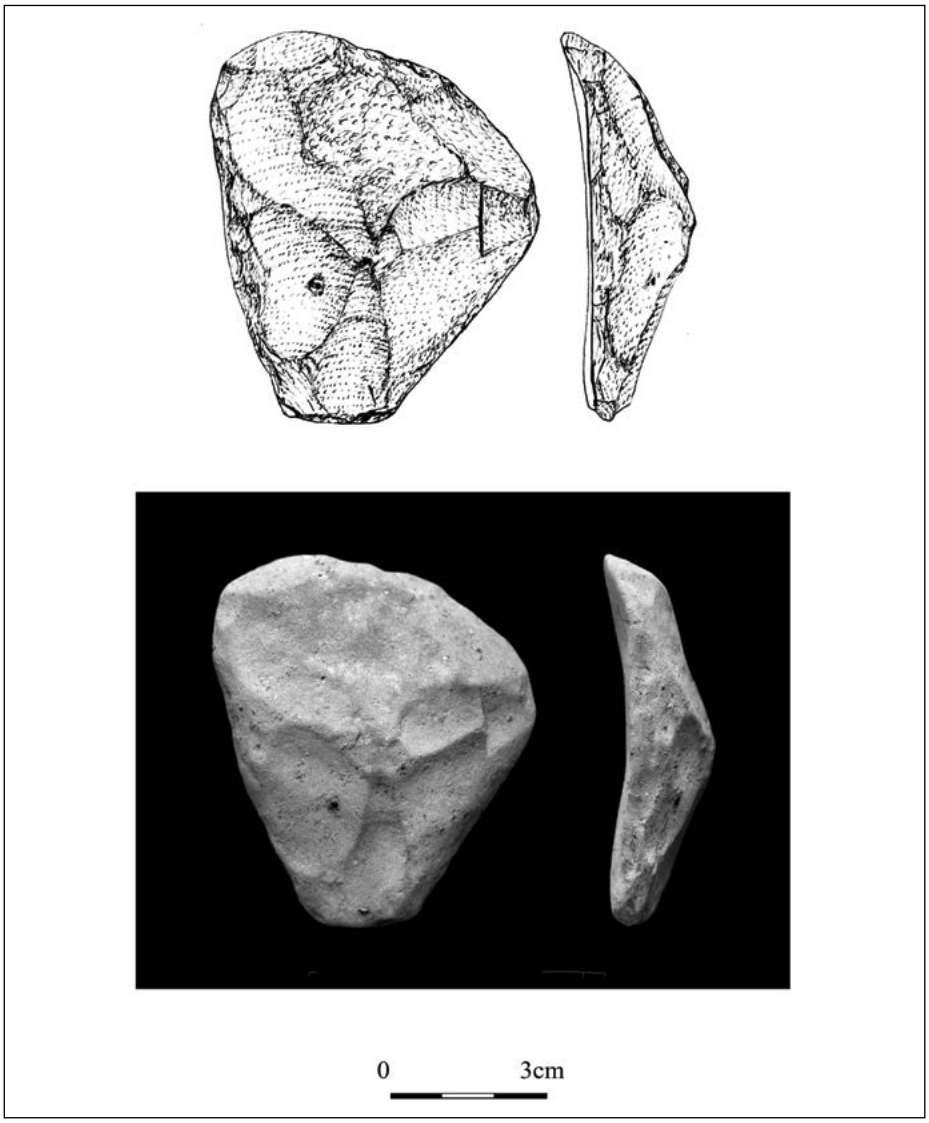

Fig. 7. *Simple side scraper manufactured on an andesite flake.*
Drawn by Katalin Nagy and photo by József Rosta, Hungarian National Museum.

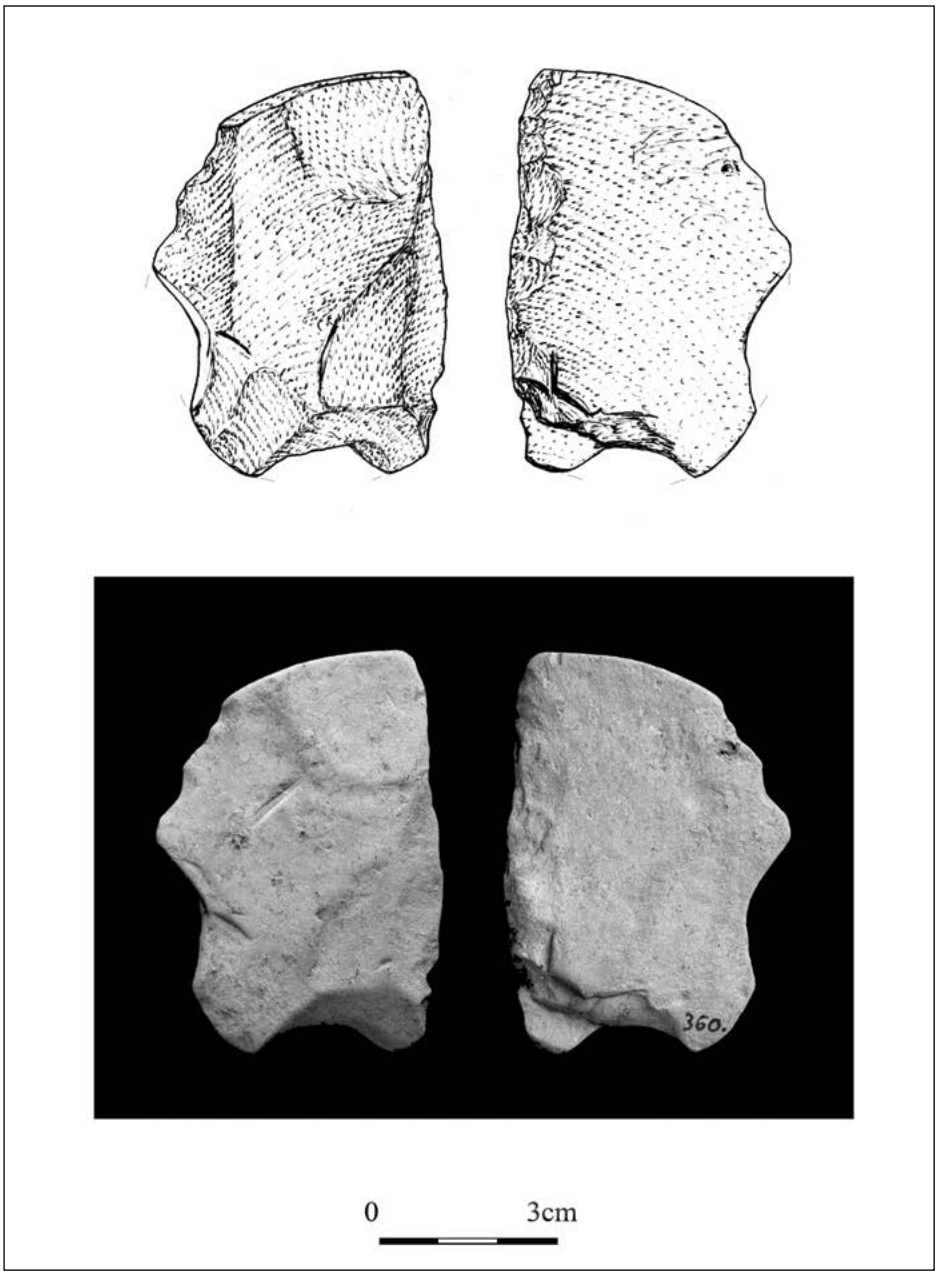

Fig. 8. *Inverse andesite scraper.*
Drawn by Katalin Nagy and photo by József Rosta, Hungarian National Museum.

of the recent papers (Mester –Lamotte 2024) suggest that during the Sajóbábony excavations both Middle and Upper Palaeolithic type tools were found. The stratigraphy and the spatial distribution of the artefacts from these two periods was not, however, discussed in detail. Thus, it is not sufficiently clear, how the *Bábonyian* assemblage from the eponymous site should be classified, and more generally, what the typological and technological character of the *Bábonyian* industry itself really is.

On the other hand, the term '*Szeletian*' is also problematic, as it is not clear if this entity is present in the assemblages of the eponymous site at all (Markó 2016). To illustrate the problems, the bifacially shaped implement (*Fig. 14, 2*, see Kadić 2015, 237. nr. 19), generally regarded as typical for the industry of the cave (Prošek 1953, 147, 190-191, Tab. VI, 9; Hauck *et al.* 2016, Fig. 3,2;). Zs. Mester (2010, 120, Fig. 5,6) has been classified as a Jankovichian tool, but, at the same time, it was claimed that *Early Szeletian* and *Jankovichian* bifacial tools belong to the same archaeological unit (Mester 2010, 120-121). In fact, this piece, associated with the iconic '*Evolved Szeletian*' leaf shaped tool (*Fig. 14, 1,* see Kadić 2015, 257. nr. 87) and several bifacially manufactured fragments, as well as a retouched blade *(Fig. 13, 2)*, erroneously classified as a Late Gravettian shouldered point (Lengyel *et al.* 2016, 178, *Fig. 4, 8*) came to light in layer 5, clearly postdating the youngest radiocarbon age published by Hauck and his colleagues (41.6 ka cal BP for the lowermost level of layer 4), interpreted as the end of the *Szeletian* occupation of the cave (Hauck *et al.* 2016, 282, *Tab. 4*).

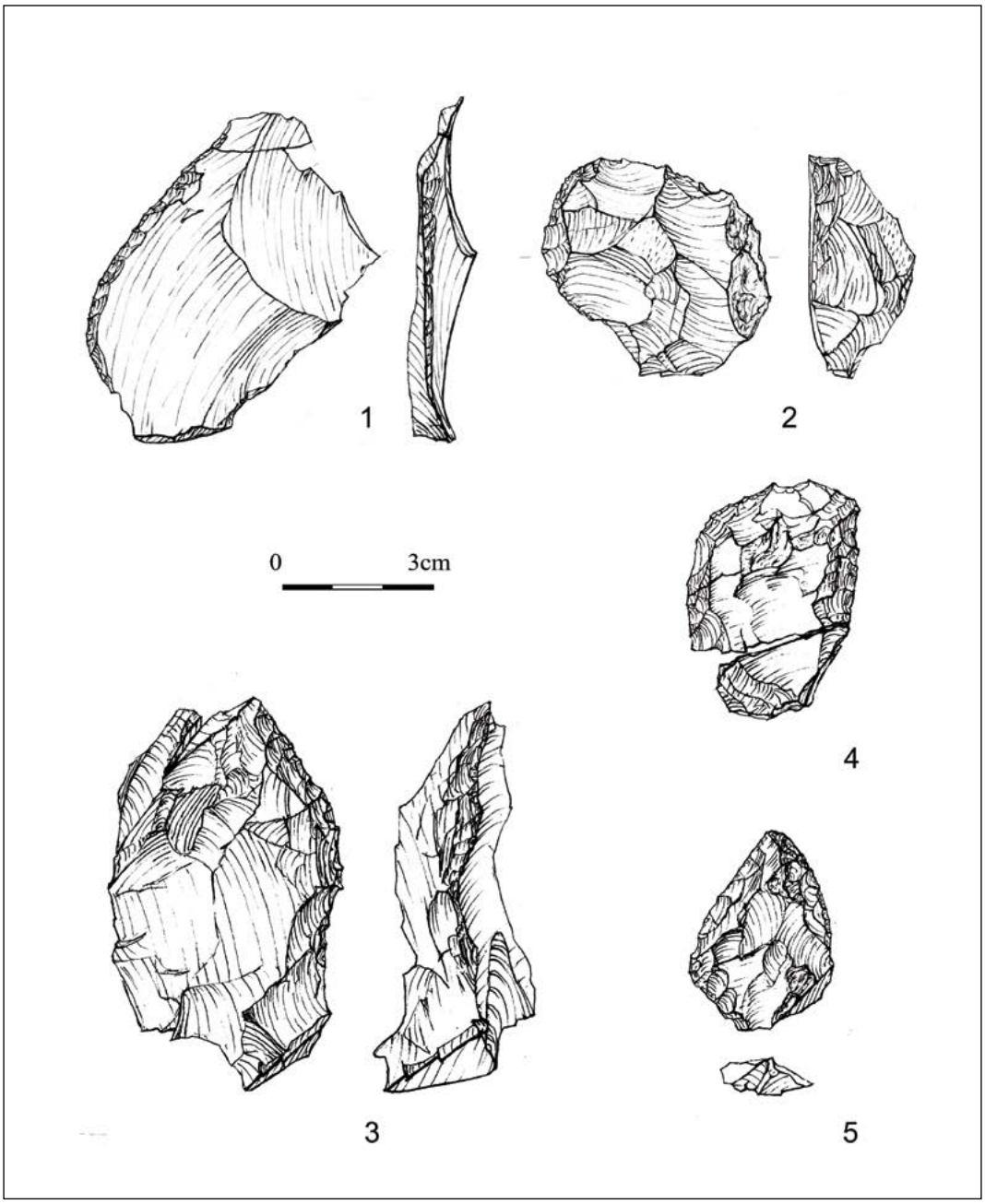

Fig. 9. *Limnic silicite flake tools excavated at the site. Drawn by Katalin Nagy.*

In our view, the cultural interpretation of the characteristic lithics collected from 4 m^2 and a single stratigraphic unit is rather challenging. Here, it is suggested that the term '*Szeletian*' should be used for the industries known from the Bükk mountains and not for an industry with a broad Central European distribution.

Recently, I have suggested that the excavated Galgagyörk, Vanyarc and Szécsénke assemblages from the Cserhát area belong with to the same Late Middle Palaeolithic leaf-point industry (*Blattspitzenindustrie*: Zandler *et al.* 2021). The Csonkás Hill assemblage probably represents an archaeological assemblage of the 'pioneers' who arrived in the region and still had no knowledge about raw material sources in the Cserhát mountains. That is why andesite and poor quality hydrothermal rocks are well represented in the excavated material. At the same time, the leaf point dominated Vanyarc assemblage with an exceptionally high ratio of extra-local raw material most probably belonged to a highly mobile (probably hunting) group, regularly moving along the range of the northern mid-mountains. Finally, the end-scraper dominated Szécsénke assemblage with an absolute dominance of local raw materials represent the assemblage type, generally called *Szeletian* e.g. in Moravia (but which is absent from the Szeleta Cave itself).

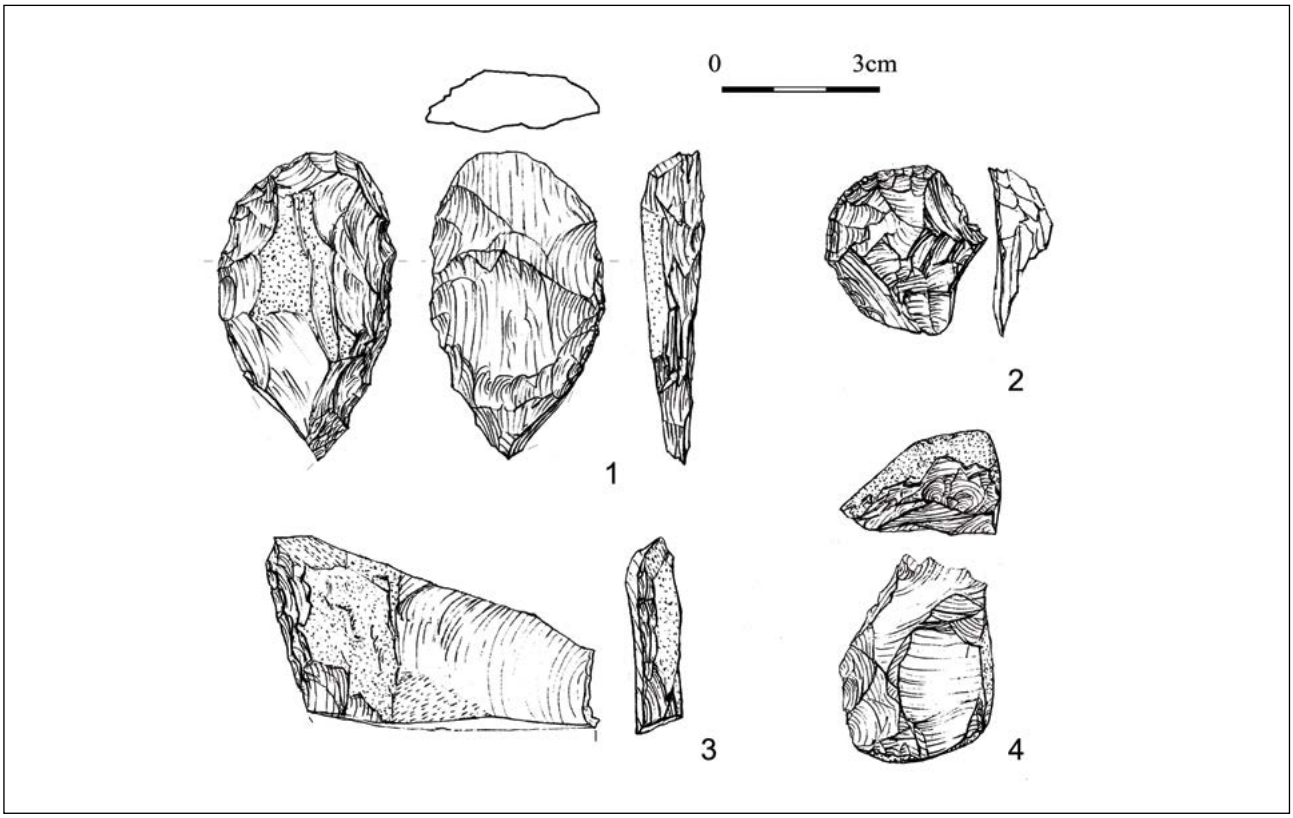

Fig. 10. *Metarhyolite flake tools (1-3) and a radiolarite core (4) excavated at the site.Drawn by Katalin Nagy.*

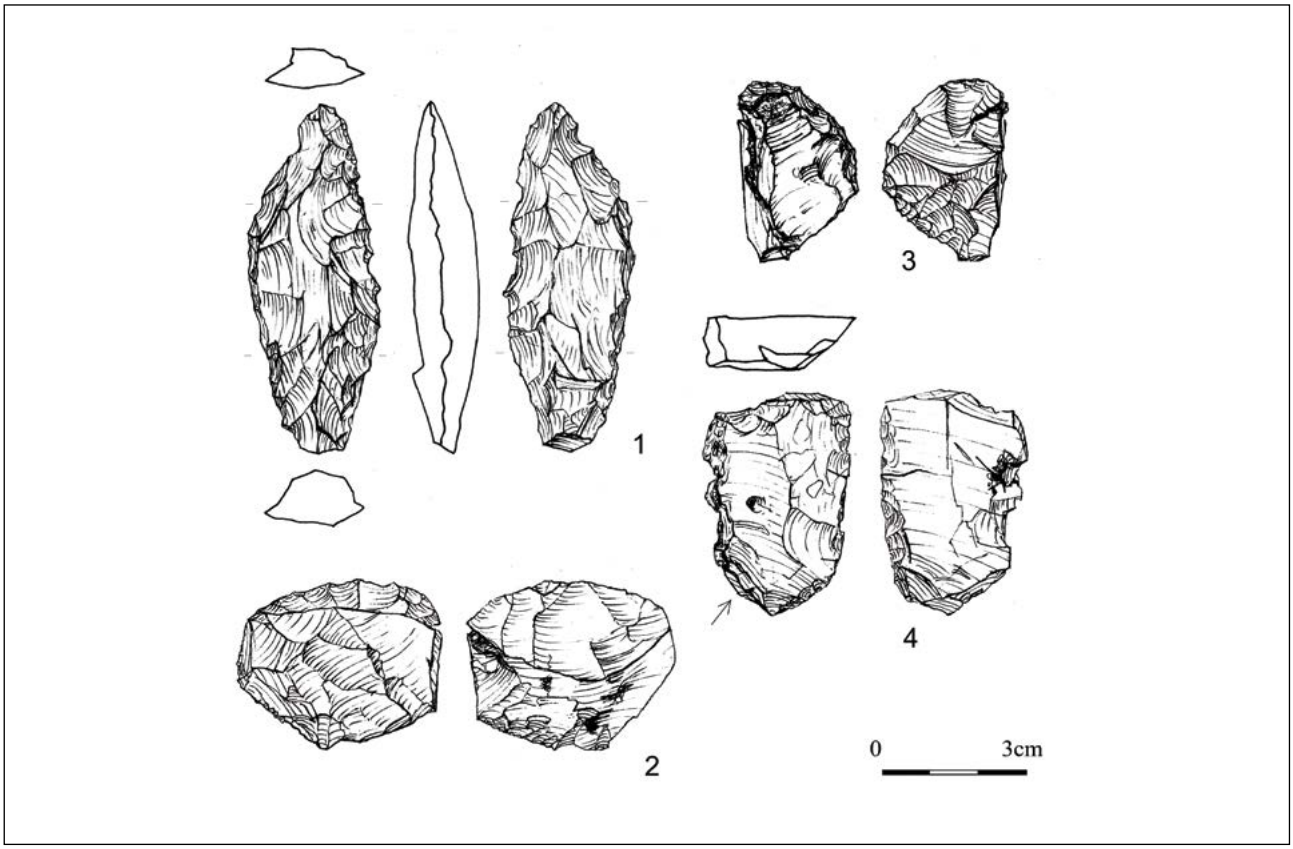

Fig. 11. *Bifacial tools produced from hydrothermal raw material types. Drawn by Katalin Nagy.*

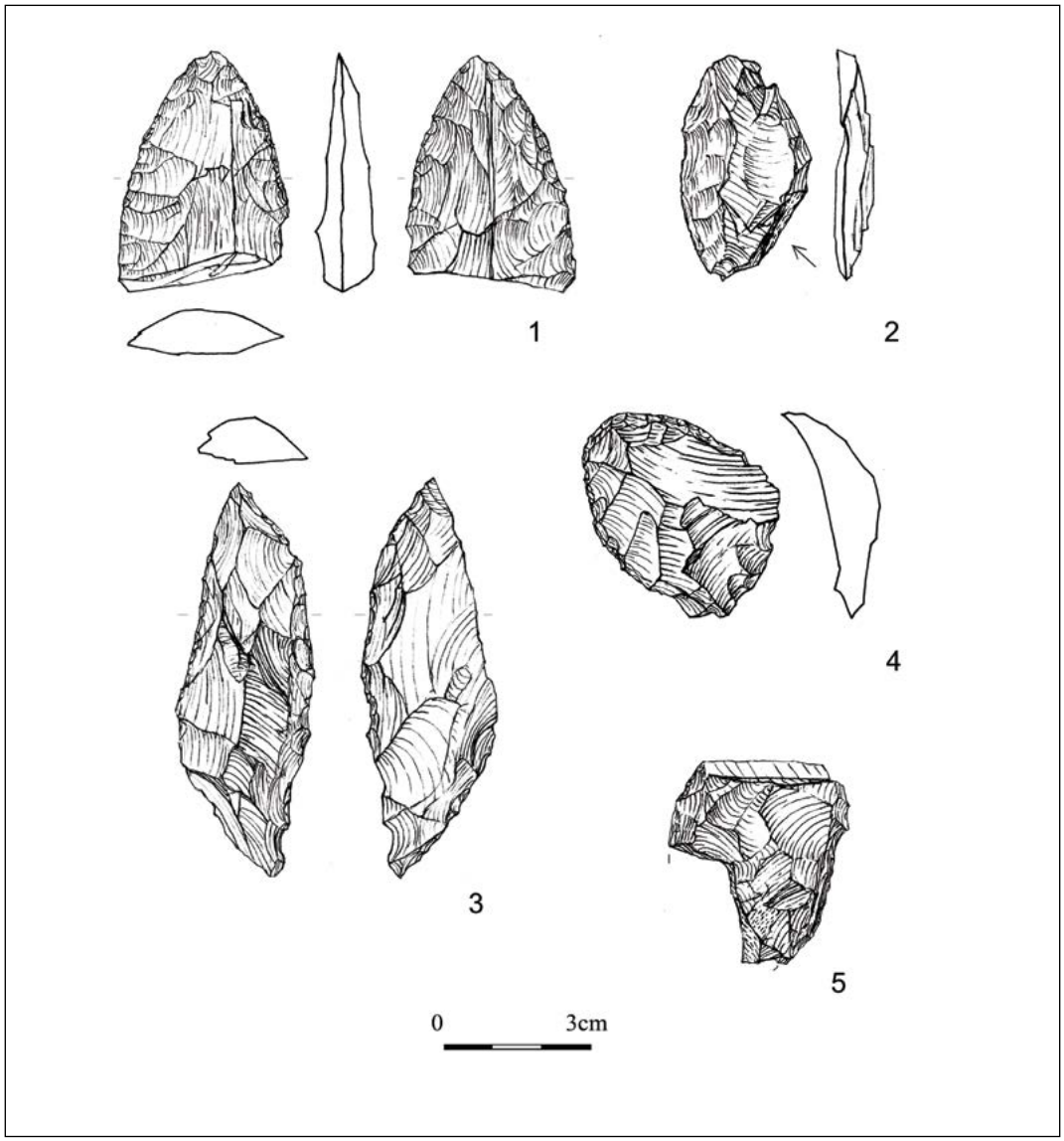

Fig. 12. *Metarhyolite bifacial tool. Drawn by Katalin Nagy.*

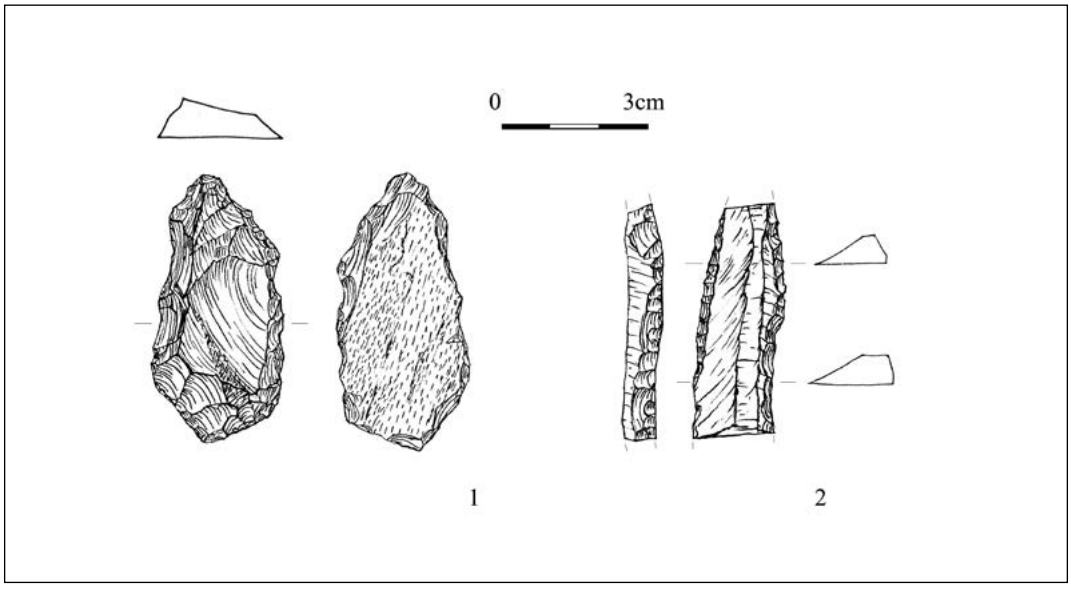

Fig. 13. *Lithics from the reddish brown layer 5 at the rear of the Szeleta Cave. Drawn by Katalin Nagy.*

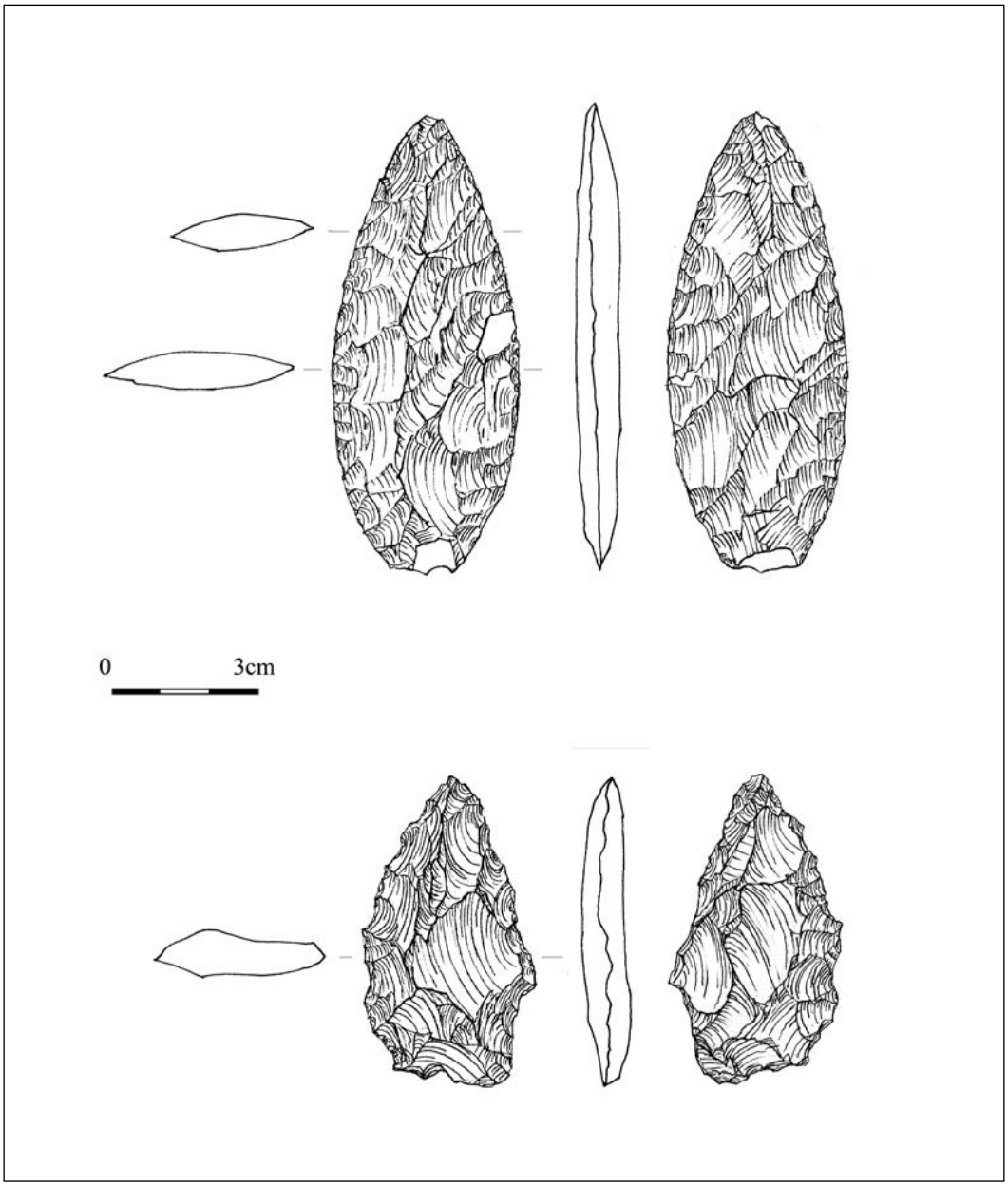

Fig. 14. *Leaf shaped implements from the reddish brown layer 5 at the rear of the Szeleta Cave. Drawn by Katalin Nagy.*

6. Conclusions

In our view, the original *Bábonyian* classification of the surface collected assemblage from Csonkás Hill near Galgagyörk was erroneous, as this entity has not yet been convincingly defined. Instead, the formerly classified *Bábonyian* assemblages from the Bükk region and the Cserhát area as well as in the Eger region (Kerekes *et al.* 2024) should be interpreted as part of a regional system, as was first suggested by Katalin Simán.

In the case of the Cserhát localities, we suggested several facies based on the analysis of the raw material groups and the typological traits. The character of the Sajóbábony site is not yet clear, but the assemblage, from several seasons of excavations, offers a good opportunity to test the ideas proposed by Katalin Simán, concerning the character of the human activity at that time and place as well as the connection with nearby localities, including the hunting station at the Szeleta Cave.

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Palaeolithic Settlement Patterns in Hungary: Revisiting Katalin Simán's model

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Abstract: *In 1988, Katalin Simán established a model for categorizing Palaeolithic sites in Northeastern Hungary, based on the properties of the archaeological material, such as the proportion of local, regional and extralocal raw materials, as well as the composition of the faunal remains. She distinguished three main settlement types: base camp, temporary (hunting) camp and workshop. Since, the related methodologies and research fields (archaeozoology, lithic technology) have developed considerably, resulting in a more complex approach to the problem of Palaeolithic settlement. In this paper, we want to pay tribute to Simán's scientific work by reconsidering her model. By reviewing the possibilities provided by the new methodologies and approaches, our aim is to illustrate how they contribute to the archaeological interpretation of the Palaeolithic sites.*

Keywords: *archaeozoology, lithic technology, spatial organisation, activity areas, taphonomy, palimpsest, ethnoarchaeology*

1. Introduction

Katalin Simán (1955–2023) was a remarkable researcher of Palaeolithic archaeology in Hungary (T. Biró 2023; Mester 2023). She was part of a generation that contributed to the renewal of Hungarian research by new ideas and new approaches of the international scientific community. Her publications witness her interest in a wide range of archaeological problems and methods of the period. She dealt with the provenience and the procurement of raw materials, including mining (Simán 1979, 1986, 1989, 1991, 1995a; Takács *et al.* 1984); the technology of stone tool production (Simán 1995b, 2000); settlement patterns on a regional scale (Simán 1988; Dobosi–Simán 2000); and the general problems of human populations, cultures, and behaviour (Simán 1990a, 1990b, 1995c, 2006; Svoboda–Simán 1989).

In this paper, we want to pay tribute to her scientific work by reconsidering her model concerning the interpretation of Palaeolithic sites as settlement types (Simán 1988). Our aim is not criticism but rather to review where we are now.

2. Simán's model of settlement pattern reconstruction

After the Hungarian National Museum, the Herman Ottó Museum in Miskolc is the most important centre of Palaeolithic research in Hungary. The reason is historical: the final impulse for establishing the museum was given by the discovery of the famous 'handaxes' from Bársony's house in the city of Miskolc in 1891 and the lively debate about them (Herman 1893; Kadić 1934; Szentesi 2003). As a consequence of the debate, excavations actively supported by the museum also started at Szeleta Cave in 1906 to find traces of the Palaeolithic people in the neighbouring Bükk Mountains (Kadić 1916; Mester 2002). The museum became the principal museum of Borsod-Abaúj-Zemplén County, and the investigations eventually extended over the whole county.

Katalin Simán began work at the Herman Ottó Museum in 1978 as an archaeologist specialised in the Palaeolithic. After almost ten years of research in the field and in the museum collection, she proposed a synthesis of the different cave and open-air sites of the county, especially their interpretation as settlements (Simán 1988). The theoretical basis of her analyses was the assessment that favourable settlement conditions determined where Palaeolithic human groups settled. As the main components of such conditions include the distribution of natural resources, such as water (hydrography), food (prey animals), and lithic raw materials (siliceous rock occurrences) must be considered. These two latter resources are archaeologically visible.She categorized the Palaeolithic sites of the county by geographic location, faunal composition found at the site and the proportions of raw materials on the site. She developed a model from the conclusions of her analyses *(Table 1)*.

Apparently, these analyses were inspired by two approaches that were very influential in the 1970s and early 1980s: on the one hand, the methodology connected to the zoology of hunting, developed by V. Gábori-Csánk and M. Kretzoi (1968), and the idea of specialized hunting (Gábori 1976, 197–206; Gábori–Gábori-Csánk 1977). On the other hand, she was also involved in the identification of raw materials and provenience studies (T. Biró 1986, 1987, 1988; Takács *et al.*, 1984). However, both approaches were dynamically changing at that time, becoming increasingly complex. This suggests that a reconsidartion of Simán's idea about settlement types is now in order.

3. The archaeozoological aspect

V. Gábori-Csánk and M. Kretzoi developed their methodology while they were analysing the animal bone assemblages unearthed at the Middle Palaeolithic site

Group	Location	Fauna	Raw material	Settlement type
I	caves in the mountains	species of the woodland landscape dominate	extralocal	temporary hunting camp
II.1	caves or open-air sites on the periphery of the mountains	species of the woodland landscape dominate	local	local adaptation (base camp)
II.2	caves or open-air sites on the periphery of the mountains	species of the steppe landscape dominate	local	workshop if local raw material is dominant, otherwise base camp
II.3	caves or open-air sites on the periphery of the mountains	species of the steppe landscape dominate	extralocal	temporary camp
III	open-air sites in open landscapes	species of the steppe landscape dominate	mainly local	workshop if local raw material dominate, otherwise base camp

Table 1. *Categories of site characteristics in Simán's model.*

of Érd. Because the fauna was dominated by cave bears on an open-air site, all the bones were considered to be anthropogenic, the result of human hunting activity. On this basis, all analyses aimed at demonstrating the specificities of the hunting activity: identification of the prey animals and the intensity of their hunting, modifications in the orientation of the hunt over time, the treatment of the prey, the quantity of procured meat, and seasonality in the hunting activities. The conclusion was that the site could be interpreted as a base camp for specialised cave bear hunters.

Modern archaeozoologists (or zooarchaeologists) looks at the osteological material from sites as a bone accumulation that was the result of the effects of different kinds of accumulation processes. Besides humans, predator animals, natural biological effects (like mortality), as well as geomorphological and climatic processes can also be taphonomic agents. Taphonomic analysis of the material is crucial for distinguishing between the role of human and non-human agents (Speth 1991). For a better understanding of the role of other predators, comparisons have been made with materials from actual and fossil carnivore dens, and carnivores' ethology and behaviour (Binford 1981; Blumenschine 1986; Fosse *et al.* 1998; Horwitz 1998; Brugal–Fosse 2004). Human activity is considered more complex than earlier thought: the focus shifted from hunting to subsistence behaviour (Patou-Mathis 1993, 1997). Moreover, ethnoarchaeological studies also help in the interpretation of archaeological remains for reconstructing past human subsistence strategies (Binford 1981, 2002, 51–56; Beyries 1997).

Using these methodologies, the archaeozoological analyses of the bone materials from Érd and Subalyuk Cave resulted in a completely different image of these sites. At the site of Érd, the age distribution of cave bears followed a natural mortality profile (Daschek 2014; Daschek–Mester 2020). Cave bears used the two small valleys as places of hibernation. In contrast, the age profile of the cave hyaenas did not correspond to the mortality curves from a den because of the absence of juveniles. They used the sites as a place of consummation, as demonstrated by gnawing damages and coprolites. The remains of horse and rhinoceros suggested that these animals were hunted and scavenged by both humans and hyaenas. The presence of lithic tool production and hearths proved human occupations too. Based on these new data, the site can be interpreted as a place alternatively used by cave bears, hyaenas and humans.

At Subalyuk Cave, the results of the archaeozoological analysis of the animal bones by layers suggested a similar picture: the cave was used alternatively by cave bears, carnivores (hyaenas and wolves), and humans (Mester–Patou-Mathis 2016). The very different numbers of lithic artefacts in the layers already argued for different kinds of human occupations, from short visits to longtime camps. However, there are interesting layers where the conclusions that can be drawn from the lithics and the bones do not correspond. In layer 1, the 23 lithic remains, including only two side scrapers, testify to a very short stay by Neanderthals at the cave. But according to the anthropogenic marks on the bones of two horses, two chamois, one red deer, and one rhinoceros show that humans processed the carcasses in the cave. They did not stay for a longer time because the cave would have been quite humid at that period during the Last Interglacial, based on the traces of climatic effects on the bone surfaces. In layer 3, the 758 lithic artefacts, including 105 tools, reflect the presence of a hunting camp. It is confirmed by the skeletal remains of 36 individuals of ibex hunted by humans. At least 15 ibex were brought to the cave as whole carcasses. However, the cave bear bones in the layer testify to a den where females hibernated with cubs. The absence of the characteristic traces of the physical effects on the bones resulting from contact with bears (shuffling over and trampling) together with anthropogenic marks demonstrate that cave bears used the cavity before or long after the human occupation. Much more interesting are the controversial situations in layers 7 and 9. In layer 7, the 82 artefacts (13 tools) suggest this site was a temporary camp of hunters, but there were a few bones of cave bear and cave hyaena. Thus, the cave served as a den for these animals. In contrast, in layer 9, nine artefacts not made into tools, were found. However, the ibex bones demonstrate that these were prey animals

given their treatment (dismembering, removing the flesh) by humans. The 4328 lithic artefacts (183 tools) provide clear evidence that there was a human occupation in layer 11. Animal bones from five horses, two ibex and two chamois evidenced the variety of hunting prey butchered at the camp. Moreover, the cave served as a den for cave bears and other carnivores too, based on the presence of their bones in this layer as well. Unfortunately, no bones can be preserved on open-air sites of the region because of chemical properties of the sediments. However, in order to reconstruct site function, it is just as important to explore the impact of natural agents on the bone accumulation, for example, in caves. Such impacts are always a possibility at a Palaeolithic site.

4. The raw material aspect

From the early 1980s, the study of the problems related to raw materials has developed in several ways (Mester *et al.* 2022, 2024a). The first is provenience studies. This research direction comprises macroscopic and petrographic analysis of the siliceous rocks in the archaeological material and comparing them to rock varieties known from geological sources (T. Biró 2004). Systematic field surveys for detailed mapping of siliceous rock occurrences yielded methodological developments in France (Demars 1982). A. Turq (2000, 2005) categorised lithic raw material occurrences in the landscape and defined four types of sources: primary and secondary autochthonous sources, sub-allochthonous sources and allochthonous sources. This categorisation of lithic resources has a very important archaeological application because each type of raw material occurence requires a different kind of human exploitation (Mester–Faragó 2022; Mester *et al.* 2022, 2024a). Field surveys yielded a huge number of rock samples linked to occurrences, representing the variability within the available raw materials. The samples have been organised into regional reference collections, named lithothecas (T. Biró 2014). In France, the groups of specialists in petroarchaeology linked the regional lithothecas on a supraregional level (Delvigne *et al.* 2018). They developed a common field methodology and database structure to share information. In parallel, they developed the concept of the evolutionary chain of silica (*chaîne évolutive de la silice*), which helps distinguish samples coming from successive stages of redeposition of a given rock type (Fernandes–Raynal 2006; Fernandes *et al.* 2007; Thiry *et al.* 2014). With this new methodology it became possible to identify a specific raw material source among occurrences of the same geological formation or of different allochthonous sources (Fernandes *et al.* 2008).

The second way to study lithic raw materials concerns the procurement and the economy. Analysing the strategies used by the knappers of Mousterian industries in the Aquitanian basin in southwest France, J.-M. Geneste (1989) conceived of the term procurement territory, meaning the part of the landscape where the exploited raw material sources were located. This territory was exploited efficiently because the rocks procured from the nearest sources (<5 km) were transported in the form of blocks to the site and knapped on-site, while those from further off sources (5–20 km) were transported in the form of cores or blanks, while those from the farthest sources (>20 km) arrived in the form of finished tools. Based on the technical behaviour exhibited by the human group, the territory can be subdivided into procurement zones. This phenomenon was revealed to be a general rule following the synthesis by J. Féblot-Augustins (1997). However the distances of the zone limits varied depending on the region (Otte *et al.* 2001; Bonjean–Otte 2004). In the international literature, this concept of procurement zones has been simplified to concentric circles around the sites marked by distances of 5, 25, 50, and 100 km (Simán 1991, 2000; T. Biró 2009). However, this static view does not correspond to a Palaeolithic human group, which could have camped closer to the given source they aimed at aquiring due to their mobile lifestyle.

The third possible way to approach the problem is to shift from the provenience approach to a palaeoethnological approach (Mester *et al.* 2012, 2022, 2024b; Mester–Faragó 2022).

Question	Potential problem	If yes	If no
Q1: Are there knappable rocks?	low silica content for conchoidal fracture	Q2	Might not be a source
Q2: Can we have access to the occurrence/outcrops?	environmental obstacles (periodically covered by snow or vegetation, rivers to cross, abrupt slopes, etc.); social obstacles (control by other groups, etc.)	Q3	Might not be a source
Q3: Can we exploit the occurrence/outcrops?	technical (it needs special knowledge, mining technology, etc.), economic (expected quantity of raw material), and organisational (more logistical investment)	Q4	Might not be a source
Q4: Can we use this stone for tool production?	physical properties of the blocks (form, size, colour), quality (fineness, homogeneity, cracks inside, inclusions, etc.), technical know-how (personal skills, knapping tools, techniques and methods, etc.), cultural traditions (rules and taboos of the group)	It is a source	Should not be a source

Table 2. *From siliceous rock occurrence to raw material source: theoretical decision-making process of a prehistoric human group.*

This latter involves considering which factors influenced prehistoric raw material acquisition and use of raw materials: the availability and accessibility of outcrops, how easily the raw material resources could be exploited and, the appropriateness of the raw material *(Table 2)*. Prehistoric knappers would have weighed all these factors in order to decide whether outcrops represented a potential source of raw materials or not. The aim of the palaeoethnological approach is to understand these decisions about raw material sources (*i.e.* the interaction between past human communities and siliceous rock occurrences) by comparing the availability of potential lithic sources in the region and the raw material economy reflected in the archaeological record.

5. Another archaeological aspect

Archaeological sites are the localities where past people or groups left the remains from their stay. The remains bear witness to what they made and how long they stayed at any given locality. Hunter-gatherer human groups exploit natural resources for acquiring goods they need for survival. Natural resources are distributed unevenly over space (the landscape) and time (seasonality). This is the origin of hunter-gatherers' mobility. For one year, a hunter-gatherer group wandered all around part of the landscape to access the necessary natural resources (Binford 2002, 109–131). This constituted their territory or habitation area. Consequently, a Palaeolithic site represents one stage in this land use system. The character of the stage depends mainly on the time spent at the place as well as the activities carried out there. It is very difficult to estimate exactly how much time was spent at a certain locality (Lubrano *et al.* 2025), except in favourable cases, such as Pincevent in France (Julien–Karlin 2014). Activities, however, can be recognized and reconstructed by thoroughly documenting archaeological record, representing products and their by-products.

Because activities were procedures, they took place in time and space. Time can be approached through the use of the concept of operational chain (*chaîne opératoire*) (Pelegrin *et al.* 1988; Karlin *et al.* 1991; Sellet 1993) and the refitting study method (Cahen 1976; Tixier 1976; Cziesla 1986; Tixier 2012). These methods allow researchers to recognize and reconstruct (mentally or physically) the sequences of acts carried out by prehistoric people as they lived their daily lives. Using the operational chain concept, the artefacts in the lithic assemblage are grouped according to phases in the lithic tool production which allow researchers to reconstruct what processes were involved in the tool's manufacture. Where stone artefacts can be refitted, the pieces are put back together connecting the surfaces created by the knapping, resulting in physical reconstruction of the original raw material block or core. Thus it is possible to see exactly how a tool was manufactured. Space should be approached using different analytical methods connected to the distribution and patterns of archaeological finds on the site (Conard 2001, 2004; Sánchez-Romero *et al.* 2022). Traceology or wear analysis complements the study of past activities at the site (Keeley 1980; Vaughan 1985; Anderson *et al.* 1993). Because the worked material also impacted the surface of a stone tool during the contact, it leaves traces on the surface of the tool. Under a microscope, characteristic traces (micro-scars, striations, rounding, micro-polish and, residue) can be identified. Reference collections of traces established during archaeological experiments helps in their identification and to link them to a kind of act (like cutting, scraping, sawing) and what kind of worked material (like wood, hide, meat, bone, antler) the tool came in contact with. Combining these approaches permits identification of settlement structure, activity areas, and finally interpretations of the spatial organisation within a site (Tixier 1976; Pigeot 1987; Bodu 1996; Machado *et al.* 2019; Berruti *et al.* 2024). The analysis and the interpretation are supported by the models based on ethnoarchaeological observations (Binford 1980, 2002, 144–194; Lancelotti *et al.* 2017).

To determine the function of a site is a more complex problem. Anthropological and ethnoarchaeological studies revealed that the function of a site depended on a series of factors, including geographical, environmental, logistical-organisational elements and duration of occupation. Geographical elements may include location within the territory, topographical relief and hydrography, as well as animal migration routes and, ways the group moved regularly over the landscape, etc. Environmental elements include climatic conditions (insolation, wind), vegetation, vicinity of natural resources, seasonality, etc. Logistical-organisational elements may consist of location within a land use system or yearly lifecycle, task-sharing, specialisation and seasonality, etc. Duration of occupation may be year-long or (quasi) continuous, temporary, short-term, occasional and, recurrent, etc. Anthropologists can see and understand this complexity when documenting the life of a group over long periods of time (Lee–DeVore 1968; Lee–Daly 1999; Binford 2002; Barnard 2004). The archaeological application of the models coming from these understandings needs to be careful because in the past, people lived in environmental and social circumstances that may be different from the today's (Lee–DeVore 1968, 251–289; Testart 1988; Sheehan 2004). Moreover, the archaeological record is necessarily fragmentary compared to past reality (Pedersen 2008). It is for this reason that why Palaeolithic archaeologists must consider as many elements as possible when trying to attribute a site to a particular category of settlement (Gamble 1986, 297–304; Wiśniewski *et al.* 2015). In the last decades, the active development of computer sciences resulted in a series of new methodologies using geoinformatics, sophisticated statistics, computer-aided and GIS-based modelling, and big data management (Connolly–Lake 2006; Drennan 2009; Lycett –Chauhan 2010; Van Pool–Leonard 2011; Serwatka 2018; Weiss *et al.* 2018; Romanowska et al. 2021; Degioanni *et al.* 2025; Sanchez-Romero *et al.* 2025). Some of these new approaches already appeared in the Hungarian Palaeolithic research too (Király 2017, 2023; Lengyel 2018; Zandler *et al.* 2023; Péntek *et al.* 2024; Trájer 2024).

Finally, the palimpsest problem causes further difficulties for interpreting the settlement type of Palaeolithic sites. The accumulation processes involved in site formation may operate on different timescales (Malinsky-Buller *et al.* 2011). Either in caves or in open-air conditions, the accumulation of cultural remains and sediments operate separately but in parallel with different dynamics. Consequently, various occupational episodes can be represented together in the archaeological record at a site (Henry 2012). Moreover, climatic and geomorphological events cause sediment mixing or redeposition mixing together the cultural remains of different periods (Kozłowski *et al.* 2009, 2012). On a theoretical level, the timescale or time perspective impacts our view of archaeological problems, and thus, influences our study and analysis as well (Bailey 2007).

6. Conclusions

Palaeolithic sites represent the occupational episodes of hunter-gatherer societies. Archaeological research aims at characterizing the sites as human settlements. However, the mobile lifeway of these societies results in a variety of occupation types. As a reference, prehistoric archaeology uses anthropological observations made among contemporary hunter-gatherer groups. But the archaeological record bears witness only to a part of the activities carried out on the site by past people. The most common remains are lithic artefacts and animal bones. In 1988, Katalin Simán established a model for categorizing Palaeolithic sites in Northeastern Hungary based on the properties of archaeological material including the proportion of local, regional and extra local raw materials in the lithic assemblage, as well as the composition of the faunal remains. She distinguished three main settlement types: base camp, temporary (hunting) camp and workshop. Since the related methodologies and research fields (archaeozoology, lithic technology) have since developed considerably, approaches today to the issue of Palaeolithic settlement result in far more complex studies.

Modern archaeozoology regards the faunal remains from a site as a bone accumulation originating from human activity (hunting or scavenging, prey processing) and natural processes (carnivore hunting or scavenging, natural mortality). Based on research carried out on natural carnivore dens, and using ethological observations of animal behaviour, it has been possible to distinguish between various agents of accumulation at archaeological sites. This approach has revealed alternative uses of the site by humans and carnivores in several cases, changing the archaeological interpretation.

Modern lithic technology studies aim at understanding past human behaviour through the whole of the lithic assemblage found at a site. Based on the operational chain concept and refitting studies, this approach can reconstruct lithic production processes together with their cognitive and social background. Combining the lithic technology with analytical methods of spatial organisation makes it possible to reconstruct human activities in space and time, and thus, the life of past peoples who lived on the site and within the landscape.

All these approaches require well-documented archaeological excavation data and systematic field and laboratory research, as well as a careful scientific reasoning.

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Thirty-six Years After: A GIS-based Analysis of an Open-air Palaeolithic Site in the Cserhát Mountains, Northern Hungary

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Abstract: *The recently deceased archaeologist Katalin Simán (1955-2023) was the first to deal with the issue of settlement forms (Simán 1988) in Hungarian Palaeolithic research. In her pioneering article, she tried to examine the determining factors in settlement forms based on raw material use and palaeontologic data from several Palaeolithic sites, mainly cave sites, in Borsod-Abaúj-Zemplén County (Northeastern Hungary). Katalin Simán's article and Viola T. Dobosi's gap-filling articles dealing with the settlement strategy of the Upper Palaeolithic Gravettian culture (Dobosi 1998–99; Dobosi – Holl 2013.) inspired the authors of the present paper to publish articles on the topography of the Middle Palaeolithic and/or Early Upper Palaeolithic sites (Péntek 2014–2015.), as well as the Upper Palaeolithic and Epipalaeolithic sites in the Cserhát Mountains and the Ipoly Valley (Péntek – Zandler 2016.). In the following, a short review and a GIS-based (Geographical Information System) analysis of an open-air Palaeolithic site will be attempted.*

Keywords: *Middle Palaeolithic, Early Upper Palaeolithic, Geographical Information System, GIS-based archaeological research*

1. Introduction

Systematic field surveys in the Cserhát Mountains carried out during recent decades have provided a lot of new information on settlement phenomena. Studies focused both on raw material resources in the Cserhát Mountains (Markó 2005; Markó–Kázmér; Markó *et al.* 2003) and on the use of raw materials at Palaeolithic sites (Markó –Péntek 2003-2004; Markó 2009; 2011) have already proved to be of great importance. Since then, new results (Péntek 2019; 2021) have also been carried out on this issue, which was also researched by Katalin Simán (Simán 1988; 1991) Nógrád County, and especially the Cserhát Mountains, is one of the best-researched areas of Hungary in terms of Palaeolithic research. This fact has a significant and far-reaching consequence, namely that for many archaeological phenomena present in the Cserhát Mountains but absent in other specific regions or micro-regions, it is not possible to decide whether the differences have cultural, traditional, behavioural or other unknown causes or reasons, or simply the result of a research hiatus. To quote Katalin Simán's thought on this point in free translation (Simán 1988, 55; Free translation of the authors): "In archaeology, the research intensity of the investigated area is an aspect that can never be neglected. We cannot get an authentic picture from an area that is not evenly researched. On the other hand, the examination of well-researched areas provides an opportunity to transpose the obtained results — taking into account the differences and their extent — to the less researched areas."

At the same time, GIS methods led to a significant paradigm shift in Palaeolithic research and have now become an almost indispensable research tool. Therefore, it would seem that the time is ripe to pay tribute to the memory of Katalin Simán by presenting some of the possibilities of geoinformatics, in the context of an open-air Palaeolithic site, as a representative "pilot site" in the Cserhát Mountains. On the one hand, these possibilities should be considered relevant, from the point of view of developing predictive models for the occurrence of potential sites, and on the other hand, from the point of view of understanding the site-formation factors of already known, localised sites.

2. Geographical and geological description of the environment of the Balogi-tábla site

The Balogi-tábla site is located on the border between the settlements of Szirák and Vanyarc in the northern part of the Ecskend Hills. The most characteristic geological formations of the area are the andesitic lodes weathered out of the 'Helvetic Schlier' (Hámor 1985, 80, 245–246). Upper Oligocene sandy layers are exposed in the valleys, followed by Carpathian limestone layers. The limestone is overlain by a thick andesite and andesite breccia cover. A large part of the surface is covered by loess. The draw roof of the Ecskend ridge and the surroundings are flat, wide vaulted, with a central water network. It belongs to the catchment area of the narrow, left bank of the Galga River and the catchment area of the Herédi Stream flowing to the Zagyva River (Dövényi 2010, 687-689). Between Vanyarc and Szirák, the gently undulating peneplain, more or less transverse to the general slope direction, with smaller and larger cross faults affected in an east-west direction, and larger displacements also occurring along the faults. Thus, minor valley incisions of asymmetrical cross-sections were also created. The Egrespuszta Valley and the smaller valleys south of Szirák are also somewhat asymmetric. Bánya Hill

(or Mész Hill, 338.2 m a.s.l.), which begins at the southwestern edge of the Egrespuszta Valley, is a buried minor andesite cover gradually being carved out of its surroundings by the asymmetrical cross-section of the Egrespuszta Valley. Then, towards the south, the altitude differences between the sides of the intersecting valleys gradually flatten out. Only the three main valleys, the Szirák, Hangács and Vanyarc Valleys, remain asymmetrical (Láng 1967, 274-275). The Sarmatian *Cerithium* Limestone on the Bánya Hill, settled on unfossiliferous gravel of Lower Miocene age (Eggenburgian or Burdigalian stage), the best outcrop of which is in the old quarry on the top of Bánya Hill. (Horusitzky 1941, 605). Traces of gravel covers can also be found near the site in the form outcrops of various sizes.

3. The Palaeolithic site of Balogi-tábla

The broader environment of this locality is shown in *Fig. 1.* In the figure, in addition to the site to be described, there are less important Palaeolithic and Neolithic artefact concentrations. The more significant gravel beds and outcrops of several hundreds of square metres are only shown in the figure for indicative purposes. The immediate surroundings of the site are shown in *Fig. 2.* In the figure, two polygons indicate the site to be described and the smaller lithic concentrations. The administrative border between the settlements of Szirák and Vanyarc, a 15–20 m wide wooded strip unsuitable for surface collection, stretches along the dirt road that passes through the site. The site is in the area of the Balogi-tábla at an altitude of about 295.0 m a.s.l. The southwest-facing part (thereinafter BT–01) is a trapezoidal area of approximately 110–165×70 m, with an approximate size of 9,300 km^2. The site section facing northeast (BT–02) is a narrow, elongated, irregular trapezoid-shaped area, the length of which is about 180 m, and the width varies between 20 and 50 m due to the topography of the area; its approximate size is 6,000 km^2. The combined area of the site is thus — including the administrative boundary strip — about 21,700 m^2 (2.17 ha). To the west of the site, at 700 m, in the area of the Alsósarlóspuszta farm, the Csurgó Stream flows in a north-northwest to south-southeast direction, which then bypasses the massive block of Sváb Hill (258.0 m a.s.l.) and flows into the Nógrádi (Vanyarci) Stream. The Balogi-tábla slopes gently towards the valley of the Csurgó Stream, its relative altitude compared to the stream valley is about 60 m. The area bordering the Balogi-tábla in an eastern direction has a steep slope and is dissected by gullies. The deeply ditched area between the promontory at 230.2 m a.s.l. and Öreg Hill at 249.0 m a.s.l. continues in an eastern direction into the Köles Ditch. The small stream carries the water flowing from the Balogi-tábla area in an eastern direction and flows into the Bér Stream. The relative altitude of the site varies between 80–100 m in an eastern direction. The small Lopó Valley, located directly at the north-western foot of Öreg Hill, is a classic dead-end valley.

4. A brief description of the archaeological material

The site was discovered in June 2003. In the period between 2003 and 2007, a total of nine field surveys were carried out, after which the agricultural cultivation of the area was abandoned, and the site could no longer

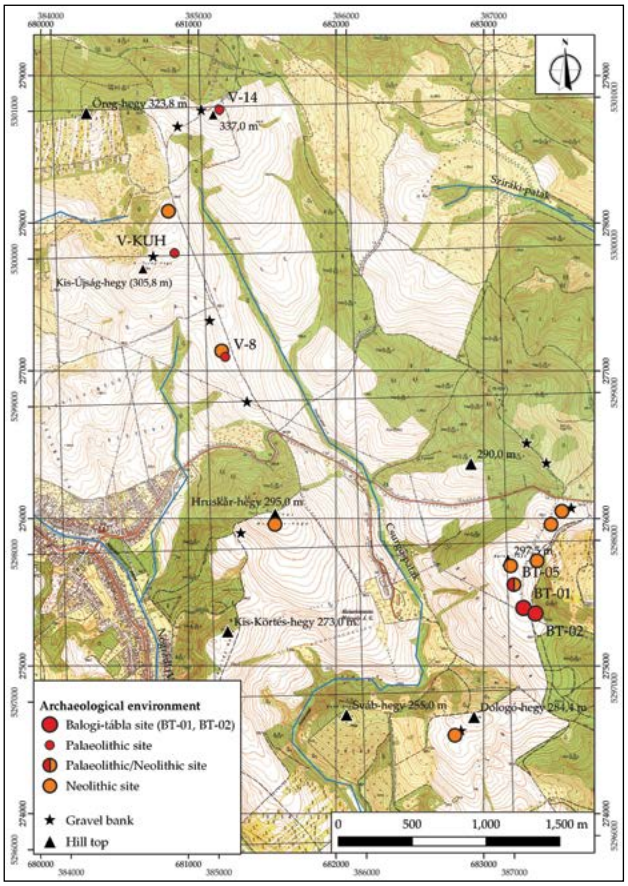

Fig. 1. *Archaeological environment of the Balogi-tábla site.*

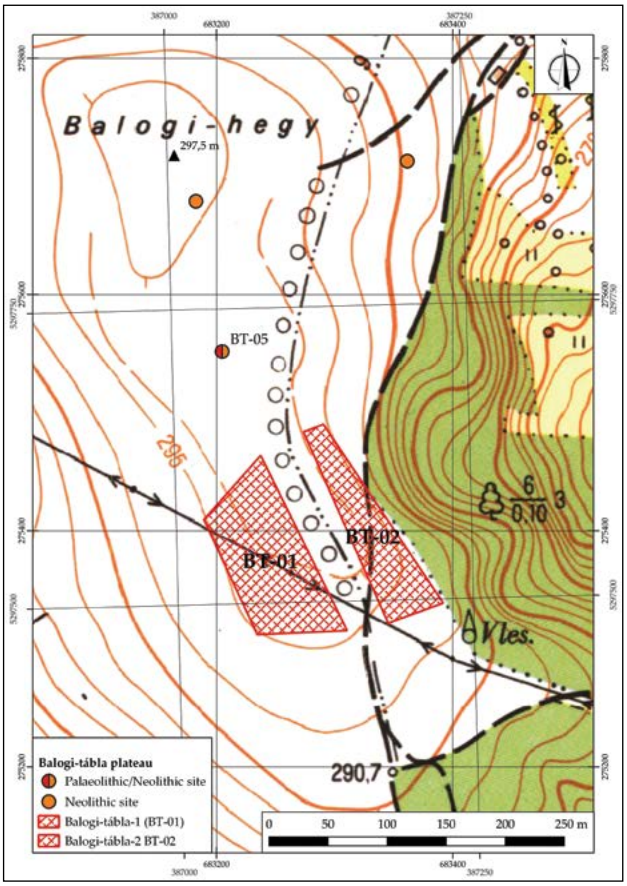

Fig. 2. *The immediate surroundings of the Balogi-tábla site.*

be explored. During the field surveys, 873 lithic artefacts were collected, which from both technological and typological points of view are Palaeolithic and form a homogenous artefact assemblage without any mixing with later prehistoric cultures. The reason for the relatively low number of collected artefacts is presumably the lack of erosional effect, the surface of the area is fairly even and has only been intensively cultivated for a short period. It should be noted that concerning the procurement of raw materials for the Palaeolithic sites in the Cserhát Mountains, considering the distances between the sites and potential sources of raw materials, a slightly modified, simplified version of Katalin Simán's classification (Simán 1991) seems to be most appropriate. The reason for the applied simplification is that considering practical examples, the 25-50 km procurement area does not play a significant role as a source of raw material for the majority of the sites. Based on the modified classification, practically all raw materials of Cserhát Mountains origin will be considered local, since these can be collected from a distance of no more than 25 km from most of the sites. The regional (mesolocal *sensu* Simán; or meso-local (Markó 2009, 112) group includes raw materials that can be obtained from a distance of 25-100 km, and finally, the long-distance (*sensu* Simán; or extralocal: Markó 2009, 107; 2011, 191) group consists of raw materials from more than 100 km away.

The raw material exploitation at the site is shown by local and non-local raw materials in *Table 1* and *Table 2*, respectively. Local raw materials dominate the assemblage (787 pcs., 90.15% of the total assemblage). Among these, limnic silicite (Přichystal 2010) stands out (736 pcs., 93.52%). In addition, the relatively high proportion of siliceous pebbles is worth highlighting (44 pcs., 5.59%). Regional raw materials are represented by 21 items (2.41% of the total assemblage). Despite this small number, the composition is very diverse, indicating a high degree of mobility. Radiolarite, radiolarian siliceous shale, and metarhyolite (quartz porphyry) from the Bükk Mountains (T. Biró–Pálosi 1983; T. Biró 2008), and Carpathian radiolarite from the White Carpathians (Cheben–Cheben 2010) are present only in a few pieces. The raw material that, mentioned also by T. Biró and Pálosi (T. Biró–Pálosi 1983, 416), was mistakenly referred to

	Local raw materials < 25 km						
Technological categories	Limnic silicite	Andesite	Siliceous pebble	Quartzite	Petrified wood	#	%
Tool	31		6			37	4.70
Blade	15		1			16	2.03
Flake	162	2	4			168	21.35
Blade core	2					2	0.25
Microblade core							
Flake core	5		2			7	0.89
Shatter	514		30	3	2	549	69.76
Raw material chunk	7		1			8	1.02
#	736	2	44	3	2	787	
%	93.52	0.25	5.59	0.38	0.25		100.00

Table 1. *Use of local raw materials.*

	Regional raw materials 25–100 km					Long distance raw materials >100 km	Unknown raw materials		
Technological categories	EFK	Bükk-type radiolarite	BRKP	Metarhy-olite	Carpathian radiolarite	Erratic flint	—	#	%
Tool		2		1	2	17		22	25.58
Blade						13		13	15.12
Flake	1		3	5	3	16		28	32.56
Blade core									
Microblade core						1		1	1.16
Flake core									
Shatter	1	2			1	17	1	22	25.58
Raw material chunk									
#	2	4	3	6	6	64	1	86	
%	2.33	4.65	3.49	6.98	6.98	74.42	1.16		100.00

Table 2. *Use of non-local raw materials.*

in many publications as Mátraháza—Felnémeti type opal, but from a geological point of view is orthoquartzite. The primary geological source can be found on Tó Hill near Egerbakta. This is a modified version of sandstone, which was not formed by metamorphosis. The binding material of the quartzite grains in contact with each other is exclusively pure silicic acid (Ireland 1974; Howard 2005). There are two artefacts made from this raw material. The only long-distance raw material is Cretaceous erratic flint (Kozłowski–Pavlikovski 1989) from the territory of Poland, probably from Upper Silesia (64 pcs., 7.33% of the total assemblage). The raw material procurement map is shown in *Fig. 3.*

Among the technological categories *(Table 3)*, the proportion of raw material fragments is very high (571 pcs., 65.41%; the percentage data here and below refer to the total assemblage), due to the poor quality of the local limnic silicite with fossil remains. The number of cores is low (10 pcs., 1.15%). Among the debitage products, there are 196 flakes (22.45%) and 29 blades (3.32%). The unretouched blades and their fragments (15 pcs. of limnic silicite, 1 p. of siliceous pebble, 13 pcs. of erratic flint) indicates that this is not an advanced blade technology. The 59 tools account for 6.76 % of the assemblage. Concerning erratic flint, the long-distance raw material, it should be noted that except for cores and raw material fragments, it is found in all technological categories. This fact suggests that this raw material was probably used to make tools on-site. Of the 59 tools, 37 were made from local raw materials (limnic silicite=31 pcs., siliceous pebble=six pcs.). A very high proportion of the remaining 22 tools were made of erratic flint (17 pcs.), five tools were made from regional raw material (Bükk Mountains, White Carpathians).

Among the types of tools *(Table 4),* although the number of tools does not reach 100 pieces, the percentages are given for easy comparison), the dominant tool is the end-scrapers (23 pcs., 38.98% of the toolkit), 20 of them were made on flakes, and the other three on blades. They are generally high end-scrapers, but morphologically do not resemble microblade cores. Partly due to their atypical and partly to their fragmentary nature, 18 tools (30.51%) could not be identified more precisely and were listed under the term "Diverse". The other Palaeolithic tool

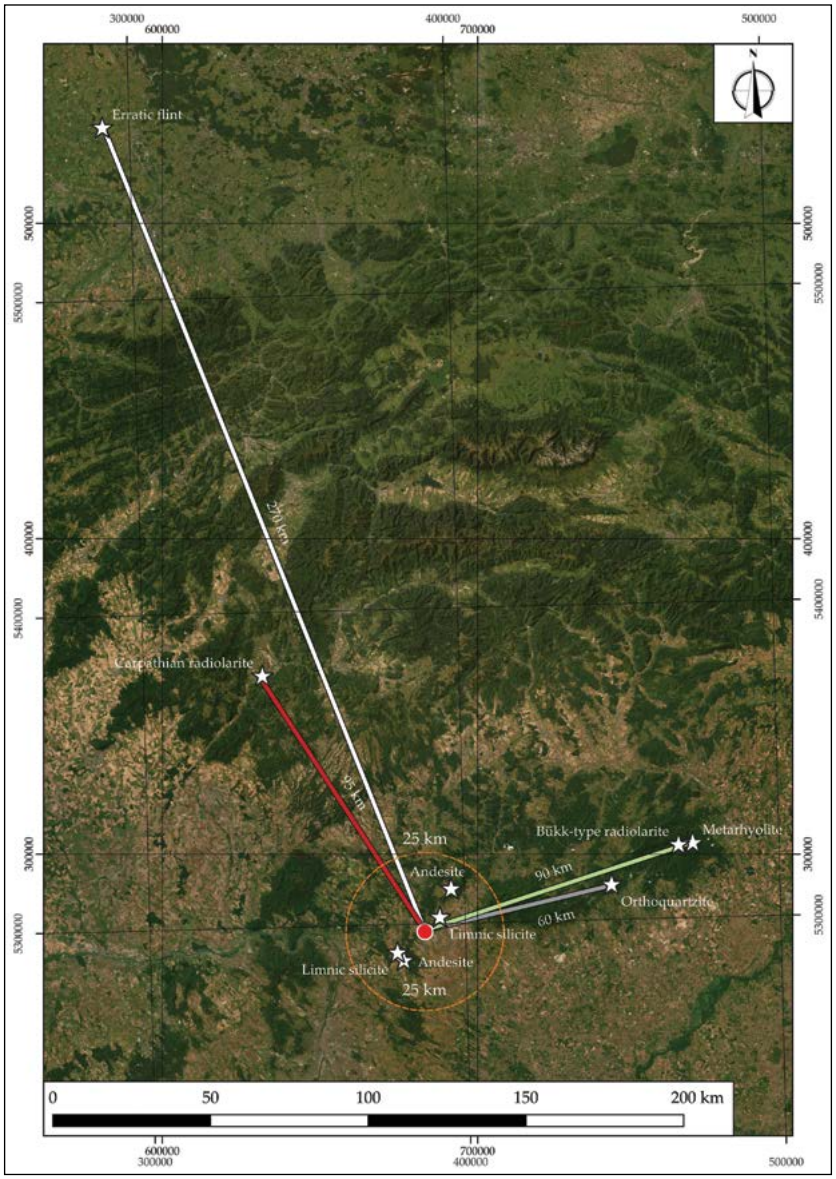

Fig. 3. *The lithic raw material procurement of the Balogi-tábla site.*

	Raw material categories					
Technological categories /Raw materials	Local raw material < 25 km	Regional raw material 25–100 km	Long distance raw material > 100 km	Unknown raw material	#	%
Tool	37	5	17		59	6.76
Blade	16		13		29	3.32
Flake	168	12	16		196	22.45
Blade core	2				2	0.23
Microblade core			1		1	0.11
Flake core	7				7	0.80
Shatter	549	4	17	1	571	65.41
Raw material chunk	8				8	0.92
#	787	21	64	1	873	
%	90.15	2.41	7.33	0.11		100.00

Table 3. *Technological categories of the lithic assemblage by raw material categories.*

	Local raw materials < 25 km				Regional raw materials 25–100 km			Long distance raw materials >100 km				Total	
Tool types	Limnic silicite	Siliceous pebble	#	%	Bükk-type radiolarite	Metarhy-olite	Carpathian radiolarite	Erratic flint	#	%		#	%
End-scraper on blade	2	1	3	8.11								3	5.08
End-scraper on flake	9	1	10	27.03	1		1	8	10	45.45		20	33.90
Burin	2		2	5.41	1			1	2	9.09		4	6.78
Leaf-point		1	1	2.70								1	1.69
Side-scraper	2		2	5.41				2	2	9.09		4	6.78
Bifacial tool	2		2	5.41								2	3.39
Splintered piece	2		2	5.41								2	3.39
Borer	3		3	8.11								3	5.08
Retouched blades, flakes	1	1	2	5.41								2	3.39
Diverse	8	2	10	27.03		1	1	6	8	36.36		18	30.51
#	31	6	37		2	1	2	17	22			59	
%	83.78	16.22		100.00	9.09	4.55	9.09	77.27		100.00			100.00
% of Total	52.54	10.17			3.39	1.69	3.39	28.81					100.00

Table 4. *Tool types of the lithic assemblage by raw material categories.*

types are represented by burins, borers, splintered pieces and retouched blade fragments or flakes with two to four pieces. The following seven tools (11.86%) are specific to the assemblage. Of the four side-scrapers, beside a simple convex side-scraper made of limnic silicite *(Fig. 5.1)*, there are three double or convergent side-scrapers *(Fig. 4.9–11)*, one was made of limnic silicite and two of erratic flint. Both limnic silicite bifacial tools with plano-convex cross-sections are atypical bifacial knives, one piece *(Fig. 5.3)* measures 54×38×17 mm; the other piece *(Fig. 5.4)* was broken recently lengthwise, and its dimensions are 56×29×15 mm. The small leaf point (48×22×9 mm) is made of siliceous pebbles; it is slightly asymmetrical to the longitudinal axis and has a plano-convex cross-section *(Fig. 5.2)*.

The assemblage of the Balogi-tábla site is thought to be homogeneous and represent traces of an early Upper Palaeolithic culture or industry belonging to the *sensu lato* Aurignacian technocomplex, which also includes Middle Palaeolithic tools, side-scrapers, bifacial tools, and leaf-shaped points.

The Balogi-tábla **BT–05** lithic concentration, situated at a distance of about 150–200 m to the northeast of the Balogi-tábla main site (see, *Fig. 2*), was disturbed by a younger prehistoric, likely Late Neolithic occupation. Despite the disturbance, the small assemblage (a total of 86 artefacts) from the concentration contains some characteristic Palaeolithic tools. There are end-scrapers *(Fig. 6.1–2)*, a combined end-scraper—burin tool *(Fig. 6.3)*, a burin *(Fig. 6.4)* and retouched blades *(Fig. 6.5–6)* as well.

The Vanyarc–8 (**V–8**) artefact concentration shown in *Fig. 1*, located approximately 2.7 km to the northwest of the Balogi-tábla site, contains retouched Aurignacian blade fragments *(Fig. 6.7–8)*. Unfortunately, the Palaeolithic concentration was significantly disturbed by a later prehistoric, Late Neolithic (Lengyel–Polgár complex) site. The bifacial fragment *(Fig. 6.9)*, found about 800 m to the northwest of the V-8 assemblage at the eastern foot of the Kis-Újság Hill (V–KUH), was probably broken during a knapping accident, and also appears to belong here. In this form, the fragment morphologically resembles the atypical bifacial knives found at the Balogi-tábla site rather than the bifacial tools of the "Vanyarc-type" industry (Markó 2012) postulated based on the lithic materials found at nearby sites.

Lithic assemblages from the area of the Cserhát Mountains with a similar typological composition are already known and partially published. First, the assemblage from the Acsa–Rovnya site, verified by excavation in the early 2000s, should be mentioned (Dobosi 2013). Local raw materials, limnic silicite (756 pcs., 77.78%), and siliceous pebble (166 pcs., 17.08%) dominate in the assemblage of 972 lithic artefacts from the Legénd–Rovnya site (Western Cserhát Mountains). Regional raw materials include metarhyolite and Carpathian radiolarite. Long-distance raw materials include obsidian and erratic flint. Among the 46 Palaeolithic tools (4.73% of the assemblage) end-scrapers made on flakes (16 pcs.) predominate, in addition, six side-scrapers and five leaf points are worth mentioning. The exact typological identification of nineteen fragmentary tools was not possible (Péntek–Zandler 2013b). The surface collection from the Bér–Szár Hill-1 site consists of 1,447 lithic

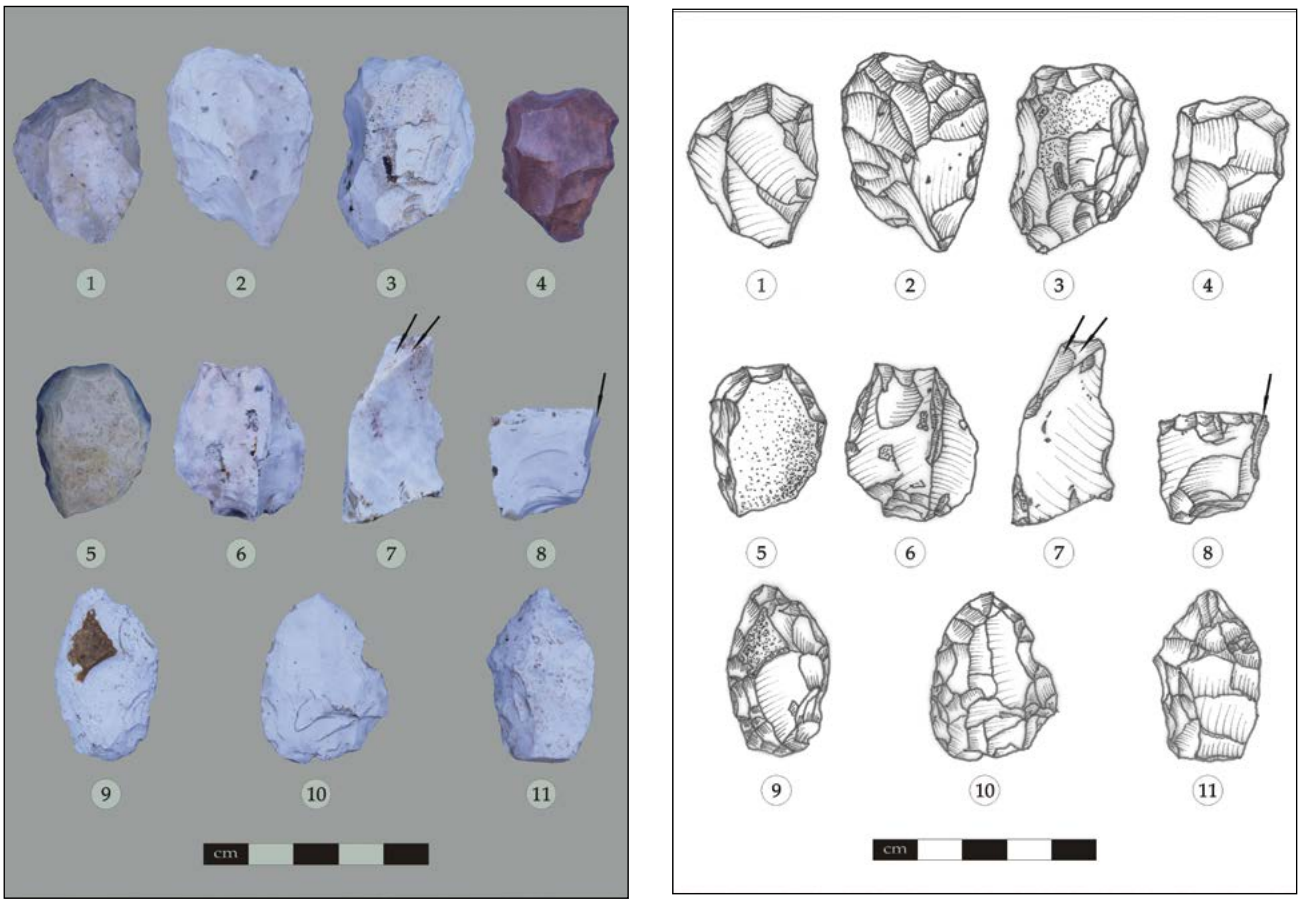

Fig. 4. *Selected tools from the Balogi-tábla site and their drawings. Drawn by K. Zandler.*

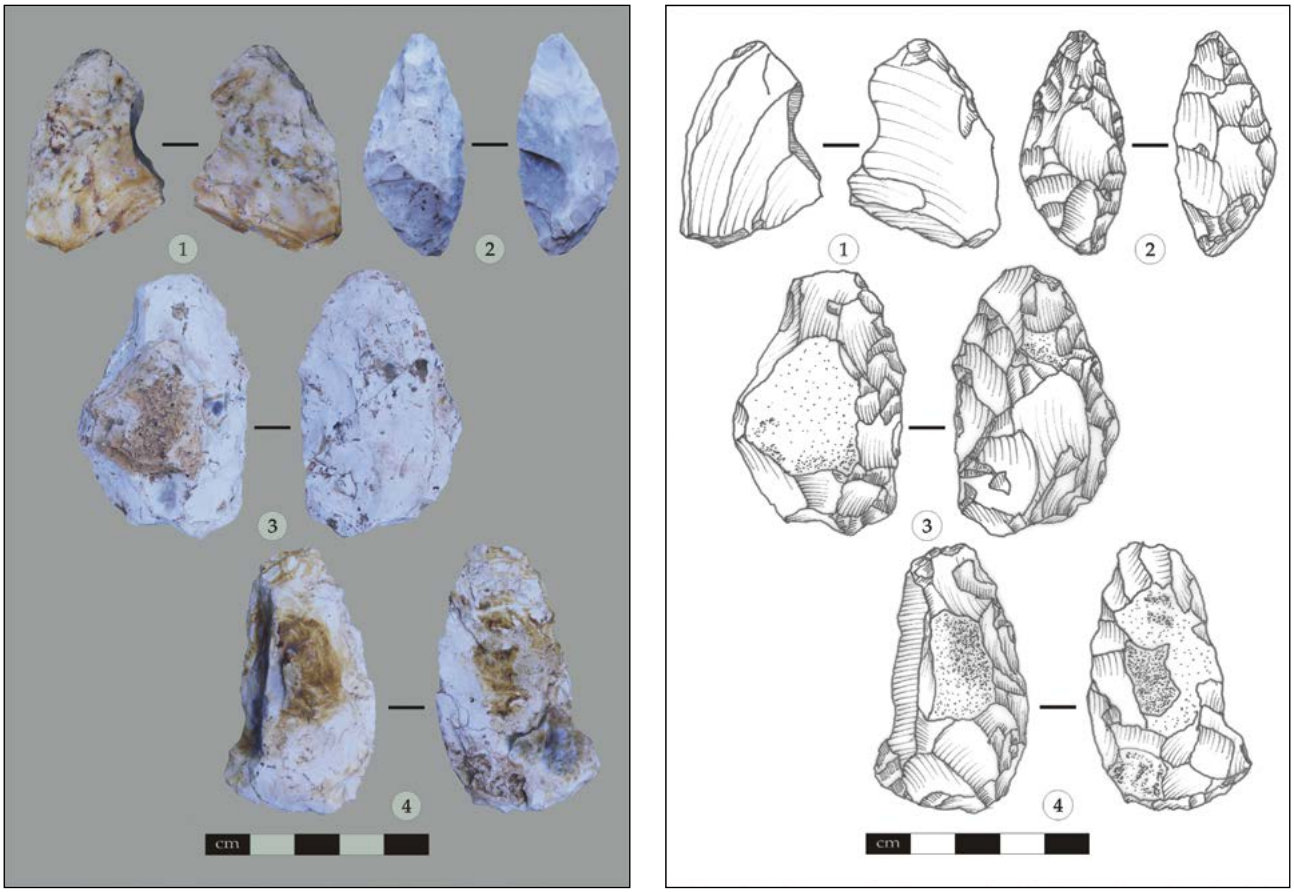

Fig. 5. *Selected tools from the Balogi-tábla site and their drawings. Drawn by K. Zandler.*

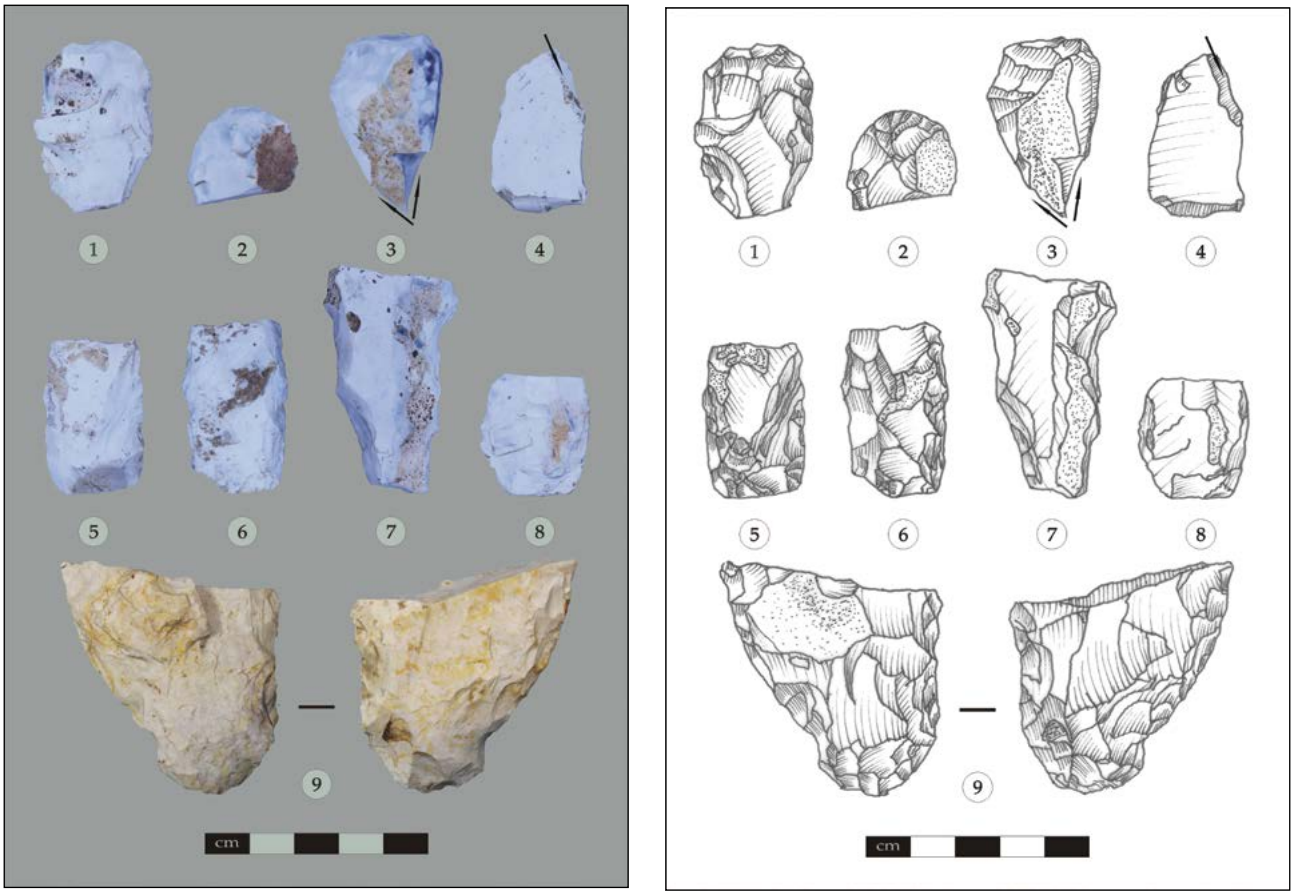

Fig. 6. *Selected tools from the archaeological environment of the Balogi-tábla site and their drawings. Drawn by K. Zandler.*

artefacts. A small amount of Neolithic admixture is expected in the assemblage. Local raw materials predominate (1,409 pcs., 97.37%), mainly limnic silicite (1,342 pcs., 92.74%). Their is a wide range of regional raw materials, with Mátra-type limnic silicite and jasper from the Mátra Mountains, metarhyolite from the Bükk Mountains, and Carpathian radiolarite from the White Carpathians. Long-distance raw materials are represented by a few pieces of Cretaceous erratic flint, including a retouched blade. In the toolkit of 51-piece toolkit, 29 were made of local limnic silicite and seven of siliceous pebble. Besides the end-scrapers made on blades (seven pcs.), end-scrapers made on flakes (nine pcs.), and burins (four pcs), there are also two leaf points, three side-scrapers and two bifacial tools. The exact typological identification of fifteen fragmentary tools was not possible. A similar composition of raw materials and tools characterises the smaller assemblages of Bér–Szár Hill-2 (a total of 691 artefacts) and Bér–Papi-földek (a total of 150 artefacts, Péntek–Zandler 2017).

Among the foreign parallels, without claiming to be complete, the assemblages of the sites of the "Prut culture" (Borziac *et al*. 2016, 254 ff), classified as Middle Aurignacian culture, and the Late Aurignacian Tvarožná I (Mlejnek 2009) site also contain bifacials and leaf points.

5. The character of the Balogi-tábla site

The use of raw materials at the Middle Palaeolithic and Early Upper Palaeolithic sites in the Cserhát Mountains displays a relatively uniform supply system, which runs in the northeast-southwest direction along the Northern Central Mountain range (Among others see, Markó 2009; 2011; 2012). The nature of the settlement structure that may have existed along the migration path connecting the Tokaj–Zemplén Mountains and Bükk Mountains to the Cserhát Mountains in the typical mountainous environment is unknown. There is very little information available on the question of whether any of the numerous settlement pattern models in the literature can be applied to Hungarian open-air sites, where the lithic assemblages are primarily derived from surface collections. There are several quasi-synonymous concepts for the term 'base camp' in the international literature on settlement structures. 'Central place' is used for the term 'base camp' (*sensu* Marks–Chabai 2001), in the terminology of A. Verpoorte (Verpoorte 2006, after Kelly 1995), while T. Hopkinson (Hopkinson 2004, 229) used the term 'center of social action'. In the Cserhát Mountains, the absence of 'base camps' used for long periods, even for several months or seasons, providing large amounts of lithic finds, seems certain. The absence of these settlement types, in any case, seems to refute the existence of a 'radiating settlement system' *sensu* Mortensen (Mortensen 1972), characterised by the existence of a central base camp (the focus of settlement), which is provided by task-specific sites (Bernbeck (1997, 'locations'); Binford (1980 9, 'activity-specific sites'); Marks–Chabai 2001, 'provisioning stations'); Bataille 2010, 69). However, it is possible to have a 'circular settlement system' where specific 'satellite' camps are linked around a smaller base camp to perform various tasks. Of these, the sites of the 'ephemeral hunting station' character, important for hunting, are of great significance. Lewis R. Binford (Binford 1978, 330) wrote the following about Nunamiut Inuit sites functioning as 'hunting stands': "*They are locations where men congregate to watch for game and to plan hunting strategies after game is sighted. They are an integral part of an "intercept" hunting strategy as opposed to an "encounter" strategy* (see Binford 1978). *In intercept hunting one employs knowledge of the factors that condition animal behavior to "predict" where animals will be, given the conditions of the moment such as weather, seasons of the year, etc. One positions himself to be able to monitor the surrounding area where game is anticipated. These "stations" from which an area is monitored are hunting stands.*"

In general, residential mobility typical of a 'circular settlement system' is more effective in an environment where resources are evenly distributed, and logistical mobility typical of a 'radiating settlement system' is assumed for dispersed but rich resources (Lieberman–Shea 1994, 316). There is no reason to assume that radiating (logistic) and circulating (residential) mobility strategies are mutually exclusive, but rather two mutually comparable and interconnected mobility strategies of a settlement system (Lieberman–Shea 1994, 319).

Concerning Middle Palaeolithic open-air sites, the importance of secluded side valleys and dead-end valleys with mostly asymmetrical cross-sections has already been mentioned in several places. This phenomenon has not only been observed in the area of the Cserhát Mountains (Markó 2007; 2009; 2012; Péntek–Zandler 2013a; 2013b) but is also characteristic of the Hont–Csitár (Molnár Hill, Zandler 2010) and Hont–Babat (Zandler 2012a) sites in the Ipoly Valley, as well as most of the sites around Eger (Zandler 2006; 2012b). Based on ethnoarchaeological data, which by definition can only be applied in a limited way to Palaeolithic conditions, it is evident that the dead-end valleys as 'topographical neuralgic points' played a role in the hunting strategy. Concentrations of ephemeral (inhabited for a short time) hunting camps are often found near them because these valleys are very suitable for the application of the 'head-'em-off-at-the-pass' hunting technique. The essence of the technique (and the strategy behind) is to herd the animals into a narrow area, which provides them with little room for movement, towards the hunters waiting there, making killing the animals significantly simpler (Burch 1972, 346–347; Baales 1999, 70–71; Bang–Andersen 2008, 66; Carr 2012, 90-104). The strategy can be applied equally effectively to the hunting of individual or individual animals separated from their group, as well as herd-forming animals in the classical sense.

The establishment of the Balogi-tábla Palaeolithic site discussed here was not related to local raw material processing, it was not a workshop or a workshop-like site *sensu* Simán (1988), but most likely it was certainly a temporary hunting camp visited seasonally, at most a few times, connected to one or more, smaller satellite stations (hunting ambushes) lying relatively close to the camp.

6. GIS-based analyses of the site

"If you understand, things are just as they are;
if you do not understand, things are just as they are."
— Zen Proverb

Although nowadays the use of different GIS methods, such as Least Cost Path Analysis (LCPA), Viewshed Analysis, Visibility Analysis, and Site Catchment Area Analysis (SCAA), and others are generally accepted in archaeological research, there has not been a significant paradigm shift in Hungarian archaeology. The archaeological application of the various GIS methods is now widespread, but most intensively in the research on later prehistoric and Roman

periods (without claiming completeness, Padányi-Gulyás 2010; 2011; 2013; Horváth–Fischl 2010; Mesterházy 2011; 2013; 2022; Mesterházy–Stibrányi 2011a; 2011b; 2012; Padányi-Gulyás *et al.* 2012; Stibrányi *et al.* 2012; Padányi-Gulyás–Siki 2013; Bödőcs 2020; Váczi *et al.* 2021). Recently, the first paper has been published on the Middle Palaeolithic open-air sites of the Cserhát Mountains including GIS-based analysis (Zandler *et al.* 2023) with the primary aim to verify the assumption that based on the field surveys, the Middle Palaeolithic sites are located along 'topographical neuralgic points', narrow side valleys, and dead-end valleys with asymmetric cross-sections. For the Palaeolithic site of Galgagyörk–Csonkás Hill, the investigation concerned whether it is possible to set up a simple, elementary prediction model based on conditions of visibility to locate potential satellite points related to the transitional hunting camp, the base camp. Taking into account the practical aspects of hunting, the analysis began with the assumption that Middle and Early Upper Palaeolithic humans did not have throwing weapons, so that the effectiveness of hunting depended on the communications between the base camp and the hypothetical satellite points. Communication possibilities were certainly determined by conditions of visibility. Some of these preliminary analyses are presented below for the Balogi-tábla site.

7. The least cost path analysis (LCPA)

Several archaeological LCPA studies have been published in recent decades, from the Palaeolithic to the Middle Ages with the aim of reconstructing of migration routes and road networks (Krist–Brown 1994; Jensen 2003; Whitley–Hicks 2003; Kantner 1997, 2004; Herzog 2008; Kondo *et al.* 2008; Kondo–Seino 2010; Livingood 2012; Phillips–Leckman 2012; Alvez 2016; Kunitz *et al.* 2017; Verhagen–Jeneson 2012; Lewis 2017; Seifried–Gardner 2019; Verhagen *et al.* 2019), examining the accessibility of archaeological sites (O'Sullivan 2019), the analysis of trade and geopolitical interactions (Jennings–Craig 2001; Hare 2004; Taliaferro *et al.* 2010; Contreras 2011; McCoy *et al.* 2011; Lucero *et al.* 2014; Schild 2016), for mapping of settlement patterns and modelling of land use (Gorenflo–Gael 1990; Celestino Pérez *et al.* 2011; Surface-Evans 2012; Sampson *et al.* 2015), as well as predicting the location of archaeological sites (Mink *et al.* 2009; Ripy *et al.* 2014; Rogers *et al.* 2014a, 2014b; Diwan 2020).

The traditional LCPA workflow has been described in several studies (see, for example, Herzog 2013; White 2015). Two main parts are briefly detailed below: 1) creating a cost surface (also named as friction surface), calculating a cumulative cost surface based on a given starting point, and 2) determining the desired least cost, efficient paths.

1) Cost surface contains information about the medium through which travellers must move and also takes into account several environmental factors that affect the travel time between locations. Environmental factors such as ground cover and terrain slope generally contribute significantly to travel speed. The most common and simplest cost surface used in archaeology is the slope. With the help of GIS applications, a Digital Elevation Model (DEM) can be easily converted into a slope map. Each cell in the slope map contains an estimate of the elevation change that occurs when moving from any of the neighbouring cells to that cell.

Two comments should be made here. Firstly, slope values are always positive, ranging from 0 to 90 degrees, meaning that all travel should be treated as if going uphill. In contrast, studies have shown that there are marked differences in terms of effort between going uphill or downhill (Gorenflo–Gael 1990). This problem is related to the concept of anisotropy, in the sense that the direction of movement affects the cost of movement. Secondly, slope values may assume a linear relationship, meaning that a given increase or decrease in slope has the same effect wherever it occurs on the cost surface. However, the slope values and the 'cost' assigned to them do not necessarily move along a linear scale, so this relationship is not necessarily (and generally not) linear. This affects the concept of non-linear cost estimation, the cost of movement can change much faster than the linear change.

A cumulative cost surface is built around one or more movement starting points for movement on the cost surface and stores the accumulated costs (in units of the cost surface) for moving away from the starting points. More friction means less efficient movement. The minimum cost for each cell of the cost surface is usually estimated using Edsger W. Dijkstra's graph search algorithm (Dijkstra 1959). Rupert Gietl *et al.* pointed out that the results will be different due to the variations between some software implementations of the algorithm (Gietl *et al.* 2008).

2) Given a cumulative cost surface, finding the efficient path that connects a given cell to a given motion starting point on the cost surface is rather simple. Compared to the time-request to create a cumulative cost surface, path finding can be quickly carried out.

Effective routes leading to the Middle Palaeolithic and Early Upper Palaeolithic sites of the Cserhát Mountains certainly led through Mátraalja, at the foot of the Western Mátra Mountains, in the narrow gorge valley between Gyöngyöspata and Szurdokpüspöki. So far only Late Upper Palaeolithic and/or Epipalaeolithic sites are known to have existed along the section of the Zagyva Valley extending south of Szurdokpüspöki (Gutay 2007; 2016; Gasparik 2015). Another possible route, bypassing the Mátra Mountains, leads from the surroundings of Eger, by the northern foothills of the Mátra Mountains, to the Zagyva River Valley. Scattered palaeontological and archaeological evidence along this route, also confirms the potentially migratory nature of the route (Péntek–Zandler 2022).

We consider it necessary to refer to a generally neglected aspect of Palaeolithic sites, namely the relationship between the topographical features of the area surrounding the site and the movement of potential prey animals. What could be the explanation for the absence of any trace of Palaeolithic activity in the Mátra Mountains? The area of the Mátra Mountains is practically impassable for megafauna species because of the excessively steep ascents and descents, making it unsuitable for hunting by Palaeolithic hunting groups. Frank J. Krist & Daniel G. Brown in their GIS modelling of caribou migrations associated with Palaeoindian sites in northeastern Lower Michigan (USA), based on a substantial body of animal behaviour literature, considered a slope of 8° (14%) or steeper to be an absolute limit for caribous (Krist–Brown 1994). David Ganskopp & Martin Vavra (Ganskopp–Vavra 1987) studied the slope use of several ungulates (cattle, wild horses, deer and Canadian wild sheep). On undulating terrain, the slope preferred by this species was less than 19%. Ganskopp *et al.* 2000. investigated the use of slopes by several ungulates (cattle, wild horses, deer, and Canadian wild sheep). The authors used a large number of observations to study cattle grazing habits on rolling pastures. The slope of the

topography of the pastures was on average 13.5%, and the tracks of the cattle had a significantly lower slope (8%) than would be expected based on the average pasture slope. The average slope of the trails was 5.2%, significantly less than the average slope of the pastures or terrain covered by the trails.

Fig. 10 shows the least cost path (LCP) from the Zagyva Valley, Szurdokpüspöki area, to the Balogi-tábla (BT–01) site. The efficient routes to the Middle Palaeolithic 'Vanyarc-type industry' sites Vanyarc–Szlovácka dolina (Markó 2012) and Vanyarc–Makói-oldal (Péntek–Zandler 2018) are also included. The sites or small lithic concentrations belonging to the 'Vanyarc-type industry' are located about 4.7 km southwest of the settlement of Vanyarc, on a ridge between the Nógrád (Vanyarc) Stream and the Saj-völgy Stream. Based on the available data, the only palaeontological site in the central part of the Cserhát Mountain Range is also indicated. The fossil collection of the Hungarian Natural History Museum has a fossil of a woolly rhinoceros (*Coelodonta antiquitatis*) from an undetermined area of the settlement Buják (Jánossy–Vörös 1979, 37). Apart from this, no other remains of prehistoric animals are known along the generated LCPs, presumably mainly due to deficiencies in field research or because of the preservation possibilities. It should be mentioned that the two southern LCPs, between Szurdokpüspöki and the Vanyarc–Makói-oldal and Balogi-tábla sites pass topographically through the flat, open, slightly undulating parts of the Hatvan plain and the southeastern parts of the Cserhátalja foothills. Most of the area would have been unsuitable for Middle Palaeolithic or Early Upper Palaeolithic hunting camps. The northern LCP up to the site of Vanyarc - Szlovácka-dolina, on the other hand, runs closer to the heavily fragmented foothills of the Cserhát Mountains. From an archaeological point of view, within the about 2.5 km wide 'buffer zone' of this generated LCP, there are four published surface scatters of different age and cultural affiliation with Middle Palaeolithic and/or Early Upper Palaeolithic character (Péntek–Zandler 2017). This 'buffer zone' also includes the Balogi-tábla site and its surroundings. Since the topographic differences between the three modelled routes are so different, it is perhaps conceivable that the initial section of the routes leading to the Vanyarc–Makói-oldal site and the Balogi-tábla site could have been the same as the northern route and that these routes only diverged somewhere near the aforementioned sites.

In the Buják–Rózsás-tető (BRT) small lithic concentration, there is an unpublished transversal side-scraper made of Carpathian radiolarite. A high-quality limnic silicite with a layered and tabular appearance was also exposed on this hillside as a lithic raw material (Markó 2005). The Upper Palaeolithic finds of the recently published Csécse–Szőlős-domb (CSD) site complex belong to the *sensu lato* Aurignacian technocomplex (Péntek *et al.* 2025).

The most relevant statistical characteristics of the LCP between Szurdokpüspöki and the Balogi-tábla site are as follows. The length of the generated path is 17.732 m and consists of 617 sections. During the path, the total uphill

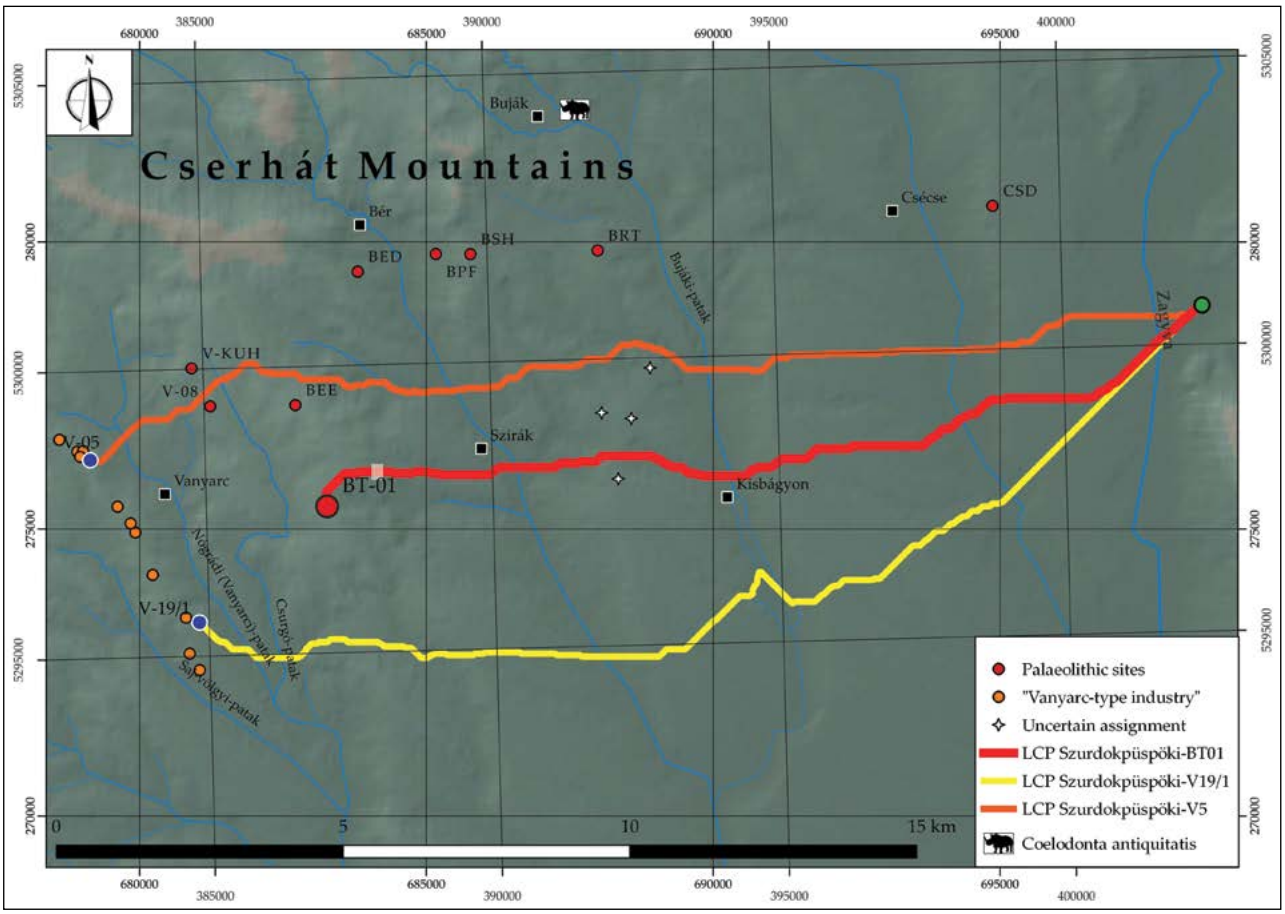

Fig. 10. *The generated least cost path (LCP) from the Zagyva Valley, Szurdokpüspöki area, to the Balogi-tábla site.*

is 328.52 m, and the downhill is 177.15 m. The maximal downhill section is -15.05%, the maximal uphill section is 22.72%. The average of the absolute values of the slope data for the sub-sections is 3.01%. Based on the standard slope gradient classes of FAO (Reinhold *et al.* 2006, 12, Table 7), 46.68% of the route is 'flat or slightly sloping' (0-2%), 35.33% is 'slightly sloping' (2-5%), 15.72% 'sloping' (5-10%), 1.78% 'strongly sloping' (10-15%; 11 subsections), and only 0.48% 'moderately steep' (15-30%; 3 sections). In the figure, white vertical lines along the least cost path indicate the sections where the slope gradient is greater than 10%. There is only one such section, 237 m long, along the path, located shortly before the Balogi-tábla site.

8. Visibility Analysis/Viewshed Analysis

Visibility analysis is a common function of most GIS. The visible area (viewshed) is the area that is visible from a specific location. The analysis uses the elevation value of each cell in a digital elevation model to determine the visibility to or from that cell. The location of a given cell varies depending on the needs of the analysis. The visible area can be calculated using individual points or multiple points, such as a line representing a path. When analysing a line segment, the visible area of all points along the line is identified. The union of the visible areas of individual points is called the visibility surface. Using the fact that visibility can be considered an inverse relationship, the process can also be reversed. For example, when searching for a specific point, the analysis can determine where the point is visible. In the case of several points, it is possible to determine the intervisibility network between the points (Caldwell *et al.* 2003; Li *et al.* 2005; Brughmans–Brandes 2017). Here, especially because of the Palaeolithic topic, the visibility study was based on the known topography and did not take into account forest cover. The latter was certainly different in the Pleistocene compared to the present, so the modelling results can be considered maximum visibility results.

There are many known archaeological applications of the method (Kwamme 1992a; 1992b; Earley-Spadoni 2015; Murrieta-Flores 2007; 2012a; 2012b; Verhagen 2018). These applications are partly used during analyses related to the selection of sites or the territorial location of settlement complexes (Jones 2006; Čučković 2015). The use of line-of-sight methods helps to determine the least cost path between different points, for example units of a settlement complex, settlements and raw material deposits (Herzog 2013; 2014; Rogers *et al.* 2014a; 2014b).

Cumulated visibility analyses can also be prepared regarding the topographical location of a given hypothetical settlement complex, a larger base camp and related smaller artefact concentrations, as well as functional satellite points. In this case, the visibility areas for all units have been combined. The permissible aggregation or merging of visibility areas is justified by the assumption that visibility conditions played a role in communication between settlements of the same period. Since hunting should be conceived of as a group activity, such communication may have played an indispensable role primarily between the base camp (in the case of Cserhát Mountains, mostly 'temporary hunting camps') and the satellite stations ('hunting ambushes'). The primary objective of the GIS-based analysis related to the Balogi-tábla site was to verify the assumption, that for practical, strategic hunting reasons, this Early Upper Palaeolithic site was closely related to the narrow stream running nearby, as a 'topographical neuralgic point'.

Fig. 11 shows the visibility area of the Balogi-tábla site BT–01 at 295.0 m a.s.l. within a radius of 4 km. Since it can be assumed that the occupants of the site were not 'lowland hunters', the Nógrád (Vanyarc) Stream valley to the southwest of the site and the Bér Stream valley east of the site can be ignored. The focus of observation is, therefore, the valley of the Csurgó Streamlet, especially its southern meandering branch, which flows by Sváb Hill (258.0 m a.s.l.) and Dologó Hill (284.4 m a.s.l.) from the west.

From the point of view of hunting, this streamlet valley must have been important. *Fig. 12* shows the visibility area divided into eight circle sectors. At the same time, it also indicates the 1 km radius circles. It can be seen that the 2 km radius circle in the western and southwestern parts is particularly visible, with specific figures, this area of 1.133 km^2 represents 9.03% of the total circle of 12.54 km^2. If we assume that the Balogi-tábla site was an ephemeral hunting camp of short duration, the question arises as to where the potential prey animals may have come from? Regarding a presumed east-west animal movement, the critical path between the Szirák and Vanyarc basins needs to be examined.

In *Fig. 13* the 6.03 km long LCP generated between the Szirák and Vanyarc Basin is marked in black. Short, coloured vertical lines mark the subsections where the slope is greater than the critical (8°=14%) value. The average elevation of the 124 uphill sections is 5.93%, and the average slope of the 101 downhill sections is 5.99%. To the north of the LCP, the marked 6.37 km long route, which takes into account the above limit, is certainly still of medieval origin, largely identical to the present-day county road between the two settlements, Szirák and Vanyarc. The 125 uphill sections of this route have an average gradient of 5.61%, and the 100 downhill sections have an average gradient of 5.64%. In *Fig. 14* besides the 4 km radius of visibility of the Balogi tábla site BT–01, the path for potential prey animals generated above is shown as well. As it can be seen, the path lies partly outside the focus of the visibility area and partly lacks the 'topographical neuralgic points', narrow valleys and stream crossings, and other topographic bottlenecks that are considered prerequisites for successful hunting. The Nógrád (Vanyarc) Stream, is a major migration route in the Central Cserhát Mountains, connecting the Hatvan plain with the upper reaches of the Galga River. Therefore, the location of the Balogi tábla site BT–01 was more influenced by the narrow, meandering lower course of the Csurgó Stream, which bypasses Sváb Hill and which sits in the focus of the visibility area. The streamlet is a tributary of the Nógrádi (Vanyarci)-patak Stream. The 9 km long route generated from the Kálló Basin at 153.15 m a.s.l. towards the Alsósarlóspuszta farm at 242.09 m a.s.l. runs up an elevation for a total of 90 m (with an average gradient of 1%), practically barrier-free in the stream valleys.

In *Fig. 15*, a mutual visibility network is shown with the Balogi-tábla site BT–01 and four potential satellite points (PSP). Sporadic, atypical, knapped stone material was found on Dologó Hill (PSP–1), at 284.4 m a.s.l. Two small lithic concentrations of rather atypical lithic materials, that also included Palaeolithic artefacts, were found on Sváb Hill (PSP–2, 255.0 m a.s.l.). No field survey has been previously undertaken at PSP–3 (Kis-Körtés Hill at 273.0 m a.s.l.); The surface is degraded and a substantial part of it is covered by a Middle Miocene gravel bed at PSP–4 (Hruskár Hill

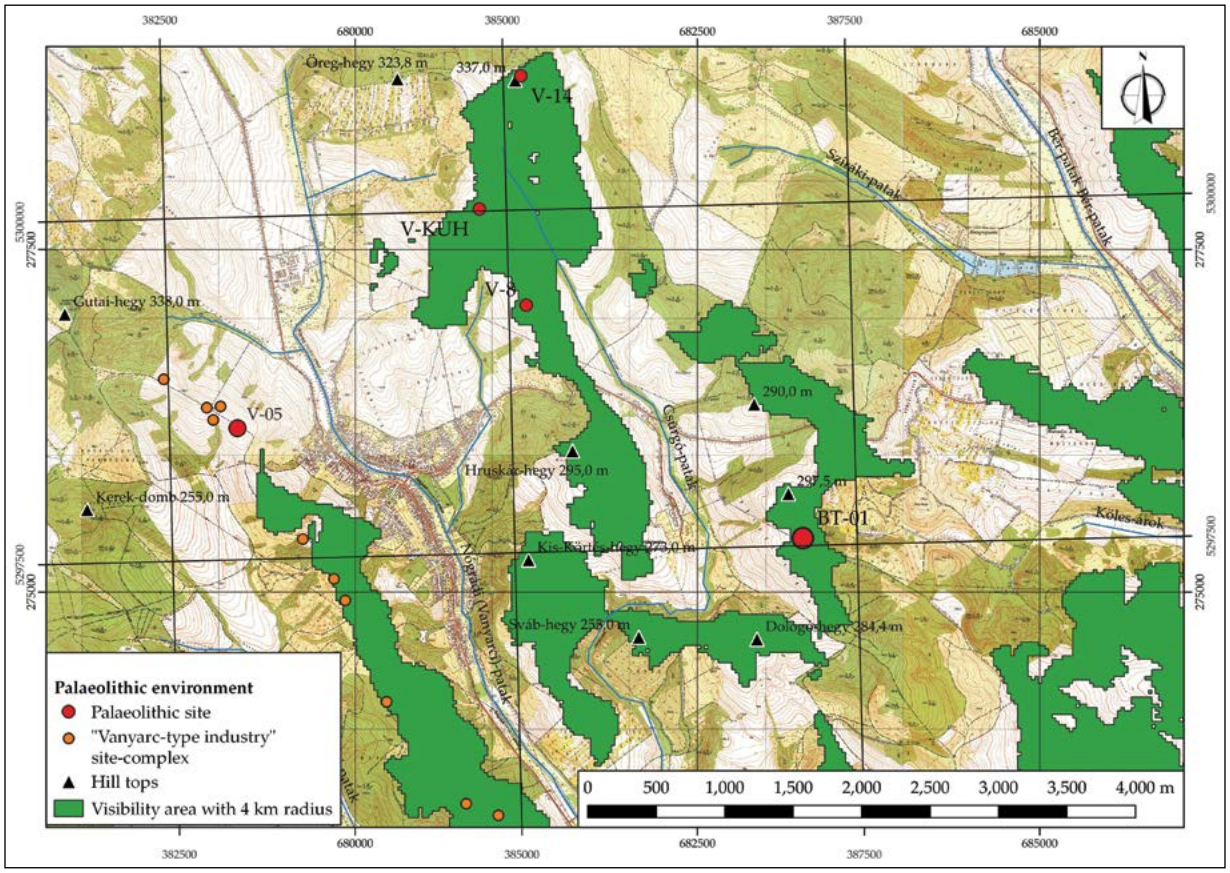

Fig. 11. *The visibility area within a radius of 4 km of the Balogi-tábla site.*

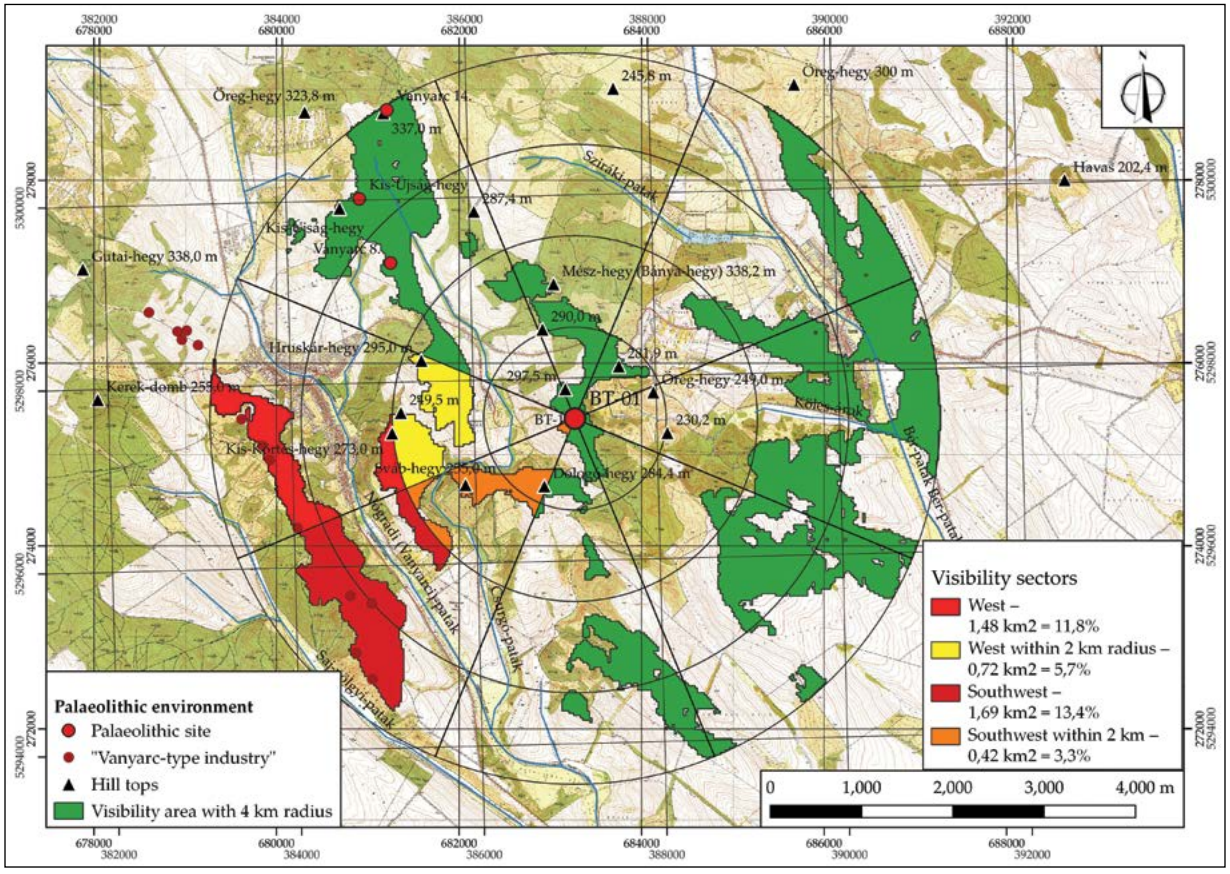

Fig. 12. *The visibility area of the Balogi-tábla site divided by the main geographic directions.*

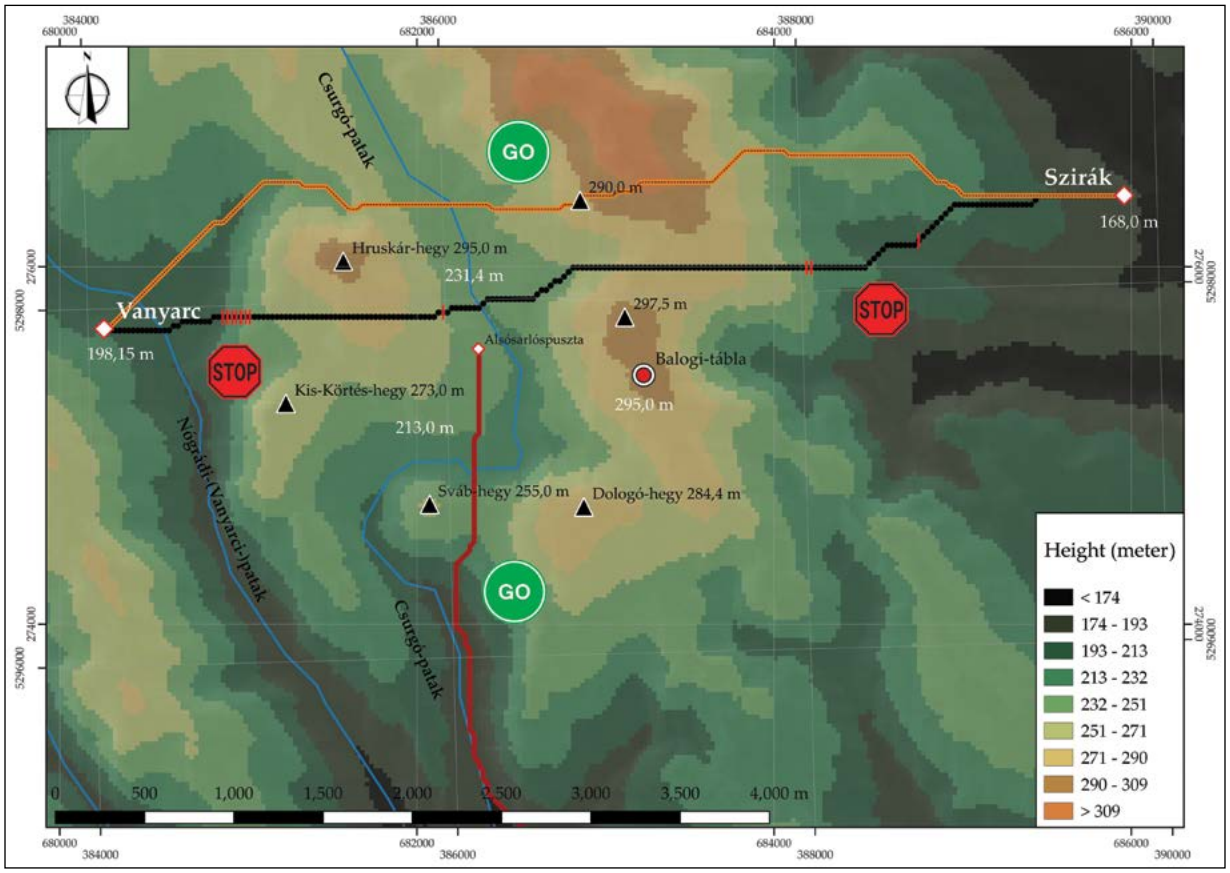

Fig. 13. *The generated least cost path (LCP) between the Szirák Basin and Vanyarc Basin.*

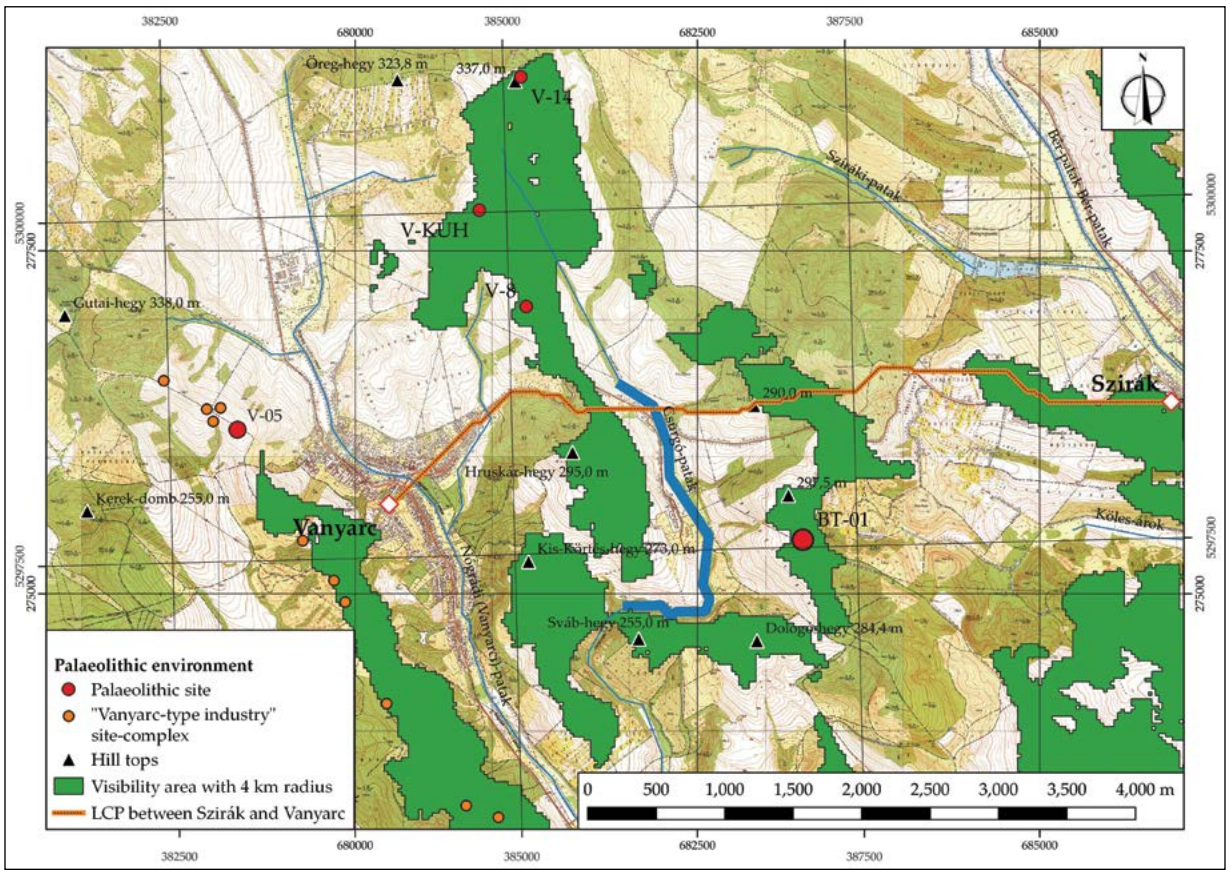

Fig. 14. *The visibility area of the Balogi-tábla site and generated least cost path (LCP) for potential prey games between the Szirák Basin and Vanyarc Basin.*

at 295.0 m a.s.l.) and only scattered younger prehistoric (Neolithic) artefacts were found during the field survey. The constructed intervisibility network has considerable communication potential and provides visual control all along the Csurgó Stream of about 1.5 km.

9. The site catchment area

The analysis of the site catchment (acquisition or procurement) area (SCA) of a site was first defined in 1970 by Claudio Vita-Finzi and Eric Higgs as '*the study of the relationships between technology and those natural resources lying within economic range of individual sites*' (Vita-Finzi–Higgis 1970, 5). It is generally assumed that the further you are from a particular place, the more energy you have to invest to acquire resources. As a result, as the hunters moved away from the given place, the intensity of exploitation in the surrounding area decreases, and finally a point is reached beyond which exploitation is unprofitable. To determine the relevant area for a specific site, Vita-Finzi and Higgs applied simple cost-benefit principles, supported by numerous ethnographic and historical examples. They set a maximum radius of daily exploitation for hunting, gathering sites at 10 km, and 5 km for the more labour-intensive activities of agricultural communities. Since local topography can impede movement in the landscape, these radii were calculated in terms of walking time — two hours and one hour, respectively. A thorough theoretical overview of SCA can be found in an article by Donna C. Roper (Roper 1979); numerous case studies of SCA of archaeological sites from different periods are known (for a non-exhaustive list, see Uthmeier *et al.* 2008; Marín-Arroyo 2009; Vidal-Matutano *et al.* 2018; Sauer - Uthmeier 2020; Marín-Arroyo–Sanz-Royo 2021).

The basis of SCA is an anisotropic cost model, which represents the cost of traversing the landscape expressed in time. The idea behind this model is to create a series of isochrone lines that allow researchers to understand (in terms of walking distances) the time required to get from a given site to any point in the study area. An isochrone line is defined as a line drawn on a map connecting points at which something occurs or arrives at the same time. A significant part of the LCPA and SCA studies use Waldo Tobler's 'hiking function' (Tobler 1993) to estimate the travel time, which is based on empirical data published by Eduard Imhof (Imhof 1950). A practical adaptation of the function is attributed to Nicholas Tripcevich (Tripcevich 2009). Among the topography factors that were calculated, the function only takes into account the slope speed on flat terrain is 5.037 km/h. In the absence of botanical and hydrographic data for the investigated area, the method based on slope conditions is methodologically justified given the environment of the Balogi-tábla site.

The polygonised isochronous lines *(Fig. 16)* show the areas that can be reached from the site at a maximum of 2 and a half hours at a resolution of 30 minutes. The anisotropic isochrones were generated using the velocity function proposed by Patricia A. Murrieta-Flores (Murrieta-Flores 2012b) of Lancaster University (Lancaster, UK), which assumes a practical realistic maximal travel speed of 4.19 km/h on flat terrain for migrating groups. The figure shows circles of 3, 6 and 9 km radius around the site

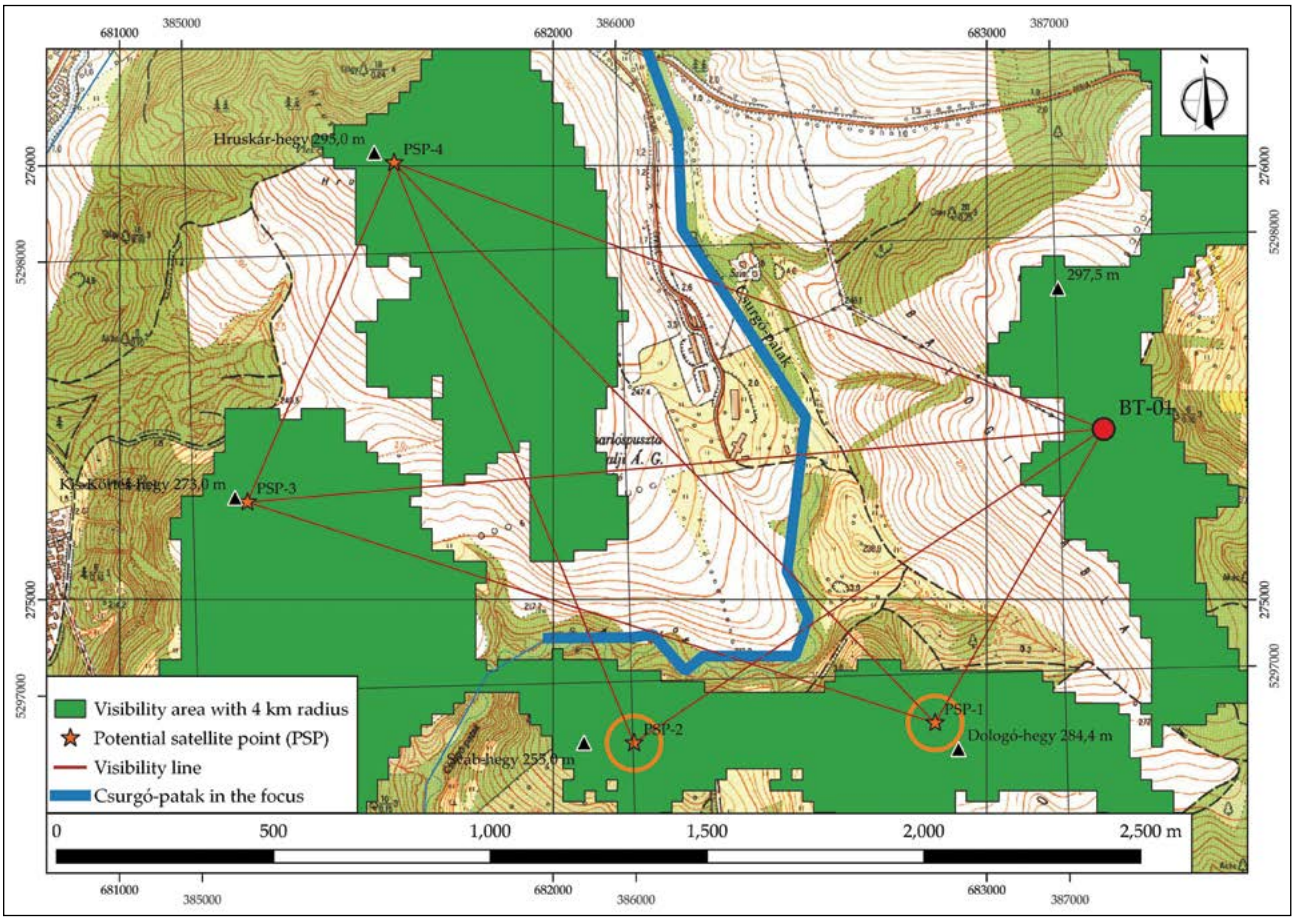

Fig. 15. *Intervisibility network between the Balogi-tábla site, and four potential satellite sites, PSP-1 to PSP-4.*

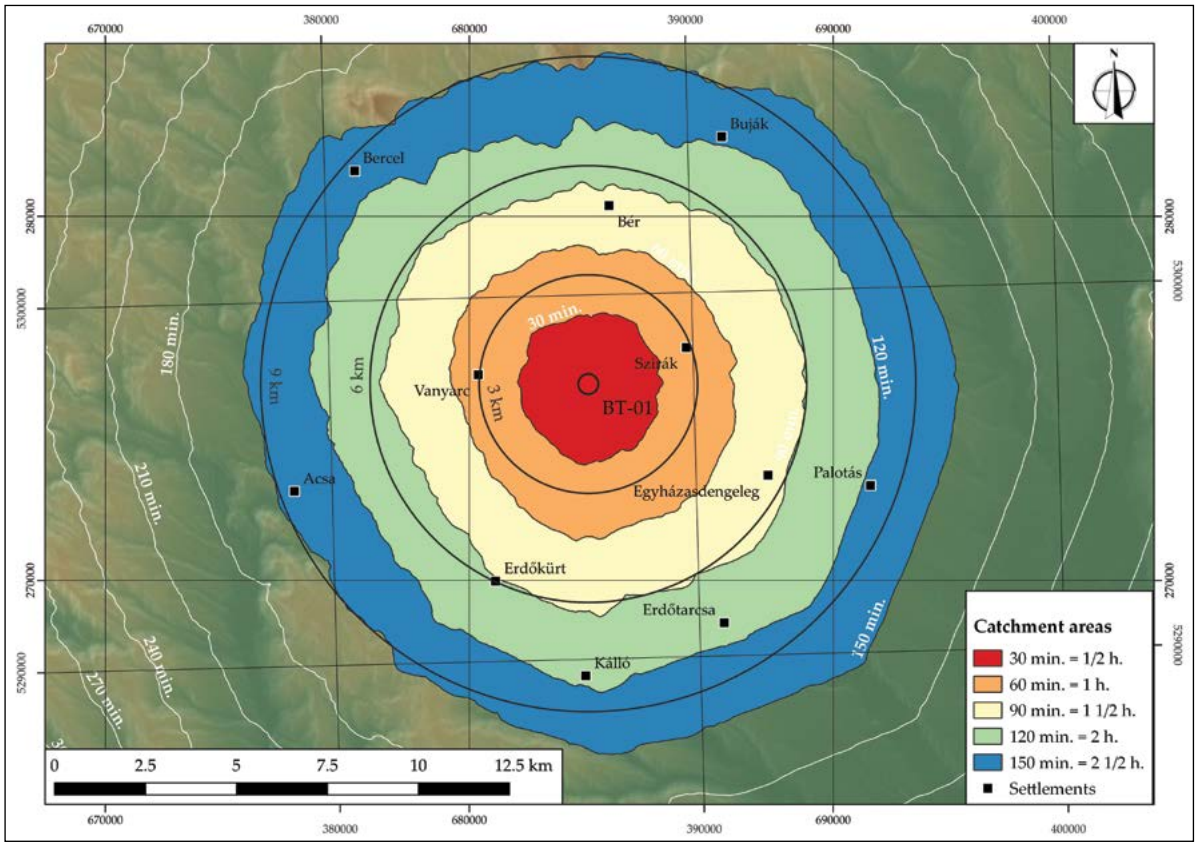

Fig. 16. *Anisotropic isochronous lines and sectors, marking the areas that can be reached from the Balogi-tábla site in a maximum of 2 ½ hours with a resolution of ½ hours.*

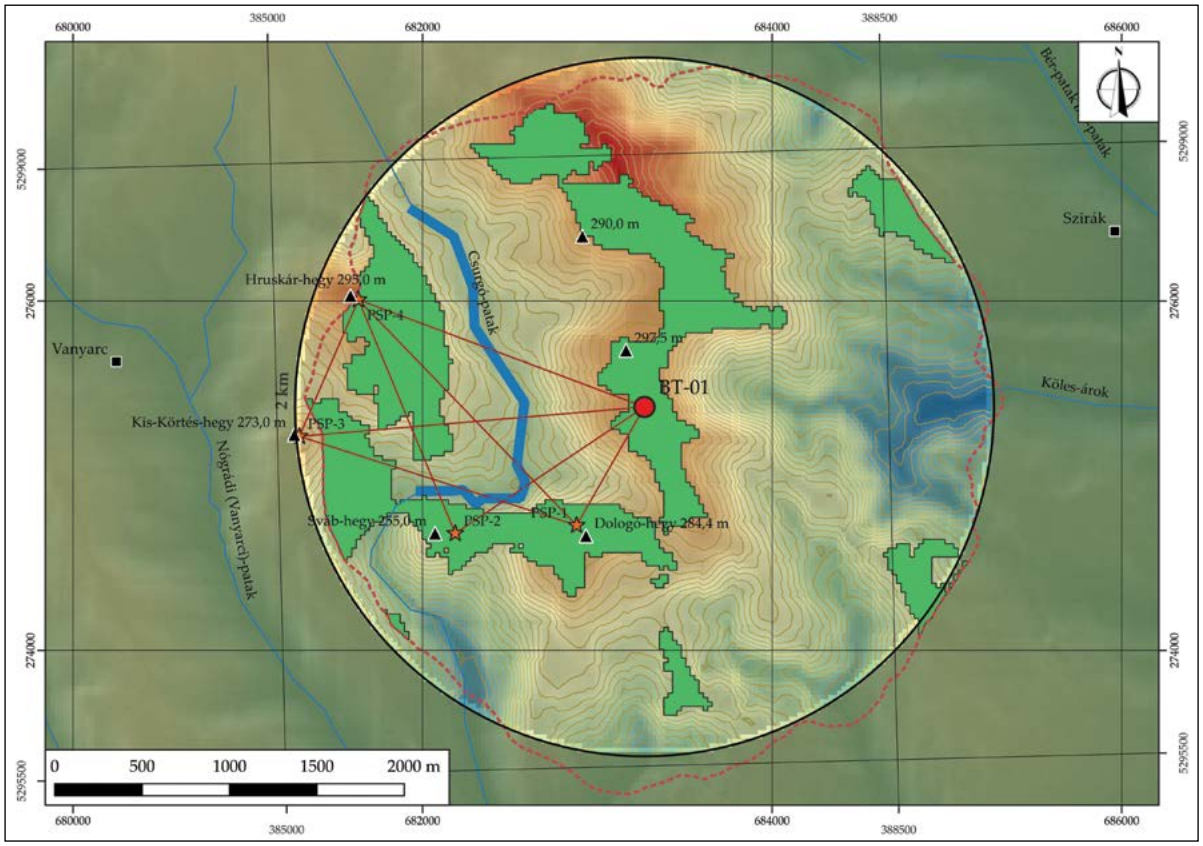

Fig. 17. *Circle with 2 km radius around the Balogi-tábla site, and the accessible area within 30 minutes from the site.*

based on Euclidean distance. It can be seen that although the isochrones are irregularly shaped, and approximately circular, the maximum distance that van be travelled in 2½ hours is just over 9 km instead of the theoretical 10.475 km. In other words, the terrain conditions around the site only permitted a lower travelling speed than the theoretical one. The fact that the isochrones are approximately circular, however, suggests that the slope conditions are not so extreme as to distort the isochronous lines, causing noticeable deviations, indentations or protrusions from the approximately circular shape.

In the centre of *Fig. 17*, there is the 2 km radius circle around the Balogi tábla site BT–01, an isochrone line of the area accessible from the site within 30 minutes of the site, a section of the visibility area, and a section of the Csurgó Stream defined during the LCPA as the observation focus of the site. Also included is the intervisibility network with assumed PSPs. The area enclosed by the isochrone is 12.34 km^2; within this area, the visibility section covers 2.29 km^2 (18.56%).

In conclusion, it can be stated that based on the above elementary GIS analyses related to the site, the field survey along the LCP generated from the Szurdokpüspök starting point in the direction of the Balogi-tábla site, an area of approximately 3–35.5 km^2 between the settlements of Kisbágyon and Szirák would be worthwhile to survey. There are four smaller lithic concentrations of uncertain cultural assignment in this area. Due to the absence of extensive forests and meadows, the area is highly suitable for field surveys. Since the use of raw materials at the Balogi-tábla site was dominated by local raw materials, it can be assumed that the hunting group already possessed certain geographical and geological information about the Cserhát Mountains and a source of suitable local raw materials. However, it seems reasonable to assume that they primarily exploited the immediate 3–4 km radius area around the site as a good strategic location for hunting. For this reason, further research into the Vanyarc–8, Vanyarc–KUH and Vanyarc–14 lithic concentrations shown in *Fig. 1* close to the site is also justified.

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A Middle Neolithic Settlement at Encs-Kelecsény, Hernád Valley, Northeastern Hungary

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Abstract: *Results of research on the Middle Neolithic settlement of Encs-Kelecsény are summarized in this paper. The site, located in the Hernád Valley, Northeastern Hungary, was excavated by Mária Wolf and Katalin Simán in 1983. Despite the small excavation area and few Neolithic features, rich ceramic and lithic material, as well as Spondylus ornaments and bone implements were unearthed there. The pottery shows characteristics of the Tiszadob and Bükk pottery styles with elements of the early Alföld Linear Pottery Culture (ALPC) in the coarse decorated ware. The site is one of the 22 known Tiszadob-Bükk settlements in the Hungarian part of the Hernád Valley microregion.*

Keywords: *pottery style, Tiszadob, Bükk, Alföld Linear Pottery Culture, settlement*

1. Research history of the site

The archaeological site of Encs-Kelecsény is located on the southern outskirts of the town Encs, near the road to Fügöd, on a hill rising above the old floodplain of the Hernád River, covering an area of 100×300 m (*Fig. 1*, L. Wolf–Simán 1984; Wolf 1989, 41. Our *Fig. 1* is made by the georeferencing of the sketch map of Wolf 1989, 41, Fig. 13. This site location does not match the one in the national site registry of Hungary, 2024). It was discovered by Mária Wolf and Katalin Simán during a field survey aimed at locating the medieval village of Kelecsény on 14 October 1981. This name was known as a toponym by local residents. According to the researcher's description, the Kelecsény begins on the eastern side of the road leading from Fügöd to Encs, 'by the town sign for Encs'. There in an area of approximately 50×200 m, artefacts were found dating from the Neolithic, the Árpád period and the Late Medieval Period. Burnt black spots and fragments of wattle-and-daub were observed in several places *(Herman Ottó Museum Archaeological Database (hereinafter HOM AD): 1607–81)*.

On March 28, 1983, M. Wolf and K. Simán carried out more field work, marking out the location of a future test excavation *(HOM AD: 1671–83)*. The finds obtained during these two field surveys also included Late Bronze Age potsherds, now held in the Herman Ottó Museum (hereinafter HOM) Archaeological Collection *(Inv. No.: 85.17.1–92.)*.

The excavation was carried out between 15 and 27 August 1983 *(HOM AD: 1716–84, 1704–84)*. Five trenches (I–V) were opened and a total area of 130 m^2 was excavated (based on the survey maps; The drawings can be found among the uncatalogued excavation drawings of the HOM AD). A large Neolithic feature identified as a sunken house was discovered, with an oval waste pit at its western end; however, the fill of the feature also contained a few Árpád period potsherds, while above the level of the feature four Bronze Age vessels containing human ashes were also unearthed (L. Wolf–Simán 1984 and *HOM AD: 1716–84, 1704-84*). It would be worthwhile to deal with this Late Bronze Age urn burial in a separate publication. A rounded oven was discovered north of the large Neolithic feature. It had an ascending wall reinforced with some stones and a plastered floor. Its southeastern side was discovered, surrounded by a semicircle of postholes. The dating remains uncertain *(HOM AD: 1716–84, 1704–84)*. The excavated find material in the HOM Archaeological Collection includes Roman Period (Germanic) potsherds (uninventoried material). The exact period these sherds belong to is not mentioned in the reports.

On 22 July 2024, a metal detector-aided site verification survey at Encs-Kelecsény was carried out by the HOM. The site had been previously described by Mária Wolf in the 1980s. Since most of the area was covered with dense, wild vegetation, the entire site unfortunately could not be delineated. Nevertheless, Neolithic and medieval (?) ceramic sherds were collected from molehills near the western edge of the site and west of it, on a high riverbank *(Fig. 1)*. A fifteenth-century coin was also found with a metal detector in a ploughed field in a lower area below the high riverbank *(Fig. 1)*. Despite favourable circumstances, no ceramic finds were during the field walk through that lower area, so it can be assumed that the coin could have washed down from higher terrain. It is also likely that the full extent of the site can be found on the high riverbank and includes the western part of the area marked out by Mária Wolf, as well as the areas to its west and northwest, although their extent cannot be determined at the moment.

2. Description of the Neolithic features

The exact location and relative positions of the trenches are not known because the survey map is not complete. We know that Trenches I-III-IV were joined *(Fig. 2)*. Based on the field diary, it is possible to identify their positions on the common survey drawing. Trench II was certainly located separately from the others, but it is not known in what direction and at what distance it opened from them. Trench V lay further away from Trenches I-III-IV, but it is also not known in which direction. Trenches II and V were also given their own separate survey maps *(Fig. 3.1–2)*.

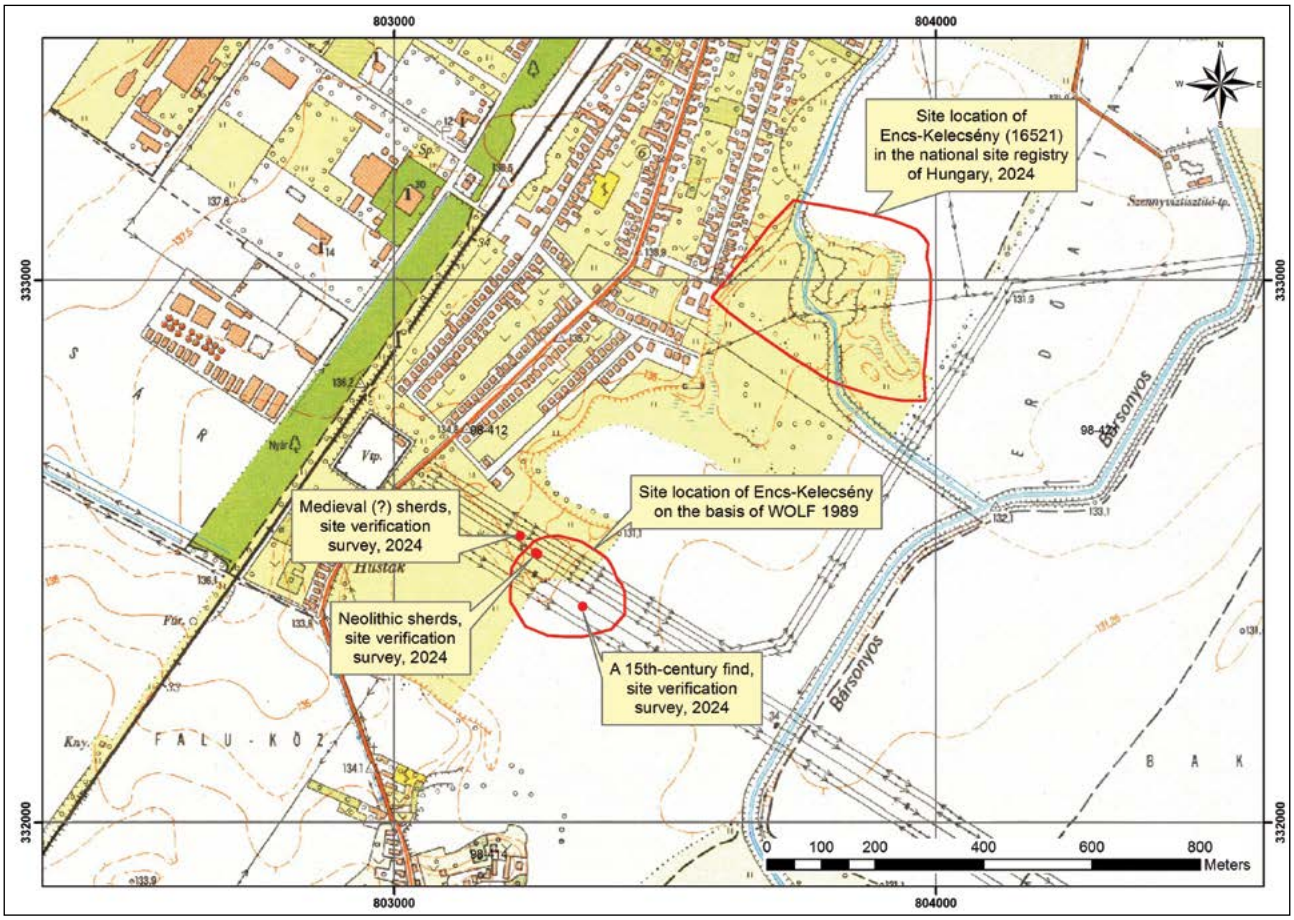

Fig. 1. *Location of Encs-Kelecsény site, on the basis of Wolf 1989, indicating the location of the finds found in 2024 and the polygon of the site in the national site registry of Hungary, 2024.*

The oven, surrounded by postholes and reinforced by some stones, was discovered in Trench II *(Fig. 3.1)*, but its dating cannot be determined with certainty, as mentioned earlier. Its stone-reinforced wall and the post holes around it *(Fig. 3.1)* do not support its Neolithic dating. A piece of the oven floor was preserved among the finds, but that also does not help in resolving the problem. In addition, only one Neolithic potsherd was recovered from the oven. Although the 'spits' (artificial layers) in Trench II also yielded (a few) Neolithic finds supporting Neolithic dating of the oven, no external ovens surrounded by postholes or reinforced by stones have been found yet from the ALPC group. The features discovered so far are ovens dug into the ground or the sides of pits, even if they were excavated as "positive" features, as if they had been above-ground structures. The Tiszadob-Bükk oven at Garadna-Elkerülő út 2 may be another parallel example from Borsod-Abaúj-Zemplén County (Csengeri 2010, 229 and *Fig. 2*), as well as a flat oven, dug into the side of a clay extraction pit from Hejőpapi-Hulladéklerakó 4 an ALPC 1 settlement (Feature s175 from the pit s99 from the János Veres' 2008 excavation. *Unpublished; HOM AD: 4701–10*).

The feature observed in Trenches I–III–IV, identified by the leaders of the excavation as a semi-subterranean house with an oval waste pit at its western end, a staircase exit in the south, and renewed floor levels might actually have been part of a large Neolithic clay extraction pit *(Fig. 2)* with different fill layers *(Fig. 4.1–2)*. The maximum depth of the feature was 165 cm in Trench I and 210 cm in Trench IV. Based on the unearthed parts *(Fig. 2)*, the pit must have been at least 15×8m. A large number of finds was recovered from there, filling 33 large and fourteen smaller storage boxes. All Neolithic finds, packaged at the excavation and labelled 'Trench I, Feature' and 'Trench IV, Feature 2', could have come from this clay extraction pit, as well as the large majority of the finds from the 'spits' of Trenches I–III–IV.

Part of a shallow but extensive pit with Neolithic finds was also found in the southern part of Trench V *(Fig. 3.2)*, along with a few Neolithic finds derived from the 'spits' of this trench.

Although there is no data on the distance between Trenches I–III–IV, II, and V, it can be assumed that a part of a relatively large Neolithic settlement was uncovered in Encs- Kelecsény. Its internal structure, unfortunately, cannot be reconstructed.

3. Neolithic pottery and small finds

Since no other Neolithic settlement features and only parts of the aforementioned clay extraction/waste disposal pit were found in Trenches I–III–IV, the Neolithic finds found in these trenches can be assumed to have been part of this large pit. Thus, the complete find material is discussed jointly below.

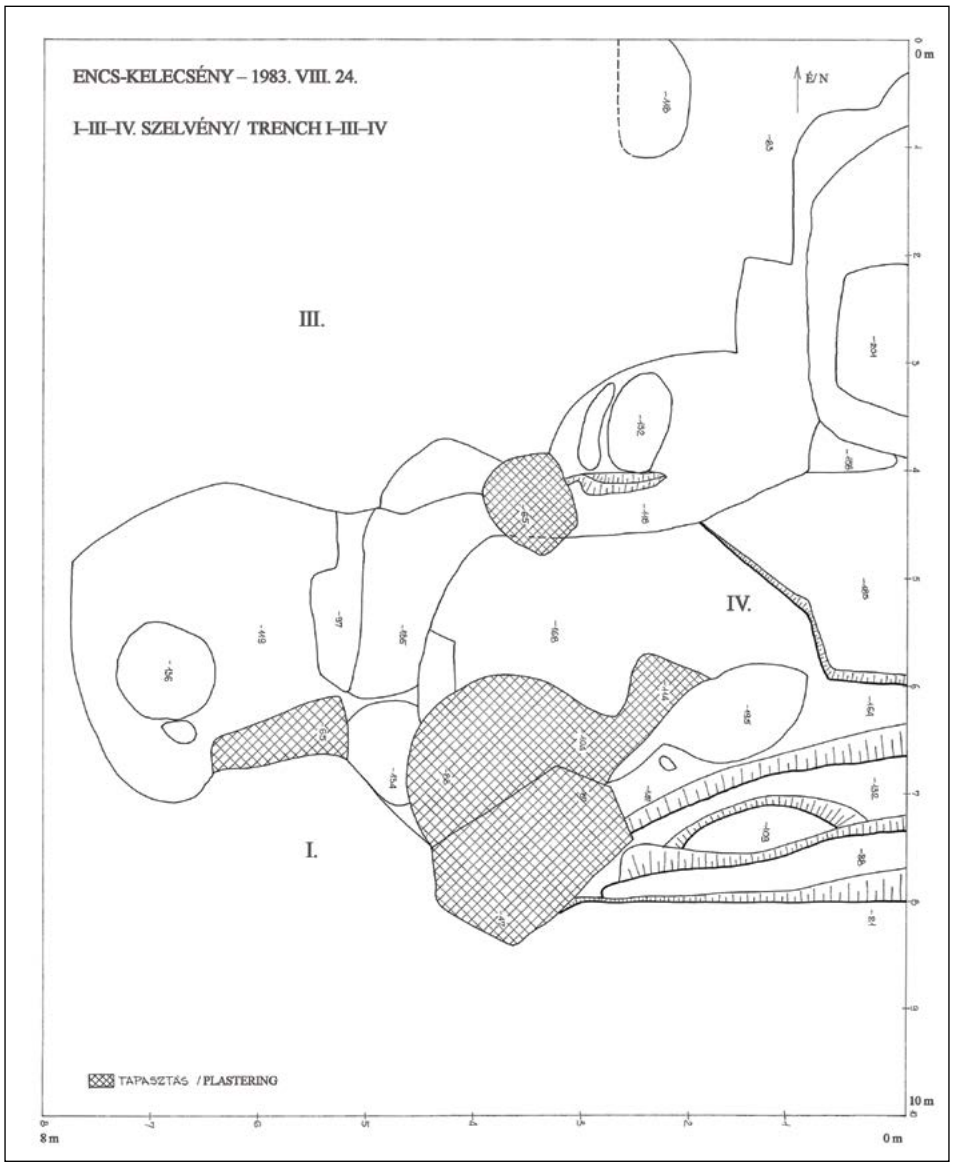

Fig. 2. *Survey maps of Trenches I–III–IV, which were opened together.*

3.1. Vessels

The pottery of the large clay extraction pit could be classified into four main groups: 1) incised fine ware, 2) incised coarse pottery, 3) undecorated fine ware, and 4) household pottery.

1) The decorated fine ware *(Fig. 5–8, Fig. 15.1–5)* is quite fragmentary, so it is only certain that various bowls, cups, and deep cups were were most commonly produced. Spouted amphora-shaped vessels, high-necked bottles, and pedestalled bowls also occur. Usually, these vessels have a grey core. Their surfaces were covered with a slip burnt to light grey, black or light brown. Tiszadob-style decorations dominate in this group. Generally, sparsely incised bundles of horizontal lines were placed below the rim *(Fig. 5.1, 4–6)* and above the base *(Fig. 5.10–11)*. Less frequently, wavy or zigzag line bundles may also appear below the rim *(Fig. 5.2–3)*. One main decoration on the vessel body include 3–5-line simple and pointed arch bundles and are common *(Fig. 5.5–7)*, while in several cases, wavy lines hang from the flat pointed arch bundles *(Fig. 5.7)*. Between the main decorative elements, starting from the ornamentation below the rim, 1–2-line 'hanging' triangles *(Fig. 5.4–5, 8)* or vertical wavy lines *(Fig. 5.2, 6–7)* appear. These supplementary motifs are perhaps the precursors of the 'hanging' triangles of the Bükk Culture's decorative system. Main decorations, divided into fields, are also common *(Fig. 5.11)*. The fields are filled with vertical or oblique line bundles, bundles of lines combined with punctures and, irregular wavy line bundles. Meander patterns can also be found although due to the fragmentary nature of the pieces, it is not possible to determine whether these motifs covered the entire surface or used as some kind of fill design. There are also typical Tiszadob bowls with internal decorations.

Tiszadob-style line bundles consist of 3–5 parallel lines that were visibly incised one by one with a single-toothed or

a multi-toothed but not rigid tool. Thus, during incising, the teeth could have moved away from each other, which could also have caused the irregularities within the line bundles.

White encrustation can be observed on several fragments *(Fig. 5.2–5, 7)* and rarely, the incisions are complemented by black bark tar painting (*Fig. 5.6, Fig. 8.4;* an example of the latter one has already been published earlier: Csengeri 2015, 139 and Plate 10.1).

Sherds with developed Bükk decoration, made in styles AB and B, are also present (*Fig. 6*; Based on of Lichardus 1974, 83–93, revised by Csengeri 2013, 177–182, 2014b, 507–508). In Trench I, these sherd types were clearly found in the upper layers. Among the Bükk-style pieces, there are also white *(Fig 6.1, 5)* and yellow encrusted sherds. Regarding the incisions, the lines of the frames were drawn individually, while, in several cases, those of the inner bundles were incised in pairs, presumably with a double-pointed tool. The sherds usually have a grey core and, in a few cases, their surfaces were covered with a slip burnt to light brown or black.

The innovative and experimental character of the Tiszadob pottery is represented by specially shaped fine ceramic vessels. This phenomenon can also be observed at other Tiszadob settlements like Garadna-Elkerülő út 2 (Csengeri 2010, Fig. 7.3 and the unpublished material of Pit S14). In Encs-Kelecsény, a special shell-shaped vessel with a hole drilled through the top and decorated on the inside, represents these vessel types *(Fig. 7.3a–b)*. Its outer side is undecorated *(Fig. 7.3a)*, while its inner side is covered with decoration divided into four fields: two are filled with irregular wavy lines and two with an irregular meander pattern *(Fig. 7.3b)*. Another unique vessel is a small, flat bowl with four-field decoration on both sides. Its fields feature the Bükk spiral pattern. A pair of holes is drilled in the vessel's rim *(Fig. 7.1a–b)*. The third strange piece is a vessel base, decorated on both sides which also has a small handle or knob with a lacey edge, perforated vertically with a pair of holes *(Fig. 7.2a–c)*.The sherd decorated with incised pointed arch line bundles on its lower side and a geometric stitched line pattern on the inner side, is perforated in one place *(Fig. 7.2a–c)*. It may have been a unique tray-like vessel *(Fig. 7.2a–c)*. The material also contains a fragment of a special, perhaps rectangular vessel decorated with meanders on its outer side and painted with black paint between the lines *(Fig. 8.4)*.

There is a small spout with an incised circle decoration at its base *(Fig. 8.3)*. Similar pieces are found, for example, at the ALPC 1 settlement of Novajidrány-Elkerülő út (two unpublished finds from the unit S2 of the *Längsgrube* from the excavation of the author, 2002), the Bükk culture settlement of Garadna-Elkerülő út 2 (an unpublished find from the unit S7 of a large pit from the author's 2003 excavation), and in a Szakálhát feature at Mezőkeresztes-Nagy Tubulyka (Feature 25). These probably come from small spouted vessels. A further analogy is a decorated three-quarter spherical segment-shaped vessel with a small spout, likely a nursing bottle, from a Bükk culture grave at Sajószentpéter-Vasúti őrház (An unpublished find from grave S23 from the author's excavations in 2008). A similar vessel, also believed to be a nursing bottle or medicine container, was found in a LBK context in Steigra (Saalekreis, Germany; Meller 2011, 95 with a figure). Another spouted vessel with ochre covering its inner side, found in a late Middle Neolithic grave on Hejőkürt-Lidl logisztikai központ, shows that such vessels could have served other functions, too (e.g., an unpublished find from the grave 155 (S2218) from J. Koós' 2005 excavation). Based on these unpublished examples from Borsod-Abaúj-Zemplén County, it can be said that one or two similar pieces are found in every settlement with larger excavated surfaces. It can be concluded that although this kind of ceramic was not one of the common vessel types, it was probably used for some purpose in all communities.

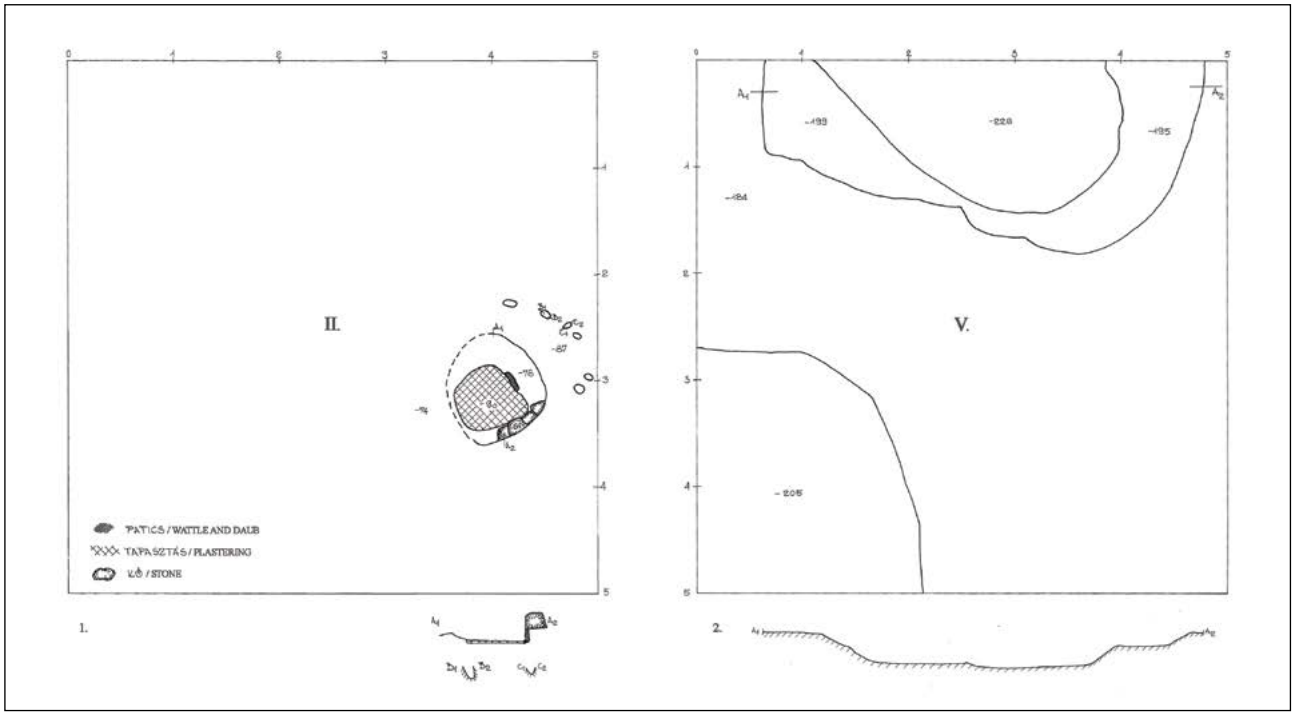

Fig. 3. 1. *Survey map of Trench II. 2. Survey map of Trench V.*

Among the special decorations (perhaps symbols), a ☽C motif on the base of a Tiszadob-style vessel *(Fig. 8.8)*, a 'W' motif on a Tiszadob-style rim fragment *(Fig. 8.6)* and an auxiliary dot-line 'H' motif on a Bükk-style fragment *(Fig. 8.7)* should be mentioned (For the symbolic signs of the Bükk culture, see Lichardus 1974, 55–60, Hreha–Šiška 2015, 109–113).

2) The coarse decorated pottery *(Fig. 9–10)* includes relatively large vessels decorated with incisions that are deeper and wider than those found on fine pottery, the shapes and patterns are reminiscent of earlier ALPC vessels. Among these forms, pedestalled bowls, deeper vessels with vertical walls and spouted amphora-shaped vessels can be recognized. There is usually no decoration below the rim *(Fig. 9.3, 5, 10)*, or if there is, it usually consists of 1–3 horizontal, wavy, or zigzag lines *(Fig. 9.1, 4, 8–9)*. The decorations consist of 1–3 lines incised one by one. The main patterns are simple and pointed arches that meet in the typical or more abstract heart shape *(Fig. 9.1, 3–6, 8–10)*. Dividing panels can also be observed between the main patterns consisting of vertical straight and/or wavy lines *(Fig. 9.1, 5)*. It is assumed that the 'hanging' auxiliary patterns of the Tiszadob style (see above for the fine ware and *Fig. 9.10*) as well as the decorative triangles of the Bükk style developed as these ALPC-style dividing panels became more shortened.

Black, bark tar painting is very common on this ware *(Fig. 10)*. Even the areas between the incised lines were painted black, thus, either emphasizing the more important patterns or the incised decorations themselves were painted with a wide black band to emphasize them. But a combination of the two types is the most common *(Fig. 10.1–5)*.

3) Undecorated fine ware *(Fig. 11–12)* is also present in the material of the large clay extraction pit in Encs-Kelecsény. It occurs in particularly large numbers in the units lying within the 'Trench I, feature'. These vessels are elaborate and have a burnished surface, similarly, to incised fine ware. Their colour is usually dark grey and black. Only bowls *(Fig. 11.2–3)* and deep cups can be identified among the forms *(Fig. 11.1)* due to the fragmentary nature of the material. Pieces of a special, perhaps oval, shallow tray were also found *(Fig. 12.1– 2)*. Another special piece includes a fragment with a broad rim that deepened into a bean-like form in one place *(Fig. 12.3a–b)*. Small, undecorated, finely elaborated ochre containers (perhaps cups) were also found in Encs-Kelecsény *(Fig. 12.4–5)*.

This ware was characteristic of the Bükk and Szakálhát pottery in Borsod-Abaúj-Zemplén County in the ALPC era from the second half of the Middle Neolithic. Only a few of such items were found in the Bükk site of Felsővadász-Várdomb (Csengeri 2001, 5), while in Sajószentpéter-Kövecses, almost half of the fine ware belonged to this category (Csengeri 2013, 73–74 and Fig. 34). Although its quantity is not emphasized in the preliminary report, undecorated fine ware also forms a separate category at the Szakálhát site of Mezőkövesd-Nagy-fertő (Csengeri 2010, 20–21), just as it is also present (in large numbers) in the unpublished Szakálhát clay extraction pit unearthed on the Mezőkeresztes-Nagy Tubulyka site (Feature 25, Judit Koós' excavation in 2000).

4) The last category is household pottery *(Fig. 13)*, where the forms are generally Middle Neolithic, typical of ALPC and its groups (Lichardus 1974, 23–29 and Abb. 1; Kalicz–Makkay 1977, 30–32, 39–40; Šiška 1989, 62–65, 84–88; Kalicz–Koós 2014, 44–47 and Fig. 31–47; Hreha–Šiška 2015, 67–72): pots and relatively large vessels with rows of holes below the rim *(Fig. 13.7)*, similar vessels but without rows of holes *(Fig. 13.4, 9)*, different types of bowls *(Fig. 13.8)*, amphora-shaped vessels with spouts or pseudo-spouts on their shoulders *(Fig. 13.3)*, pot-like vessels with spouts under the rim *(Fig. 13.5)*,and large storage vessels with cylindrical necks *(Fig.13.1–2)*. The decorations include finger impressions on the rim *(Fig. 13.1–2)*,while the vessels walls feature elongated grips, elongated grips with finger impressions, small simple knobs, disc-shaped knobs with depressed centres, and hollow knobs pressed from the inside *(Fig. 13.6)*. Incised mesh decoration appears on some fragments *(Fig. 13.4)*. There are also finger and nail impressions on the surface of large vessels *(Fig. 13.9)*, while the inclusion of a finger-impressed rib is common to find on storage vessel neck *(Fig. 13.1–2)*. These applied decorations and surface decorations are also common in the ALPC and its groups (Kalicz–Makkay 1977, 35–36, 43; Kalicz–Koós 2014, 54–55; Hreha–Šiška 2015, 107–109).

3.2. Miniature vessels

Miniature vessels are discussed separately, since typologically, they resemble three of the four 'main' vessel categories (1, 3, and 4). Decorated miniature vessels usually have special shapes, such as the two shallow trays with laced rims *(Fig. 8.1–2)*, one of which has Tiszadob-Bükk motifs on both sides and leg stubs on its base *(Fig. 8.2)*, and another which has a rough Tiszadob-style meander pattern on it *(Fig. 8.1)*.

Several miniature pieces possibly imitate undecorated fine pottery and household pottery, although their shape cannot be reconstructed. A fragment of a miniature sieve occurred among the household ceramic wares *(Fig. 8.5)*.

3.3. Anthropo- and zoomorphic representations

This find group includes a human figurine *(Fig. 14.4)*, another, quite stylised human figurine *(Fig. 14.2–3)*, a fragment of an animal-headed vessel handle(?) *(Fig. 14.1)*, and a vessel fragment with a hand- or foot-like handle *(Fig. 15.5)*.

One of the figurines is typical of the Tiszadob group; it is a fragment with the lower part of a flat bodied, standing figure *(Fig. 14.4)*. Its front side is undecorated, and its legs are indicated by two protruding cones *(Fig. 14.4b)*. The back side is covered with a Tiszadob meander pattern with lines representing human buttocks *(Fig. 14.4a)*. It is dark and elaborate, with a burnished surface. Its closest parallel is the iconic find from the Tiszadob group, the figurine fragment from Miskolc-Fűtőház (Korek 1959, 13–14, Abb. 4.1–2, Taf. I.1–2).

A special object from Encs-Kelecsény is an oval ceramic 'plate' *(Fig. 14.2–3)* similar to ones from Mezőkövesd-Mocsolyás (Kalicz–Koós 2014, 36–37 and Fig. 27, Plate 12.6, Plate 13.10), Bükkábrány-Kőkúti-dűlő (Bánya II) (Selján–Veres 2008, 8 and Fig. 3.3), Novajidrány-Elkerülő út (Csengeri 2013, 96, Fig. 8.3, 107; see more examples) and Hejőkürt-Lidl logisztikai központ (An unpublished find from S86, a large pit from J. Koós' 2005 excavation). One side of the Encs figurine is convex. Its lower part is separated from the upper part by a horizontal line *(Fig. 14.2a, 3a)*. Under the division towards the bottom, there are slanted lines with horizontal crossings (perhaps indicating clothing), while there are two double, slightly curved parallel lines with vertical divisions on the upper (perhaps naked) part (?) *(Fig. 14.2a, 3a)*. The depiction of a naked upper back

and clothed lower back appears on many ALPC figurines (For example: Novajidrány-Elkerülő út, Csengeri 2013, 92–93, 96, Fig. 2.1, Fig. 2.3, Fig. 4–5, Fig. 6.3, 107–108), while the two double lines seems to be the 'double band' motif found on the back of ALPC figurines and face vessels (Raczky–Anders 2003, 163, 170–171). Unfortunately, the other side of the object is damaged, and its surface almost entirely missing. However, it was certainly decorated *(Fig. 14.2b, 3b)*. A decorative detail next to one of its sides remained in the form of a pair of vertical lines connected by hatching *(Fig. 14.2b, 3b)*. Somewhat similar is a special, flat object from Šarišské Michal'any. Its front displays a depiction of an abstract human representation, with a 'sickle motif' on its face and a flat, undecorated back side. However, the Encs object is smaller, and its back was probably also convex. S. Šiška classified the Šarišské Michal'any find within the Tiszadob group and first described it as a flat plate (Šiška 1986, 441–442 and Abb. 1.2) and later as a vessel lid (Šiška 1989, 109–110 and Obr. 41.2; 1995, 36 and Fig. III). Rastislav Hreha classifies the object within the Bükk culture (personal communication).

The large pit also contained an animal-headed vessel handle (?) *(Fig. 14.1)*. It possibly depicts a bull's head, with its front side decorated with a meander pattern *(Fig. 14.1b)*, and undecorated back side *(Fig. 14.1a)*. Known analogies include a small clay bull horn sculpture from Mezőkövesd-Mocsolyás (drilled through the horns; Kalicz–Koós 2014, 34–35 and Fig. 23, Plate 8.7, Plate 13.9) and a vessel handle (?) with bull horns from Hejőpapi-Hulladéklerakó 1 (An unpublished find from unit S734 from the *Längsgrube* OBJ62, from Miklós Makoldi's 2009–2010 excavation), both dating to the ALPC Phase 1. A pot handle with a realistically shaped bull's head is known from Szarvas 102, an ALPC settlement (Jankovich *et al.* 1989, Plate 6.6).

There is also a side fragment from a Tiszadob-style vessel with a hand- or foot-like buckle on it *(Fig. 15.5)*. Usually, handles in the shape of a stylized human head have an inverted triangular (Bükkábrány-Kőkúti-dűlő (Bánya II): Selján–Veres 2008, 8–9 and Fig. 3.2, 4; Mezőkeresztes-Repcsényes (MOL-20): Selján–Veres 2008, 16 and Fig. 9.1) or other form (Tolcsva–Olaszliszka-Előhegy: Kalicz–Makkay 1977, 61 and Taf. 27.1–3, Taf. 107.3, Taf. 186.18), and handles depicting a whole person rarely occur (More precisely, a woman depicted with breasts. An unpublished find from the unit S704 of the *Längsgrube* OBJ67, from a 2009-2010 excavation by Miklós Makoldi at Hejőpapi-Hulladéklerakó 1) can be dated to the early ALPC. In contrast to that piece, handles on the shoulders of the vessels in the shape of hands or feet appeared or became common only during the later periods of ALPC, for example, in the Tiszadob-Bükk culture (see the large face-storage vessel from Garadna-Elkerülő út 2, Csengeri 2010, 229 and Fig. 4; 2011, 68–69, 81–82 and Fig. 1–2 and unpublished finds from features S14 and S31 at the same site).

Also worthy of attention are two solid vessel legs with Tiszadob-style incised decorations *(Fig. 15.3–4)*, one cylindrical *(Fig. 15.4)* and the other square *(Fig. 15.3)*, each without vessel forms that can be reconstructed. Vessels with legs had been produced since the early ALPC period (Kalicz–Makkay 1977, 23 and Taf. 4.1, 8 from Tiszacsege-Homokbánya) and were also in use in the Tiszadob-Bükk period (Hreha–Šiška 2015, 73 and Tab. XCIV.18, Tab. CXII.23 from Šarišské Michal'any), although their shapes can rarely be reconstructed (A zoomorphic vessel from Tiszacsege-Homokbánya; Kalicz–Makkay 1977, 23 and Taf. 4.8). Often only the decorated or undecorated clay legs are found (recently, Kovács–Németh 2022, *Fig. 8.8–9, Fig. 9.1–2, 4* – ALPC 2–3, Szakálhát and Bükk finds), which could have been parts of, not only vessels but also figurines, altars, or other symbolic objects.

Among the Tiszadob fine ware, was a possibly stylized depiction of a man with raised arms visible on the inner side of a vessel's base *(Fig. 15.2)*. Similar but larger human representations appear on the sides of vessels from Edelény-Borsod-Derékegyháza (Tompa 1929, 32 and Taf. XVIII.5.) and Bükkábrány-Kőkúti-dűlő (Bánya II) (legs) (Selján–Veres 2008, 13–15 and *Fig. 7.2*) – both dated to the fourth phase of the Middle Neolithic in this region. (The study of Selján–Veres (2008) classifies Feature S247, where the assumed human depiction was found, to the ALPC Phase 1).

Fragments of ten different face vessels found in Encs-Kelecsény were published in 2014; these will not be described in detail here (Csengeri 2014a). During the current round of processing, two other potential pieces were discovered *(Fig. 15.1, 6)*. One may be part of a fine spherical bowl and perhaps displays the central asymmetric part of the symbolic 'sickle motif' and one of the two symmetrical side parts of it *(Fig. 15.1)*. The sherd also has slanted rectangles *(Fig. 15.1)*. Its rim is notched which is typical for the area above the face on ALPC face vessels (Csengeri 2011, 80–81). The other fragment may be the back of a large, coarse, Tiszadob-style necked vessel with incised rectangle patterns on its shoulder *(Fig. 15.6)*.This motif occurs on the back of the necked face vessels of ALPC either in form of separate or joined rectangles (For example on face vessel No. 1 and No. 10 from Garadna, Csengeri 2011, Fig. 2, Fig. 9.3, Fig. 10.2).

The proportion of human figurines and face vessels at the site clearly shows the shift that happened between the ALPC Phase 1 and the splitting of ALPC into regional groups in Phases 3 and 4 of the Middle Neolithic, accompanied by a drastic decrease in the popularity of human figurines and a marked increase in the number of face vessels presumably due to changes in ritual practice (Raczky–Anders 2003, 159; Hansen 2007, 190; Csengeri 2011, 86).

3.4. Spondylus ornaments

Six Spondylus objects were found at the site *(Fig. 16.15–20)*: a massive, intact, broad bracelet *(Fig. 16.20)*, a fragment of a thin bracelet *(Fig. 16.19)*, two medium-sized cylindrical beads *(Fig. 16.17–18)* and two disc-shaped beads *(Fig. 16.15–16)*, all representing typical Middle Neolithic prestige item forms (Siklósi–Csengeri 2011). From these finds, the broad, massive bracelet is the rarest *(Fig. 16.20)*. There are only two known analogies to it in Borsod-Abaúj-Zemplén County, one found in a Middle Neolithic grave at Mezőkeresztes-Aranykalász Tsz (or Táncsics-tanya) (Megay 1962 and *HOM AD: 235–68*; HOM Archaeological Collection Inv. No.: 62.29.2.) and one found in a child's burial assigned to the Tiszadob group at Bükkábrány-Bánya XII. (K. Tutkovics–Kalli 2020, 153–154 and Fig. 3). This type of bracelet is made from the right (lower) valve of the *Spondylus gaederopus* shell, which is attached to the seabed and does not come to the surface even after the animal dies and is difficult to remove. In contrast, the left (upper) valve typically washes up on the beach after the animal's death. Lower valves were most likely obtained during fishing for live shells, like pearl fishing at a depth of 6–10 m in the Mediterranean Sea (Nieszery 1995, 173). However, the upper valves usually become seriously damaged by the time they reach the shore, so most likely

the live shells were collected in the Neolithic (see Nieszery 1995, 173).

The fragment of a thin Spondylus bracelet from Encs-Kelecsény with a widened and flat bottom *(Fig. 16.19)* has analogies e.g. in the ALPC Phase 1 graves of Füzesabony-Gubakút (Domboróczki 1997, Cat. Nr. I.31 p. 163) and Mezőkövesd-Mocsolyás (Kalicz–Koós 2014, 65–70, Plate 115.2), or from an ALPC grave at Mezőkeresztes-Cethalom (Wolf–Simonyi 1995, 6 and Fig. 3.9).

3.5. Ceramic jewellery

The personal objects made from ceramics found on the Encs-Kelecsény site include nine ceramic beads *(Fig. 16.1–8)*: two disc-shaped beads*(Fig. 16.1–2)*, a small spherical bead *(Fig. 16.3)*, a cylindrical bead (broken), a cylindrical bead with a tapered end *(Fig. 16.4)*, a biconical bead *(Fig. 16.8)*, a flattened cylindrical bead *(Fig. 16.5)*, a flattened biconical bead (or irregular) *(Fig. 16.6)* and a flattened rhomboid bead *(Fig. 16.7)*. Most types can also be found in versions made from Spondylus shells, so it can be assumed that these ceramic beads are imitations of the shell beads. Flattened biconical (or irregular) Spondylus beads, biconical ones, a cylindrical one, and a flattened cylindrical one were found in Feature S191, a Tiszadob-Bükk grave, at Garadna-Elkerülő út 2 (Siklósi–Csengeri 2011, 49 and Fig. 5). Cylindrical Spondylus beads, a cylindrical one with tapered end and a biconical one were found in a Tiszadob feature at Hejőkürt-Lidl logisztikai központ (Feature S1539.), while disc-shaped Spondylus beads were placed in graves 48 and 62 at the Tiszadob site of Mezőzombor-Községi temető (Cemetery) (Csengeri 2004, 65–66 and Fig. 5, Fig. 8), for example. Large, cylindrical and biconical Spondylus beads can also be found in the Szakálhát grave S120 of Mezőkövesd-Nagy-fertő site (Csengeri 2004, 66 and Fig. 11; Siklósi–Csengeri 2011, 49 and Fig. 4).

Thirteen ceramic bracelet fragments also came to light from Encs-Kelecsény *(Fig. 16.9–13)*. Two of them have round cross sections *(Fig. 16.9–10)* while one piece has a crescent shape. All other pieces have a flat bottom *(Fig. 16.11–13)*, imitating the bottom of a Spondylus bracelet.

A fragment of a cylindrical, curved ceramic amulet, perforated through its upper part, should also be mentioned *(Fig. 16.14)*. This type of item is common in the Middle Neolithic, but there are also versions made of Spondylus, such as the animal tooth-shaped pendants placed in grave 49 Tiszadob of the Mezőzombor-Községi temető (Cemetery) site (Csengeri 2004, 65 and Fig. 6; Siklósi–Csengeri 2011, 49 and Fig. 6). Thus, it can be assumed that the ceramic bracelets and amulets formed in the shape of animal teeth were also imitations of Spondylus objects.

3.6. Other small finds

Among the other small finds, there are also objects associated with weaving and spinning. There are five spindle whorl fragments cut from the side of fine pottery vessels, three of which feature linear motifs. The material also includes a small, triangular, flat ceramic weight with a hole in its upper section, as well as a smaller, truncated conical weight with a hole in its upper part.

4. Neolithic stone implements

The chipped stone implements, ground stone tools, and other stone utensils of the site were studied by K. T. Biró in 1998 (T. Biró 1998, 44 and Table VIII, Plates VIII a-c. Table VIII). The number of artefacts currently available does not match the numbers reported in her publication. She examined

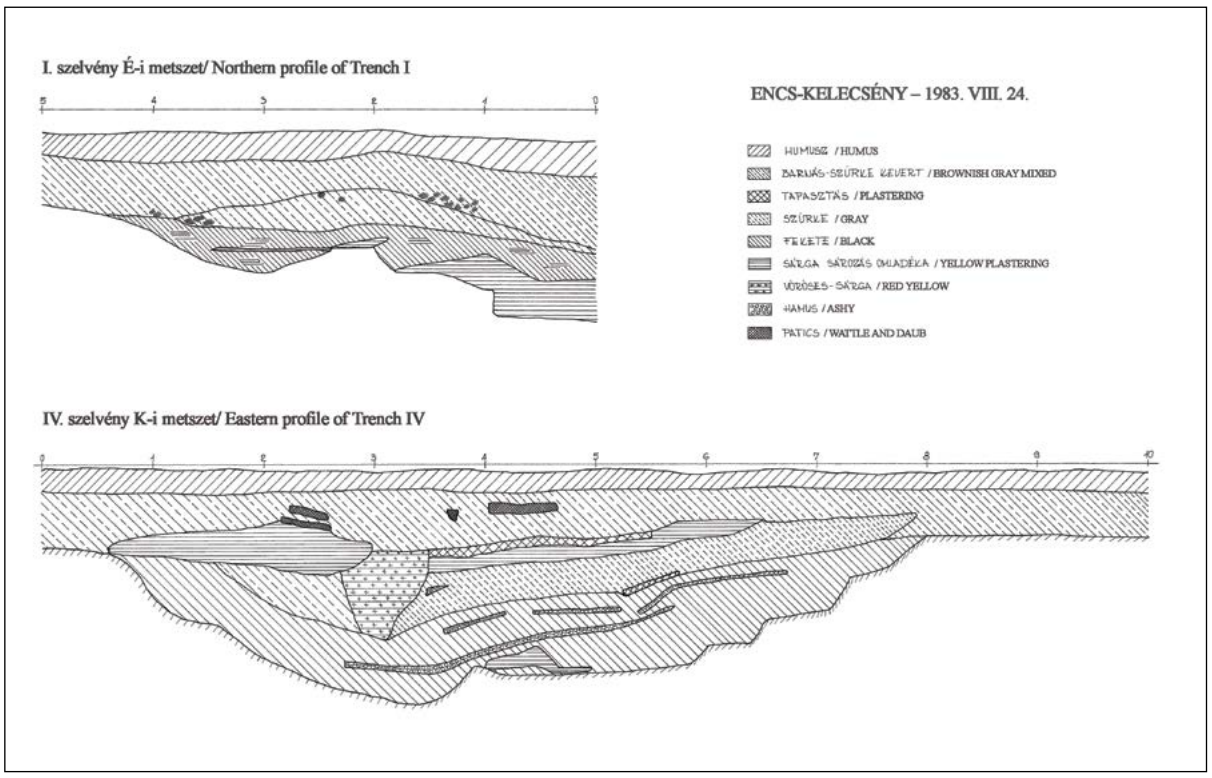

Fig. 4. 1. *Profile of the large clay extraction pit at the northern wall of Trench I. 2. Profile of the large clay extraction pit at the eastern wall of Trench IV.*

904 pieces (T. Biró 1998, Table VIII). The great number of finds was connected to the excavation technique (sediment sieving), which allowed items falling within even smaller size ranges (under 1 cm) to be found (T. Biró 1998, 44). The typical obsidian/limnoquartzite dominance found at Middle Neolithic sites is characteristic as raw material for the chipped stone material of the site, taking the form of retouched blade-like artefacts, truncated blades and burins, and a few scrapers (T. Biró 1998, 44). Based on the finds, K. T. Biró assumes that toolmaking occurred locally at the Neolithic settlement (T. Biró 1998, 44). Both obsidian and limnoquartzites can be locally sourced or be obtained from the near region occupied by the Encs-Kelecsény community (although they could also have been part of intra-cultural exchange).

Six ground stone tools were also found at the site *(Fig. 17.14-18)*: four fragments of thick axes *(Fig. 17.14-17)*, one flat axe *(Fig. 17.18)*, and a very small ground axe fragment. Five of them were studied by E. Kereskényi for her PhD research (Kereskényi 2021). Based on her investigations, the raw materials of these axes were: blueschist (1), contact metabasite (1), andesite (2) and quartzite (1) (Kereskényi *et al.* 2018; 2021 and personal communication (hereafter p. c.) E. Kereskényi). The previously unexamined very small ground fragment is likely also blueschist (p. c. by E. Kereskényi.). The blueschist flat axe and the thick contact metabasite axe were subjected to different archaeometric analyses by E. Kereskényi (Kereskényi *et al.* 2018; Kereskényi 2021). Based on these examinations, the most likely source area for the blueschist of the flat axe (B08 sample) *(Fig. 17.18)* is the Meliata Unit, Slovakia (Rudník, Zadiel, Šugov Valley; Kereskényi *et al.* 2018, 591–595; Kereskényi 2021, 31–36), with outcrops occurring at a distance of 55–70 km from Encs-Kelecsény via the valleys of the Hernád River and its tributaries. Accordingly, blueschist can be considered a regional raw material within the Tiszadob-Bükk cultural boundaries. However, the use of the blueschist pebbles from Cretaceous conglomerate in the Pieniny Klippen Belt, Slovakia, cannot be completely ruled out either (Kereskényi *et al.* 2018, 595; Kereskényi 2021, 34–35), while the concentration of ground blueschist tools in northern Hungary suggests a natural source may be found there as well (Kereskényi 2021, 34–35). In contrast, the raw material of the studied thick contact metabasite axe (C09) *(Fig. 17.14)* originates from a more distant area, the Bohemian Massif (320–500 km away), either from its northern (Jizerské Mountain) or southeastern part (area of Želešice) (Kereskényi 2021, 77–81). This axe was produced from what was a therefore long-distance raw material for the Encs-Kelecsény community, which they could have acquired from contemporary linear pottery cultural groups (LBK II or LBK II-III) in the area of the present-day Czech Republic via an exchange network (the late or the final (Šárka) stages. For the relative and absolute chronology of the region, see Čižmář 1998, 112–120; Mateiciucová 2008, Tab. 3; Pavlů–Zápotocká 2013, 29–30 and *Fig. 5*; Trampota–Květina 2020, Fig. 2, Tab. 3).

The two thick andesite axes *(Fig. 17.16–17)* were not investigated in detail, but they are also most likely to have come from a source in the region, since the material occurs in several places in the Eperjes–Tokaj Mountains near this Neolithic settlement (p.c. by E. Kereskényi).

The raw material of the thick axe made of quartzite *(Fig. 17.15)* was also not studied in more detail, but its place of origin – due to its widespread provenance area – could not be identified even with probes (p.c. by E. Kereskényi).

There is also a preform for a long, narrow and, rounded, brownish ground axe *(Fig. 17.21)* displaying traces of polishing on one part of its surface, based on the observation made by N. Kovács (p.c. by N. Kovács). It was made of a loosely compacted raw material, granite-mylonite, very rarely used for ground stone tools, according to E. Kereskényi (p.c. by E. Kereskényi), probably because this raw material was not actually very good for manufacturing axes. In this case, it is probably a piece of stone that was found in the river sediments and then ground, but the creation process presumably stopped in its initial phase (p.c. by E. Kereskényi and N. Kovács).

Among the other stone objects, there are two greenish specimens, with a natural shape similar to ground axes *(Fig. 17.19–20)*. They may have been collected with the aim of making tools. The raw materials cannot be identified by macroscopic observation; it may be some kind of metamorphic rock, perhaps metavolcanite (p.c. by E. Kereskényi). Blocks of potential raw materials to produce ground stone tools are found much more rarely at Neolithic settlements than the raw material blocks and cores used in the production of chipped tools. The number of semi-finished products is even fewer. There are more than 500 Neolithic ground stone axes from Borsod-Abaúj-Zemplén County in the Archaeological Collection of the HOM; in contrast, there are only four or five semi-finished products and the same is true for the number of presumed raw materials.

The shape of the Encs-Kelecsény preform and the two stone axe raw material pieces suggest that Neolithic collectors consciously looked for pieces of rocks similar to the shape of axes in their natural state in order to reduce the amount of work required to produce an axe.

There are also seven and a half limnoquartzite hammerstones/grinders, three grinding stones *(Fig. 18.1–3)*, and ten smaller fragments of grinding stones made from volcanic rocks, three polishers made from sandstone *(Fig. 17.1– 3)*, and four other ground stone fragments from Encs-Kelecsény.

5. Archaeozoological finds and bone implements

According to the excavation diary and reports, there was an abundant Middle Neolithic animal bone material with many shells and bone tools at the site. In contrast, nowadays, all that remains is half a large storage box of these finds. The reason behind this is that the archaeozoological finds of HOM were stored in the attic of the main building on Görgey Street, Miskolc for decades. During this time, unfavourable storage conditions developed. Although this method and place of storage was eventually discontinued, by 2004, large numbers of bags and boxes of animal bones the archaeological sites they came from became unidentifiable because by then their labels had been destroyed.

The number of bone tools presently found in the HOM also seems small compared to the 'large quantity' mentioned in the excavation report. The eleven remaining tools consist mainly of awls/pins *(Fig.17.4–7)*, smoothing tools *(Fig. 17.10–12)* and pointed, wider bone objects *(Fig. 17.8–9, 13)*.

6. Chronological position and connections of the Encs-Kelecsény Neolithic settlement

Based on its pottery finds, the Encs-Kelecsény site fits within the category of Middle Neolithic Tiszadob-Bükk settlements. Mostly, innovative shapes and decorations,

characteristic of the Tiszadob group, are present in the Neolithic pit at the site, along with the coarse pottery reminiscent of the earlier ALPC periods. In addition, ceramic vessel fragments in the Bükk AB and B styles are also present. For the absolute chronological position of the Encs-Kelecsény settlement only one radiocarbon date is available: 5300–5050 cal BC (2σ) (6213 ± 26 BP; ±1σ) which is an average date for the second half of the Middle Neolithic of the Carpathian Basin. (The analysis of an animal bone piece of 'Trench IV, Feature 2' was carried out in Debrecen, 2025; sample DeA-52558).

Based on the size of the site identified by M. Wolf and K. Simán, Encs-Kelecsény may have been a small Neolithic settlement. Due to the dense, bushy vegetation, however, it will be difficult to verify this using geophysical investigations, and not at all possible from finds collected from the surface during field survey work. Its original extent was probably larger than has been supposed.

The stone finds from the site mainly indicate that the Neolithic community processed local and regional raw materials. Only some of the ground stone axes were made from raw material such as contact metabasite which can be considered a long distance raw material, suggesting connections with contemporary linear pottery groups in Bohemia and Moravia.

Altogether 22 Tiszadob-Bükk settlements are known in the approximately 40 km long Hernád Valley microregion (from the Hungarian–Slovak border in the north to the Sajó–Hernád Plain microregion in the south) and on the slopes overlooking the river *(Fig. 19)*. The most important of these are (from north to south): Kéked-Hosszúföldek (Csengeri 2018), Hidasnémeti-Kiserdő (Koós 2018, 66–68, Excavation led by M. Hajdu), Hidasnémeti-Kis-kötél-dűlő (T. Biró–Koós–Csengeri 2019; Szörényi–Pusztai *et al*. 2020, 147–148), Garadna-Elkerülő út 2 (Állami Csemetekert – State plant nursery) (Csengeri 2010, 229–233; Szörényi–Pusztai *et al.* 2020, 146.), Forró-Király-kút dűlő I – Kocsár-kút dűlő II (Szörényi–Pusztai *et al.* 2020, 141) and Novajidrány-Elkerülő út (Csengeri 2010, 233–234; Several excavations, as yet unplublished, took place at the site between 2017–2020, in connection with the construction of the M30 motorway. The institutions carrying out the excavations: HOM (leading the excavation: Krisztián Tóth), Móra Ferenc Museum (leading the excavations: Noémi Ninetta Keresztes) and the Hungarian National Museum (leading the excavations: Bíborka Vass) *(Fig. 19)*. Near these sites, on the hills above the Hernád Valley and at the entrance to the valleys of Hernád's tributaries, are several other sites of similar age *(Fig. 19)*. It is not possible, however, to say which of these settlements were coeval with Encs-Kelecsény. The sites are located at varying distances (usually 1.3–6.4 km), but there are areas where neighbouring settlements are only 0.2–1 km apart. For example, in the immediate vicinity of Encs-Kelecsény, there are five other sites of similar age: Encs-Királydomb (Although not mentioned in Kemenczei–K. Végh 1963, 239, Middle Neolithic artifacts were found by T. Kemenczei at the site in 1963. HOM Archaeological Collection Inv. No.: 64.26.1-4. Later the site was researched by Gy. Nováki in 1993 /Nováki *et al.* 2007, 142–143/; by T. Pusztai and T. Bodnár in 2003 /Pusztai 2004/; by T. Pusztai, G. Szörényi and Sz. Honti in 2006 /Pusztai 2008/. Neolithic finds are not mentioned in this later research), Encs-Fügöd-Vízre járó 2 (Galkó 2019), Encs-Fügöd-Alsó-fügödi legelő (Csengeri–Galkó 2018), Encs-Fügöd-Bibic (Csengeri–Galkó 2018), Hernádszentandrás-Csárda (Csengeri 2019) *(Fig. 19)*. However, these settlements were probably not inhabited at the same time. The seeming disparity in the territorial distribution of the Tiszadob-Bükk sites may also be due to the research differences within a given area. A systematic field survey involving the entire Hernád Valley has not yet been carried out, although several development-led research projects have focused on the region, starting with Mária Wolf's medieval (Árpád Period) settlement research covering the southern part of historical Abaúj County, which also resulted in the discovery of the Encs-Kelecsény site in the 1980s (Wolf 1989). In 1999, the then staff of HOM conducted a field survey prior to the planned reconstruction of Route 3 *(HOM AD: 2723–00)*. In 2009, the University of Miskolc and HOM conducted a systematic field survey as part of Palaeolithic settlement research, led by Gy. Lengyel and P. Szolyák. The research area covered the entire area of the Hungarian part of the Hernád Valley, that is the hills above the right bank of the river (Lengyel–Szolyák 2011). Next year, in 2010, the University of Miskolc also conducted a field survey as part of the Middle Bronze Age settlement research led by K. P. Fischl at several points within the region *(HOM AD: 7793–24)*. The last field survey was carried out in cooperation with Via Antica Ltd. (company), the University of Miskolc, and HOM, led by Cs. Szalontai, prior to the construction of the M30 motorway in 2013. Several new sites came to light during these field surveys (Szörényi–Pusztai *et al.* 2020, 108–109). The research was carried out over a 100–100 m wide band down the planned axis of motorway M30 (Szörényi–Pusztai *et al.* 2020, 108–109).

The final reconstruction of the Tiszadob-Bükk settlement network is significantly complicated by the fact that the settlements with the Tiszadob-style ceramics, located on lower surfaces near the Hernád River and their tributaries were flooded at some point. In several cases, these settlements were destroyed and buried beneath a 140–200 cm thick layer of silt, so they can only be found by accident (Csengeri 2014b, 513).

Due to the above-mentioned reasons, and assuming that settlements changed locations more often than in later periods which means neither the network of coexisting settlements and their possible hierarchy nor the differences in their size can be reconstructed. However, it can be very clearly seen that there was a strong connection of settlement location to water and that the population deliberately located themselves along rivers and smaller watercourses *(Fig. 16)*. It is possible that more settlements existed in the region than the 22 sites assigned to the approximately 300-year period of the Tiszadob-Bükk Culture (5300–5000 BC).

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Fig. 5. 1–11. *Tiszadob-style decorated fine ware.*
Fig. 6. 1–14. *Bükk-style decorated fine ware.*

Fig. 7. 1–3. *Special vessels.*

Fig. 8. 1–2., 5. *Miniature vessels.* ***3., 6–8.*** *Special forms.*

Fig. 9. 1–10. *Tiszadob-style coarse decorated pottery.*

Fig. 10.1–5. *Painted ALPC-style coarse pottery.*

Fig. 11. 1–3. *Undecorated fine ware.*

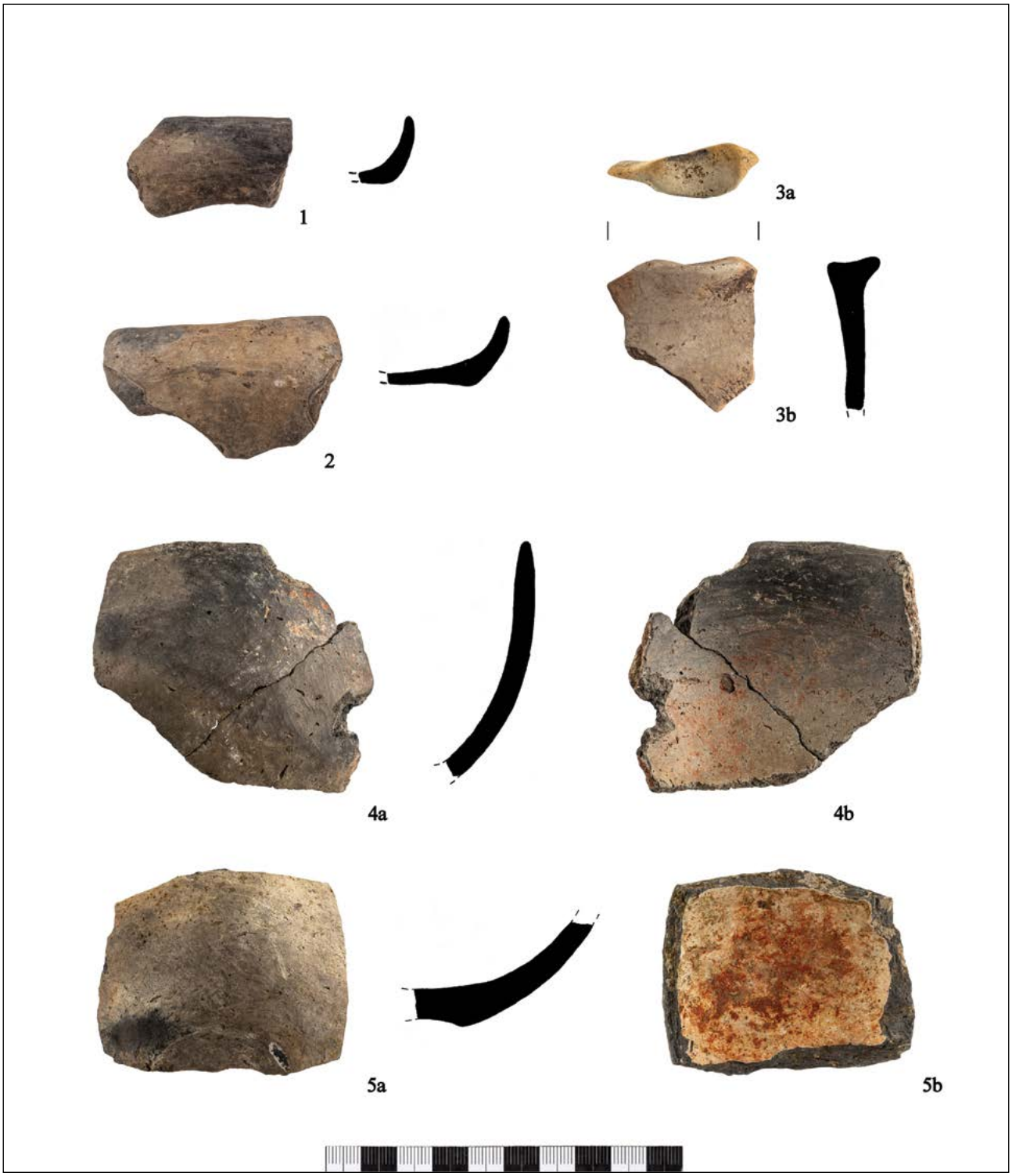

Fig. 12. 1–3. *Undecorated fine ware.* ***4–5.*** *Ochre containers.*

Fig. 13. 1–9. *Household pottery.*

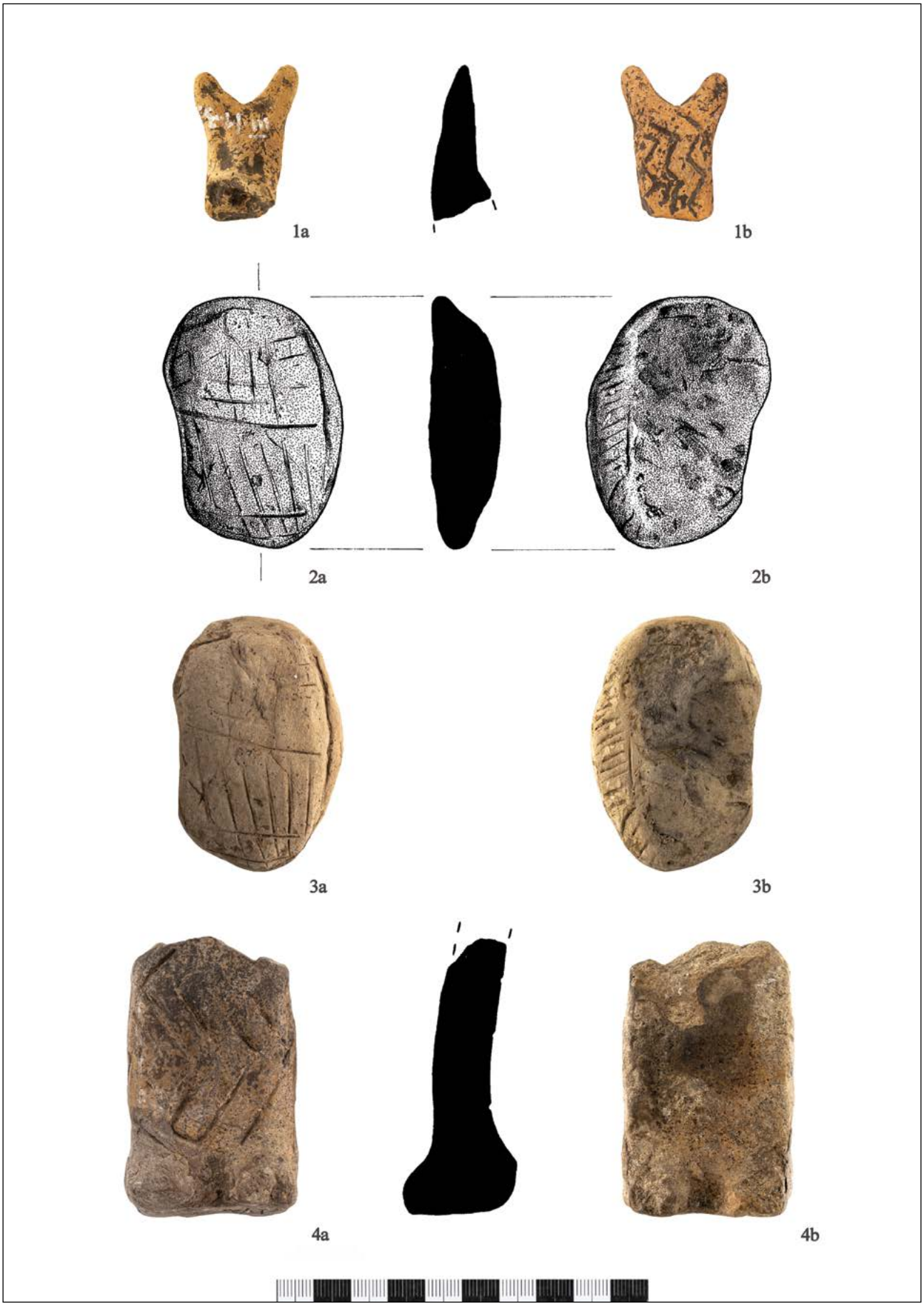

Fig. 14. 1. *A zoomorphic representation.* ***2–4.*** *Anthropomorphic representations.*

Fig. 15. 1., 6. *Possible face vessel fragments.* ***2–5.*** *Special pottery.*

Fig. 16. 1–8. *Ceramic beads.* ***9–13.*** *Fragments of ceramic bracelets.* ***14.*** *Fragment of a pottery amulet.* ***15–20.*** *Spondylus jewellery.*

Fig. 17. 1–3. *Fragments of ground stone tools.* ***4–13.*** *Bone implements.* ***14–18.*** *Fragments of ground stone axes.* ***19–20.*** *Raw material pieces.* ***21.*** *A pre-form of a ground stone axe.*

Fig. 18. 1–3. *Grinding stones.*

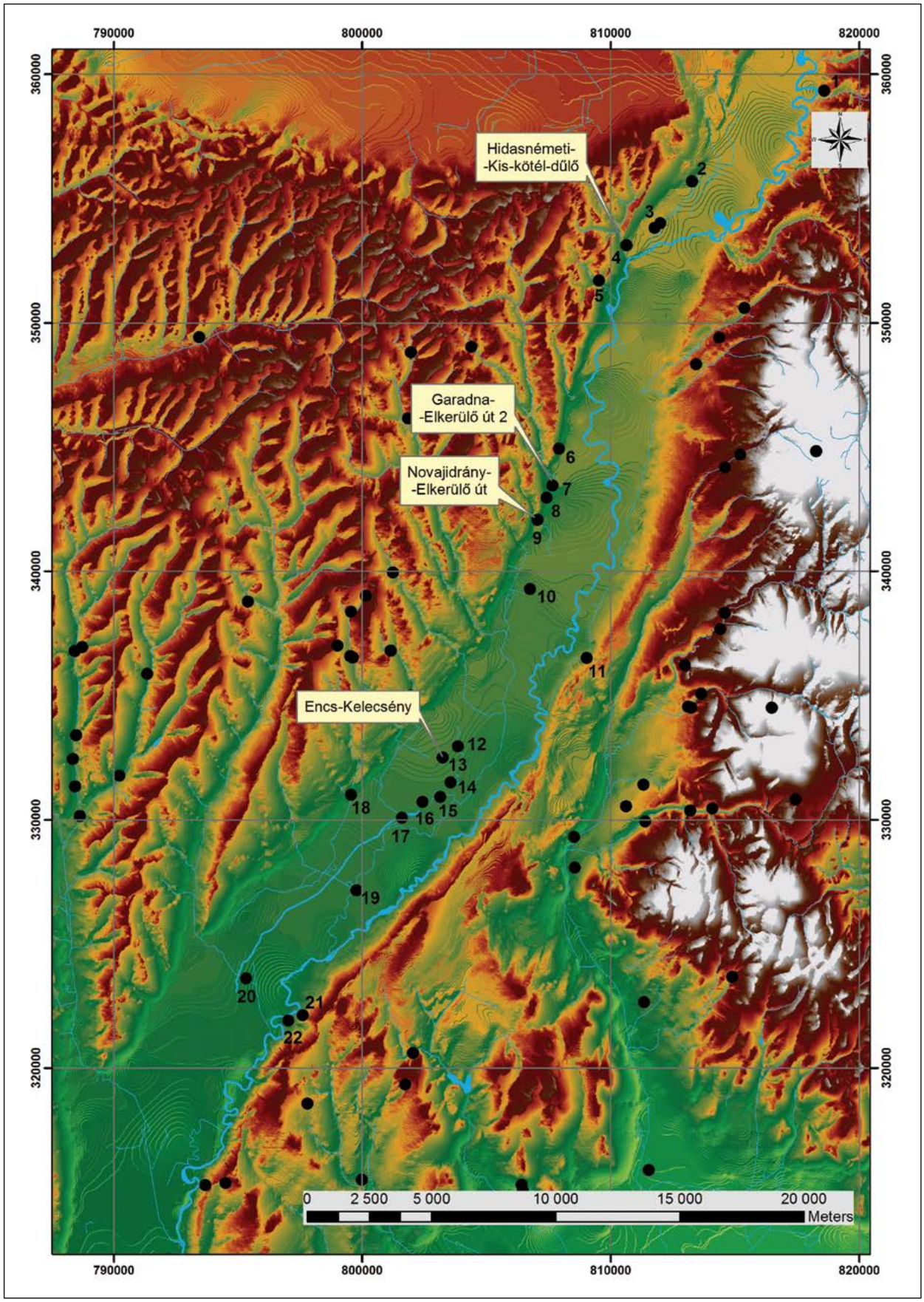

Fig. 19. *Tiszadob-Bükk settlements in the Hungarian part of the Hernád Valley.*
1. Kéked-Hosszú-földek, 2. Tornyosnémeti-Petőfi u. 18., 3. Hidasnémeti-Kiserdő – Tornyosnémeti-Király-domb, 4. Hidasnémeti-Kis-kötél-dűlő, 5. Hernádszurdok-Tükör-domb, 6. Garadna-Elkerülő út 1, 7. Garadna-Elkerülő út 2 , 8. Garadna-Csemetekert, 9. Novajidrány-Elkerülő út, 10. Novajidrány-Terpesz Kelet, 11. Hernádcéce-Miszlonka-tető, 12. Encs-Királydomb, 13. Encs-Kelecsény, 14. Encs-Fügöd-Vízre járó 2, 15. Encs-Fügöd-Alsó-fügödi legelő, 16. Encs-Fügöd-Bibic, 17. Hernádszentandrás-Csárda, 18. Forró-Király-kút dűlő I – Kocsár-kút dűlő II, 19. Ináncs-Dombrét, 20. Halmaj-Vasonca-patak, 21. Szentistvánbaksa-Anyagnyerőhely, 22. Szentistvánbaksa-Kossuth u. 37.

Middle Bronze Age Animal Exploitation at Alsóvadász–Várdomb, Northeastern Hungary

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Abstract: *The Bronze Ages site of Alsóvadász–Várdomb was excavated by Katalin Simán in 1980, on behalf of the Herman Ottó Museum in Miskolc. Although the excavations are so far unpublished, the animal remains were studied by the authors shortly after the field season. This paper is a summary of the early Middle Bronze Age - Middle Bronze Age assemblages assigned to the Otomani-Füzesabony Cultural Complex at the site, including the evaluation of bone and antler artifacts. These results are also interpreted within the broader context of animal remains from some other local Bronze Age settlements in Hungary.*

Keywords: *meat provisioning, natural environment, pig keeping, manufacturing of osseous materials*

1. Introduction

The Bronze Age site of Alsóvadász–Várdomb is a tell settlement located in hill country north of the Great Hungarian Plain. The village from which the site takes its name, lies in Borsod-Abaúj-Zemplén County in the northern Cserehát Hills region, 22 km NE from the industrial town of Miskolc *(Fig. 1)*.

The site is located on an Upper Pleistocene terrace in a hilly landscape under relative geological uplifting on consolidated Tertiary deposits. The soils comprise sandy-loess-like deposits and slope loess from rolling Pleistocene sediments, typical of mountain and low hill areas in the area (Pécsi 1969).

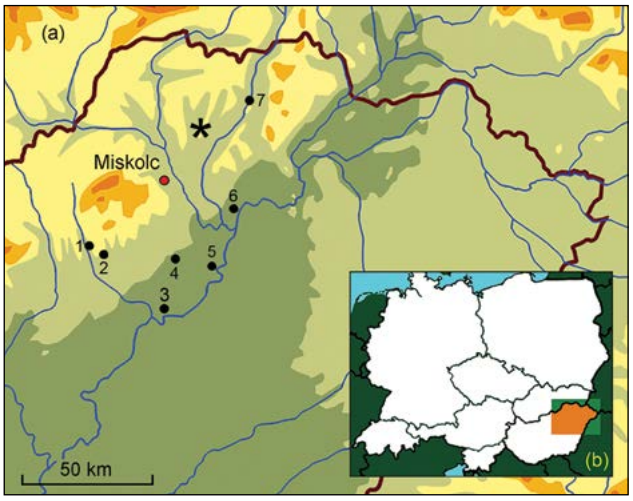

Fig. 1. *(a) The location of Alsóvadász–Várdomb (asterisk) in relation to the city of Miskolc in the Northern Hill Region of Northeastern Hungary. (b) Insert showing the studied section of Hungary (shading) in contemporary Central Europe. Sites used in comparisons: 1= Bogács–Pazsagpuszta, 2= Tard–Tatárdomb, 3= Tiszabábolna–Fehérló-tanya, 4= Mezőcsát–Laposhalom, 5= Tiszakeszi–Bálinthát-Újtemető, 6= Tiszalúc–Dankadomb, 7= Hernádbűd–Várdomb.*

The Bronze Age settlement was discovered in the western area of the contemporary village of Alsóvadász on an elevation (ca DD: 48.2416°N, 20.9005°E) near the present-day cemetery. The archaeological site is bordered by the broad valley of Vadász Stream on the east, a western tributary of the stream to the south, and the Völgy, a natural ditch lying to the west. At its core is a tell settlement, separated from the rest of the natural elevation by an almost perfectly circular artificial ditch whose defensive function could not be unambiguously ascertained. In addition, there is a horizontal settlement extending beyond this enclosure. The area enclosed by the artificial ditch is approximately 40 m in diameter. Its edges could be precisely established by verifying excavations as well as recent geophysical survey work (Kertész 2018, 154). The best preserved, southern section of this ditch was 4-5 m deep, while on the western and eastern sides of the elevation it is detectable only in the form of a terrace (Kertész 2018, 147). The greatest diameter of this circular feature may have been as wide as 50 m, although the exact size remains unknown (Pusztai 2007, 105). The tell, surrounded by the artificial ditch and the horizontal settlement beyond it, apparently belonged to the same habitation unit.

2. Brief research history

Like several important prehistoric settlements, Alsóvadász–Várdomb entered the archaeological record during the late nineteenth century, when stone axes and adzes were reported from the small hill known (Szendrei 1884). In 1905, Lajos Márton excavated there, collecting 364 artifacts, including a clay wagon model and animal figurines (Kertész 2018, 151, Fig. 8). Numerous prehistoric pot shards were also reported from the site (Hampel 1906). Since the early twentieth century, however, no serious archaeological work was carried out at this settlement. In 1979, earth-removal work forced archaeologists to conduct rescue excavations at the site. Damage to the

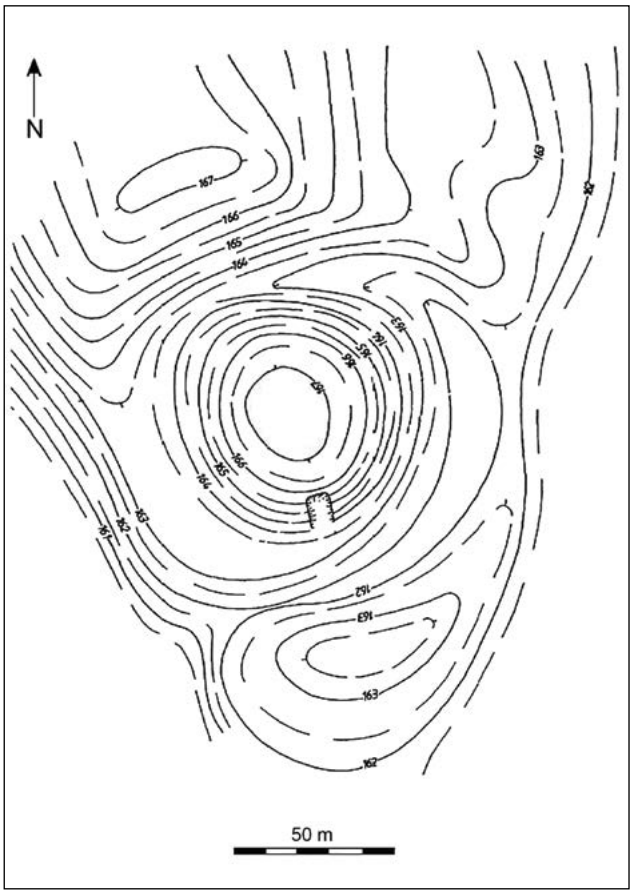

Fig. 2. *The contour map of the tell surrounded by the artificial ditch. The contemporary shooting range is marked on the southern edge. After Nováki et al. (2009).*

small mound was reported to the Herman Ottó Museum in Miskolc in 1978. During the spring of 1979, Gyula Nováki and György Sándorfi carried out a survey and prepared a contour map of the site and its surroundings (Nováki *et al.* 2009, *Fig. 2*). They marked the construction site of a shooting range cut into the south side of the elevation *(Fig. 2)*, near the location of subsequent excavations.

Field work at the site was directed by Katalin Simán in July 1980. Upon arrival, she discovered a circular, 'fortified' area ringing the crest of the small hill, as well as evidence of Bronze Age habitation over a wide area covering the adjacent, gently sloping land. Long after the 1979–1980 rescue operations, field walks were carried out outside the artificial ditch surrounding the tell, as there is a plateau ideal for settlement on the south-eastern edge of the elevation outside the ditch. Although this overgrown area was not accessible to surveyors, an approximately 50–60 m long, once intensively inhabited area was found in the plough lands towards the west. Coeval ceramic materials indicated that this may have been a horizontal settlement associated with the Bronze Age tell (Pusztai 2007, 105).

3. Excavations by Katalin Simán

An area of 5 x 5 m was opened within the ring-shaped artificial ditch and explored down to a depth of 3 m, to the virgin soil. After cutting through the bulk, which may have resulted in mixing material from the humus and sub-humus layers as well as level I, excavations began in the next three levels. They revealed five settlement layers, although the lowermost (V) was only a few mm thick and contained only traces of features identified in the layers above and no artifacts at all.

According to the original documentation by Katalin Simán, the uppermost layer I—found under the co-mingled, disturbed humus layer—contained ceramics typical of the Middle Bronze Age Ottomány Culture. In the next three levels, features of the late Hatvan Culture (Houses II, III, and IV) were found. However, the name Ottomány culture is no longer relevant to this site, neither chronologically nor in spatial terms. In newer Hungarian archaeological nomenclature, Ottomány is a cultural entity contemporaneous with Hatvan, but geographically different. Since the ceramics recovered at the site are yet to be studied, the remains can best be assigned broadly to the Otomani-Füzesabony Cultural Complex (OFCC) (P. Fischl 2018, 3–8). This umbrella term better represents the chronological and cultural picture as it is presently understood. The development of the cultures involved is associated with the onset of centuries of relatively quiet coexistence between the sedentary agriculturalists inhabiting the region until the end of the Middle Bronze Age (Kulcsár 2001, 142). Nevertheless, in this basic analysis of the faunal material and worked hard osseous materials from Alsóvadász, the two-phase attribution was respected: the early Middle and Middle Bronze Age chronological sub-division established by the excavator, Katalin Simán.

There were three house floors, which the excavator was, more-or-less, successful in distinguishing from one another. This occupation level also contained pits A, B, C, and D, although of these, only feature B yielded datable prehistoric shards. All three Hatvan Culture houses are large with pounded clay floors. In House IV, a matting imprint was discovered in the top plastering of the floor. The lowermost (V) layer contained no finds (B. Hellebrandt–Simán 1980, 88). Other features were most likely of medieval or early modern age origin. In any case, none of the features contained pot shards of diagnostic value.

Reconciling Reinecke's and Bóna's relative chronological sequences for the Hungarian Bronze Age with relevant ^{14}C dates has only recently begun (Kiss *et al.* 2019). Therefore, as of today, no absolute dating is available from the site. The closest ^{14}C dates based on animal bone for the OFCC come from approximately coeval layers at the site of Včelince in Slovakia lying, more-or-less, in the same geographic region as Alsóvadász–Várdomb in Hungary. The earliest Hatvan layers at Včelince date to (Bln 5560: 3710±38 BP), that is, ca. 2200–2170, 2150–2030 cal BCE, the same time range as the Hatvan levels at Jászdózsa–Kápolnahalom in Hungary. The later samples at Včelince date to around 1730 BCE, ending ca 1500 BCE (Görsdorf *et al.* 2004, 89).

4. Taphonomy

A special feature of the faunal material is that it seems to have been broken up to an extent not usually seen elsewhere, even at prehistoric sites. The degree of bone fragmentation is largely similar across the settlement. On average, 38% of the material was non-identifiable, largely due to the high degree of breakage, which precluded taking measurements on most of the bones. The proportion of identifiable bones was especially low in the early Middle Bronze Age material, in which only 524 out of 911 specimens (*i.e.* only 58%) were identifiable to species or at least skeletal

	Early MBA		MBA	
Taxon	n	NISP %	n	NISP %
Cattle (*Bos taurus* L., 1758)	162	30.9	163	32.1
Caprine (Caprinae Gray, 1852)	144	27.4	151	29.9
Pig (*Sus domesticus* Erxleben, 1777)	131	25.0	127	25.2
Horse (*Equus caballus* L., 1758)	8	1.5	9	1.8
Dog (*Canis familiaris* L., 1758)	11	2.1	22	4.4
Aurochs (*Bos primigenius* Bojanus, 1627)	3	0.6	1	0.2
Red deer (*Cervus elaphus* L., 1758)	37	7.0	10	2.0
Roe deer (*Capreolus capreolus* L., 1758)	12	2.3	8	1.6
Wild boar (*Sus scrofa* L., 1758)	8	1.6	10	2.0
Brown bear (*Ursus arctos* L., 1758)	0		1	0.2
Brown hare (*Lepus europaeus* Pallas, 1778)	4	0.8	1	0.2
Rodent (Rodentia Bowdich, 1821)	0		2	0.4
Bird (Aves L., 1758)	4	0.8	0	0.0
Total NISP	**524**	**100**	**505**	**100**
Non-identifiable	387		258	

Table 1. *The taxonomic distribution of Middle Bronze Age (MBA) refuse bone assemblage*

element level *(Table 1)*. The anatomical composition of the material reflects several trends attributable to bone density mediated attrition, *i.e.* the selective representation of early fusing, relatively robust bones such as the distal ends of the humerus or tibia, while fragile cranial bones, vertebrae or ribs are often fragmented beyond precise taxonomic identifiability.

In addition to intentional (prehistoric) and post-depositional bone fragmentation, poor preservation may partially account for the unusually high proportion of bones which bear marks of heavy canid gnawing. Some may even have been damaged by scavenging pigs.

Last but not least, fine recovery methods (dry screening or water-sieving) were not practiced in Hungarian archaeology at the time of these excavations. Consequently, it is not only the remains of small-sized animals (fish, birds, rodents) and juvenile individuals which are underrepresented in such, hand-collected assemblages, but also smaller skeletal elements such as phalanges or deciduous teeth of domestic livestock.

5. Taxonomic evaluation

As seen in *Table 1*, the size and composition of zooarchaeological assemblages representing these two consecutive typo-chronological phases are comparable in terms of size and seem quite similar in their taxonomic composition as well *(Fig. 3)*. Both phases distinguished during the excavation of the site yielded approximately 500 identifiable bone specimens (NISP) each, a number considered to be largely representative in terms of taxonomic evaluation on a purely empirical basis.

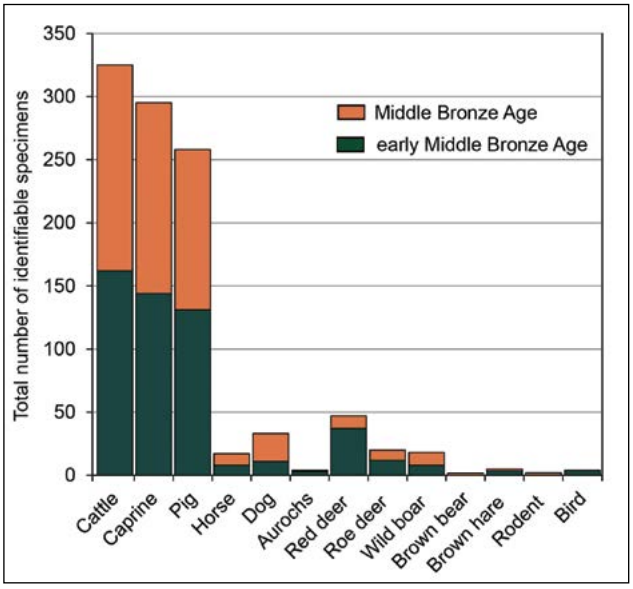

Fig. 3. *The number of identifiable specimens (NISP) recovered from the two Middle Bronze Age phases of the settlement.*

5.1. Early Middle Bronze Age refuse bone

The numbers and percentages of skeletal elements for the most commonly identified taxa of livestock – cattle, caprines and domestic pig – are detailed in *Table 2*.

Cattle. There are 162 cattle bones which constitute 30.9% of the identifiable specimens representing this phase. These bones look small and suggest a cattle population age structure, more-or-less, typical of Bronze Age cattle all over Hungary, that is, there are very few bones from extreme (juvenile, mature or senile) age categories. Several bone specimens originate from subadult individuals, while the majority come from young adult cattle. As in similar cases observed at other Bronze Age settlements, it appears that some subadult bullocks, having reached almost fully-grown live weight, were slaughtered, while the rest of the sub-adult stock were kept for breeding, traction and possibly milking. These latter may have been killed at the end of their working lives. Anatomical representation for this species is shown in the first column of *Table 2* both in terms of absolute numbers and percentages. Cranial fragments of cattle are quite frequent, including eight horn core fragments. Four of these horn cores are complete enough to suggest that at least two originate from cows and one from a bull. Relatively

	Cattle		Caprine		Pig	
Skeletal element	NISP	%	NISP	%	NISP	%
cranium	13	8.0	1	0.7	8	6.1
horn core	8	4.9				
maxilla	3	1.9	2	1.4	10	7.6
mandibula	12	7.4	16	11.1	17	13.0
teeth	8	4.9	20	13.9	7	5.3
vertebrae	6	3.7	2	1.4	2	1.5
ribs	8	4.9	1	0.7	1	0.8
scapula	7	4.3	7	4.9	9	6.9
pelvis	5	3.1	4	2.8	3	2.3
humerus	6	3.7	15	10.4	19	14.5
radius	8	4.9	14	9.7	7	5.3
ulna	3	1.9	3	2.1	8	6.1
femur	12	7.4	10	6.9	11	8.4
tibia	18	11.1	26	18.1	14	10.7
fibula					4	3.1
metapodia					6	4.6
metacarpus	6	3.7	7	4.9		
metatarsus	15	9.3	11	7.6		
carpus	3	1.9				
calcaneus	7	4.3	1	0.7	2	1.5
astragalus	3	1.9	1	0.7		
phalanx proximalis	9	5.6	2	1.4	3	2.3
phalanx media	2	1.2	1	0.7		
phalanx distalis	2	1.2				
Total	**162**	**100.0**	**144**	**100.0**	**131**	**100.0**

Table 2. *The anatomical distribution of skeletal elements from the main livestock taxa in the early Middle Bronze Age assemblage.*

many vertebral fragments were identifiable to this species. Scapula and pelvis could be safely identified, but while most of the rib fragments probably come from cattle, many of the small pieces could not be precisely identified beyond the "large ungulate" category.

The robust diaphysis and distal epiphysis fragments of cattle humerus are rather common, while the relative frequency of radio-cubitus fragments is smaller. From the hind leg, the high frequency of tibia fragments is not unrelated to the great number of splinters tibiae tend to produce due to both natural and anthropogenic fragmentation. Metacarpal and metatarsal bone fragments constitute only smaller percentages of the cattle bone at this site. Of the short bones, the small carpal bones are rarely found, perhaps a result of lack of sieving. Curiously, the calcaneus seems better represented than the more compact astragalus. Phalanges of this large animal species are quite common.

Caprines. The 144 bones of sheep or goat account for 27.4% of the identifiable bone specimens. This percentage represents a relatively high figure for faunal assemblages from sites of the time period in this area.

The frequencies of skeletal elements are listed in *Table 2, column 2*. Neurocranium bones of caprines are found rather infrequently. There is only one occipital bone fragment in the Hatvan Culture assemblage. Probably, the explanation is that, in addition to being butchered, cooked and broken up - possibly during the extraction of the brain as food, the thin cranial bones tend to fragment into small, non-identifiable pieces. The dental parts of the maxilla are scarce in these early levels as well. The caprine mandible is better preserved, although numerous loose teeth from both the upper and lower jaws are also indicative of the high degree of fragmentation in the caprine bone assemblage.

Of the other flat bones, vertebrae are predictably underrepresented. Many small fragments could not be identified beyond the "small ungulate" category. Scapula fragments are more common than those of the less fragile pelvis.

Long bones follow predictable patterns. Humerus distal epiphysis fragments were frequently found while pieces of the radio-cubitus likewise commonly occur. Fragments of femora are far less common than those of the fragile tibia. The metacarpal and metatarsal bones account for 5-10% of caprine bones respectively. Short bones of caprines, usually rare in such hand-collected assemblages, include an astragalus and a calcaneus each, as well as two proximal phalanges.

Pig. The 131 specimens originating from domestic pig, account for 25% of the identifiable early Middle Bronze Age faunal sample. The frequencies of skeletal elements from pig are listed in *Table 2, column 3*. The rather robust cranial bones of this species tend to be well-preserved, with almost every skull part represented to some extent. The dental section of the maxilla is also common in the material. Surprisingly, it occurs more often than disarticulated pieces of the massive mandible, although the latter is also represented by numerous ramus fragments among the early Middle Bronze Age domestic pig bone. Loose teeth, on the other hand, are less common, possibly because in this material, both upper and lower jaws are better preserved than usual.

There are very few identifiable vertebral fragments, and many fragments cannot be identified to species. The scapula is well-represented but pelvic fragments are relatively less common. Undoubtedly, some of the small non-identifiable, small ungulate rib fragments originate from pig as well.

Pig long bones are all well-represented, especially the early fusing distal epiphysis of the humerus. Radius and the relatively strong ulna occur in comparable numbers. The same holds true for the femur and tibia. Fibula diaphysis fragments were also regularly found. Metapodia, mostly complete bones, are frequently recovered. Small-sized short bones of domestic pig, as with those of caprine, are rare, again probably connected to the absence of sieving. Only a calcaneus and some proximal phalanges were encountered in the early Middle Bronze Age domestic pig material.

Horse. There are only eight bones of horse which constitute 1.5% of all identifiable specimens from this period. There is one each of a second lower molar tooth, a distal scapula fragment, a tibia distal epiphysis, two complete metacarpi, a metatarsus, an astragalus, and a proximal phalanx.

Dog. Domestic dog accounts for 2.1% of the identifiable bones with 11 specimens, including 2 complete skulls. Other bones include complete mandibles, cervical vertebrae, a whole radius and femur as well as a nearly complete tibia. A complete metatarsus was also found. The presence of intact skulls and mostly complete long bones supports the suggestion that dogs were not butchered, that is, eaten at this site during the Bronze Age. Whole dog crania tend to be a characteristic feature of Middle Bronze Age sites in Hungary. Dogs or parts of dogs appear in house foundations for example in the Hatvan levels at the tell settlement of Tiszaug–Kéménytető (Choyke, personal communication).

Aurochs. The three large bone fragments in the size range of the wild ancestor of domestic cattle comprise only 0.6% of all identifiable bones in the early Middle Bronze Age assemblage. They include a robust humerus diaphysis fragment and two massive tibia splinters. Although several of the extremely rare finds of European bison (*Bison bonasus* L. 1758) came to light in the Northern Hill Region of Hungary (Bökönyi 1958, 75; Bartosiewicz 1999, 82; Bartosiewicz–Gál 2010, 116, Table 9.1), the overwhelming majority of robust bovine remains are identifiable as those of aurochs. Therefore, given the absence of diagnostic morphological features, large bovine bones from Alsóvadász–Várdomb were tentatively considered the remains of aurochsen on a probabilistic basis.

Red deer. While not as common as at other sites in the eastern regions of Bronze Age Hungary, red deer is still present at 7% of the identifiable specimens in the early Middle Bronze Age assemblage of Alsóvadász–Várdomb. This sub-sample consists of 36 identifiable red deer specimens. These include a single neurocranium fragment, as well as the dental parts of the maxilla and the mandible. Two loose teeth were also recovered. In addition to a pelvis fragment, a distal humerus epiphysis was found as well as radius and ulna fragments. Seven femur diaphysis splinters could also be identified, in contrast to the single

tibia fragment. Metapodia represent around 10% of the deer bone assemblage. Short bones occur sporadically and include a single astragalus and a centrotarsal bone. Two proximal phalanges are also worth mentioning.

Importantly, antlers are found in the form of cut off tines. Although skeletal bone offers solid proof of deer hunting, it is impossible to tell whether these tine fragments originate from killed individuals or were procured by gathering shed antler in the early spring (Choyke 1998).

Roe deer. Twelve roe deer bones account for 2.3% of the identifiable early Middle Bronze Age animal remains. They come from the dental part of the maxilla, as well as loose teeth (also maxillary). A distal humerus epiphysis and a whole ulna were also found. However, two thirds of the red deer remains comprise metatarsus diaphysis splinters.

Wild boar. At 1.6% of the identifiable specimens, wild boar is accounted for by only nine bones. Identification is based on their relative size – a rather unreliable way to separate the wild from the domestic form of swine. The skeletal elements include frontal bone fragments, as well as fragments from the mandible, in addition to two complete metapodia, a calcaneus and a proximal phalanx.

Brown hare. The four hare bones recovered include 1 humerus, 2 metapodia, and a pelvis fragment, that is, they represent 0.8% of the identifiable remains. There are also four complete rodent bones (1 humerus, 1 ulna and 2 tibiae) whose precise identification could not be realized at the time.

5.2 Middle Bronze Age refuse bone

The skeletal part distribution, both in absolute numbers and percentages represent the economically most important taxa of livestock and are detailed in *Table 3*.

Cattle. Bones of the largest and most important domestic species comprise 32% of the identifiable remains in this settlement phase. The frequencies of skeletal parts are listed in the first column of *Table 3*. While the number of cattle cranial fragments is small, horn cores contribute over 10% to the material. This looks like an exceptionally large proportion for cattle in this settlement phase. Although these horn cores are quite fragmented, one of them certainly can be identified as coming from a female. Maxilla and mandible fragments are common, as well as loose upper and lower teeth. There are relatively few vertebrae intact enough to be identified to the species level. Pelvic fragments, including those of the acetabulum, are quite well-represented, better than fragments of the scapula. Again, there is a strong possibility that all large ungulate rib fragments originate from cattle. In spite of its more massive structure, the humerus is relatively underrepresented in this sample, occurring mostly as diaphysis and distal epiphysis fragments. Radio-cubitus remains are more common. In comparison with femur fragments, those from the tibia (again probably slightly overrepresented due to the high degree of fragmentation) are the most commonly recovered skeletal element. The metacarpal and metatarsal bones comprise almost one tenth of the Middle Bronze Age cattle bone assemblage. The short bones of cattle are reasonably well-represented. In addition to seven astragali, calcanei and several proximal and medium phalanges were found.

Caprines. The 151 caprine bones account for 29.9% of the identifiable bone assemblage. They do not represent a remarkable sample of bones neither in terms of skeletal part distribution nor age structure, although many of the specimens come from individuals of relatively small stature.

The absolute and relative frequencies of skeletal elements are listed in *Table 3, column 2*. The fragile cranial bones are surprisingly well-represented, but dental parts of the maxilla and mandible occur in greater numbers and in, more-or-less, equal proportions to each other. However, loose teeth occur far more frequently, representing over 10% of this assemblage, which is attributable to the high degree of skull fragmentation.

The condition of vertebrae is in keeping with the fragmented nature of the faunal material generally and the fact that several pieces could not be identified even on a subfamily level, *i.e.* they are as likely to originate from pigs as from caprines. Pelvis fragments, including the acetabulum, account for twice as many fragments as the scapula. Some of the non-identifiable small ungulate rib fragments certainly include some pieces from sheep or goat.

Scapula is well-represented and so is the humerus. This co-occurrence should be expected, but as has been seen elsewhere, there is no demonstrable relationship between the occurrence or non-occurrence of these two skeletal elements for any species. The radius accounts for a similar proportion of caprine skeletal elements. Bones of the hind leg include numerous femur fragments, and the usual high proportion of tibia splinters exceeding 15% of all identifiable caprine bones. Metacarpal and metatarsal bone fragments make up a far smaller part of the assemblage. In general, it seems to be true that metatarsal bones are slightly more common than metacarpals. They are certainly used preferentially for bone tools both here and elsewhere at coeval sites in the region.

Short bones are rare, possibly due to the lack of screening: a single calcaneus, three proximal phalanx (one of them from goat) and a medium as well as a distal phalanx could be identified.

Pig. The 127 domestic pig bones make up 25.2% of the total number of identifiable specimens. These pigs were neither bigger nor smaller than the average observed for Bronze Age domestic pigs. Based on tooth eruption and wear, the age structure is similar to that observed at other sites: single meat-purpose pigs tend to be slaughtered earlier than bovids, the latter having also been exploited for renewable "secondary" products such as milk, labor, possibly wool.

The frequencies of pig skeletal elements are listed in *Table 3, column 3*. Cranial fragments of domestic pig tend to be better represented archaeologically than those of similarly sized caprine. Maxilla fragments are far fewer than mandible fragments, the latter exceeding by 10%. Loose teeth of pigs—as with those of caprines—were frequently found. Again, this must be associated with the great degree of fragmentation observed at this site. Vertebrae, except the first two cervical vertebrae (axis and atlas), are largely missing or not identifiable. Some of the ribs listed as "unidentified small ungulate" must come from this species as well, as they account for only 1.6% of the domestic pig bone. Scapula fragments are common although the pelvis is unusually underrepresented. Of the long bones, humerus is

	Cattle		Caprine		Pig	
Skeletal element	NISP	%	NISP	%	NISP	%
cranium	12	7.4	3	2.0	10	7.9
horn core	18	11.0				
maxilla	4	2.5	6	4.0	5	3.9
mandibula	13	8.0	7	4.6	14	11.0
teeth	14	8.6	17	11.3	9	7.1
vertebrae	4	2.5			2	1.6
ribs	1	0.6			2	1.6
scapula	6	3.7	10	6.6	9	7.1
pelvis	11	6.7	18	11.9	2	1.6
humerus	4	2.5	12	7.9	22	17.3
radius	6	3.7	10	6.6	3	2.4
ulna	9	5.5			14	11.0
femur	9	5.5	15	9.9	3	2.4
tibia	11	6.7	24	15.9	17	13.4
fibula					1	0.8
metapodia					8	6.3
metacarpus	8	4.9	9	6.0		
metatarsus	7	4.3	13	8.6		
carpus						
calcaneus	2	1.2	1	0.7	2	1.6
astragalus	7	4.3				
phalanx proximalis	13	8.0	3	2.0	3	2.4
phalanx media	3	1.8	1	0.7		
phalanx distalis			1	0.7	1	0.8
Total	**163**	**100.0**	**151**	**100.0**	**127**	**100.0**

Table 3. *The anatomical distribution of skeletal elements from the main livestock taxa in the Middle Bronze Age assemblage.*

as common as scapula is among the flat bones. The ulna is vastly overrepresented in comparison with the radius in the total assemblage of pig remains among the radio-cubitus fragments. Once again, the femur (perhaps in keeping with the low proportion of pelvis fragments) is relatively poorly represented. This is in contrast to the tibia, which is abundantly present, while the remains of the delicate pig fibula occur far less frequently. Metapodia are relatively common in the material. Short bones of this small ungulate are rarely found which again is attributable at least in part to the lack of sieving. In addition to two calcanei, only three proximal and a distal phalanx were found.

Horse. Nine horse bones make up only a small portion of the identifiable specimens at 1.87%. They include a skull fragment, a loose tooth and two acetabulum pelvis fragments. The greatest proportion of skeletal elements is represented by four proximal phalanges.

Dog. The 22 bone specimens originating from dogs comprise 4.4% of the total number of identifiable specimens. Most of the long bones are complete. However, there are no dog skulls coming from these levels and even cranial fragments are missing. The only exceptions are a single fragment representing the dental part of the maxilla and the mandible. There is a caudal vertebra and a scapula, while the pelvis is represented by two specimens. Of the long bones, humerus yielded two pieces, while a single radius fragment and two ulnae were found. Bones of the hind leg include four complete femora and three tibiae with and three without the attached fibula. However, no metapodia were found and only a single dog calcaneus is present in the material.

Aurochs. Wild aurochs is represented by a single identifiable specimen, a fragment from a huge thoracic vertebra. Similarly to other remains of this species, this element is unsuitable for taking measurements for the purpose of metric distinction between the wild and domestic forms (Bökönyi 1995). However, the sheer size of this bone speaks for itself.

Red deer. Among the red deer remains, there are only ten skeletal bones, indicating that the animal was hunted. Red deer comprises 2% of the identifiable Middle Bronze Age bone specimens. The skeletal elements include an axis fragment, the articular end of a scapula as well as a pelvis fragment. Of the long bones, there is an ulna and three metacarpus splinters, the distal end of a tibia, and the diaphysis of a metatarsus. The only short bone identified is a carpus. In addition, there is a single antler tine fragment, however, it is impossible to tell whether it originates from shed antler or from a hunted individual (9.1%).

Roe deer. There are eight specimens of roe deer bone, corresponding to 1.6% of the Middle Bronze Age faunal material. They include 2 distal humerus fragments, an ulna, as well as three tibia and two metatarsus splinters.

Wild boar. The ten bone specimens originating from this wild species constitute 2.0% of the identifiable faunal specimens. They include three scapula fragments, a complete radius, and a distal tibia fragment. Of the metapodia, metacarpi and three metatarsi were identified.

Other species. The single identified brown bear bone comprises 0.2% of the identifiable bones. It is a pelvis fragment. Incidentally, the single hare bone found is a pelvis fragment as well. The two rodent bones, a pelvis and the articulated femur, could not be precisely identified to species.

While both the early Middle Bronze Age and Middle Bronze Age phases of the site yielded sufficient numbers of identifiable bones for the purposes of taxonomic analysis, when broken down by skeletal elements, the resulting numbers are too low to display any consistent, believable patterning. Even among the best-represented taxa of livestock, most variation in the skeletal part distributions *(Table 2 and 3)* may be attributed to random variation and taphonomic factors (preservation, recovery) rather than to systematic differences in prehistoric butchery or food preparation practices.

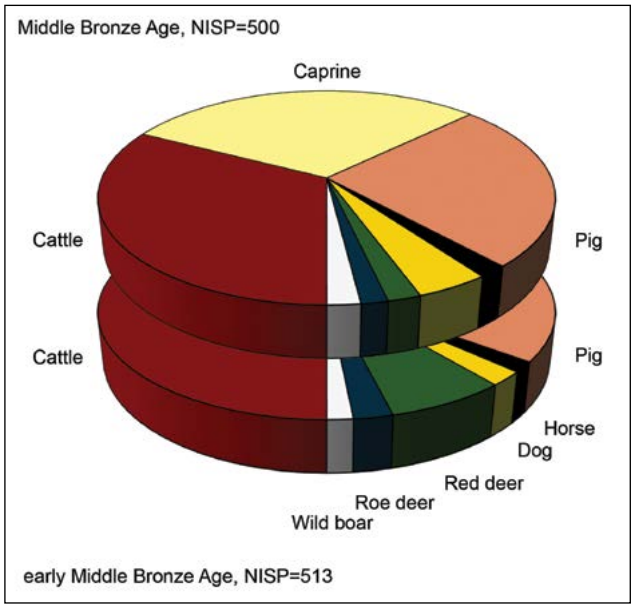

Fig. 4. *The percentage proportion of identifiable animal remains recovered from the two Middle Bronze Age phases of the settlement.*

5.3 Differences by phasing

Due to the striking similarities between the taxonomic compositions of the early Middle Bronze Age and Middle Bronze Age faunal assemblages separated during the course of excavations, a comparison between the percentages of various animals reveals very few differences *(Fig. 4)*. While the contributions of meat-purpose livestock to the numbers of identifiable specimens may be considered constant, bovid numbers rise slightly over time as do the numbers of domestic dog remains. Domestic pig remains stay at high levels while the small percentage of red deer bones drops *(Table 1)*.Thanks to the relatively large size of both faunal assemblages, this difference has proven to be significant (Chi^2=20.326, p=0.005, degrees of freedom=7; species represented by fewer than five bones, e.g. bear, could not be included in this calculation). As for the sources of this difference, while in the case of non-meat-purpose dogs the number of bone specimens could be increased by skeletal elements from the same individual, the higher representation of red deer bones is indicative of a slightly greater contribution of venison to the diet. Importantly, however, this difference is dwarfed by the fact that the definitive proportions between beef, mutton and pork did not change during the two phases studied from the site: domestic artiodactyls played an overwhelming and stable role in meat consumption at the settlement. Given the striking similarity between the two sub-assemblages and the fact that the detailed typo-chronological analysis of the ceramic material is yet to be carried out, in the rest of this paper both faunal assemblages from the two Middle Bronze Age phases from Alsóvadász–Várdomb were pooled to allow regional comparisons.

5.4 Comparative materials

Since the early 2000s, extensive field surveys have been carried out in the Borsod Plain and the Bükk Foothill zone, within the framework of the Borsod Region Bronze Age

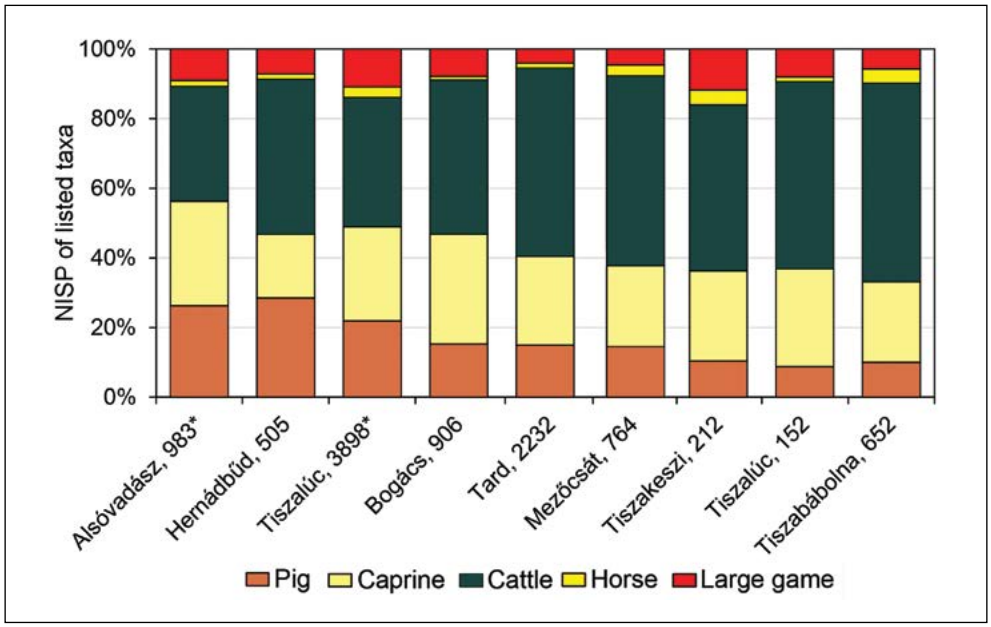

Fig. 5. *Comparison between the percentual contribution of meat purpose animal taxa at the Middle Bronze Age settlements surveyed (Figure 1). Alsóvadász–Várdomb is represented by the pooled data from the two phases. Numbers by site names indicate the NISP of taxa considered. The two excavated assemblages are distinguished by asterisks.*

Settlement (BORBAS) project (for sites see *Fig. 1*, Kienlin 2018). The faunal analysis of finds gathered by surface collection was carried out by Beáta Tugya (Tugya 2018). Alsóvadász–Várdomb falls on the edge of this microregion.

Comparisons between assemblages from excavations and field surveys need to be made very cautiously due to the different taphonomic status of the two types of collections. A possible methodological difference was tested at the site of Tiszalúc–Dankadomb. Both excavated (Bökönyi 1974b, 413) and survey assemblages were available from this site. The rank order of taxa present in the two Tiszalúc assemblages was identical (Tugya 2018, 128, Fig. II. 35), confirmed by a high coefficient of rank correlation (r_s=0.946, p=0.000) calculated here. Minor discrepancies were caused only by differences in the order of rare species of probable minor economic significance.

However, the material collected during field walks (Tugya 2018, 128) contained a significantly higher proportion of cattle remains and a smaller percent of caprine bones (Chi^2=22.687, p =0.000, degrees of freedom=3; horse bones not included due to their small numbers).This difference between the excavated assemblage and that collected during surveys may be explained by a combination of three, probably inseparable, factors:

Find size: large fragments of cattle bone are more easily noticed during field walks compared to the far smaller caprine remains recovered more precisely during excavations.

Assemblage size: the over 25 times size difference between the two assemblages from Tiszalúc (field walks NISP=158, excavations NISP= 4050) limits comparisons as species representation in the smaller sample is prone to random bias (Bartosiewicz–Gál 2007).

Fragmentation: animal remains brought to the surface must have been more damaged by secondary ('dry') fracturing (Outram *et al.* 2005) caused by multiple instances of re-deposition, often exacerbated by post-prehistoric impacts such as tillage activity.

Keeping these potentially distorting factors in mind, it is still worth comparing our assemblage to those from the BORBAS project *(Fig. 5)*.

Meat provisioning at all the settlements included in field surveys was based on domestic livestock. The contributions by large game (aurochs, red deer, roe deer and wild pig) vary around 10% of the NISP, far too low to be indicative of subsistence hunting. While the dominance of cattle NISP at most surveyed settlements may be increased by fragmentation, there is no doubt that in terms of meat weight this large-bodied species played a key role as a source of meat. It is of special interest that the field survey at Hernádbűd yielded relatively many pig bones, comparable to the numbers found at Alsóvadász. This could be explained by the settlement's location in a comparable, hilly environment. However, excavations at Tiszalúc also indicate the relative importance of pork at this settlement (Bökönyi 1974b, 413), located in the floodplain of the Tisza River. The contribution of caprines to livestock NISP is also relatively small compared to that of pig at these three sites, regardless of the origins of the method of collection.

Sheep and possibly goat are better represented at the settlements surveyed in the open plain near the Tisza (sites distinguished by the 'Tisza' prefix in the right side of the diagram. In contrast, it is worth pointing out that the hillier, probably forested environment of Tard is marked by the recovery of two bones of brown bear, reminiscent of the rare find from Alsóvadász.

The early Middle Bronze Age levels at Alsóvadász–Várdomb represents a slightly earlier phase than the Hatvan culture material identified at Tiszaug–Kéménytető, located in the central area of the Great Hungarian Plain (Choyke–Bartosiewicz 1999–2000; Bartosiewicz 2016). It differs from that material in the greater contribution of

domestic pigs. This animal species is of particular interest due to its high proportion at Alsóvadász–Várdomb. Aside from the surface collection from Hernádbűd–Várdomb (Tugya 2009, 34), only excavations at the far-away tell site of Békés–Városerdő (from the OFCC) yielded pig remains amounting to one quarter of NISP in that large assemblage (Bökönyi 1974a, 82). It is also possible, that the percentages of domestic pig were relatively high in the early Middle Bronze Age and Middle Bronze Age layers excavated at the tell settlement of Jászdózsa–Kápolnahalom identified by Sándor Bökönyi (Bökönyi 1980, personal communication). The 18 and 11.5% he reported, respectively, may be suppressed by the fact that he included antler fragments (potentially acquired by gathering shed antler) in the total NISP. This inflates the contribution of large game at Jászdózsa. Reducing their numbers by the antler remains would slightly increase the percentages of all other animals, including that of domestic pig.

Taxon	Early MBA	MBA	Total
Cattle	6	1	7
Caprine	13		13
Pig	5		5
Dog		1	1
Red deer	6	1	7
Roe deer	1		1
Non-identifiable	2	3	5
Total	**33**	**6**	**39**

Table 4. *The taxonomic distribution of Middle Bronze Age (MBA) worked animal remains.*

6 Bone and antler manufacturing

The original analysis of the worked osseous materials from the site was carried out before the publication of the systematic prehistoric bone tool typology developed by Jörg Schibler (Schibler 1981). However, his largely species and skeletal element-based system can also be applied to the bone tool identifications carried out at this site.

6.1 Early Middle Bronze Age bone manufacturing

The vast majority of the bone tools (33 out of 39, *Table 4*) come from the early Middle Bronze Age Hatvan Culture levels. Generally speaking, these worked osseous objects are similar to those found in the Hatvan layers at tell settlements such as Jászdózsa–Kápolnahalom or even Tiszaug–Kéménytető on the Great Hungarian Plain. Broad scrapers are almost uniformly made from the long bone splinters of large ungulates, most probably cattle. These bevel-edged tools are in sharp contrast to the rib scrapers, popular on coeval Bronze Age sites in Transdanubia, the western part of present-day Hungary (Choyke 1984, Table 5, 46).

Cattle bone comprise 18.1% of the Hatvan Culture worked bone assemblage with three metatarsal diaphysis fragments turned into some kind of scraper using flint to scrape and form the working edge. Another cattle bone was made into a dull perforator but was barely used, as was an even smaller splinter of cattle tibia (Schibler Type 1/9 (Schibler 1981, 131)). Both tools seem to be less carefully planned, massive perforators falling into the category of *ad hoc* or Class II tools (Choyke 1997). Similar ad hoc points, characteristic of this time period generally

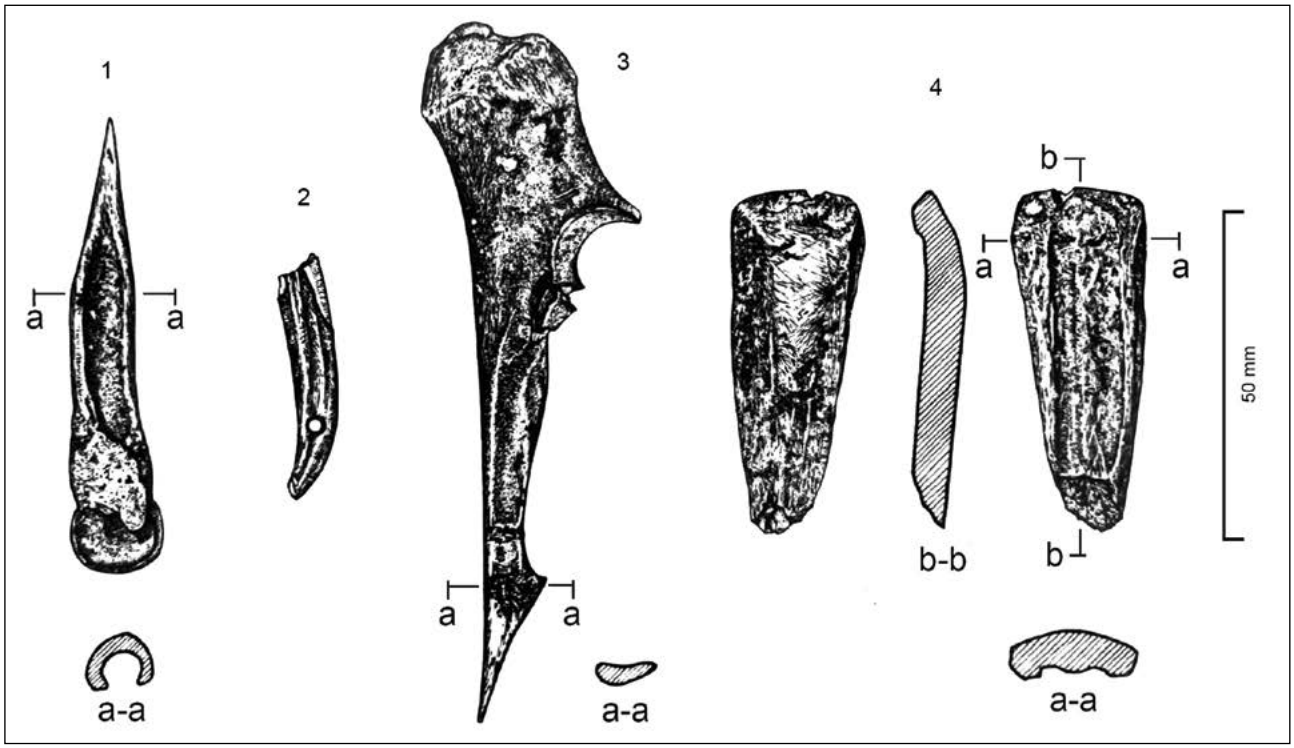

Fig. 6. *Bone tools. 1: Sheep metapodium point (Type 1/1), 2: pig lower incisor pendant (Type 23/2), 3: sheep ulna point (Type1/4), massive bevel-ended "chisel" (Type 4/3) made from large ungulate long bone. a-a and b-b mark relevant sections of the object.*

in Hungary were identified by Bea Tugya at the site of Tiszabábolna–Fehérló-tanya tools found during survey (P. Fischl *et al.* 2015, 130).

There is also a drill made from a long bone splinter. The thickness of the bone wall suggests that it came from a large-sized species, most likely cattle. Such drills, characterized by short tups with a round cross-section, are usually made on sturdy long bone splinters over the whole region studied here. These forms of drills are characteristically made from metapodium diaphyses and can be found at many Middle Bronze Age sites, especially those located on the Great Hungarian Plain. However, the apparently preferential use of domestic cattle is not as typical for worked bone assemblages from the eastern half of the country as it would be for assemblages coming from Middle Bronze Age sites located west of the Danube River (Choyke 1983, Table 2–4, 40–45).

Cattle bone is important for tool making, but sheep/goat bone is the most important for the manufacture of perforator type tools. A variety of perforators were produced, preferentially on the metapodia of caprines. Such perforators are very similar to those used on settlements located on the Great Hungarian Plain except that they are remarkably well-planned and carefully made (Choyke 1997, 66). First the metapodia usually are grooved and split cleanly down the medial line. The rough internal edges were then planed down and the point worked using a flint burin or scraper. Typically, the distal epiphysis is retained as a blunt handle (*Fig. 6/1*; Schibler Type 1/1; small ruminant metapodium point (Schibler 1981, 131). There are three complete tools of this type, all fine perforators. Also present are two metatarsal blanks in which the diaphysis was split and the rough edges planed down with flint but not sharpened. There is a metapodium diaphysis splinter which was shaped into a point (Schibler Type 1/7 (Schibler 1981, 131). The lack of use wear over the marks left by flint scraping shows that the tool was not actually used before it broke.

The ulna, extracted from a sheep's front leg as a whole and sharpened into a fine perforator distally, is of a type found occasionally over the whole of Hungary *(Fig. 6/3)*. Interestingly, this type seems absent from Swiss prehistoric lake dwellings upon which Schibler's typology is based: he only recorded a use of large ruminant ulnae as massive perforators (Type 1/5) rather than those from caprines (Schibler 1981, 131).

There are three narrow ceramic scrapers made on a barely modified tibia and femur diaphysis and a spine of the scapula of caprines respectively. These tools have an improvised appearance and fall into the category of "Class II" tools (Choyke 1997, 68). There is also the head of a bone pin which probably comes from a caprine long bone diaphysis. Its final form was produced using abrasion with a stone such as sandstone. Similar, though not identical, such pins exist at other sites in the Upper Tisza Region (Mezőcsát–Pástidomb, Ároktő–Dongóhalom). Bone pins were also found further south, at the site of Gyulavarsánd–Laposhalom although these pieces are much more elaborate and thus, stylistically very different from the pin-like object from Alsóvadász–Várdomb.

There is a long bone splinter in the caprine bone size range and one from a large ungulate which are flat in cross-section and carved to a point at both ends using a sandstone like stone (Schibler Type 2/1 (Schibler 1981, 131). Such artifacts, known over the entire region, are generally considered to have been fishing gorges although they may have simply been bone points embedded in a handle for better manual control (Clark 1949, 61). The interpretation of fishing gorge is somewhat reinforced by their frequent presence at places where fish remains are also abundant (Tiszaug–Kéménytető).

Four pig bones (15.2% of the Hatvan Culture tool assemblage) and teeth were modified although their representation in the tool inventory is not proportional to their relatively high figures recorded in the refuse bone material. Three of these were incisors, scraped drilled through their roots for suspension *(Fig. 5/2)*. Curiously, only the site of Gyulavarsánd–Laposhalom in the southeastern section of the Great Hungarian Plain yielded similar perforated pig incisors (Choyke 1984). Again (using faunal data from the closely related site of Békés–Városerdő) these are the only sites with an equally high proportion of pig remains in the identifiable refuse bone sample. There is a pig phalanx, stained a golden-brown colour, which is worn on its dorsal side. It was possibly used as a ceramic burnisher. Similar Middle Bronze Age specimens from the proximal phalanges of wild boar, trimmed laterally and medially, are known from the Middle Bronze Age of northern Hungary (Choyke 1984) while they also appear regularly among the probable ceramic burnishers made from phalanges, and astragali from various domestic species at the site of Százhalombatta–Földvár in central

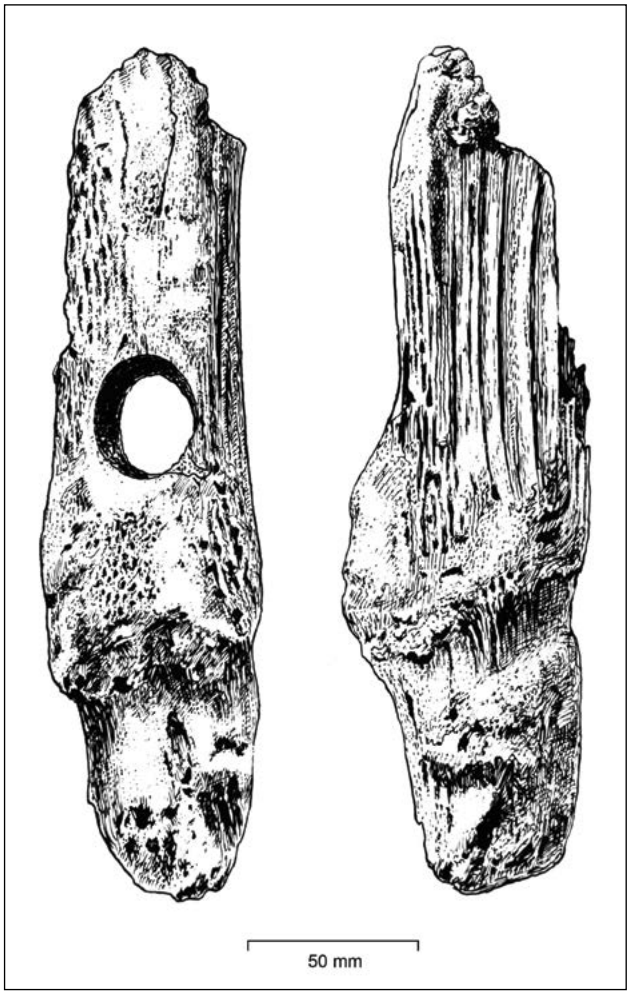

Fig. 7. *Hafted mattock made from the antler of a hunted red deer stag.*

Hungary. A similar ruminant phalanx, found during survey work, artificially worn flat on its plantar surface, was also found at Tiszabábolna–Fehérló-tanya as well as at the site of Mezőcsát–Laposhalom (P. Fischl *et al.* 2015, 130, Fig. 22/3). Similarly worn phalanges from Hatvan and Füzesabony levels at Jászdózsa–Kápolnahalom as well as worn astragali are slightly different in character. They are more neatly made and produced on both cervid and domestic bovid phalanges. Faceted astragali from Zagyvapálfalva–Homokbánya (Meier 2013, 167, Fig. 16.1) are also more formally shaped, showing patterned use wear consistent with burnishing (Meier 2013, 172). This observation calls into question whether such diverse phalanges functioned only as ceramic burnishers (Choyke 2005, 137, Fig. 9).

The use of antler for tool making is much more important than the frequency of red deer skeletal bone in the refuse sample would suggest. Red deer antler implements make up 18.1% of the early Middle Bronze Age tool assemblage from Alsóvadász. This proportion suggests that not all the worked antlers originate from hunting, antlers may have been gathered as well. There are two antler burr and beam hafted tools in the early Middle Bronze Age, one originating from a hunted individual as shown by the presence of the burr with the pedicle attached *(Fig. 7)*.

The two burr and beam hafted tools are cut somewhat obliquely at the butt end and asymmetrically hafted. The eye tine, however, is cut off smoothly and the butt end, while oblique, is not as planar compared to tools from settlements in the plain south of the Cserhát Hills. These artifacts appear to differ stylistically rather than in terms of their function. There is a section of an antler beam which had been hafted. One of its ends shows battering from use. This specimen has no clear parallels elsewhere in Middle Bronze Age Hungary.

The oblique ends and symmetrical hafting are typical for Bronze Age antler mattocks at sites of the Great Hungarian Plain in general, but the smoothly cut off eye tines and shortening of the oblique end is not. There are two antler tines which have been modified, one to form a bevelled scraper and the other partially drilled and shaped with flint near the tip. However, this specimen remained unfinished.

There is a single roe deer metatarsus diaphysis splinter which is a finished form of the aforementioned two caprine metatarsus blanks. It is classed as a fine perforator, a task for which the solid, gracefully elongated metapodia of this wild animal would be ideal. The use of roe deer bone for such tools was preferred during the Neolithic when this game was more extensively hunted, providing a consistent supply of quality raw material.

Finally, there is a bird's long bone which was shaped using a flint tool into a needle. It broke once and was re-drilled. Bird bones are rarely recovered without using screening. However, sharp avian long bones represent a commonly used material with which to manufacture broad needles (possible net or mat weavers) throughout the Hungarian Bronze Age.

6.2 Middle Bronze Age bone manufacturing

The Middle Bronze Age levels at Alsóvadász–Várdomb produced only six bone and antler artifacts. In spite of the remarkable similarity in the size and taxonomic composition of the two assemblages available from this site, this number is rather small compared to the early Middle Bronze Age, Hatvan period assemblage and may reflect different activities in this part of the settlement in later times, although this impression may be influenced by sampling bias. However, when the proportion of worked osseous remains within each species is compared, the pattern obtained reliably reflects the refuse sample coming from the early Middle Bronze Age levels *(Fig. 8)*.

There is a broad ceramic scraper made from a large rib, probably from domestic cattle, in the Middle Bronze Age assemblage. It differs significantly from the rib scrapers of Transdanubia, that is, the western part of Hungary. Even though one side of this tool is heavily worn, the other side is not, although the bevel along the working edge is markedly shorter. The animal this tool was made from had been injured at one time as there is a partially healed lesion visible on the body of the rib. Healed rib fractures are relatively common in prehistoric cattle (Bartosiewicz 2006).

Dog is represented by a canine drilled through the root. Since dog remains were more often found in this later assemblage, it is unsurprising that this ornament was encountered at this site. This type of perforated dog tooth ornament occurs commonly during this period on many prehistoric sites.

There is another large double-pointed artifact made from red deer antler. It was carved with flint and is oblong

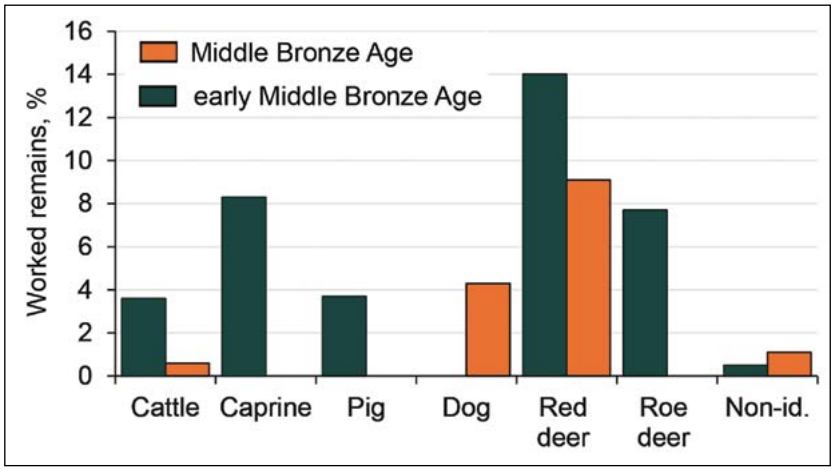

Fig. 8. *The proportion of worked animal bones (by species) in the two phases of the settlement.*

in cross section. There are two parallels to this form made from bone at Tiszaug–Kéménytető. Its function is unknown, but something associated with net weaving, for example, could be imagined.

There are three tools made on bone that are not identifiable to species. Of the two long bone splinters from small-sized ungulates, one was a scraper of some sort. The other is a pointed tool with a long tip which is round in cross section and made from a bone splinter. Wear, but lack of striations, suggests it was used to perforate a fine, but not too hard, material. Finally, there is a narrow scraper that was made on a rib fragment of a small-sized ungulate species. It was used briefly on a hard material such as dried ceramics with fine temper.

There is no evidence at Alsóvadász–Várdomb for the use of the astragalus bones as gaming pieces or ceramic smoothers, artifacts that appear commonly at other contemporaneous sites such as Százhalombatta–Földvár or Jászdózsa–Kápolnahalom (Choyke 2005, 2023). This absence might be related to their lower frequency in the refuse bone assemblages. The absence of such objects may, of course, also be connected to where the excavation was located, *vis à vis* particular craft activities within the settlement.

7. Conclusions

Generally speaking, Bronze Age settlements can vary quite a bit in terms of species composition depending on their geographical location. Excavated Middle Bronze Age animal bone assemblages across Hungary (Bökönyi 1974b; Choyke 1983, 1984; Bartosiewicz 1996; Choyke–Bartosiewicz 1999–2000; Gál 2017) tend to show the highest average contribution by cattle (58%) followed by smaller percentages of both caprines (24%) and pig (18%). These simple numbers, however, mask considerable diversity both by period and by settlement type. It seems that local ecological conditions in the mosaic-like natural environment of the Carpathian Basin had an impact on both animal keeping and the economic role played by usually declining hunting (Bartosiewicz 2022, 73).

The 25% contribution of domestic pig remains to NISP in both faunal assemblages from Alsóvadász–Várdomb is unusually high and comparable only to the figure from the Middle Bronze Age site of Békés–Városerdő (25.1%). There, however, the percentage of caprines was much smaller (11%) than in the case of Alsóvadász (27–30%). This figure is higher only at a very few sites, such as in the hill-fort of Sárbogárd–Cifrabolondvár in Transdanubia and the small village site of Csongrád–Vidre-Sziget on the great Hungarian Plain.

The rather intensive consumption of pork does not correlate with an increased use of pig bones in tool production. Practical explanations include the absence of fused metapodia in pig. These skeletal parts are widely used in caprine bone manufacturing to produce sharp points and rounded handles from the remaining epiphysis. In addition, pigs being single purpose meat animals, were often slaughtered at a relatively young age when their bones tend to be softer that those of adult individuals. Aside from the fibula, pig bones are also curved in a way that make them less convenient for bone tool manufacturing.

Considering the likely forested environment (indicated by the presence of bones from large game, including brown bear), venison played a surprisingly small role in meat provisioning. On the other hand, there is evidence of a robust antler manufacturing tradition, especially in the early Middle Bronze Age Hatvan Culture layers. The Hatvan levels also yielded small clay animal figurines of horses, and possibly dogs *(Fig. 9)*. These are eminently non-meat purpose animals with a high status and/or emotional value, although similar animal figurines from the Hatvan Culture also appear to depict cattle and pigs, among other species, at the tell settlement of Jászdózsa–Kápolnahalom (Tárnoki 2003, 147, Fig. 8).

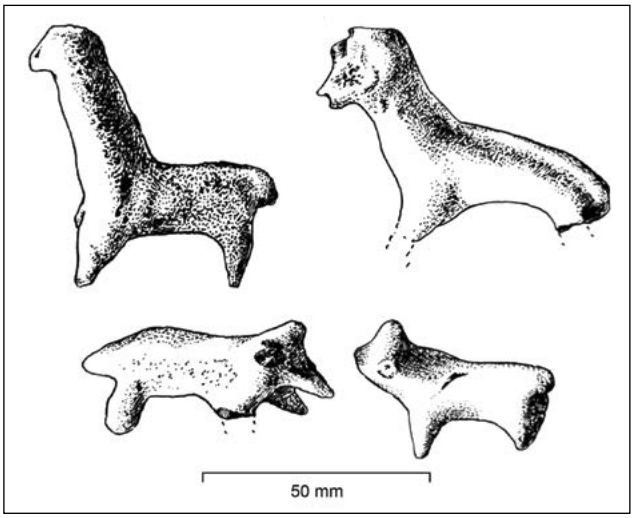

Fig. 9. *Animal figurines made of clay. Top row: horses, bottom row: possible dogs (?).*

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Archaeological Data on the Role of Fortified County Seats during the First Mongol Invasion of Hungary

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Abstract: *This article examines the role of county seats in the Kingdom of Hungary during the first Mongol invasion (1241-42). Through the concrete example of Abaújvár castle and its finds, the article illustrates how archaeology can contribute, alongside scarce written sources, to answering this question. The county seat of Abaújvár is mentioned in a letter written by Hungarian aristocrats to the pope in February 1242, in which possible centres of resistance to the Mongols are mentioned. The letter makes it clear that Abaújvár was the strongest castle in north-eastern Hungary at that time. However, it is not clear, whether the Mongols ever actually besieged it. The systematic evaluation of the results from the excavations in 2019 and earlier, in 1974-81, however, prompt us to reconsider the role of Abaújvár during the Mongol invasion. The weapons recovered, especially some of the arrowheads, are clearly linked to the Mongols and, thus, indicate they indeed attacked Abaújvár. This conclusion is supported by a hidden hoard—a mix of jewellery and coins—found inside the fortified county seat. They unquestionably belong to the Mongol hoard horizon. The presence of the hidden hoard and the large number of scattered weapons and other high value artefacts from the time seem to support the idea that the castle was abandoned by its defenders for a brief period. However, the 1242 letter contradicts this idea. These inconsistencies have yet to be resolved. For the time being, it seems certain that the county seat of Abaújvár, contrary to what was previously thought, played an important role during the Mongol invasion.*

Keywords: *county seats of the eleventh-thirteenth centuries, the first Mongol invasion, Mongol weapons, Mongol treasure trove*

György Györffy was the first to investigate the period in which fortified county seats of the eleventh to the thirteenth centuries fell into obsolescence in the Kingdom of Hungary and the reasons they no longer served their former roles (Györffy 1977, 200ff.). He believed they lost their importance during the Mongol invasion and this was proof they had become outmoded. Without examining the combat style of the Mongols or the defensive nature of either the county castle or what he labelled the "true" or "classical" stone castle, Györffy implied the defunct fortified county seats were replaced overnight by the newer stone castles. Although previously Györffy's theory received a lot of criticism, everyone agreed in this question. The destruction of county castles during the Mongol invasion had become a given, proven by the mere fact that "real"—that is, stone castles—were built only after the Mongol invasion. (I have also examined this topic in my earlier work, too: *cf.* Wolf 2011; Wolf 2018, 133).

István Bóna was squarely of the opinion that only the fortified county seats survived the Mongol invasion, since their ramparts were elevated and reinforced by stone walls (Bóna 1998, 39, 42). To his mind, this is without question why the county seat of Abaújvár, for example, was able to withstand the Mongol siege. In contrast, the county seat of Borsod had to have been destroyed, as there no trace remained of stone walls added at the top of the ramparts (Bóna 1998, 39). His conclusions have been adopted by many researchers lacking any deeper knowledge of the castle in question.

Bóna probably based his opinion on a reference to the Abaújvár county seat in a letter of 2 February 1242 from the Hungarian barons to the pope. The letter described the situation after the Mongols had successfully crossed the frozen Danube. The authors listed the fortified positions which, as far as they knew, were still resisting or might serve as launching spots for a counterattack against the Mongols. The places listed are found both "across the Danube" (that is, to the west of the river, in today's Transdanubia)—Fehérvár, Esztergom, Veszprém, Tihany, Győr, Szentmártonhegy (Pannonhalma), Moson, Sopron, Vasvár, Németújvár (Güssing, Austria), Zala, and Léka (Lockenhaus, Austria)—and "on this side of the Danube" (that is, to the north and east of the river)—Pozsony (Bratislava, Slovakia), Nyitra (Nitra, Slovakia), Komárom, Fülek (Fiľakovo, Slovakia) and Abaújvár and "other castles and fortified places". Thus, only five fortifications of the latter group are mentioned by name, including Abaújvár (Katona 1981, 311–313; Zsoldos 1991, 60; Zsoldos 2003, 532).

To the list of fortified county seats mentioned above, can be added the following: Trencsén (Trenčín, Slovakia), whose defenders were rewarded by Béla IV in 1243 (Katona 1981, 314; Zsoldos 1991, 64–65, note 80); Túróc (Turiec, Slovakia), whose serfs defended the fortification and were mentioned in a charter from 1257 (Zsoldos 2003, 531–532.); and those county seats that were finally conquered by the Mongols (Várad/Oradea, Gyulafehérvár/Alba Julia, Csanád/Cenad, Kolozsvár/Cluj, Romania). (Zsoldos 2003, 532, note 59).

The vast majority of the fortifications mentioned in the letter of 1242 were therefore of the old type of county castles, and only a very few of these constructions were of the new type of private, stone castles (such as Németújvár/Güssing, Austria, Léka /Lockenhaus, Austria, and Fülek/Fiľakovo, Slovakia) or fortified monastery buildings (Tihany and Pannonhalma). Written sources confirm that county

seats and their warriors stood their ground during the Mongol invasions; these centres of local defence were simultaneously centres of the organisational network of various fortifications.

The survival of this network is also well illustrated by the military events from the second half of the thirteenth century, with those of 1273 being especially instructive. At that time, the people who participated in military operations came not only from the areas involved (Nyitra, Vas, Sopron, Veszprém, and Pozsony), but also from more distant county seats (Abaúj, Nógrád, Borsod, and Gömör) (Zsoldos 1991, 70–71; Zsoldos 2003, 538–539). It directly follows that, at the end of the thirteenth century, the royal network of county seats must still have been a functioning institution from a military standpoint, and the old county seats must still have served as the main line of defence along the borders (Fügedi 1977, 31). The only safe havens from the Mongols were the fortified county seats, and as can be seen, the more spacious of these, first and foremost had the capacity to take in larger numbers of refugees than the small private castles of the period (Erik Fügedi and István Feld held similar opinions while studying the private castles of the period: *cf.* Fügedi 1977, 61; Feld 2015, 363; Feld 2017, 380).

In summary, we can state that, in light of recent research, the widely expressed opinion that most of the fortified county seats were destroyed during the Mongol invasion, thus showing their obsolescence, is no longer tenable. The reason why these fortifications fell out of favour was not so much that were militarily out of date, but rather the great socio-economic changes that took place in Hungary in the second half of the thirteenth century. (Katalin Szende also emphasized the role played by economic and social changes: *cf.* Szende 2013, 134–136) As part of this process, the royal counties created by King Stephen were dissolved and replaced by noble counties, which were organised on a different basis. Thus, I contend that it was not the type of fortification that became obsolete but rather the institutional system itself. The reshaping of the market network and the shifting of trade routes, in which the Mongols undoubtedly played a role, may have contributed to this change (Fügedi 1981, 343; Romhányi 1990, 125; Szende 2013, 138–139).

In the following article, I would like to show through a concrete example what archaeology can add to the data from written sources. As mentioned above, the Abaújvár county seat appears in the letter of 1242. It is already clear from the letter that Abaújvár was the strongest fortification in north-eastern Hungary at that time *(Fig. 1)*. What is not clear, however, is whether the Mongols did in fact lay siege to the castle. A systematic evaluation of the results from excavations in 2019 (For a brief discussion of the excavation results: Wolf 2022) and 1974-81, however, suggest the role of Abaújvár in the Mongol invasion should be reconsidered.

When the earthwork rampart was cut through, the archaeologist Judit Gádor determined that the wood structure in the upper layer of the rampart differed from that in the lower layers. This strongly suggested that the rampart had been rebuilt and its height increased. The artefacts recovered point to a date in the second half of the twelfth century.

Gádor also came upon the remains of a stone wall laid with mortar on top of the rampart of wood and earth. The stone wall was built along the centre line of the rampart, presumably when the feature, originally vertical on the outside, had begun to develop a slope. However, neither the excavation nor the written sources have provided any definitive information on when the stone wall was constructed. Gádor has proposed the mid-thirteenth century as the earliest possible date of construction.

As Gádor stated there were no signs of destruction, it is therefore unlikely the Mongols conquered the castle. On the other hand, she has conjectured that the structure, like

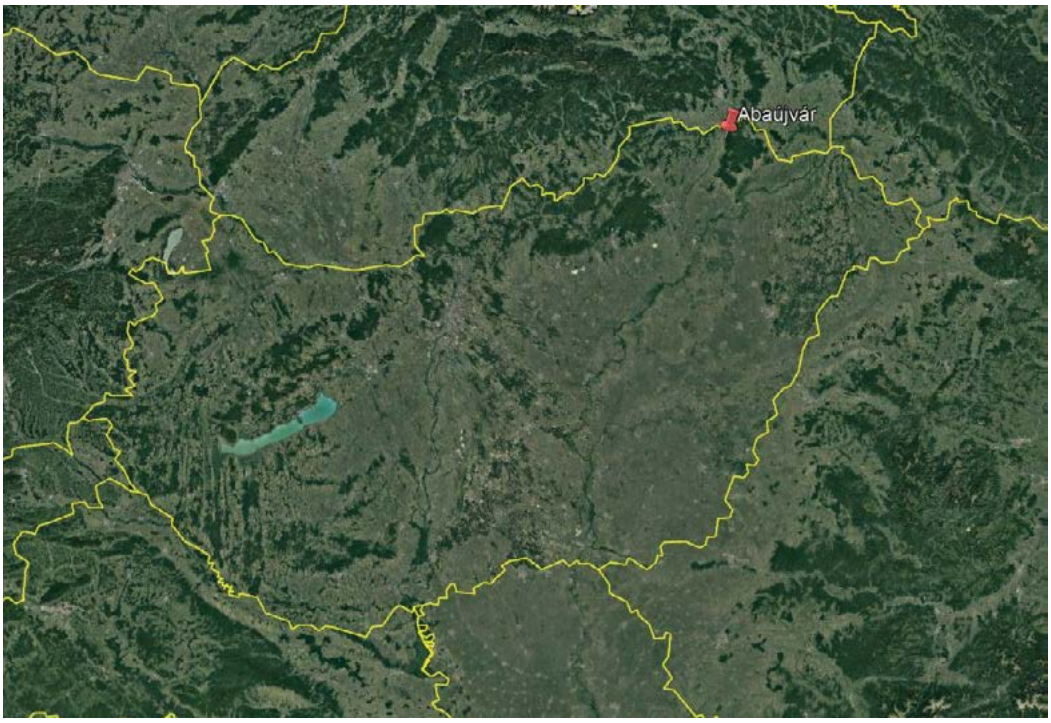

Fig. 1. *Abaújvár's location in present-day Hungary.*

the surrounding settlements, was abandoned for a time. It was after this hiatus that the stone wall on top of the ruined rampart was built (Gádor–Nováki 1976/1, 37–47; Gádor–Nováki 1976/2, 425–434; Gádor–Nováki 1980, 43–76).

Gádor has also tentatively linked the rebuilding of the church inside the fortification to the Mongol invasion. The church was first built at the end of the eleventh century and rebuilt in the second half of the thirteenth century, as verified by the coins found there, which include one specimen of Stephen V (1270-1272) coinage (CNH I.296) (Gádor 1980, 443–450).

Several weapons were found during the excavations. As it was a fortification, this in itself is not surprising. The type and age of the weapons, however, is puzzling.

Arrowheads

In Abaújvár, the long-range weapons excavated in the largest numbers have been represented by arrowheads, with 53 unearthed. Two of them were found in graves in the cemetery around the church: one was embedded in the deceased's sacrum (grave 706) and the other in the cervical vertebrae of the deceased (grave 714). The former is a large, broad, flat, leaf-shaped arrowhead widening underneath into a rectangular shape, then curving into the tang, which has a rectangular cross-section. The end of the tang is broken off. The arrowhead is 8.3 cm long, while the blade is 7.3 cm. The maximum width of the blade is 3.2 cm and the maximum thickness of it 0.2 cm. Similar arrowheads have been found in thirteenth- and fourteenth-century Kuban kurgans and in old Russian settlements destroyed by the Mongols in the thirteenth century (Медведев 1966/2, 60, ris. 4. 20.) *(Fig. 2.7)*. The arrowhead found in the cervical vertebrae of the deceased in grave 714 is thin with a rhombus cross-section. The bottom of the blade has a base with a circular cross-section. The tang is pointy and slightly twisted and has a circular cross-section. The arrowhead is 71 mm long, while the blade is 6 mm long and 3 mm thick *(Fig. 3.3)*. Similar arrowheads have been discovered in the Bakonyszentlászló-Kesellőhegy earthwork, which dates to the thirteenth century (Nováki 1979, 117, ill. 53. 2-5). The two deceased people, therefore, died from their injuries, but their deaths cannot be linked definitively to the Mongol attack, even if the arrowheads are clearly of an Eastern type.

A long arrowhead, tapering towards the tip, was also recovered from the upper layer of the rampart *(Fig. 4.3)*. It is most closely related to some variants of type 93 in the

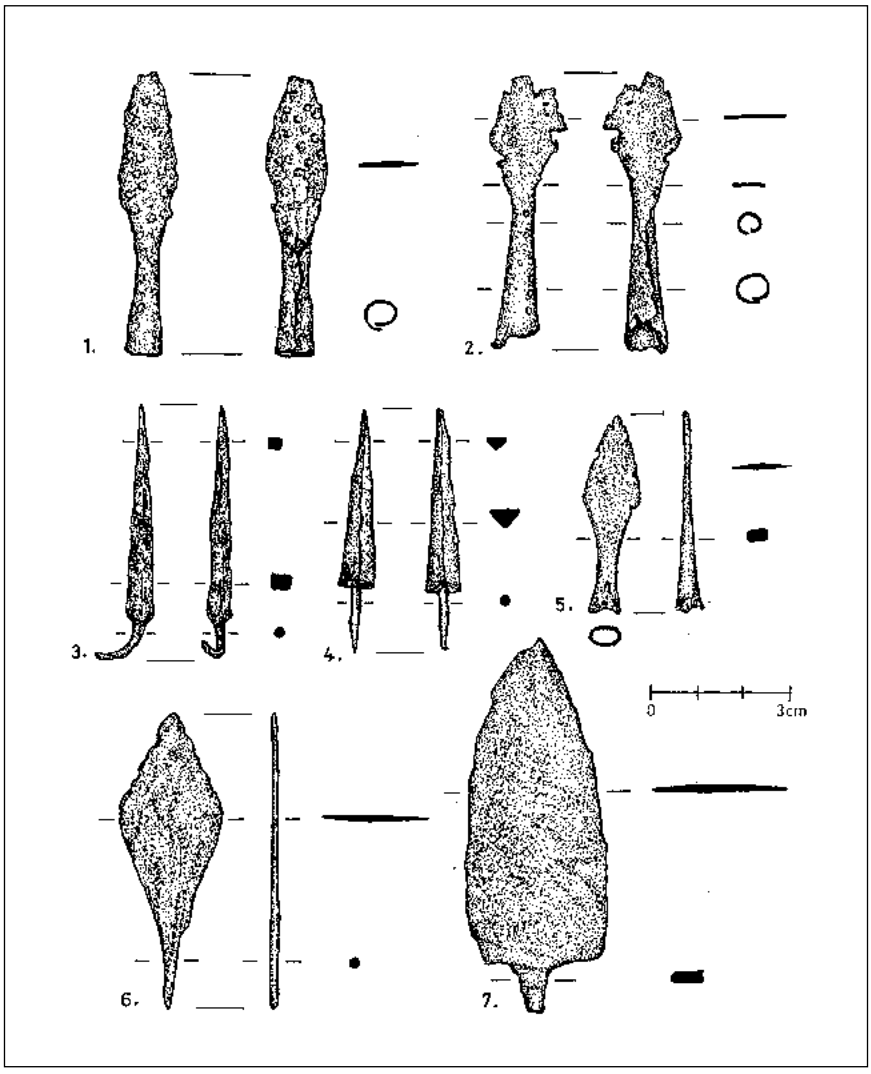

Fig. 2. *Arrowheads from the cemetery around the church: 1-6; 7: grave 706. Drawn by Mrs András Sáfrány.*

Medvedev system (Медведев 1966, 84 tabl. 17, 28). A similar specimen was found at the castle of Czermno (Czermno nad Huczwą, Poland) (Kuśnierz *2005,* 118, tabl. 28) which was attacked by the Mongols in 1240, and in Hungary at Szabolcs-Kisfalud (Fodor 1975, 181, fig. 8.3; Fodor 1976, 378), also destroyed during the Mongol invasion. Several more specimens have come to light in the interior of Abaújvár castle *(Fig. 4.4; Fig. 5.4-5)*.

The largest number of arrowheads were found in the cemetery area around the church and on the western side of the fortification, near the rampart. Several of them clearly are of the Mongol type from the thirteenth and fourteenth centuries: wedge-shaped arrowheads called *tomars.* These, long, flat, rectangular, straight-edged projectile points were used to pierce the rings of chain mail *(Fig. 6.1-2)*. In Medvedev's system, they can be classified mainly as type 100. They all have an overall length of 42-165 mm, a blade length of 22-88 mm, a width of 7-12 mm, and a weight of 7-21 g (Медведев 1966/2, ris. 4.6; Медведев 1966, 86, tabl. 24.1; 25.21; Худяков 1980, 92, tabl. XXXI.10–11, tabl. XXIII; Ruttkay 1976, 330. Abb. 54. Type B4; https://swordmaster.org/2017/02/24/zheleznye-nakonechniki-strel-iz-srednevekovyh-kurganov-kuzneckoy-kotloviny.html, tip 9, ris 5. 23–24, 13. Last accessed 14 May 2024.) Hudyakov classified them in Group II, Type 2. (Худяков 1991, 106–107, gruppa II, tip. 2. ris. 55.3, 10; 56.9) This type of arrowhead was also found at Czermno Castle (Poland) (Kuśnierz 2005, 118, tabl. III.8). Among Hungarian finds, this type was found in Bakonyszentlászló-Kesellőhegy and Szank in addition to Abaújvár (Nováki 1979, 53, ill. 6; https://mandiner.hu/cikk/20230511_tatarjaras_tortenelem_rosta_szabolcs. Last accessed 13 June 2023.). The Mongols are also associated with elongated triangular or rounded points, analogies of which have been found in Ghengis Khan's capital Karakorum, in parts of Eastern Europe and the Volga region, and in nomadic kurgans in Ukraine (Медведев 1966/2, 55–56, ris 1. 1–3, 5, ris 2. 1–8, ris 3.1–7; Кирпичсников 1985, 352, tabl. 140. 1–3; Худяков 1980, tabl. XXIX, table 2, XXX. 1–2; https://swordmaster.org/2017/02/24/zheleznye–nakonechniki-strel-iz-srednevekovyh-kurganov-kuzneckoy-kotloviny.html Tip 2. Ris. 4. 2-3. Last accessed 14 May 2024.). These arrowheads, type 67 in Medvedev's system, are 63 to 135

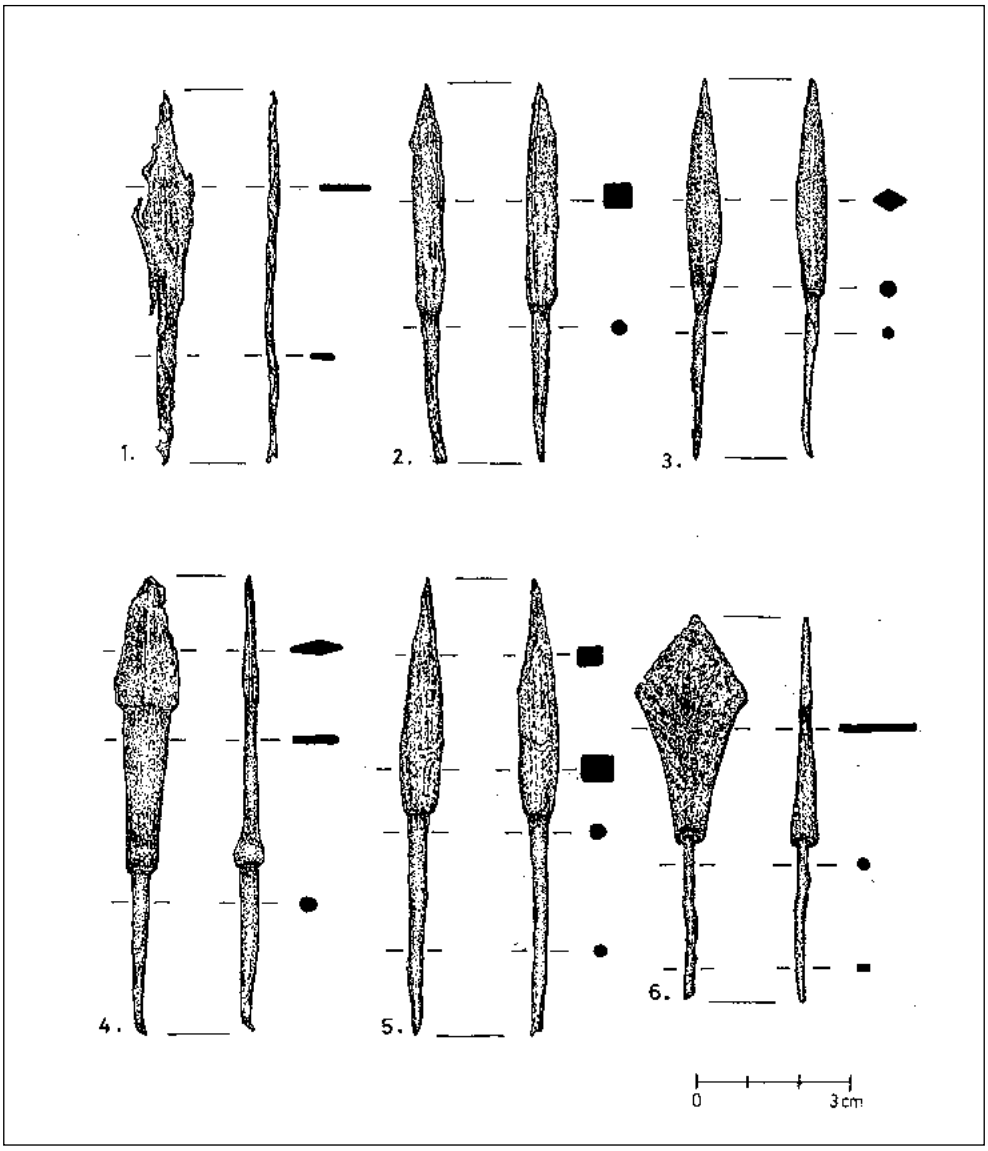

Fig. 3. *Arrowheads from the area of the castle 1-2, 4: from the cemetery around the church; 3: grave 714; 5: from the upper layer of the rampart; isolated find from the settlement area. Drawn by Mrs András Sáfrány.*

mm long and 11 to 25 mm wide, their blades are between 38 and 75 mm long, and they weigh between 8 and 15 g. Before the Mongol invasion, they were not known in Russia and Eastern Europe in general but arrived with the Batu hordes in the first half of the thirteenth century. A typical Mongol arrowhead, they were found in large numbers in all the Russian settlements destroyed by the Mongols in the southern part of the country and were generally distributed throughout Eastern Europe in the fourteenth century. They were also the most widely used in Mongolia in the thirteenth and fourteenth centuries and, as already mentioned, were found in Karakorum. Two types can be distinguished: blunt and angled *(Fig. 5.6; Fig. 6.3 and 6.5)* and curved with a convex point *(Fig. 5.7, 5.9, 5.11; Fig. 6.4, 6.6)*. However, there are no chronological or regional differences between these varieties; everywhere they occur together everywhere, even found in the same quiver (Медведев 1966, 75–76, tabl. 24.2–6, 26; tabl. 27–31; tabl. 29.1–3, tabl. 30.64–65). Hudjakov has placed them in group II, types 1 and 7 (Худяков 1991, 105–106. Gruppa II, tip 1, ris. 54.1, 4, 10; 55. 4–5, 8; 56. 1, 5, 7–8, 10–12; 57. 5, 7, 8; 58.4; 111–112. Gruppa II, tip 7, ris. 54.3, 5.), and Fedorov-Davydov in type B IX. (Федоров-Давыдов 1966, 27-28, ris. 3.9), Similar arrowheads have been found in Bazin-Cajla (Pezinok-Cajla, the Pezinok district in Bratislava, Slovakia) (Farkaš 2015, obr. 19, 1, 5; Holeščák 2020, 98–99, fig 7. 1–2), Nyitra (Nitra, Slovakia), Bajmóc (Bojnice, Slovakia) (Holeščák 2017, 47–48, fig 1.3), and Czermno (Poland). Other specimens of this type have also been found in other Polish towns, in Crakow, Gródek, Przemyśl and Kłobuck (Kuśnierz 2005, 118, tabl. III.1–7, 9. With earlier literature.). A similar specimen also came to light in the thirteenth- and fourteenth-century settlement layer of Hansca in Moldova (Postică–Hîncu 2023, 52, pl. 192/1). In Hungary, such arrowheads have been found in Szabolcs-Kisfalud and Szank (Fodor 1975, fig. 8.5; Rosta–Pánya 2018, 52; https://mandiner.hu/cikk/20230511_tatarjaras_tortenelem_rosta_szabolcs. Last accessed 13 June 2023.). Their function was to pierce the chain mail.

Also, with Eastern analogies is the arrowhead with a "heavy" or "explosive" head *(Fig. 3.4)*, of which one specimen is known from the interior of the castle. Attached to the bulky, elongated, rhombus-shaped blade is a short neck

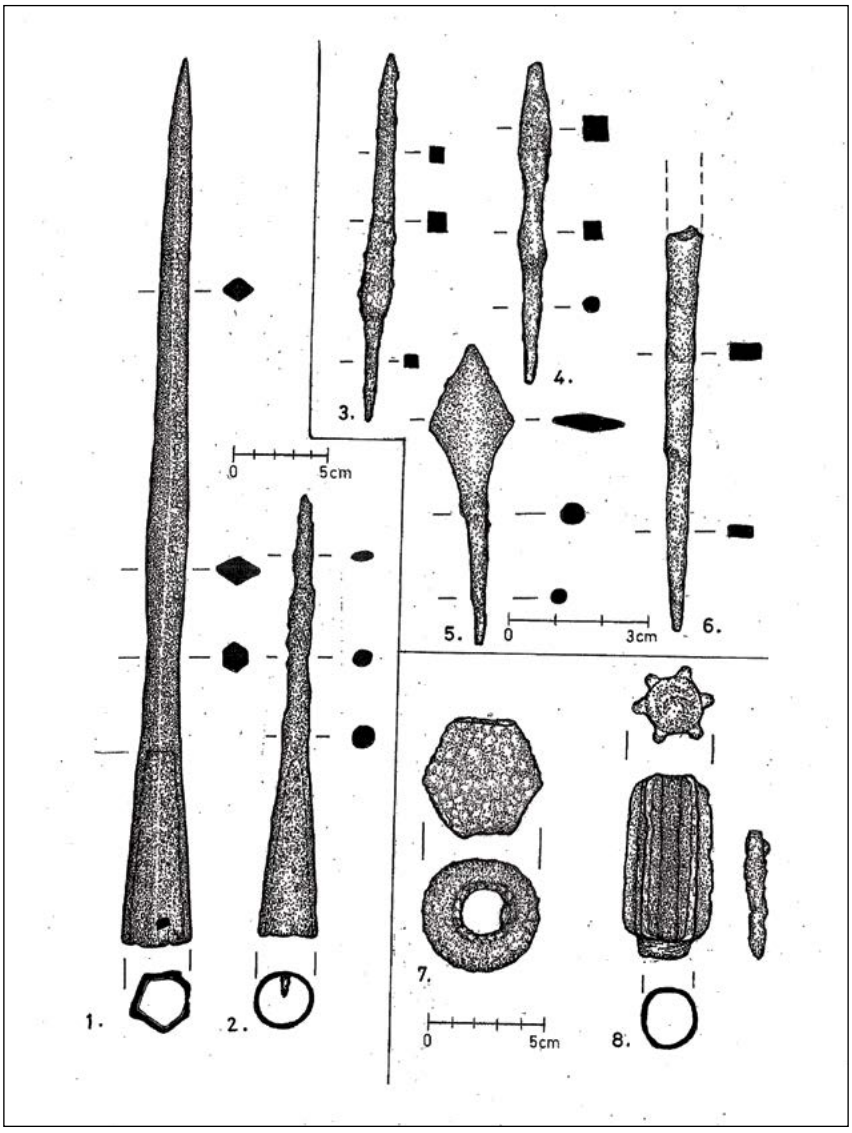

Fig. 4. *Arms from the castle area 1: pike from the cemetery area around the church; 2: pike from the western side of the castle, near the rampart; 3: arrowhead from the upper layer of the rampart; 4-6: isolated arrowheads from the castle area. Drawn by Mrs András Sáfrány.*

with a circular cross-section, which makes the arrowhead longer and heavier. It was used to pierce plate armour (Худяков 1980, 92, tabl. XXXI. 2; Худяков 1986, 194, ris 82. 14; https://swordmaster.org/2017/02/24/zheleznye-nakonechniki-strel-iz-srednevekovyh-kurganov-kuzneckoy-kotloviny.html. Tip 15, ris 1.20. Last accessed 14 May 2024. I am grateful to Valéria Kulcsár for translating and helping interpret the information related to the arrowhead type).

A pyramid-shaped arrowhead with a triangular cross-section *(Fig. 2.4)*, also rare among Mongolian finds, was also recovered from Abaújvár castle. Arrowheads of this type, number 76 in Medvedev's system, are 43 to 85 mm in length and 6 to 11 mm in width. Their blades are 22 to 58 mm in length, and they weigh 6 to 9 g. One analogy to this armour-piercing arrowhead is also known from Karakorum (Медведев 1966/2, ris 1.18; Медведев 1966, 79, tabl. 29.18; Худяков 1991, 114. Gruppa IV, tip 1, ris 62.11), another is from the region of the Golden Horde (Федоров-Давыдов 1966, 2, Ris 3.9, tip ь III.), and a third was found in a house from the twelfth- or thirteenth-century settlement of Hansca, Moldova (Postică–Hîncu 2023, 52, pl. 168/3.).

Several, differently shaped arrowheads, still capable of piercing armour were also found in the Abaújvár fortification *(Fig. 2.3; Fig. 3.2)*. These specimens have long, narrow blades with a quadrilateral cross-section and belong to type 93 in Medvedev's system. As discussed earlier, several variations of this type are known, with the overall length of the arrowhead varying from 50 to 115 mm, the length of the blade from 30 to 70 mm, the width from 5 to 8 mm, and the weight from 4 to 12 g. This type was used in Eastern Europe between the tenth and fourteenth centuries and is known from several settlements, such as Novgorod, where specimens from the first half of the eleventh through the thirteenth centuries have turned up (Медведев 1966, 84, tabl. 30.87; 19.30; 21.19, 32; 25.15.). This group includes the above-mentioned arrowhead buried in the cervical vertebrae of the deceased in grave 714 *(Fig. 3.3)* as well as another found in the same tomb *(Fig. 3.5)*. Similar specimens were recovered in Bazin (Pezinok, Slovakia) (Farkaš 2015, obr. 18. 1-10, 12, 38; 19. 2.).

During the 2019 excavation, metal detector searches were conducted in several areas of the castle, but no further

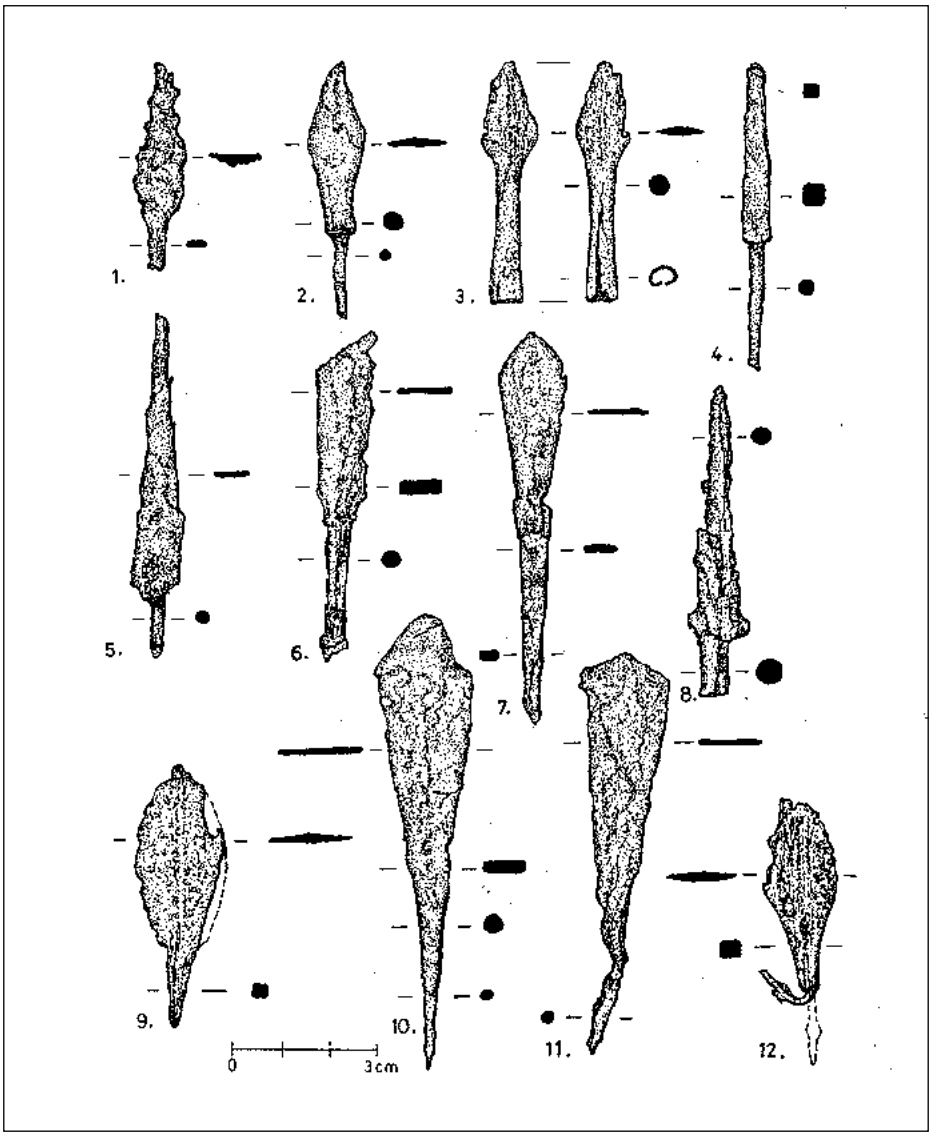

Fig. 5. *Arrowheads from the area within the castle 1-12. Drawn by Mrs András Sáfrány.*

arrowheads were discovered. It can reasonably be assumed, however, that the specimens recovered thus far represent only a fraction of the projectiles originally used. After the battle, the victors most likely collected the remaining usable arrows. The group of arrowheads discussed above, which account for almost half of the specimens found, clearly show that the Mongols attacked the fortified county seat of Abaújvár.

In addition to arrowheads, several types of close combat weapons were also recovered. First, I will discuss sheath fittings for peasant knives (*messers*), which can be considered bladed weapons.

Knife sheath fittings

In the literature, knives are classified as weapons or tools of utility depending on the length of the blade. In practice, of course, they could have several functions, regardless of their size (Ruttkay 1976, 295). However, according to some researchers, even large knives could only be considered weapons if they were accompanied by a sheath that allowed them to be attached to the belt (Rusu 2005, 15). The remains of the mounts of sheath can be interpreted using archaeological methodology. Among the finds from Abaújvár there are numerous knives, but none were especially large specimens that could be considered weapons. Nevertheless, three sheath mounts were found: one from the upper layer of the rampart *(Fig. 7.1)* and two more, isolated finds from the cemetery area *(Fig. 7.2–3)*.

Early research suggested that peasant knives emerged first in Italy and France as an accessory of burghers and peasants in the fourteenth century. In Hungary, they only became commonplace in the early fifteenth century, introduced by the Slavs during the Hussite Wars (Kalmár 1971, 117–118). Although earlier examples dating from the second half of the twelfth century to the early thirteenth have been recovered (Ruttkay 1976, 295–296), this type of weapon was long considered late medieval. However, a systematic collection of Transylvanian artefacts has shown that the use of combat knives became more common in Transylvania in the thirteenth century and spread in quantity in the early fourteenth century (Rusu 2005, 20-21). The first Hungarian sheath mount came to light in the settlement of Muhi (Éri–Bálint 1959, 39, XXI, table 9; Michnai 1982, 133, ill. 8.17), but afterward, various sheath fittings were discovered more

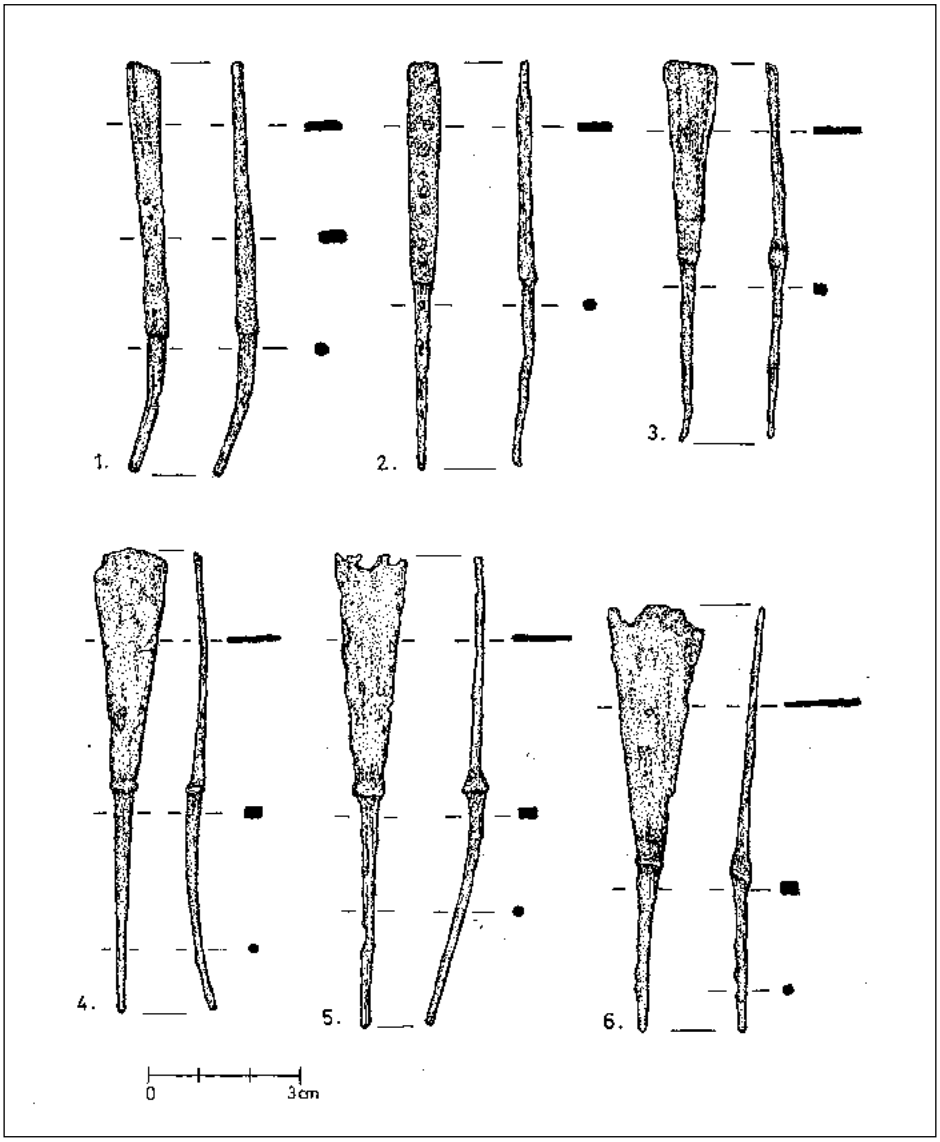

Fig. 6. *Arrowheads from the cemetery around the church: 1-5; from the area of the settlement: 6. Drawn by Mrs András Sáfrány.*

often during castle excavations (Including but not limited to: Hubafalva (Hubina, Slovakia): Ruttkay 1976, 295–296, fig. 34.2; Abaújvár: Gádor–Nováki 1980, 74, table VI.13; Kács: Parádi 1982, 12, ill. 12.5; Ipolydamásd-Zúvár: Miklós 1989, 9, ill. 7.2; Miklós 1997, ill. 4; Ipolydamásd-Damásd Castle: Miklós 1989, ill. 16.7; Miklós 1997, ill. 12.2; Vágsziklás (Skalka nad Váhom- Chochel, Slovakia): Hanuliak 2001, 339, obr. 9.2; Feketehalom (Codlea, Romania): Rusu 2005, 15, ill. 3.a, ill. 4.a–d; Doboka (Dăbâca, Romania): Rusu 2005, 15, ill. 3.b–d, ill. 4.p–r.). More recent excavations have yielded specimens from settlements such as Hejőkeresztúr (Wolf 2022, 64-65), Szank (Sz. Wilhelm 2014, 84, 89, ill. 11.4), and Kána (here in greater numbers: Terei–Horvát 2007, 163–166), and also in the medieval town of Pest (P. Horváth 2018, 265, ill. 14.1.), and Sajólád-Kemej (Wolf 1988, 194, ill. 8.6.) I previously identified this find as the sheath for a ninth-century knife. However, the majority of the artefacts found at this site, in the same feature where this knife was found, date to the twelfth–thirteenth centuries. Moreover, the closest analogies were found at Muhi and Feketehalm (Codlea, Romania). (Éri–Bálint 1959, table XXI. 9; Rusu 2005, ill. 4) I should also add that those Baltic fitted knives and their blade protectors that have been published are completely different from the Árpád period specimens and so far are known only from the Transdanubian region. (Szőke 1994, 260-261, ill. 9, ill. 2, ill. 11, ill. 7. With earlier literature). These results have led me to believe the Kemej artefact can safely be classified in the group of sheaths found in Árpád-period settlements. This clearly shows that peasant knives were not only used by the military populations living in the castles, but were also widely used as tools of self-defence by the civilian inhabitants, whose need for security and protection played a role in the development of this knife type. This is demonstrated well by the sheath frame remains found on Szarvas Hill in Vác, in a place where people took shelter against the invading Mongols (Mag–Rácz 2021, 66, ill. 14-15).

The above examples show that in the thirteenth century, the peasant knife was used not only in Transylvania but also in many other areas of the Kingdom of Hungary. Thus, the hypotheses that these knives were introduced by the

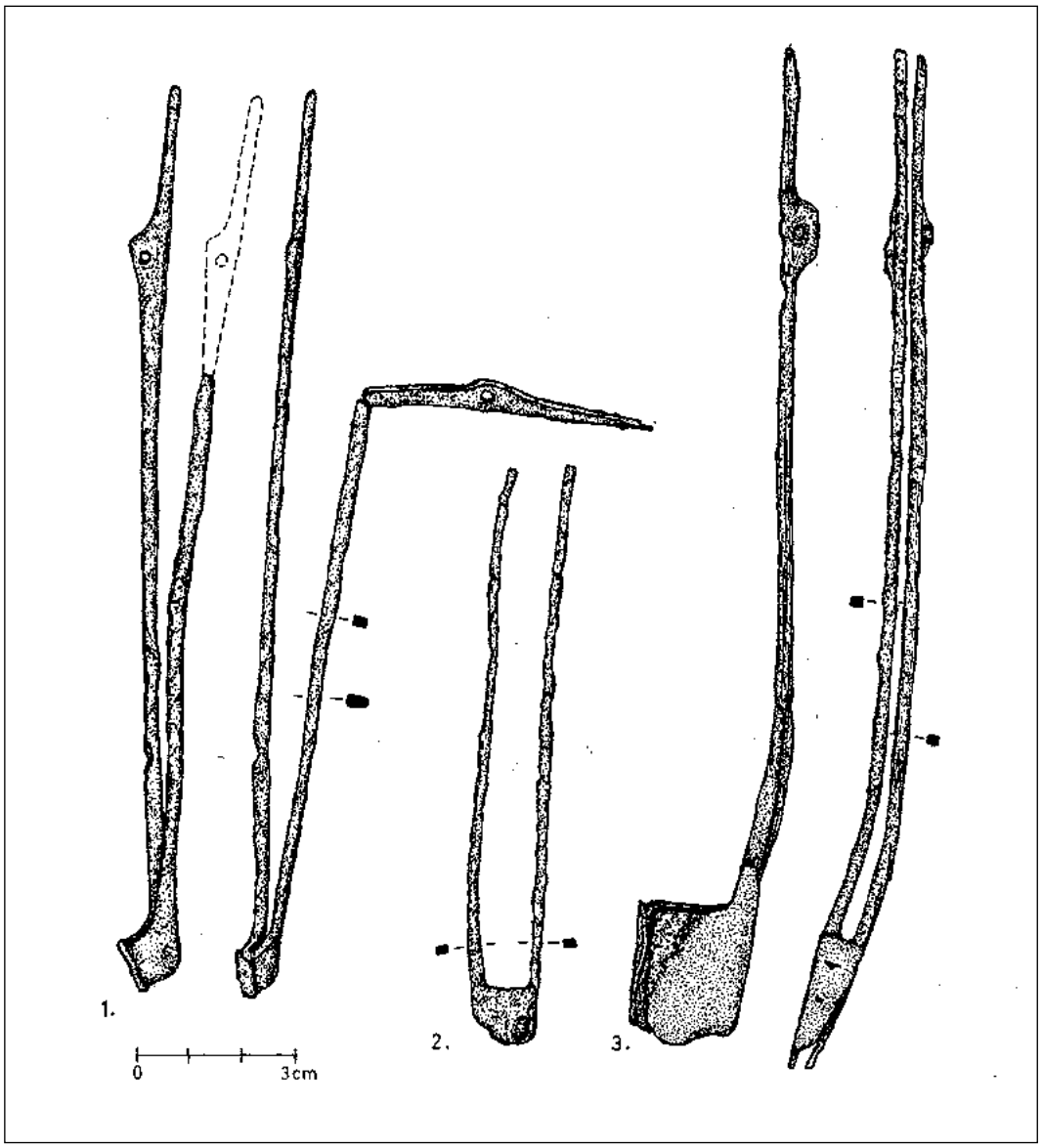

Fig. 7. *Sheath frames: 1. From the upper layer of the rampart; 2-3: from the cemetery around the church. Drawn by Mrs András Sáfrány.*

Slavs or arrived in the region later, in the fifteenth century, have not stood the test of time. Opinions are divided on whether this knife type originated in the West, East, or North (Kalmár 1971, 117–118; Ruttkay 1976, 296; Rusu 2005, 20–21). Unfortunately, the sheath fitting from Muhi, the only to be discovered in a grave, provides no help in answering this question. In fact, it does not even tell us with any certainty for which side its wearer fought for in the Battle of Muhi on April 11-12, 1241 (Pusztai 2014, 144, 145, ill. 1). In Abaújvár, however, it seems more likely that the owners of the peasant knives were among the defenders of the fortification. The fact that some of the defenders of the castle were armed with peasant knives may reinforce the idea that some of the serfs who were forced to serve the castle were not engaged in productive work but were part of the warring factions (Zsoldos 1991, 47–49).

Spearheads

The two spearheads, one of which was found in the cemetery area and the other on the western side of the castle, immediately by the foot of the rampart, are also instruments intended for close combat. The first find is a large, narrow, bladed specimen with a rhombus-shaped cross section. Its total length is 47 cm, the length of its blade is 27 cm, the width is 2 cm, and the width at the tip is 1 cm. A neck, also with a hexagonal cross section, was fashioned between the blade and the socket. A rectangular hole used for attaching the spearhead to the shaft was placed in the front side of the socket *(Fig. 4.1)*. The other specimen is much smaller and also has a narrow blade. Its total length is 23.5 cm, while the blade measures 18 cm in length. Its width is 1.4 cm, narrowing to 0.4 cm at the tip. Its cross section above the socket is round, although at the tip it is lenticular. The socket is 5.5 cm long and 3 cm wide, its cross section is circular, and its thickness is 2 mm. On the inside of the socket, affixed to the wall is a smaller nail used to attach the spearhead to the shaft *(Fig. 4.2)*.

In Kirpichnikov's classification system, the two specimens both belong to type V, the narrowest type of spear, called a pike. Initially the typical weapon of nomadic warriors in Asia, pikes were later adopted in some European countries (the Kievan Rus, Bulgaria, and Hungary) bordering on the steppe and thus in contact with its people. Therefore, pikes from the tenth century and onwards cannot be labelled as typical nomadic weapons. In the pre-Mongol period, the pike developed into a perfect form that remained unchanged until the end of the Middle Ages. The blade is narrow (up to 1 cm), widening slightly towards the socket (up to 3.5 cm), and the neck, on rare occasions, thickens all the way around. The pike was designed primarily to effectively pierce metal armour. In the twelfth and thirteenth centuries, this was the most common of all spearhead shapes, and was still used in nearly this same form in the seventeenth century as well. The cross section of the blade was almost always a rhombus or a square and less often took the form of an equal-armed cross (Кирпичников 1966, II, 15–17, tabl. IV.10–13 and IX.7–13). In Hungary, the spear blades from Bezdéd and Majs are similar to the specimens from Abaújvár. Analogies to the socket of the larger spearhead, with its hexagonal cross section, were found on the Törtel-Demeter farm (one specimen, Kovács 1970, 94, ill. 6.3) and among the iron tool finds from Debrecen (Kiss 1962, 32, fig. 3.2–3). Aside from the hexagonal socket, they are very similar in size and form to the objects found in the first house in the Hajdúböszörmény-Téglagyár site (Szabó 2003, 83–84, table VIII.3–4; Rózsa 2022, 427, 23.18). Bezdéd, Majs, and Törtel spearheads can be dated to the tenth century. The finds indicate that the conquering Hungarians brought this type of weapon with them to their new homeland (Kovács 1970, 82, fig. 5.3, fig. 6.1; Kovács 1986, ill. 9). Several specimens of this type from today's Slovakia (Ruttkay 1976, 302–303, fig. 36b) and the region of Poland (Nadolski 1954, I, types: 53-54, tabl. XIX.1, 5) can be dated to the tenth and eleventh centuries. Similar objects were recovered from the fortress near the village of Okorsh in north-eastern Bulgaria, and these too can be dated to the tenth century (Атанасов–Йотов 2023, 208, obr. 27). The Abaújvár spearheads, however, cannot be dated to the tenth century, since the castle was only built in the first half of the eleventh century. The date of origin of the Debrecen spearheads is uncertain since the iron tools with which they were discovered may have been made in the late Árpád period, and therefore the spearheads too are most likely from this period (Müller 1975, 89). The pieces from Hajdúböszörmény have been dated to the twelfth-thirteenth centuries, based mainly on the spur found with them. In Ruttkay's classification, the pikes are type VI, with a pointy edge, and a blade with a square or rhombus cross section, in several varieties. Ruttkay considered this type to be of Eastern European origin and widely distributed. However, he believed other populations comming from the Eastern European steppes in the eleventh through the thirteenth centuries, and not just the conquering Hungarians, could have introduced these pikes into the Carpathian Basin (Ruttkay 1976, 302–303, fig. 36b). The smaller pikes can be classified as type I in the Fedorov-Davidov system (Федоров-Давыдов 1966, 24, ris. 3. 5) and type 4 of group I in the Hudyakov system. A specimen of this type was also found in Karakorum (Худяков 1991 134, ris. 74.2, 9). Therefore, it is possible that the smaller pike dates to the period of the Mongol invasion and belonged to one of the Mongol warriors attacking the castle of Abaújvár. Based on the archaeological artefacts, however, stabbing weapons were not prevalent among the Mongol combatants. Of the extremely small number of late nomadic pole arms known from Eastern Europe and Inner Asia, most were stabbing weapons. They usually had narrow blades and the cross-section of the blade was square or rhombus-shaped, with a tip suitable for stabbing, and thus could only be used for frontal attacks (Худяков 1991, 134–135; Csiky 2015, 31–32; Csiky 2022, 66). An exact analogy to the larger pike from Abaújvár has not yet been found. The date of fabrication of this larger pike can only be assigned to a broad period between the eleventh and the thirteenth centuries. However, as it was found in the cemetery around the church, where some of the arrowheads and two of the iron sheath mounts were found, this object might be linked to the Mongol siege of Abaújvár. As faras is known at present, pikes continued to be used during the Árpád period. It seems that even in the thirteenth century, the Hungarians preferred these spears, which had a shaft equal to the height of a man and could be used for both stabbing and throwing (Kovács 1986, 260–261). Battles with spears were mentioned several times in thirteenth-century written sources, in royal letters of donation. However, in every case, these records refer to men of the highest social status who fought as knights (Borossy 1962, 160–163). It is possible, therefore, that not only the larger pike, but both weapons were used by the defenders of the castle.

Maces

The two mace heads, also unearthed on the western side of the castle, are likewise instruments of close combat. The first iron mace head, in the shape of a sphere or barrel, was found near the rampart. It has a double conical shape and measures 5 cm in height and 5 cm in diameter, with a cylindrical hole measuring 1.9 cm in diameter for the shaft. One end of the mace head is cut straight, and the other is worn into a slightly concave shape. The outer surface is uneven, dotted with smaller protrusions (bumps) *(Fig. 4.7)*. Spherical or barrel-shaped maces belong to type V in Kirpichnikov's system. They are mostly made of iron and less frequently of bronze. Kirpichnikov considers their precursor the smooth-surfaced clay mace found in Sarkel in the eleventh-century Slavic level. However, the vast majority of these metal objects dates to the twelfth century or first half of the thirteenth century (Кирпичников 1966, II, 54 tabl. XXV.5, XXX). Specimens found in eastern Prussia, Sweden, and Gotland also date to this period. Similar artefacts have been found in Bulgaria, but without a more precise date for their manufacture as weel as in Romania from the settlement of Bisericuta-Garván, dated to the eleventh and twelfth centuries. It is highly likely that these maces appeared together with star-shaped mace heads (Kovács 1971, 178-179, fig. I.5). More recent finds also include early specimens from Bulgaria, Poland, and Prussia, dating to the eleventh century. In various churches in Chios and Crete, some eleventh-century wall paintings depict spherical maces, as do several pictorial sources dating to the second half of the twelfth century (D'Amato 2011, 32-33; fig 3; fig 13. With further literature). Among Hungarian finds, the spherical or barrel-shaped mace head is rare. One of the oldest finds was recovered on the border of Endrőd, along the Hármas-Körös River, and is dated to the twelfth or the first half of the thirteenth century (Kovács 1971, 179, note 60). Another specimen was also found in Békés County, in the Gyomaendrőd-Kápolna mound (Endrőd site 6). It was recovered from the rubble layer of the church and probably dates to the twelfth or first half of the thirteenth century (Jankovich B. 2013, 30, note 34; 42, note 111; 225, note 1447; 281, table 47.5). Another early specimen, although we have no information on its exact dating, is the spherical mace head unearthed during the 1934 excavation of the ruined market town of Muhi (Éri–Bálint 1959, 33, table XXI.2). A smaller mace head with a flat surface comes from the village of Kána and dates to the early twelfth or thirteenth centuries (Terei–Horváth 2007, 162, ill. 13.6). Two iron specimens were also found in Cegléd-Madarászhalom. One is a double cone shaped object with a smooth surface, clearly linked to the Mongol invasion (Topál 1972, 90, object 30, table VI.7), while the other is larger with protrusions (bumps) on its outer surface, dated to the twelfth or early thirteenth century (Gulyás 2007, 52). The spherical, iron mace head with bumps found on the outskirts of Baraca (Barca, Slovakia) may date to an earlier period given the ceramic remains found with it (B. Kovács 1980, 18).

The other, a cylindrical, six-flanged iron mace head was also discovered on the western side of the castle, immediately at the foot of the rampart. It measures 7 cm in length and 3.6 cm in width. Its top and bottom are rounded, and the bottom has an oval, 1-cm-deep socket with a diameter of 24 mm. The six flanges, the "feathers" of the mace head, create a star shape. The flanges are 6 mm wide and protrude 6 mm from the body of the weapon. A fragment of a nail was found among wood remains inside the mace head, *(Fig. 4.8, Fig. 8)*. Similar mace heads have thus far been rare among artefacts from Hungary although recently their numbers have increased. They still cannot be considered common however. An iron mace head of this kind was found alongside a warrior buried on the edge of the destroyed market town of Muhi (Pusztai 2014, 142–144, ill. 4.8). Others were recovered from Dunaföldvár-Lóhegy (Boldog 2012, 181–196; Szilágyi–Serlegi 2014, 133–134), the field margin between Szekszárd-Füstöstó dűlő (K. Németh 2025, 172, Fig. 2), Szank (p.c. by Szabolcs Rosta), Tázlár (Gallina *et al.* 2024, 28-29, 7. Fig. 3), the castle of Eger, and the area of Szécsény (Kovács S. 2016a, 100–101, ill. 3-4; Kovács S. 2019, 10–11, ill. 07). A bronze specimen, on the other hand, was found in Bugac-Pétermonostora (Rosta 2023, 86, table 5.c). The Armoury of the Hungarian National Museum also contains one cast from bronze, but without any indication of where it was found (Kovács S. 2016, 41, ill. 06; Kovács S. 2016a, 100, ill. 2). Domestic cylindrical mace heads from Hungary come from sites linked to the Mongol invasion, except for one of unknown origin in the Hungarian National Museum and another from the unspecified "Szécsény area". Similar mace heads from the thirteenth and fourteenth centuries are also known from the Volga region of the Golden Horde. Despite this evidence, however, some researchers believe this type of mace head cannot be linked to the Mongols but could only have been imported (Świętosławski 1999, 56, XVI.1; Boldog 2012, 183). Nevertheless, contemporary accounts mention the mace being among the equipment of the Mongol army. No information about its form, however. Miniatures show that the court of Ilkanida in Iran in the fourteenth century used a cylindrical mace following the Mongol conquest. It was depicted in battle scenes and in court ceremonies, serving as both a weapon and an insignia, in the early fourteenth century (Boldog 2012, 186–187).

The mace is a weapon of Eastern origin and may have arrived in Western Europe in the eleventh century. The first European depiction of it appears in the Bayeux tapestry, embroidered in the 1070s (Kalmár 1964, 34; Kalmár 1971, 20; Kovács 1971, 168; Kovács S. 2010, 172; D'Amato 2011, 8–9). Earlier research dated the spread of the weapon to the thirteenth century and linked it to the Cumans (Kalmár 1964, 33; Kalmár 1971, 20); however, very early on it was suggested that the Hungarians may have encountered it in their contacts with the Pechenegs or other nomadic peoples arriving in the Carpathian Basin (Kovács 1971, 180; Ruttkay 1976, 317). Current research holds that maces appeared in the Kingdom of Hungary with the Pechenegs, which both isolated finds and linguistic data confirm. However, this type of weapon was not used by the Hungarian heavy cavalry until at least the end of the twelfth century. This is underscored by the fact that maces were first depicted in Hungary in 1239, appearing on the equestrian seal of Apaj of the Gutkeled kindred, Ban of Slavonia (Kovács S. 2019, 9–10; Tatár 2004, 172). For a long time, it seemed obvious that the Hungarians had adopted the mace from the people of the Steppe. More recently, however, it has been suggested that the Hungarians were introduced to this weapon type through contact with the Byzantines (Kovács S. 2019, 9–10).

As discussed above, the Abaújvár cylindrical mace has few analogies from Hungary, but numerous similar specimens were found in the Near East, Anatolia, and Iran, where several depictions are also known. This type of mace has been found among the weaponry of the Byzantine army

and in the Muslim world, especially where the influence of the Seljuk Turks was strongest, and depictions can be seen in frescoes from the territory of the Byzantine Empire and on contemporary Muslim coins (D'Amato 2011, 29; Boldog 2012, 183; Kovács S. 2016a, 99-100; Kovács S. 2019, 10-11). Cylindrical mace heads appeared in the second half of the twelfth century and became more widespread in the thirteenth century. They are considered the forerunners of the "feathered" (flanged) maces widely used from the fourteenth century onwards (Kalmár 1964, 32-33; Кирпичников 1966, II. 54; D' Amato 2011, 29; Boldog 2012, 183-184; Kovács S. 2019). While earlier research held that feathered maces originated in the West and spread eastwards, more recent research indicates the opposite is true. Instead, the weapon is of Eastern origin and spread to Eastern Europe in the thirteenth century and then onwards to the West. The flanged mace head used in the West was certainly based on Byzantine or Islamic prototypes, and the most likely place of origin is Iran (Kalmár 1971, 19; D'Amato 2011, 29).

Fig. 8. *Cylinder-shaped mace head from the western side of the castle, near the rampart. Photo by Gábor Bakos.*

The cylindrical mace heads found thus far in Hungary are clearly linked to the Mongol invasion. Some researchers, however, are not convinced these specimens were used by the Mongols. Instead, classifying them as a mace type used in the Holy Land, they have suggested they were brought to Hungary by crusaders, like Andrew II (1205–1235) or members of Christian military orders with property in Hungary. Another proposal is that merchants or their escorts might have used these weapons (Boldog 2012, 192; Kovács S. 2016a, 100; Kovács S. 2019, 10–11). I am doubtful, though, that these mace heads arrived in Hungary directly from the Holy Land. After all, during the period between Andrew II's crusade to the Holy Land (1218) and the Mongol invasion (1241–42), the people who used these instruments as personal weapons would likely have died, and the mace heads lost or destroyed. The strongest counterevidence, however, is the fact that all the mace heads were recovered from sites attacked by the Mongols. The more territory the Mongols conquered, the more varied their military equipment became, since they would use the various tools and weapons of the lands and peoples they subjugated (Boldog 2012, 186). Cylindrical mace heads were already common in Eastern Europe in the thirteenth century (D'Amato 2011, 29). It is conceivable then, especially in light of later developments, that the cylindrical mace heads discovered were introduced by the Mongols.

The assemblage of iron tools found on the rampart of the county seat of Abaújvár is extremely important in the castle's history during the period of the Mongol invasion. A spade shoe, two sickles, and a grape pruning knife were found underneath the upper row of beams in the rampart (Gádor–Nováki 1976, 40–44).

Even more significant, however, was a mixed hoard comprising coins, jewellery, and a remnant of textile woven with gilt silver thread. It was possible to determine precisely when it was hidden. The gold and silver rings, earrings, beads, buckles, and more than eight hundred coins clearly place the Abaújvár find in the horizon of treasures hidden during the Mongol invasion (Bakos *et al.* 2020, 54–58). Although the assemblage of iron tools can be dated to the twelfth and thirteenth centuries, they were hidden in a way similar to the hoard; thus, presumably their owners also aimed to save them during the Mongol invasion.

The finds and features discovered at the Abaújvár site, therefore, indicate the county castle was attacked by the Mongols. The apparent absence of a destruction layer, however, shows the castle escaped capture. Nevertheless, the structure must have suffered some damage because Béla IV (1235–1270) considered it important to donate land to maintain it in 1251 (Györffy 1987, 58, 62; Wenzel 1873, XI, 353–354). The rebuilding of the church in the second half of the thirteenth century, as mentioned above, also indicates the Mongols inflicted damage. The treasures that remained hidden, which the owners were unable to recover, and the large number of scattered weapons and other finds of great value in that period seem to bolster the notion that the castle was abandoned for a while by its defenders and

inhabitants. This is contradicted, however, by the letter of 1242 that names Abaújvár as a possible centre of resistance against the Mongols. These contradictions await resolution. For the time being, it is certain that – despite our previous knowledge – the county seat of Abaújvár played a significant defensive role during the Mongol invasion.

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Topographic Research in Nógrád County in the Footsteps of Katalin Simán

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Abstract: *The appointment of Katalin Simán as director of the museum in Szécsény in 1992, along with her notable professional expertise and keen interest in the Palaeolithic period, significantly changed the course of prehistoric research in the Cserhát region. The most remarkable outcomes of her topographical collection are the Palaeolithic sites in the Ipoly Valley around Hont and their "rediscovery." Her research repeatedly highlighted the importance of authentic site reconnaissance work as well as it contributed to a deeper understanding of the area's Palaeolithic history. In our paper, we present a summary of Katalin Simán's topographical investigations and findings in Nógrád County, shedding light, not only on Palaeolithic sites, but also providing an overview of ongoing research efforts following in her footsteps.*

Keywords: *topographic research, Northern Hungary, Palaeolithic sites*

1. Introduction

In the 1950s, the topographic method of archaeological investigation in Nógrád County commenced with the appointment of Pál Patay as the first full-time archaeologist-curator at the Palóc Museum in Balassagyarmat. Patay advocated for systematically collecting archaeological artefacts from each municipality in the county, whenever feasible, along with documenting the site locations (Patay 2013). He devoted significant effort to visiting the various villages in the county in order to compile the topographic archaeological record. Following Patay's departure from the museum in 1956, this research approach was halted until the latter half of the 1960s, when it was briefly reinstated as part of the fieldwork carried out for Katalin Hegedűs' master's thesis (Hegedűs 1967).

The appointment of Katalin Simán as director of the museum in Szécsény in 1992, along with her notable professional expertise and keen interest in the Palaeolithic period, brought about a significant transformation in the field. A noteworthy impact was made through systematic site surveys conducted during the reassessment of known Palaeolithic sites in the county, particularly in the Ipoly Valley encompassing Parassa and Hont. Additionally, her collaboration with László Tóth, an agronomist from Pásztó, who had extensively surveyed and gathered data from the southern regions of Nógrád county starting in 1988, led to the identification of numerous prehistoric sites, including those of Palaeolithic origin. In our paper, we present a summary of Katalin Simán's topographical investigations and findings in Nógrád county, shedding light not only on Palaeolithic sites, but also providing an overview of ongoing research efforts following in her footsteps.

1.1. The state of topographical research until 1993

Established in 1973, the Ferenc Kubinyi Museum (today: Forgách-Lipthay Castlemuseum) in Szécsény ushered in a new era of archaeological activity in the region by providing the necessary resources and expertise for specialized museology. The entire archaeological collection was transferred to Szécsény, along with the previous associated documentations housed in the auxiliary collections of the Palóc Museum. This consolidation of archaeological efforts under one roof was a distinctive feature of the Nógrád County Museum Organisation, marking a departure from the norm in Hungary until 2013. Over the course of 40 years, the museum's role as a central hub for county archaeology revealed both its strengths and limitations. Downsides were mainly related to the economic reliance on the central authority, infrastructural deficiencies, and cumbersome bureaucratic processes. On the other hand, benefits stemmed from the resources embedded in the professional work organisation, the centralized auxiliary collection and library services. The established system operated in a stable and, despite the constraints imposed by late-state socialism, predictable albeit suboptimal manner for almost two decades, until the period following the societal shifts of the early 1990s. Archaeological field activities encompassed not only rescue excavations and documentation of find discoveries but also included the opportunity for multi-year planned excavations (e.g. Buják–Tarisznyapart (Tárnoki 2010), Szécsény–Ültetéstető (Soós 1982). Due to staff turnover among archaeologists, along with a range of additional tasks arising from the scale and condition of the archaeological collection (such as uncatalogued artefacts, lack of documentation, limited financial resources for conservation, etc.), as well as other key museum-related responsibilities of the era (such as an overwhelming focus on public cultural initiatives), the county's archaeological topographical research has been deprioritized. While certain focused data collection initiatives pertaining to particular historical epochs within limited geographic scopes were undertaken (e.g., the medieval topography of Szécsény (Majcher Tamás: Szécsény középkori topográfiája. Szakdolgozat. ELTE 1992),

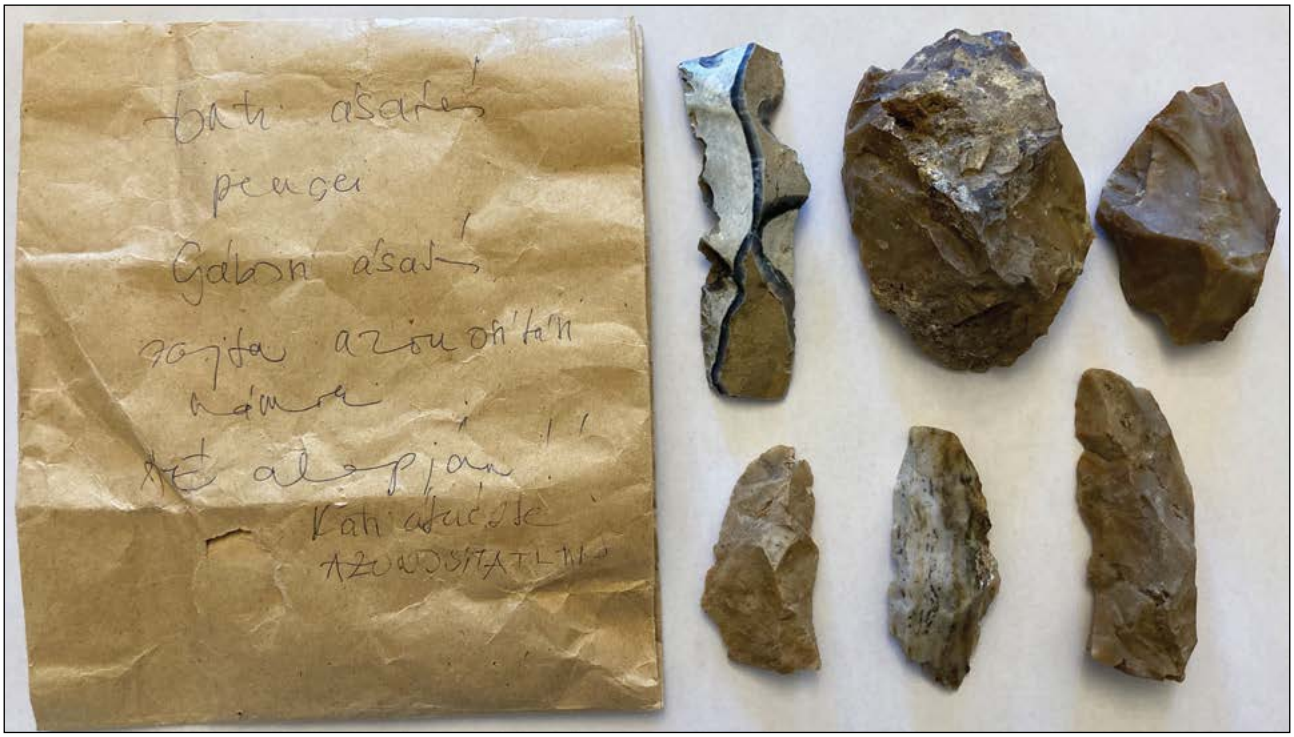

Fig. 1. *Identified stone ensemble from M. Gábori's excavation in Parassa.*

no systematic or thorough field surveys were executed. Recently, the ISzAP (Ipoly-Szécsény Archaeological Project) topographic research program launched in 2014 focuses on the cultural and trade connections of the first agricultural communities that settled the Szécsény basin in the Ipoly Valley *(Fig. 4)* (Guba *et al.* 2016).

1.2. Katalin Simán's topographical research in the Ipoly River Valley

One of the significant Palaeolithic research sites in Hungary lies within the region encompassed by the settlements of Ipolyság, Hont, and Parassa in the north-western part of Nógrád County. In 1913, István Majer made the first discoveries of obsidian and limnoquartzite flakes in the garden of the railway restaurant located in Ipolyság/Šahy (now Slovakia) (Majer 1920*;* for a detailed summary of research history, see T. Dobosi–Simán 2000; Zandler 2010, 23.). However, for approximately four decades following this discovery, there was no further investigation undertaken concerning these finds or the sites in the surrounding area. It was not until after the Second World War that Pál Patay identified certain Palaeolithic sites (Patay 1954), leading to the commencement of extensive field survey work by Miklós Gábori (Gábori 1957) and Veronika Gáboriné (Mrs. Gábor) Csánk (Gábori 1958) along the Hungarian side of the border. Their survey primarily concentrated on the terraces of the Ipoly River, resulting in the identification of numerous Palaeolithic sites. During the 1950s and again in 1969, smaller planned excavations were conducted at various locations such as Hont-Templomdomb (Gábori 1956; Zandler 2011) and Hont–Csitár (Gábori 1964; Zandler 2010). Subsequently, some of the artefacts brought to light during excavations were added to the archaeological collection of the Hungarian National Museum, while a smaller portion was integrated into the Szécsény Museum's collections. Later, additional artifacts were discovered within the collections of the Budapest History Museum (*cf.*: Dobosi–Simán 2000, 223). Regrettably, a number of these finds have either gone missing or currently cannot be located *(Fig. 1)*. A small number of flakes were identified and inventoried during the revision of the archaeological collection at the Szécsény Museum conducted in 2023 (MNM FLKM Archaeological Registry 696.2023; Inv.no: 2023.46.1-6.). Moreover, artefacts were discerned, intermingled with material from other sites, during the review of the collections at the Hungarian National Museum (e.g., Zandler 2010). Beyond the loss of archaeological artefacts, parts of the excavation and field survey documentation are unavailable (Zandler 2010), hindering the accurate identification of these sites. In 1965, following the identification of a Palaeolithic site in Hont-Várhegy in conjunction with Katalin Hegedűs's thesis, two patinated flakes were discovered (Topographical catalog cards of Katalin Hegedűs's thesis. MNM FLKM Archaeological Registry 127/88). In 1966, together with the Gábori couple, they located the Hont-Csitár site (Hegedűs 1967). Despite these challenges, multiple publications have been devoted to these discoveries (Zandler 2010, 23), sparking an intense scientific discourse regarding their cultural categorization and dating (Simán 1993, 247–248). The findings from the field surveys and excavations were not fully disclosed at that time – and have not been published since then.

The significant progress made in the revision, processing, and evaluation of the prehistoric discoveries in Hont and its surrounding areas, as well as the verification of the sites, can largely be attributed to the archaeological endeavours of Katalin Simán in Nógrád county. It was not until nearly 40 years after the initial excavations and field surveys conducted by the Gábori couple in Hont that a comprehensive study encapsulating the prehistoric sites of the county was finally concluded in 1993. Subsequently, the reassessment of the artefacts stored in the archaeological collections of the Szécsény Museum and the Hungarian

Fig. 2. *Excavation view at the site Hont-Parassa III. – Orgonás.*

National Museum commenced (Simán 1993). From a museological perspective, one notable aspect is the inventory of previously unregistered artefacts stored in the collection of the Szécsény Museum, which were at that point already published by M. Gábori. In 1995, the stone tools showcased in the permanent exhibition of the Hungarian National Museum, sourced from Miklós Gábori's excavations in Hont, were inventoried upon their return to the archaeological collections of the Szécsény Museum. No written documentation regarding the transfer or loan of these artefacts was found. Additionally, the first field inspection occurred during this time. In April 1994, a successful attempt was made to investigate the Hont-Parassa III site. A collaborative survey was undertaken with the archaeologist, Sára Kató. At the Szécsény Museum, both the archaeological database and the museum archives lack precise records regarding the specific location and timing of the field survey. The archaeological inventory book contains details regarding the composition of the gathered artefacts, while the museum's annual work report briefly acknowledges the survey: "Field surveys were conducted in Ipolyvölgy". In their 2000 paper, V. T. Dobosi and K. Simán document the survey location for Hont-Parassa III as "the terrace above the stable," noting the discovery of Neolithic ceramic sherds. (T. Dobosi–Simán 2000, 323), while in November the fieldwork failed to identify the site at Hont–Templomdomb. Only one piece of a patinated flint stone flake was discovered according to the inventory book's notes. The discovery of new artefacts at the examined locations, along with favourable excavation conditions, paved the way for a systematic and planned research initiative in 1995, in collaboration with Viola T. Dobosi, chief of the Archaeological Collection at the Hungarian National Museum. Following an extensive topographical investigation conducted over several years, incorporating field surveys and excavations *(Fig. 2)*, the precise locations of numerous sites in the vicinity of Hont were successfully ascertained. Additionally, this undertaking resulted in the discovery of previously unidentified sites. Field surveys also involved the collection of raw material samples for the Lithotheca at the Hungarian National Museum. This process ultimately facilitated the identification of Gábori's Parassa III (Ipolyvölgy 6 - Orgonás) and Parassa II. Téglagyár (Ipolyvölgy 5), as well as the Parassa I. Ipolyság site (now Slovakia, Šahy – Ipolyvölgy 4) discovered by Majer (T. Dobosi–Simán 2000; 2003).

The inventory, processing *(Fig. 3)*, and partial publication of the discovered material were also undertaken. The excavation artefacts from Hont-Parassa III-Orgonás were incorporated into the collection of the Hungarian National Museum. Not only were Stone Age discoveries published, but also artefacts from other periods (Late Bronze Age) unearthed during the excavation. Additionally, materials gathered as stray finds between 1994 and 1995 were added to the archaeological collection of the Szécsény Museum. Katalin Simán placed particular emphasis on the inventory of these finds; however, only a limited number of tools were published. (Simán 1993). The finds were published by K. Zandler (Zandler 2011). Unfortunately, the artefacts from Parassa-Téglagyár are still missing. However, the identification of previously known sites within Hont's central parts, as well as on the periphery of the village,

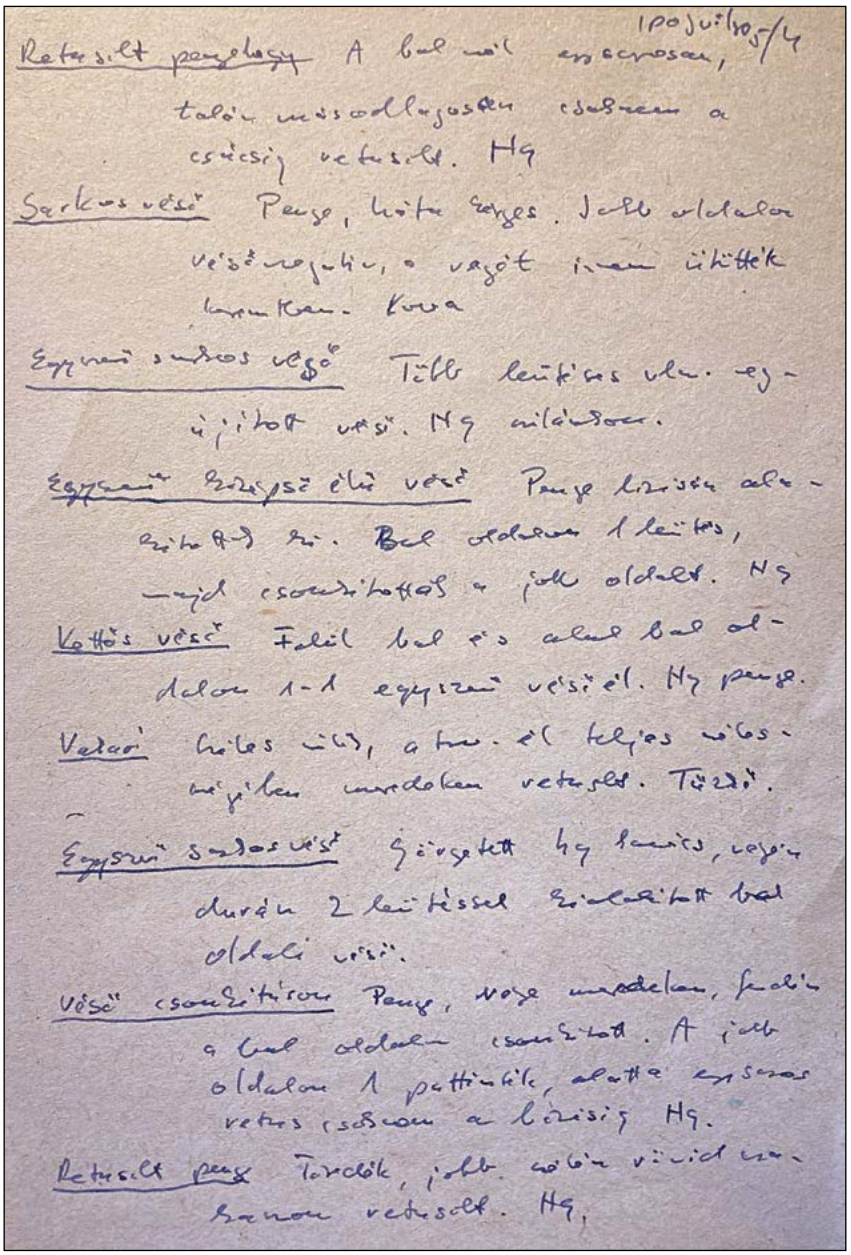

Fig. 3. *K. Simán's handwritten notes on the stone implements excavated in Hont-Parassa III. – Orgonás.*

along its southern border, proved unsuccessful. This failed attempt to locate these sites can be partly attributed to the departure of Katalin Simán from Nógrád County following the conclusion of her tenure as director in 1997.

However, the new research did not have to wait long. The Hont–Csitár and Hont–Babat sites were re-identified by András Markó (University of Szeged), Attila Péntek (independent researcher) and Krisztián Zandler (Ferenczy Museum Centre) in 2002, and the material from both sites was subsequently processed and published (Zandler 2010; 2012). The new wave of prehistoric research in Nógrád and partly in Pest County started with the systematic field surveys of A. Péntek in the Galga River Valley (Markó *et al.* 2002) joined by A. Markó and K. Zandler not only in the Cserhát mountains (Markó 2007; 2012; Zandler *et al.* 2021; 2023), but also in the Ipoly Valley region (Péntek 2014-2015; Péntek–Zandler 2016). Within the framework of this research, the systematic publication of the Palaeolithic finds in the collection of the Szécsény Museum has commenced. In 2011 due to pipeline construction activities small scale verification excavations were also conducted at the Hont–Templomdomb site, at Hont–Pázmány and Hont–Bánat streets and at the site of Hont–Kiskertes. The systematic field surveys of K. Zandler in the Ipoly Valley around Hont and Drégelypalánk yielded new Palaeolithic sites, as well as in the collection of new material from some known sites (Mordovin–Zandler 2018; Zandler 2018). Stratigraphic test excavations at Ipoly Valley 3 (Zandler–Péntek 2016), Drégelypalánk–Gyakorszer-dűlő (Markó *et al.* 2020) and Hont–Babat (Markó–Zandler 2021) did not yield any results.

More recently, K. Szegedi, T. Marton, and Gy. Lengyel have undertaken the re-evaluation and detailed analysis of the chipped stone finds from the 1955 excavation at Hont–Templomdomb (Szegedi *et al.* 2023).

Fig. 4. *Identified sites during the ISzaP topographic research with possible Palaeolithic sites (highlighted in red).*

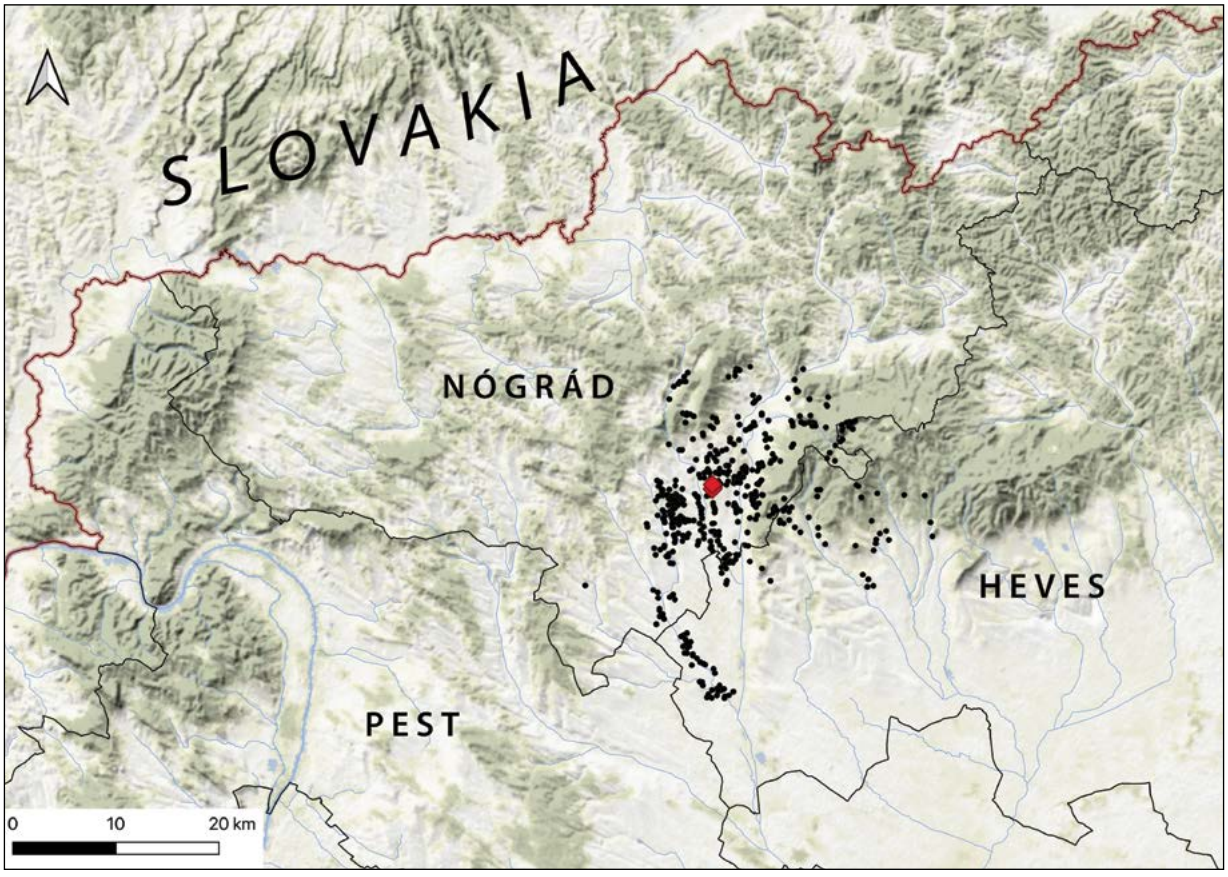

Fig. 5. *Prehistoric sites identified by László Tóth with possible Palaeolithic sites (highlighted in red).*

1.3. Prehistoric topographical research of Southern Nógrád

In parallel with the research on the Ipoly Valley sites, Katalin Simán also carried out topographical investigations in the southern part of the county, specifically in the Mátra and Cserhát forelands, primarily around Pásztó and Szurdokpüspöki. Some of this research was conducted with the assistance of László Tóth, an agronomist from Pásztó, who has been closely connected to the archaeological research of Nógrád and, to some extent, Heves County since the mid-1980s. Tóth's theoretical and field interest in archaeology significantly augmented the archaeological collection of the Szécsény Museum with thousands of objects. During his field trips, he registered nearly 150 archaeological sites *(Fig. 5)*. Between 1989 and 1994, he donated a small portion of his collection to the Szécsény Museum. There is no documentation regarding the accession of the artefacts to the museum, including the conditions and dates of their arrival, or the inventory process, in either the museum or the archaeological archive. The museum archive contains only a list of the locations where the received artefacts were found: "The archaeological site inventory of Pásztó and its vicinity, based on the field surveys conducted by agronomist László Tóth." (Archive documentation, KFM Archaeological Registry: 149.89. and KFM RA 222.94.) In 2020, due to his advanced age he decided to give away the remaining items also to a public collection, primarily to the Szécsény Museum (*Sz. Guba: Documentation regarding the accession of the archaeological collection of László Tóth into the museum's holdings. Archive documentation, MNM FLKM Archaeological Registry.*), and a smaller part to the István Dobó Castle Museum in Eger. Tóth began his collecting activities in the mid-1980s, mainly in areas cultivated by the state owned, farmers' co-operative in Pásztó, which was under his leadership. Administratively, this region is referred to as southern Nógrád, while geographically it encompasses the southern extension of Cserhát, the north-eastern forecourt of Mátra, and the Zagyva Valley. Field surveys conducted in 1985 by Viola T. Dobosi in the Zagyva Valley resulted in the discovery of artefacts from the Copper Age, Late Bronze Age, and Migration Period, which were subsequently brought to the Szécsény Museum. Unfortunately, beyond the entry of the objects in the inventory book, no data are available on the circumstances of their discovery, the purpose of the field surveys, or other archaeological observations. T. Dobosi primarily collected in areas that were later officially registered sites based on Tóth's data (e.g., Szurdokpüspöki-Szivattyúház).

The placement and inventory of the artefacts collected by László Tóth fortunately coincided with the beginning of Katalin Simán's activities in Nógrád. Primarily based on stone tools, she identified several sites that she tentatively classified as Palaeolithic (e.g., Jobbágyi-Hársas, Szurdokpüspöki–Derzsi). The Palaeolithic sites could not be located during Attila Péntek's field research in the early 2000s and not even since then. In her summary publication, she posited that the northern forecourt of the Mátra served as a significant traffic corridor, particularly in relation to the distribution of raw materials. She hypothesised that there could be several workshops similar to Derzsi in this area, thereby delineating potential directions for further research (Simán 1993, 249).

As a first step, field surveys were carried out in 1993 with the assistance of László Tóth and the archaeologist Sára Kató. Information about these visits is solely provided by the entries in the inventory book, which indicate that the Szurdokpüspöki area was primarily investigated (Kapuszer, Derzsi, Szélgát) and, contrary to expectations, finds from younger prehistoric (Neolithic, Bronze Age) periods were discovered. In 1994, László Tóth presented the museum with new stone tools from the Pásztó–Hasznos and Szurdokpüspöki–TSz-major sites, leading to further joint site visits. In 1995, Viola T. Dobosi participated in explorations at two potential locations in the vicinity of Pásztó. Unfortunately, the concise annual work report does not disclose the exact sites; however, according to the inventory book, Stone Age tools were found at Pásztó I and II, which were determined to be from periods later than the Palaeolithic era. Meanwhile, the commencement of research in the vicinity of Hont captured Katalin Simán's attention. Consequently, the promising efforts in southern Nógrád to identify additional Palaeolithic sites were not pursued further for nearly a decade. Mónika Gutay conducted field surveys for her MA thesis together with independent researcher, Gyula Kerékgyártó in 2005. (Gutay 2007). The prehistoric topographical research of the northern forecourt of Mátra was continued primarily by László Tóth and, to a lesser extent, by other amateur collectors: small collections were accessed from László Czinkóczi (local resident in Szurdoskpüspöki) and Ferenc Lendvai (local resident in Jobbágyi). However, with Katalin Simán's departure, the museum has lost interest in the work of the collector from Pásztó, and thus the verification of the 50 prehistoric sites discovered by him remained incomplete.

At the beginning of the 2000s Gábor Bácsmegi, a prehistoric archaeologist specialised in the Neolithic period started to work at the Szécsény Museum. Learning about the collector's prehistoric collection – which had grown considerably by then – G. Bácsmegi turned with fresh vigour to László Tóth's findings. During 2004–2005 G. Bácsmegi, N. Larsson and myself had several visits at his house to study some of the finest pieces of this collection. Some of the polished stone tools, clay figurines and ceramics were also handed over for the Neolithic exhibition at the museum in Szécsény. However, the entire collection remained in his possession without the (professional) archaeologists knowing about its extention. Due to a new cooperation G. Bácsmegi, Sz. Guba and N. Larsson conducted test excavations at the Copper Age Pásztó-Kurtavölgy site in 2005, while together with Tibor Marton (HUN-REN Budapest) and William Eichmann (University of Wisconsin) some suspected Mesolithic sites were also surveyed. Unfortunately, there were no further investigations until 2020 when László Tóth donated the rest of his collection to the Szécsény Museum and we faced for the first time its extensions. It counts over 800 unique finds, ca 10,000 ceramics and stone implements. Since then, the scientific processing of the finds had also begun, T. Marton is working with the chipped stone tools from the Neolithic sites, György Szakmány and colleagues (ELTE University Department of Petrology and Geochemistry) analyzed the polished stone tools, while A. Péntek, K. Zandler and A. Markó started to identify Palaeolithic assemblages within the significant amount of collected stone material.

Although we are only at the beginning of this work, we have already been able to point out the material of some sites that can be definitely defined as Palaeolithic. These fit well into the series of Cserhátalja sites investigated by A. Péntek, A. Markó and K. Zandler so far.

2. Summary

The most significant outcomes of Katalin Simán's topographical collection are the Palaeolithic sites in the Ipoly Valley around Hont and their "rediscovery." Her research enabled the authentication of open-air sites known since the 1950s, locating new sites, and contributed to a deeper understanding of the area's Palaeolithic history. Targeted field surveys and verification excavations not only allowed for the revision of finds from sites previously researched by M. Gábori and V. Csánk Gábori, but also laid the groundwork for a new, intensive research direction that extends into the early decades of the 21st century. Her research has repeatedly highlighted the importance of authentic site reconnaissance work. This is crucial not only because emerging methods, excavation protocols, natural science investigations (such as sedimentology (Markó 2007; 2012) and raw material determination (Markó–Kázmér 2004; Markó 2005; Péntek 2021) and the application of geospatial information systems (Zandler *et al.* 2023) can yield new directions and results, but also because the identification and legal protection of sites through registration require precise identification and validation of their extent. In this sense, following K. Simán's footsteps on basic topographic research will continue both at the western part of the Ipoly Valley *(*Markó–Zandler 2021, in the surroundings of Szécsény *(Fig. 4)* as well as at the Middle Ipoly Valley around Litke (Simán 1979). During 2023 Ferenc Cserpák, A. Péntek and K. Zandler tried to identify the site, but up till now without any success.

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Kati and the "Flint Mines"

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Abstract: *Apart from classical Palaeolithic studies based mainly on archaeological typology, Katalin Simán had a profound interest in various aspects of interdisciplinary (= archaeometrical) aspects of investigation of ancient heritage, including raw material studies. She personally conducted excavations on exploitation sites, took part on similar excavations as a staff member and contributed to the general knowledge on lithic raw materials by collecting reference samples.*

Keywords: *"flint mines", exploitation of raw material, lithic resources*

1. Introduction

Exploitation of (lithic) raw materials is one of the most ancient specialized crafts of humanity, at least the crafts that left recognizable traces in the archaeological cultural heritage. Lithic complexity varies, from hardly identifiable surface collection to pits, shafts and underground "labyrinths" as spectacularly summarized in Weisgerber 1980 Abb. 8-13 pp.35-40.

Due to the initiative of the Felder brothers from the Netherlands, miners by profession themselves, an international (basically European) interest arose in prehistoric mining, in the 1970s leading to a series of meetings, collaborative work and cataloguing of flint mines from all over Europe (published in Staringia 1976, 1979, Weisgerber 1980, *Fig. 1*).

From the beginning of the 'Lithic Ages' till approximately the Late Neolithic - as well as to some extent in the Copper and Early Bronze Ages - chipped stone tools made overwhelmingly of siliceous materials held great importance for prehistoric peoples. Acquiring siliceous materials for tools took several forms, from simple surface collecting to large-scale flint mining. In broad outlines the "evolution" of flint mining began with simple extraction pits while during the Late Neolithic, in some places sophisticated deep-worked mines with shafts, tunnels and galleries appeared. However, these mining methods may co-occur at some sites because they depended on the accessibility of the material (e.g. geological and geographical conditions) or on the planned use of the material. Naturally, mining techniques were influenced also by the quality of the flint - especially when prestige objects were made. In some cases cultural traditions also played a role in the choice of raw material.

Usually in earlier phases of the 'Lithic Ages' quality was less important while later mass production and trade - quite often long-distance trade - stimulated the development of mining. Hungarian prehistoric research played an important role in this work; starting in the 1920s with the study of Miskolc-Avas Hill, excavated and published by Jenő Hillebrand (Hillebrand 1928, 1929), and the flint-mine excavations of the 1960s (Sümeg, Tata: Fülöp 1973, 1976, 1984, other flint mines: Bácskay 1980, Bácskay *et al.* 1995). The last summary of "flint mining" in Hungary was published in 2012 (T. Biró 2012).

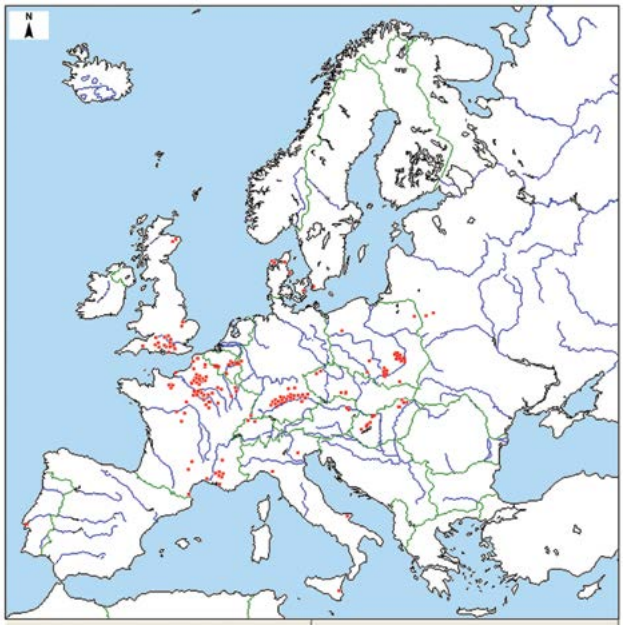

Fig. 1. *Flint mines in Europe, based on Flint Symposium data published in Weisgerber 1980 and Archeologia Polona vol. 33.*

2. "Flint mine" research by Katalin Simán

2.1 Excavations lead by Kati in HOM

When Katalin Simán worked in the Herman Ottó Museum in Miskolc she was deeply involved in their study of the Miskolc-Avas flint mine (Simán 1978, 1979, 1986a).

She carried out rescue excavations there and revised the material, results and observations from earlier excavations. In her work, she made the conditions at the mine clear which was not an easy task. The mined raw material at the site was hydroquartzite. She was able to distinguish four mining methods: pits (earliest phases), shafts, tunnels and galleries (later phases). Mining tools comprised large quartzite pebbles. It was very difficult to determine the age of mining activities there. The Avas mine functioned from the Late Neolithic, most probably also in the Middle Ages and in Modern Times as well when the extraction of this material for gun flints is documented.

Katalin Simán also described "primary working activity inside the shafts and secondary workshop traces on the surface around them (Simán 1979, 1995a). She fit the excavated flakes and identified the main product of the workshop, basically cores *(Fig. 2)*.

The other important exploitation region Kati excavated (years 1983-1985, 1992) was on the territory of the limnic quartzite deposits of the northwestern parts of the Tokaj Mountains, in the vicinity of the villages of Korlát and Arka (Simán 1986b, 1991, 1995b). This region also has a rich history of research for the Hungarian Palaeolithic and Neolithic (Patay 1937, Vértes 1964-65), where the role of the local raw material was of crucial importance. No specific mining features were found by Kati but the surface was covered everywhere by fabrication debris, flakes and cores, lying over the limnic quartzite beds. Kati separated two varieties of limnic quartzite here, basically on grounds of their respective quality. The main output of the workshop activity were pre-cores. Kati attributed most of them to the Upper Palaeolithic period, not excluding, however, earlier and later production activity (Simán 1995b).

2.2 Kati on other "flint mine" excavations

Apart from the excavations lead by Kati Simán personally, she took an active part in the study of prehistoric exploitation sites as an expert staff member on the excavation team. The investigation of the possibly largest mining field in Hungary, excavated between 1983 and 1985 and 1993 to 1995, respectively (T. Biró 1986, 1995, T. Biró–Regenye 1995) and its associated satellite workshop sites (Szentgál-Teleki dűlő, Ajka-Pálmajor, Városlőd-Tsz major) (T. Biró–Regenye 1991, Regenye 2011) also benefited from her – physical and mental – contributions. She was also a staff member on the excavation of the only known *flint* mine in the strict sense, *i.e.* yielding siliceous sediments formed from a relatively young and shallow water marine environment) at Nagytevel (2005-2008, T. Biró *et al.* 2010) and the preceding excavation of its, and so far, the only known associated workshop site, Kup-Egyes (excavated between 2000 and 2003, T. Biró–Regenye 2003, T. Biró *et al.* 2025).

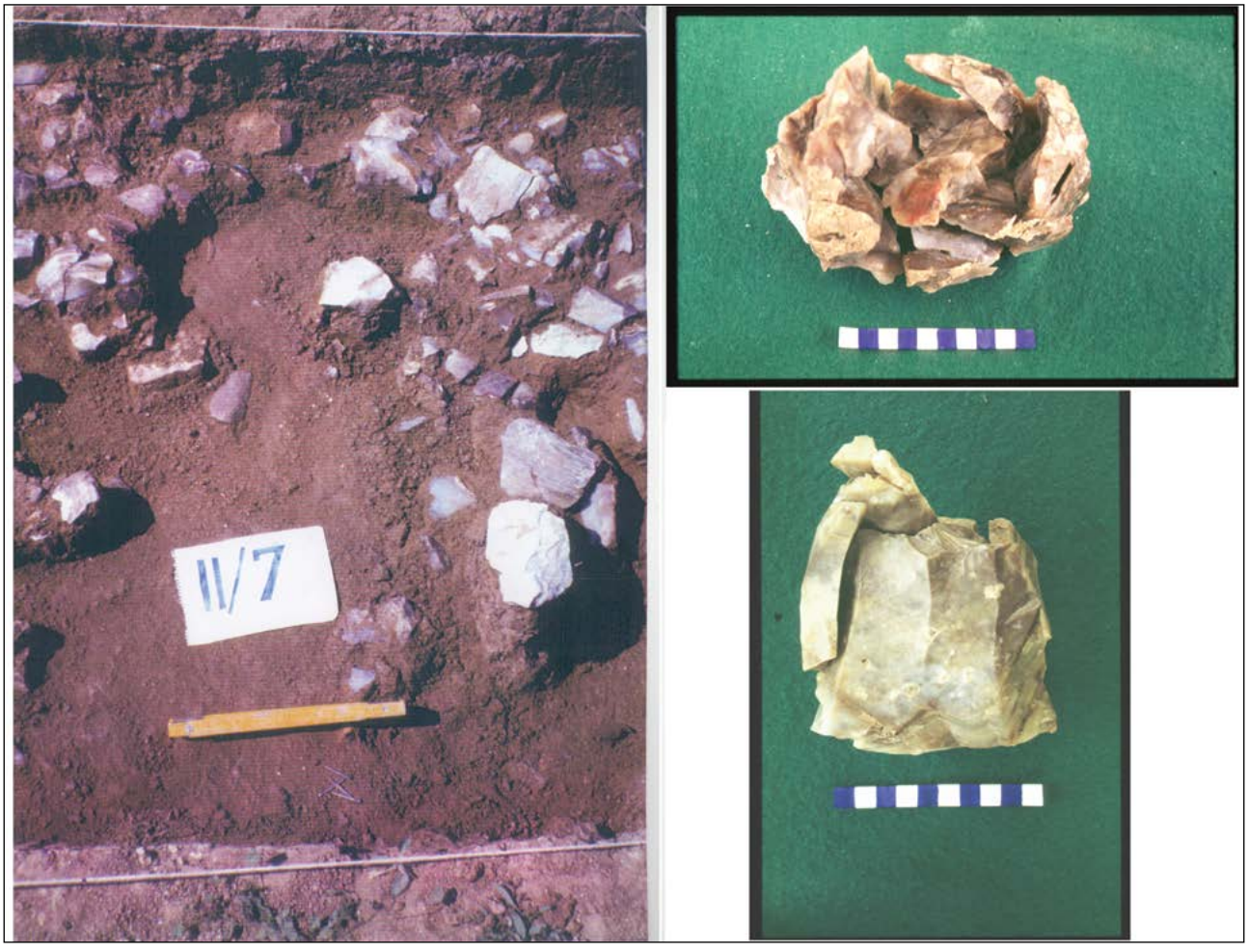

Fig. 2. *Miskolc -Avas, excavations by K. Simán. 2/a: Miskolc-Avas: position of the knapper indicated by the spatial distribution of rejected flakes; 2/b, 2/c: Refitted pre-cores from Miskolc-Avas. Photos by K. Simán.*

2.3 Collecting trips for raw material sources

Within the framework of the historical raw material research program of the Hungarian Geological Survey (Fülöp 1984), a systematic research on prehistoric lithic resources in Hungary was started in the 1980s. By 1986, the accumulated information was enough to initiate and organize an International Conference on the subject (T. Biró ed. 1986, 1987) and with the active help of participating colleagues, to lay the basis for a reference collection for prehistoric raw materials exploited in the territory of Hungary and the Carpathian Basin (T. Biró–Dobosi 1991, T. Biró *et al.* 2000). Kati Simán took part in the organisation of the meeting, the preparation of the conference excursions as well as collecting trips for lithic raw material sources. She was involved in several field surveys for the base collection (186 localities with 589 samples, SK contribution: 29 sites, 98 samples) and later on (ca. 2500 localities resulting in 6685 samples, SK contribution: 134 sites, 432 samples).

Fig. 3. *Kati Simán in the Tata Geologists Garden. Photo: E. Babinszki (3/1, 3/3, 3/4) and K. Simán (3/2).*

3. Finally

From 2015, she also regularly took part in new research (T. Biró *et al.* 2018) and regular maintenance work at Tata-Kálváriadomb, the only "flint mine" in Hungary that can be currently visited on a regular basis as part of the „Geologists' Garden" (Tóth 2018, url). She was part of the regular (and as always, voluntary) staff *(Fig. 3/1)* and made documentation photos *(Fig. 3/2)*, took an active part in the excavations *(Fig. 3/3)* and apart from the daily work of excavation and maintenance, made use of her exceptional talents as naturopathic doctor under the shade of a majestic linden tree, by the millstone table of Lajos Lóczy *(Fig. 3/4)*. Due to the extremely dry weather in 2022, the tree dried out and had to be cut down. And we will miss Kati, our friend and colleague, forever.

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Excavation of the Neolithic Site of Felsőörs–Bárókert, 2009
Preliminary assessment of the Neolithic settlement

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Abstract: *There is a prehistoric site in the southern parts of Felsőörs village that has been known since the end of the 19th century. It was excavated in 2009 by a team of volunteers, including Katalin Simán, a regular participant in our excavations - as guest, friend, team-mate and first-rate expert. A 20x20 m area was excavated here in the vicinity of a spring running close to the site. The area was unevenly covered by archaeological features that were much more densely located on the eastern side, with post holes indicating the presence of houses. There were archaeological phenomena assigned to three prehistoric chronological horizons, notably with finds of the Linearbandkeramik (LBK), the Lengyel culture and the Baden culture. The Neolithic finds were located mainly as overlapping features, the Copper Age phenomena were observed in separated position, restricted to the southern quarter of the site.*
This paper will present the observed Neolithic settlement features, with special emphasis on house floor plans. Remains of three LBK houses and a partly overlapping Lengyel building have been documented. Two chronological phases could be separated within the LBK features. The structural elements of the Lengyel house indicate LBK traditions. The Lengyel settlement features seem to form a cohesive unit with houses, associated pits and graves.

Keywords: *Neolithic, Balaton Uplands, settlement–excavation, house structures*

1. Introduction

The prehistoric site of Felsőörs has been known since the end of the 19th century (Regenye *et al.* 2009). Based on a surface find collection, the site was registered in 1965 as (Éri 1969, 91–92: Felsőörs–Tsz–major, topographic number MRT 2, 19/12; site ID 7908). The area was parcelled out and in 2008 the development of the plots started. A densely packed Neolithic and Copper Age site of about 200 x 150 m was revealed in the trenches laid down for a power line running around the plots. In the following years, due to construction work, research was carried out at different points on the site. The site was investigated by the Laczkó Dezső Museum, Veszprém.

The 2009 excavation is presented here, as it was carried out jointly by the authors and with the participation of Katalin Simán. Today, community archaeology is widespread; however, archaeological excavations involving volunteers are not without precedent. It was precisely Katalin Simán who made archaeological camps regular features during her days as a Miskolc museologist. Following in her footsteps, we organized our excavation camps in Veszprém county beginning in the 1980s to explore Tűzköves–hegy (hill) in Szentgál, then the flint deposit in Nagytevel and the workshop settlements around them. In 2009, we moved to Felsőörs from the Bakony Mountains, because excavation became necessary before construction began. Twenty–nine volunteers worked on the excavation in Felsőörs. Apart from Katalin Simán there were geologists, archaeological technicians, teachers and students. Kati (Katalin) had decided years earlier to pursue a career in archaeological translation instead of practicing archaeology, but the desire to excavate never dies out in an archaeologist and so, she also worked with us enthusiastically, apparently finding joy to unearth archaeological features *(Fig. 1)*. In addition, of course, we could also count on her as a professional consultant.

2. Location of the site *(fig. 2)*

Felsőörs is a village located in the Balaton Uplands (northern shoreline of the Lake Balaton), in Veszprém County, in Western Hungary, some 10 kms to the south of Veszprém and 5 kms to the north of Lake Balaton. The Balaton Uplands belong to the Balaton water catchment area. Partly for this reason, but also for others, the lake played a significant role in the development of the Neolithic settlement system from the earliest times. A peculiar situation has been created by the fact that, due to the geography of the lake, the Neolithic settlement developed differently on some sections of the northern lake shore. The region of Felsőörs, the eastern part of the Balaton Uplands, proved to be less suitable for Neolithic settlement than the western part. Nevertheless, the Felsőörs excavation has revealed a remarkable settlement inhabited over several periods.

The site is located directly on the southern edge of Felsőörs village, on a hillside gently sloping in a southwestern direction, at an altitude of 210 m above sea level *(Fig. 2.2)*. The area was previously used for agricultural purposes, but has been converted into a residential area and built over in recent years. At the bottom of the hill there is a spring (Al–kút). The waters of the resulting small stream reach the deep Malomvölgy (Valley of Mills) to the west of the village, where the Malomvölgyi Stream flows. The Malomvölgyi Stream merges with the parallel Királykúti

Fig. 1. *Kati on the excavation*

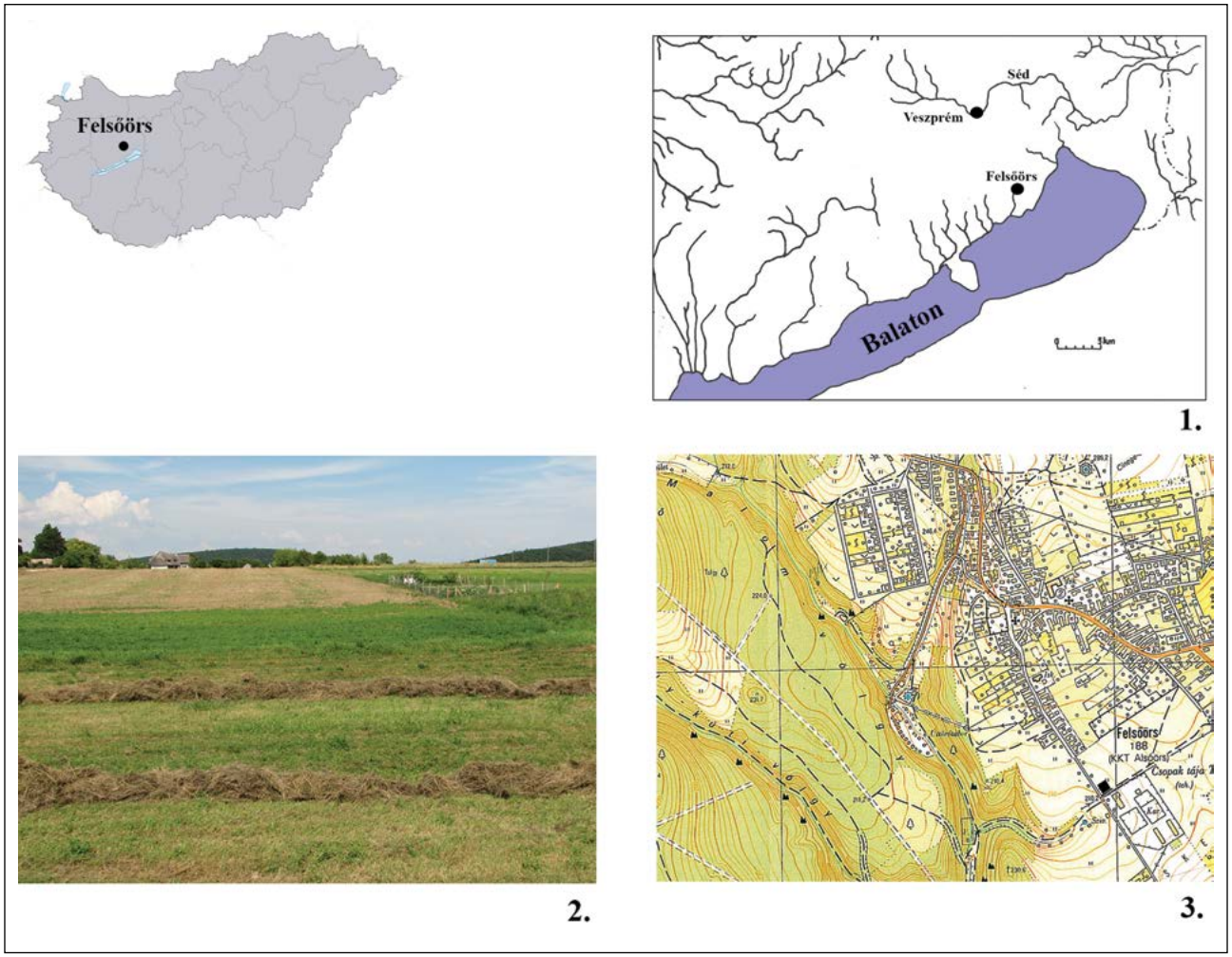

Fig. 2. 1. *The location of Felsőörs–Bárókert site.* ***2.*** *The site from the west, before construction.* ***3.*** *The excavation site south of the village.*

Stream to form the Lovasi séd (stream), which flows into Lake Balaton. The streams flowing in deep gorge valleys are a characteristic landscape element in the eastern part of the Balaton Uplands. Here, the plateau runs down steeply towards Lake Balaton and has a sharp edge, articulated by erosional valleys. This feature of the topography limited the possibility of Neolithic occupation. Neolithic settlements appeared later in this micro–region incorporated to the western basin of the lake. There, the sites of the formative phase of the *Linearbandkeramik* culture (LBK) are located directly along the shoreline (Bánffy 2004, 332; Bánffy–Oross 2009, 220; Oross–Bánffy 2009, 177). This type of find assemblage is not found by the eastern basin of the lake, which was still uninhabited at the time, despite the presence of a Starčevo site with a strong Balkan influence on the neck of the Tihany peninsula (Regenye 2007; 2010; 2011a). Settlement in this part of Lake Balaton took place a little later and it is clear that the process did not start with the sites of the formative phase of the LBK, *i.e.* the western basin of Lake Balaton, but from the east along the Séd Stream (Regenye 2008, 21; 2019, Fig. 5). The phenomenon is explained by the fact that the area was not suitable for farming in the deep gorge valleys, Neolithic sites such as the Felsőörs site presented here, can only be found on the plateau above the valleys (T. Biró–Regenye 1991, Fig. 2, 3). Archaeological sites on this eastern section of the lake shore are not typical in later times either (T. Biró–Regenye 1991). Felsőörs is the only location where there were settlements from several periods. The LBK was followed by the late Neolithic Lengyel culture. Besides the dominant Neolithic settlement features, pits of the late Copper Age Baden culture also appeared to a lesser extent. This is probably because there are several springs around the village, so the area is rich in water resources.

3. Archaeological research at the site

Archaeological research has been carried out in the area since 2008, when construction works began. The trench for the electric line, which was the first to be built, provided a good cross–section of the prehistoric settlement on the hillside. The earliest settlement can be found near the spring at the foot of the hill, up to the lower third of the hill. The settlement of the late LBK is located halfway up the hill. The entire hillside, up to the top of the hill, is covered by a large Lengyel Culture settlement. The Late Copper Age settlement is limited to the western–northwestern part of the hill.

The location of the 2009 excavation is on the south–western edge of the hill, the area next to the spring *(Fig. 2.3)*. We excavated 400 m^2 on plot 55/29 (renumbered as 55/31 in the meantime) between 3–31 August 2009. The excavation was supported by the National Fund for Culture, grant number 2731/159. Two factors determined the choice of the location for the excavation work. One was the fact that the plot was about to be developed, and the other was the result of a test excavation carried out on the southern edge of this plot during public works in the previous year, which revealed a dense network of features and was part of the earliest occupation layer of the site. The 20 x 20 m exploration section was aligned with this test trench and the numbering of features was continued from the previous year, starting with 53. During the excavation 94 features were documented. Partly due to erosion and partly due to the proximity of the spring, the soil had to be removed to a depth of 1 m in the southern corner of the surface in order to reach the subsoil, the loess. The terrain rises slightly to the northeast, while on the eastern side the excavation could only be expended down to 30–40 cm.

4. The form, structure and location of the archaeological features

The 20 x 20 m area is not evenly covered with archaeological features. The eastern side was much more densely inhabited. Mainly identified were concentrations of postholes, which suggests the presence of house structures. There are finds from three periods. The Neolithic features overlap each other, while the Copper Age phenomena are separated from them and confined to the southern quarter of the surface.

The presentation of the features starts with the latest one *(Fig. 3)*. A shallow ditch with an average width of 120–150 cm runs across the surface *i.e.* in a southwest–northeast direction, parallel to the southern edge of the plot, at a distance of 5 m from it. The ditch then turned to the north at the eastern edge of the excavation area. The ditch intersected the features of the Lengyel culture house and is therefore later than it. It passed between the Copper Age pits, with which it had no connection. No finds were found in the ditch. It can be identified it as a recent feature because the direction of the prehistoric features was aligned with the hill, whereas the ditch prallels the plot boundary giving the impression that it marks an earlier parcel boundary. This identification was confirmed by a geophysical survey of the area (Geographical survey conducted by Balázs Heilig, Hungarian Institute of Geology and Geophysics, survey date 2015), which showed clear evidence of an earlier plot division. Two oval shallow flat–bottomed features without finds were found parallel to the western section of the ditch. These were also non–archaeological features associated with the earlier plot.

Going backwards in time, we uncovered two Late Copper Age phenomena *(Fig. 3)*. Regular circular, beehive–shaped pits or groups of pits dug within each other, in rows, one in the southern corner of the surface and the other 3 m to its north. The southern group of features consists of a 2 m pit and a 2.5 m diameter pit, touching each other, with two 50 cm diameter postholes at the bottom of the latter. The northern one is a pit with a diameter of 2 m, with another beehive–shaped pit with a diameter of 130 cm dug into its eastern side. There was also a 50 cm diameter posthole at the bottom of the larger pit. The pits yielded pottery fragments, mostly of Late Copper Age date, but with some Neolithic ones mixed in the sediment. No Late Copper Age finds were recovered elsewhere during the excavation.

Late Neolithic phenomena dominate the surface *(Fig. 4)*, because the southeastern part is occupied by a Lengyel house. The structure of the Lengyel houses is very distinctive and very prominent. In this case, too, the traces of the building structure in the ground stand out from the dense cluster of features observed on this part of the excavation surface *(Fig. 5)*. The slightly trapezoidal house is oriented north to south, with a wider southern end *(Fig. 6)*. Its dimensions were: 7 m wide in the north, 8 m in the south and 15 m long. It is divided into two rooms by an internal wall. The northern room is the larger one. The northeastern corner of the house is crossed by the ditch previously identified as the site boundary; the corner is slightly off the surface. The southern end of the house extends into the test trench from 2008; its line is slightly uncertain.

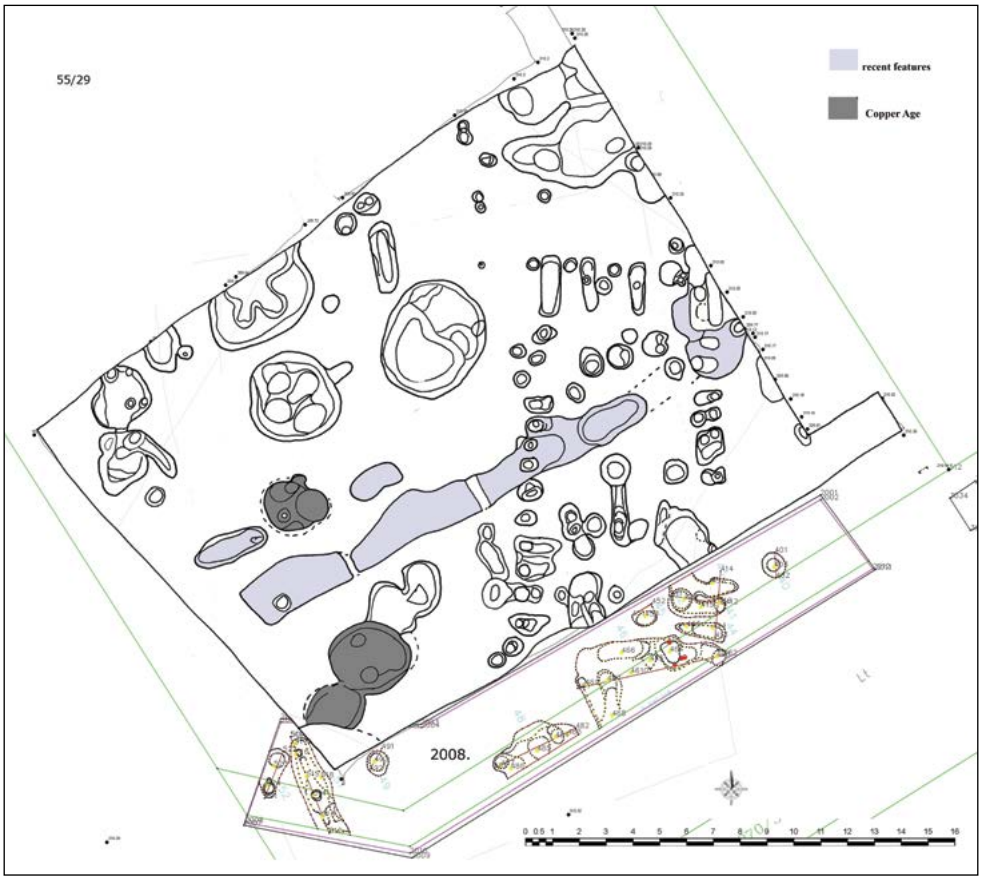

Fig. 3. *Contemporary and Copper Age settlement features.*

Fig. 4. *Lengyel culture settlement features.*

Fig. 5. *The Lengyel house from the northwest.*

The foundations of the north wall are the most robust, consisting of four roughly parallel, not quite evenly spaced postholes 2 m long and 50–60 cm wide, aligned along the longitudinal axis of the house. The first three are each joined on their western sides by a small round posthole while there is a large shallow pit, between the 3rd and 4th, 80 cm in diameter. Its association with the house is doubtful. There should be an elongated posthole here, as the space is available. The north wall of Lengyel houses usually has an odd number of oblong postholes. For some reason the 5th one was not found. The longitudinal wall to the west is marked by 13 densely placed, elongated trenches perpendicular to the axis of the house. They vary in size and shape, with 30 cm diameter postholes aligned with the western edge. In the southern section of the western wall, there are elongated postholes up to 150 cm in length, which extended into the interior of the room. Only 10 trenches were recorded in the eastern wall. These are similarly elongated or square in form, but they are not the same shape like those in the western wall, with a single posthole dug at the end of the trench. Most of them contain a double posthole. Next to the partition wall, the row of postholes forming the eastern wall is incomplete. If this was indeed the case, the northern room would have had a separate entrance. However, this is unlikely as the entrance to Lengyel houses was always on the southern side. In the eastern wall, the trenches of the southern room are also larger here, as with western wall. In the southern room, the foundation appears to be more robust. The internal partition wall is formed by three elongated postholes, deeper at one end, and aligned with the longitudinal axis of the house. The position of the southern wall is somewhat uncertain, but falls within the 2008 test trench area. There is only one deep posthole, much larger than the rest, located on the longitudinal axis of the house. Only half of this was excavated, the other half in the narrow unexcavated band between the 2008 test trench and the excavation surface. The line of the west wall definitely ends on the 2009 excavation surface. The end of the eastern wall is clearly outlined in the 2008 trench, but the end is uncertain because it is cut by a 10th–11th century semi–subterranean house. We also found a deep pit within it, just in line with the centre of the Lengyel house, which could be the place of the southern supporting post. In this case the house would have been 2 m longer. It is not clear which solution is correct.

There were some pits near the house *(Fig. 4)*. Two regular, almost round pits of the same size lay very close to each other and to the house. One, a deep, slightly oval, 3.70 x 3.50 m pit *(Fig. 7)*, was found 2 m west of the north–western corner of the house. It had been dug into an earlier LBK pit. Also 2 m to the west of this was another, shallow, round pit *(Fig. 8)*, 3.5 m in diameter, with an uneven floor, indicating multiple usage. The larger pits near the houses are generally considered to be extraction pits for plastering the house walls. The large, irregular pits were probably used to extract clay for several houses. The form and dimensions are the result of long use. The pits excavated here are smaller than usual and more regular in shape. They were probably used only for this one house and then filled in with rubbish. A LBK pit to the north and northwest of the

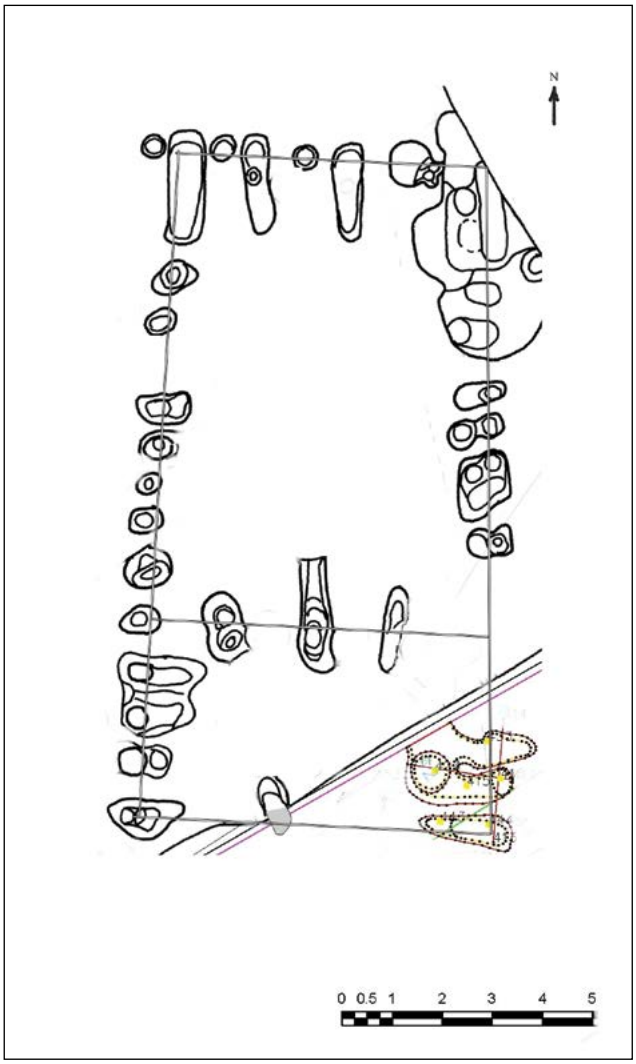

Fig. 6. *Lengyel house plan.*
Fig. 7. *Lengyel pit (feature 98).*
Fig. 8. *Lengyel pit (feature 101).*
Fig. 9. *Split pit (feature 115).*
Fig. 10. *Grave 1 (feature 133).*

house also contained a large quantity of Lengyel pottery, resulting from activities in the Lengyel settlement. A narrow pit with a narrowing bottom (*Schlitzgrube*/split pit) is also probably a Lengyel feature *(Fig 9)*. It is located about 5 m north–northwest of the house, roughly parallel to the house, and measures 280 x 100 cm. This type of feature is common in Neolithic settlements. It is characterised by its standard size and the absence of finds; although here the pit contained LBK material. For this very reason, it is likely to belong to the Lengyel settlement, as LBK pottery was also common in the postholes of the Lengyel house. The features were obviously dug into LBK settlement layers. There were no other Lengyel pits on the western part of the excavation surface.

The two graves which have been discovered are linked to the house and at the same time to the pits. Both were found on the edge of one of the large pits. One sits 2 m and the other 7 m from the northwestern corner of the house. Both are oriented in a slightly different northeast-southwest direction from the usual east-west direction,

so that the heads are oriented towards the corner of the house. The burial situated closer to the house contains a badly damaged skeleton in a crouched position lying on its left side *(Fig. 10)*. The skull, the arm bones, the beginning of the ribs and part of the leg bones are in place. The grave lay at a shallow depth, and was disturbed by ploughing. A small vessel was found in the grave in front of the skull, and a chipped stone tool lay on the skull. There was no detectable soil discolouration marking the grave; it was discovered during the excavation of the pit. A skeleton in crouched position lying on its left side was deposited further away from the house *(Fig. 11)*. It lay at the same depth as the previous one, the skull having been disturbed by the mechanical removal of the top layer of soil. The rounded rectangular grave–pit was quite small, 1 m long and 0.5 m wide. The grave was aligned with one of the large pits. Pottery fragments, a stone blade and a bone point were found in the soil on the grave. Their interpretation as grave goods is doubtful.

The LBK phenomena *(Fig. 12)* come from several periods and cannot be interpreted as a single system. In the area of the Lengyel house and to its north, there are shallow postholes that do not fit into the structure of the Lengyel house. These postholes allow the reconstruction of two LBK house plans. The houses are incomplete and their structure is not clearly visible. Their orientation is slightly different from that of the Lengyel house, running northwest-southeast. House 1 occupies the southern half of the Lengyel house. It is marked by two longitudinal ditches, 6 m apart, which can be interpreted as lateral pits, and from which a 6 m long house can be reconstructed. In line with the dividing wall of the Lengyel house and 2 m south of it there are two rows of three posts, the cross–rows of the building. The northern one (house 2), 7 m wide, extends beyond the surface, and can be reconstructed as an 11 m long house. The northern edge of the Lengyel house is built on top of it. Its western longitudinal wall is marked by 30–40 cm diameter postholes, while the southern wall is marked by larger ones, 80 cm in diameter. Inside there are ambiguous triple cross–rows. The eastern wall is marked by a single posthole, with most of the wall lying outside the excavation area. There was no lateral pit (*Längsgrube*) found adjacent to the longitudinal wall. A small section of the third house is visible in the southern corner of the 2008 test excavation, with a trench oriented in the same direction as the previous ones with postholes in it and with a few postholes beside it.

Near the houses there are larger shallow pits containing pottery fragments from the LBK. To the west of house 1 there is a 3 x 2 m pit, containing mostly early LBK finds. Along the northern edge of the excavation there is a continuous group of late LBK pits 2–4 m in diameter. In the area of the reconstructed plan of house 2 there are larger pits, containing mostly early LBK finds, on which the late LBK house was built. To the east of the houses, on the eastern edge of the excavation, we found pits also containing late LBK finds. To the west of house 2, and north of house 1, a 3.5 m wide oval pit was found containing mostly early LBK finds.

Fig. 11. *Grave 2 (feature 100).*

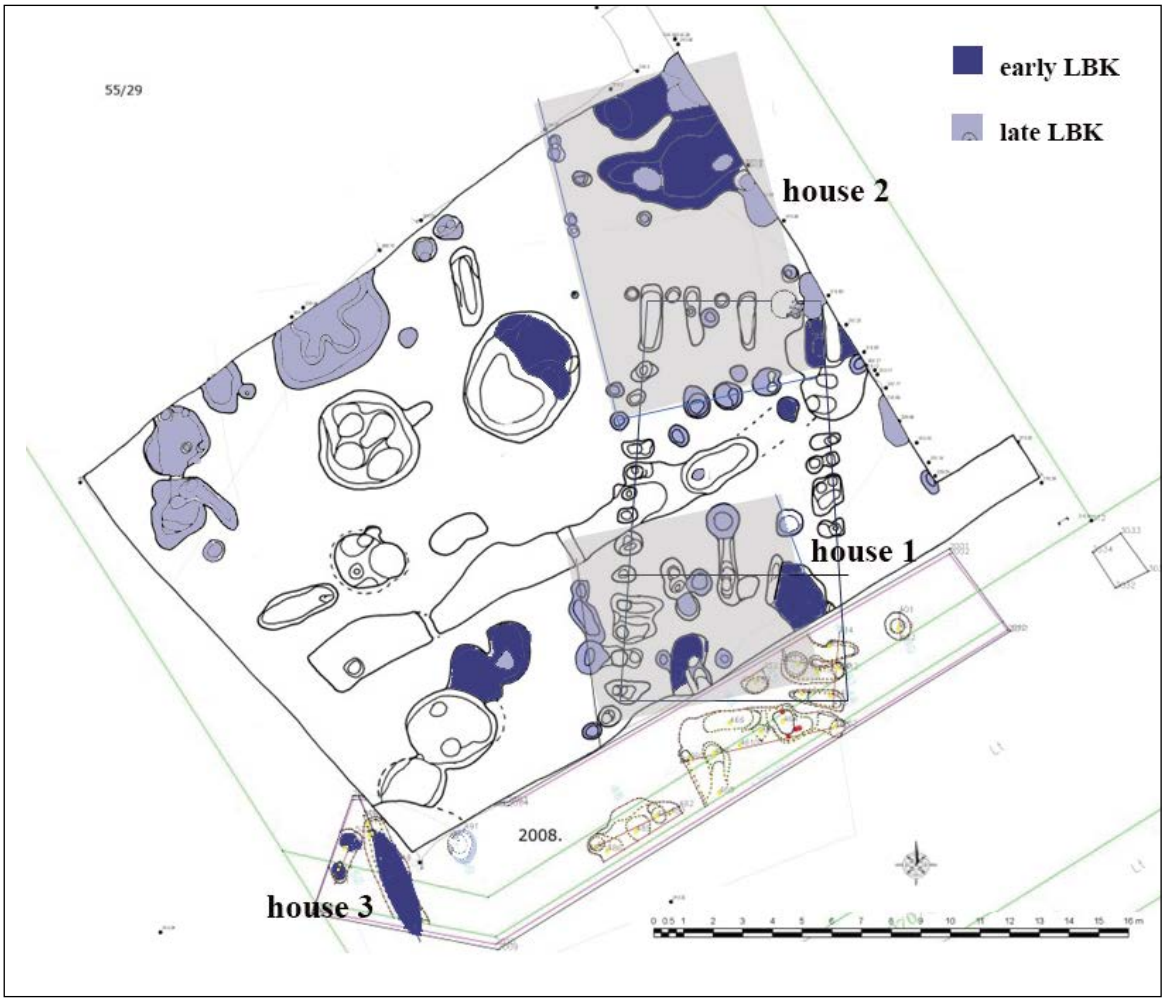

Fig. 12. *Interpretation of the LBK features, reconstructed house plans.*

5. Evaluation of the Neolithic features

5.1 Lengyel architectural remains

Of the periods represented on the site, the Lengyel settlement is the most extensive. The excavation at the bottom of the hill was carried out on the southwestern edge of this settlement. The higher part of the hill was more intensively inhabited, as evidenced by the surface finds. The lower part of the hill was previously occupied by a settlement of the LBK, on which the Lengyel house was built. As a result, the postholes from the Lengyel house contained significant LBK finds. This, together with the earlier building remains, made it difficult to identify the features of the Lengyel house. The structure of the house displays a typical Lengyel house type. A similar, slightly trapezoidal, two–roomed house structure, built with a partition wall with a strong load–bearing capacity, opened to the south with only a deep supporting post foundation along the line of the short southern wall, was previously recovered in Zengővárkony (Dombay 1960, 17, Fig. 57–65) and Santovka, as well as in Žlkovce (Pavúk 1990; 1991; 1998; 2003), then in Veszprém (Regenye 2004), and most recently in Alsónyék (Osztás 2019; Osztás *et al.* 2012; 2016). The proportions, structure and orientation of the houses are largely the same at these sites. Juraj Pavúk has classified the houses of the Lengyel culture excavated in Slovakia in a typological order, this house represents category 3a in his system (Pavúk 2003, 459). There are some minor differences between Felsőörs and the above examples, but these do not affect the structure itself. The northern wall and the inner partition wall are marked by elongated postholes *(Fig. 13)*. This technique of post construction is typical of Lengyel buildings. The posthole was recovered in an oval shape trench, the trench sloped down towards one end and the post was placed there. In Felsőörs, such foundation trenches were also used in the longitudinal wall, perpendicular to the axis of the house and extending inwards *(Fig. 14)*. This is rare in the examples listed above, and may represent an earlier building practice. The plan of houses in Svodín around the smaller round ditch (houses 210/73, 211/73) displays this same design (Němejcová–Pavúková 1986, Fig. 3.2; 1995 Supplement 1.). In his typology of houses, Juraj Pavúk classifies the Svodín houses mentioned above in a separate subtype (1a) precisely because of this particular foundation technique (Pavúk 2003, 457). The Felsőörs house also belongs to this group 1a due to the foundation technique used for the longitudinal wall. This house is most closely related in form to the houses of the nearby Veszprém site, with one difference. The postholes of the long wall of the Veszprém houses were dug differently, not using the foundation technique described here (Regenye 2004, Fig. 13–16). A common feature of the houses at both sites is that the side walls of the southern rooms had a more robust foundation, especially the eastern wall. In Felsőörs,

a particular phenomenon can be added to this situation. In the eastern wall, the foundation trenches dug for the posts contained two closely spaced posts *(Fig. 15)*. This is not a renovation, but a double row of posts that was created during the construction. Either the construction process or the internal structure required the duplication of the posts. Reinforcing the wall thickness with double posts is not typical of Lengyel buildings, but it was a practice that existed during the LBK. The double posts of the southern part of longhouses are well known, usually reconstructed as a support structure for a grain storage floor (Waterbolk–Modderman 1958–59; Oross 2013, 194–197). Double posts are not common for side walls. But it is perhaps no coincidence that a double row of posts similar to the one in Felsőörs can be found at a nearby site (Keszthely – Lendl Adolf Road, house 14) in the eastern side wall of an LBK building (Oross *et al.* 2019, 27). This double post row seems to be part of a kind of load–bearing structure, which is also the case with the Lengyel house. All this should be emphasized because the analysis of the Lengyel house in Felsőörs drew attention to an architectural element that provides an opportunity to look for links between LBK and Lengyel architecture. There is another phenomenon that lies deep in the LBK architectural tradition. One of the characteristic features of early LBK houses, as Eva Lenneis has pointed out, is the depth of the postholes marking the southern wall of the corridor where the north and central parts of the tripartite buildings meet. Sometimes these are the only features that remain of the whole building, as illustrated by the houses Strögen 1 and Brunn 18 and 23 (Lenneis 2004, 153–154, Fig. 6, Fig. 1). The static role of the partition wall of the Lengyel house is therefore not a new idea, and was already used in the early LBK period. These two cases raise the question of the role played by the LBK building tradition in the construction design of the Lengyel house.

The classical Lengyel house was timber–framed, trapezoidal, two–roomed, north–south oriented, with posts dug deep on the north side and in the partition wall, with a dense row of posts along the longitudinal walls and a large post in the middle of the south side, appeared over a large area and with the same layout. This architectural practice is very different from the previous LBK house construction. The reason for the difference, as Juraj Pavúk pointed out, is that the weight of the roof is transferred to the walls by means of a new roof structure instead of internal supporting posts (Pavúk 2003). The development of the Lengyel Culture architecture raises many questions. In order to answer these questions, it is necessary to consider that the use of this classical Lengyel house is limited both regionally and temporally. Regarding regional differences, it should be noted that the architecture is different in the western part of the Lengyel distribution, in present–day Austria (Lenneis–Rammer 2017, 270–275). This type of house is mainly found in the eastern part of the distribution area.

Fig. 13. *Elongated posthole in the partition of the Lengyel house (feature 81).*
Fig. 14. *Elongated postholes in the western wall of the Lengyel house (features 92, 132).*
Fig. 15. *Double postholes in the eastern wall of the Lengyel house (features 57, 58, 119).*
Fig. 16. *Small vessel as part of grave goods in grave 1.*

Regarding the chronology, we know from the Alsónyék site that this house type was certainly constructed in the decades around 4700 BC (Osztás *et al.* 2016, 223). At the Veszprém site, burials began around 4800 BC, so the first house may have appeared here somewhat earlier than in Alsónyék (Regenye *et al.* 2020, 43). The earliest known occurrence of the house type is known from the Svodín site (Němejcová–Pavúková 1986, Fig. 3.2; 1995. supplement 1.), which dates from 4855–4800 cal BC (68% probability, Regenye *et al.* 2020, 44). The house type in question is not yet known in the formative Lengyel period, but after that, as we can see from the data, there was not much time for its development. It is possible to take as a model for this house type not only the architecture of the LBK, but also a different type of architecture which appeared on Sopot sites in Transdanubia (Petrivente: Kalicz *et al.* 2007, Fig. 2.6; Sormás–Török–földek: P. Barna 2007; 2011; 2017). The Sopot houses excavated at the Sormás site are small, marked by irregular post positions or foundation ditches. The houses of the formative Lengyel culture were also excavated there. The size of these formative Lengyel houses increased compared to Sopot, although their structure seems to be similar. Some elements of classical Lengyel house architecture may be recognizable in them (P. Barna 2011, 37), but the poor preservation of the groundplan makes it impossible to establish a definite link. The houses excavated at the Csúcshegy–Harsánylejtő site in Budapest are excellent examples of the transitional period (Virág 2018). The houses have a timber–framed construction with supporting posts along the longitudinal axis. The pottery material at the site of the formative Lengyel culture is late Sopot in character, with Lužianky and Tisza elements, evidence of the cultural diversity of the area (Virág 2018, 13). Zsuzsanna M. Virág associates the houses with the Sopot buildings, referring to the above–mentioned houses in Sormás and emphasizing that this architectural solution differs from the LBK tradition, as the roof construction follows the new method (Virág 2018, 14). Juraj Pavúk explicitly mentions an architectural discontinuity between the Lengyel and the LBK architecture, and finds the origin of the new building technology in the Vinča culture (Pavúk 2003, 455, 463). It is obvious that the innovation of the roof structure emerged out of the cultural wave marking the end of the LBK and the emergence of the Lengyel culture. Part of this process was the settlement of Sopot communities of various origins in the Danube region. However, the construction of the Sopot buildings do not explain every detail of the Lengyel house which required the hundreds of years of LBK's building experience to develop. Both Budapest and Svodín are located in areas where there had previously been a significant Zseliz (Želiezovce) settlement. We should take into account the Zseliz (Želiezovce) building traditions, if we want to understand Lengyel building methods. This fact is evident in the scale and design of the buildings, and is reflected in the architectural details observable in Felsőörs.

As we have seen, we have data on the appearance of this type of house. We can also see the end of this house type's use period. At the end of the Lengyel period, longer, larger houses began to be built and the characteristic oval postholes in the partition wall disappeared (Veszprém House 9: Regenye 2004, Fig. 18; Szombathely: Ilon–Farkas 2001). It is worth adding that the classic Lengyel house occurs at sites where graves are also found. The Lengyel distribution can be divided into two areas based on burial practice, with cemeteries being found only in the eastern half. Communities that buried their dead within the settlement seem to have built the classic Lengyel house type.

5.2 Lengyel burials

In terms of burial context, the Lengyel distribution is sharply divided. The Balaton region, including Felsőörs, lies on the western edge of the area where in Lengyel times it was common to bury people. Compared to the large cemeteries of eastern Transdanubia, there are only few graves here. Although there are significantly fewer graves, the burial customs in our region are otherwise similar to those of the large cemeteries of eastern Transdanubia. In the western part of the Lengyel occupation, the burials are missing or of a special nature (Kalicz 1985, 21; Neugebauer–Maresch 2005, 225; Regenye 2011b, 65–68; Barna *et al.* 2019 153–154).

Two graves were found during this excavation in Felsőörs *(Fig. 10–11)*. Their position in the site clearly links them to the house. Not only because they were found close to it, but also because the graves appear to have been oriented towards the near corner of the house, and therefore slightly off the east-west axis. In southern Transdanubia an east-west orientation of the corpse, with the body lying on its left side is most common (Zalai–Gaál 2010, 62–70). The graves were also associated with the pits outside the house. Grave 2 just touched the large round pit, while Grave 1 occupied the south–eastern quarter of the backfilled pit, presumably to avoid positioning it directly by the base of the house. The alternating layers of loess and clay suggest the pit was rapidly filled in. A general characteristic of the Lengyel cemeteries, and of this phase of the Neolithic more generally, is that the cemetery always occupied part of the settlement, with the graves being located close to the houses, sometimes in line with them (Anders–Nagy 2007, 88; Demján 2015, 365). The other typical feature is that the graves formed clusters (Demján 2012; Lichter 2001, 222; Němejcová–Pavúková 1986; Siklósi 2007, 189). Subsequent excavations in Felsőörs have revealed three more burials placed away from the house and from these graves. They therefore did not form a group of burials. The two presented here are clearly associated with the house.

When evaluating the graves, it is important to consider the grave goods. Only grave 1 contained grave goods, a one-part vessel and a chipped stone tool. The small vessel has a thin wall, a high cylindrical upper part with a rounded belly and a short bottom *(Fig. 16)*. It is a finely made, thin–walled variant of cup–shaped small vessels. The colour is brown, with grey spots and two rows of small knobs on the sides. Dimensions: rim diameter 9 cm, height 9 cm, base diameter 5 cm. One-part vessels were decorated with applied ornamentation, with virtually no vessel lacking knobs. Small knobs appear to have been the norm, arranged into one or two rows. The shapes of vessels are often helpful in dating, but these do not offer much help here. Although the form itself is archaic, its presence and use marks a late horizon in the southern Transdanubian Lengyel burials (Regenye *et al.* 2020, Fig. 2: 1d1a, 1d1b, 1e4c). This contradicts the early dating of the house. Obviously, no conclusions can be drawn from a single vessel. The vessel was placed in front of the head, which was a common position – this small vessel was usually held in the hand in front of the head. The small vessel found in grave 6 at the site Veszprém was in a similar position (Regenye 2006, Fig. 18.1.). A stone tool was found on the head of the deceased *(Fig. 17)*. No grave goods were found in grave 2.

Fig. 17. *Chipped stone blade on the skull as part of the grave goods in grave 1.*

5.3 Lengyel settlement layout

Two of the pits, roughly circular in shape, obviously belong to the surroundings of the Lengyel house and were originally used to extract the clay for the construction. In the northern foreground of the house, the LBK pits were also disturbed by Lengyel activity. The so–called *Schlitzgrube* (split pit) is also close to the LBK pits. It contains LBK–type finds, but their position is secondary in any case. These pits are typical of Neolithic and Copper Age settlements. Since they do not contain any finds, their function is difficult to decipher (Lenneis 2013). Their occurrence at different sites, from different Neolithic periods, often with several pits found at a single site, indicates their essential role in Neolithic life, and the long preservation of a standard size and shape indicates a strong link between function and form. They are typically found within the settlement, for example at the nearby Veszprém site, the pits were located on the edge of the settlement (Regenye–T. Biró 2022, 91). Their position is similar in Felsőörs, also on the edge of the settlement.

With regard to the surroundings of the Lengyel house and the organisation of the space, it is also worth mentioning that two fragmentary finds related to rituals, a fragment of a clay human figure *(Fig. 18)* and a small altar or footstool *(Fig. 19)*, were found in one of the two large pits further away from the house (Regenye 2017). The figurine lay in the centre of the pit, at the bottom of a burnt layer, which had formed a compact, distinct layer in the eastern half of the pit, at a depth of 40 cm *(Fig. 20)*. The footstool or altar was found at the level of this layer. It was located at the edge of the pit in the south–eastern quarter. The ritual objects were placed in the ground in the already partially filled pit. The figurine is that of a pregnant woman, fragmentary, with the hands and legs missing and broken at the hips. The surface retains traces of white paint in patches on the head and torso. The distinct outline of the paint in places suggests that the entire figure was not painted, but in a particular pattern, perhaps indicating a scarf over the head. The rather large figurine (the fragment is 13 cm high) represents the type with a round head, large ears and a long neck. A small number of similar figures are known (Kaposvár: Regenye 2003; Zalavár: Szathmáry 1993, photo 2, photo 3 1; Žlkovce: Pavúk 1998, Obr. 11. 2–3; Mucsfa: Zalai–Gaál 1996, Fig. 13). The statuette is characterized by arms that extended forward, bent at the elbows. The sculpture is clearly distinguishable from early Lengyel figurines precisely because of the arms. In those early sculptures arms were never depicted, or only as horizontal extensions. The arms on figurines appeared at about the same time as the innovation of the classical Lengyel house. The other object accompanying the figurine is a footstool/altar. A bowl–shaped upper part stands on two rectangular legs. Half of one leg is missing. The uncertainty of the name comes from the form. The form is basically that of a stool, but with

Fig. 18. *Anthropomorphic clay figurine in pit 101.*

Fig 19. *Small footstool or altar in pit 101.*

Fig. 20. *Burnt red layer in pit 101, which contained ritual objects.*

a small bowl sitting on it. As the rim of the bowl is missing in one section, it could also have been a seat or a pouring bowl. The colour and material of the two objects are consistent with their contemporaneity and, as they were discarded together, they were probably in use at the same time.

It is known that the ritual use of human figurines in the Neolithic took place in the space of the living (Bánffy 1991; Biehl 2001, 17), but for the final stage there seems to be a connection with the dead because of their burial in the ground. The identical treatment of the figurines is an indication of some kind of spiritual link between the people buried in the settlement and the figurine. It is perhaps not a coincidence that the two ritual objects were placed in the pit next to the grave.

The house, the graves and the pits, one with ritual objects, seem to be part of a planned system. The Felsőörs house and its surrounding phenomena form a coherent structure, a temporal unit. This is a rare situation in Lengyel settlements, where the coherence of houses and pits is usually not clear due to the densely built–up nature of the area. Here the west–southwest boundary of the settlement has probably been identified. This is the reason the structure outline was clear. There is only one building horizon. Later settlement was confined to the higher slopes.

5.4 LBK architectural remains

The LBK settlement does not display a uniform picture like the Lengyel phenomena. One reason is that they lived in this small area for a long time. Another reason is the Lengyel settlement itself. The Lengyel features are deeper; the Lengyel house is much more prominent than the LBK houses. The three reconstructed buildings extend away from each other in a north–northeast direction and mark possible locations for three rows of houses *(Fig. 12)*. The ground plan reconstructions are uncertain. House 1 is 6 m wide and its length can be reconstructed as 6 m based on the lateral pits and some post locations. This building thus appears to be too short compared to the average LBK buildings, but there is no evidence for further features. Its territorial coincidence with the Lengyel house makes a more precise delimitation unlikely. However, it is not impossible that the reconstructed length is correct, because there are examples of such small houses at sites around Lake Balaton (Keszthely: Oross 2019, 22; Balatonszárszó: Oross 2013, 199; Oross 2010, 71) and near the Danube (Budapest–Kőérberek House 1: Horváth 2005, 14). House 2 is 7 m wide and the excavated length is 11 m, although it could be longer. The post line of the western wall is visible and the three more robust postholes of the southern wall. However, the internal structure is very uncertain; perhaps some postholes from 4 cross–rows can be identified. The southern side is covered by the northern edge of the Lengyel house. Another problem is that there were previously LBK pits in the area of the house, making it difficult to observe the postholes. The lateral pit (*Längsgrube*) by the longitudinal wall is missing here. Lateral pits are important features of the LBK houses, but their absence is not an exclusionary factor. The floor plan of House 3 cannot be reconstructed, as only a small part of it was excavated. The orientation of all three houses is the same, northwest–southeast. The early LBK and Zseliz (Želiezovce) houses at the Litér site, near Lake Balaton, are also oriented northwest–southeast (Regenye 2008, Fig. 1). They therefore fit in with the group of sites on the southern shore of Lake Balaton (Oross 2019, 32–33). The eastern basin of Lake Balaton was regionally linked to the sites on the southern shore. On the basis of the large–scale excavations of recent years, Krisztián Oross describes the entire Balaton area as a cultural zone during the late LBK period (Oross 2019, 59).

Because of their position, Houses 1 and 3 may belong to the early LBK settlement horizon. They are located in the southern corner of the excavation area, near the spring. We found postholes in the lateral pit (*Längsgrube*) in House 3, a phenomenon that occurs in the early LBK houses of Dunakeszi (Horváth 2002, 27). The small size of House 1 is also an indication of an early date. The house follows the construction rule of early LBK houses; it has 3 rows of internal postholes and a lateral pit that are, more or less, identifiable (Lenneis 2008, 167). The absence of post rows in the sidewalls is not surprising as posts did not always leave traces. House 2 can be dated to the late LBK because it was built on the place of earlier pits, and late LBK pottery dominates its surroundings.

Large, irregularly shaped, shallow pits line the north and east sides of the excavation area. Among these, the pits in the northwest quarter are of interest as they contain fragments of red sandstone. One of the pit contains a large block of sandstone. The feature group consists of contiguous shallow pits with horizontal floors, with larger postholes in and adjacent to them *(Fig. 21)*. This may be a workshop for processing red sandstone into grindstones. This is all the more likely because the red sandstone was quarried nearby.

6.The finds

The processing of the finds has not yet been completed. A total of 3251 finds were recovered, the majority of which comprise 2352 pottery fragments (104 Late Copper Age, the rest Neolithic), animal bones (608), stone tools (146) and daub (144).

7. Summary

Based on site distribution data, Neolithic settlement on the lake shore in the eastern Balaton region seems to have been sporadic (T. Biró–Regenye 1991, Figures 2, 3). From this point of view, Felsőörs is of regional importance. Both the LBK and the Lengyel horizons of the site have yielded new data. The early LBK material represents the first settlement at this location, on the edge of the Balaton Uplands, on the plateau of a deep gorge valley. However, this is not the earliest occurrence of LBK, as there are earlier sites in the western basin of Lake Balaton and north of Felsőörs, along the Séd Stream. The Lengyel settlement is also considered early among sites of this period. The characteristic postholes of the excavated house indicate a very early form of what could be called a typical Lengyel house.

The excavation conducted in 2009 covered a small part of the settlement which was occupied over several periods. The location of the excavated area near a spring is significant because the settlement appears to have started here and spread up the hillside. Three Neolithic settlement levels have been distinguished. The first corresponds to the early LBK horizon, where we uncovered the rather incomplete remains of two small houses (House 1, 3), oriented northwest–southeast with their accompanying pits. This early LBK was followed by a more densely packed late LBK layer, also with incomplete house remains (House 2). The age of the houses was determined by the finds in the pits around them. The incompletely recorded house plans contain elements that follow the architectural rules of

Fig. 21. *LBK pit structure with red sandstones (features 107, 108, 109).*

the LBK. Their positioning and form help to determine their relative ages. The third Neolithic horizon is a prominent north–south oriented Lengyel house with associated features and burials. The house and its surroundings on the edge of the settlement form an autonomous structure that has not been disturbed by subsequent land use, and includes two graves and ritual objects found in one of the pits, providing an insight into the profane and sacred dimensions of life. The shape and section of the postholes forming the house's floor plan is very characteristic of the early period of Lengyel domestic architecture. Certain elements of the house structure link this type of Lengyel house to LBK architecture, thus providing an opportunity to trace the continuity of Neolithic house building practices.

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Mit Kati in der Mátra – Mahl- und Mühlsteinmine Prospektionen in 2012-2014

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Abstract: *Wir kennen in der Mátra sehr viele Mahl- und Mühlsteinschlagplätze in jeweils kleinerer und größerer Ausdehnung. Hier sind manchmal hunderte von zerbrochene Mahl- und Mühlsteinfragmente zu finden die bei der Herstellung in verschiedene Produktionsphasen angefallen sind. Von der Vorgeschichte über die Eisenzeit bis zum Mittelalter verwendeten Steinmetze unterschiedliche Strategien zur Herstellung von Mahl-Mühlsteinen. In diesem Artikel stelle ich die vor Ort beobachteten Spuren dieser Techniken vor.*

Schlüsselwörter: *Prospektion, Mahl- und Mühlsteinabbau, Piroxen-Andesit-Tuff, Werkzeugspuren*

1. Einleitung

Kati nahm 2012 und 2014 an wochenlangen archäologischen Feldbegehungen zu Mahl- und Mühlsteinwerkstätten in Domoszló teil, die vom Ungarischen Nationalmuseum organisiert wurden *(Fig 1, 2)*. Während der Abende gab sie mir auch viele Tipps für das Verfassen meiner Dissertation. In diesem Artikel stelle ich die verschiedenen Werkzeug- und Verarbeitungsspuren vor, die während der Exkursionen beobachtet wurden, in chronologischer Reihenfolge basierend auf den im Steinbruch Mayen-Koblenz in Deutschland identifizierten industriearchäologischen Funden (T. Biró–Péterdi 2011; Péterdi *et al.* 2016, s. 221).

Die Mátra entstand während des Miozän-Vulkanismus und ist reich an Andesit-Tuff-Lagerstätten an ihren südlichen Hängen. Wo aufgrund seiner Struktur ist Andesit-Tuff ein für diesen Zweck hervorragend geeignetes Gestein und wo es in rissfreier Form und in ausreichender Größe aufzufinden war, kennen wir Mahl- und Mühlsteinschlagplätze in jeweils kleinerer und größerer Ausdehnung (Péterdi *et al.* 2016. 224-227). Hier sind manchmal hunderte von zerbrochene Mahl- und Mühlsteinfragmente zu finden die bei der Herstellung in verschiedene Produktionsphasen angefallen sind. Bei Mühlsteinen kann es sich um Reibstein- (Unterteil) und Läufersteinfragmente (Oberteil) handeln (Von Berg–Wegner 1995, s. 44-46, Tóth 2023, s. 100). Es gibt auch vermutlich verbrannte Gesteinsbrocken mit rötlich-schwarzer Oberfläche und gebogenen Oberflächen, und zuletzt große, kugelrunde Schlagsteine mit 20-25 cm Durchmesser zur Herstellung von Mahlsteinen. Ebensfals zu finden sind auch neben verstreuten Mühlsteinfragmenten mittels Hammer und Meißel eingeschnittenen Felsen viele Mühlstein-Werkstattgruben, voll mit meist handtellergroßen Andesit-tuff Scherben.

2. Mahlsteine

In prähistorischen Zeiten wurden Mahlsteine zunächst aus Brocken hergestellt, deren Form schon die Mahlsteine ähnlich war, wobei Hämmer- und Schlagsteine als Werkzeuge verwendet wurden *(Fig. 6-7)*, die aus härteren Gesteinen als Pyroxenandesit-Tuff gefertigt waren. (Von Berg–Wegner 1995, s. 17). Die Verarbeitung könnte auch durch Pulverisieren, *i.e.* „Picken" erfolgt sein. Diese Technik, die zum finalen Glätten der Oberfläche von Mahlsteinen und Mühlsteinen verwendet wird, hat sich bis in die jüngste Zeit erhalten *(Fig. 26)*.

Bis zum Ende der Bronzezeit wurden Mahlsteine mit Schlagsteinen und gehauenen, groben Steinhämmern geformt, die Steinäxte ähneln. (Von Berg–Wegner 1995, s. 21, s. 49-51). Diese Mahlsteine hatten im Neolithikum normalerweise eine ebene Arbeitsfläche und einen damit paralelle flachen Boden. Sie wurden in verschiedenen Größen und Stärken hergestellt, von einigen Kilo schweren Stücken bis hin zu Stücken mit einem halben Zentner Gewicht. Ein solches, fast fertiges Exemplar *(Fig. 5)* befindet sich in Gyöngyös-Mátrafüred Benevár-berg. (Tóth 2016, s. 103).

Die Reibsteine der Bronzezeit haben ein anmutigeres und geschwungeneres Design als die aus der Jungsteinzeit: sie haben normalerweise die Form eines Bootsrumfes *(Fig. 3-4)* oder Brotleibs mit einer, hübsch geglätteten Oberfläche. (Von Berg–Wegner 1995, s. 41-42). Zur Herstellung von Mahlsteinen nutzten die Menschen der Bronzezeit noch Steinwerkzeuge, da sich Werkzeuge aus Bronze am harten Stein sehr schnell abnutzten.

Ich glaube, dass in den Werkstätten der prähistorischen Mühlsteine am Fuß der Mátra auch Brandspuren zu erkennen sind (*Feuersetzen*, eine Technik, die auch in den Mayen-Kottenheim-Steinbrüchen von der Urzeit bis zur Neuzeit angewendet wurde), diese sind jedoch nicht eindeutig und können auch nicht ohne archäometrische Untersuchungen wissenschaftlich nachgewiesen werden (Von Berg–Wegner 1995, s. 16, s. 44). Mit Hilfe von Feuer und Wasser konnte der Mahlsteinhauer problemlos in einer halben Stunde Werkstücke der richtigen Größe aus den Felsen spalten können.

In der Eisenzeit erleichterte der Einsatz von Eisenwerkzeugen die Herstellung von Mahlsteinen. Die für

Fig. 1-2. *Kati, die Truppe und Mühlsteine im Gelände. Fotos: Rita Hanthy.*

Fig. 3-5. *Große Reibsteine im Wald, Domoszló und Mátrafüred (TZH)*

diese Zeit charakteristischen Forchen wurden senkrecht zur horizontalen Oberfläche vom Fels mit einer Breite von bis zu 15–20 cm mit breitwinkligen Hammern und Meißeln eingeschlagen, danach wurden dann mit Hilfe von breiten Keilen kleinere Stücke vertikal von den größeren Felsbrocken abgespalten. Auf der Ostseite von Hegyesberg in Domoszló befindet sich ein solcher eingeforchter Felsblock. Das Endprodukt, ein fast vollständig fertiggestellter, typischer keltischer Mühlstein in Form einer umgekehrten Pyramide, befindet sich in Markaz-Tatarenfeld *(Fig. 8-9)*. Dieser Mahlsteintyp wurde im Boden eingesenkt befestigt und hatte aufgrund seiner Konstruktion im Vergleich zu früheren Typen eine längere Lebensdauer. (Von Berg–Wegner 1995, s. 22., s. 42). Das Design wurde bis zur Römerzeit verwendet, als im Karpatenbecken die ersten runden Mühlsteine mit Löchern eingeführt wurden.

3. Mühlsteinproduktion

In Mátra hergestellte Mühlsteine wurden an archäologischen Stätten in vielen Regionen des Landes identifiziert, angefangen von der Sarmatenzeit über die Awarenzeit bis zum Mittelalter hin. (Péterdi *et al.* 2017; Péterdi *et al.* 2018).

Die im Mátra gefertigte Mühlsteine wurden von den Werkzeugen, die seit der Römerzeit zur Herstellung von Mühlsteinen in Mátra verwendet wurden, wurde noch keines gefunden *(Fig. 21, 25)*. Die wichtigsten davon sind die Zirkel, Hämmer, die, bis zum heutigen Tag benutzte

Fig. 6-7. *Mahlsteinmüllplatz und ein Schlagstein (TBK)*

Fig. 8-9. *Eisenzeitlicher Mahlstein in Markaz und breitgeschlagene Forche im Fels auf dem Hegyes-berg (TZH)*

verschiedene Meißel, Eisenkeile, der Spitzhammer, der Schröter, Setz- und Spalthammer und der gezahnter Steinflächen zum Glätten der Oberflächen (Von Berg–Wegner 1995, s. 46).

Während in der Eisenzeit aufgrund von schweren Meißeln und Hämmern mit relativ stumpfen Winkeln die Mahlsteinschläger Steine nur vertikal spalten konnten, haben die Meister ab der Römerzeit mit einem ähnlichen Werkzeugsatz wie heute, mit Hilfe von schmalen Meißeln und Keilen in jede Richtung Rillen in den Stein eingeschnitten *(Fig. 10-14)*. und auch horizontal gut spalten können (Von Berg–Wegner 1995, s. 28-34).

Von den Römer an nutzte man auch die Technik des Spalten mit Lochreihen (sog. „*Keiltaschen*") für Eisenkeile, um größere Blöcke aufzuspalten, wobei mit einem Meißel in Abständen von 15–20 cm Reihen kleiner und flacher Keillöcher von kaum 5–10 cm eingetieft wurden, in die dann von Eisenblätchen umfasste Eisenkeile eingeschlagen wurden bis der Stein riss. Es scheint, dass diese Technik von den Mátra-Mühlsteinhauern nicht angewendet wurde. (Mangartz 1998, s. 11, 20, Von Berg–Wegner 1995, s. 28).

4. Techniken

Am Fuß der Mátra lassen sich mindestens vier Hauptgruppen von Mühlsteinhau-Techniken unterscheiden.

- *Erstens: aus einem Andesit-tuff Brocken, die Größe und Form des zukünftigen Mühlsteins entsprechend, von mindestens 40–50 cm Durchmesser, wurde der Mühlstein mit Hilfe von Meißeln oder Spitzhammer – mit Abschlägen – in ein Halbfabrikat geformt.*
- *Zweitens: Aus einem Steinblock von annähernd gleicher Größe und Form wie ein Mühlstein, nur viel dicker als nötig, wurden durch tiefes Einrillen (2-3 cm dünne, sehr tiefe Rillen) entlang seines Umfangs ein oder zwei Mühlsteinscheiben geformt, die entlang der kreisförmigen Randkerbe abgespalten wurden, ähnlich wie Salamischeiben.*
- *Drittens: Aus einem größeren Stein wurde mit Hilfe von Meißel und Hammer mit ein oder zwei vertikalen Schnitten eine Mühlsteinscheibe geformt, die schließlich vom größeren Stein abgespalten wurde.*
- *Viertens: Auf einem großen Felsen wurde eine glattere Oberfläche ausgewählt, auf die mit einem Zirkel, vielleicht einer Schablone oder freihändig die Form des Mühlsteins gezeichnet wurde, entlang des Felsens dann mit einem Meißel oder Spitzhammer kreisförmig etwas tiefer als die zukünftige Dicke des Mühlsteins eine Rille gehauen (Fotos 15-20). Dann wurde von der am besten zugänglichen Seite aus ein Durchgang vom künftigen Mühlstein bis zum Rand des Felsens geschnitten, von wo aus der Mühlsteinblock mit Hilfe eines Meißels und anschließend mit Keilen von der Seite rausgespalten wurde, so dass er dort bloß ein kreisrunder Negativ übrig blieb. Solche Mühlsteinnegative finden sich unter anderem an den Standorten Mittelberg und Kolibiszka in Domoszló, sowie im Tekerestal in Abasár (Tóth 2023, s. 100).*

Im optimalen Fall erscheinen Mühlsteinschläger-Fundplätze in der Landschaft als gut erkennbare Arbeitsgruben, mit einer maximalen Tiefe von einem Meter und einem Durchmesser von zwei bis fünf Metern. Auch die Oberfläche der Arbeitsgruben ist meist mit großen und kleinen Abschlägen bedeckt, oft findet man beschädigte Mühlsteine in der Umgebung oder sogar im Inneren. Ohne sie braucht es viel Übung und Glück, die Spuren in der unübersichtlichen Wald- und Felslandschaft zu entdecken. Dabei kann es sich um einzelne Felsen, normalgroße Abschläge oder auch um Giga-Abschläge handeln *(Fig. 22-23)*. Wenn die sich durch nur einen großen, gezielten Schlag lösten, erhielt der Mühlsteinhauer eine nahezu fertige Oberfläche. Verworfene Mahl- und Mühlsteine können aus verschiedenen Gründen zerbrochen sein, beispielsweise aufgrund von Materialfehlern (verdeckte Risse), unzureichender Abstützung der Werkstücke und auch wegen Schlagfehlern. Bei Mühlsteinen war vor allem die Herstellung von Achsenlöchern mit quadratischem und rundem Querschnitt ein gefährlicher Arbeitsgang. Dabei hauten oder meißelten die Meister die Löcher aus einer oder zwei Richtungen durch die Mitte des Mühlsteins.

Fig. 10-14. *Die Rillen der Mühlsteinhauer (TZH)*

Fig. 15-20. *Aufgegebene Mühlsteinfelsen (1. Domoszló-Wildtrinke; 2. Kolibiszka; 3-4.: Abasár-Tekerestal; 5-6: Domoszló, Mittelberg - TZH)*

Fig. 21. *Schleifsteinhauer aus Tirol, aus der Bilddokumentation von Benedikt Kuby.*
https://www.youtube.com/watch?v=CM6oGFK58_k&t=600s

Fig. 22-23. *Mühlsteinhauer-Arbeitsgrube in Abasár-Tekerestal und Giga-Abschlag auf den Mittelberg, Domoszló (TZH)*

Fig. 24-25. *Mühlsteinfabrikat-Fragment in Markaz-Radbauertal, (TZH)*
Indischer Reibsteinhauer bei der Arbeit mit Hammer und Spitzmeißel
https://www.youtube.com/watch?v=_z7TchLLXww

Fig. 26. *Eine der letzten Arbeitsschritten: das Glätten der Oberfläche („Pulverisierung / Picken", hier von einer Molcajete, oder Mörser in Mexiko) mit einem leichten Hammerstein.*
https://www.youtube.com/watch?v=3b7tJR-jWc4

Basierend auf ethnografischen Beispielen wurden Mühlsteine wahrscheinlich vor Ort nur grob ausgearbeitet und in den Werkstätten zu Hause fertiggestellt. Der Durchmesser der fertigen Mühlsteine variierte zwischen 30 und 50 cm, der häufigste Durchmesser lag jedoch bei 40 cm. Dieser Durchmesser entspricht dem Aktionsradius eines durchschnittlichen menschlichen Arms, der eine horizontale Drehbewegung ausführt.

5. Postproduktion

Steinmetze fertigten häufig auch die hölzernen Teile der Mühlsteine, wie den Dreharm und den Tisch oder Stock. Spuren der Nachbearbeitung und der vor Ort befindlichen Artefakte, wie zBp. Metallwerkzeuge und Keramiken, die dabei helfen könnten, den genauen Zeitramen des Steinschneidens zu bestimmen, wurden noch nicht gefunden. Wir können uns aber sicher sein, dass wir in dem riesigen Gelände früher oder später neue aufregende Entdeckungen machen werden. Doch die Forschungszeit 2012–2014 bleibt, vielleicht dank Kati, allen Teilnehmern in besonders schöner Erinnerung.

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Archaeological and Palaeontological Field-work with Katalin Simán in Rudabánya

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Rudabánya (Northeastern Hungary) is famous in archaeology, mining history, palaeontology, geology, mineralogy, etc. The Triassic metasomatic copper-iron ore occurrences from Rudabánya Hill are rich in high quality malachite, azurite, cuprite and native-copper minerals (Koch 1966, Szakáll 2001). Intensive gold- and silver mining activity (Pantó *et al.* 1957) in the Hungarian Kingdom started during the reign of the Árpád-dynasty from the eleventh century. The heyday occurred during the rule of King Charles I. (Caroberto or Károly), who bestowed the privilege of "Royal mining town" on Rudabánya (Faller *et al.* 1997) appearing on the still existing sigillum ("*Sigillum civitas Rudae*"). In 1967, mining geologist Gábor Hernyák (Solt 2014) working at the Rudabánya Ore Mining Company (Hernyák 1967) found lignite and clay layer (Edelény Variegated Clay Formation) from the Pannonian (10-12 my.) in the open pit. This horizon contained, among plant fossils and other animal bones, some unique Prehominid remains comprising a mandible and teeth.

In 1967, András Tasnádi Kubacska, a palaeontologist working at the *Magyar Állami Földtani Intézet* (Geological Institute of Hungary, Budapest) organized a significant exhibition for the centenary anniversary of the Institute (founded in 1869), held in 1969 and collected minerals and fossils from different important localities and from every important mining area in Hungary. He visited Rudabánya too and Gábor Hernyák gave him, among the nice azurite, malachite, cuprite and native copper minerals the Pannonian fossil bones, mandibles and shiny teeth as well. When Tasnádi arrived back in Budapest, his colleague Professor Miklós Kretzoi, palaeontologist and curator of the Vertebrate Collection, immediately recognized the great importance of the Prehominid fossils. He started systematic excavations in Rudabánya resulting in the identification of a new evolutionary line to early hominization (Kretzoi 2002),), *Rudapithecus hungaricus*. Later, László Kordos, also a palaeontologist at the Geological Institute of Hungary, continued the research and excavations at an expanded international level (Bernor *et al.* 2005, Kordos 2015).

During their studies focussing on Palaeolithic archaeology at Eötvös Loránd University, Katalin Simán and Katalin Biró were naturally interested in Quaternary palaeontology. They attended the special colloquiums given by Miklós Kretzoi. From 1974, both took part in the famous excavations lead by M. Kretzoi at Rudabánya.

Katalin Simán was an first-rate colleague and always searched for new occurrences with great interest, employing very precise methods on the site. She was very active in fieldwork as well and very much enjoyed the special atmosphere of the excavations. As many famous palaeontologists (and some archaeologists, too) also visited the excavations, she made some important scientific contacts as well.

Thousands of years ago, the native-copper were collected as a useful raw material, since they could be found on the surface of the southwest-northeast running ditch in the Rudabánya Hills in the oxidation-zone of mineralization. A lot of neighbouring villages (Dövény, Felsőkelecsény, Imola, Szendrő, Szendrőlád, Trizs) in the area are rich in Bronze Age finds (Wágner 1879, Szendrei 1883, Márton 1901). In the summer of 1976, some pottery occurrences from the Bronze Age were discovered while walking from Rudabánya up to the palaeontological excavation above the Andrássy mine, on the southern slope of "Villanytető". As Katalin Simán was already working as one of the archaeologists at the Herman Ottó Museum in Miskolc, the county museum for the county where Rudabánya is located, we told her about the new discovery. Some days later, she travelled to Rudabánya and excavated the 20 m long site of a Late Bronze Age settlement (Gádor–Hellebrandt–Simán 1979 113-114.). She also excavated together with her colleagues in many different Palaeolithic (Sajószentpéter), Bronze Age (Sajómercse, Szendrő) and Árpád-period (Edelény, Szendrő) localities in Borsod County.

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Horse Skeletons at the Celtic Settlement of Balatonőszöd–Temetői-dűlő

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Tribute: *Katalin Simán has given much to Hungarian archaeology, not only as an archaeologist but also as a translator. She has translated many of my works, including the topics related to the site excavated at Balatonőszöd. One of my last works connected to Balatonőszöd is presented here as a token of my respect and gratitude.*

Abstract: *Two horse skeletons were excavated at Balatonőszöd–Temetői-dűlő. The horse as an animal species is rare in zooarchaeological finds even in Late Iron Age Celtic materials, and the occurrence of coherent skeletal parts or whole skeletons is quite unique. The study explores whether the two horse deposits could be sacred offerings and, if so, to which Celtic rite or god they are linked.*

Keywords: *La Tène D, settlement pit, animal deposit, horse, Epona*

1. Introduction

An archaeological excavation was carried out at the Temetői-dűlő near Balatonőszöd during 2001-2002, in connection with the construction on the planned M7 motorway. Among other finds and periods, a Late Iron Age Celtic (La Tène D2) settlement part was brought to light (Belényesy–Horváth 2007, 97-109; Honti–Horváth 2013, DVD 1/ The Late Iron Age settlement part). In 2001, András Sófalvi excavated a small part of the north-western part of the site, including the features reported in this study.

Unlike other sites on the southern shore of Lake Balaton, neither earlier Iron Age nor a Roman continuation from the Celtic period could be found at Balatonőszöd. These other settlements start in the Hallstatt or La Tène B/C phase and continue into the La Tène D period at Balatonboglár–Berekre-dűlő, Balatonboglár–Borkombinát, Ordacsehi–Csereföld and, Ordacsehi–Kistöltés (see Belényesy *et al.* 2007, 60: Chronological table). According to research, the territory of Transdanubia was occupied without a fight by the Roman Empire in the second half of the first century CE. The features and artefacts of the Roman period indigenous settlements follow the Late Iron Age Celtic precedents without major changes (*cf.* Németh 2007a, 2007b). Balatonlelle–Kenderföld was continually inhabited from the La Tène D period to the late Roman fifth century CE, while at other sites, the La Tène D period is followed by a Roman occupation until the late Roman period, after a short hiatus in the early first century CE although the settlements shift spatially relatively to the earlier Late Iron Age settlement core (*e.g.* Balatonszemes–Szemesi-berek, Balatonboglár–Berekre-dűlő, Balatonboglár–Borkombinát, Ordacsehi–Kistöltés, Ordacsehi–Csereföld, Ordacsehi–Bugaszeg, Ordacsehi–Major, see Belényesy *et al.* 2007, 60: Chronological Table).

The area probably fell into the territory of the *Hercuniates* tribe during the period under consideration. The ethnonym *Hercuniates* is associated with the name of the forest of *Hercynia*/*Hercynia silva* (*cf.* Szabó 1971, 17, Szabó 1971, Fig. 2; Szabó 2005, 90, Map 64). The Celtic population movements that began between *ca.* 60-40 BCE, following the expansion of the Dacian *Burebist*, however, rewrote the map of *Pannonia*. In fact, the tribal affiliation of the area stretching from the Sió River in the south to the Kapos River in the west is uncertain from this time onwards, based on research on later Romanised, reorganised *civitas* (Kovács 2011). The *Cotinus* tribe may also be involved in the occupied area between the southern shoreline of Lake Balaton and the Kapos River (Szabó 2005, 69-70, and Map on p. 177: the map shows a later Romanised state in the second century CE). They moved from Slovakian territory, but interestingly adopted Dacian cultural elements when they settled in *Pannonia*. Tacitus mentions them as specialists in iron smithing (Germania 43: http://mek.oszk.hu/04300/04353/html/01.htm#2).

Topographically, Balatonőszöd is located on the southern shore of Lake Balaton, on the banks of a former watercourse, now an artificial canal (*Kis- and Nagy-Metszés csatornák*/Small and Big Transecting channels). The Roman Road linking Keszthely–Fenékpuszta (*Valcum*) with Ságvár (*Tricciana*) was completed in the first century CE. A number of Romanised Celtic settlements were located along it, including Balatonőszöd. Since both sites have earlier Celtic antecedents, the Roman road itself was also probably constructed earlier. Balatonföldvár and Nagyberki–Szalacska are the closest known Celtic tribal centres to Balatonőszöd.

Celtic features (houses, ovens and pits) were found over all the *ca.* 100,000 m^2 excavation area, in a regular, common pattern, mostly on the northwest–southeast running slope that follows the line of the water bed of a stream that once flowed into Lake Balaton *(Fig. 1)*. Twenty-five houses (semi-subterranean constructions with two piles standing

opposite each other); some 320 pits (including beehive-shaped, burnt-out-sided grain storage pits) and about 40 ovens are associated with this period.

A few human skeletons without finds that were thrown into a pit raise the possibility of a Late Iron Age date (Nos. 2, 4, 10, 26, 58) for the site, although only radiocarbon dating can definitively determine when these bodies were deposited. Complete or partial animal skeletons were recovered in a further 13 pits, including red deer (*Cervus elaphus,* Linnaeus, 1758: Horváth 2019; 2022), domestic pig (*Sus scrofa domestica*, Linnaeus, 1758), horse (*Equus ferus,* Linneaus, 1758) and possibly dog (*Canis lupus familiaris*). In this paper, the pits containing horse skeletons will be discussed in detail.

2. Description of the features

2.1. Pit 229, Trench 52/19

An incomplete skeleton of a horse was recovered very close to the ground surface in the dark brown fill of Pit 229 (mixed with loam and charcoal pieces and ceramic fragments from neighbouring Pit 230). The animal was lying on its left side, with its head protruding forward to its forelegs. Its hind legs are missing, and its pelvis is by its head. The skeleton was already damaged during the humification process, partly due to its drying out close to the surface and partly due to the digging work (it was crushed by heavy vehicles passing over it several times as it lay under the construction). No other finds were found in the pit *(Fig. 2, Fig. 4.1)*.

After the excavation, only a few bone fragments were recovered from the animal skeleton. These fragments were not suitable for detailed zooarchaeological study. Based on the photo and drawing documentation, István Vörös, a zooarchaeologist identified it as a fragmented horse skeleton. (Here, I would like to thank István Vörös for his work on the animal bones of the Balatonőszöd–Temetői-dűlő site, which included the Celtic settlement area, details of which were published in Honti–Horváth 2013, DVD 1/The section on the Late Iron Age settlement.

The radiocarbon date from the horse skeleton: VERA-4807: 1985 ±35 BP, 46cal BC–121cal AD 1 σ (95.4%), 5–73 cal AD 2 σ (53.3%) *(Fig. 5)*.

Finds from the classical Baden culture were found in Pit 230, next to Pit 229. The two pits did not intersect, but only touched at their edges (the southern side of Pit 230 with the northern side of Pit 229). Therefore, a first interpretation suggested that Pit 229 was Late Copper Age date and one of the fairly common animal burials of the Baden culture (Horváth 2007; 2012; 2014). However, subsequent faunal analysis and ^{14}C measurements ruled out this dating possibility.

Celtic finds (pottery fragments and a bronze fibula) were recovered in Pit 929, which lay adjacent to the western side of Pit 230 (The Celtic finds were described by Károly Tankó). Celtic sherds were found along with the skeleton of a dog in

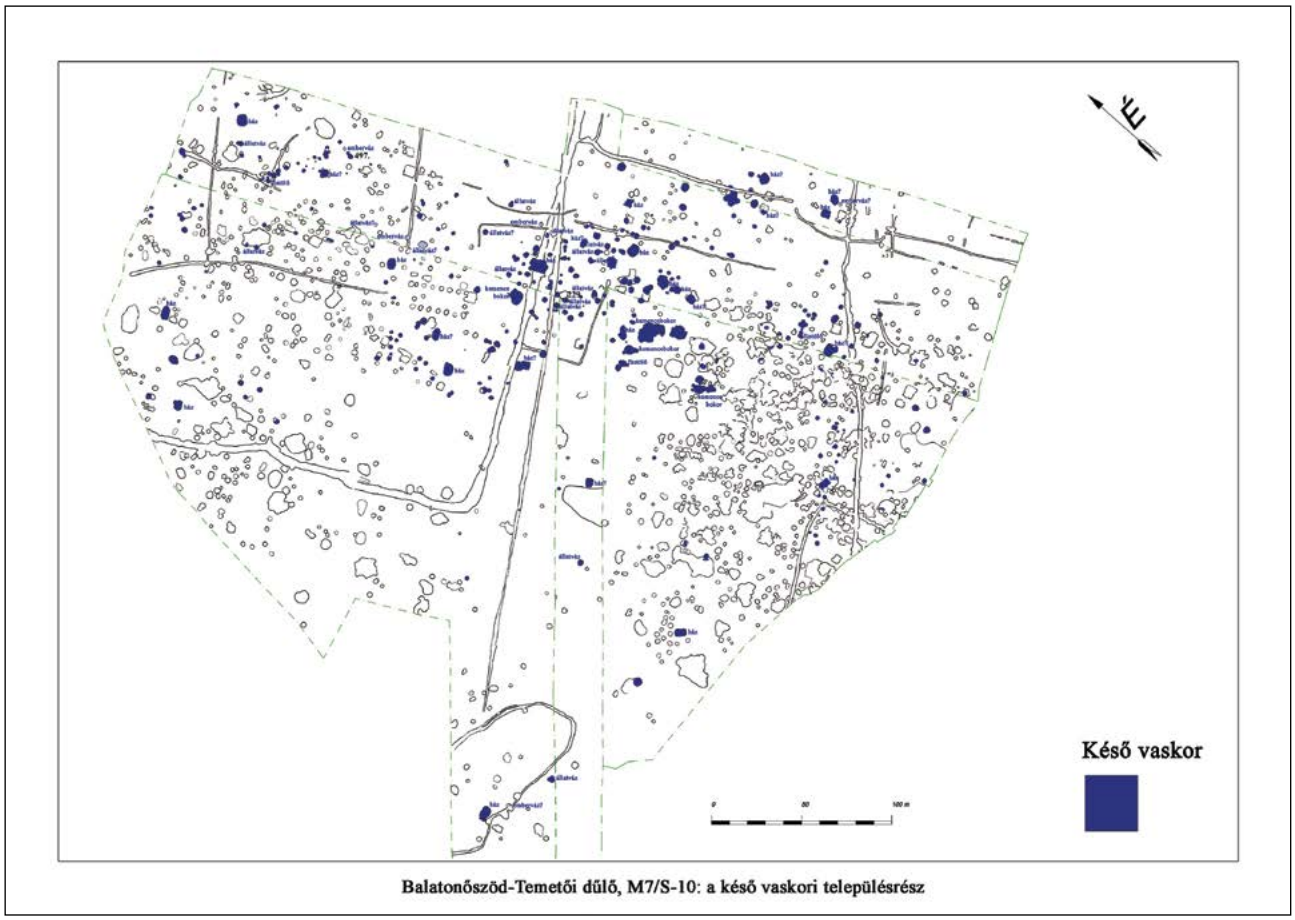

Fig. 1. *Groundplan of the Balatonőszöd–Temetői-dűlő, site M7/S-10 (Zsolt Viemann). Dark blue: Celtic features. Light blue: uncertain Celtic features. Made by Tünde Horváth.*

Pit 2150, excavated a few metres southwest of Pit 229. The pit was cut by a medieval ditch, No. 240 (the dog skeleton may also belong to it).

2.2. Pit 497, Trench 58/22

A new pit (Pit 497) was observed during the excavation of the dark brown, solid fill of Pit 430 that was mixed with daub fragments. This new pit was filled with loose, ash-red, burnt daub fragments. A horse with an arched spine was revealed, lying on its left side. Its hind legs were extended and its forelegs bent *(Fig. 3, Fig. 4.2)*.

The skeleton was destroyed during excavation work. However, based on the photo and drawing documentation, István Vörös was able to identify the skeleton as that of a horse. Apart from the animal's bones, there were no other finds in the pit.

Pit 431 is located on the north side of Pits 430–497 and contains Celtic sherds. Pit 442 contained a human skeleton and was located a few metres to the north. The human skeleton (No. 4) had been thrown into the pit. No other finds of dating value were found in the pit.

3. Interpretation of the features containing horse skeletons

In both cases, the horse skeletons found in the two pits can be considered special animal deposits with no associated pottery, containing only horse bones. Terminology has been introduced through scholarly research on similar related animal bone groups (ABGs/deposits, see Morris 2012). Celtic features were found in their immediate vicinity that did have contain Celtic finds but there were also features from other periods (Late Copper Age and Middle Ages). The cultural affiliation of the two pits was therefore not clear at first. Both horse skeletons lay in pits that first appeared during excavations as round patches on the surface, although Pit 497 was dug into an earlier pit (perhaps from a different period, *e.g.* Baden culture). In this case, therefore, the horse skeletons can be considered primary animal deposits in a secondarily dug feature.

Both horse skeletons were found in partial condition although, originally, only the skeleton from Pit 229 was incomplete: its two hind limbs were not placed in the pit. The two hind legs may have used for other purposes and in other places. As this is the fleshiest part of the animal, its consumption (secular or sacred) is the most likely explanation. In contrast, the skeleton of the animal in Pit 497 may have been complete at the time it was excavated and its missing parts are the result of incomplete excavation.

Both animals lay on their left sides, but in different positions: the partial skeleton of Pit 229 was manipulated: the head, neck and chest regions were placed in the pit, not in anatomical order, but separated and slightly superimposed, with the remaining forelegs and the ilium moved up to the neck region. Considering the dismemberment along body regions and the shallow burial of the skeleton, it may be interpreted as a ritual sacrifice/burial, part of a dead animal, or even as a slaughtering pit left over as kitchen waste. Some scholars have suggested that the Celts did not eat horse meat for religious reasons, out of respect for the goddess *Epona* (Jovičić–Bogdanović 2017, 39). Otherwise, in some Gallic settlements, young animals were slaughtered for consumption (*e.g.* Creil and Chevrières, in France), while at the Iron Age site of Danebury (Great Britain), it was the older animals that were slaughtered for their meat (Green 2002, 20). At the site of Epiais–Rhus

Fig. 2. *Balatonőszöd–Temetői-dűlő, Pits 229 and 230. Made by Tünde Horváth.*

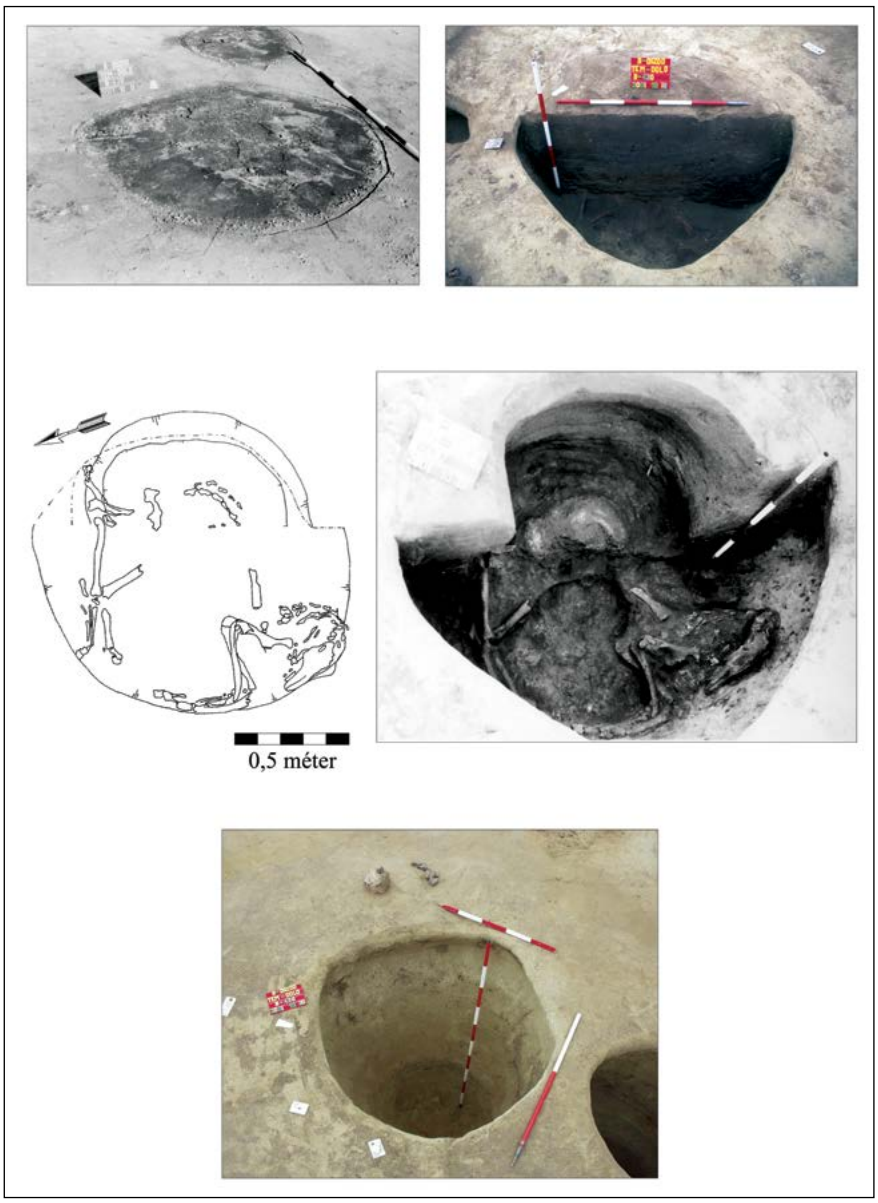

Fig. 3. *Balatonőszöd–Temetői-dűlő, Pits 430 and 497. Made by Tünde Horváth.*

(France), horses were skinned and their meat consumed (Green 2002, 36). Hippophagy, sometimes very developed, rather characterizes rural establishments and villages, such as Acy-Romance, France (Méniel 2016). This obviously recalls the remains of heads and spines of horses preserved in extremis in the heavily levelled ditch of the palisaded enclosure of Acy-Romance. Here, these are mainly remains of cuts kept within the enclosure, with very few traces of any banqueting, most of the meat being clearly distributed in the village. Other scholars and examples suggest that in the somewhat later, already Romanised cases, the situation varied according to which part of the empire the Roman soldiers came from and whether there was a tradition of eating horse meat, something that may have been influenced by former local indigenous traditions (see e.g. Méniel 1992; Lauwerier 1999, 107-110).

If it turns out that the dog carcass found in Pit 2150 is also Celtic, the proximity of the two animals could be interpreted as some kind of a horse–dog connection. At some Celtic sites, skeletons of the two animals excavated next to or in close proximity to each other have been found with a frequency that goes beyond random chance. Most cases are associated with hunting on horseback with dogs and some kind of hunting rite (e.*g.* in Danebury, Great Britain), or in Compiègne (France, see Green 2002, 56-57, 103, Fig. 5.7).

The horse laid in Pit 497 was deliberately positioned: lying in anatomical position. The animal carcass was aligned with the side wall of the pit, so that its spine was arched along a concave line, its hind legs extended, and its forelegs bent at the foot, following the curve of the pit side wall. In this case, the horse may also be a ritual deposit. The human skeleton No. 4 (its cultural affiliation is uncertain) found thrown into Pit 442 lay close to it. Even if the human skeletal deposit belongs to the Late Iron Age, the horse in Pit 497 may have played the role of a human companion animal.

Unfortunately, we have not had the opportunity to carry out a zooarchaelogical study in any of these cases,

so no features have been identified indicating sex or age or measurements to determine their size (possibly indicating that the two animals resembled the smaller, pony-like horse of the Celts: Green 2002, 20, 67, 69-70; Lauwerier 1999, 102-104). Neither were there any morphological indications of possible pathological lesions, taphonomic data, or slaughtering data available for any of the features.

Based on the circumstances of their discovery, recovery of two horse skeletons (one partial and one complete) from a Celtic village can be considered ritualistic in origin for the complete skeleton and questionable in the case of the partial skeleton. A possible interpretation of the partial horse in Pit 229 suggests the fleshy missing hind limbs could have been consumed, possibly during a ritual feast. Thus, the possibility of a sacral interpretation for both specimens is supported, in particular because horse is not otherwise represented in the animal bone material of the settlement, so that horse meat was not consumed on a regular basis at the settlement. In all respects, the two horse deposits seem to have been exceptional and not commonplace.

The horse held a high status among the Celts, especially because of their roles in fighting and hunting (Green 2002, 73; Jennings 2011; Mírová 2019, 173-179). The horse was the animal (attribute, companion) of the goddess *Epona*. It is reasonable to think that the appearance of horse skeletons in ritual circumstances in a Celtic settlement was linked to the cult of *Epona*, although in a completely hypothetical form at present, as this archaeological phenomenon has not yet been clearly linked to either this cult or goddess. Therefore, in the next part of the paper, I will examine similar cases at Celtic sites and finds that have been strongly linked to the *Epona* cult.

The archaeological-historical remains of the *Epona* cult known so far are found in Roman/Latin or Greek literary sources, inscriptions and figural or painted/engraved representations. The cult's appearance is best known from figural stone slab (limestone and marble) reliefs or embossed on metal (bronze, iron, lead) sheets. A refreshing exception is a new find representing *Epona* found in a well at a luxurious villa excavated near Sens (France). The goddess appears on copper alloy plates placed over a wooden model with some traces of silver sheet and glass paste. She appears in the company of seven dogs, a wolf and a vulture (Driard–Deyts 2013). A completely wooden statuette from Saintes (France) was also recovered from a well (Driard–Deyts 2013, 441).

No archaeological phenomenon/feature has yet been attributed to *Epona*. Among the known finds associated with *Epona*, there is not a single one that can be dated with absolute certainty to the first century CE, or even earlier, and which would be chronologically synchronous with the settlement of Balatonőszöd. Not only are there figurative representations of the goddess in some form (wall paintings, votive plates, altars, *etc.*) but riderless terracotta horse figures can also be associated with the cult of *Epona* (nearly 50 riderless horse figures have been found at the Belgian site of Assche–Kalkoven; these figures were most often sacrifices in horse races: van Boekel 1987, 699; Varga 2020, 120-121). The burial of a horse (with bronze mask and unused coins) was found within the military *vicus* of Leiden–Roomburg (Netherlands), came to light in the Corbulo canal. The skeleton displays heavy cut marks but is complete. This burial has also been interpreted as a sacrifice (Lauwerier 1999, 109).

The finds that can certainly be linked to *Epona* come from Roman-founded or surviving Romanised native Celtic sites dating from as early as the second-third centuries CE. The earliest monuments, the inscribed tablets from the sanctuary at *Intaranum* (Entrains-sur-Nohain, *Aedui* indigenous tribe, France: *CIL XIII 2902, 2903*), are generally dated by research to the late first and early second centuries CE. The altar at *Sarmizegetusa* (Várhely, Romania: *CIL III 7904*), dated to the last years of *Trajan*'s reign (CE 98–117) based on the mention of the name of governor *C. Avidius Nigrinus*, is only slightly later in date. It is quite clear that no firm conclusions can be drawn about the local origin of *Epona* worship from the prevalence of the predominantly second-third century CE artifacts. Even if no serious religious historian today disputes the Celtic origin of *Epona*, the relatively late memorial material is still referred to quite often in the designation of the original site name of the goddess riding a mare or sitting on a throne. For example, the view that the origins of the cult of *Epona* can be traced back to the *Treviri* and *Mediomatrici*, who lived in the Moselle region and were famous for their horse breeding, and to the *Lingones*, who lived on the border of *Belgica* and *Lugdunensis*, generally in the *Belgica* region, is still very much believed. The only conclusion that can be drawn from the quantitative distribution and chronological position of the *Epona* cult's relics is that the worship of the equestrian goddess was particularly intense in the imperial period in the province of *Belgica*, in the territory of the *Treviri*, *Mediomatrici* and *Lingones* tribes, and in the Rhineland, which was *Belgica*'s missionary territory for the *Epona* cult. But the inscription in the peasant calendar of Guidizzolo, near Mantua, Italy, with a qualitative value equivalent to the quantitative index of hundreds of small votive objects, suggests that the cult of *Epona* had strong roots in the Upper Italian Celtic world, similarly to Gaul. Nor can the urban cult of the goddess on horseback be disputed. The cult probably originated in Upper Italy and can be traced to as early as the first century CE, and the locally rooted Danube cult of Rome. The figure of *Epona* is therefore not on deriving from a Celtic tribe or tribal confederation, but rather a common fertility goddess from mainland (and island?) Celticity, originally worshipped in the form of a horse. However, by the imperial period, the cult of the goddess was far from common in the Celtic territories and, moreover, was coloured by local cultural features from area to area. The increased worship of *Epona* by the tribes of eastern Belgium in the second-third centuries CE may be linked to the boom in animal husbandry and agriculture in general in the Moselle area, which coincides exactly in time and space with the rich memorial material of *Epona* here" (Nagy 1953).

The Celtic beginnings of the *Epona* cult are therefore unknown to us from an archaeological point of view, not only in terms of its origins and location, but also in terms of its form and nature. Its manifestation in a rural, late Celtic settlement could take the form of a ritually placed animal deposit, the species of which would be the iconic animal of *Epona* – the horse. Some of the depictions that are certainly related to *Epona* show a mare (female horse) and a foal together with the figure of the goddess. Stallions and (male) horseman have different associations (*Rudiobus*, *Mars Segomo, Mars Rudianos*, Thracian horseman and Danubian horseman, *cf.* Green 2002, 208; Varga 2020, 120); although their syncretism cannot be excluded. They may appear together on a votive plate (*cf.* Mackintosh 1991; Plemić 2013).

4. Horse deposits of a similar date from pits in European Celtic settlements

In this subsection, I will discuss (complete/partial) horse skeletons recovered from Celtic sites of similar age (between BCE 50 and CE 150, based on the radiocarbon date interval of the Balatonőszöd horse skeleton) and labelled as native settlements. I have not included examples of horse and man buried together or close together (*e.g.* Jubilee Line, Stratford Langthorne Abbey, East London in Great Britain: Green 2002, 99, Fig. 5.5; from the territory of France: Méniel 1992, 65-104), nor do I discuss horse bones recovered during excavations at Celtic sanctuaries or cemeteries (*e.g.* Gournay-sur-Aronde and Ribemont-sur-Ancre in France: Green 2002, 113-114; Méniel 1992, 1ère Partie, 9-104, 2e Partie, 105-156; Méniel 2008). Nor will I discuss horse skeletons excavated in Romanised Celtic sites of a similar age (e.g. Icklingham in Great Britain: The skeleton of a horse injured in an accident was interpreted as a carcass: Levine *et al.* 2002; there are other sites with similar interpretations from the Netherlands: Lauwerier 1999, 107, and from France: Lepetz–Van Andringa 2008).

An early Roman fort, previously abandoned, was established again on the southern shore of Lake Balaton, on the new track of the M7 motorway with a hiatus as a Romanised native settlement at the Ordacsehi–Bugaszeg site, in the second-third centuries CE. Here, a complete horse skeleton along with other animal skeletal remains was uncovered in one of the wells. According to the excavation description, the well was used secondarily as a carrion pit (Gallina *et al.* 2007, 216). By narrowing the search in this way, I found surprisingly few cases.

A pit containing a complete horse skeleton and another pit with only two horse legs came to light at the Rijswijk site in the Netherlands. Two partial horse skeletons were found in one pit in Velsen–Hoovens. In general, horse meat was not consumed on Dutch indigenous sites, with a few exceptions. In this case, the zooarchaeologist assumed that although horse meat was not favoured, but that exceptions could be made for a few special occasions: famine or a ritual ceremony. It may also have been that the horse died of disease, and was buried without being eaten (Lauwerier 1999, 108).

Other cases are clearly ritual in their aspects. Two horses were buried in front of the entrances to two buildings as a building sacrifice on the site of a Romanised native villa in Druten. A similar event took place at the site of Wijster where cattle was sacrificed along with the horse. A solitary horse grave was found in front of the farm entrance as a settlement sacrifice at the site of Leidschendam–De Leeuwenbergh site. At the same site, the carcasses of a young horse and two dogs were interpreted as marking a ceremonial place (Lauwerier 1999, 109).

The Houten–Tielland site is mentioned as a special case, where 87 bones from a five-year-old mare were found in a pit arranged in non-anatomical order, with traces of cutting and other signs of processing. The butchery marks clearly indicated processing for food consumption, although the horse was not consumed at the site according to the zooarchaelogical study that fully processed the faunal material from the site. In this extreme case, the pit was interpreted as the remains of a ritual feast (Lauwerier 1999, 109-110).

In Britain, the horse as a special deposit found in pits was over-represented compared to other animal species in native settlements. The skull is the most commonly found skeletal element. Horse meat was also consumed in southern England. At Tollard Royal a complete skeleton was found in a pit, at the site of Danebury with a head-neck-chest section was deposited in a later hole dug in a pit along with some chipped stone tools. According to the zooarchaelogist, the horse had been cut open and eviscerated (Green 2002, 115-116).

5. The Goddess Epona

Although *Epona* was identified as early as the nineteenth century among the known archaeological finds (*esp.* the works of Salomon Reinach, *e.g.* Reinach 1895), most of the finds related to the goddess and her cult were not found in Celtic, but rather in a Romanised or Romanised native (mostly former Celtic, Germanic, Pannonian/Illyrian) environment, similar to the written Latin or Greek sources that mention her (Early pre-Roman, *i.e.* Celtic, *e.g.* the stone statues of the Woman from Bourges, first century BCE: Linduff 1979, 824, Fig. 12; and the Warrior from Ste. Anastasie: Linduff 1979, 824, Fig. 13; for a summary, see *e.g.* Linduff 1979, 820-821; Mírová 2019, 179-182). Unlike other equestrian gods/goddesses/heroes, however, *Epona* has no ancient (Roman or Greek) counterpart or antecedent. However, she was so popular because of her universal character (as the mistress of life and death, of prosperity, wealth, fertility, vegetation, rebirth, and more specifically as the protector of horses and riders, travellers, transporters/carriers, *etc*. (for modern religious history overview of *Epona*, see Poitrenaud 2015) that Rome, made 18 December her official feast day as the only Celtic god(dess). There are two inscriptions from the Central Balkans mentioning *Epona* (Doclea and Branetić), both were on silver vessels, which were not associated with horses/horsemanship but with mining. In this case, the figure of *Epona* was intertwined with the local figure of *Dea Orcia* or *Terra Mater* (Gavrilovic 2013, 254.; Duval 1976, 50). The stables were decorated, libations were offered and, pigs were sacrificed in her honour (Varga 2020, 120). Most of the libation was done with a *patera* (which were often found with a depiction/attribute of *Epona*, or *Epona* was depicted holding a sacrificial *patera: e.g.* Reinach 1895, 119). The large stone bas-relief from Beihingen (Germany), depicts two men sacrificing a pig to *Epona* (Schleiermacher 1933, 130).

The confusion is further compounded by the fact that the figure of the goddess associated with horses was not only familiar to the Celtic but also to other Indo-European peoples (*e.g.* Germanic, Iranian). The Roman *Epona* depictions, which mostly date from the second to third centuries CE, show certain groupings on maps (associated with the appearance of Roman mounted military squadrons along the frontier: Linduff 1979, 827-832; Speidel 1994, 123), but differ in their iconography.

The 'Horses facing *Epona*', also known as the 'Imperial type', is typical in Italy, North-Africa, England and along the Danube (Linduff 1979, 823, 837). According to Katheryn Linduff, the iconography of the goddess between two horses, which is popular in the Danube provinces, derives from local beliefs that *Epona* is known as a tamer of wild animals and may have appeared as an emphasis on the local domestication motif (Thrace was a famous horse-taming and breeding region, see Rabadjiev 2014). All the depictions are unified expressions of *Epona* as the protector of horses and the goddess of abundance. In its main aspects, the goddess is mainly seen as nurturing, protecting and providing fertility. For this reason, *Epona* has been associated or overlapped with other Celtic fertility goddesses (*e.g. Matres, Matronae*); and with Rhiannon of the

island Celts (Welsh). Several of her statues have emerged from (sacred) lakes, wells, springs, showing the goddess' relationship with water as the source of life, representing her powers of renewal, rejuvenation, healing, possibly purification; and her funerary/death aspect (as protector of the dead, companion in the afterlife). As Rhiannon rides out of the darkness in her flaming cloak, it is a sign that she has defeated death and returned from her journey to the afterlife, similarly to the figure of the Thracian equestrian hero (Linduff 1979, 834-835; Speidel 1994, 126-127). The latter aspect is indicated by the fact that, in several cases, mainly in the former western Celtic/Gaelic area, representations of her have been found in funerary settings (in funerary mounds, in graves, on gravestones, *e.g.* a sarcophagus from Arles: Benoit 1959, Fig. 4; the tomb-stele from Agassac: Linduff 1979, Fig. 8; the funeral steles from Horgne-au-Sablon near Metz: Poitrenaud 2015, 6).

6. Archaeological traces of the Epona cult in Hungary during the Roman Empire

Since traces of the *Epona* cult in the Roman period can be found more often from the second-third centuries CE, it is necessary to examine a time interval greater than the first-second centuries CE because of the comparative material that can be included.

6.1. Budapest, XI. district–Albertfalva (Pannonia Inferior, Eraviscan native tribe)

Stone altar with inscription

A stone altar, damaged on its right side, was found near a group of buildings excavated in 1947 near the *vicus* of the auxiliary fort in the southeastern part of the Romanized *Eraviscan* settlement, in 1944. Date: 200–300 CE (Nagy 1954, 13, note 34; Varga 2020, 104; http://lupa.at/10788 (01.03.2024)) Inscription: *Epon[ae] / sacr[um] / C(aius) Iul[ius] / Vita[lis] / tub[ic(en)] / v(otum) s(olvit) l(ibens) [m(erito)]*

Terracotta horse figurines

Two terracotta horse figurine fragments were found in 2006 in the northern part of the Alberfalva *vicus*, on Hunyadi János Street, Budapest. A fragment of the rear section of the figurine was found lying in a well and has been dated between CE 73–250, while a head fragment was brought to light in a pit house and has been dated to the end of the second century CE (Varga 2020, 124, Cat, No. 9, 12, Fig. 6.1, 4).

6.2. Budapest, district III–Óbuda [Aquincum] (Pannonia Inferior, Eraviscan native tribe)

Fragmentary stone altar with inscription

The altar was found south of the *macellum*, near the southern city gate on the north-south main street, in the third residential building. Since, according to the plan of the excavated wall remains, a public building once stood here, it is conceivable that travellers who had successfully completed their journeys from distant places offered their vows in front of the altar here. The building also included a *tablinum* and a dining room. Date: 201–300 CE (Nagy 1937, 263; CIL III, 03420; Varga 2020, 120). The altar was erected by *Apuleius Januarius*, a cavalryman in the 2nd *legio Adiutrix*, in honour of *Epona Augusta*. Inscription: *Epon(a)e Aug(ustae) / Apulei{i} us / Ianuari/us eq(ues) leg(ionis) / II Ad(iutricis) P(iae) F(idelis) / v(otum) s(olvit) l(ibens) m(erito)* (https://eponainscriptions.wordpress.com/cil-03-03420/ (05.03.2024))

Votive metal plate

(The description is based on a photograph.) The metal plate was found in 1845 in Óbuda. Its owner, Ferencz Kis, cleaned off the dirt and engraved his initials ('KISF') on the back. The find was presented to experts in Budapest, then in Berlin, Rome and Naples, who identified it as an *Epona* votive tablet (Magyar Akadémiai Értesítő 1847, 8. szám, 235, with lithography, Fig. 6).

The goddess, shown seated in a long tunic tied just below her breast, rests her feet on a pedestal. The edges of the throne, which ends in a high buttress, are accentuated by notches. The hair of the goddess is symmetrically parted. The equine figures facing each other are not identical: the horse figure on the right is taller, more corpulent and has her head turned facing upwards, while the figure on the left is smaller and has her head turned sideways. The jaws of both animals are shown both touching the bundle of grain in the goddess' lap.

The rectangular, gable-roofed building is depicted with incised line stacks. It has a niche-like form. Its interior is further divided by a floor and an ornate twisted column at the top of the building's sides. The upper triangular top of the slab, terminating in a *tympanum*, is damaged at its apex.

The grave stone was found on the banks of the Danube River north of Budapest–Hajógyár Island, in the area of the roman city of *Aquincum* (Hungarian National Museum, Inv. No. 61.13.36). Although questions were raised about the authenticity of the find, Tibor Nagy considered it to be original (Nagy 1965, 114, Fig. 6: "In a columnar *aedicule* frame on a cast bronze plate, *Epona*, enthroned in the centre, rests her hands on the heads of two horses standing frontally on her right and left, facing her lap.") Date: second-third centuries CE. Size: 79.4 mm (L); 67.2 mm (W); 3 mm (Th).

This gravestone is closest to the Worms relief in terms of its layout which belongs to the so-called 'Imperial type' composition (Boucher 1990, 993, Kat. 189).

6.3. Szentendre, the Ulcisia castra military fort (Pannonia Inferior, Eraviscan native tribe)

Inscribed stone altar

The inscribed altar may have stood in one of the stables (now the Waczek residence) and came from the *porta decumana*, originally the *retentura* part of the military fort. According to a mention by the consuls from CE 241 in the *Cohors milliaria Nova Severiana Surorum Sagittariorum Iul. Victor*, a Syrian cavalry archer soldier, dedicated it to the spirit of the *cohors* and to *Regina Epona* (Nagy 1943, 397; Nagy 1973). Inscription: *Genio t(urmae) et / Epon(a) e Reg(inae) / Iul(ius) Victor / eq(ues) vexi(llarius) coh(ortis) / n(ova) S(everianae) Gordian(ae) / S(urorum) s(agittariorum) in honore(m) t(urmae) / v(otum) s(olvit) l(ibens) m(erito) / Imp(eratore) d(omino) n(ostro) Gordiano / II et {et} Pomp(eiano) co(n)s(ulibus) / Kal(endis) Iun(iis)* (https://www.epona.net/inscriptions.html (05.03.2024))

6.4. Dacia

A stone relief from an unknown provenance. It shows the so-called '*Epona* associated with horses' (the 2nd type of Salomon Reinach: Nagy 1965, 97) or 'Imperial type *Epona*' (after Wilhelm Schleiermacher: Nagy 1965, 97) made from Dacian (?) marble (?). The provenance of the find is questionable. The find came from a private collector, József Fleissig (For his activity see Kemenczei 2005–2006). Different information concerning the name of the private collector

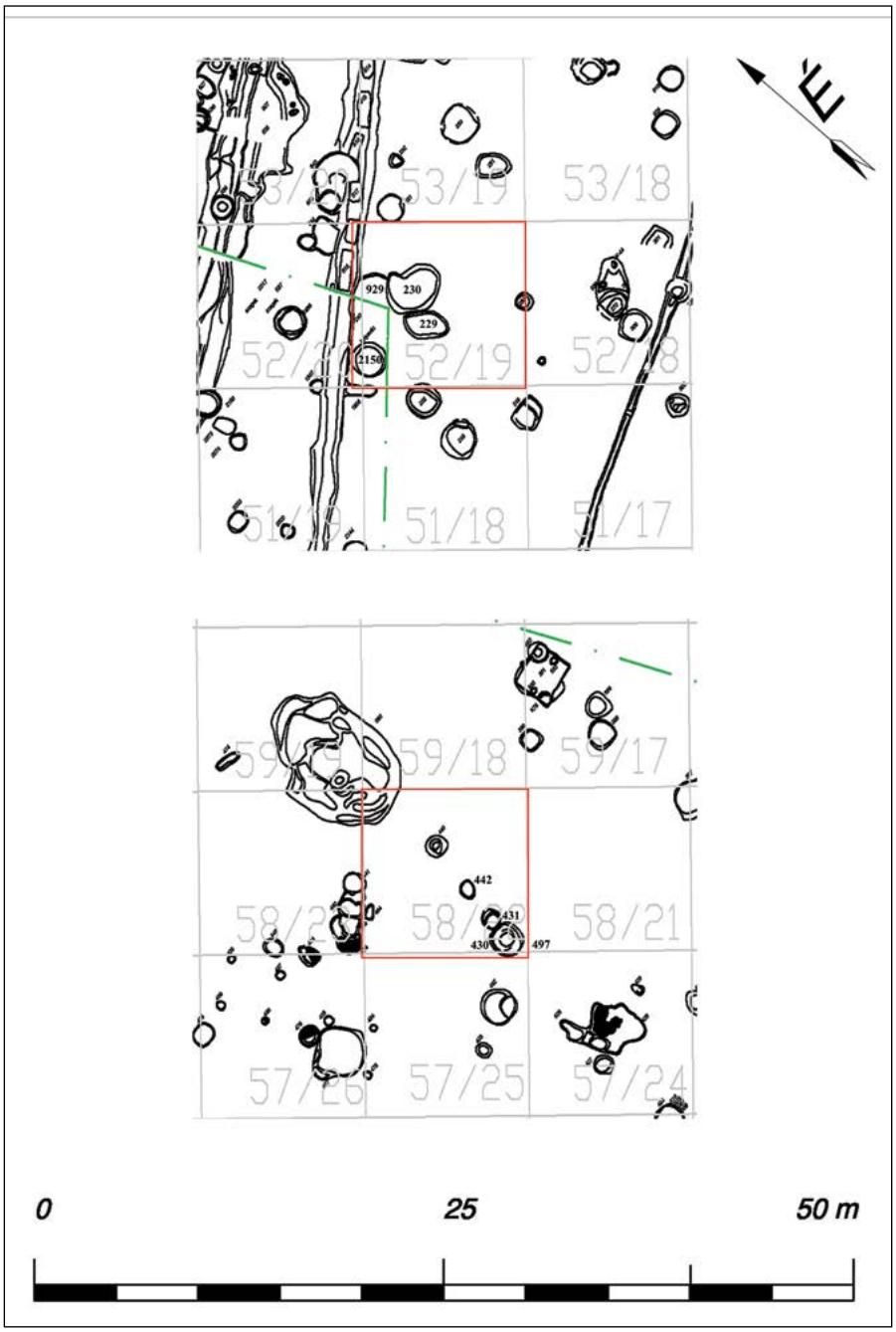

Fig. 4. *Cuts from the groundplan of the excavation with the two studied areas. In the red frame, the certain features with details from the horse deposits. Made by Tünde Horváth.*

is written on the museum find box, however: "Purchased from the collection of Ernő Fogarasi/from the collection of Pál Fabó". in Budapest. The relief was transferred to the Collection of Antiquities of the Budapest Museum of Fine Arts (Inv. No. 60.15.A, 21×20,4×3,2 cm, https://www.szepmuveszeti.hu/mutargyak/6521/ (14.03.2024)).

The raw material, thought to be marble, has not been studied yet by geological (macroscopical, microscopical), or chemical (stable isotopic, XRF, CL) analyses.

The raw material appears as a greyish-yellow crystalline textured stone slab. The back side seems to be original, unworked, with traces/imprints of organic materials. Simple macroscopic experiments (dripping with vinegar and hydrochloric acid) and removal of the contamination (cortex) were not authorised. A steel needle scratches easily the stone giving it a hardness of 3 on the Mohs scale. In fact, it could be hard limestone or recrystallised dolomite or sandstone (For the raw material analysis of rocks considered to be Roman marble in Hungary in general see http://www.ace.hu/daad/daad1/). The object was discussed in detail in a study by Tibor Nagy in the Annual of the Museum of Fine Arts in 1965 (Nagy 1965).

I have not found any clues as to the origin of the idea of the *Dacian* derivation of the relief in relation to Joseph Fleissig. According to Dumitru Tudor (Tudor 1976, 144), no *Epona* relief has been found in *Dacia*, and few figures are known from the southern Danube provinces. Today, more are known from this area (*e.g.* Plovdiv, Abrit, Gigen, Harletz,

for a summary, see Plemić 2013, 66); and, contrary to Tudor's opinion, there are now also relief fragments (2 pieces) dedicated to *Epona* from *Tibiscum* (*Dacia*), dated to the third century CE (Timoc 1997; Gavrilovic 2013, 252, Fig. 3, footnote 16). Their iconography and shape of the fragmentary reliefs differ from the Budapest Museum of Fine Arts piece (*e.g.*, a sacred tree appears next to *Epona* in the upper left corner, not a *velum)*. Furthermore, the name of *Epona* also appears in inscriptions from *Dacia*: on an inscription from *Sarmizegethusa* (Várhely), dedicated by *Marcus Calventius Viator* centurion and horse trainer to the goddess *Epona* and the *Campestres,* a triple mother goddess figure (Speidel 1994, 33-34, Fig. 3; Husar 1995, 88; Gavrilovic 2013, 255). *Epona Augusta* is mentioned on other votive monuments from *Apulum*/Alba Iulia (Gyulafehérvár: *AE 1983, 815*); and *Epona Regina*, also from Alba Iulia (*CIL III 7750*).

My own description modifies and supplements his excellent observations in minor details *(Fig. 7)*.

The relief, striving for symmetry, depicts the front view of a rectangular building, a *naiskos* or *aedicule* (Nagy 1965: naiskos; Plemić 2013, 67: aedicule). The stone altar from the only known sanctuary dedicated to *Epona* in Entrains-sur-Nohain (Nièvre, France) bears the following inscription: *Augusto sacrum deae / Eponae / Connonius Icotasgi fil(ius) / templum cum suisorna/mentis omnibus de suodonavit l(ibens) m(erito) (*see Boucher 1984*)*. In her study, the author argues for a first century CE date. Another sacred place dedicated to the goddess is located in Châteaubleau, where nine small bronze horses, probably representing mares, were discovered in a cultic well in the centre of an octagonal building which bordered one of the three fanums of the Gallo-Roman sanctuary, together with a stone statuette of the goddess (Poitrenaud 2015, 2). The gabled roof is represented by a triangular *tympanum*, and the walls and floor by a rectangular frame (also called a niche).

A similar framed design was represented on the so-called Danubian horseman type lead plates (D. Tudor type III) from the provinces of *Dacia* and *Moesia* (Plemić 2013, 67). Most of these are made from lead and are believed to have been produced in one workshop (Tudor 1976, 66, 69) and, on the bronze plate from *Aquincum* (see above, and *Fig. 6*) and on a sandstone *Epona* relief from near Troesmis, from Cerna (Romania/Moesia Inferior, Alexandrescu 2017, 11-15, Taf. II: Abb. 3).

Beneath the ceiling, in the upper right and left corners, a *velum* (multiple drapery-like curtains not touching each other) cascade down. The symmetrical *velum* in the upper corners of the relief is known only from the mural of *Epona* in the *Maxentius Circus* in Rome (Nagy 1965, Fig. 5; https://www.epona.net/depictions.html, 01.03.2024). Garlands can be seen in the upper left corner, with *Epona* enthroned in the middle, flanked by a figure of a horse on the medallion of a serpent-ornamented vessel, made in Nad Klepečkom (*Viminacium*, *Moesia Superior*) in the mid-end of the second century CE. However, it has been interpreted by the authors as a rosary after a passage in *Apuleius' Metamorphosis* (Met. III, 27, 48: https://mek.oszk.hu/04000/04003/04003.htm#3).

The figural obverse, carved, engraved and polished, has a greyish cortex, which is reddish-brown in places. Additional details (incised or painted) may be hidden beneath the cortex as part of the representation.

In the centre of the space, divided in two by drapery, stands the front facing figure of the goddess *Epona* herself, seated on a throne with a back. Her head reaches up into the vault, her feet rest on a pedestal (low profiled stool/ *suppedaneum*). The female figure is middle-aged, her hair is parted, she wears a shirt with short sleeves and a cut out neck, her tunic (*chiton*) is pleated and ankle-length, and she wears a belt high around her waist, below her breasts. She rests her two hands on the necks of the left and right figures of the horses, depicted in a side view, facing and striding symmetrically towards her: her hand has a smoothing motion makes a smoothing motion on the larger horse figure while her fingers are spread wide open on the

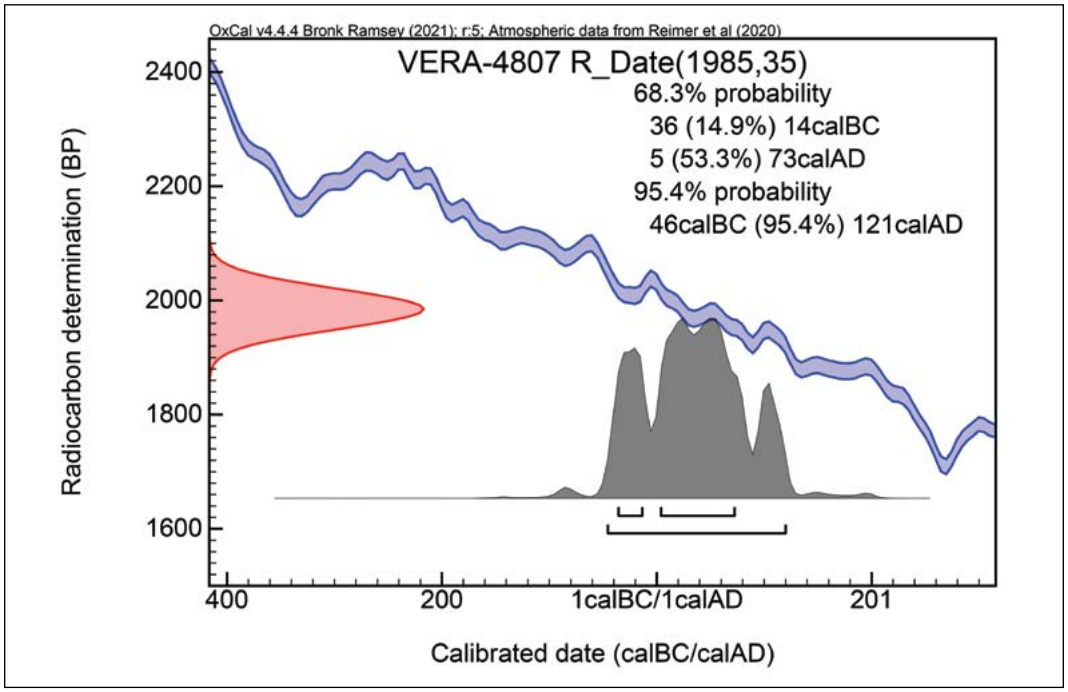

Fig. 5. *Calibration of the radiocarbon date from the horse skeleton from Pit 229 (VERA-4807, Plot single). Made by Tünde Horváth.*

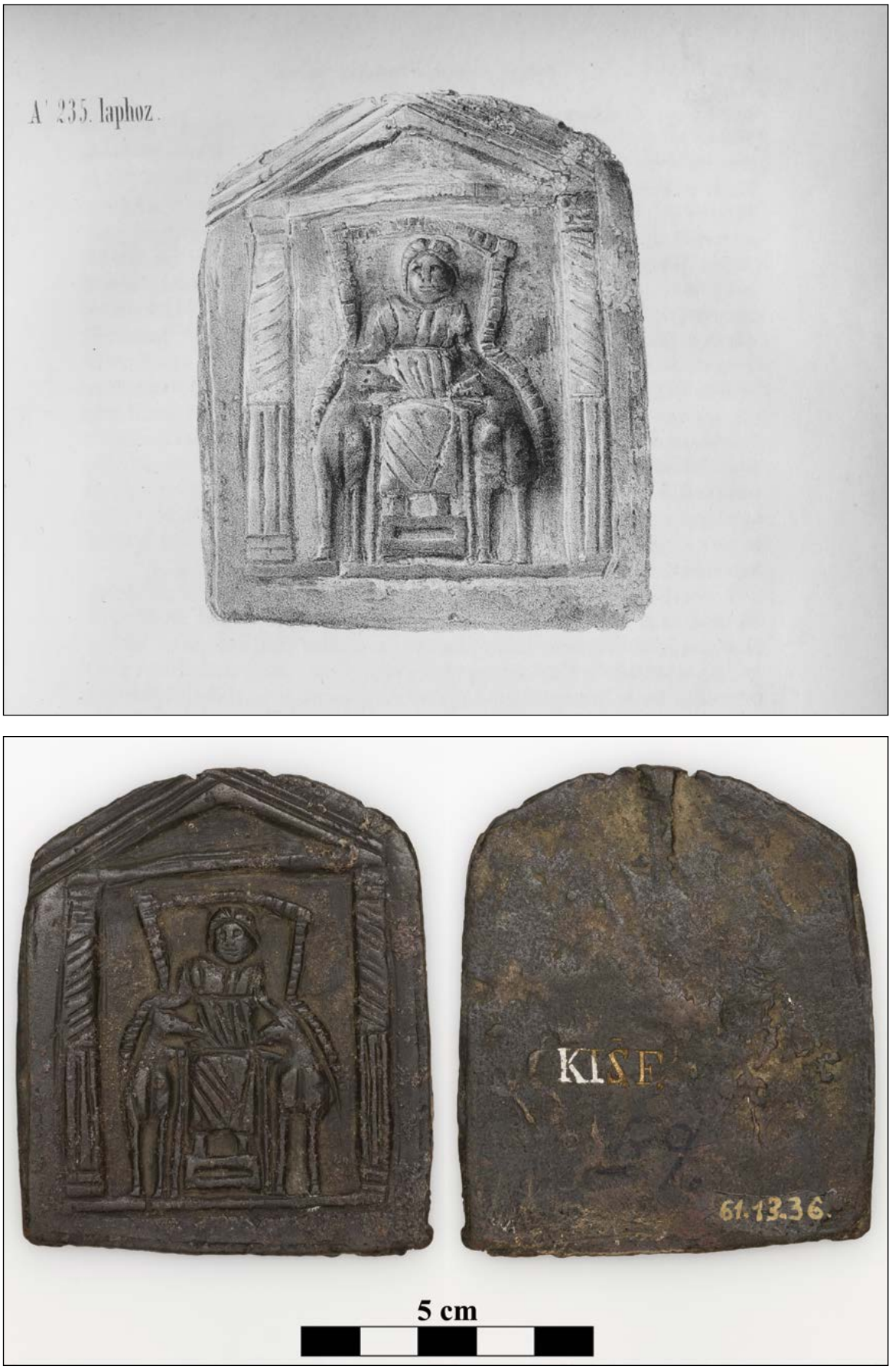

Fig. 6.1-2. *Metal votive plate of depicting Epona from the Hungarian National Museum in Budapest, Inv. No. RT-RO 61.13.36. = 28/1860.XI.1. © Magyar Nemzeti Múzeum.1. Original lithography made by Ferencz Kis in 1847 (after Akadémiai Értesítő 1847, no. 8, 235). 2. Coloured photos from the front and back side of the metal plate, taken by Iván Jaksity. Layout by Tünde Horváth.*

Fig. 7. *Stone votive tablet of Epona from the Museum of Fine Arts at Budapest, Antique Collection, Inv. No. 60.15.A. 1. Frontside. 2. Obverse. Taken by Tünde Horváth.*

smaller horse, gripping the mare's neck. According to Tibor Nagy, this gesture does not represent the *potnia thérón/ mistress* of animals, but the *hippotrophy/feeder* of animals (Nagy 1965, 109). Nagy considered it possible that there is fodder depicted on the enthroned female figure's lap, covered with paint, which has now worn off (Nagy 1965, 96). This assumption, which would now be easily verifiable under an UV lamp, cannot now be carried out because of the dirt that has accumulated on the piece.

The horses, held upright and facing downwards, rest their heads on *Epona*'s lap, their chins touching her dress. The two horse figures, although superficially similar, are subtly different: the one on the right is slightly larger, more stout, with more pronounced ears than the one on the left. As with other *Epona* depictions, we may be looking at a mare and her foal. This difference was also noted by Tibor Nagy, although he considered both horse figures to be foals (Nagy 1965, 96).

A foal and a mare pair is depicted *e.g.* in the find from Brazey, France (Green 2002, 205, Fig. 8.6); and in reliefs from Chorey, France (Linduff 1979, Fig. 4; *and Mellecey, France:* Linduff 1979, Fig. 3). The figures of the two horses step out of the structured space: at the height of their hind quarters, the frame representing the wall disappears, leaving the building open (opening a door to the outside world).

Slightly off centre, the panel is cracked in a vertical line up to the waist of the seated goddess figure. Minor damage and chipping, is visible at the top of the pediment and in its two lower corners.

The find is dated to the second half of the second century CE on the basis of its stylistic features (Nagy 1965, Fig. 3, 98; Szilágyi 2002, 176-177, Fig. 131). According to Tibor Nagy, the Imperial type was already widespread in Rome in wall paintings on stable walls by the end of the first century CE, after *Iuvenalis* (Sat. VIII, 74: https://mek.oszk.hu/19800/19858/19858.pdf), and from there the imperial type spread to the rest of the empire.

In addition, it should be noted here that, based on recent archaeological excavations, *Epona*'s depictions have already been discovered elsewhere, not only in stables. (For example, see the votive inscription on the wall of the stable of the governor in *Apulum*/Alba Iulia: Husar 1995; but also in luxury villa buildings and thermal baths, *e.g.* at Sens: *Driard*–Deyts 2013*)*.

The closest iconographic parallel comes from Harletz/ *Augustae* (Bulgaria/*Moesia Inferior*), where differences between the two horse figures are also clearly visible (Plemić 2013, Fig. 7). A now lost fragmentary marble relief from Čair, with four equines (Serbia/*Moesia Superior*) displays similarities (Gavrilovic 2013, 251, Fig. 2; Jovičić–Bogdanović 2018, 34, Fig. 1).

Since the best parallels for the find suggest a location in the Lower-Danubian provinces (*Moesia*), and no information or data now support its *Dacian* origin, it might be worthwhile placing the origin of the relief in *Moesia* or *Pannonia*.

7. Summary

Two horse skeletons were found during our excavations at Balatonőszöd–Temetői-dűlő, Transdanubia, Hungary. The horse carcass placed in shallow Pit 229 had been manipulated: it was dismembered and the remaining parts left in the pit in a non-anatomical order. The two hind (fleshy) limbs were missing: this part was removed, presumably for consumption. As no horse bone was found

in the animal bone material from the settlement, it is likely that the horse meat was not eaten on a daily basis. If it was consumed, it would have been on particular occasions: as food during times of scarcity or during a ritual feast on special occasions.

Pit 497 was dug secondarily into Pit 430 and the complete horse skeleton was laid within it. In this case, I interpreted the animal as a ritual deposit. Dutch horse burials of a similar age appear as construction/foundation sacrifices. The Balatonőszöd cases, however, cannot be linked to the entrance of the settlement or buildings.

At other sites, horse remains have been found in wet environments (*e.g.* wells). In the case of Balatonőszöd, since the horse remains were found in a pit, not a well, the 'sacred water' could have been Lake Balaton itself (Latin: *Lacus Pelso*), which may itself have been a *genius loci* for religious worship or embodied a water-related aspect of *Epona,* comparable with the name *Pelso* that appears on the hunting plate of the *Seuso* treasure (Vörös 2011, 254). Several springs known for their medicinal properties, have been found on the shores of Lake Balaton. These springs appear to have been known as early as the Celtic period, but certainly they were known from the Roman period, for example at Kékkút, Balatonfüred and Hévíz.

According to our observations during the excavation, the end of the Celtic settlement's life may have been brought about by a prolonged climatic decline, which turned wet and rainy, and caused Lake Balaton and the watercourses flowing into it to overflow and cover the coastal part of the Celtic settlement with silt along the line of the *Kis-* and *Nagy-Metszés* channels. A uniform layer of intact grey silt was recorded over the buried features along this stretch of the lake. Perhaps this catastrophic change may have triggered extreme transcendental behaviour – involving bloody animal sacrifice – by the inhabitants, who appealed to the gods for help (in vain), and this may have encouraged them finally to leave the settlement.

The horse sacrifice or sacrifices at Balatonőszöd cannot be clearly linked to *Epona*, although it cannot be ruled out that they were offered to the goddess. In this case, only the aspect of *Epona* related to sacred waters, purification, rebirth, could have been the motivation for the blood sacrifice.

The iconography or the find circumstances of the *Epona* depictions of later date, known from Roman or Romanised indigenous Celtic sites in Hungary, do not point to any interpretative direction that could be in any way related to the sacrificial activity connected to Balatonőszöd. All the artefacts found in *Pannonia Inferior* reflect the attitude of the goddess towards horses and riders, whose background and place of origin can be traced back to the Italian part of the Roman empire.

This difference in the goddess' attributes suggest a break between the Celtic (*interpretatio gallica*) and the Roman (*interpretatio romana*) practices of the *Epona* cult in the Carpathian Basin. However, it may also represent two different and divergent aspects of the goddess' multiple manifestations.

In other Roman depictions of *Epona*, the fish (*e.g.* on the tomb-stele from Agassac, France: Linduff 1979, Fig. 8; Poitrenaud 2015, 6-7, Fig. 8; on the plates with the Danubian Goddess and the Danubian Horseman from *Dacia* and *Moesia*, Lower Danube: Plemić 2013, 60-61, 69, Fig. 5.) and the hook symbols perhaps may refer to the water-related aspect of the goddess (*e.g.* on the stone relief from Koprno, Croatia: Poitrenaud 2015, 4, Fig. 5; on the handle of a silver hook discovered on Mount Rudnik, Serbia, decorated with a bust of a young woman placed between two duck heads and a goat: Poitrenaud 2015, 4).

Émile Thevenot noted that the goddess is sometimes depicted lying on the back of a mare, in the attitude of divinized springs and deduces a relationship with healing waters (Poitrenaud 2015, 2, Fig. 2: Allerey, France).

Abbreviations

AE - L'année épigraphique, Paris 1888.
CIL - *Corpus inscriptionum Latinarum*, Berlin 1872, ed. Th. Mommsen

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https://www.epona.net/timeline.html

Antique authors

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Decimus Iulius Iuvenalis Szatírái (Satires by Decimus Iulius Iuvenalis). Translation: János Kis, 1825. https://mek.oszk.hu/19800/19858/19858.pdf

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Do it Yourself, Sir...
Tracing Human Calcinates from Urnfield Period Cremation Burials

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Abstract: *This study is concerned with the extraction of human bones from cremation graves burnt on funeral pyres. It follows the complete workflow until the calcinated remains are handed over to the anthropologist. Recovery was mainly achieved by dry sieving (4 mm) followed by wet cleaning in sieves of 2 and 1 mm mesh size. The water was either poured over the calcinates in the sieves or I moved the sieves around in water stored in barrels like a gold-digger. Following this procedure, the calcinates were selected as they dried; after complete drying they were packed. Five days were spent on this task in October 2025, processing 124 kg of soil samples collected from 10 graves from a large Urnfield cemetery with 400 urn graves found at the site of Farád, NW Hungary (Table 1). Thus, the soil samples yielded anthropological information, in addition to palynological and ^{14}C data available from the site. The results will be published in two subsequent studies.*

Keywords: *Western Hungary, Late Bronze Age, Urnfield culture, burnt human bones, methodology*

Modern archaeology is characterised by the popularity of genetic, isotopic (strontium), pollen and ceramic analyses, non-destructive metal testing, LiDAR imaging, drones, preventive archaeology, spatial informatics, 3D modelling, and AI. Naturally, these specialties are just the tip of the iceberg and their concerted use is considered exceptional in many countries, including Hungary. That is to say, the above examples appear only as individual projects on the level of the "elites" of thee profession. They are not part of the general protocol, even if they are still formulated as "expectations".

In the history of archaeology, the collection of burnt, badly preserved human bones was typically neglected (Pap 2003, 67). In that case, who cares about the topic in the title and why is it important, even inevitable, according to this author? The answer lies in the goal – no matter how far-fetched it seems – of acquiring a profound knowledge of the people living in a given period. A specialist in the subject, Antónia Marcsik (2011, 440) formulated these ideas very clearly:

"The analysis of cremated bone remains comprises a special field in historical anthropology, requiring special care and attention. Human and animal bones must be separated, the fragments have to be ordered anatomically by size and colour on the level of individuals. Quantitative analysis should provide the number and weight of the bones; their colour is determined by the extent of the burning, that is, which parts of the cadaver were in direct contact with the flames. We can also study the fragmentation and the surface of the bones. The determination of gender is primarily based on morphological characters, as much as they are at our disposal, individual age of the deceased can be estimated on the basis of teeth and cranial sutures. The possibilities of further metrical analysis depend on, basically, the extent of cremation..."

Although evident, it needs to be explicitly written here: if anthropologists do not receive any material to work on, these kinds of observations cannot be made. As a first step, therefore, the phenomena providing the evidence, the cremation graves themselves should be explored and the human remains properly collected. The following sentence could have been written by any expert on various archaeological periods (Kulcsár *et al.* 2011, 144). The wording is clear and relevant to cremation graves from any period:

"*How to recognise cremation graves on a surface with the humus removed? A cremation cemetery can be indicated by some broken urn fragments with scattered calcinated bones, in other instances, smaller or larger burnt patches of rectangular form with rounded corners and burnt sediment with charcoal.*" *(Fig. 1)*.

An early example of this subject came to light here from northwestern Transdanubia, a region best known to the author. On the territory of the Delta motorway junction at Balatonfűzfő, in 1966, Sylvia Palágyi located some half dozen graves from a Late Tumulus culture - Early Urnfield period cemetery during rescue excavations. One of the deceased, a 20–35-year-old male, belonging to the society's elites, was buried with a sword, a battle axe and a bow, as well as a unique, decorated knife. The remains had been disturbed in the Roman period. The calcinated bones and a bronze sheet were found around a broken urn lying on its side. The excavating archaeologist observed the remains from the funeral pyre and collected the ashes comprising 270 g of calcinates scattered over a larger area. All these phenomena can be observed on the documentation photograph (*Fig. 2* – Ilon 2012, 137).

In the course of my professional career, I have had the chance to excavate Urnfield period cemeteries three times, in two localities. In the first case, (1999: Szombathely–Zanat),

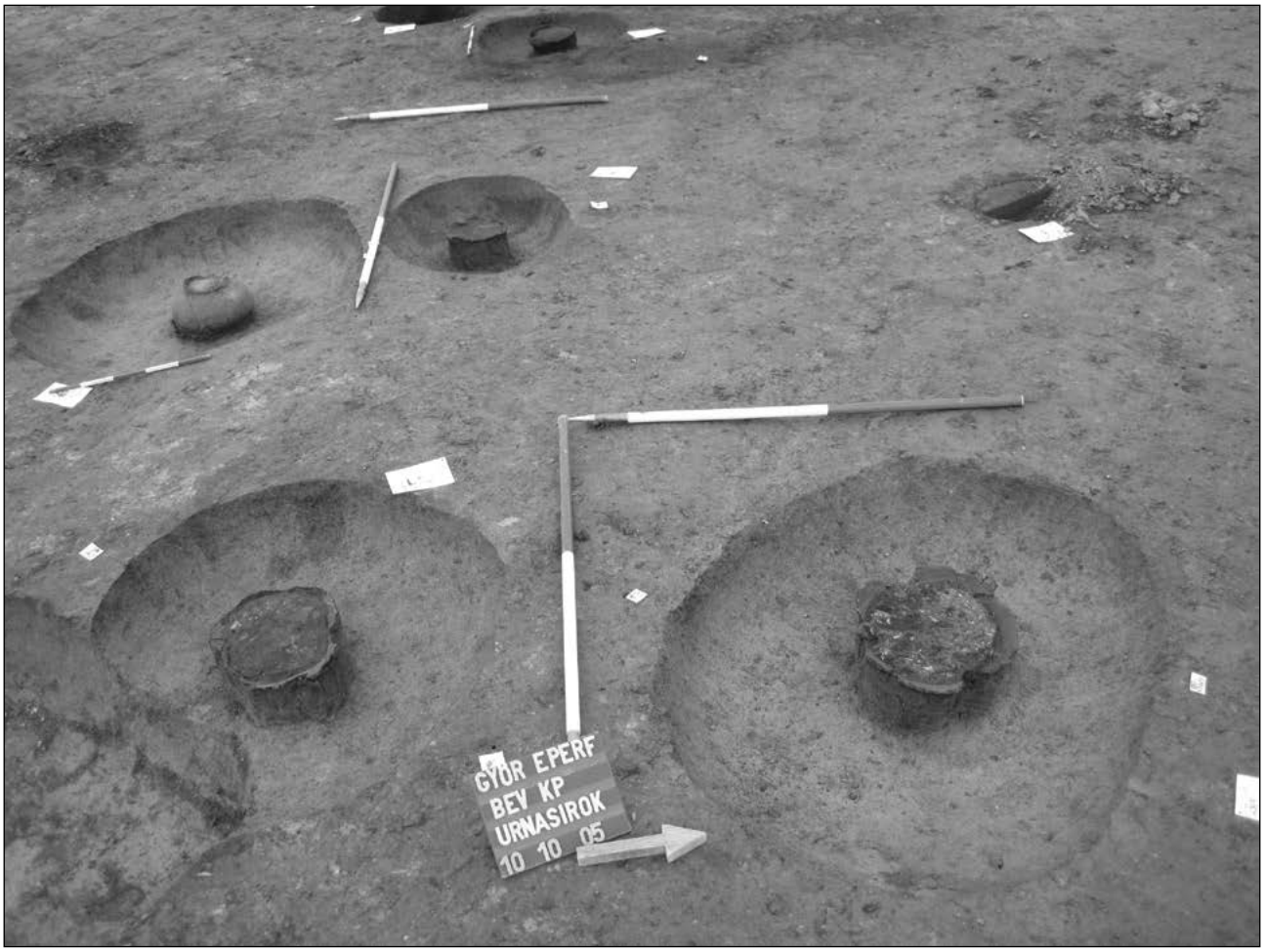

Fig. 1. *Details from Grave group I. from the Ménfőcsanak cemetery. Photo by J. Hatos.*

Fig. 2. *Grave No. 6. from the Balatonfűzfő cemetery. Photo by S. Palágyi.*

looking back from today's perspective, the excavation technique used here was only partly acceptable. Namely, the calcinates and the grave goods were collected on-site – albeit in the case of the graves, in collaboration with conservators. The drawings and photographic documentation could have been better as well; much precious information was lost. During the subsequent two excavations, however, we already operated in a way that approached international standards. Fine labour took place in the conservator's workshop (Gramsch 2008, 343–345, Abb. 3–4). The results, accordingly, were published in time. This was only possible within the framework of properly planned and financed teamwork. The first activity of this type occurred during the second phase of the rescue excavations at the Szombathely–Zanat cemetery in 2008 (Ilon *et al.* 2011). The second location was at the Győr-Ménfőcsanak–Széles-földek site in 2010 (Ilon 2015a). Both excavations were carried out during the short existence of the Cultural Heritage Protection Service (KÖSZ), an organisation specially dedicated to high standards in the realisation of large excavation surfaces and preventive excavation work. Of course, my happiness was not unclouded since, as of today, I still have not been able to get ^{14}C dating for the Zanat. This is a fundamental deficiency on an international comparison level. This deficiency could be made up any time, but nevertheless, it is a shame. In the case of the Ménfőcsanak cemetery, I did manage to procure ^{14}C dating.

What happened in these two places? Let us concentrate here on the calcinates that are the main concern here. All the graves were registered and documented according to the protocol, then, wherever it possible, they were lifted *in situ*. By this time, the time allowed for field activities had been shortened (we must not forget they were rescue excavations where timing is a major factor as the territory must be delivered to constructors according to contract). The contents of the vessels functioning as urns could be studied under more ideal conditions, in the conservator's workshop. There, the sediments could be removed from the vessels layer by layer (Marcsik 2011, 436), and the process documented in drawings and photographs. Soil samples were taken for palynological analysis, packing bones that were sufficiently preserved for ^{14}C dating, and for picking out the calcinates for specialist studies. The selected and cleaned human- and animal bones were transferred to the anthropologist and archaeozoologist, respectively. Steps in this process and their illustration are not presented here as they can be found and studied in the relevant technical literature mentioned above.

Grave No.	Grave type	Pkg. No.	Excavation date	Soil quantity (kg)	Calcinate quantity (gram)	Work time ("flotation") dry + wet + sorting (hours)	Cleaning date	Notes
S-486	urn	1155	06/04/2016	4.2	215	0,5 + sorting: 2	12/10/2025	
S-490	urn	877	02/08? /04/2016	16.8	13.2	1 + sorting: 0,5	12/10/2025	
S-504	biconical [vessel] + mug, bowl	1120	05/04/2016	5.4	27.9	0,5 + sorting: 0,5	14/10/2025	
S-516	urn + pin	1187	07/04/2016	16.3	15.8	1,5 + sorting: 0,5	10/10/2025	
S-517	half of an urn	1172	07/04/2016	11.2	.0,9	1 + sorting: 0,5	10/10/2025	
S-518	bowl in urn + mug	1173, 5117	07/04/2016	35.1	621	3 + sorting: 4	08,09/10/2025	The grave vessel could not have contained this much soil
S-538	urn, from shoulder down + bronze pin/wire	1273	13/04/2016	14.4	728	1 + sorting: 2	14/10/2025	
S-568	lower part of urn	1330	18/04/2016	4	317	1 + sorting: 1	10/10/2025	
S-1130	lower part of urn	1462, 3444	30/04/2016	7.7	116	0,7 + sorting: 1	14/10/2025	
S-1625	urn + cup, twisted bronze ring, 4 closed bronze rings	3421, 3425	21/06/2016	8.9	608	1 + sorting: 2	14/10/2025	
				total: 124	*2662.8*	*total: 25,2 (+ 2 final packaging, administration)*	*5 days*	

Table 1.

What can we do if the circumstances and situation are not as ideal as in the case of the two aforementioned cemeteries?

Research at Farád–Dámföld, located on the border between the Rábaköz and the Hanság region in northwest Hungary did not start badly either. The anthropological material from the trial excavations in 2014 could be extracted based on the workflow described above at the Szombathely Centre for Heritage Research, a branch unit of the Hungarian National Museum, the legal successor of KÖSZ. The details of the anthropological study (there were samples suitable for analysis from 13 graves) from the nearly 400 grave cemetery were published later than the publication of the archaeological finds from the 19 graves found during the trial excavation (Ilon 2015b 235–236, 246, Taf. 14B-C; Czigány 2024, Fig. 7.2.E2. Table 1). The rescue excavations of 2016 already took place under the aegis of the Rómer Flóris Museum of Art and History (RFMTM). The excavations were led by Dávid Czigány, an archaeologist at the RFMTM. The grave of the only armed warrior buried in the cemetery (Grave 394) was evaluated by the excavation leader and the author of this paper in 2025: the publication is already in press (Czigány–Ilon 2026). Following wet sieving with a 1 mm hole diameter mesh, the author could find 1.28 g calcinate associated with a 12 – x year old person in the 17.25 g soil sample taken from the grave In the meantime, it was decided that the 10 burials, together with the existing palynological report and ^{14}C dates (Sümegi 2016) should be published as soon as possible. The quantity of collected soil samples and their method of extraction is unknown. Thus *Table 1* should be completed with these unknown but not essentially relevant data.

This goal ended in my taking the matter, literally, into my hands, to extract the burnt human remains, i. e. the calcinates from the sediment samples collected. Therefore, while in the previous three cases, my colleagues followed my instructions, now I became my own boss. Below, I describe my personal experiences.

The method used in geological micropalaeontology (Biró 2011, 507) would have been well suited to carry out the archaeological- anthropological study, but *silting*, applied for the first time in my professional career at Gór on a series of sieves *(Fig. 3)* was out of question here. *Why?* The series of copper sieves was no longer at my disposal;

Fig. 3. *Silting at the site Gór–Kápolnadomb. Photo by the Author, 1991.*

furthermore, as I observed at Gór, this method is extremely water intensive. Then and at that time (summer) we had access to piped water. Now, in October, when I was faced with this challenge, the weather conditions were anything but summerlike. During the 5 days considered necessary for the activity and over two weeks, the temperature never rose above 18 °C. Typically, the sun was shining and the wind was only blowing on the first day. Water provision was not a problem as we have a well dug in the yard, from where I could have extracted several cubic metres of water per day with an electric motor pump. At home, of course, I had no facility for floatation, either *(Fig. 4)*, but on the strength of my former experiences *(Fig. 5)* I would not have applied it anyway. Today, the large amount of water required is no longer acceptable to me.

Before going into the details of my work here, let us clear some basic concepts.

Several descriptions for the concept of sieving, silting and floatation and their application could be mentioned here: Some of them include (Vértes 1954, 104; Bartosiewicz 1983; Jerem 2003, 42. on Fig. 5, the Gór series of sieves; Gyulai 2003, 64; Gyulai 2011, 455; Torma–Sümegi 2015, 104–105; Pető–Kenéz 2018,12, 37–38, Fig. 23–24). Although in the 1980s, two specialists had already, had drawn the

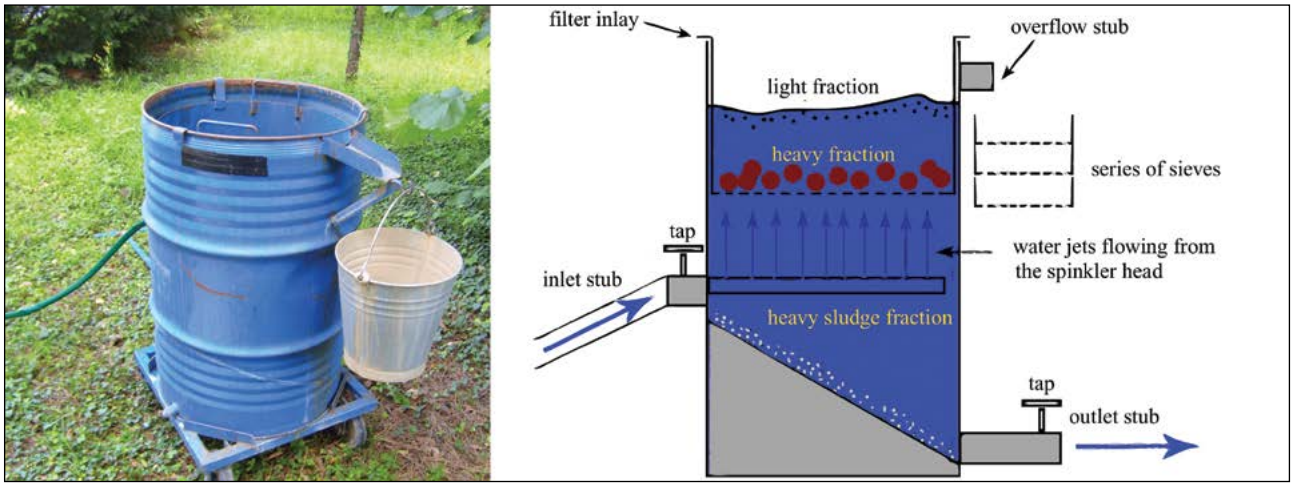

Fig. 4. *Flotation equipment and its operating principle. Constructed by Á. Kenéz.*

attention of Hungarian researchers to the applicability and usefulness of these methods (Bartosiewicz 1983, 1988, 2021, 387; Takács 1988), apart from those studying the Palaeolithic period, less than a dozen researchers have regularly used silting or flotation in the past nearly half century. Most were not archaeologists but rather biologists supporting archaeological research (e.g., malacologists, archaeozoologists and, archaeobotanists).

The three methods were presented in the clearest, most striking and most complete way by the archaeobotanist Andrea Torma in the volume „ *A régésztechnikus kézikönyve I.*" [The handbook of the archaeological technician]. Let me quote her verbatim:

1. sieving (Fig. 6)

The simplest method for detaching soil grains and inorganic debris from each other is filtering the cultural layer with the expected finds through sieves with a 3-10 mm mesh size. The advantage of the method is its low device requirement (strong kitchen sieves, laboratory hand sieves or mason's screens can be used); its drawback is that it can only be used for completely dry sediments. Small botanical finds cannot be collected efficiently using dry sieving.

2. silting (Fig. 3)

This method was used first for palaeontological studies for analysis of Pleistocene sediments (so-called Rangle's silting equipment). It was introduced for use on archaeological excavations since the 1960s. The essence of the process is to wash the soil sample to be tested with water through a sieve. In our country, the most popular silting equipment is a set of sieves with gradually smaller mesh size (such as 4-2-1, 5-1-0, 5-0.25 mm), that are fixed on a supporting frame. The water passing through the row of sieves and the washed-out inorganic debris (soil particles) flow into a settling tank, from where the water flows out when the tank is full. The process of silting consumes rather a lot of water as operating it requires running water. The hole diameter of the lowest sieve should not be too small because the soil particles cannot pass through and the sieve might get clogged.

3. flotation (Fig. 4–5)

Flotation is based on the differences in specific gravity of varying materials. Inorganic materials with a specific gravity greater than that of water will sink to the bottom of the settling tank, while materials with a specific gravity lighter than water (plant parts, bones, etc.) float to the surface of the water, so they can be easily taken off. Wet organic materials can also sink to the bottom of the tank, which can be brought to surface with a jet of water. For the flotation process, we only need a sufficiently large settling tank, a sieve for picking out the finds from the surface and an ample water supply. This process also requires a lot of water. Water will also introduce air into the system, so the air bubbles will be attached to the low-density residues and bring them to the surface.

As we have seen above, the process of silting and flotation can be combined, thus increasing the efficiency of collection (Torma 2002, 260–261). This was eminently confirmed by experiments in the 1980s in Hungary (Bartosiewicz 1983, 1988, especially 268–269, Fig. 1, Table 1); however, they did not result in the general application of the method.

What tool kit did the author use for the applied methodology?

1) *Wheelbarrow*. A common wheelbarrow, available in general stores, were in regular service on our residential grounds. They had rubber wheels and an iron plate tray *(Fig. 6)*.

Fig. 5. *Flotation in action at the KÖSZ (Cultural Heritage Protection Service), Szombathely base. Photo by the Author, 2014.*

2) *Wooden picket.* Two pieces of strong locust wood, 2 x 2 cm in cross section. Locust wood withstands exposure to water well. The pieces of wood are 65 cm long to comfortably fit across the tray of the wheelbarrow but short enough so as not to hinder the work. Any sieve smaller than the tray of the wheelbarrow can be placed on them so that only the distance between the pickets should be adjusted *(Fig. 6–7)*.

3) *Coarse mason's sieve.* Made of pine wood, and normally used to make fine concrete or fine lime plaster. The size of the rectangular frame is 55 x 25 cm, its height comes from the nailed together, 9 cm high plank. It has two handles on the short side under the rim. It was fastened with small nails. The handles were 12 cm long and 1.5 cm wide. The frame was supplied with an iron mesh with 4 mm, rectangular holes, fixed with a 0.5 cm thick and 1.5 cm wide plywood sheet *(Fig. 6)*.

This tool was inherited from the previous owner of our house, so it is at least 50 years old. I have reinforced the corners with a few nails, as well as the plywood sheet holding the net. Former use had badly damaged this latter part (corrugated, missing in one section) due to it regular contact water, concrete, and mortar.

4) Basin-form sieve *cribble*. A coarse sieve with two handles, made of aluminium alloy, bought in a general hardware store. The diameter of its mouth is 31 cm, the height is 10 cm. A small wire base raises it 0.5 cm above the tabletop, so that the sample, e.g., the bone fragments inside, can be ventilated from below. The holes of the sieve are round and 2 mm in diameter *(Fig. 7)*.

5) *Sieve*. Basin-form sieve with a plastic handle and steel mesh, bought in the general hardware store. The diameter of its mouth is 22 cm, its height is 11 cm. The holes are rhombus-shaped and 1 mm in diameter *(Fig. 8)*.

6) One or two *buckets*, made of plastic or metal. If necessary, the aluminium alloy cribble and the sieve with handle can be placed onto them.

7) Plastic *gardening spoon*. I was using a pointed piece, for occasionally moving the sediments.

8) *Tweezers*. Stainless steel, multifunctional (e. g. mechanical, laboratory, medical, kitchen). Hooked, pointed. Used for collecting pebbles and calcinates from the sample. *(Fig. 6)*.

9) *Water* in a 200 l plastic *barrel*, two 5 l plastic *watering cans*.

10) Plastic and bamboo trays for drying the calcinates, prior to separation and collection. As the bones from the graves have already undergone ^{14}C dating, in the first step of drying them, I used a simple kitchen paper towel reported by others (Pető–Kenéz 2018, 40) *(Fig. 9)*. The dry calcinates

Fig. 6. *The author, lifting a piece of calcinate found during dry sieving. Photo by K. Hári.*

Fig. 7. Aluminium sieve used during dry work, before wet cleaning. Photo by the Author.
Fig. 8. Plastic sieve used during wet cleaning. Photo by the Author.
Fig. 9. Calcinates from Grave No. S-538 on a bamboo tray during drying and a portion of packed remains. Photo by the Author.

can be easily retrieved from the paper towels (paper towels used for hand-drying, packed in rolls or sheets are eminently suitable).

11) *Digital scales*, weighing up to 500 g, 5000 g or bathroom scales for body weight measurement. The collected dry calcinates were weighed on the first two scales. The dry sediments lifted from the soil were weighed on the body scale.

12) During the procedure, *aluminium foil trays* were also used *(Fig. 6)*, before we could obtain the sealable *plastic boxes* needed for final packaging. The latter, with a lid, served for packaging and storing the dried anthropological material. *(Fig. 9)*.

13) *Zip-lock nylon bags* were used for packaging and storing smaller anthropological remains and other artifacts (e. g. pottery fragments, glass beads, plant remains).

14) *Felt-tip pen* for labelling the boxes.

15) *Smartphone* for the photo documentation of the workflow and its results and a *computer* with the appropriate software to store the images.

16) All necessary and feasible data were recorded in an Excel table (using the above-mentioned digital equipment).

What was the method used?

The head of the excavation had the vessels (226 pieces) removed *in situ* from most of the Farád graves and taken to the museum's storage; part of them (60 pieces) were taken into the conservator's workshop contracted for this work.

Let me present here, as a specific example the burial recorded as S-518 *(Fig. 10)*. The unwrapping of the main vessel, i. e. the urn, began in the workshop. The urn contained, apart from the calcinates, a bowl and a mug. All the vessels were conserved and restored *(Fig. 11–12)*. Unfortunately, the recovery process of the soil in the urn was not realised in layers, thus the calcinates were neither stored nor documented on a level-by-level basis. Therefore, there is no data on the manner in which the various parts of the body were placed in the urn, and we cannot even hope to reconstruct the funeral ritual (Gramsch 2008; Peace *et al.* 2024, 310, Fig. 152). Of the ten burials observed, the sediments in the small vessels inside the urn were stored and packed separately only in one instance (the bowl from grave S-504). For the sediments of Grave S-518, of course, I had access to all the photographic documentation from the excavation and the conservation work.

1) The loose and dry sediments, totalling 35.1 kg, were measured. The approximately 0.035 m³ volume was placed in a plastic garbage bag, then in a woven nylon bag, and

Fig. 10. *Grave No. S-518 during excavation. Photo by D. Czigány.*

Fig. 11. *Cleaning the interior part of Grave No. S-518. Photo by Ms. S. Szórádi.*

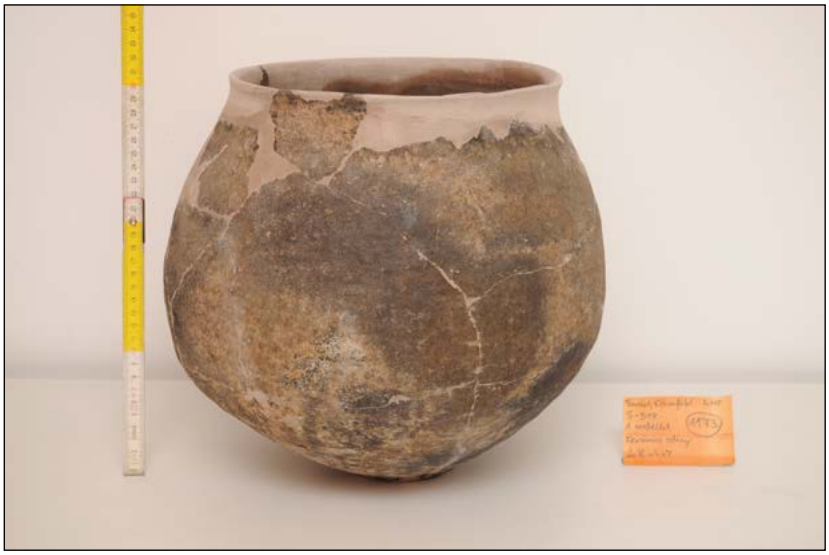

Fig. 12. *The urn from Grave S-518 after conservation. Photo by Ms. S. Szórádi.*

finally into a multi-layer paper bag. Knowing the dimensions of the restored urn *(Fig. 12)* and knowing that it was filled to a maximum of ¾ of its volume with compacted soil *(Fig. 10)*, it can be ruled out that it could have been filled with such a large amount of material (Füleky 2011, 109–110). In my opinion, part of the sediment around the urn grave were probably also collected and passed on to me. As regards our final aim, this had a positive effect on my work as I could collect all the human remains from the grave brought to the museum.

2) I poured the soil samples into the mason's sieve batches of a maximum of 5 kg *(Fig. 6)*.

3) I worked in a dry manner, meaning I moved the sieve with the soil in all directions. In the meantime, I hand-picked out, not only the larger pebbles but also the few cm² fragments from the plastic bags and sacks that had fallen apart during nine years of storage. There were eight plain ceramic sherds that I also did not keep. The calcinates were collected by hand or using the tweezers *(Fig. 6)*.

4) The calcinates were placed into the aluminium *(Fig. 7)* or the plastic sieve *(Fig. 8)*, respectively, depending on their quantity and the degree of contamination. Then, water was poured on them from the plastic can or the given sieve was submerged into the large barrel and moved with care to remove the soil. Not a single bit of calcinate floated out of the sieve, i. e. there was no loss of evidence. For this burial, about 8 cans of water (ca 40 l) were used. For other, less complicated graves, a maximum 15 l would be required.

5) As the calcinates dried, I picked out everything, even the smallest, pebbles *(Fig. 6)*. Finally, only the calcinates remained and were left to dry one more night at room temperature. After that, I packed them up *(Fig. 9)*.

My work yielded 621 g of burnt human bone from the soil of Grave S-518. The bone fragments were between 2-3 mm in size up to a few cm in size. These latter could already be submitted for anthropological identification *(Table 1)* on 21 October 2025.

How can I summarise my work?

During dry sieving, I used an implement with larger mesh size (4 mm) than that described by Vértes (2 mm; Vértes 1954, 104). The great advantage of dry sieving was its speed and that it could be performed without special preparation. In our case, the completely dry soil was dust-free, so I did not have to wear a mask (Pető–Kenéz 2018, 37). This work-phase was carried out in the open doorway of my garage, on the threshold *(Fig. 6)*. Most of the time, I usually worked with the soil from each grave here and in this manner. Water was used only in the final phase for extracting the anthropological material, and I used much less water than I would have had to with silting and flotation. Real silting (Vértes 1965, 205), that is, using a row of sieves and flotation at the end, were not applied here. Therefore, I would define my work as being the simplest possible way of employing a so-called "*combined method*" (Pető–Kenéz 2018, Fig. 38, 25), applying basic dry sieving and finishing by wet sieving using at most two sieves *(Fig. 6–8)*. It is closest to the process described by György Lengyel and Zsolt Mester (2011, 258, Fig. 8). As illustration, they published the photo of silting work carried out during a cave excavation in Israel where the soil sample was placed into a foil-lined box and exposed to high-pressure water. In my work, however, I did not make use at all of such procedures.

I have summarised the quantities of the extracted human bone remains in *Table 1* as being 0.9–728 g. This compares to the previous data from Farád: 0.5–460 g (Czigány 2024, 7.2.E2. Table 1). Comparable data from two Western Hungarian Urnfield cemeteries is also available. Altogether, 4–1520 g of calcinated bones were collected from human remains extracted from Szombathely–Zanat soil samples (Ilon *et al.* 2011, Fig. 86), and 10–1295 g of calcinated bones from the soil samples taken from the cemetery of Ménfőcsanak–Széles-földek (Ilon 2015a). In the case of the more distant Békásmegyer cemetery, we know that from altogether 241 graves, the amount of calcinates sent to the laboratory weighed between 2 and 3000 g (Heussner 2010, 307). It is, however, questionable how much of the calcinated bone was collected from the funeral pyre after the cremation. Data from Bronze Age European cremated burials vary, supposedly, between 2 and 3000 g of calcinated bone (Fülöp 2018, 299–301, Fig. 11, 14.1). Based on modern observations made in crematoria, a woman weighing approximately 70 kg will yield 1500–1700 g of burnt bone remains and a man 1800–2000 g of burnt bone (Wilschke-Schrotta–Renhart 2021, 265).

To answer the provocative question raised in the introduction: if the anthropologist has nothing to work on, *i. e.* calcinates from the urn grave, then it is evident that nothing can be said about the members of the former prehistoric community who were cremated in the graves or on a funeral pyre. On the basis of my experience *(Table 1)*, I can responsibly say that we have been able to project and plan the anthropological evaluation of the Farád Urnfield cemetery, which is the largest such burial ground known so far in Transdanubia. Supposing an average quantity of 12.4 kg each of soil samples from the 226 funeral vessels, in the course of 5 working days (eight working hours daily), one worker could process the approximately 280 kg of sediment from ten graves using the above methodology within one and a half months. Calculating with summer season temporary workers, *i. e.* students, paid, properly instructed and supervised, the whole work would last less than one month and can be completed for about half a million forints at current prices. It can even be realised for free using two volunteers interested in community archaeology.

In the current paper I have tried to argue that even without a supporting institutional background, a lot of valuable work can be accomplished, as we know from the example of Katalin Simán in another context. In my case, using a simple tool-kit, not really strenuous physical work and low water consumption, and mainly using dry sieving I could achieve results on the anthropological evidence, comparable to that of mediaeval fish bones (Bartosiewicz 2021, 389–390), that is, with practically no loss, from a specific type of context, *i. e.* urn graves containing cremated bones.

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