Bronze Age Fortified Settlements in Central Europe

Polskie Towarzystwo Historyczne

Bronze Age Fortified Settlements in Central Europe

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Wydawnictwo Nauka i Innowacje

In Kommission bei Dr Rudolf Habelt GmbH, Bonn

Poznań 2016

Studien zur Archäologie in Ostmitteleuropa
Studia nad Pradziejami Europy Środkowej
Band / Tom 17

Herausgegeben von / Redaktorzy Johannes Müller, Kiel

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The publication was financed by National Science Center of Poland – project no. 2012/05/B/HS3/03714

Publikacja dofinansowana przez Ministra Nauki i Szkolnictwa Wyższego
oraz Uniwersytet im. Adama Mickiewicza w Poznaniu

Distribution Dr. Rudolf Habelt GmbH, Bonn

Translation Ryszard J. Reisner, Tomasz Żebrowski, Zofia Ziółkowska, Mateusz Jaeger
Editor Mieczysława Makarowicz
Technical editor Aldona Najdora
Graphics Mateusz Stróżyk
Cover design Holger Dietrich und Ines Reese, Kiel

ISBN 978-3-7749-4019-2 (Verlag Dr. Rudolf Habelt GmbH, Bonn)
978-83-64864-29-2 (Wydawnictwo Nauka i Innowacje Sp. z o.o.)

Printed by Uni-Druk, Luboń, Poland

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Preface from series' editors

This volume is yet another publication in the Studien zur Archäologie in Ostmitteleuropa/Studia nad Pradziejami Europy Środkowej series. It is based on the author's doctoral dissertation concerning defensive settlements in Central Europe. The latter is one of the major focus areas in the archaeology of the period around 2000 BCE, encompassing numerous issues relating to the key phenomena of the Early Bronze age, such as social stratification, trade and exchange, warfare and metal production. At the same time, the book contributes to the broader discussion on Bronze Age defensive settlements presented as part of the SAO/SPEŚ series, supplementing general studies (volume 5), aspectual monographs (volume 9) and the findings from research conducted at the site in Bruszczewo (volumes 2, 13 and 14). This publication offers a comparative study of four areas in Central Europe: the Alpine region, south-western Wielkopolska, the Middle Danube Basin and Upper Tisza Basin, outlining a comprehensive panorama of the phenomenon and demonstrating regional variations. The author delivers a well-ordered disquisition concerning chief aspects of the functioning of settlements in the aforesaid cultural-geographical regions, supported by abundant data. Given the shortage of monographic studies on the addressed issue, this book constitutes a significant building block in our knowledge about Bronze Age settlement forms, and compellingly suggests future directions of research.

Johannes Müller • Janusz Czebreszuk • Sławomir Kadrow

Acknowledgements

This publication is based on a doctoral dissertation defended at the Adam Mickiewicz University in Poznań in 2011, with only minor revisions and updates. The dissertation was drafted at the AMU Institute of Prehistory, under the supervision of Professor Janusz Czebreszuk to whom expressions of gratitude are due in the first place – not only for the sound advice and hints, but also for all the moments of frustration and arguments. I am convinced that the latter also contributed to my formation as an archaeologist.

The dissertation was reviewed by Professors Arkadiusz Marciniak (AMU Poznań) and Kristian Kristiansen (University of Gothenburg). Presented version of the text was reviewed by Professors Aleksander Kośko (AMU Poznań) and Sławomir Kadrow (Institute of Archaeology and Ethnology, Polish Academy of Sciences, Kraków). Thanks to their critical feedback, the text in its present form is free from the many shortcomings it might have had. Naturally, I bear the sole responsibility for any flaws that may still be found.

This work would not have been accomplished if not for the support of many of my colleagues. I am particularly grateful to Professor Aleksander Kośko, who made it possible for me to present the progress I had made to a circle of experts and kindly critics from the Poznań archaeological milieu.

I am much indebted to Professor Johannes Müller, director of the Institut für Ur- und Frühgeschichte, Christian-Albrechts Universität zu Kiel, whose boundless hospitality was tremendously helpful. It was within the walls of that university that I spent a long time taking advantage of the abundant resource of its libraries. A group of friends made me feel in Kiel at home. For that I wish to thank Jutta Kneisel, Georg Schafferer, Martin Furholt, Robert Hofmann, as well as Doris and Carsten Mischka.

I would like to thank everyone and assure those whom fallible memory might have omitted of my gratefulness. Therefore I extend my expressions of gratitude to colleagues from Poznań: Józef Bednarczyk, Piotr Chachlikowski, Mateusz Cwaliński, Marcin Ignaczak, Iwona Hildebrandt-Radke, Mariusz Kufel, Przemysław Makarowicz, Mirosław Makohonienko, Jakub Niebieszczański, Łukasz Pospieszny, Mateusz Stróżyk, Paulina Suchowska-Dücke and to fellow researchers from other scientific institutions: Peter Ettel (Jena), Klara P. Fischl (Miskolc), Anthony Harding (Exeter), Tünde Horváth (Budapest), Tobias L. Kienlin (Cologne), Viktoria Kiss (Budapest), Gabriella Kulcsár (Budapest), Klara Marková (Nitra), Justyna Molak (Kraków), Marcin S. Przybyła (Kraków), Tomáš Nováček (Brno), Ladislav Olexa (Košice), Vajk Szeverényi (Budapest) and Claes Uhnér (Gothenburg).

Last but not least, I would like to thank my parents Henryka and Marek, as well as my wife Katarzyna for the years of ceaseless support.

I dedicate this book to two special persons, without whom everything I do would be pointless – my son Aleksander and daughter Nina.

Introduction

The available literature on this particular subject in the last half century or so would appear to indicate that the issue of fortified settlements in the Bronze Age is one of the key and relatively well researched questions (see chapter 1). In reality, however, the literature at large often is of a general nature, rarely concerning itself with the appropriate source texts that contain first-hand data recorded during the course of excavations. It can be clearly see that European prehistory would seem to make use of a particular canon of literature in this respect that bears little critical value.

It is in fact on the basis of such texts that a homogenous picture of fortified settlements and their inhabitants was created. The fortifications around settlements were to be a physical proof of the deepening social stratification process and growing complexity of settlement hierarchy. These very processes took place in every one of the regions where the rise of fortified settlements was observed. Finally, a series of cultural traits of the settlements themselves would become proof of the close genetic ties with the Aegean-Anatolian zone.

Although fortified settlements were built in the majority of developed European regions of the Bronze Age, it was decided to base analysis on finds related to specific, chosen research areas. This work therefore will devote itself to four principle chapters, each reflecting a chosen point of study: the Alpine area and associated inner-Alpine Bronze Age groups (chapter 3), south-western Wielkopolska, Bruszczewo and related Kościan Group of the Únětice culture (chapter 4), middle Danube Basin and Vatya culture (chapter 5) and last, the upper Tisza Basin in eastern Slovakia and related Otomani-Füzesabony culture (chapter 6).

The choice of specific research areas was dictated by the acceptance of defined criteria. First, regions were selected, in which the subject of fortified constructions has a long-standing research tradition. This guaranteed the access to a subsequently broad collection of professional literature. At the time this study was commenced, in all the regions concerned, excavation work was being conducted, planned for the next several years. This has created the possibility of finding new, up to date information that is often (though not always, see chapter 2) in accord with the systematically raised standards of methodology (such as interdisciplinary research with the participation of the natural sciences in the various phases of locating and analysing finds).

The methodology of the study therefore takes the premise that the communities of fortified settlements in terms of their culture reflect the most important processes taking place at this period during the Bronze Age, such as the intensification of long-distance and inter-regional exchange, social stratification, the rise of elites and the boom of artisan crafts with metallurgy of bronze at the forefront.

Such phenomena should therefore manifest itself in particular archaeological finds retrieved in fortified settlement research. So as to verify current views relating to fortified settlements, it was decided to base the structure of this study on an outline of the main aspects and in what follows, a critical analysis of chosen research areas. Thus each chapter has the following sequence of discussion: natural environment and economy, inner layout, fortifications, me-

tallurgy and chronology. A detailed outline of particular fortified settlement elements on the one hand aims to demonstrate the basis of documenting finds at our disposal and on the other, represents a collection of the most vital information relating to the level of social organisation for the communities analysed.

The above five principal aspects under research in this work and subject to discussion, relate to the key questions hitherto only dealt with in general terms in the professional literature. They are presented therefore as below.

First, the particular characteristics of the natural environment and economy provide an opportunity for archaeologists (and other scholars) to follow the local cultural patterns of how fortified settlement societies adapted to the conditions present at that time, an issue which has been sometimes ignored in the research on fortified settlements.

Next, the analysis of finds relating to the inner layout is a useful basis for verifying views on the existence of evidence in regard to particular forms of spatial organisation in fortified settlements, in part related to the influences of the urbanised Aegean--Anatolian area (among others the existence of delineated artisan zones and the division into the acropolis and the outskirts; Bóna 1975: 146; Kadrow 2001: 83, 87).

Fortifications are the fundamental elements that distinguished the above mentioned sites. Assessment of the level of technological complexity, building materials and size of fortifications was an important element allowing to define their functionality and effort in their making. Similar to the case of inner layout elements, as in fortifications, a verification was made of the view that proposed eastern Mediterranean origins (Vladár 1973: 280-293; Krause 2007b).

Further, finds relating to metallurgy were analysed. They are known from all the regions under analysis, the vast majority of settlements also yielded evidence of a local 'finishing' of these. In each of these areas, however, the new raw material was treated differently. The finds from fortified settlements indicate that various means of adapting bronze and associated strategies of application took place.

Finally, as far as chronology is concerned, data were collected and analysed in terms of absolute dating and to a lesser extent, relative chronology.

Every chapter relating to one of the above mentioned study areas is completed by a summary relating to the role and function of fortified settlements in the given region. Moreover, in this context, currently held views in the literature were subjected to critical analysis on the basis of research discussion for each aspect.

The aspectual outline of study areas therefore was the basis of comparative analysis (chapter 7), which contains conclusions also confirming the comparability of certain elements of fortified settlements in particular regions of central Europe and data corroborating the existence of local culture traditions.

The conclusion completes this work, summarising data and views drawn from the discussion and in so doing, provides some answers to the respective research questions.

CHAPTER 1

History of Research

The fortified settlement is one of the most important and characteristic traits of the central European Bronze Age. The emergence of such structures took place for the most part in regions with developed cultures and the growth of fortification sites had its own internal dynamic, reaching a zenith in two periods. The first stage of their rise was at the turn of the Early and Middle Bronze Ages, the second a period that witnessed the domination of the Urnfield cultural circle (Jockenhövel 1990). In the context of this study, however, there shall be a discussion in brief relating only to the earlier period, with a particular focus on selected research areas.

Fortified settlements, their role, chronology, formal features and even issues relating to terminology are a constant subject of discussion in European prehistory. The list of research monographs relating to particular sites is, however, a very short one (Točik 1964; 1981; Shennan 1995; Rind 1999; Poroszlai, Vicze 2000; Olexa 2003; Czebreszuk, Müller 2004; Poroszlai, Vicze 2005; Müller, Czebreszuk, Kneisel 2010). There is a sizeable store of research dealing with particular aspects, mostly in the form of summary reports of excavation research progress, general studies that in part relate to the subject area of fortified settlements and a plethora of post-conference publications such as the noteworthy *Beiträge zum bronzezeitlichen Burgenbau in Mitteleuropa* (Chropovský, Hermann 1982) and *Frühbronzezeitliche befestigte Siedlungen in Mitteleuropa* (Gedl 1985). The former to a large extent was devoted to the Late Bronze Age and Early Iron Age whilst the latter detailed information summarising the knowledge extant in respect to fortified settlements in Poland and to a lesser extent, the issues pertaining to regions more geographically removed. Recently, two works has been published, containing several studies on the broader geographic map of Europe in the context of the first half of the 2nd millenium BC (Czebreszuk, Kadrow, Müller 2008; Jaeger, Czebreszuk, Fischl 2012).

The history of studies into fortified settlements in all the areas under research (with the exception of Bruszczewo microregion) date back to the 19th c. when historians and archaeologists began to take particular notice of sites that suggested a certain specificity of terrain forms, which intimated the existence of prehistoric relics. In many places at that time excavations were conducted (Kovács 1988: 17-18; Lippert 1992: 12; Shennan 1995: 20; David 1998a: 231; Olexa 2003: 19; Gogâltan 2008: 44, Fig. 4.1).

In the Alpine area, particular interest in the above mentioned types of settlement goes back to the beginnings of the 20th c. (Shennan 1995: 20). Already in this early period the potential connection was pointed out between settlement growth and local deposits of copper ore (Zschocke, Preuschen 1932). The first excavation research was undertaken, among others, at the sites of Götschenberg and St. Veit Klinglberg (Lippert 1992: 13; Shennan 1992: 13-14). Some of the settlements were identified under the programme of

survey research conducted by Hell (Hell 1921; 1924; 1927, quoted in Shennan 1995: 20). In addition, during Second World War these sites continued to be the subject of archaeological interest. From this period, among others, come the preserved archival plans of excavation sites of Fellers in Switzerland (Krause 2008: 77-78, Fig. 14.1, 14.2). In later periods, interest in Alpine settlements went hand in hand with research into their potential ties with local copper ore deposits and the existence of a hypothetical production chain that would link fortified settlements with open ones, at the foot of the Alps (Wyss 1971; Menke 1982). In the present discussion this issue still dominates. Of particular note is the research and publication record of Krause, who proposes fortified settlements played a key role in the control and growth of copper extraction in the east Alps and the existence of complex social structures among the communities engaged in mining. In several publications in recent years the above researcher bases his thesis on research results of excavations at the Friaga Wald settlement (Bartholomäberg) (Krause 2002; 2005; 2007a; 2008; 2009). This site is one of the elements of the wider HiMAT research project *The History of Mining Activities in the Tyrol and Adjacent Areas: Impact on Environment and Human Societies* created by the University of Innsbruck, which is concerned with the documentation of the processes in the rise and fall of mining areas in the eastern alps.

Krause's arguments have called forth a robust debate, in the main from Bartelheim, Kienlin and Stöllner. The first contends that it is possible to overrate the role of metallurgy in the Bronze Age, emphasing the importance of fertile soils and salt extraction as far more crucial factors for the formation of the settlement network during that period, as well as the phenomenon of accretion in prestige and power (social stratification) in the Early Bronze Age (Bartelheim 2002; 2007; 2009).

Kienlin and Stöllner on the other hand, differ primarily in their views on the degree of complexity in social structures related to the extraction of copper ore in the Alps, and propose an alternative scenario of mining societies. In their view, the beginnings and development in ore extraction, as well as identification of potential in local deposits is related rather to simpler social systems such as pastoral. At the same time, Kienlin and Stöllner dispute that hierarchical societies needed to exist in order that copper mining develop at the turn of the Early and Middle Bronze Ages (Kienlin, Stöllner 2009; Kienlin 2010).

The second of the areas under research is one of particular note. In contrast to the others it mainly relates to one settlement associated with the Únětice culture, Bruszczewo. The first references to discoveries of archaeological relics in the immediate vicinity of the site are to be found already in the 17th and 18th c., the oldest such documentation in Polish lands (Czebreszuk, Müller, Silska 2004: 13). Later, in the 19th c., a chance discovery was made of a destroyed 'princely grave' of the Únětice culture in Przesieka Polska (Schwenzer 2004: 317). It was not until 1943 that Bruszczewo (site 5) was subject to surface analysis and some two decades later in 1964 after surface verification surveys that a decision was undertaken to commence excavation (Czebreszuk, Müller, Silska 2004: 14) by Pieczyński and his team in 1964-68, under the aegis of the Poznań Archaeological Museum.

Both the results of this research stage and subsequent analysis of excavation begun in 1995 by the Institute of Prehistory, Adam Mickiewicz University in Poznań, were discussed in detail in the literature (Czebreszuk, Müller, Silska 2004: 14-26). An important turning point in the Bruszczewo excavations was the commencement in 1999 of Polish-German collaboration that continued (with a break in 2002) until 2007 (first the Free University of Berlin, then the University of Bamberg and finally, Kiel University). Thereupon research was begun in the peat zone of the site, which produced a series of important and unique finds. From 2003 the author took personal part in excavation work, and from 2005 led work in particular trenches at the site's mineral zone (non-peat, sandy soils).

The results of work to date have provided the subject matter for a series of scholarly works from which the most important are recent publications (Czebreszuk,

Müller 2004; Müller, Czebreszuk, Kneisel 2010), which primarily embraced specialist studies to a large extent related with the peat zone of the site. Moreover, only just recently, few studies have been published, relating to the subject of the Bruszczewo settlement and its function, as well as the extent of its social organisation (Jaeger, Czebreszuk 2010; Kneisel 2010e; Kneisel, Müller 2011).

In the case of the two remaining research areas, in the context of the 19th c. geopolitical situation in Europe, a decided majority of the sites not only in Hungarian areas but also in Slovakia, were discovered by Hungarian aficionados of antiquities. The settlements in the Carpathian Basin, often tell in formation, stood out boldly in the passing landscape. In the nascent beginnings of archaeology proper, these enigmatic formations often were given names suggesting ties with the early history of particular regions, such as 'Avar sconces' (Vicze 1992: 146). As mentioned above, it was already in the 19th c. that the first research was carried out and it should be noted that the Alscút-Göböljárás (Vatya culture) site map was drawn up by Arch Prince Joseph of Habsburg, who also led a dig over several seasons on the settlement (Kovács 1988: 23, foot. 5). This would seem to indicate the elite nature at that time in Europe of interest in prehistory.

At the beginning of the 20th c. tell settlements in the Great Hungarian Plain were subject to a considerable amount of interest. V. G. Childe, among others, was involved in researching these sites as well as the broader subject of the Bronze Age in this part of Europe. He led excavation work at Tószeg-Laposhalom and was the first to identify the collection of relics related to the Vatya culture, giving it the name of Lovasberény-Vatya (Kovács 1984a: 217; 1988: 18-19; Bóna 1992c: 104; Kreiter 2007: 18). The network of Vatya culture sites was first presented as an independent culture by Patay in 1938 (Kovács 1984a: 217).

The 1950's are witness to the start of research activity in Hungarian archaeology on the part of future leading figures of European prehistory. During this time in 1959 Bóna produces his classical work *Die Mittlere Bronzezeit Ungarns und ihre Südöstlichen Beziehungen*, published nearly two decades later in 1975 (Kovács 1984a: 217). The typo-chronological scheme (Bóna 1975) for the Vatya culture to this day remains the basic taxonomy for Hungarian archaeologists (Poroszlai 2000; Kreiter 2005; Kreiter 2007: 19). At the same time, Mozsolics began researching Dunaújváros-Koziderpadlás sites (Kovács 1984a: 217; Bóna 1992d). Also, very crucial data was produced by land surveys conducted by Nováki, subsequently bearing fruit as published location plans for a series of Vatya culture fortified settlements (Nováki 1952).

A significant intensification of research towards identifying Vatya culture defensive structures took place in the 1960's. Several excavation works began, among others in Aba-Belsőbárándpuszta-Bolondvár, Százhalombatta (Kovács 1963; 1969) and Lovasberény-Mihályvár (Petres, Bándi 1969). However, as in many Vatya culture sites (not only settlements) like the aforementioned, research was not completed. One of the few published studies was that of the Alpár site, which apart from a full presentation of archaeological research results, provided specialist documentation such as that of animal remains (Bóna, Nováki 1982).

In the above context the number of registered Vatya culture sites has not been reflected in the research literature. To the 90 sites referred to by Bóna in 1975 (his research, dated 1959), some 220 would be added several years later (Kovács 1982: 280). The present number is difficult to estimate and the recent literature relies on the estimates of Kovács (Vicze 2000: 120).

One relatively recent and important research project is the joint Hungarian, Swedish and British SAX ongoing excavation work (*Százhalombatta Archaeological Expedition*), which published two monographs and briefer studies documenting research completed thus far (Poroszlai, Vicze 2000; 2005).

The most recent projects concerning Vatya culture are being carried out in by international teams in the valley of the river Benta (Earle et al. 2012) and in the Kakucs microregion. In the latter, researchers reanalysed archival excavation studies

(Kakucs-Balla-domb settlement; Jaeger, Kulcsár 2013) and an interdisciplinary archaeological research in the defensive settlement of Kakucs-Turján was launched by a Polish-Hungarian-German team (Kulcsár et al. 2014; Pető et al. 2015).

Otomani-Füzesabony fortified settlements were first analysed in detail in the middle of the 20th c. although the site of Nižná Myšľa was already referred to in 1892, and its plan published six years later (Olexa 2003: 20, Fig. 8). In 1919 the first excavations were conducted, which took on a particular form, taking over from previously abandoned Hungarian (war) trenches. That year the excavation work yielded the first finds, which were deposited in the National Museum in Prague (Olexa 2003: 19).

The interest of archaeologists was only awakened by a chance discovery in 1948 of finds from this cemetery. The resultant brief documentation was, however, never published (Olexa 2003: 20-21). The new excavations, which continues to this very day, began in 1977 (Gašaj, Olexa 1992: 13). At present, the efforts of the researchers focus on publishing the findings from excavations in the burial site associated with the earlier fortified settlement (Olexa, Nováček 2013). Various authors also present studies highlighting selected aspects, based on the results of new, specialized analyses (e.g. Olexa, Nováček 2012; Jaeger, Olexa 2014).

The sites of Košice-Barca and Spišský Štvrtok have been responsible for a growth of interest in fortified settlements of the Early Bronze Age in the regions of Czechoslovakia at that time. The former was researched in 1951-1954 during which excavation work revealed a series of spectacular discoveries as well as documentation on the regular layout of 23 huts, which went on to be published without challenge or revision (Kabát 1955a; 1955b). The documentation of sites and their materials, however, has not to date been published in full. In 1994 an alternative interpretation of the site's stratigraphic layout and construction was presented premised on a partial documentation of the settlement (Točik 1994).

In the case of the Spišský Štvrtok settlement, the history of excavation work began without any fanfare, beginning in 1962, then subsequently in 1966 (Novotný, Kovalčík 1967: 26-27). During this time various finds (in part tied to the Púchov culture) from local villagers' collections began to reach nearby museums (Novotný, Kovalčík 1967: 25-27, with footnote 5). The present store of knowledge of this in the recent literature was formed as a result of excavation works conducted in 1968-1975 by Vladár. In the process of research, stone fortifications were partially revealed along with unique ramparts, as well as numerous goods out of bronze, gold and amber (Vladár 1973; 1975).

These finds were interpreted as material evidence of Aegean (early Mycenaean) influences on local Otomani-Füzesabony communities. Vladár devoted a series of publications to this subject matter (Vladár 1973; 1974; 1979; 1982; 2012; Vladár, Bartoněk 1977). The comprehensive collections of materials discovered during excavation work lasting several years unfortunately was never researched in full or published. Apart from any question marks that may arise in respect to the chronology of stone settlement construction (to be discussed in a subsequent part of this study), it should be emphasised that to some extent the work of Vladár proved to be significant in arousing research interest in central European fortified settlements, as well as the Otomani-Füzesabony culture itself.

At the turn of the 1960's and 1970's in Czechoslovakia, research into fortified constructions of local cultures of the Early Bronze Age increased markedly. Apart from Otomani-Füzesabony sites, there were also identified significant Mad'arovce culture sites of Veselé and Nitriansky Hrádok (Točik 1964; 1981).

The recent period has not produced meaningful progress in research in the above discussion. Nonetheless it is worth noting work on the open settlement at Včelince (Furmánek, Marková 1992; 2001). Excavation has revealed one of the few radiocarbon datings related to the cultures of the Otomani-Füzesabony, Hatvan and Piliny in Slovakia (Görsdorf, Marková, Furmánek 2004).

On the other hand, progress should be noted in the case of polish research on the Otomani-Füzesabony culture. In the past 15 years settlement enclaves have been

identified and documented in the Lower Beskids (Gancarski 1994; 1999; 2002; Gancarski, Ginalski 2001; Przybyła, Skoneczna 2011; Przybyła, Skoneczna, Vitoš 2012).

In conclusion, it is important to note the long research tradition of fortified settlements in the Bronze Age. The comprehensive and rich collection of finds is alas, not reflected in our present store of knowledge of this area. The majority of sites has not been researched comprehensively in the context of interdisciplinary projects and at present the professional literature is but a dispersed collection of texts, lacking monographic studies. These and other issues will be discussed in following chapter.

CHAPTER 2

Source Criticism

Although each of the regions where fortified settlements have been discovered has a long research tradition, our present knowledge is as yet significantly limited. This is due to a number of factors.

First, it needs to be pointed out that the research of fortified settlements, as sites of significant size and complexity in respect to archaeological remains, represents several challenges of an organisational and logistical nature. Long-term and interdisciplinary research projects, often going beyond the context of traditionally understood archaeology, require sizeable financial support and collaboration with the natural sciences. These are factual difficulties that have and will continue to bear upon the quality of research conducted at fortified settlements and consequently, how much the relevant data can reveal.

In the context of this study of particular importance therefore are lacunae in the knowledge of various aspects of how fortified settlements functioned in the region of the Carpathian Basin. It can be said that the number of known and researched Otomani-Füzesabony and Vatya fortified settlements is in great contrast to the quality and number of available research publications.

In the 1970's and the 1980's the issue of fortified settlements served as one of the central themes undertaken by Czechoslovak scholars. On the wave of spectacular sites found such as Spišský Štvrtok (Vladár 1975) or Nitriansky Hrádok (Točík 1981), a wide-ranging discussion began on possible relations between the Carpathian Basin (and further central Europe) and the Aegean-Anatolian area (Bader 1990: 181).

This rather particular research trend in fortified settlements, especially in sites related to the Otomani-Füzesabony culture, resulted in archaeologists concentrating their efforts only on the search for, and documentation of, chosen categories of material culture that could testify to the existence of the above mentioned long-distance contacts (Vladár 1973; Vladár, Bartoněk 1977). A large number therefore of attractive discoveries absorbed scholars' attention throughout this period. The richness of finds discovered became the so called bedrock of many well known publishing houses and archaeological exhibitions. Alas, at the same time, these sites overshadowed the research gaps in other, often much more significant though less spectacular, issues such as chronology or economy (Jaeger 2012c). As a result we know of a rather impressive number of aspectual publications in respect to particular discoveries and features (e. g. Hájek 1954; Olexa 1987; 1992; Jakab, Olexa, Vladár 1999; Olexa, Pitorák 2004), which in sum do not, however, bring much to the discussion on more fundamental issues.

In the context of supposed genetic relations between the Otomani-Füzesabony and Mycenaean architecture there arose also many myths (see comments on the construction of the Košice-Barca settlement and fortifications of the Spišský Štvrtok site; chapter 6. 3.) based on meagre data provided by scholars, which is now in fact difficult to verify (Jaeger 2014: 301).

Despite the long list of the Otomani-Füzesabony culture settlements in north-east Slovakia that include also the most important and spectacular fortified sites such as Košice-Barca, Nižná Myšľa and Spišský Štvrtok, the level of knowledge in regard to the Otomani-Füzesabony communities is still insufficient, primarily a result of the meagre publication record of excavation research[1]. Although these sites were analysed over many seasons, no complete research was published. One of the main, often quoted sources is publication *Między Mykenami a Bałtykiem* (Gancarski 2002), which boasts among others, plans of the Košice-Barca, Nižná Myšľa, Spišský Štvrtok and Rozhanovce settlements. These do not, however, provide information on research methodology and legend, which would enable a correct interpretation.

In the case of Nižná Myšľa, the published research refers mainly to the cemetery associated with the older fortified settlement (Olexa, Nováček 2013). The outcome of excavations published at the beginning of the 1980's is reflected in actually the same text, this time published in German and Slovak, with minor changes in data (Olexa 1982a; 1982b; 1983a). The main collection of publications relating to the rich history of research are reports published in the Slovak archaeological bulletin *Archeologické Výskumy a Nalezý na Slovensku*. In addition, popular science publications have reached the general public, providing an outline of the site (Olexa 2003). The above limitations notwithstanding, the Nižná Myšľa settlement is still the best known sites of the Otomani-Füzesabony culture in Slovakia.

On the other hand, one of the most often cited examples of Otomani-Füzesabony fortified settlement that is discussed, Spišský Štvrtok, is known to its many readers from only a brief work of less than twenty pages (Vladár 1975). In effect this work is a vade mecum on archaeological sites visited by guests at archaeological congress in Bratislava in 1975. In spite of the obvious limitations in research value and extent of information presented, the data has become part of the research canon and is a reference point for discussion on the above site.

It should also be emphasised that in the context of Otomani-Füzesabony culture research, it has only to a small extent drawn attention to the important issue of finding sources in the natural sciences. In the case of archaeozoological data, all that is known at present are general data relating to the occurrence of particular wild and domesticated species, which are, however, devoid of information on the size of samples and methodology of plant macro-remains. The lack of excavation techniques focused on their retrieval (rinsing of archaeological features and their contents) has meant that to a large extent there are only available analyses of particular groups of finds such as seed prints in clay (mainly pieces of daub).

In the case of the Vatya culture the situation is similar, as far as the extent of field work, excavation and presentation of research is concerned, with considerable lacunae in these aspects.

Out of approximately 30[2] fortified settlements, only 14 were excavated[3] (Vicze

[1] As in the case of Vatya culture settlements discussed in another place and the *Bronzezeit in Ungarn* (Frankfurt am Main 1992) catalogue, similarly in the case of the Otomani-Füzesabony culture guide to the *Między Mykenami a Bałtykiem. Kultura Otomani-Füzesabony* exhibition, it is one of the key publications on the Otomani-Füzesabony fortified settlements. Moreover, it should be noted that up to recently, the main publication on research at Nižná Myšľa was the exhibition catalogue in Wuppertal (Gašaj, Olexa 1992). Further, the settlement in Trzcinica also had a guide published, largely devoted to the open-air museum project in which most of the research findings are placed (Gancarski 2006).

[2] In the analysis of bone remains and bone tools from the Bronze Age, Choyke (1979: 10; 1983: 23) mentions 26 fortified settlements, citing older work (Nováki 1952; Petres, Bándi 1969). In the more recent literature, however, other figures in this respect are given; 30 (Vicze 2000: 120; Poroszlai, Vicze 2004: 231) and 28 (Poroszlai 1996: 5). Kovács also mentions 28 settlements, though highland ones, emphasising that only some were fortified (Kovács 1984a: 219; 1998: 489, Fig. 7).

[3] This issue is not exclusive to Vatya culture settlements but in general to those sites with tell formations in the Carpathian Basin (Kovács 1988). Out of the 188 tell and tell-like settlements catalogued by Gogâltan (2008: 42), only 28 boasted excavation work in respect to fortifications.

2000: 121, Table 1). In some cases, analysis was devoted to the identification of the stratigraphical layout in the settlement interior. Fortifications were analysed only in instances (Kovács 1984a: 219; Poroszlai 1988: 31; Endrődi, Gyulai 1999: 8). On account of the tell formation of settlements and associated degree of complexity in stratigraphy, the surface area of trenches was significantly limited, reaching from more than a dozen meters to, in some exceptional cases, several hundred square metres[4] (Vicze 2000: 122; Poroszlai, Vicze 2004: 233).

Apart from the relatively small scale of excavations, it could be said that methodology was also a vital problem. This is well exemplified by the Bölcske-Vörösgyűrű site, at which various research methods were used. Apart from the most controversial, the so called *Spatenstichtechnik*, digging to a depth defined by the length of a spade (about 20 cm; Choyke, Vretemark, Sten 2003: 179), without taking into consideration the cultural and natural strata, a division was also made of digs measuring one square metre lots.

In the area of the lots, digging still went on without consideration of the respective divisions of particular layers and features. Both methods resulted in the mixing of relic materials and meant in fact that the correct identification of the chronology of stratigraphical formations was impossible. The third method to be used was based on digging lots within a band measuring 1 meter in width and 5 m in length. This allowed the documentation both of the profile and flat plans of particular sections, but at the same time, made impossible the research of large surface areas and the observation of larger structures in the terrain – often visible only after putting together all the illustrative documentation from all the lots (Poroszlai 2000: 113).

In this context, digging down to the length of the spade not only made work difficult but in fact made stratigraphical observation impossible, as well as limiting the quantity and quality of retrieved finds. This is for example, visible in the case of bone remains. Most often therefore only the most obvious bone tools were collected as well as those well preserved and large fragments of bone (Choyke 1979: 10; Choyke, Vretemark, Sten 2003: 179). It is for this reason therefore that archaeozoological analyses are laden often with a large margin of error. The principle sources in this work and its conclusions are those concerned with particular aspects of the issue in general or broad-ranging studies by Choyke and Bartosiewicz, as well as monographic studies of settlements by Százhalombatta (Poroszlai 2000; Poroszlai, Vicze 2005) and Alpár (Bóna, Nováki 1982), which include research on osteological animal material (Hartyányi 1982; Choyke 2000).

In turn, archaeological research projects on the environment conducted recently in Hungary did not relate to the oecumene of the Vatya culture (Gál, Juhász, Sümegi 2005; Zatykó, Juhász, Sümegi 2007). In the context therefore of a region such as the Carpathian Basin (Sümegi, Bodor 2000: 84) that is clearly heterogeneous from a natural sciences point of view, there is practically no possibility of extrapolating the results of the above publications.

Under the SAX project a number of specialist environmental analyses were conducted, including a palinological profiles. For a number of reasons, however, they represent a less than credible source for they carry errors both in the presentation of research results and their respective interpretation. These problems shall be discussed in detail in a subsequent part of this study where the issues of the environment and economy are raised (chapter 5.1).

One general and highly significant problem is the lack of complete publications of Vatya culture sites not only fortified). One of the few exceptions in this context are the previously mentioned analyses of Százhalombatta and Alpár. The remaining are known only from brief reports that have few illustrations, do not provide enough (or no) detail on the scale of research, trenches location and plans (profiles) of archaeological features – including even the most important such as fortifications

[4] In the case of the Lovasberény-Mihályvár settlement, an area of 3000 m^2 was excavated. In spite of all the work invested into excavation research, the subsequent documentation was not completed and only brief reports published (Petres, Bándi 1969; Choyke, Bartosiewicz 1987).

and elements of construction. Information in respect to the form and size of the latter are, in several cases, only based on field observation, which significantly limits their verification.

On account of the subject matter of this study one very crucial issue is the almost non-existent documentation on the absolute chronology of the Bronze Age in the Carpathian Basin. At present there is only very little in the way of radiocarbon dating records – which in addition for the most part do not provide reliable data relating to context, nature of materials analysed and even at times, location of research (cf. remarks in Jaeger, Kulcsár 2013).

Typochronological categorization of ceramic artefacts of the Vatya culture relies on the now classic study by Bóna (1975). Correctness of the framework developed by that author has recently been validated as part of studies of a very extensive collection of pottery from the burial site in Dunaújváros-Duna-dűlő (Vicze 2011; Laabs 2014). At the same, the performance of the typological paradigm relative to the scale of absolute chronology remains an open question (see below, chapter 5.5; Jaeger, Kulcsár 2013).

The case of the Otomani-Füzesabony culture in regard to the present discussion is indeed a complex one, for its territorial range is partitioned in the present day by various contemporary nations, which has resulted in the practice of differing research cultures (strategies) developing, each at their own pace (and direction). Thus research in Romania, Hungary and Slovakia was conducted independently of the other in each case, which led among others, to a great number of differing 'chronologies' (Bader 1998: 76, Tab. 1) and the view that the Otomani-Füzesabony culture was not homogenous but rather a group of communities where various archaeological units functioned, often within clearly defined territorial boundaries (Fischl 2006: 207, foot. 192) [5].

The traditional division among Slovak, Hungarian and Romanian scholars is reflected in the nomenclature of these cultures; Otomani [Romania, Slovakia], Ottomány, Gyulavarsánd and Füzesabony [Hungary] (Bader 1998). Importantly, some of the above in the research tradition, mainly Hungarian and Romanian, represent a particular means of documenting the chronology (relative) of the Otomani-Füzesabony culture development phases. It should be noted here that to date, the independent nature of chronology and culture of highlighted Otomani-Füzesabony 'branches' in Hungary and Romania has as yet to be convincingly justified (Bader 1998: 74).

In Slovakia, research on the Otomani-Füzesabony culture has seen at least several typo-chronological systems proposed – none of which has as yet to be clearly defined and presented in a coherent publication (Bader 1998: 67-69). Similarly to the case of the Vatya culture, the number of radiocarbon datings is very small and only in a few instances can one observe that these are well documented for their context.

Some of the above mentioned issues also relate to the Alpine area. Though the sites under discussion were registered already at the beginning of the 20th c., to date, however, only one monograph study on a fortified site has appeared (St. Veit Klinglberg; Shennan 1995). Although it is as yet only one such, this work represents an important part of the discussion devoted to the relation of fortified settlements to the mining and processing of copper ore from local deposits. The publication on the St. Veit Klinglberg settlement has provided also a number of animal bone remains and plant macro-remains. Their research did not, however, document clearly the means of economy organised by the autochthons. Nonetheless this became the basis of a hypothetical model of economic dependency at fortified settlements on settlements in the valley region. Confronted with the lack of comparable natural environment data from other fortified sites in the area un-

[5] For the purposes of the present study the term Otomani-Füzesabony culture is used, based on an existing tradition in the nomenclature of prehistory in Poland (Gancarski 2002). It is not meant to negate in any way the polymorphic nature of the Otomani-Füzesabony culture phenomenon but to underscore the need to view this, differences notwithstanding, as a larger whole that decidedly goes beyond the borders of present-day countries.

der discussion, this hypothesis has as yet to be fully verified. This issue moreover, is not clarified either by hitherto mentioned palinological profiles, which demonstrate the presence of Bronze Age communities in the Alpine area and their impact on their immediate environment. They cannot, however, provide a definitive answer to the question of the particular model of economy functioning at fortified settlements or their social stability, at present a point of wide-ranging discussion.

Some of the data at our disposal moreover, comes the presentation of research results in archaeology and environment around the region of Montafon, foremost the Friaga Wald settlement (Krause 2005; 2007a; 2008; 2009).

The last of the areas to be discussed in this work is south-western Wielkopolska and Bruszczewo settlement, which is clearly different from others in the context of the degree of archaeological identification. First, this site is unique for the European Lowland in its preservation of archaeological and natural finds in the peat zone of the site. The long-standing interdisciplinary programme of research concerned with foremost the identification of the fortified settlement at Bruszczewo, as well as its environmental and cultural background, has provided many detailed records.

Bruszczewo is moreover, different from other sites in its highly informative level of research in the cultural context. The issue of the Únětice culture represents one of the key problems raised in studies on the Early Bronze Age. Further, it is also the only area from which information has been gained on so called open settlements. The above factors significantly increase the possibility of comparing particular aspects of how settlements in Bruszczewo functioned in relation to other sites from the oecumene of the Únětice culture. It ought to be emphasised, however, so far it has not been possible to indicate an analogical fortified settlement, even in such significant regions as central Germany or Bohemia (Ettel 2008; 2010).

CHAPTER 3

Research Area I. Alpine Area: inner-Alpine Bronze Age groups

The Alps, divided today among several modern countries, saw intensive settlement processes already in the very early times. They were driven by varied natural conditions that supported specific subsistence strategies (e.g. pastoral economy, transhumance; Primas 1999: 2-4; Spindler 2003) and offered abundance of natural resources (Della Casa 2003; Krause 2005: 391).

The first to make use of the resources of the Alpine Area were Mesolithic societies seasonally migrating between subAlpine lowlands and mountain valleys (Lippert 1999: 142; Della Casa 2002: 68, fig. 4. 3; 2003: 203-204). To their presence testify assemblages of flints. In the light of palynological studies, the first traces of groups of humans refer to the 6th millennium BC. The next phase of settling the Alps witnessed the development of Neolithic societies, beginning with the middle of the 5th millennium BC. It is also at that time that the first settlement indicators appeared, accompanied by others attesting to the existence of open pasture areas. Also, the first cereal pollen is encountered then. The periods when anthropopressure was at its strongest occurred, however, in the middle of the 4th millennium BC and, even more evidently, after ca. 2000 BC (Lippert 1999: 142, Abb. 1; Primas 1999: 4; 2009: 190-191). Both periods of intensive deforestation and anthropopressure can be related in part to the exploitation of local copper deposits. They differed in their geological characteristics, which was reflected in their varied availability (Lippert 1992; Shennan 1992: 535; Bartelheim et al. 2002; Stöllner 2003: 420, Fig. 2; Bartelheim 2007: 190-193). All these facts make it obvious that by no means the societies of the Early Bronze Age were the first to subdue the Alps. Nonetheless, owing to a considerable acceleration of the settlement process in comparison to the preceding periods, it is the Bronze Age that must be associated with the early 'conquest of the Alps' (Wyss 1971; Krause 2005: 390; for an opposite view see Primas 2009: 190) (Fig. 1).

3.1. Natural environment and economy

The Alpine area offers diverse settlement conditions, supporting thus many different subsistence strategies. Next to numerous lakes and mountainous regions, valleys and lowlands were settled as well (Müller 2002: 281; Krause 2005: 390). What information we have on environmental conditions comes in the first place from palynological studies and analyses of macrobotanical remains.

The investigations of the settlement at Friaga Wald included collecting a series of cores from five bogs (Garsella, Tschuga, Brannertsried, Wildes Ried and Mat-

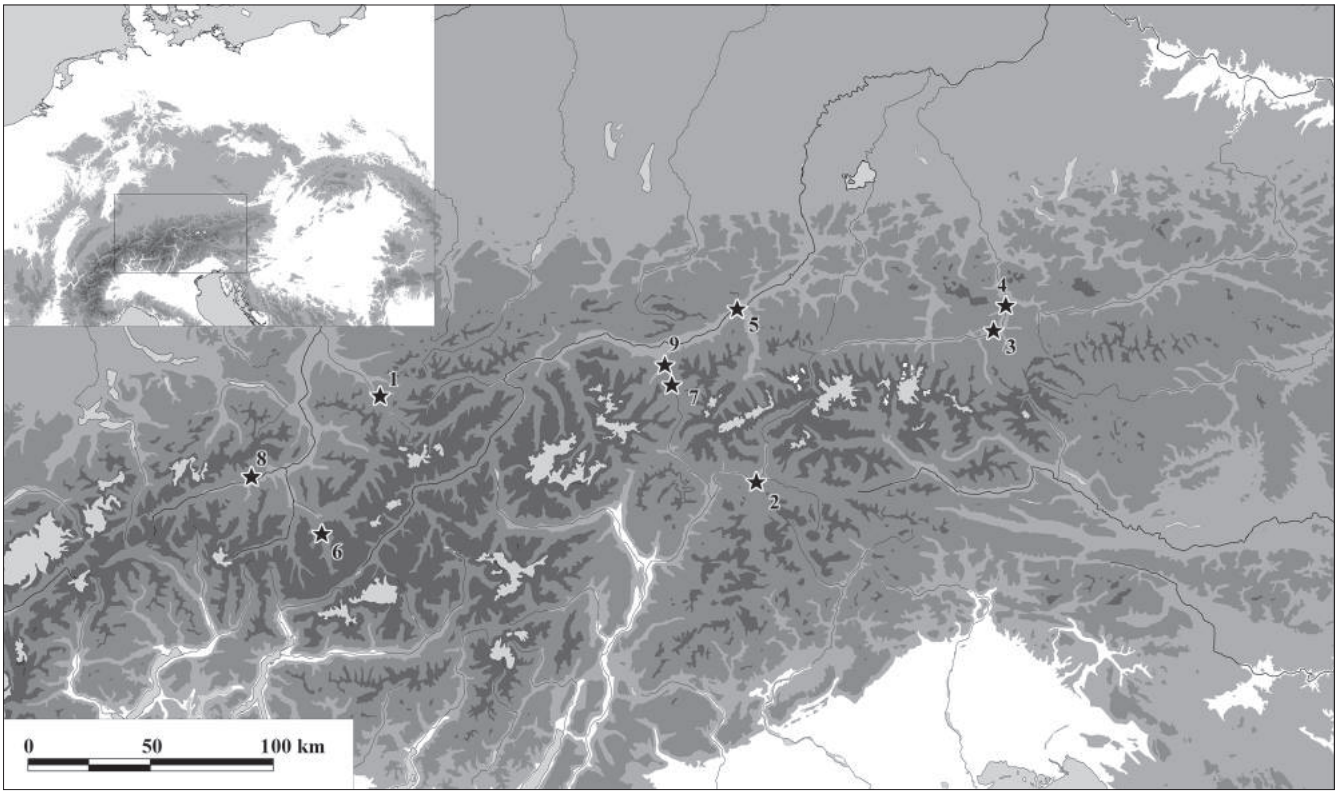

Fig. 1. Fortified settlements in the Alpine area:
1 – Friaga Wald,
2 – Sotćiastel,
3 – St. Veit Klinglberg,
4 – Bischhofshofen,
5 – Buchberg,
6 – Savognin-Padnal,
7 – Gschleirsbühel,
8 – Mutta,
9 – Patscherhügel
(after Krause 2005)

schwitz; Krause, Oeggl, Pernicka 2004: 9-10). A profile from the Tschuga bog (Krause 2007a: 129-130, Fig. 14, Fig. 15) allows one to trace the sequence of environment changes brought about by the presence of man. The first traces of anthropopressure, namely the thinning of the primeval fir-spruce forest including some beech and the appearance of the plantain can be seen ca. 3000 BC. A clear decline in the share of fir and spruce pollen, and the appearance of the plantain, cereal pollen and coprophilous fungi are related to another phase of anthropopressure which took place about the middle of the 3rd millennium BC.

The most conspicuous changes in the environment are visible after 2100 BC. Around 1800 BC, there is a sharp decline in the share of pollen of the coniferous trees accompanied by a steep climb of the cereal pollen curve (Krause, Oeggl, Pernicka 2004: 10-11). More information on the shares of individual species of crop plants at the site was supplied by the analysis of macrobotanical remains. They were found in soil samples collected from the remains of two huts and the cultural layer surrounding them (Schmidl, Oeggl 2005: 304). The principal cereal was barley whose share in the identified macrobotanical remains amounted to 67.5 per cent (Schmidl, Oeggl 2005: 305). A lesser role was played by emmer and spelt while the shares of small spelt, common wheat and true millet were very small indeed. Other crop plants included legumes: peas and broad beans. Identified in the soil samples from the site, wild fruits such as hazel nuts, blackthorns, dog rose and elder fruits bear out conclusions following from the palynological studies, namely, that the forest cover thinned in the immediate vicinity of the settlement (Schmidl, Oeggl 2005: 305; Krause 2007a: 129). The sample content did not show any differences that could be linked to their origin from specific archaeological contexts, for instance from the interior of huts (Schmidl, Oeggl 2005: 309).

Similar results were rendered by the analyses of macrobotanical remains from other sites in the Alps. The investigations

of the fortified settlement at Sotćiastel included the taking of 38 samples from different parts of the site. The samples were related to structural remains, fortifications and the cultural layer. In this case barley was the best represented cereal species as well – its share in the samples was 59.7 per cent. Emmer and spelt had a smaller share. The other species were only marginally represented. As in the case of the settlement at Friaga Wald, at Sotćiastel pea was recorded. Wild plants whose remains were identified included raspberry, stone bramble and elder (Swidrak, Oeggl 1998).

The study of bog profiles collected in the vicinity of today's Bischofshofen yielded consistent data pointing to the thinning of forests and the presence of settlement indicators and cereal pollen (Krause, Oeggl, Pernicka 2004: 12-13).

The upland settlement at Savognin--Padnal, probably surrounded originally by artificial fortifications too (Rageth 1986: 63; Shennan 1995: 293), rendered finds related to the cultivation of cereals: a sickle, sickle fragments, quern stones and grinders. In addition, remains of barley, emmer and small spelt as well as pea and oats were recovered but have not been comprehensively analyzed yet (Rageth 1986: 83-84).

The settlement at St. Veit Klinglberg (Shennan 1995) must have been surrounded by a coniferous forest typical of higher altitudes of mountain landscapes. Excavations at the site yielded charcoals of other tree species too, which could have grown close to the settlement; they were chiefly broad-leaved ones such as hazel, maple, beech and elm (Gale 1995: 235-236). The most important macrobotanical remains for interpreting the function of the settlement are the finds of charred barley and wheat grains. The absence of any evidence of grain being processed locally (e.g. glumes) may indicate that threshed grains were used at the settlement (Green 1995: 229). This led the author of the research to forward a hypothesis that settlement inhabitants either produced little cereals in nearby fields or they obtained them ready for consumption through exchange (Shennan 1995: 285).

For animal breeding there is little source material. The literature on the subject provides little explanation why this is so, either. Perhaps some sites did not yield any sources in this category. Other possible explanations could include specific soil conditions unfavourable to bone preservation or post-deposition processes, in particular strong soil erosion, which frequently destroys most of cultural strata. It must be observed, however, that in such a case these processes should have unfavourably affected the state of preservation of the macrobotanical remains as well. Hence, it is possible that small amounts of osteological material reflect the original scarcity of livestock raised at individual settlements.

In the case of St. Veit Klinglberg, relying on a small assemblage of osteological material, a conclusion was drawn that settlement inhabitants must have bred pigs. Against the possibility that pork alone was obtained through exchange testify the finds of teeth and skull bones of pigs. Next to the pig, other remains that could be identified included cattle and a small amount of wild species. This picture corresponds to the general information on the structure of animal breeding in the discussed period of the Bronze Age (Legge 1995: 233).

By contrast, the settlement at Sotćiastel supplied data indicating the presence of all the principal breeding species of the Bronze Age, i.e. cattle, goat, sheep and pig. Cattle remains were the most numerous. The assemblage of remains of small ruminants witnessed a strong domination of the sheep over the goat. The breeding of small ruminants had a mixed character as it was partially aimed at producing milk and wool. Of marginal significance must have been the pig; its remains made up only 4 per cent of all osteological material. Few remains of wild species (red deer, Alpine ibex, brown bear) do not reflect, in the opinion of the authors of the analysis, a planned hunting economy, primarily because of their very small amounts (Riedel, Tecchiati 1998).

Remains found at the Buchberg site were chiefly those of domesticated animals: cattle, pig, and goat, sheep. As at the settlements mentioned earlier, wild species must have had little economic significance. Cattle and small ruminants were slaughtered at a mature age, which suggests that they were raised mainly for dairy products

(cattle, goat, sheep) and wool (sheep). Pigs were of course sources of meat and were slaughtered at the age of about 2 years. Strangely enough, remains of females were not distinguished in the osteological material; in the assemblage of cattle bones, in turn, remains of females dominated (Pucher 1986).

Rich bone remains from Savognin-Padnal have not been analyzed in full (Rageth 1986: 84-85). Judging by the names of species, there is no doubt that there too domesticated animals clearly dominated over wild ones. The most numerous were the remains of cattle, next were those of goats, sheep and finally those of pigs (Rageth 1986: 93-94).

These modest natural-scientific data clearly show that the inhabitants of the Alpine settlements had an agro-breeding economy of their own. In the opinion of many authors, a special case is posed by the settlement at St. Veit Klinglberg. The discovery of threshed grains within its perimeter supposedly indicates a kind of economic dependence on lowland settlements (Shennan 1995: 285; Bartelheim 2007: 201--202).

What is worth stressing is the fragmentariness of available natural-scientific sources. On the one hand, the paucity of information is probably caused by special post-deposition factors, on the other, the discussion of the fortified settlements of the Alpine area focused chiefly on social issues and the significance of local copper ore deposits (Krause 2002; 2005; Bartelheim 2007: 204-205) at the expense of a thorough exploration of the natural context of the settlements and their economic foundations.

3.2. Inner layout

For several investigated settlements of the Alpine area information on their inner layout is available. Frequently, however, the information is fragmentary and concerns either particular parts of a settlement or certain elements of recorded structures.

The meagre information concerns the settlements at Sotćiastel, Friaga Wald and Buchberg. In the case of the first of the named settlements, investigators point only to a possibility that five hearths were in use at the same time (Tecchiati 1998: 384). The hearths are treated as remains of five houses (Krause 2005: 397).

An artificial terrace built by the inhabitants of the settlement at Friaga Wald provided enough surface to hold from six to eight huts of 20 sq. m each (5 × 4 m) (Krause, Oeggl, Pernicka 2004: 7; Krause 2005: 406). The only recorded remains of the huts were stone foundations linked to the older (Early Bronze) and younger (Middle Bronze) periods of the settlement use (Krause, Oeggl, Pernicka 2004: 9, Abb. 8:7) as well as two hearths dating back to the younger settlement phase (Krause 2007a: 125). The structures must have been placed along the wall in a line and close to each other (Krause 2007a: 125) (Fig. 2).

The area encircled by a stone wall at the Buchberg site did not yield any information on the layout. Relying on the distribution of pottery fragments and the discovery of a cultural layer in the north-eastern portion of the landform, the researchers came to the conclusion that the settlement proper was located there, i.e. outside the area fortified with a wall (Sydow 1986: 188). This hypothesis was refuted later. Further excavations supplied a rich collection of pottery, bones and bronze artefacts but no remains of settlement features could be recovered (Sydow 1996).

The best-known of the Alpine settlements – St. Veit Klinglberg – because of the advanced destruction of its surface due to erosion – can offer only general information on the type and scale of structures. A large number of postholes of irregular shapes were recorded on the site; most of them, however, did not form any compact arrangements that would allow investigators to reconstruct houses. An exception was postholes located in the south-west-

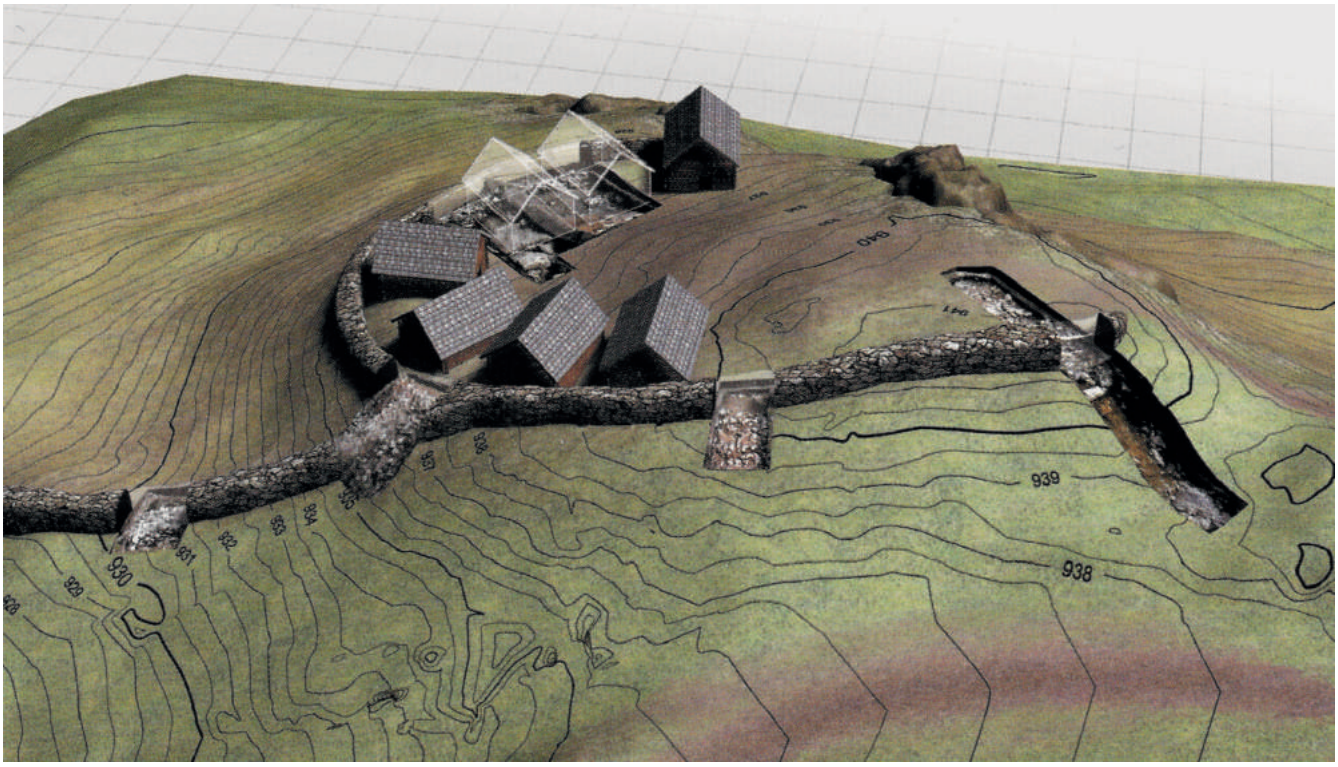

Fig. 2. Friaga Wald. Reconstruction of the inner layout of the settlement (after Krause 2007a).

Fig. 3. Gschleirsbühel. Plan of the settlement with location of the excavated remains of the inner layout and fortifications (after Zemmer-Plank 1978).

ern portion of the site that were arranged in a way suggestive of a dwelling structure measuring 7 × 3 m, however without a hearth. The other features did not permit any certain reconstruction of building forms, although it is suspected that log houses once stood on the site. They are younger than post houses (Shennan 1995: 85-90, 282).

A more complex and fuller picture of settlement layout is shown by the investigations of the settlement at Gschleirsbühel (Fig. 3). Used at the site, the system of probe trenches and the rescue character of the excavations (Krause 2005: 395) prevented the investigators from exploring the whole surface of recorded structures. Hence, the layout published by the principal investigator contains a clear element of interpretation (Zemmer-Plank 1978: 176, 178, Abb. 19). What could be partially explored was the remains of four houses. Three of them had a characteristic hearth built of flat stones and clay (houses no. 1, 2 and 4). The absence of a hearth from one of the houses (no. 3) was not interpreted in any way (another function? granary?) (Zemmer-Plank 1978: 181). The houses had irregular layouts and concealed remains of small stone walls that must have originally divided inner space into smaller rooms (Zemmer--Plank 1978: 184-185, Abb. 25). The walls of at least some houses (no. 2, 3 and 4) formed also part of the wall surrounding the settlement (Zemmer-Plank 1978: 182--184). Discovered at Gschleirsbühel, a peculiar rectangular structure, almost square, was called tower by the author of the investigations. Its walls were massive up to 2 m thick while its overall dimensions were approx. 5 × 5 m (Zemmer-Plank 1978: 179, 181; Krause 2005: 395, 397, Abb. 6). The structure, unlike the other houses, did not yield any artefacts. The remains of all recorded houses had the form of stone underpinnings of the dry wall type. They must have supported timber structures proper (Zemmer-Plank 1978: 205). The settlement at Gschleirsbühel shows traces of destruction by fire. Afterwards, the site was used as a burial ground, with individual cremation burials being placed in niches made in the wall (Zemmer-Plank 1978: 173, 182, 184, Abb. 14).

Detailed data concerning the form, scale and changes of settlement layout are available for the settlement at Savognin-Padnal. Although, as it has been mentioned earlier, it is not certain that the settlement was fortified, owing to the quality of information that can make the above picture fuller, a decision was made to discuss the settlement in greater detail.

At Savognin-Padnal, the settlement process went through several phases in the Bronze Age and was divided by the author of the research into five horizons designated with letters beginning with E (late BA1/A2) and ending with A (youngest/ /HaB) (Rageth 1986: 64-75; 1997: 98-99). The discussion shall focus on horizons D and E linked to the Early Bronze Age and the onset of the Middle Bronze Age (Rageth 1986: 76-77, Abb. 13).

Because of a hollow in the landform on which the settlement was founded, prior to any construction, the inhabitants of Savognin-Padnal had levelled the area. It was on this level that the first huts were built in a line stretching north – south for topographic reasons. A northernmost group of houses consisted most likely of two huts. The first of them measured 5.5 × 3 m, employed a post construction and had a stone hearth. Next to it, possibly making use of the same wall, another structure was raised measuring 4-5 × 6 m. It also had a hearth but the techniques used to build it were mixed: in part a post construction and in part a dry wall stone underpinning were employed. Another group of huts, located more to the south, was separated from the huts described earlier by a street 3 m wide. The 'southern' group was made up of three huts, which also stood in a line. Their dimensions were as follows: 3.5 × 3.5-3.7 m, 4.5 × 4 m and 4.6 × 4.8 m.

Among the remains of one of the huts a discovery was made of timber elements of a floor (Rageth 1986: 66, Abb. 3). The southernmost hut had been partially damaged by the structures of horizon D and held sources related to metalworking (see below). Individual houses of horizon E varied in size and construction techniques. All the huts, five to six altogether, burnt down.

The next phase witnessed the construction of 8-9 huts in two groups separated

by a street 2.5 m wide. In the centre of the first group there stood two huts measuring 5 × 9 m and 4.5 × 5.5 m, respectively. Both had hearths. The more southern hut again supplied sources related to metalworking, which may testify to a certain continuity of placing this craft within the settlement (Rageth 1986: 68). Another group of houses had been raised west of the previously described ones, across a street about 0.9-1.3 m wide. The houses have not been preserved well enough to make any educated guesses about their full dimensions. What could be recorded only was the lengths of their walls which measured 9 and 6.5 m. In one of the houses a hearth was discovered. Next two houses were built east of the hut with metalworking remains. They were separated only by a narrow space of 0.3-0.5 m interpreted as a drainage ditch. Also in this case, in one house only the remains of a hearth were unearthed. However, the most interesting structure belonging to horizon D was, without question, the so-called cistern. It was located south of the huts and was made of a wooden box measuring 4.8 × 3 m (originally up to 2 m high), which sunk into a pit 8-10.5 m in diameter and 2.5-3.3 m deep. The box was built of 10 vertical poles joined by wooden planks inserted into grooves made in the poles (Rageth 1986: 68, Abb. 7). The cistern must have been a receptacle of rainwater. Unlike the houses of the previous horizon, all the houses of horizon D were built on stone dry wall foundations. Impressions of large beams (15-25 cm in diameter) in the unearthed fragments of daub were interpreted as evidence for the use of log constructions. The structures belonging to horizons D and E burnt down.

Horizons C and B, linked to the final part of the Middle and Late Bronze Age (Rageth 1986: 76-77, Abb. 13), show many characteristics that are similar to those of the older settlement layout. What had not changed includes orientation along the north-south axis, the dominant log construction of houses and similar hearth constructions. The youngest, Late Bronze horizon A yielded little information. What is important, however, is the fact that layout orientation had changed. In this case houses were built along the southeast – northwest axis (Rageth 1986: 70-75).

The examples of structures discussed above which were found at Alpine area settlements have several common characteristics following certainly not only from similar natural conditions and available building materials but also from a common cultural tradition (*inneralpine Bronzezeit*, Rageth 1986; Primas 2008: 25-26). Above all, a constant element is the use of stone material for building dry wall foundations on which timber wall constructions were raised later. The settlement layout (likewise settlement fortifications, see below) was always adjusted to local topographic conditions, which frequently naturally limited construction options. Another common element in the discussed examples is the use of similar stone hearths inside huts. Due to the fact that it is hard to detect archaeologically log constructions resting on stone foundations, it cannot be assumed with absolute certainty that this type of construction was common to a majority of Alpine area settlements. The same is true for the development process from post to log constructions observed on particular horizons at Savognin Padnal. The available sources, however, let us cautiously assume that both hypotheses are plausible (cf. Shennan 1995: 282).

Relaying on settlement layout data and amount of space used for economic purposes, many hypotheses have been put forward concerning the demographic potential of Alpine settlements. It must be emphasized, however, that the basic condition of such estimations, i.e. a full excavation investigation of the whole settlement area, has not been met in any of the discussed examples.

The settlement at Savognin-Padnal, during Early Bronze Age horizon E, could have been inhabited at any one time by 40 to 50 people. The number rises slightly in some calculations to about 60-70 for horizon D (Rageth 1997: 98-99). Similar estimates, arrived at by multiplying the supposed number of huts by the presumed number of inhabitants of a single hut (4-5 people; cf. remarks by Rageth 1997: 98, including footnote 5), resulted in a group of 16-20 people in the case of the settlement at Sotćiastel (Krause 2005: 397) and 24-35 people for the site at Friaga Wald (Krause 2005: 406). Relying on the published plan of the set-

tlement at Gschleirsbühel (Zemmer-Plank 1978: 178, Abb. 19), it can be assumed that the four unearthed huts were inhabited by 16-2- people (Rageth 1997: 98, including footnotes 5 and 6). As it is unclear what the purpose of the so-called tower was, it was not included in the calculations. A higher number of potential inhabitants of a single hut, i.e. 4-7 people, was assumed by Shennan in the case of the settlement at St. Veit Klinglberg. With the estimated number of houses sized 7 × 3 m, this author arrived at a number of 30-40 up to 100-110 people inhabiting the settlement at any one time (Shennan 1995: 283). It is worth emphasizing that the estimates of the numbers of inhabitants living in the settlements at any one time are relatively low.

3.3. Fortifications

Owing to their location, all the settlements had natural advantages making them easy to defend. The settlement at Gschleirsbühel was founded on a hill rising to an altitude of 1.073 m. The rescue character of the investigations permitted to explore only in part the structure of the settlement and its fortifications. In her report on the excavations the author uses the term *Ringmauer* (e.g. Zemmer-Plank 1978: 182, 186) suggesting that a wall encircled the whole settlement. The wall, in some of its sections, incorporated walls of several huts (Fig. 3). The wall, whose exact dimensions are unknown (on the average 0.9 m wide in the south-west portion of the settlement, Zemmer-Plank 1978: 182), had been built of local stone, using the dry wall technique. In the north-east portion of the investigated area, three regularly arranged postholes were identified which most likely are remains of a timber structure supporting the stone rampart (Zemmer-Plank 1978: 178, Abb. 19, 186).

A closed stone wall is also known from the settlement at Buchberg located at an altitude of 620 m (Sydow 1986: 181, Abb. 3; Krause 2005: 396). The wall marks off a rectangular space of approx. 30 × 25 m (Sydow 1996: 567) (Fig. 4). The structure of the Bronze Age fortification had been distorted in part by building a similar, bigger rectangular wall in the La Tène period (Sydow 1986: 182). The technique used is again that of dry wall reinforced perhaps with some timber structures. Its width was estimated at 2-2.5 m (Sydow 1986: 188).

A wall surrounded also the whole area (60 × 43 m) of the settlement at Mutta. It was 70 m long and 2-3 m wide (Krause, Oeggl, Pernicka 2004: 8; Krause 2005: 396).

Owing to favourable defensive conditions provided by the topographic situation, settlement fortifications were often limited to the most easily accessible parts of a site.

A stone rampart divided into sections is known from the site at Patscherhügel. Built at an altitude of 860 m, the settlement was fortified with a wall 25 m long and around 3 m wide supported by additional timber elements (Krause 2005: 396, Abb. 5, 399, Abb. 9).

The investigations of the settlement at Sotćiastel exposed preserved remains of a stone rampart divided into sections. The rampart was 70 m long and 2-3 m wide and protected only the east part of the site. Due to poor stability, it must have been reinforced too with timber structures, for instance, a palisade (Tecchiati 1998: 91-92; 388).

A palisade, being in his opinion one of the hypothetical elements of fortifications at Savognin-Padnal, was discerned by Rageth (Rageth 1986: 63). The hypothesis, however, was not borne out by excavations; it was not entirely disproved either as not the whole site was explored.

At St. Veit Klinglberg, at a site situated about 50 m over the valley of the Salzach River, at an altitude of about 700 m, a rampart was built after the settlement had existed in an open form for some time (Shennan 1995: 74) (Fig. 5). It crossed the south portion of the site thus cutting the settlement off from the most easily accessible ap-

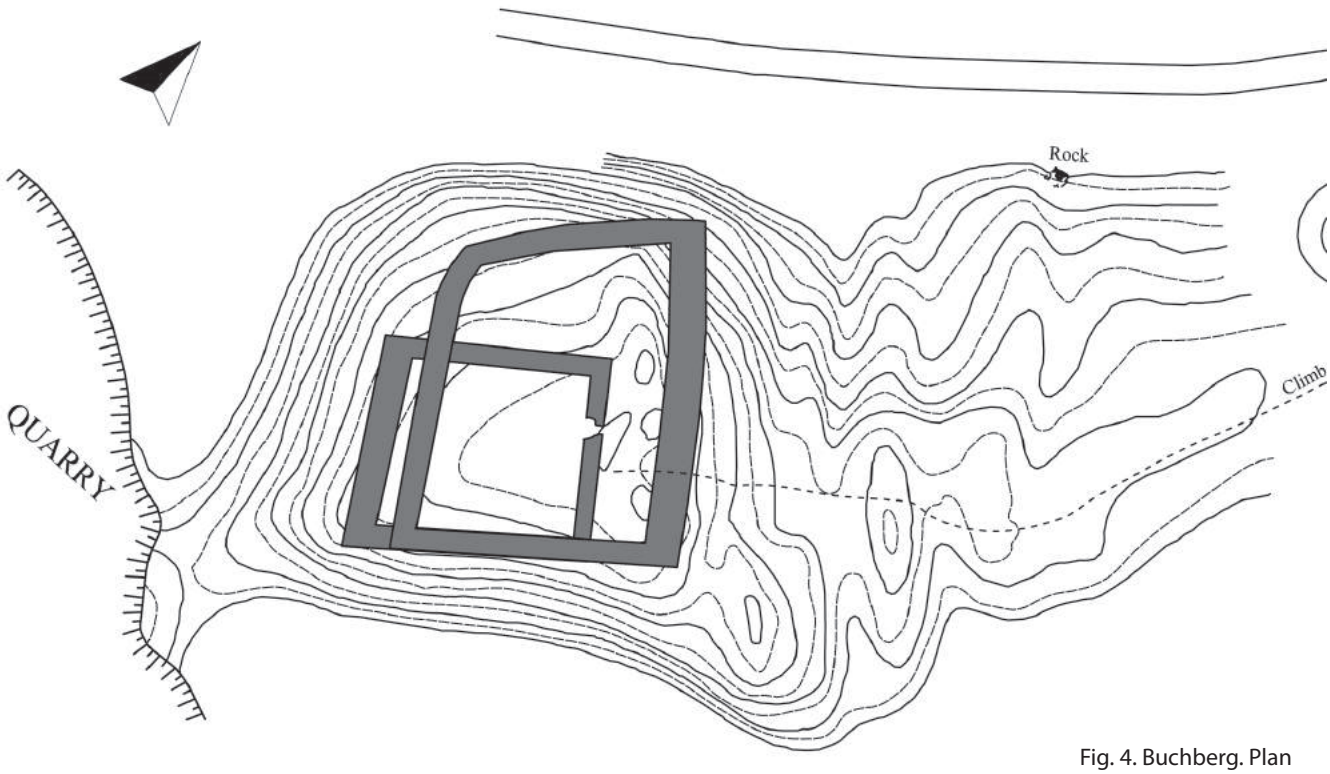

Fig. 4. Buchberg. Plan of the site with reconstructed course of the walls (Early Bronze Age and La Tène period) (after Krause 2005).

proach. The width of the rampart, relying on the preserved fragments of its dispersed debris, was estimated at about 2 m while its height was put at 2-2.5 m. Indentified in several different excavations, the fragments of the rampart in aggregate suggest that it was about 100 m long (Shennan 1989: 37, Abb. 2; 1995: 75, Fig. 5. 1; Krause 2005: 393, Abb. 3).

The site at Friaga Wald is situated about 240 m over a valley, on an elevation rising to an altitude of 940 m (Krause 2005: 403). The elevation was modified by making an artificial terrace for building houses on (Krause 2007a: 123). The terrace wall (Krause, Oeggl, Pernicka 2004: 9, Abb. 7) joined a segmented stone rampart about 80 m long and 2-3 m wide. It cut off the settlement from an easily accessible slope lying to the north of the settlement (Krause, Oeggl, Pernicka 2004: 7) (Fig. 6). Loose stones of which it was composed formed a typical dry wall (Krause, Oeggl, Pernicka 2004: 12, Abb. 12; Krause 2007a: 125, Fig. 9).

As in the case of structures recorded inside Alpine settlements, also in the case of their fortifications one may observe a striking homogeneity of techniques used to build defensive structures. Stone dry walls, when inhabitants desired to raise them higher, must have been given supplementary timber elements to make them stable. What all these settlements have in common is unquestionably the use of local rock material to raise ramparts. Although this seems entirely understandable and environmentally justified, the origins of this construction technique were sought on the Adriatic. The origins of the stone structures of the Alpine area are traced to settlements of the *castellieri* type, which are found on the Istria peninsula (Krause 2007b; 2008: 79-82; 2009: 63). Their best-explored example is the settlement at Monkodonja (Hänsel, Matošević, Mihovilić, Teržan 2009). Mentioned idea refers to the Adriatic-Ionian zone of interaction presented by Maran (1998). From there, some elements could have reached the Alpine area (Krause 2007b: 62, Abb. 14). Considering that the settlements cursorily discussed above have not yielded any direct evidence of contacts with the Adriatic coast,

Fig. 5. St. Veit Klinglberg. Plan of the site with reconstructed course of the wall and location of trenches (after Krause 2005).

one should be sceptical about the theory. It seems that so simple architectural solutions, which we deal with here, without any other elements that would join the two regions, do not provide on their own sufficient proof of a genetic relationship. In addition, it is worth noticing the motive of extraction and processing of copper ore, specific to the Alps and different from that on Istria, which was often the raison d'être of some of the settlements or even the reason, as it seems, why they came into being in the first place. Furthermore, the very stone structures of the Alpine area by no means reproduce the complexity level that is known, for instance, from the settlement at Monkodonja. Stone was used there to build a settlement of a complex structure with a clear division into the so-called acropolis and suburbium (Krause 2007b: 61, Abb. 13), and elaborate architectural elements (e.g. an entrance built in many stages and a cist grave; Hänsel, Matošević, Mihovilić, Teržan 2009) that are not known from any Alpine settlements.

The fact that ramparts were built in places that were most easily accessible and unprotected by terrain topography may suggest their defensive role. It is worth considering, however, whether actually most defences were large enough and had

necessary characteristics to effectively fulfil their defensive role (Shennan 1995: 75). The particularly modest size of the wall at Gschleirsbühel raises serious doubts (0.9 m wide, Zemmer-Plank 1978: 182). Even in the case of walls with a wider base and estimated height of 2-3 m, however, (Shennan 1995: 282) they could provide effective protection only when weapons requiring people to fight at close quarters were used (Ivanova 2008: 114). For defenders to take advantage of height, walls had to be build in such a way so that they could be used as so-called 'fighting stages' (Ivanova 2008: 114). One way of achieving this was adding platforms that enabled defenders to move along the inner side of a wall at a specific height or along its top. No Alpine settlement rendered remains of such additional structures. When weapons of a greater range were used, as for instance bows, a wall of such a height proved useless (Avery 1993: 59). Houses that formed portions of ramparts (see above) must have been particularly vulnerable. In case that they were higher than walls making them an easy, because well visible, target for potential attackers.

The stone structures surrounding the settlements are without doubt examples of ramparts. This does not mean, however, that they played a military role. Their characteristics justify calling them *curtains,* i.e. structures that always formed a barrier but not always had a military significance. Their purpose could have been above all to protect both people and property as well as privacy. What they enabled was to control the access to the settlement space and limit the visibility of its interior (Keeley, Fontana, Quick 2007: 57-58).

These doubts are certain arguments in the discussion of the significance and manner of use of the Alpine settlements. With

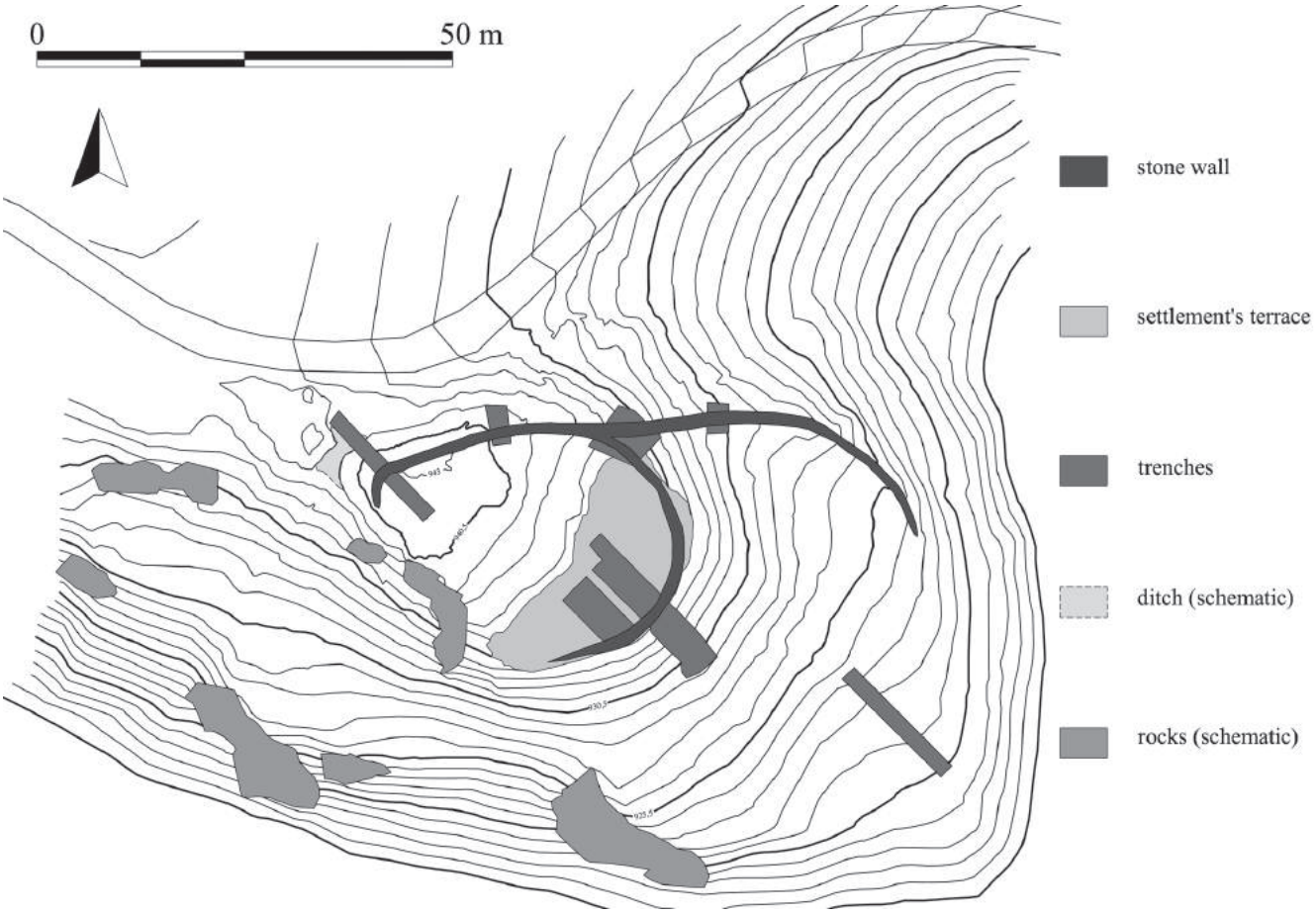

Fig. 6. Friaga Wald. Plan of the site with reconstructed course of the stone wall and location of trenches (after Krause 2005).

respect to St. Veit Klinglberg, Shennan put forward a hypothesis about seasonal occupation of the settlement or its permanent habitation but only by few inhabitants. The number of inhabitants would grow in wintertime when there was no need to tend animals or cultivate crops and when low temperatures were conducive to mining works (Shennan 1989: 45-46). Further investigations at the site revealed that its inhabitants were self-sufficient when it comes to animal breeding. This may bear out the hypothesis that the settlement was inhabited all year round by at least a small group of people (Shennan 1995: 285). Next to a defensive/military function, walls, it can be assumed, had also other roles related to, say, marking off and securing the rights of a group to a piece of land, protecting livestock and better controlling a walled space by providing a single guarded entrance (Avery 1993: 65). In the case of the Alpine settlements, perhaps due to the fragmentary nature of the excavations, however, no remains of entrances could be uncovered.

A considerable effort put into the construction of stone walls does not have to be an argument against the seasonal use of particular settlements. There are many sources showing that even seasonal work related to the extraction of raw materials may entail extensive infrastructure (Stöllner 2003: 432).

3.4. Metallurgy

The basic category of sources, underpinning the discussion of fortified settlements in the Alpine area, is made up of artefacts relating to metallurgy in the broad sense of the word. It is in reliance on such sources that conclusions are drawn concerning the social structure of the inhabitants of the settlements (Shennan 1995: 289; Krause 2002; 2005; Bartelheim 2007: 195-209).

The features discussed here, located in a region rich in mineral deposits (Günther 1995: 254-255; Krause 2003: 37, Abb. 12), have, indeed, yielded finds that can be linked to some of the stages of copper ore processing (Eibner 1982) and a few ready-made bronze objects as well.

The least information is available for the settlement at Gschleirsbühel. The author of the investigations mentions only two small fragments of socketed spear (Zemmer--Plank 1978: 186).

The first excavations at Buchberg, besides characteristic pottery thinned with slag (Sydow 1986: 186), did not render initially any evidence, either, of local copper (ore) processing. The first unequivocal evidence was obtained in 1992. A survey of the site yielded lumps of slag and black copper and more fragments of pottery thinned in a characteristic manner (Martinek 1994). Another survey yielded a find of an axe of Langquaid II type as well as lumps of black copper and slag, a pin of *Scheibenkopfnadel* type and fragments of a vessel interpreted to be a crucible (Martinek 1994; 1996: 576, 583; Krause 2003: 40, Abb. 14). In 1994, the site was excavated again. This time, next to more slag lumps, a discovery was made of a tuyère (Martinek 1996: 582--583). Mineralogical and chemical analyses of the artefacts showed that *fahlores*, characteristic of the eastern Alps, underwent the whole production cycle at the site (Martinek 1996: 576-584; Krause 2003: 39--40). A radiocarbon date (1955-1885 BC), obtained for the site, belongs to the earliest ones testifying to the metallurgy of copper in the region (Martinek 1996: 584). From the point of view of social significance of metallurgy, the most important find made in Buchberg is a dagger with a solid handle (Fig. 7:1). It must be stressed, however, that the find is an isolated one.

The settlement at Sotćiastel is known for a large assemblage of about 50 metal objects (Tecchiati 1998: 230-235, Tav. 42-47, 272) predominantly dated to the beginning of the Middle Bronze Age.

Within the alleged fortified settlement at Savognin-Padnal, in horizons E and D, discoveries had been made of houses, mentioned already earlier, which were inter-

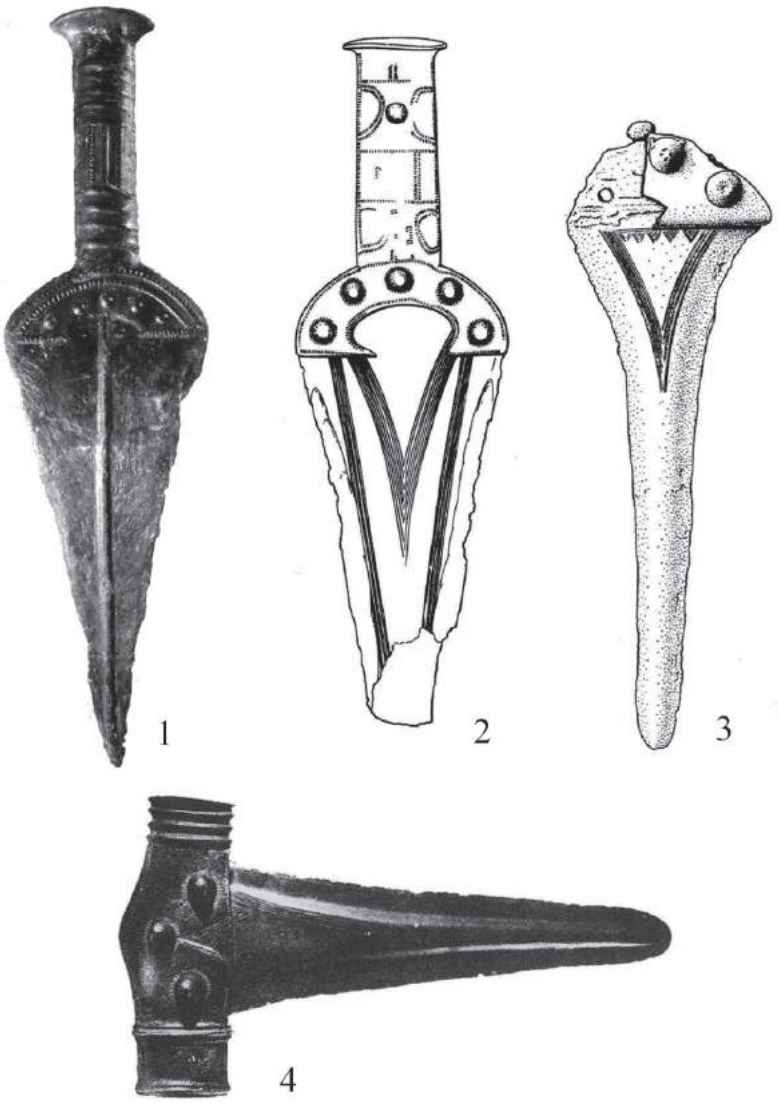

Fig. 7. Daggers with solid hilts and a halberd from the Alpine area:
1 – Buchberg,
2 – Patsch-Mülthaler Tunnel,
3 – Aham, 4 – Brünnthal
(after Bartelheim 2009).

preted as huts/workshops of a metallurgist. In the older of the houses, finds included copper ore lumps, metal droplets, mould and crucible fragments and remains of ore roasting (Rageth 1979: 51, Abb. 27. 1, 67, Abb. 50. 1; 1986: 67). Whereas, the younger house yielded only metal droplets (Rageth 1986: 68).

As far as the region of Montafon is concerned, the investigations of a fortified settlement at Friaga Wald are one of the arguments making a case for the fundamental role of the extraction and processing of copper ore in the life of Alpine area communities, a view shared by Krause (2002; 2005). The site rendered a single complete specimen of a pin of *Lochhalsnadel mit trompetenförmigen Kopf* type and two heads of similar pins dated to ca. 1500 BC (Krause 2005: 405-406, with footnote 61; 2007a: 123, Fig. 4. 1). The project, focused on early metallurgy in the region of Montafon, included taking a number of samples of minerals for the purpose of comparing them with artefacts originating in the region. Analyses were made of the trace elements of lead, which is found in copper as an impurity whose isotopic composition is specific to individual ore deposits. The research further consisted in comparing the pattern of trace elements in copper with the isotopic values of lead in the Montafon ores and metal artefacts (Romanow 1995: 264; Krause, Oeggl, Pernicka 2004: 14-17,

Abb. 20). The results, although they do not exclude a possibility that the raw material for the making of some objects originated with the ores found in Montafon region, are by no means conclusive because of too small a selection of copper ore samples subjected to analysis from the eastern part of the Alpine area (Krause 2007a: 132). It is worth noting that the investigations at the settlement at Friaga Wald, underpinning Krause's project aimed at obtaining source materials that would directly link the fortified settlements of the Alpine area to the extraction of copper ore and metallurgy, have not supplied so far any evidence of the local production of metal or any form of ore processing (see comments by Kienlin, Stöllner 2009: 71).

In St. Veit Klinglberg, among the sources forming direct evidence of metalworking, a mention should be made of only two tuyère fragments (Shennan 1995: 175). There is, however, a group of sources that permits scholars to link the inhabitants of the settlement to particular stages of copper production (Shennan 1989: 41). In total, the investigations yielded about 150 objects related to metallurgy, mostly small lumps of black copper (Shennan 1995: 242-243). The assemblage includes also fine fragments of ready-made goods and complete artefacts. One should mention, above all, a dagger blade, twisted wire (probably, a pin fragment), chisel and arrowhead (Shennan 1995: 245, Fig. 10. 1). These objects may be dated, with considerable certainty, to the late period of the Early Bronze Age (Shennan 1995: 244). It cannot be ruled out that some of them were made locally. An important category of finds from the area of St. Veit Klinglberg are the so-called 'casting cakes'. These are lumps of copper with a high content of arsenic, antimony, iron and sulphur. Unsuitable for producing metal objects, they had to be refined first (Eibner 1982; Romanow 1995: 264). In the region in question, 'casting cakes' may have been a semi-product exchanged for other goods (Menke 1982: 214-215; Romanow 1995: 265).

A peculiar source, testifying to the inhabitants' connection to the extraction and preliminary processing of copper ore, is local pottery. Without any technological reason, as a temper meant to thin the ceramic body, slag was used here. The same practice was followed, for instance, at the settlement at Buchberg. This type of temper is characteristic only of settlements in the Alpine area (Lippert 1999: 114). No shard originating elsewhere has this characteristic. Since this kind of temper does not improve the durability of vessels, attempts were made to seek an explanation for this practice in the sphere of beliefs. The pottery makers must have been convinced that in this way they imparted metal characteristics to the pottery (Shennan 1995: 283-284).

The sources related to the extraction and processing of copper, originating with Alpine settlements, make a rather modest assemblage sharply contrasting with the significance mining and metallurgy supposedly played in the life of local communities (recently: Krause 2009). However, intensive research into early metallurgy in the Alpine area witnessed in recent years may provide us with new information sources. Particularly meaningful in this context, the case of the Buchberg settlement shows that a return of archaeologists to a site after almost 30 years may produce a broad gamut of artefacts testifying to the existence of the whole chain of *fahlore* processing.

3.5. Chronology

The chronological position of the settlements is often discussed leaving out their cultural attribution. Any findings refer to the general characteristics of pottery or metal goods that permit scholars to place them within Paul Reinecke's system. Pottery is very often simply included in an appropriate section of the inner-Alpine Bronze Age (*inneralpine Bronzezeit*, in the sense of Rageth 1986). Only some publications indicated the typological links of pottery to the south German Straubing cul-

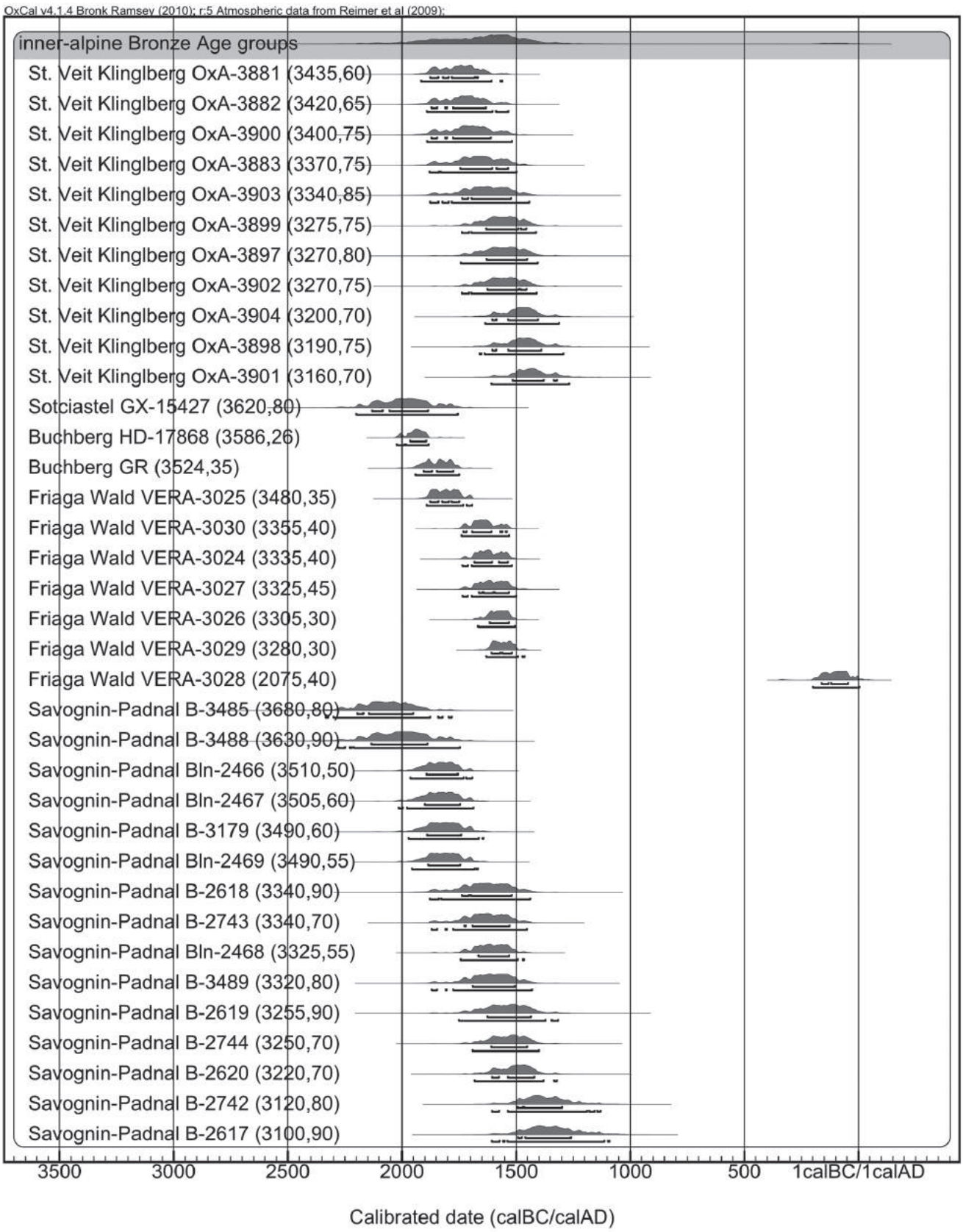

Fig. 8. The sum of the probability distribution of radiocarbon datings from fortified settlements in the Alpine area (after Shennan 1995; Martinek 1996; Tecchiatti 1998; Krause 2005).

ture[1] (Zemmer-Plank 1978: 204; Shennan 1989: 44). Others do not refer precisely to typochronological units in the traditional meaning of archaeological culture (Shennan 1995; Krause Oeggl, Pernicka 2004; '*inneralpine Gruppen*' Krause 2005: 392, Abb. 2), relying solely on absolute age determinations using the ^{14}C method.

In the light of available data, fortified settlements developed in the Alpine area in the late section of the Early Bronze Age and in the early section of the Middle Bronze Age (BA2/BB1; Krause 2005: 396, Abb. 5). Only the dates from Savognin-Padnal mark an earlier period. In the case of horizon E, they are spread from the end of the 22nd century BC to ca. 1800 BC, while in the case of horizon D they are distributed from ca. 1700 to 1400 BC (Krause 1996: 80)[2].

[1] Taking into account the number of ceramic sources found at St. Veit Klinglberg (approx. 40,000 fragments), their role in the strategy of research into the settlement's chronology was marginal (Shennan 1995: 35-48).

[2] In a publication devoted to the chronology of southern Germany, Switzerland and Austria (1996), Krause gave a list of dates from Savognin-Padnal that did not correspond exactly to a list of dates made by the author of the study Rageth. The former designated some dates determined in the laboratory in Bern as ones determined in a Berlin laboratory (see Rageth 1986: 95-96; Krause 1996: 82-83, Liste 1).

3.6. Summary: role and function of fortified settlements in the Alpine area

Observed in the finds from St. Veit Klinglberg, the simultaneous presence of cleaned cereal grains and artefacts related to copper ore processing triggered discussions of the model of circulation of metal and metal semi-finished products in the Alpine area. For it is assumed that 'casting cakes', a raw material for the production of copper obtained from nearby deposits, were the basic products exchanged by inhabitants for other goods (Menke 1982: 218; Shennan 1995: 307-308; Krause 2005: 395). What were these other goods? Relying on the find of an amber bead in St. Veit Klinglberg, it was suggested that it was amber that was used in the exchange of goods (Shennan 1995: 242). Other sources from the settlement, however, indicate that goods obtained by exchange could have included farm produce, above all cereals. Another possibility is the exchange of the raw material for ready-made bronze goods manufactured in valley settlements or tin necessary to produce bronze alloys. Available maps indicate that roles in the chain of production and distribution of copper and bronze may have been divided between the mountain zone and the piedmont of the Alps. It is suggested that settlements located in the mining region (e.g. St. Veit Klinglberg) occupied themselves with the extraction of raw material which then travelled upstream (along the Salzach River) to other settlements where it was processed (refined) and from where it reached successive recipients (Menke 1982: 120; Romanow 1995: 265; Shennan 1995: 308, 295, Abb. 12.1). It is presumed that in settlements, in the valleys of the Saalach and Salzach rivers, a special kind of copper was produced to be later distributed as ingots known as *Ösenringbarren* and *Spangenbarren* (e.g. Menke 1982: 13, Abb. 4, 68, Abb. 45) across the vast areas of the Alpine piedmonts, southern Bavaria, Lower Austria, Moravia, and southern and northern Bohemia (Junk, Krause, Pernicka 2001; Moucha 2005: 25-42). The ingots were supposedly a form of commodity money of specific quality and value (Lenerz de Wilde 1995; Pernicka, Krause 1998: 223) that was frequently valorised in deposits of a ritual character (Innerhofer 1997).

So far, the social interpretation of the fortified settlements of the Alpine area was dominated by two radically different views. In the conclusion of the report on investigations at the settlement at St. Veit Klinglberg, Shennan claimed that there was no convincing evidence of a central

settlement in the region in question nor were there any sources that would point to the existence of a separate social stratum or elites (Shennan 1995: 289). Relying on ethnographic observations from Cameroun and the 19th century 'theory of comparative advantage' formulated by David Ricardo, he pointed to a model in which the extraction and preliminary processing of copper ore by specific communities were simply elements of a local economic system and a result of the calculation of relationships holding between costs, profits and values (also in the social sense) (Shennan 1999; Kadrow 2001: 151-152). According to this model, the community of St. Veit Klinglberg was an underprivileged group in the exchange system, sustaining relatively high production costs of their commodity. However, the fact that they occupied a specific niche resulted in their remaining part of a larger system, permitting them to gain some advantages (Shennan 1999). From this perspective, the inhabitants of St. Veit Klinglberg were not local elites – quite on the contrary, they were a group dependent on the recipients of the effects of their work who supplied the settlement with necessary farm produce (Bartelheim 2007: 203).

A completely different view was presented by Krause. Relying on the analysis of the settlement at Friaga Wald (Krause, Oeggl, Pernicka 2004) and others in the region, he attributed to them a similar role to that of Medieval fortified enclosures (*Burgen*) (Krause 2005: 408). They were, in his opinion, seats of local leaders controlling the raw material and a given territory (Krause 2005: 390, 408-409). This view had been presented already earlier with respect to the region of Saalfelden in which existing settlements were assigned a task of not only guarding the places where ores were mined and processed but also controlling a route along the valley of the Saalach River (Moosleitner 1991; Shennan 1995: 21, Fig. 1.1). The major criteria that Krause adopted while formulating his hypothesis were stone defences around settlements and finds of prestige objects (halberds and daggers with solid handles) (Krause 2002; 2005: 391-392, Abb. 2). In the light of our knowledge on the settlements in the region, one can hardly agree with the opinions of the cited author. Specifically, in the different aspects of fortified settlements described above, one can hardly find any conclusive evidence testifying to the social differentiation of their inhabitants.

Among structures located within settlements, there are no houses that could be assigned a special position, because of their dissimilar form or a special inventory. A central house, set apart from others by its size and a number of hearths, is known from Savognin-Padnal. However, it was built in horizon B linked to the Late Bronze Age (Rageth 1986: 71-73). Also, the main characteristic of the settlements – their defences – cannot be treated by itself as evidence of the existence of a settlement hierarchy in the Alpine area (Krause 2005: 408) for the simple reasons that their functional nature is not absolutely clear and our knowledge of other, so-called open, settlement forms is inadequate[3]. The inventories of artefacts obtained from the settlements do not meet the traditional criteria of sources, testifying to the existence of separate social groups or elites (Bartelheim 2007: 201, 203, Abb. IV. 10). Such sources include above all objects made using a complex technique or from an exotic raw material. As such they directly testify not only to the existence of private property, but also to the possibility of acquiring them through exchange with remote areas. In all the research areas discussed here there are many examples of such finds (see below). An exception here is the settlements of the Alpine area (Fig. 7). They yielded a very modest inventory of finds of a special status. This overall picture is not changed by the amber beads from St. Veit Klinglberg (Shennan 1995: 242) and Savognin-Padnal (Stahl 2006: 147) or the dagger with a solid handle from the settlement at Buchberg (Pöll 2014). For the presence of amber is observed in the region as early as the late the 3rd millennium BC. Whereas daggers with solid handles, apart from the exception mentioned earlier, are known, above all, from finds of single specimens often made high in the mountains (Kienlin,

[3] Located in the Bartholomäberg district, the site at Boda Weg is dated only to the 14th and 13th centuries BC (Krause 2007a: 127-128).

Stöllner 2009: 88). Hence, there is no direct evidence that would justify linking them to the fortified settlements.

To the fact that the fortified settlements were part of a broader cultural circle could testify fragments of *Brotlaibidole* unearthed at Sotćiastel and Gschleirsbühel (Zemmer-Plank 1978: 206, Taf. 14. 5; Tecchiati 1998: 193, Fig. 29a-32b). These objects are found above all in two clusters. The first is associated with the Polada culture in northern Italy while the other stretches from the drainage of the middle Danube to the western portion of the Carpathian Basin (Rind 1999: 92, Abb. 15). Since we do not know the function and significance of these objects, it is hardly possible to assess their potential 'prestige' or social value.

Even if it is assumed that at least some of the settlements of the Alpine area were related to the mining of local copper deposits, there is no reason to see behind them complex social structures usually manifested by the presence of, at the least, prestige objects (Kienlin, Stöllner 2009). The picture of the settlements lacking any clear evidence of social hierarchy seems to agree with the opinion of Bartelheim who pointed out that manufacturing ready-made bronze goods and decorating them were valued higher than procuring raw material itself in the general central European context. This opinion may be borne out by inventories found in so-called metallurgists' graves of which few are known (Bartelheim 2007: 205-207).

Another problem, faced by those who search for elites and evidence showing how intensive social processes were, is posed by a virtually total absence of sepulchral sources in the region (Bartelheim 2007: 201). Rich 'princely graves', burials whose grave goods included daggers, and single/collective finds of, for instance, halberds are all connected to areas lying north of the Alps (e.g. Bartelheim 2007: 200, Abb. IV. 8; Weinberger 2008: 47, Fig. 5, 49, Fig. 6). They are yet another proof that metallurgical production was easier to monopolize and that distribution of the new raw material in areas distant from its mining centres offered previously unknown advantages (Jaeger, Czebreszuk 2010). The difference could have been a result of the way metal was treated. In the regions located closer to the places of its procurement, it could have gone through, to some extent, the stage of 'turning into a commodity' (Shennan 1992: 539).

CHAPTER 4

Research Area II. South-western Wielkopolska, Bruszczewo: Kościan Group of Únětice culture

The settlement at Bruszczewo, situated in southern Wielkopolska (Fig. 9), is a major element of a relatively small enclave, but significant owing to the abundance of sources, of the Únětice culture known as the Kościan Group (Szydłowski 2003; Jaeger, Czebreszuk 2010)[1]. Although its geographical range has not been clearly determined (Szydłowski 2003), the group should be associated in the first place with the settlement at Bruszczewo, a unique cemetery of 'princely graves' in Łęki Małe (Jaeger, Czebreszuk 2010), an alleged barrow at Przysieka Polska (Schwenzer 2004), single graves, numerous hoards and isolated finds of bronze objects (Czebreszuk, Müller 2004: 41-42).

For a long time, the Bruszczewo settlement had been treated as an element in the existing network of Wielkopolska's fortified settlements. Among features similar to Bruszczewo had been counted settlements at Słopanowo and Pudliszki (Gedl 1982: 205; Gediga 1983: 51, Abb. 1; Kłosińska 1997: 104; Czebreszuk, Müller 2004: 43, Abb. 16). However, verifying investigations carried out in recent years led to a revision of this view. In the light of absolute chronology, the Pudliszki settlement must be associated, without any doubt, with the Late Bronze Age and the Lusatian culture (Jaeger, Czebreszuk, Müller 2008; Jaeger 2010). In the case of the Słopanowo settlement, a mistake was made in determining both the age and function of unearthed ditches. In reality, they were remains of a barrow of the Wielbark culture (Jaeger, Czebreszuk, Müller 2008: 152, with footnote 5).

Next to the investigations of the settlement at Bruszczewo, significant information on the local Únětice culture enclave is supplied by the excavations of barrows at Łęki Małe and a survey programme systematically carried out within the Bruszczewo project (Czebreszuk, Szydłowski 2010). What all these efforts revealed is the intensity of the settlement process in the Early Bronze Age. Its scale can be compared to the periods when the Lusatian and Przeworsk cultures dominated (Czebreszuk, Szydłowski 2010: 87-88, ryc. 5).

The Bruszczewo settlement has a long record of investigations (Czebreszuk, Müller, Silska 2004). Particularly interesting and unique information was obtained from the peat zone of the site where a part of wooden defences, remains of houses and a single burial with timber elements survived.

[1] The Bruszczewo site was used also by the societies of the Lusatian culture and, albeit less intensively, in the Middle Ages. The Late Bronze Age stage of settlement occupancy may be linked to a number of pits, timber structures preserved in the western peat zone and a ditch.

Fig. 9. South-western Poland. Early Bronze Age fortified settlements: 1 – Bruszczewo, 2 – Radłowice, 3 – Jędrychowice, 4 – Nowa Cerekwia.

4.1. Natural environment and economy

In the case of Bruszczewo, the fund of available information on the natural context and subsistence strategies of settlement inhabitants is relatively the largest and most specific. Already the investigations carried out in the 1960s produced animal and macrobotanical remains, which were analyzed (Klichowska 1971; Makowiecki, Drejer 2010: 288).

The research project launched in the 1990s had an interdisciplinary character. During excavations, next to bone remains, a large number of soil samples were collected. Some of them were washed (floated)

at the site (Kroll 2010: 250). Samples were taken from units of vertical stratigraphy, isolated natural strata and features considered particularly interesting. The samples were collected in both settlement zones (Kroll 2010: 252, Fig. 3). The results of the analysis of macrobotanical and animal remains were supplemented by conclusions following from palynological profiles. The latter were collected both from cultural layers and in the immediate vicinity of the settlement.

The list of crops drafted in the wake of the first excavations (Klichowska 1971: 94) was confirmed by the analysis of natural layer 35 from the peat zone of the site. The layer was found to contain the remains of barley, emmer, small spelt and spelt. In addition, there were found young offshoots and leaf fragments, which may testify to the use of leaf-hay (Karg, Bauer, Fingerhut 2004: 264, 266). Layer 35 was interpreted as manure (Haas, Wahlmüller 2004: 275). This view is supported by the presence of maggot sheaths, shed by the fly species that naturally lay eggs in animal dung (Karg, Bauer, Fingerhut 2004: 265), spores of coprophilous fungi and parasites (Haas, Wahlmüller 2004: 275-276). The analysis of macrobotanical remains shows that barley and wheat were cultivated separately in Bruszczewo. The latter was not just an accompanying cereal. Whereas oats, found in the macrobotanical remains as well, was a weed in the Early Bronze Age. Millet, in turn, is known to have been grown there because its impressions were found on pottery and it was discovered in single pits located in the central mineral part of the site (Kroll 2010: 260-262). The cereals that were found at Bruszczewo were by no means winter crops. This means that fields were cultivated from early spring to late summer. When crops were not grown on them, they could have been used as so-called stubble meadows. For this reason, they must have been 'naturally' fertilized with animal dung. As a result, grains recorded at Bruszczewo reached a relatively large weight (Kroll 2010: 226). Within the mineral zone, in a close stratigraphic relationship to the burial (Kneisel 2010d: 718), a large amount of grain was unearthed. The deposit consisted of barley and wheat (Kneisel 2010a: 146). Its composition differed from the cereal concentration discovered in trench 52. An analyzed sample (20 litres of sediment with cereal from an area of 3 sq. m) yielded virtually barley only and practically without any impurities – the grain must have been made ready for consumption (Kneisel 2010a: 146; Kroll 2010: 260). The presence of a specific weed – black bindweed – may indicate the method of harvesting and storing barley. It can be safely assumed that grain was harvested still in ears and it was in this form that it was stored (Kroll 2010: 264).

Next to cereals, the analysis of macrobotanical remains revealed the presence of a number of other plants both domesticated and wild. Pit fills in the mineral zone of the site and the peat zone yielded the remains of poppy, dill, pea, lentil and bitter vetch. In the last-mentioned case, we are dealing with the oldest trace of the plant in the eastern portion of central Europe (Kroll 2010: 260, 264, 274). In all probability, specialized varieties of legumes, dill and poppy were grown in gardens (Kroll 2010: 264).

Owing to the already mentioned specific conditions prevailing in part of the site, botanical samples yielded large amounts of remains of aquatic vegetation (Kroll 2010: 257, Fig. 8).

The knowledge of resources and values (not only nutritional ones) of wild plants growing around the settlement is evidence by a broad spectrum of macrobotanical remains. What was gathered included not only fruit (e.g. apples, raspberries) but also plants of potential medicinal properties (e.g. hop, henbane) and technical ones (e.g. linden as a source of fibres). The presence of hazel nuts and acorns is strongly attested. Archaeological sources found at other Bronze Age sites show clearly that acorns were above all part of human diet (Hajnalová, Furmánek, Marková 1999: 231). This is evidenced by the fact that acorns were roasted and heating is the easiest way of removing bitterness from them. In Bruszczewo, acorns were found in the grain deposit associated with the burial (Kroll 2010: 266, 274).

The study of macrobotanical remains from Bruszczewo allowed Kroll to draw a number of conclusions concerning the type of landscape and vegetation in the

surroundings of the settlement and the rate they changed. What he chiefly relied on was the remains of pasture weeds indicative of the gradual eutrophication and opening of the landscape around the settlement due to animal grazing (Kroll 2010: 268-270). The process is also evidenced by the analyses of the sediment from layer 35. The manure content is in this case related to the presence of herds of cattle on the lakeshore (a watering place) (Kroll 2010: 258).

The conclusions drawn from the analysis of botanical samples are borne out by palynological studies. Altogether, we have four profiles[2]. Three of them come form the peat zone of the site. The first is a box profile taken from quadrat 2 (north profile of quadrat 2, trench 30) (Diers 2010: 342). Next two profiles come from cultural layers (profiles Qu-9 and BK 2005/1). Profile 16/5.5 was taken from a place located about 200 m away from the site. The drilling was done in the deepest place of the lake that originally surrounded the settlement (Haas, Wahlmüller 2010: 54, Fig. 1; 56, Fig. 2; 58). The profiles recorded anthropogenic processes related to all the periods of major settlement activity in the region known from archaeological data (Czebreszuk, Szydłowski 2010; Diers 2010: 364; Haas, Wahlmüller 2010). The profiles were analyzed in accordance with the most recent standards that next to pollen grains also stress the need to identify extrafossils (locally grown cysts, fungal spores, algal remains, charcoal bits, aquatic insect eggs, parasites) (Haas, Wahlmüller 2010: 56, 58), which offer greater possibilities of reconstructing the former natural environment.

Both archaeological and palynological data tend to show that first societies penetrating the area of the site and its surroundings were Neolithic groups (Czebreszuk, Szydłowski 84, Fig. 1-4; Haas, Wahlmüller 2010: 70-78). However, a continuous and intensive use of the area began only in the Early Bronze Age.

The most intensive deforestation of the area took place in the period from 2050 to 1750 BC. This is shown by indicators recorded in profiles BK 2005/1 and 16/5/5. Arable fields must have been located in the immediate vicinity of the settlement. The landscape was 'subdued' by burning surrounding forests. Animal breeding was important. In the next period (1750-1650 BC), a clear change must be presumed in the strategy of the agro-breeding economy. This is reflected in the pollen influx value that shows that settlement inhabitants gave up burning forest and tilled the fields located at a considerable distance from the settlement. The next period (1650-1000 BC) is characterized by a steep fall in human impact indicators. The economic activity of Early Bronze Age societies was far more intensive than that recorded for later times, including the period of Roman influence. In the latter period, the impact of man on the local natural environment seems to have been rather limited. Neither the region's vegetation nor its landscape underwent then any major change. Surprisingly, an increase in afforestation is recorded and a clear spreading of the oak, birch and pine (Haas, Wahlmüller 2010: 78).

Extrafossils, found in palynological profiles collected from both cultural layers and the original lake area, confirmed that part of accumulated sediment was made up faeces (human or animal). The waters of the lake must have contained excrements. This could have adversely affected water quality in the lake and resulted in its periodic toxicity (Haas, Wahlmüller 2010: 78-80).

Next to lake contamination indicators, on the same stratigraphic level (only in the Early bronze Age), the presence of mistletoe and ivy was recorded (Haas, Wahlmüller 2010: 80). A possible explanation of the presence is the use of the twigs of these plants as cattle fodder (Karg, Bauer, Fingerhut 2004: 266). However, a correlation between the finds of mistletoe and human whipworm eggs allowed the researchers to put forward another interpretation proposal. Relying on ethnographic sources, they pointed to the potential significance of the plant as a cure for the parasite living in the water of the lake (Haas, Wahlmüller 2010: 80). At the present stage of research, however, this is only a working hypothesis.

In the light of the investigations described above, the local natural environ-

[2] For a detailed description of the method of profile collection and analysis see Diers 2010: 342-346; Haas, Wahlmüller 2010: 58-64.

ment was strongly affected by the intensive animal breeding practised by settlement inhabitants. The investigations at Bruszczewo yielded a large amount of animal bone remains. The remains from both the first and second stages of the investigations were subjected to a partial archaeozoological analysis (Makowiecki 2004; Makowiecki, Drejer 2010). Moreover preliminary taphonomical investigations were carried out on animal bones from pit no 150 (Marciniak 2010).

The osteological material collected between 1995 and 2001 was made up of two bone assemblages[3] built up using two different techniques. Next to the traditional manual collection of animal remains, the flotation method was taken advantage of using sieves of 3 mm mesh size. This had a considerable impact on the analysis results. What changed most was the representation of individual species. The washing revealed the presence of so-called small animals (mud turtle, pike, sheatfish) and birds[4] (mallard), and raised the share of wild species remains (for instance, by 10 per cent rose the number of deer bone fragments and by 15 per cent climbed those of the roe deer) (Makowiecki 2004: 283-285).

At the settlement cattle breeding clearly dominated over the raising of sheep, goats or pigs, which is seen in the number of bone fragments of individual species. Little represented in the material studied were the bones of the horse or the dog (Makowiecki 2004: 283, Fig. 133; Makowiecki, Drejer 2010: 292; Table 1). The wild species that were indentified were mostly large animals such as, above all, the deer and wild boar followed by the roe deer and aurochs. Among small animal bones, the most numerous were those of the beaver. The rest of remains belonged to the brown hare, brown bear, (pine?) marten and wildcat. Apart from mammals, the assemblage contained bird remains (Makowiecki, Drejer 2010: 292).

Individual domesticated species, being the chief source of animal proteins, were used in many different ways. For the analysis of mortality did not reveal any specific, one-track breeding strategy. Even in the case of pigs, carcasses were of varied quality, and nutritional and culinary values as animals were slaughtered at different ages (Makowiecki 2004: 284, 290).

When the chronology of the site could be made more specific, the osteological material coming from the 1960s was re-analyzed. Two 'pure' sets of animal remains were separated and a third, mixed one. The first two were linked to the Únětice and Lusatian cultures, respectively, while the third one combined the two phases of settlement at the Bruszczewo promontory and the Early Medieval times. Next, the three sets of chronologically ordered remains were subjected to a spatial analysis within zones (A-E, S) marked off following the form and location of pits (Makowiecki, Drejer 2010: 288-290; Fig. 1).

The most interesting for this work, the set associated with the Early Bronze Age contained altogether 3,500 bone remains in 49 features. Over a half (54 per cent) could be identified. A vast majority of them (89 per cent) belonged to domesticated species (Makowiecki, Drejer 2010: 290-292). This tendency could be seen in all the zones, although percentage ratios within them varied (Makowiecki, Drejer 2010: 294).

A spatial analysis allowed to capture a cluster of Early Bronze features containing animal bones in the northeastern portion of the settlement, in zones A, B, and D. In terms of numbers, however, zones C, A and B stood out (Makowiecki, Drejer 2010: 294). What seems to be particularly significant, however, is the conclusions following from the spatial distribution of remains of wild species. They were particularly densely concentrated in zones B and C, with their share in the former zone reaching 22.5 per cent. A tentative assumption can be made that this fact reflects a special manner of distribution of food and raw materials obtained by hunting. The researchers pointed to a possibility that wild animals could have been differently valorized because they belonged to the natural world (Makowiecki, Drejer 2010: 294, 300). This suggestion agrees with the view that hunting grew in social importance in

[3] The analyzed assemblage consisted in total of 2,486 bone fragments of which 1,859 or 74.8% were identified Makowiecki 2004: 283).

[4] Fish remains were not represented at all in the assemblage of bones collected in the 1960s (Makowiecki 2004: 282).

the Bronze Age as illustrated by a rich collection of flint points discovered at Bruszczewo and attesting to the popularity of the bow – a hunter's attribute.

The above information paints a picture of a well-organized society engaged in an intensive agro-breeding economy supplemented by gathering, hunting and garden growing of specialized plant varieties. However, the most significant outcome of the research is a unique possibility of determining the scale of human impact in the region. It is this impact that, hypothetically, led to an extensive degradation of the natural environment and contributed to the fall of the Bruszczewo settlement.

4.2. Inner layout

A fundamental problem facing researchers in the case of the Bruszczewo settlement is determining how its interior was laid out. The site has been an arable field for decades. Long years of ploughing, including particularly deep and destructive steam ploughing in the 19th c., and other agrotechnical measures resulted in great destruction of strata from the Early Bronze Age. The magnitude of the problem may be illustrated by the fact that only in trench 47/05 a cultural layer linked to the Únětice settlement survived in fragments (Czebreszuk, Suchowska 2010: 545, Fig. 2). Next to contemporary destructive processes, some elements of the Early Bronze Age settlement must have been destroyed during the younger phases of the site use. This is well illustrated by the fact that the Lusatian ditch was in part dug into a ditch from the Early Bronze Age.

In consequence, little data is available on the inner layout of the Bruszczewo settlement (Müller, Kneisel 2010: 762). What was nevertheless recorded is a large number of storage pits and postholes (Czebreszuk, Ducke, Müller, Silska 2004: 73; Kneisel 2010a: 94, Abb. 1) (Fig. 10). In addition, excavations and geomagnetic investigations support a view that between the most densely settled part of the settlement and the defences there was an empty space about 20 m wide (Czebreszuk, Ducke, Müller, Silska 2004: 73). Certainly, some of the postholes must be relics of Early Bronze Age post houses. What is not certain, however, is their chronology. For the most part, these features are deprived of any archaeological artefacts that would allow researchers to attribute them to a specific period of the Bruszczewo use (Czebreszuk, Ducke, Müller, Silska 2004: 74). The arrangement of the postholes revealed in the course of excavations is insufficient to reconstruct unequivocally the remains of huts. Quite possibly, some postholes that are regularly arranged along an E-W axis are relics of Early Bronze Age structures (Czebreszuk, Ducke, Müller, Silska 2004: 74, Abb. 28). How the huts looked we can presume only indirectly relying on information from other sites of a similar chronology.

In the case of sites located in Poland, our knowledge is excessively modest as a result of the absence of planned excavations (Sarnowska 1969: 16; Butent-Stefaniak 1997: 166-171; Lasak 2001: 249-253). A majority of Early Bronze Age settlements were only fragmentarily investigated, often as part of excavations of multicultural sites. They rendered above all discoveries of different types of storing pits. In several cases, features of exceptionally large size were interpreted as remains of dwelling structures – semidugouts (Sarnowska 1969: 14; Butent-Stefaniak 1997: 167). Relics of Early Bronze Age structures were unearthed at a fortified settlement in Radłowice (Lasak 1988; Butent-Stefaniak 1997: 169). They included postholes left behind by both overground huts and dwelling structures partially sunk into the ground (Lasak, Furmanek 2008: 124-125, 130, Abb. 3). Post huts were small structures measuring from 9 to 25 sq. m and may have had a similar form to hut remains known from Germany and Moravia, of which more is known (Stuchlík 2000: 221-229; Schefzik 2006: 154-155; Abb. 11-12). For the latter area, four types of post houses occurring at Early

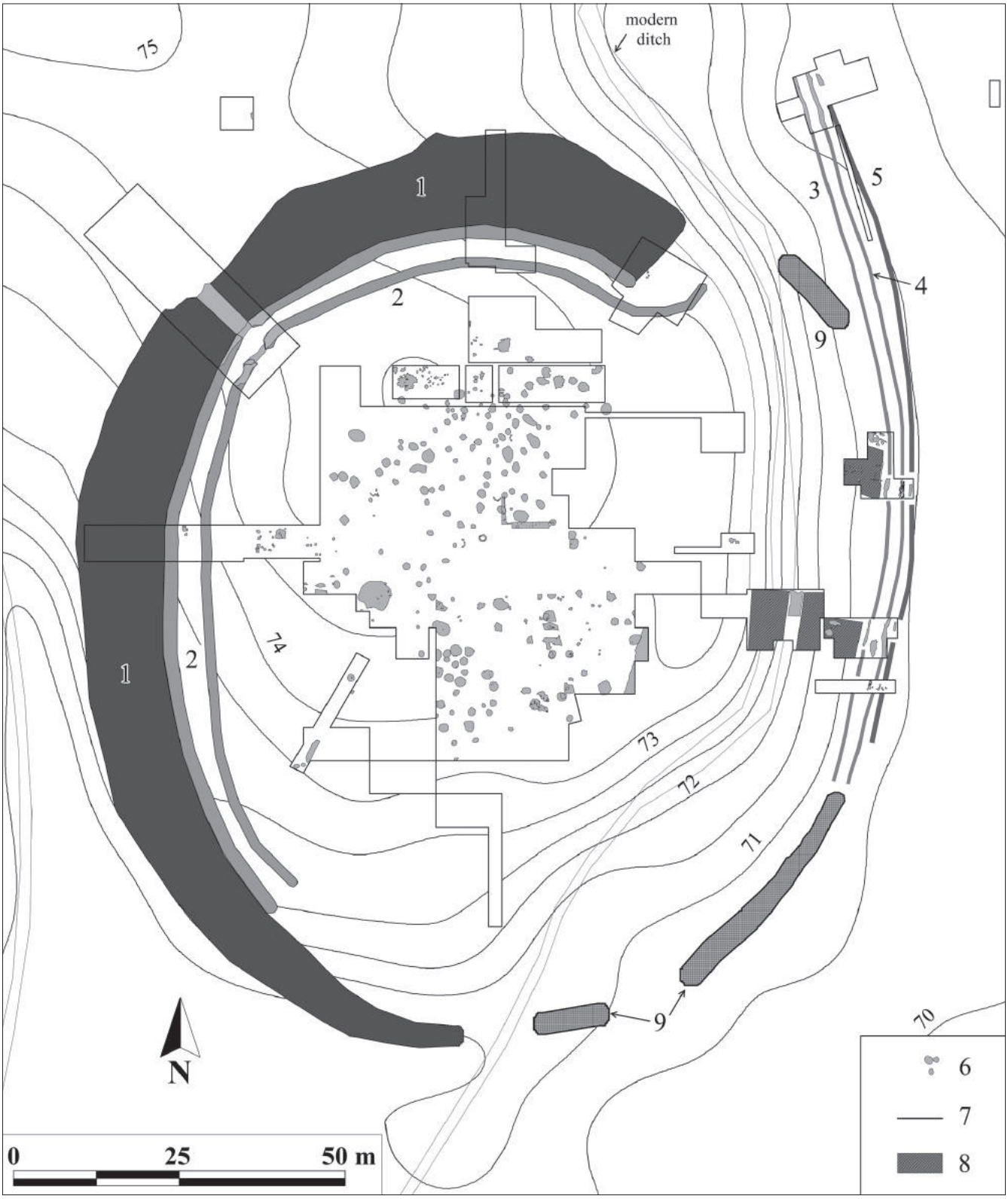

Fig. 10. Bruszczewo. Plan of the settlement with excavated elements of the inner layout and fortifications: 1 – ditch, 2 – palisades, 3, 4 – fascines, 5 – wooden wall, 6 – pits, 7 – excavated area, 8 – houses in wet area, 9 – probable course of EBA ditch (after Kneisel et al. 2008).

Bronze Age settlements were distinguished: small overground houses, houses sunk into the ground, hall houses and circular ones (Stuchlík 2000). At the Bruszczewo site, in none of the investigated settlement parts, can one find a circular arrangement of postholes at a relatively small area, which typical of houses built on a circular plan (see Velešovice; Stuchlík 2000: 237, Obr. 13). Neither are there any regularly spaced postholes, typical of hall structures (see Šumice; Stuchlík, Stuchlíková 1999: 178, Abb. 8; Eching/Öberau type; Schefzik 2006: 140, Abb. 1). I believe it can be tentatively assumed that rather small overground post houses provided shelter to settlement inhabitants. Such structures are known from many Únětice culture sites in Moravia (e.g. Sedlec, Holubice, Moravská Nová Ves; Stuchlík 2000: 224-226, Obr. 3-6).

Next to postholes, the mineral part of the Bruszczewo settlement yielded a single feature which is probably a relic of a house sunk into the ground. Feature 78, only partially explored, was trapezoidal in shape, measured 4.4 m in length and 2.4 to approx. 4 m in width, and held a stone hearth (Czebreszuk, Ducke, Müller, Silska 2004: 75, Abb. 29). Dwelling features partially sunk into the ground are known from other Únětice culture settlements (Lasak 1988: 48; Stuchlík 2000: 235-236). However, feature 78 differs significantly from huts described by the quoted authors – in both Radłowice and Moravian Budkovice, recorded postholes were traces of structural elements of houses (Lasak 1988: 48; Stuchlík 2000: 236, Obr. 12). Moreover, feature 29 from Radłowice yielded daub fragments bearing twig impressions showing the way walls had been built (Lasak 1988: 48). Whereas in the case of Bruszczewo no postholes were found to be related to feature 78. Perhaps an explanation should be sought in another type of structure used to build the house. Next to post structures dating to the Early Bronze Age, we know of log structures as well. For instance, log huts were found at a fortified settlement in Jędrychowice (Butent-Stefaniak 1997: 171).

Owing to the specific conditions prevailing in Bruszczewo's peat layers, helping to preserve organic materials, numerous elements of wooden architecture survived at the site. Next to defences, in the oxygen-free environment, discoveries were made of fragments of structural elements of buildings, possibly of dwelling character. Excavations of peat layers call for a specific methodology. One of its more important precepts is that trench size be kept rather small (Kneisel 2010a: 140). For this reason, the structural elements of houses described below, situated at the shoreline of the original lake, have been explored only in part. In total, fragments of four wooden structures were discovered and interpreted as remains of huts.

The first structure was unearthed in trench 30. It was situated west of an inner wattle. It was made of a cluster of 26 piles, which, unlike defence posts, had been halved. The structure was accompanied by the remains of a hearth (Kneisel et al. 2008: 157, 162; Kneisel 2010a: 104).

Another structure, in trench 31, could be seen in geomagnetic plan as a roughly rectangular anomaly (Ducke, Müller 2004: 63, Abb. 23). Located north of the structure described earlier, its elements were uncovered simultaneously in two quadrats (5 and 7) (Kneisel 2010a: 115, Abb. 24). These were two perpendicular and two longitudinal beams. The end of one of the beams was fastened with large stones. In the case of this structure, an unusual detail could be recorded, namely, one of the beams was placed on piles which were mortised in purpose-made openings in the beam (Kneisel 2010a: 118, Abb. 32) (Fig. 11). Between the beams, birch bark, clay and twigs were recorded which must have been remains of a floor (Kneisel et al. 2008: 162; Kneisel 2010a: 126).

West of the first described structure, in the area between the mineral and peat zones of the site, poorly preserved remains of another structure were unearthed. What was left included a single massive post, a large number of small-diameter postholes and the so-called 'shadows' left behind by the wood that had rotted away in the mineral layer (Kneisel et al. 2008: 163).

The remains of the last house were discovered in trench 52 (quadrat 11), placed on the slope of the promontory and joining both zones of the site. Only a part of the house was explored including the remains

Fig. 11. Bruszczewo, trench 31. Construction detail of the remains of dwelling no 2 (after Kneisel et al. 2008).

of a collapsed wall in the form of layers of burned and unburned clay (Kneisel 2010a: 137-138, Abb. 64). Close to the house, a large deposit of charred grain was found (Kneisel et al. 2008: 163).

Additionally, quadrat 8 in trench 31 yielded a characteristic concentration of small twigs. It is highly probable that these are remains of a destroyed wattle wall or fence (Kneisel et al. 2008: 162, Fig. 6; Kneisel 2010a: 128-130, Abb. 51).

While discussing the inner layout of the settlement, it is worth noting that the only grave discovered in Bruszczewo until now was located a short distance from the above structures. A grave of a man wrapped in a willow twig mat was uncovered in quadrat 2 (Kneisel 2010d; Jaeger 2012b) (Fig. 12). The current knowledge on the layout structure in this part of the site suggests that we deal here with a burial within the settlement bounds. In Poland, we know of examples of the co-occurrence of graves and economic features on Únětice culture sites (e.g. Radłowice, Wrocław-Oporów, Domasław; Sarnowska 1969: 226; Butent-Stefaniak 1997: 169-170).

Summing up, it is quite clear that the state of preservation of the mineral part of the Bruszczewo settlement largely prevents any reconstruction of houses. Nevertheless, it can be tentatively assumed that mainly small post huts were built within the settlement bounds. In one case, there is evidence of another type of structure: a hut partially sunk into the ground, possibly built of logs. Fortunately, special data were supplied by the peat zone of the site. Relying on them, it can be claimed now with certainty that along the shoreline of the original lake there stood buildings of which some at least were dwelling structures.

4.3. Fortifications

The first information on the defences on the Bruszczewo promontory referred to a stone-earthen rampart topped by a timber structure, which had been rebuilt on three occasions (Pieczyński 1985; Czebreszuk, Müller, Silska 2004: 20). The investigations carried out in the 1990[s] made it possible to verify the information. The

Fig. 12. Bruszczewo. A burial in the eastern part of the settlement (after Kneisel 2010d).

stratigraphy interpreted by Pieczyński as rampart remains was actually a mixed material, including stone clusters, connected to the Early Medieval and modern periods of site use (Czebreszuk 2004: 83).

The new stage of research, involving drilling and aerial photography, produced the first information on a ditch surrounding the settlement. The ditch was excavated in two phases of excavations. During the first one, in the 1990s, ditch profiles were uncovered in trenches no. 7 (northern portion of the site), no. 10 (northeastern portion) and no. 16 (western portion) (Müller, Czebreszuk 2003: 451, Abb. 6). The second phase, taking place in the 2006-2007 seasons, encompassed defences, including the ditch, in the entrance area.

The drillings and aerial photographs were supplemented by geophysical prospection in the 2003 season (Ducke, Müller 2003). It helped to make comprehensive visualization of the structure of archaeological remains of which part can be unequivocally called fortifications.

Generally, it must be stressed that the very location of the settlement was chosen taking into account strategic considerations. For the settlement stood on a small promontory jutting out into the valley of

the Samica River. Hence, the site was originally surrounded by water[5]. The north-western part of the promontory was cut off by a ditch (Fig. 10). In effect, the settlement was a completely isolated, almost circular space 120 m in diameter measuring about 1.5 ha (Czebreszuk, Ducke, Müller, Silska 2004: 71).

The ditch varied in width. In trench 7 it was 20 m wide while is depth was up to 4.5 m (Czebreszuk, Ducke, Müller, Silska 2004: 71-72, Abb. 26). In the entrance area (trench 51) the ditch was much narrower as it must have measured only approx. 10-12 m[6]. Considering the relationship between the depth of the ditch and that of the body of water, and the nature of strata recorded in the bottom of trench 7, it can be safely assumed that originally the ditch was filled with water (Czebreszuk, Ducke, Müller, Silska 2004: 71). Apart from the ditch, another obstacle barring entrance to the settlement was three palisades made of rows of massive halved oak trunks up to 30 cm in diameter (Jaeger 2012b: 397, Fig. 5).

Obtained radiocarbon datings show that individual sections of the palisade were regularly repaired for about 200 years (Czebreszuk, Ducke, Müller, Silska 2004: 71-73, Abb. 27).

In the entrance area, in the inner palisade row, a breach was recorded in which a dark streak of charcoal and burned clay could be discerned. The streak formed a crescent about 4 m long while its width varied from 0.1 to 0.2 m. This layer is presumably what remained of a burned gate (Kneisel 2010a: 96-98) (Fig. 13).

In trench 51 a large assemblage of daub fragments was recovered showing how certain elements of the entrance area had been built. A large part of the daub fragments bear wood impressions which differ in diameter. Next to a small number of stake impressions having about 5 cm in diameter there is a large number of impressions of small branches only about 1,5 cm in diameter. The arrangement of impressions – frequently parallel (possibly vertical) clusters of three elements (two next to each other with the third protruding forward) – does not provide enough information to draw any conclusions as to the construction of the gate. What is certain, however, is the fact that in the entrance area there was a structure built of wooden elements of different sizes additionally secured with clay.

Unique information on the structure, sizes and construction of defences at Bruszczewo was supplied by investigations in the peat zone of the site. In the oxygen-free environment prevailing there discoveries were made of excellently preserved fragments of wooden structures designed to protect the settlement's shoreline.

There were three lines of defences stretching roughly along the N-S axis: two wattle structures and a timber wall. The former consisted of piles intertwined with branches (Müller 2004: 125-133, Abb. 64--78) (Fig. 10; 14). In 2005, excavations in quadrat 4 (trench 30) supplied first clear evidence of differences between the two lines of wattle. The inner structure was built of thinner branches measuring 2-4 cm in diameter while the outer wattle, closer to the lake, consisted of thicker branches measuring 6-8 cm in diameter (Kneisel 2010a: 112). Relying on the length of collapsed piles, found in different quadrats, which once were elements of the wattles, their original minimum height can be roughly estimated at about 3 m (Kneisel 2010a: 114).

In front of both wattles, looking from the lake, there stood a massive timber wall. It was built of beams inserted between double posts. The excellent state of preservation of timber structures in the peat zone of the site helped to determine tree species in many instances (Kneisel, Kroll 2010). The most widely represented species in examined piles was the oak. Its share amounted to 62 per cent (Kneisel, Kroll 2010: 567, Abb. 2). In some excavations, the oak was the only species used for building all or certain defence elements. Next to the oak, a relatively frequent use was made of the ash and al-

[5] At present, specialists involved in the Bruszczewo project, continue to discuss the issue of the type of the body of water that once neighboured the settlement. The prevailing view is that it was an oxbow lake (Haas, Wahlmüller 2010; see Bork 2010 for opposite oppinnion).

[6] The uncovered profile showed the structure of the Early Bronze Age ditch. Its northern slope was damaged by another ditch dug in the Late Bronze Age (Hildebrandt-Radke 2010: 25, Fig. 11).

Fig. 13. Bruszczewo, trench 51. View of the burned palisade and gate construction (photograph: M. Jaeger).

der. Other species identified at the site were clearly far less important. The dominance of the oak suggests that it was carefully selected. Undoubtedly, the specific properties of the oak played a role. Oak is a particularly desirable building material because of its flexibility, durability and cleavability as well as resistance to water and, at a specific age (60-70) years, to fire (Romanowska--Grabowska 1991: 221). Also ash and alder make a good building material suitable for a damp environment (Kneisel, Kroll 2010: 566, 568). The use of other tree species, less suitable for building purposes, may be tentatively explained by chronological differences, i.e. the fact that the defences were built in phases, or by reparation of the defences. Well established by the study of the original natural environment surrounding the settlement, the process of slow degradation of the environment (seen in the deforestation of the surrounding area in the late phase of the settlement's life) might have resulted in making use of more easily available but less suitable tree species (Kneisel, Kroll 2010: 570). There are still too few dendrological studies available to consider this hypothesis the only plausible explanation. To some extent it is supported by several recorded instances of secondary use of older pieces of timber, originally serving undoubtedly another purpose, to construct individual fortification elements. For example, in fortifications from trench 31/6, a beam was used bearing characteristic tool marks, made from a tree cut down 10 years earlier than other trees recorded in the same structure (Kneisel, Kroll 2010: 574).

The good state of preservation of timber fortification elements allowed researchers

to study how individual posts had been worked. A considerable number of them were sharpened (for excellent illustrations see Kneisel, Kroll 2010: 587-651). A close scrutiny of five examples of tool marks left on posts from Bruszczewo showed remarkable coincidence between the width of the tool marks and that of the cutting edge of a bronze axe found at the site (Kneisel, Kroll 2010: 570-572, Abb. 5). In the case of a site of a unique character on a regional scale, that Bruszczewo unquestionably is, this finding is of crucial importance. Not only the monumentality of Bruszczewo fortifications, but also the way they were built – using widely available bronze tools – sent people a clear signal how advanced the social organization of settlement inhabitants was (Jaeger, Czebreszuk 2010: 220-221).

The high complexity and size of the fortifications of the Bruszczewo promontory have found no analogy so far among the other fortified settlements associated with the Únětice culture. Located in Silesia, the site at Radłowice, unlike Bruszczewo, was surrounded by two rather small ditches (Lasak, Furmanek 2008: 130, Abb. 4), the size of which questioned their military or defensive character. The defences of the settlement were explored in a selective excavation project and by no means do they resemble any structures known from Bruszczewo.

Located in Silesia too, fortified settlements belonging to the so-called Nowa Cerekiew group, are traditionally viewed as a product of elements originating with the Únětice culture and the circle of Maďarovce-Věteřov-Böheimkirchen (Gedl 1985)[7]. One of such settlements located at Jędrychowice had defences comprising many complex elements. The outer line of defence was made of a rampart whose width at the base varied from 6 to 16 m. On its inner side, there was a ditch 10 to 13 m wide, 3 to 4 m deep with a V-shaped cross-section. The inner line of defence was made of log structures (probably huts), strengthened on the ditch side with a gravel-loess bank lined with a stone wall (Chochorowski 1985). Reconstructed in the course of excavations at the site, the system of defences is a unique example of a combination of different elements, unknown at Bruszczewo.

The eponymous settlement in Nowa Cerekiew is known from the reports of the rescue excavations that covered only a small area when compared to the potential area of the site (Kunawicz-Kosińska 1985: 111, Fig. 2). In the light of the reports, it was suggested that there existed two ditches which protected two separate settlement zones – an inner stronghold and an outer enclosure. The outer ditch was about 6 m wide and 3.6 m deep (Kunawicz-Kosińska 1985: 115). The inner ditch, in turn, was about 14 m wide and 3.5 m deep and had a V-shaped cross-section. In front of it, there was a gravel-clay rampart (Kunawicz-Kosińska 1985: 112). The hypothesis about the existence of a rampart has not been supported by any sound arguments nor has it been properly documented (see comments by Butent-Stefaniak 1997: 173). Moreover, the general structure of defences described above is an interpretation of a selective picture obtained by excavations. A probe into the course of ditches and a small space investigated within possible bailies, without recourse to other methods (e.g. magnetometry), do not provide sufficient data to draw any conclusions, in particular on the complex inner division of the settlement suggestive of the existence of separate social groups among its inhabitants. The weak source base for some of her hypotheses has been conceded by the research author herself (Kunawicz-Kosińska 1985: 124). Taking into account the selective nature of the investigations of the settlement in Nowa Cerekiew and the kind and combination of the defences discovered there, the site cannot be considered an object for any comparisons with the Bruszczewo defences.

Due to insufficient research, in the case of settlements located in today's Germany, Bohemia and Moravia, it is only possible to ascertain the presence of different fortification elements such as ramparts or ditches. In a vast majority of cases, little is known

[7] On re-analyzing the results of excavations at the settlements in Nowa Cerekiew and Jędrychowice, the share of stylistic elements of pottery linked to the circle of Maďarovce-Věteřov-Böheimkirchen has been estimated to be much less significant that it had been believed so far. It is with high probability that these settlements should linked to the classic stage of the Únětice culture (Molak 2008).

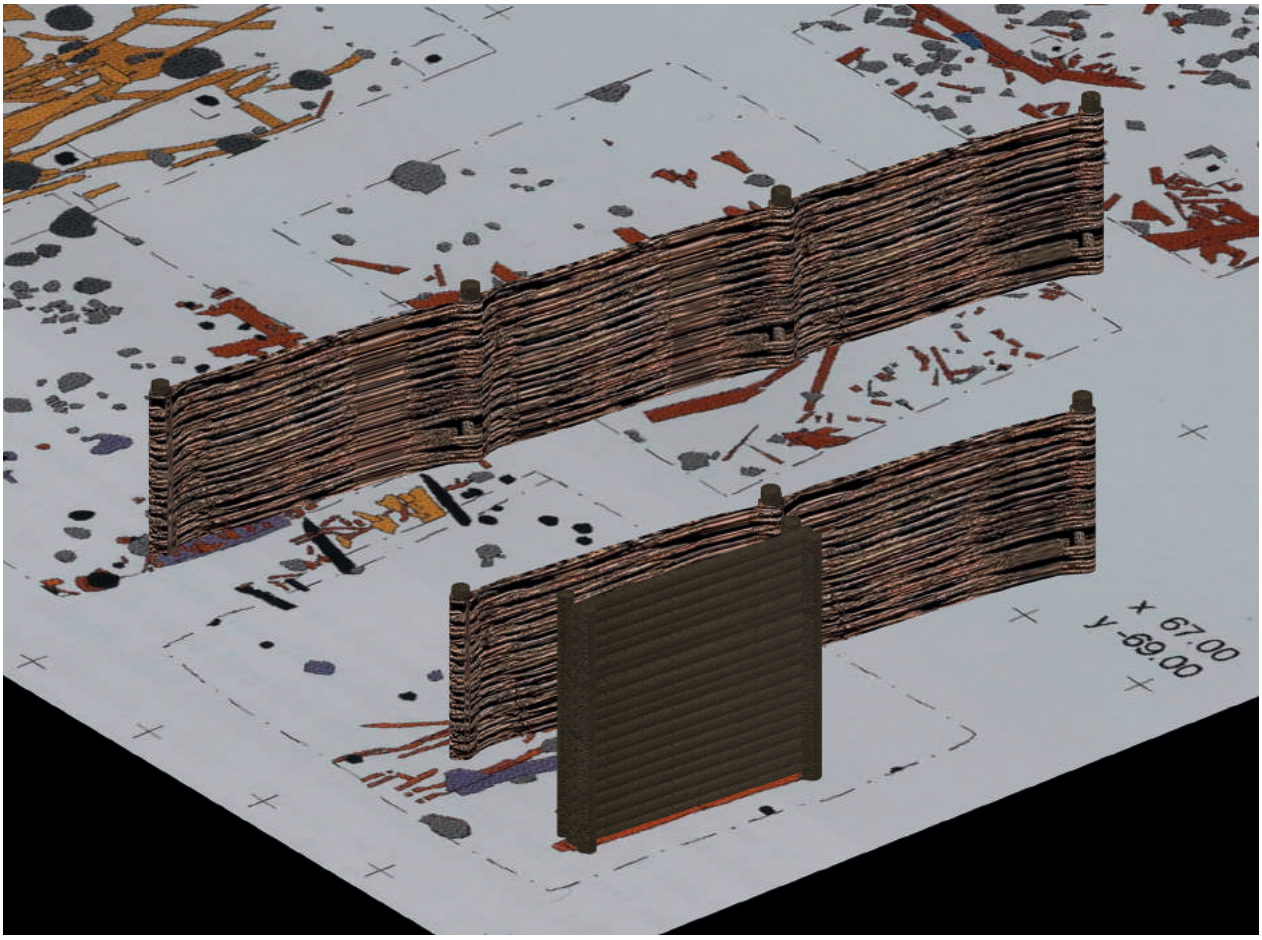

Fig. 14. Bruszczewo, trench 30. At the top – reconstruction of three lines of fortifications in the eastern peat part of the site; at the bottom – the outer fascine and wall of beams (graphics M. Stróżyk; photograph J. Kneisel).

of specific construction details (Stuchlík 1985; Simon 1990; Novotná 1999: 102-103; Ettel 2008; 2010). Gathering such information is often prevented by the fact that settlements, founded at strategic locations, were used and re-used in many later periods (Ettel 2008: 11).

Suggested in the literature, a similarity in size between the Bruszczewo ditch and the ditches surrounding Otomani-Füzesabony culture settlements in Slovakia (Czebreszuk, Müller 2004b: 313) is only a seemingly significant characteristic common to both cultural circles. A comprehensive look at the settlements reveals a number of different characteristics, which are far more significant. The Slovak settlements mentioned by the quoted authors considerably differ in size from the Bruszczewo settlement (Czebreszuk, Müller 2004b: 312, Abb. 147). Next to ditches, major defences consisted of ramparts having a complex structure of timber and earth, not infrequently reinforced with stone elements (see below, chapter 6.3).

4.4. Metallurgy

Already the first investigations at the Bruszczewo settlement, carried out in the 1960[s], produced a number of finds attesting to the local working of metals.

One report on Pieczyński's investigations contains information that all objects related to metalworking were discovered on a single occasion when the so-called 'founder's workshop' was unearthed (Pieczyński 1985: 167-168, Fig. 1). Actually, these objects come from different contexts uncovered in trenches designated by letters Y and W (Czebreszuk, Müller 2003: 482; Czebreszuk, Müller, Silska 2004: 15, Abb. 2). In 1967, in trench Y, a hoard was found consisting of two axes and a damaged dagger blade (Czebreszuk, Müller, Silska 2004: 19, Abb. 4:4-5, 10) while in trench W metallurgist's tools were found: a ladle, tuyère, crucible, three clay pads, and a part of sandstone mould (Czebreszuk, Müller, Silska 2004: 19, Abb. 4:2, 6-9, 11-12). A third axe was probably found at the site in the layer of humus, while another dagger blade and more tuyères were discovered in pits 19 and 67, respectively (Czebreszuk, Müller 2003: 452; Czebreszuk, Müller, Silska 2004: 18) (Fig. 15).

The second stage of excavations at the site also brought a number of finds of ready-made bronze goods and objects attesting to the local working of metals. The first group comprises among others a characteristic damaged bronze disc (trench 22), a dress pin (trench 23) and a dress pin fragment (trench 24), an awl/punch (a loose find from a ditch fill layer representing the Late Bronze Age; trench 51), a pin (quadrat 11, trench 52), an awl and another pin (quadrat 12, trench 52) in the peat zone. To the local production of at least some of these objects, apart from the metallurgist's tools, testify minute but significant finds of metal droplets and scrap metal (Rassmann 2010: 711-712, Taf. 1-2). Some of them come from the surface soil which is regularly surveyed with a metal detector.

Despite a large number of finds related to metallurgy, it is hardly possible to identify any places and their number where bronze could be worked. It must be emphasized, however, that most sources of this category were located along the edge of the area where pits and postholes were particularly densely distributed (Czebreszuk, Müller 2003: 451--452, Abb. 6). It cannot be determined, either, whether in Bruszczewo ready-made objects were manufactured by melting old damaged ones or metallic pieces of tin and copper were combined in a crucible (see comments by Kuijpers 2008: 19-20).

A vast majority of Bruszczewo finds related to metallurgy can be associated with the Early Bronze Age period of the settlement life. The artefacts dating to this period include unquestionably the dagger blades. The axes, too, display forms characteristic of the Únětice culture environment. Two of them can be included in the Wrocław--Szczytniki type (variety B), while the third

specimen is an example of a Bennewitz type axe (variety B) (Rassmann 2004: 262). Early Bronze Age provenance is shared also by the two pins discovered in the eastern peat zone. The characteristic specimen of an *Ösenkopfnadel* (quadrat 12, trench 52) and the more common pin of the *Rollenkopfnadel* type (quadrat 11, trench 52), because of their stratigraphic position, are linked to the first stage of settlement at the Bruszczewo promontory. Also small tools, such as awls and punches, from Bruszczewo have close analogies in Únětice culture assemblages. The form of punch[8] from trench 51 is known, among others, from a grave in Skarbienice (Sarnowska 1969: 139, Fig. 36:b). In turn, the type of awl discovered in quadrat 12 is recorded in a set of loose finds from the Vraný settlement in Bohemia (Moucha 2005: 164, 474, Taf. 251:9). The dress pin (double knob/doubleheader) and the fragment of a dress pin mentioned earlier are artefacts typical of the Únětice culture. In Poland, one could mention in the first place an analogous object forming part of a hoard from Wrocław-Gądów Mały (Sarnowska 1969: 220, Fig. 76:c). In turn, the characteristic disc from Bruszczewo could have been a semi-product of a disc-like ornament. Such objects are known from deposits found above all in Bohemia (Moucha 2005: 53-55, 326, Taf. 55).

The assemblage of metallurgical tools comprises a crucible, tuyères and a sandstone casting mould (Fig. 15). The crucible from Bruszczewo has a small handle modelled in clay and, apart from that, has a rather common form determined by function. It is worth noting that the life of such crucibles lasted at best five castings (Kuijpers 2008: 86). The tuyères known from the settlement are very popular over vast areas of Europe (Jockenhövel 1985) occurring in different cultural contexts (Bátora 2006: 55-94). In the milieu of the Únětice culture they are found in both graves (Bátora 2006: 78-80, Obr. 55-57) and settlements (Moucha 2005: 474, Taf. 180:12). The last element of the assemblage is a mould for casting massive bracelets. Such objects are characteristic of western Poland and middle Elbe drainage (Blajer 1990: 46-47). From the area of Kościan Group of Únětice culture we know of deposits from Granowo, Kokorzyn, Piotrkowice and Poniec, which comprise massive bracelets (Blajer 1990; Jaeger, Czebreszuk 2010: 223)

The analysis of the raw material components of some objects found in Bruszczewo permits to assign them to two copper types: Bennewitz and Bresinchen. According to the divisions developed by Rassmann, artefacts from the settlement concentrate chiefly within horizon III (2000-1850BC) and horizon IV (1850-1650BC). A single analysis only can be related to horizon II (2100-2000 BC) (Rassmann 2005: 470, Abb. 4). Regardless of the results of further planned metallographic studies of Bruszczewo artefacts, it can be observed already now that the origins of metallurgy are relatively early and, equally important, metalworking was practised at the settlement throughout its lifetime.

Next to the sources coming from the Bruszczewo settlement itself, valuable information can be obtained from numerous hoards unearthed in Kościan Group of Únětice culture. The most numerous artefact in them was massive open rings (35 specimens), followed by necklaces with loop endings (17 specimens), daggers (14 specimens), axes (13 specimens) and ear wraps (10 specimens, including 6 gold ones).

[8] The term 'punch' has been adopted instead of 'awl', which is found in the literature (for a broader discussion of the function and significance of these objects see Jaeger, Czebreszuk 2010: 225--226).

4.5. Chronology

In the case of Bruszczewo we possess an exceptionally large (over 80) set of radiocarbon determinations (Czebreszuk, Müller 2004; Kneisel 2010a: 148, 150). The specific conditions of wood preservation in the peat zone have also provided dendrologi-

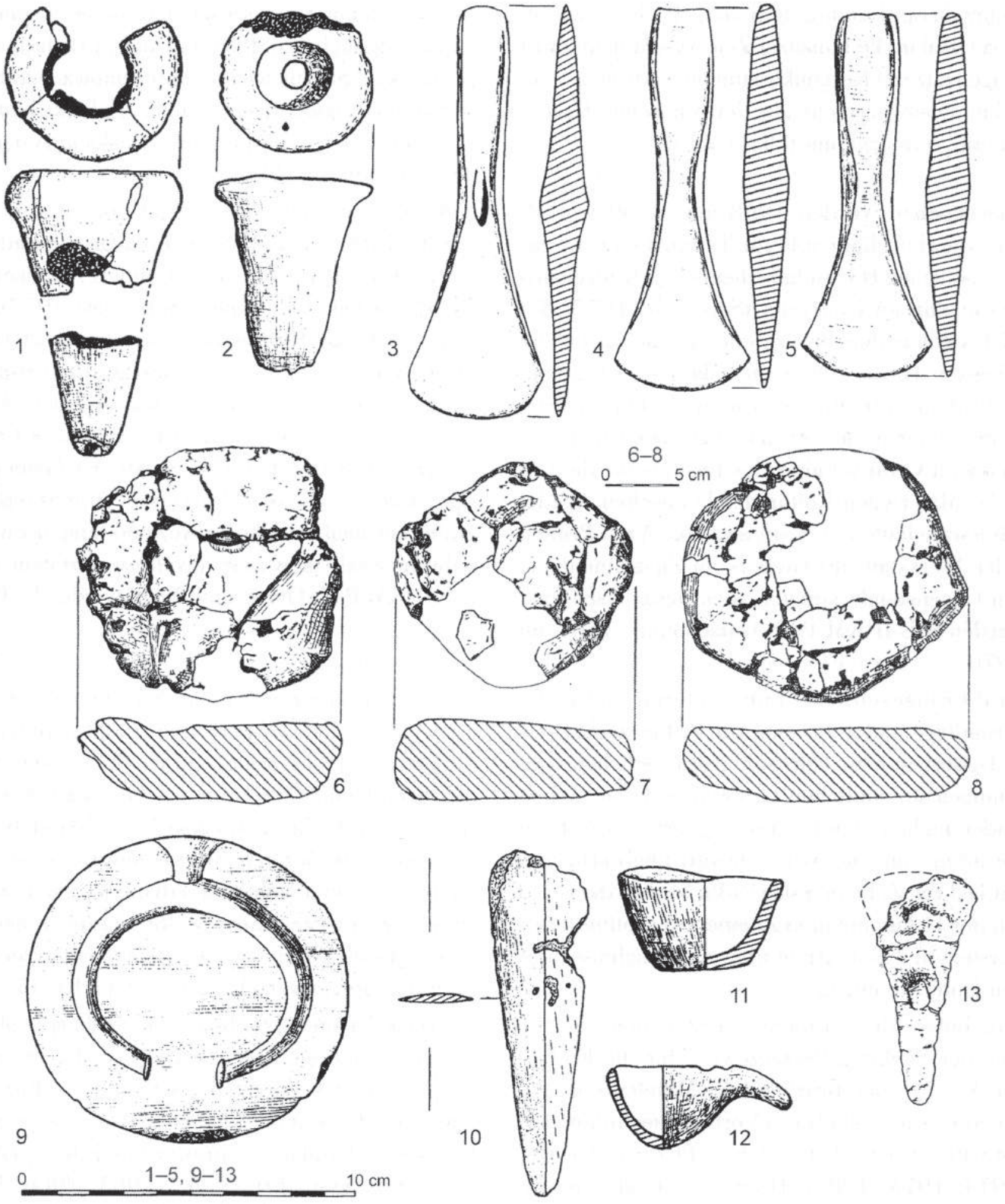

Fig. 15. Bruszczewo. A selection of bronze objects and items connected with metallurgical production (after Müller, Czebreszuk 2003).

cal datings. Analyses of the data obtained during years-long excavation campaign are still being continued. Within the compass of that work more datings will probably be obtained for both categories.

So far, research into the chronology of the site has been directed not just towards defining the temporal framework within which the fortified settlement had functioned; it has also attempted a detailed reconstruction of its development. Combination of radiocarbon and dendrological datings has made it possible now to define the age of particular elements of the settlement. The information concerns specific parts of the fortifications, the zone of entrance to the site, remains of dwellings and a burial in the mineral zone.

The oldest radiocarbon datings in the pool come from a palisade discovered in trench 7. Two dates obtained for the outer tree rings of a pole indicate the turn of the 21st and 20th c. BC as the period when the tree was felled (Czebreszuk, Müller 2004: 294-295, Abb. 135). The palisade was constantly repaired for ca 200 years. This is confirmed by the dates obtained from the successive strata of its conservation (Czebreszuk, Ducke, Müller, Silska 2004: 73, Abb. 27; Czebreszuk, Müller 2004b: 297).

Objects from the mineral zone have yielded only 6 radiocarbon datings. They show concurrent values contained in the period of the 17th and 16th c. BC (Pieczyński 1985: 169; Czebreszuk, Müller 2004b: 297, 303, Abb. 144), indicative of a relatively late period of the decline of human settlement in Bruszczewo. Next two radiocarbon dates were obtained from the entrance zone (trench 51). They are connected with the burnt construction of the gate and the adjacent palisade, and their values are evidently concurrent: 1740-1630, 1740-1610 BC respectively (Kneisel 2010a: 150). The late dating of the decline of the settlement is further supported by datings obtained from the fill-in of the Early Bronze Age ditch in the entrance zone (trench 51). In this case the analysis based on fragments of charcoal still sunk in the pieces of daub from the gate structure. Only impressions of small wood fragments not more than 5 cm in diameter were found in the daub. The datings cover the period of 1921-1503 BC (Fig. 16). Taking into account the considerable number of objects in the mineral zone of the site, it must be made clear that the assessment of the chronology of this part of the site and the decline of the Bruszczewo settlement is by no means definite.

The peat zone revealed remains of dwellings and elements of fortifications. For the former, radiocarbon datings point to end of the 20th down to the turn of the 18th and 17th c. BC (Kneisel 2010a: 134, 136, Abb. 63). The dendrological data for the

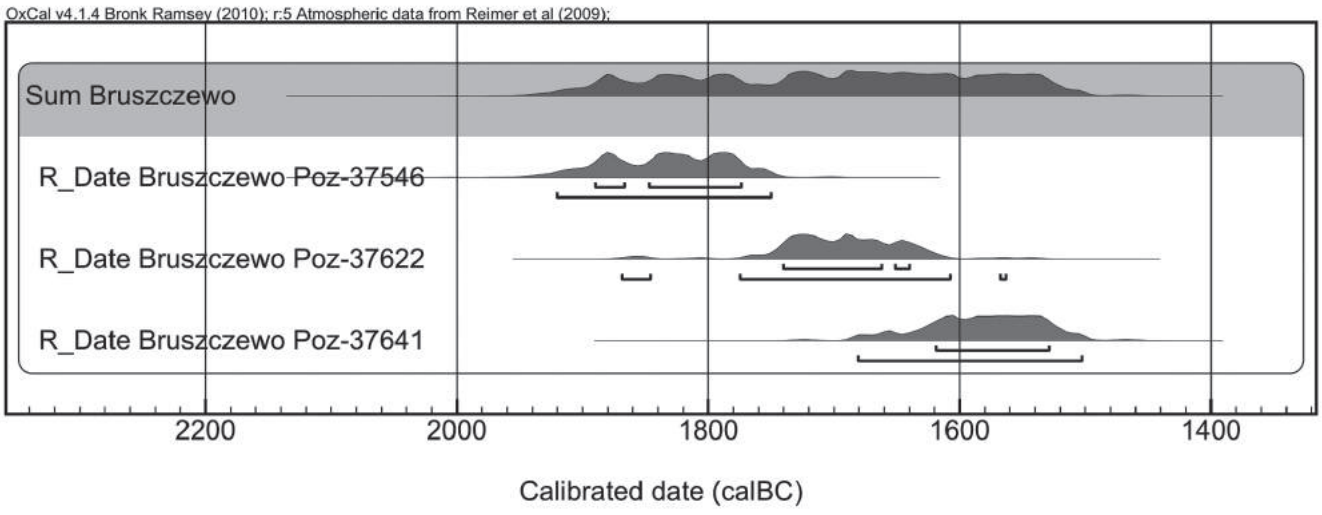

Fig. 16. Bruszczewo. The sum of the probability distribution of radiocarbon datings from the fill-in of the ditch (trench 51, plot 51/3).

fortifications reveal a relatively short period over which they were constructed (Kneisel 2010b: 212). The dates from the outer fascine are contained within 1797-1790 BC time bracket, and for the inner one within 1793-1787 BC. The wall made of beams was probably erected in 1787 BC (Kneisel 2010b: 224; Ważny 2010). The youngest dendrological date from Bruszczewo discovered so far was obtained from a pole of the beam structure in quadrat 5. Its value indicates 1779 BC (Kneisel 2010a: 148).

Three radiocarbon datings were done for the grave discovered in the peat zone. Their analysis and the data established for the objects in a specified relation to the grave suggest the 1880-1780 BC time bracket as the most probable time of the man's burial (Kneisel 2010d: 718).

Further research will undoubtedly require an explanation of the discrepancy between the youngest datings from the peat zone, mainly contained in the 17th c. BC, and the mineral zone dates which go back to the 16th c. BC: it must be borne in mind that alike to the peat zone datings, expert palynological and geomorphological data indicate an earlier (17th c. BC) end of human activity (Müller, Kneisel 2010: 762).

4.6. Summary: role and function of the Bruszczewo settlement in the Kościan group of the Únětice culture

The geographical location of the Bruszczewo settlement – and putting it more broadly the Kościan Group of the Únětice culture – has made authors refer to it as periphery. The cultural phenomena illustrated by Bruszczewo and its region have been treated as subordinate to the component elements of the core of Únětice settlement in central Germany (Zich 1996; Makarowicz 1998: 295). I believe, however, that the available archaeological data show that the view of Bruszczewo as a periphery is not correct. The aspects of the settlement's life discussed above make it appear as a rather complex entity and give us an insight into the historical context in which it thrived. A high degree of social organization allowed the local community not only to raise robust defences but also to maintain and repair them over many years. The inhabitants of the Bruszczewo promontory completely subdued its vicinity as well: natural scientific studies showed that intensive and varied use had been made of natural resources.

In my opinion, however, an effective use made of local ecological conditions is not the only key to the understanding of the stability and continuance of settlement at Bruszczewo and to proper assessment of the role the fortified settlement played on the local and supralocal scale. In this connection far more important for the settlement's continuance was mastery over the two basic raw materials of the times: tin bronze and amber. It is only through the prism of the analysis of their importance that the geographic distance from the Únětice oecumene acquires any sense. The distance appears, paradoxically, as a basis of success and the chief reason for remaining in the mainstream of the most momentous cultural phenomena of the Early Bronze Age (Jaeger, Czebreszuk 2010; Müller, Kneisel 2010: 756-759).

As mentioned earlier, the investigations of the Bruszczewo settlement carried out so far have supplied many sources, attesting to the working of metals. In the context of the significance of Bruszczewo's metallurgy for the region, among the published finds, notice should be given to the stone mould for casting massive bracelets (Müller, Kneisel 2010: 757) (Fig. 15:9). Such ornaments are characteristic of western Poland and the middle Elbe drainage (Blajer 1990: 46-47). Next to necklaces with loop endings and Salez type axes, the bracelets could have formed a group of standardized objects circulating as commodity money or raw material ingots (Lenerz de Wilde 1995; Krause, Pernicka 1998; Müller 2002:

272, Abb. 6; Pare 2000: 27-29). Next to the shape, standardization applied also to the raw material used for manufacturing massive bracelets. In this way what could be assessed was not only the weight but also the quality of goods (Pare 2000: 27-28; Krause 2003: 188-189). The inclusion of the bracelets in many Kościan Group hoards (e.g. Poniec, Kokorzyn) and the fact that such bracelets were made at the Bruszczewo settlement testify to the local community's being part of a specific network of cultural patterns (Müller, Kneisel 2010: 759). In addition, it can be tentatively assumed that the Bruszczewo settlement was a centre from which spread knowledge related to the system of weights and measures coming into being in the Bronze Age (Pare 1999).

Many Kościan Group deposits can counted among the so-called *Barrenhorte* (e.g. Poniec; Blajer 1990: 109-110). On the one hand, the number and standardized form of objects make it more probable that they served as commodity money/ingots of raw material, on the other hand, the conditions in which they were hidden, which left them irretrievable, and the very fact of removing them from circulation suggest that they were often a kind of 'offering for gods' (Junk, Krause, Pernicka 2001). Another group of objects deposited by Kościan Group populations, above all because of their high cultural valorisation, are halberds and daggers (Hansen 2002: 156-160), known from, among other places, 'princely graves' in Łęki Małe and Przysieka Polska and a hoard in Poniec (Blajer 1990: 125--126, 228). Hence, the metallurgical production in Bruszczewo was not only an important economic factor but also played a significant role in the ritual life of the settlement and its vicinity.

In the light of the metallographic analyses of bronze axes performed by Kienlin, it can hardly be claimed that a monopoly on bronze production by the Bruszczewo settlement was sufficient to ensure local elites success. Metallurgical technology in the younger period of the Early Bronze Age (BA2) must have been quite common and the number of objects in circulation could provide enough raw material for home production not subject anymore to the control of local elites (Kienlin 2007). It must be stressed, however, that a distinction should be drawn between the knowledge of the metallurgical process and skills necessary to manufacture specific objects (Kuijpers 2008: 32). Such skills were acquired by experience and were largely dependent on personal predilections. The distinction could have hypothetically resulted in the parallel development of metallurgy (Rowlands 1971; Levy 1991). The fact that secrets how to manufacture simple tools (e.g. axes) were widely known does not exclude a possibility that some areas of metallurgy were monopolized, for instance those related to individual stages of the production process (e.g. ornamentation) or to the making of special objects calling for special skills (e.g. halberds). With the technology becoming more and more common and the growing amount of raw material in circulation, the significance of manipulation of added value – *meaning* – could have grown if only by practising elaborate rituals. I believe that it is in this context that the role of the Bruszczewo settlement should be discussed.

The metallurgy of the Únětice circle has stable special stylistic and formal traits. Despite regional differences, the most significant elements, such as production of halberds, daggers and a number of ornaments remained unchanged. An important trait attesting to the cohesiveness of Únětice metallurgy was also similar technology manifested in the use of a constant set of metallurgical implements. Particularly meaningful in this connection, an object found at the Bruszczewo settlement in 2007 is a small tool having one sharp end and the other shaped like a spatula with a boss in between (Fig. 17). The function of such objects is still unclear, which is reflected by different names applied to them. Next to the term 'awl' (Moucha 2005: 128, 164), the tool is called 'punch' (Sarnowska 1969: 139). The terms suggest that the tool was applied to different raw materials – leather or metal. Taking into account the context of an analogous find from Skarbienice (Fig. 17), the latter possibility seems to be very probable. In the deposit, the tool was accompanied by gold and bronze ornaments, a chisel with parallel ends, a flat axe, spoon-like axe and

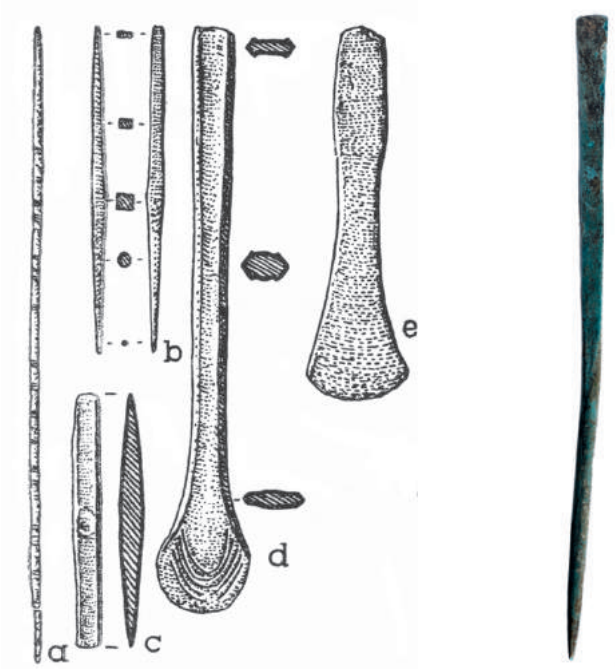

Fig. 17. On the left – Skarbienice, burial furnishings; on the right – Bruszczewo, punch from trench 51; not to scale (after Sarnowska 1969; photograph S. Jagiolla).

a bronze rod. The circumstances of the discovery indicate that the deposit was more likely a set of grave goods than a hoard (Sarnowska 1969: 139-140). The metal rod was taken by Sarnowska to be a 'straightened out bronze bracelet'. However, in the light of current findings it should be considered rather a semi-finished necklace with loop endings or a specimen of an *Ösenringbarren*[9]. The relatively rich grave goods of the alleged burial from Skarbienice, seen in the presence of gold ear wraps and a spoon-like axe, interpreted as a status symbol known in the Early Bronze Age (Hafner 1995), point to the special status of the deceased. The discovered objects (a punch and semi-finished bronze ornament) may indicate that the deceased had some connection to metallurgy. The presence of a chisel does not necessarily undermine this hypothesis. The analysis of sources related to pottery, carpentry and metallurgy, made for the settlement of the Vatya culture at Százhalombatta, contradicts the view that individual crafts were always kept apart (Sofaer 2006)[10]. What is extremely important, the punches in all

[9] The so-called *Ösenringbarren* had been perceived as a semi-finished product for manufacturing other objects for a long time. Metallographic studies indicated, however, that a surprisingly large number of specimens had survived in the archaeological material. Furthermore, it was pointed out that a vast majority of such objects had been deposited in, at times, very numerous assemblages. Hence, two hypotheses were put forward. The first maintains that *Ösenringbarren* could have been used for making a specific type of objects, having specific raw material properties, and thus special value, for the purpose of ritual depositions. The other suggests that *Ösenringbarren* be treated as commodity money (Krause, Pernicka 1998).

[10] It can be assumed that woodworking was one of the crafts having rich cultural associations. Metal axes allowed people to successfully open up new land for cultivation. In the case of chisels, a certain insight how important skilful use of them was is offered by sources coming from other areas. For instance, in the Nordic Area we know of special campstools and wooden cups decorated with tin nails which have been traditionally attributed to higher social strata (Kristiansen, Larsson 2005: 57-58). We also know of large objects, attested to in rock art, such as boats and chariots, the production of which called for great skill (Larsson 2004). In the case of the Únětice culture, we do not have such clear reference material, however, the fact that chisels were deposited in special rich contexts, as for instance the 'princely grave' in Leubingen, justifies the analogy (Hansen 2002: 152, Abb. 1)

cases, regardless where found, are highly standardized. If it is assumed that they served as metalworking tools, used above all to mark ornaments on metal goods, we must ponder what made them look so alike. Tool functionality does not seem to be here a decisive criterion. I believe that the most important reason was something which can be called principles of *metallurgical art*. The making and using of a proper tool could be decisive in successful object decoration. The ornamentation of 'Únětice' objects (the spectrum of forms alike), despite a long development tradition and the existence of local traditions, always has a special trait to it. The ornamentation of metal objects could not have been a question of *fashion*, but rather, similarly to pottery style, it carried a number of symbolic meaning, raising it to the rank of sociocultural self-identifier (Hodder 1982). The possession of *knowledge* about the principles of making special objects and decorating them must have been an important element which, under limited availability, may have become a source of power and might. A key term here is *meaning*, i.e. the characteristic that imparts a proper value to an object (Fontijn 2002: 23)[11].

From this point of view, the economy of the Bruszczewo settlement can be defined in terms of prestige economy (Friedman, Rowlands 1977)[12], i.e. a system that for a large part relies on symbolism and manipulation of social relationships, and in which actions in the ritual sphere and in the broad realm of the sacred are an inherent element of the economy (Kim 2001: 462-463). A prestige economy is controlled through many symbolic efforts. In effect, economic capital (e.g. a surplus or part of production) is transformed into political one (Earle 1997). Under this system, prestige is not accumulated by raising productivity (i.e. increasing the amount of luxury goods), but by improving their quality and value by restricting access to them. Benefits from a prestige economy are not directly proportional to a growth of surplus or the amount of production that can be exchanged. What they depend on instead is the success of efforts in the area of meaning manipulation, development of added value of prestige goods and search for the new ways to capitalise prestige. The last-mentioned aim may be attained by introducing new prestige objects and also, even more importantly, by imparting new information to them or developing a new ideology altogether (Kim 2001: 463-464). Hence, the power of elites in a prestige economy is based not only on the production of prestige goods but, first and foremost, on the prerogative to bestow an added value – *meaning* – on them.

The model of prestige economy entails the existence of a social stratum – elites in control of the system. In the case of the Kościan Group of the Únětice culture and the Bruszczewo settlement itself, one can easily point to archaeological sources being a manifestation of cumulated power and prestige. Next to the construction and maintenance of massive defences around the settlement, they include 'princely graves' known from the region (Fig. 18) (Jaeger, Czebreszuk 2010; Jaeger 2012a; Jaeger 2012b: 393-395).

In the Únětice culture oecumene, we know only of single instances of this type of barrow graves (Höfer 1906; Grössler 1907; Schmidt, Nitzschke 1980; Sarnowska 1969: 292-315; Schwenzer 2004), while in the Kościan region, next to a single grave in Przysieka Polska, we are dealing with a unique funerary complex in Łęki Małe, consisting of several barrows standing in a line (Kowiańska-Piaszykowa, Kurnatowski 1954; Czebreszuk 2001: 87)[13]. The

[11] Fontijn, considering the question of meaning of specific objects, used an analogy of a modern wedding ring, which illustrates the problem extremely well. Besides the value of precious metal expressed in money, a wedding ring has no special significance and remains, as a mass produced article, one of many similar objects until a special status is bestowed on it during a wedding ceremony (Fontijn 2002: 25).

[12] The work quoted here (Friedman, Rowlands 1977) is a starting point in the long history of the concept of 'prestige economy' and development of its applications in prehistorical studies, particularly in the studies of the Bronze and Iron Age (Marcoux 2007: 232-234; Barrett 2012; with further literature).

[13] Four of the barrows have been excavated. They yielded a rich inventory of pottery and numerous bronze, gold and amber objects. The age

Fig. 18. Łęki Małe, barrow no 1. At the top – view of the barrow after reconstruction; at the bottom – burial furnishing (photograph: M. Jaeger; after Czerniak 2008).

Bruszczewo settlement can be directly linked to the find from Przysieka Polska. The find comprises a rich assemblage of bronze objects and a perforated amber disc (Schwenzer 2004).

It is widely accepted that the 'princely graves' are burials of the members of the privileged stratum of the then society. Their special position is believed to have derived from the control of (re-)distribution of raw material(s) and ready-made goods (Hansen 2002).

In this approach, bronze metallurgy could have made the Bruszczewo settlement the centre of the region. We do not have, however, sufficient archaemetallurgical data now to be able to determine how far products made at Bruszczewo travelled. They might have spread beyond the borders of today's Wielkopolska.

There are, however, indirect reasons to believe that Bruszczewo and the Kościan Group of Únětice culture had links to other regions. In this context, the 'princely graves' should be considered as the idea of building monumental and richly furnished barrow graves seems to have broader cultural connotations reaching as far as northern France and southern England (Hansen 2002: 153-154; Steffen 2010). The absolute chronology of the graves from those regions allows to partially synchronize them with the Únětice culture graves (Becker, Krause, Kromer 1989: 427; Gascó 1996: 231, 246). A tentative assumption can be made that the idea of raising barrows reached the Únětice environment as one of many ideas accompanying metallurgical technology (Pare 2000: 26-27).

The other element placing Bruszczewo in a broader central European context is amber (Czebreszuk 2011). The settlement has yielded a single amber bead so far (Czebreszuk, Kneisel, Müller 2010). By no means does it detract from the significance of the find. Amber is impermanent, therefore, the 'filter' of post-deposition processes has a strong impact on its modest representation in settlement materials. A majority of finds linked to the Únětice culture come from grave contexts and hoards. In the case of the Kościan Group, one should mention first artefacts from the 'princely graves' in Łęki Małe and Przysieka Polska (Czebreszuk, Kneisel, Müller 2010: 698; Jaeger, Czebreszuk 2010; Jaeger 2012a).

Mapping out the Bruszczewo artefacts together with the other amber finds from the Early Bronze Age produces two characteristic belts (Fig. 19). The first stretches from the Moravian Gate across Lower Silesia, eastern Wielkopolska and Kujawy as far as the mouth of the Vistula River. The second runs along the Baltic coast. Presented elsewhere, a contextual analysis of amber objects shows that the two belts coincide with the distribution of other major categories of finds such as imported goods or gold items as well as special features such as fortified settlements and barrow graves. The belts follow trails that crossed the lands of today's Poland and joined the northern and southern edges of the continent (Jaeger, Czebreszuk 2010: 230-231).

The outlined set of archaeological characteristics reveals a singular concentration of signs pointing to the existence of stable and complex social structures in Bruszczewo's vicinity. Their special nature can be seen in all areas, beginning with the relationship between man and the environment. The immediate vicinity of Bruszczewo formed an island in the primeval landscape where a strong human impact could be seen and which was dominated by a central fortified settlement. The raising of fortifications and their subsequent maintenance over many years attest to the stability of power structures organizing the life of the society. Some of its members could have been involved in the most significant innovation of those times: the metallurgy of tin bronze. The characteristics of the Bruszczewo metallurgy emphasized earlier suggest that it had a more important role to play: local elites not only produced bronze objects but also controlled their meaning. This was a significant factor contributing to their superior position within the community and strengthening their rank as a partner in a long-range exchange network. This view is supported by

of the burials is determined by a set of 10 radiocarbon measurements placing the site in the period from 2200-1800 BC (Czebreszuk 2001: 84-88). These results match those concerning the burials at Leubingen and Helmsdorf (Becker, Krause, Kromer 1989: 427).

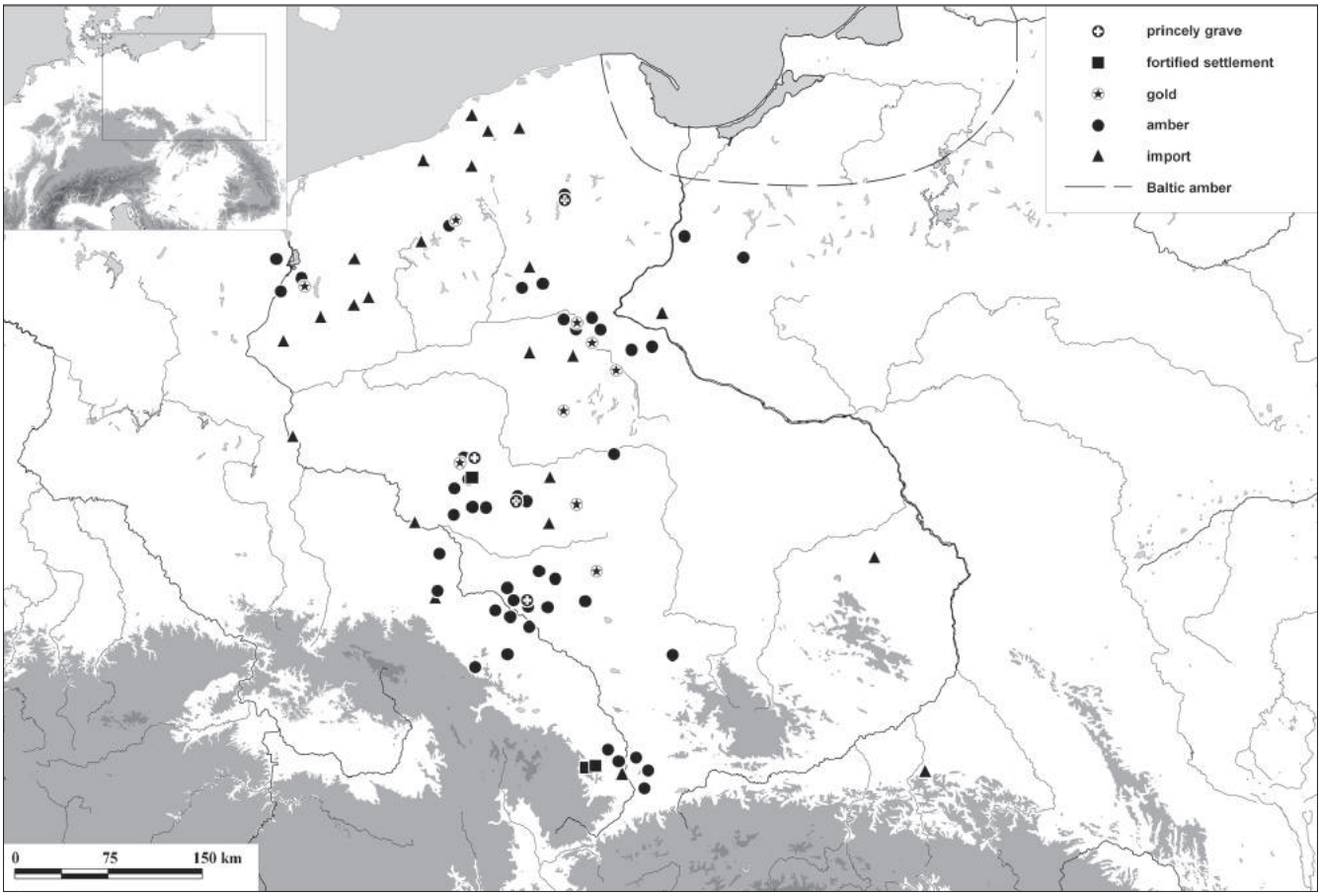

Fig. 19. The route of the so-called first amber road (the Early Bronze Age) over the territories of modern Poland;
1-3 – Łęki Małe,
4-5 – Bruszczewo,
6-7 – Przysieka Polska.

the presence of 'princely graves' in Bruszczewo's vicinity. A deeper understanding of the causes of this state of affairs is offered by the analysis of the cultural significance of amber and its presence in the region. It was the demand for amber, growing among the societies of southern Europe, that gave societies living along the trail such a major civilization chance.

The context in which the Bruszczewo settlement lived, outlined above, calls for taking a special view of the then geography of settlement. It formed lines along trails. Individual settlement regions coincided with trail hubs or existed entirely away from them. Bruszczewo societies participated in a long-range exchange in many ways and benefited socially by the very fact that it was among them that the most complex social structures took shape, headed by a stable upper class. It was the representatives of such 'inland ports of trade' that formed a network of people staying in touch with each other, and organized the life of individual local communities. They were stable links of the chain that joined the most distant ends of the continent in the Bronze Age (Kristiansen, Larsson 2005; Jaeger, Czebreszuk 2010: 231-232; Czebreszuk 2011).

CHAPTER 5

Research Area III. Middle Danube Basin: Vatya culture

Even though the Danube is generally believed to be a river that was the main route of transmitting cultural impulses during the Bronze Age, the area is one of the least recognised for the period covering the first half of the 2nd millennium BC. The issues connected with the Vatya culture have been, and still are, mostly the domain of Hungarian archaeologists. European archaeological literature in German and English seems not to appreciate its significance. The Vatya culture developed in an area diversified in terms of natural habitat features and topography, partly drawing on the strong Early Bronze Age traditions of the Nagyrév culture. Together with its numerous and vast cemeteries it is chiefly known for its fortified settlements, often of a tell structure (Fig. 20) (Kovács 1982; 1984a).

5.1. Natural environment and economy

Taking into account all available analyses of bone remains, it can be claimed with certainty that the societies of the Middle Bronze Age obtained animal proteins above all by breeding domesticated species (Bökönyi 1982: 130; Choyke 1984: 22; 1998: 161; 2000: 100; Choyke, Vretemark, Sten 2003: 180, Fig. 2, 3).

Hunting wild species was clearly a supplementary way of obtaining food; to a larger extent it served to procure such raw materials as antlers and hides (Choyke 1984: 34-35). It must be noted, however, that the occurrence of wild animal remains often depends on the size of bone assemblage subjected to analyses[1] (Choyke, Bartosiewicz 1999: 241-242, Table 1). Among wild species, the red deer was the most important; its remains were virtually always found at the investigated sites (Bökönyi 1982: 130; Choyke 1984: 22; 1987; 2000: 100; Choyke, Bartosiewicz 1999: 239, 246). In contrast, the significance of the wild boar was much smaller (Choyke 1998: 161). The remains of other wild species – the hare, brown bear and wild birds – represent usually a small percentage of assemblages (Choyke, Vretemark, Sten 2003: 180, Fig. 2, 3). The importance of the red deer is largely based on the Choyke's analyses of bone and antler tools found at fortified settlements located in today's Hungary. In many cases,

[1] In a large assemblage of bones (3,310 bones identified by a NISP analysis), collected keeping to all methodological requirements during the investigations at Százhalombatta, the remains of wild species made up only about 1-2 per cent of all bones (Choyke, Vretemark, Sten 2003: 183). In the assemblage of 3,828 identified bones from Lovasberény-Mihályvár, the share of domesticated species bones was 79.5 per cent (Choyke, Bartosiewicz 1987: 13, Table 1).

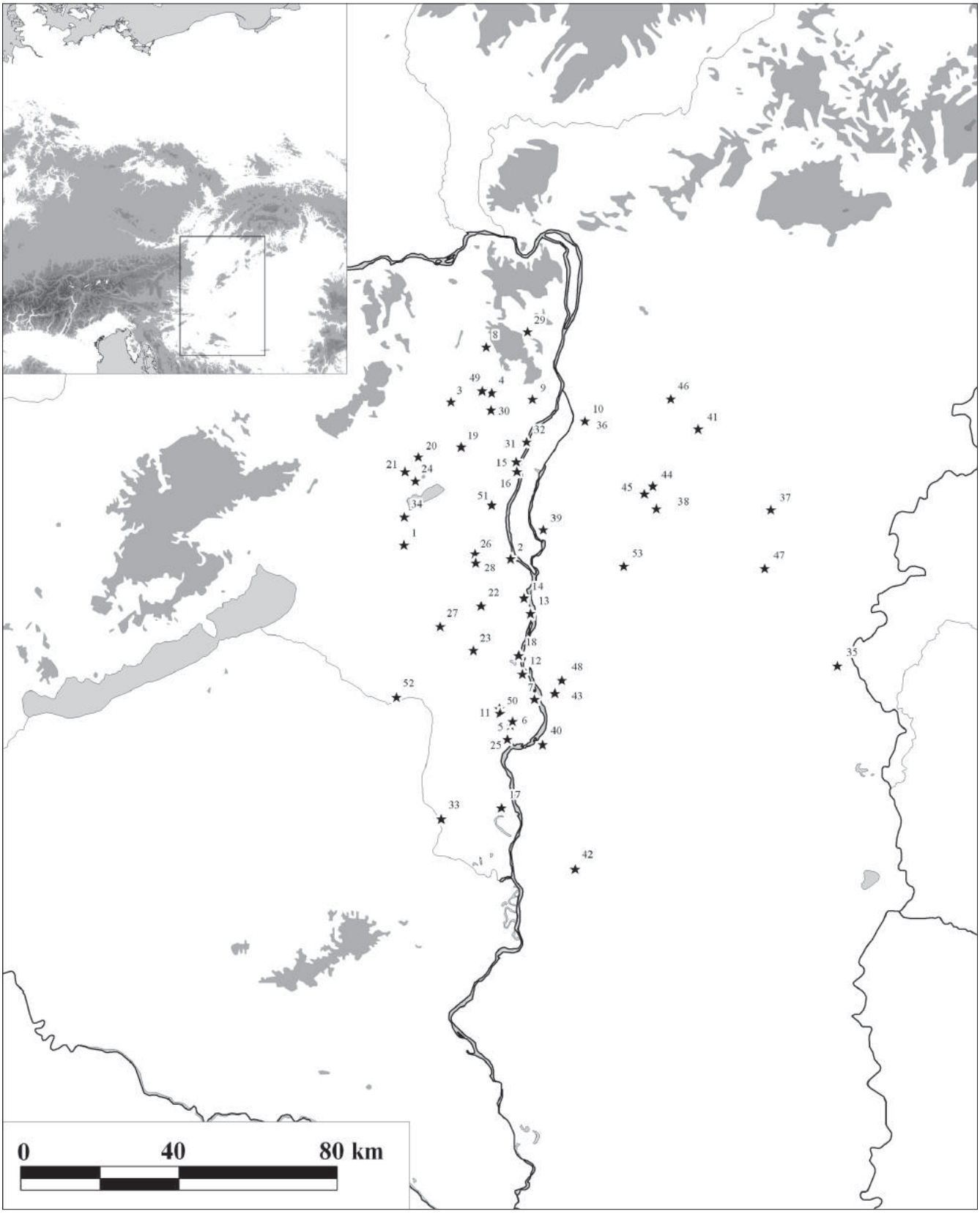

Fig. 20. Distribution of the Vatya culture fortified and tell settlements (index: Szeverényi, Kulcsár 2012).

the share of fragments or complete antler tools was as high as 50 per cent (Choyke 1984: 34). Much less frequently, red deer remains were found in the assemblages of post-consumption refuse (Choyke 1984: 34-35). On the one hand, this indicates how important the species was, in the first place as the source of antlers, on the other hand, it justifies a presumption that hunting was not necessarily the chief way of their procurement. The number of identified antler fragments and ready objects made of this material suggests that the gathering of shed antlers could have been an organized effort. Antlers shed by an animal cannot lie long as they are subject to natural decay and gnawing by animals. As antler shedding occurs regularly, gathering could be planned as a seasonal activity to some extent (Choyke 1998: 172).

Some researchers mention a possibility of a change in the meaning of hunting from purely economic to cultural. If this is true, hunting (with the use of dogs? Choyke, Vretemark, Sten 2003: 183) might have been a display of the life style of male elites (Vretemark, Sten 2005: 159) and a way of procuring raw material (antlers) for the making of special-value objects (e.g. elements of a horse harness, see Kristiansen 2004).

The beginnings of the career of antlers as a raw material for the making of tools of necessary hardness and strength (pick, hoes, hammers, etc.) should be sought in the Late Neolithic (Lengyel i Tiszapolgár) when such tools appeared for the first time and the red deer was an important hunted species (Choyke 1998: 172). The climate change that occurred in the Late Neolithic and Early Bronze Ages brought about an expansion of woodlands, where the red deer breeds naturally, and thus could have contributed to a greater use of antlers. They were particularly suitable (because of its strength and hardness, Choyke 1998: 171) for the making of picks and hoes. In all probability, these were main tools used for breaking up soil in ditch digging and fortification raising by the societies of the Middle Bronze Age (Choyke 1998: 174).

It seems that in the case of objects of special forms and ornaments, as for instance cheekpieces, a group of craftsmen could have specialized in their production at time intervals[2] (Choyke 1998: 173). Such objects are made with high precision and form a group of items, which easily crosses the boundaries of archaeological cultures and geographical regions (Hüttel 1981; Choyke, Vretemark, Sten 2003: 184).

The question of cheekpieces is directly related to the use of a domesticated variety of the horse which appeared in the region together with the Early Bronze Bell Beaker and Nagyrév cultures (Bökönyi 1978; 1992: 70). In the light of available sources, a growth in its value is clearly observable. Originally, a slaughter animal (Early Bronze Age), the horse grew in value to reach the status of a draught animal used primarily[3] for transporting goods and people (Middle and Late Bronze Age) (Choyke, Bartosiewicz 1999: 245). Relying on a broad distribution of cheekpieces and other elements related to the so-called *Streitwagenkomplex* (Kristiansen 2004), it is assumed that in the Middle Bronze Age the horse could have been a commodity exported from the Carpathian Basin to distant areas of the Aegean and Anatolia (Sherratt 1993: 24).

Horse remains found at the Százhalombatta settlement testify to the long-term breeding of horses and their use as draught and riding animal (Benecke 1998: 65-67; Vretemark, Sten 2005: 165-166). A comparison of the size of horses from different regions of Europe shows that they reached the greatest height at the withers in the lands of today's Hungary (Benecke 1998: 66, 68, Abb. 8).

Quite frequently recorded in the osteological material, the dog had some extra-economic role (Vörös 1996; Choyke, Bartosiewicz 1999: 247) testified to by the fact that no traces of breaking dog bones

[2] At the settlement in Pákozdvár, a discovery was made of two cheekpieces and four fragments of antlers, being probably semi-finished products for making such objects (Choyke 1979: 16).

[3] In a NISP analysis of animal bones from Százhalombatta, the share of horse remains amounted to 5 per cent. Some elements of horse carcasses were dressed for consumption, which means that although meat production was not the major reason for breeding horses, they served as a source of food under certain circumstances (Choyke, Vretemark, Sten 2003: 182)

(Choyke 1984: 24) were encountered and by the cases of depositing dog skulls under hut foundations (e.g. Százhalombatta; Choyke, Vretemark, Sten 2003: 182-183, Fig. 6, 7). The traces of bone gnawing, found in assemblages from individual settlements, point to a close relationship between dogs and inhabitants (Choyke, Bartosiewicz 1999: 245). The relationship is borne out by evidence from other regions of Bronze Age Europe, for instance by famous rock art at Tanum, Sweden (Gräslund 2004: 167, 169, Fig. 2). Dogs could have served, above all, as helpers in hunting and herd tending.

The significance of the dog and hare in the extra-utilitarian sphere is shown well by the analyses of bone objects and waste products. Some of them could have been elements of dress, identifying members of individual societies, occupying particular settlements. Among them are, known chiefly from the settlement at Százhalombatta (one specimen comes from Pákozd and some others were registered at Kakucs-Turján[4]), metacarpus bones of a dog and a hare perforated on one side (suggestive of being necklaces or amulets). What they represented was probably the swiftness of these animals – a characteristic associated with the male element or hunting (Choyke, Vretemark, Sten 2003: 186-187).

As regards domesticated species, the most important were cattle, goat, sheep and pig. Virtually in all assemblages studied, cattle bones dominated[5] (Choyke, Bartosiewicz 1987: 8; Choyke, Bartosiewicz 1999: 244, Fig. 3; 246-247; Vretemark, Sten 2005: 158). The ratios of major species of domesticated animals – cattle, goat, sheep, and pig – varied with respect to space and time. What varied in the first place was the percentage share of goat, sheep and pig bones (Choyke, Bartosiewicz 1999: 244, Fig. 3). This could have been caused by different local environment conditions rather than global climate changes (Choyke, Bartosiewicz 1999: 245-247; Bökönyi 1992: 71-72).

Unlike the pig, cattle and sheep were frequently bred over many years for the purpose of obtaining milk and wool (Benecke 1998: 64-65; Choyke, Bartosiewicz 1999). In the case of the settlement at Százhalombatta, a clear trend is visible whereby the number of sheep slaughtered at a mature age grows. The trend reflects a change in the strategy of their breeding between strata VI and V (Early Bronze Age, Nagyrév culture) and strata IV-II (Middle Bronze Age, Vatya culture) (Vretemark, Sten 2005: 162-164).

Indirect information on the significance and scale of animal use is offered by detailed pedologic examinations aimed at determining phosphate content in different tell strata. Such examinations have been performed for the settlement at Százhalombatta. Averaging phosphate content for strata corresponding to the period of use of the site shows that each year at least one ton of bones was accumulated (Füleky, Vicze 2007: 138).

As settlements were often located close to rivers, fishing must have been one source of food (Jaeger 2012c: 151). Unfortunately, due to the research methodology, we do not have many ichtyological remains (Choyke, Bartosiewicz 1999: 239). At the settlement at Százhalombatta, identification was made of fish bones representing two families of fish: *Cyprinidae* and *Acipenseridae* (Choyke 2000: 100). From Alpár, we have bones of a carp, sheatfish and pike (Bökönyi 1982: 130).

Detailed analyses of bone tools used by the societies of the Vatya culture showed some characteristic forms such as cattle rib scraper (Choyke, Vretemark, Sten 2003: 186, Fig. 14). In the areas located east of the Vatya culture oecumene, similar tools were made from the tibiae of goats, sheep.

Characteristic only of the settlement at Százhalombatta (next to pendants/amulets made of a dog or hare metacarpus bones), there were two bone objects. First, skates made of cattle tibiae (Choyke, Vretemark, Sten 2003: 187, Fig. 15) had been known from the same area only from Early Bronze Age Bell Beaker sites (Choyke, Bartosiewicz 2005: 318-319). Second, a small double

[4] Analyses of animal osseous remains as well as bone and antler products from the Kakucs-Turján settlement are currently in progress.

[5] One of very few departures from this rule, a predominance of small ruminants can be observed in a bone assemblage from Alpár (Bökönyi 1982: 120, 130).

blade made from ribs or shaft fragments of long bones (Choyke, Vretemark, Sten 2003: 187, Fig. 16) is suggested to have been a body ornament, i.e. an active element of the identity of this very community (these object are not found on other Vatya culture sites).

In the case of the Vatya culture, it is assumed that land cultivation and animal breeding were very important as any surpluses produced were exchanged for ready bronze objects or raw material necessary to manufacture them (Poroszlai 1996: 13; 2003: 151).

As in the case of bone assemblages, also with macrobotanical remains one has to be aware of methodological problems related to their collection. For many analyzed assemblages come from the times when investigations employed *Spatenstichtechnik* and no systems of regular sampling or sieving of the fills of archaeological layers or features were employed (Endrődi, Gyulai 1999: 25-27).

At Vatya culture settlements, the most frequently recorded cereals were small spelt, barley and emmer. Barley, present in all botanical samples studied, occasionally was the only recorded cereal (e.g. Solymár--Várhegy) or clearly dominated over the other species (e.g. 98-per-cent share of barley in Baracs-Bottyánsánc) (Endrődi, Gyulai 1999: 27). At a late Vatya culture settlement in Mende-Leányvár, an equally high shares of two kinds of wheat were recorded (small spelt and emmer) and a large amount of barley remains. At the settlement in Dunaújváros-Koziderpadlás, next to emmer, barley was found. In turn, in the case of the Alpár-Várdomb settlement, small spelt and barley dominated with a minor share of emmer (Endrődi, Gyulai 1992: 66). A noteworthy element are the substantial amounts of grain which have been discovered in Kakucs-Turján within the perimeter of the remnants of huts. Barley and einkorn predominate among the recorded cereal species (Gissel 2015).

Cereal grains are often found from individual huts and were found in vessels or pits, close to furnaces (Endrődi, Gyulai 1999: 27). At times, these were large amounts (e.g. 10 litres of wheat grains in Pákozdvár, Bóna 1975: 74), showing that the then farmers knew how to store some of their crops (Endrődi, Gyulai 1999: 27). This is also perfectly illustrated by the finds of large storage vessels ('granaries') at the settlement in Alpár (Bóna, Nováki 1982: 42-43, Fig. 11-12). Moreover, in the Middle Bronze Age, the cultivation of true millet became more popular (Endrődi, Gyulai 1999: 27). The shares of emmer and small spelt varied from site to site (e.g. at Százhalombatta and Mende emmer predominated while at Bölcske small spelt was clearly in the majority; Endrődi, Gyulai 1999: 27). To some extent, the distribution of wheat species seems to follow a certain spatial pattern. One can distinguish two major regions where individual species were cultivated:

- east and northeast Transdanubia and the northern portion of the region lying between the Danube and Tisza rivers were characterized by the predominance of small spelt, with a smaller shares of emmer and common wheat,
- the left bank of the Tisza and eastern portion of the region lying between the Tisza and Danube were characterized by a high preponderance of emmer over small spelt and common wheat (Nováki 1969: 40-41, Abb. 1; Gyulai 1993: 25-26, Fig. 1).

Where the two regions overlapped, the shares of small spelt and emmer in studied samples were equal.

Data concerning changes in the structure of crops throughout the lifetime of the settlement (phases Vatya I-Vatya III) were supplied by investigations at Bölcske. In the oldest phase (Vatya I), remains of different cereals were found: two- and six-row barley, multi-row barley, common wheat, small spelt, emmer, and spelt; in this period emmer was a predominant species. In the next period (Vatya II), two-row barley disappeared almost completely while emmer, spelt and small spelt continued to be grown. In the final phase of the settlement's lifetime (Vatya III) all species known from previous periods continued to be grown. The spectrum of crops expanded to include two-row barley (absent in phase Vatya II) and true millet.

Generally speaking, since phase Vatya II the number and quality of cultivated ce-

reals had grown. There also appeared evidence of legume cultivation, above all lentil and pea as well as bitter vetch and broad bean (Hartyányi 1982: 162; Gyulai 1992: 66; 1999: 27). The finds of apples and other wild fruits in samples studied show that, on the one hand, they supplemented the diet of the inhabitants and, on the other, indicate what kind of vegetation grew in the immediate vicinity of settlements (Endrődi, Gyulai 1999: 28-29).

Next to macrobotanical remains, other evidence of the use of cereals comes from numerous stone implements related to grain processing such as quern stones and grinders as well as harvesting tools (Bóna 1975: 74, 140, 164; Horváth, Kozák, Pető 2001).

The length of Nagyrév and Vatya settlement (e.g. Százhalombatta ca. 1900-1400 BC) on individual tells leads us to assume a strong human impact on the environment. However, profiles collected and palynological analyses made within the SAX project do not allow researchers to determine exactly how strong the impact was (Fig. 21, 22). Due to the absence of a suitable body of water close to the Százhalombatta settlement where pollen grains could accumulate (Sümegi, Bodor 2005: 209), a profile was collected in an oxbow lake on Csepel island, located about 500 m from the tell. The profile admitted of the following conclusions: in the Middle Bronze Age there is evidence of human activity in the form of opening the landscape for cultivation and animal breeding.

The published diagrams reveal, however, the weakness of this interpretation. Above all, although evidence of occurrence of wheat pollen grains is cited in the text (Sümegi, Bodor 2000: 89), their curve is absent from the relevant diagram (see Sümegi, Bodor 2000) (Fig. 21). However, rye is included in the diagram although in this case the curve clearly shows that this pollen type is absent from the profile. Furthermore, controversies are aroused by the determinations of various oak and willow species (Sümegi, Bodor 2000: 86) (Fig. 21). In the period preceding the Bronze Age (zone A), evidence for the opening of landscape comes from the presence or even predominance of plantain. Strangely enough, the relevant diagram shows that the pollen grains of this plant were virtually absent in the period in question. A similar situation concerns grasses, the pollen grains of which were absent from the profile testifying to the opening of the landscape (Sümegi, Bodor 2000: 86-87) (Fig. 21, 22). Furthermore, despite available radiocarbon dates[6], the study relies on the traditional division into the periods of Atlantic, Subboreal and Sub-Atlantic (Sümegi, Bodor 2000). Considered significant, the presence of the walnut may have been a result of migrations from the south (the Balkans, Anatolia) (Sümegi, Bodor 2000: 89). This brief review of controversies aroused by the analysis of the profile urges caution in accepting its results.

More profiles within the same project were collected in the valley of the Benta River. The palynological studies, despite the fact that they were made about 20 km away from the Százhalombatta tell, are, next to surveys, one of the ways of exploring its settlement and economic background area. In the researchers' opinion, it lay on the lower course of the river (Vicze, Earle, Artursson 2005: 237, 250, Fig. 1). Two profiles were collected – one in the dry valley of Lake Bia, the other close to the Sóskút settlement (Sümegi, Bodor 2005: 209; Vicze, Earle, Artursson 2005: 244). In the first profile, in the section linked to the Bronze Age, the accumulated pollen grain composition allowed the authors to draw far-reaching conclusions concerning the existence of busy roads along the Benta River valley. It is along the roads that, in the authors' opinion, weeds supposedly expanded (e. g. plantain, knotweed, pearlworts, saltbush as well as the hazel and walnut; it is also close to them that open areas stretched where animals were grazed. The pollen analysis did not bear out cereal cultivation in the immediate vicinity of the river valley. Indirect evidence for the presence of cereals is supposedly offered by the pollen grains of field weeds (Sümegi, Bodor 2005: 214-218).

The analysis results of the other profile, collected about 300 m from the Sóskúti

[6] The text mentions two radiocarbon dates, while the accompanying diagram presents three dates (Sümegi, Bodor 2000: 85; 95, Fig. 7a, 7b, 7c).

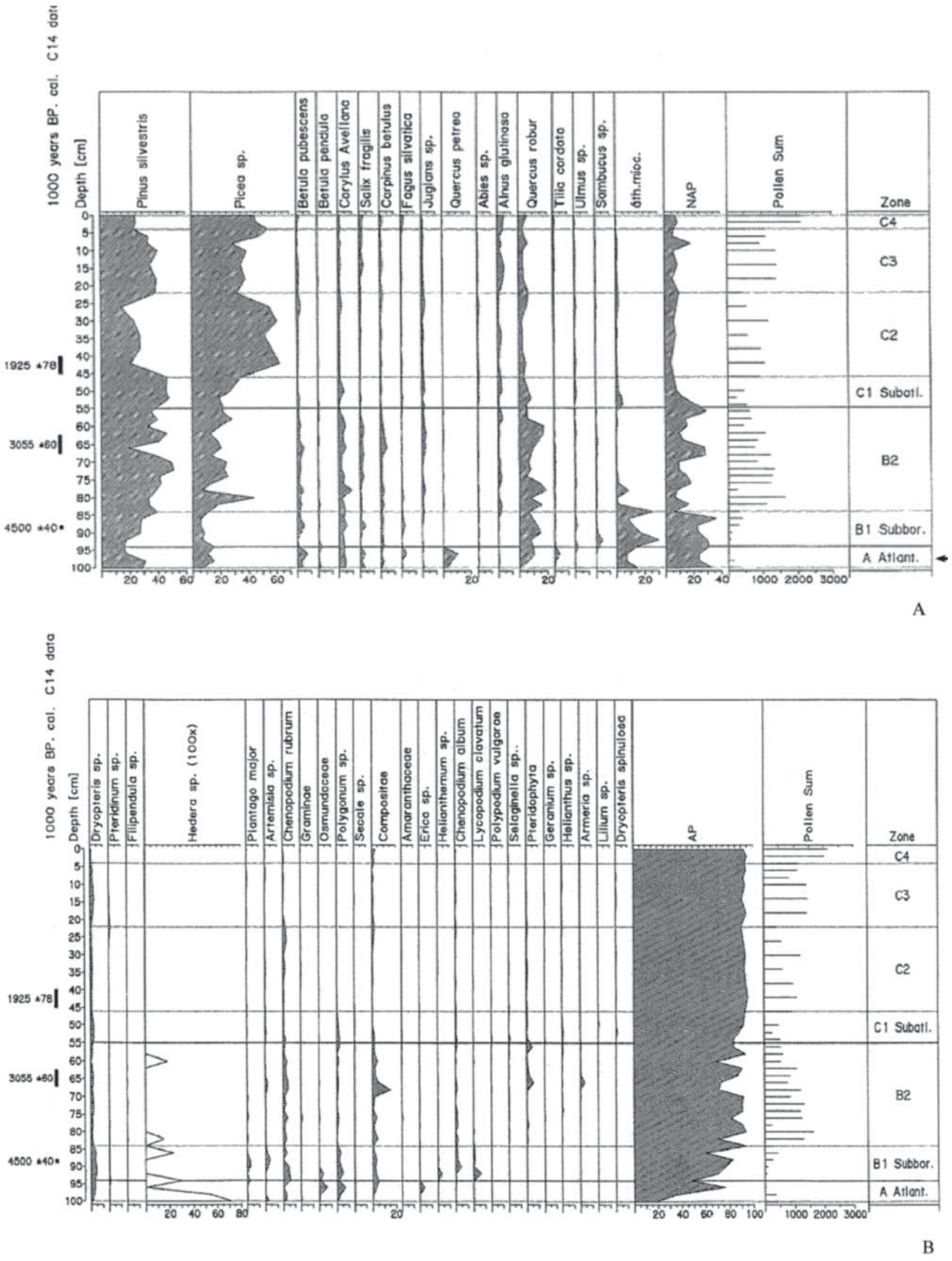

Fig. 21. Pollen diagrams from Tököl, profile Tököl II. At the top – AP; AP+NAP=100%; at the bottom – NAP; AP+NAP=100% (after Sümegi, Bodor 2000).

Hegy site, have been similarly assessed. On the site where profile was collected, in the Bronze Age, there supposedly stretched open spaces, including settlements, roads, and walnut stands. What makes a difference in this case, however, is the presence of wheat pollen, which, together with field weed pollen, indicates the existence of cultivated fields nearby (Sümegi, Bodor 2005: 220-221). However, the way the analysis results are presented, lacking information on the shares of individual pollen grains in the profile, does not permit their unequivocal assessment (Sümegi, Bodor 2005: 234, Fig. 111). Included in the text, the information from archaeologists, pointing to the potential role of the Benta River valley as a connecting link of sorts between the mountainous region of Transdanubia and the Danube valley (Sümegi, Bodor 2005: 209), must have had an impact on the assessment of pollen diagrams and must have made the authors draw far-reaching conclusions concerning the existence of roads and related landscape elements as well as settlement in the area.

Summing up, what should be noted is the considerable knowledge of animal breeding and land cultivation possessed by the inhabitants of the discussed settlements. This diversification secured their subsistence and allowed them to make the best use of the local environment. The estimates of the population of individual settlements and their long life testify to the population success of local communities and an efficient and multiform use of the natural environment.

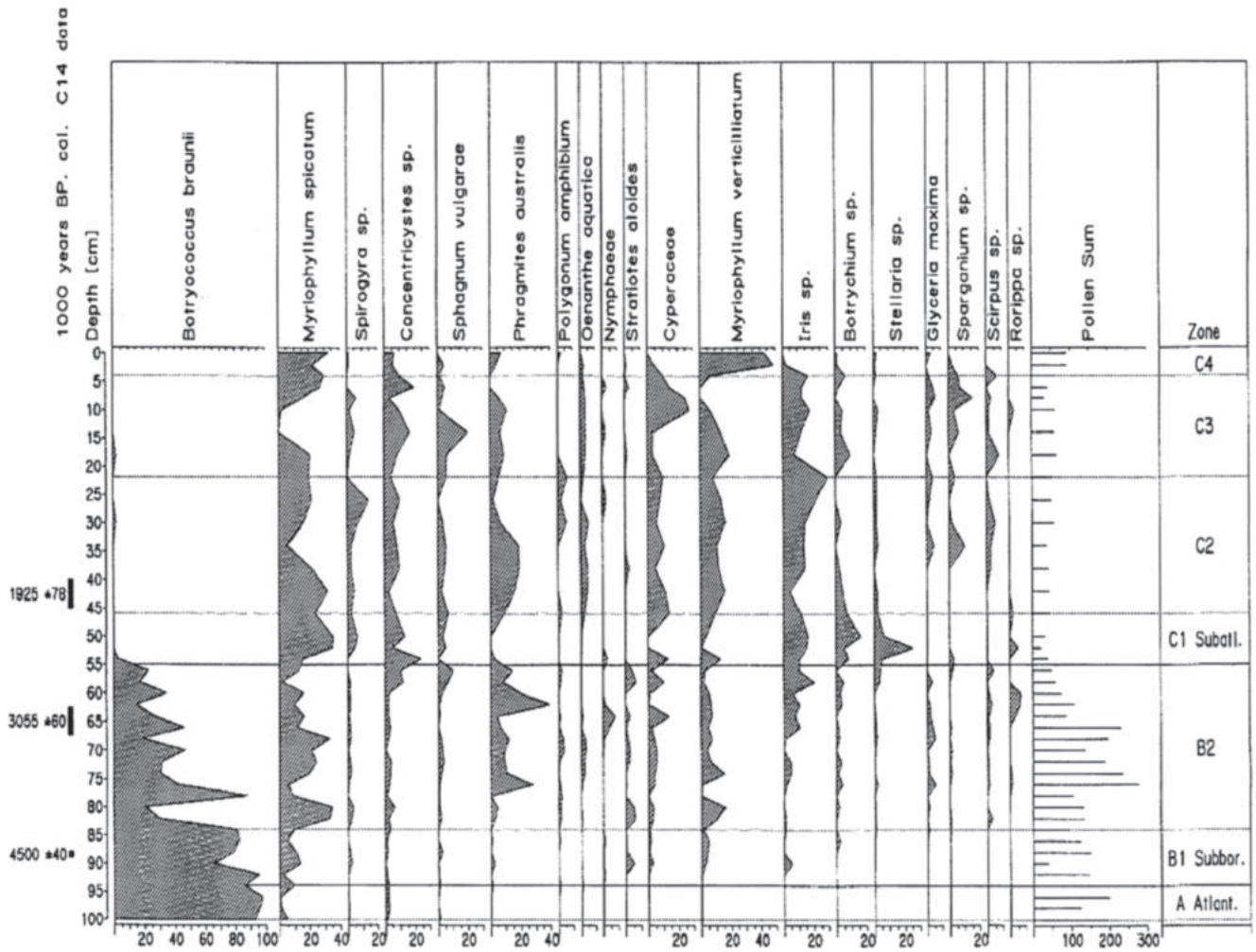

Fig. 22. Pollen diagram (100% = Σ; water plants) from Tököl, profile Tököl II (after Sümegi, Bodor 2000).

5.2. Inner layout

For the majority of Vatya culture settlements discussed here, the available picture of their inner layout is rather fragmentary. Excavations, albeit few, often concentrated on the stratigraphy of their interior. Complex character of strata at the sites, of which some had been continuously settled since the Nagyrév culture (David 1998a: 232--233), resulted in a limitation of excavated areas.

Although the Nagyrév culture remains outside of the scope of this dissertation, because of a close genetic relationship between this culture and the Vatya culture, observable, for instance, in construction, the discussion shall cover also finds originating with the Early Bronze strata of individual settlements.

In Bölcske-Vörösgyűrű, complex stratigraphy reflects the length of settlement stretching from the proto-Ökörhalom phase of the Nagyrév culture to phase III of the Vatya culture (Poroszlai 1992a: 142; 2000: 136). Inside the settlement's perimeter, the remains of several huts with post walls were discovered as well as others with walls built of compacted clay. Both types of wall construction were used to build characteristic huts with rounded corners (Poroszlai 2000: 119, Abb. 4; 120). Numerous finds of daub bearing impressions of twigs testify to the use of wattle and daub structures (Poroszlai 2000: 118). The best preserved and the largest hut at the site was unearthed at level E3, linked to phase III (Kulcs) of the Nagyrév culture (Poroszlai 1992a: 143--144). Oriented along the NW-SO[7] axis, the building measured 9.5 × 4.6 m. Inside, there was a circular hearth. Many charcoals are telltale signs of a destruction by fire. Daub fragments found inside the hut bear impressions of twigs and fingers (Poroszlai 2000: 120-121, Abb. 6; 141, Abb. 28:3). Pieces of daub were also discovered in layer 10 (level E3); it was all that survived from such construction elements as window and door frames (Poroszlai 2000: 122). In layer 9 (level E3), fragments of another two huts with rounded corners were recorded. They had been built only about 0.5-1.0 m apart (Poroszlai 2000: 122-123, Abb. 9).

In the case of this settlement, information on Vatya culture structures is less precise. In layer A-D3, a discovery was made of remains of a hut 4.5 m wide, containing a circular hearth preserved only in fragments (Poroszlai 2000: 126). Due to occurrence of deep pits characteristic of the Vatya culture in its youngest strata, destroying older strata[8], it was not possible to determine the structure and size of individual dwellings (Poroszlai 1993: 63; 1992: 144). Relying, however, on the data from the other sites, it may be assumed that the dwellings were very similar to Nagyrév huts (Poroszlai 2000: 124; 126; see below).

At the Baracs-Földvár settlement, a stratigraphic sequence was identified, too, testifying to the continuity of settlement from the Early to Middle Bronze Age. Layers XIII-IX related to the Nagyrév settlement. Beginning with layer VIII, traces of the Vatya culture settlement could be observed. As in the case of the settlement at Bölcske-Vörösgyűrű described earlier, also here more information is available on the older period of site settlement. Layer XI yielded remains of two huts that differed in their structure but were both oriented N-S. First was a post structure while the other had walls built of compacted clay. Next to one of them, furnace remains survived (Vicze 1992: 146-147). Vatya culture layers were pierced by numerous deep pits, hindering the study of Middle Bronze dwelling structures. It was only in layer VI that a wall fragment survived suggestive of a post-structure house, oriented N-S as in the case of the Nagyrév huts (Vicze 1992: 147).

The settlement in Nagykőrös-Földvár, prior to the construction of fortifications, was open, which is evidenced by at least four settlement horizons associated with

[7] All hut remains discovered at the site attest to the NW-SO orientation.

[8] Features of this type regularly hinder the study of stratigraphy in the youngest strata of Vatya culture settlements (see comments by Mozsolics 1988: 46).

phase Vatya II. In an excavation dug next to a rampart, the remains of three huts were uncovered. Two of them (nos. 2 and 3) were parallel to each other. Hut no. 2, oriented NW-SE, had two rooms separated by a wall of which two postholes and a foundation groove survived. The burned remains of the hut permit to estimate its original width at 4 m. Among its rubble, there were many reed impressions showing that originally either its floor had been lined with reeds[9] or its roof had been made of reeds and subsequently collapsed (Poroszlai 1992c: 157; 1993: 61). Due to numerous pits disturbing the feature, it is hard to estimate its full size (Poroszlai 1988: 33). Hut no. 3 had been badly damaged by pits dug into it later. What is left of it includes floor fragments of compacted clay and a hearth fragment (Poroszlai 1992c: 158). Fragments of the third hut survived as well. Inside all the huts, many postholes were found that were unrelated to the construction of walls or roofs. The postholes could be traces left behind by the furniture or fixtures that once stood in the huts (Poroszlai 1992c: 158).

Some information on dwelling and other accompanying structures was obtained through excavations at the settlement in Alpár-Várdomb. In the first (youngest) level of strata dating to the Bronze Age, badly damaged in the times of Medieval settlement, no remains of any houses could be found. The strata contained only pits and hearth remains, including characteristic hearths (*Kesselherdstellen*) (Bóna, Nováki 1982: 108). The second level finds included floor remains of compacted clay; they were, however, insufficient to reconstruct the forms and sizes of huts to which they related. In this case also *Kesselherdstellen* were found (Bóna, Nováki 1982: 109). On the second level, a stratum was recorded showing that the settlement area had been prepared for the building of new houses of the third level. Within it, a hut floor and a preserved wall of compacted clay were uncovered. Next to the hut remains, probably oriented N-S, on a prepared clay foundation, there were two oval furnaces. The hut interior was divided into separate rooms. In the third level, stratigraphy was disturbed by deep postholes indirectly indicating the type of structures used to erect houses in the younger levels (1 and 2). In the fourth level, floor remains of compacted clay survived together with a hut, the interior of which was divided into three parts. A wall fragment survived up to the height of 12 cm (Bóna, Nováki 1982: 109). As in the case of level 3, next to the hut there stood an oval furnace.

In level 4, numerous pits were up to 2.6-3.6 m deep. In one of them (pit 75/10), a completely preserved storage vessel was discovered. The researchers interpreted the find as a symbolic grave or a sacrificial pit (Bóna, Nováki 1982: 109). It seems, however, that calling the feature a storage pit, fulfilling a household function, is more legitimate.

In an excavation cutting the settlement's rampart, finds included the remains of a furnace, three large storage vessels or 'granaries' (Bóna, Nováki 1982: 42-43, Abb. 11-12) a quern and many charred cereal grains (Bóna, Nováki 1982: 110). It could not be determined whether all these features and finds originally were inside the hut.

On the inner side of the rampart, the remains of a rectangular hut survived whose walls, built of compacted clay, were reinforced by posts. About 0.25 m thick, a clay floor bore traces of being renewed five times (Bóna, Nováki 1982: 110). Contemporaneous with the hut, pit 77/7 reached about 1.30 m below the floor level; on its bottom, a posthole approx. 0.40 m deep was discovered.

In the researchers opinion, huts with walls of compacted clay can be linked to the tradition of Nagyrév architecture and are older than post structures[10] (Bóna, Nováki 1982: 112).

[9] At the Vatya culture settlement in Aba-Belsőbárándpuszta-Bolondvár, a discovery was made of remains of huts with clay floors. The floors had been lined with reeds or leather (Kovács 1963: 131); at a Nagyrév culture site in Tiszaug-Kéménytető traces of reed-mace were recorded used for the same purpose (Csányi, Stanczik 1992: 118).

[10] Adduced by the researchers, evidence for the destruction of older levels by deep postholes from levels 1 and 2 (see above) seems to indicate that structures reinforced by posts existed also in the younger period of the settlements lifetime.

Relying on the information contained in the report on the investigations in Alpár--Várdomb, one can trace certain chronological changes in the type and layout of the settlement. The oldest huts were built about 3 m from the line of fortifications. Built of compacted clay, their walls marked off a rather considerable space divided into separate rooms. The thin walls must have had an adverse effect on the lifetime of the huts. Later huts were placed closer to the rampart. Their walls were already thicker but still lacked any timber elements which could reinforce them. Such reinforcing elements appeared only in the successive settlement phase. These huts were again placed farther from the rampart. In the space closer to the rampart line, furnaces and storage pits were located (Bóna, Nováki 1982: 115).

The relatively most comprehensive information on inner layout was supplied by the results of the excavations at the Százhalombatta settlement that have been published so far. At the site, five settlement levels were distinguished dating back to the Early and Middle Bronze Age; levels VI-V are associated with the Nagyrév culture while levels IV-II are linked to the Vatya culture[11] (Poroszlai 2000: 16). The huts that were built in the times of Nagyrév settlement had walls erected using two different techniques. Some of them were reinforced on the outside by light posts/pegs, while others lacked any such elements. Floors, as in the case of the other settlements, were made of a layer of compacted clay, sometimes lined with reeds (Poroszlai 2000: 18). The interior of huts was often divided into separate rooms. During the investigations carried out in 1989, three levels of such huts were unearthed. All of them had two things in common: their corners were rounded and they were oriented NW-SE (Poroszlai 1996: 7). In 1990, a discovery was made of a hut measuring 8 × 5 m, the interior of which was divided into two rooms serving different functions (a kitchen and living quarters). They were separated by a step making the floor levels differ by approx. 0.25 m and a light clay wall reinforced by slender posts/pegs. A large posthole in the middle of the step suggests that the hut had a gable roof[12] (Poroszlai 1992b: 154; 1996: 7, Fig. 2). The room interpreted as a kitchen measured 2 × 3.3 m; inside, a storage pit was uncovered (1.2 × 0.50 m), containing much refuse. Next to the hut a furnace stood and remains of metallurgical production lay around such as a fragment of a mould for casting a miniature chisel (Poroszlai 2000: 19, 37, Fig. 17a), metal droplets and tuyères (Poroszlai 1992b: 154; 1996: 7).

Another hut of an analogous form was built exactly on the same place. The layer that separated the remains of the structures was about 0.10-0.15 m thick – exactly as much as the layer separating the remains of Nagyrév culture settlement from strata associated with the Vatya culture (Poroszlai 1996: 8; 2000: 20). The huts of the latter culture were built in all probability in the same manner but due to numerous pits it was not possible to record any well-preserved structures. In the youngest level (Vatya--Kosider phase), remains of three huts were discovered which stood in line and were oriented NW-SE; there were also pits of which some had their bottoms lined with clay. The huts were separated by narrow alleys (Poroszlai, Vicze 2004: 233). Level IV supplied certain data confirming the similarity between the huts of both cultures. One of them was a rounded corner of a hut (Poroszlai 2000: 32, Fig. 7:H2), the floor of which did not survive. From the corner, it could be seen that hut walls were 0.40-0.50 m thick and were made of compacted clay reinforced by post/pegs (Poroszlai 2000: 17). Inside the hut, remains of a furnace were identified; however, due to its poor state of preservation, its form could not be determined beyond any doubt (Poroszlai 2000: 32, Fig. 7:3T).

In 1991, a place where Vatya culture populations produced pottery was discovered. At the site there where eleven furnaces and large amounts of burned pottery, complete vessels and vessel fragments (Poroszlai 1993: 66; 1996: 10).

[11] Level I contained mixed artefacts from various chronological periods (Vatya-Koszider, HaC-D, La Tène D and finds relating to Celtic settlement) (Poroszlai 2000: 16, 21).

[12] The hut was reconstructed in the Százhalombatta Archaeological Park (Poroszlai 1997: 64-66, Abb. 6).

Successive years of excavations (1992--1993) brought about the discovery of the parts of three Vatya culture huts. They were oriented NW-SE and their interiors were divided into rooms. The huts had wattle and daub walls (Sofaer 2006: 130) and were separated by an alley 0.7-1.0 m wide (Poroszlai 1996: 12, Fig. 5). Relying on the examination of hut parts, the size of two huts was estimated at 15 × 8 m and 20 × 15 m (Poroszlai 1996: 11) (Fig. 23).

The researchers assumed that there could be 50-70 huts at a time inhabited by large 7-8 member families. Hence, the population of the settlement could be roughly estimated at 400-500 people (Poroszlai 1996: 11; 2003: 153). The assumed numbers, however, have not been justified in any way.

Magnetometric prospection at the Kakucs-Turján site revealed remnants of several buildings. Remnants of two huts were discovered within the excavation opened in 2013, where investigations still continue. Both were probably built in exactly the same location, and to the same or similar dimensions. The relatively well-preserved remnants of the lower sections of the younger building (dated to ca 1750-1700; Jaeger 2016), suggest that it was erected using analogous methods as in other sites of the Vatya culture. They were built of clay (tempered with a large amount of grasses typical of aquatic environment), on a "skeleton" constructed probably from vertically fixed wooden stakes of relatively small diameter. Usage of the latter is well attested not only in numerous fragments of impressed pug, but also by a number of well-preserved wooden stakes. The entire structure owed its stability to posts, though in the case of Kakucs-Turján no regular arrangement of those (in the shape of postholes) could be established for an entire building. Based on the current state of research, any internal division of the building cannot be conclusively stated. A well-preserved oven was discovered in the northern corner of the earlier hut. The floors in both huts, consisting of layers of hardpacked clay, survived only in part[13]. The aforementioned numerous fragments of pug with the impressions of wooden structural detail were recorded among the remnants of walls of both buildings. Some of the fragments were singularly moulded/ /modelled, which would suggest their special architectural significance.

Relying on this information, one can point to many similarities between the layout and structures of Nagyrév and Vatya cultures (Poroszlai 2000: 20; 2003: 153). The huts were large, each having several rooms, pisé floor, clay walls, sometimes reinforced by posts/pegs on the outside; they were fitted with hearths[14]; additional furnaces were often placed next to the huts (Poroszlai 2003a: 153-154, Fig.18).

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Studying clay use techniques employed in hut construction on the Százhalombatta site, Sofaer noticed many similarities with vessel moulding, some aspects of which were, in turn, similar to the techniques

[13] At the current stage of research, it cannot be determined whether the floor clay was baked as part of deliberate measure.

[14] Hearths are one of the most commonly recorded features at the settlements of Nagyrév and Vatya cultures. They were found at a vast majority of excavated settlements. Frequently, they have a complex form as, for instance, hearth discovered at Százhalombatta or mentioned hearth from Kakucs-Turján (Poroszlai 2003: 154, Fig. 18; Lakatos-Pammer 2005).

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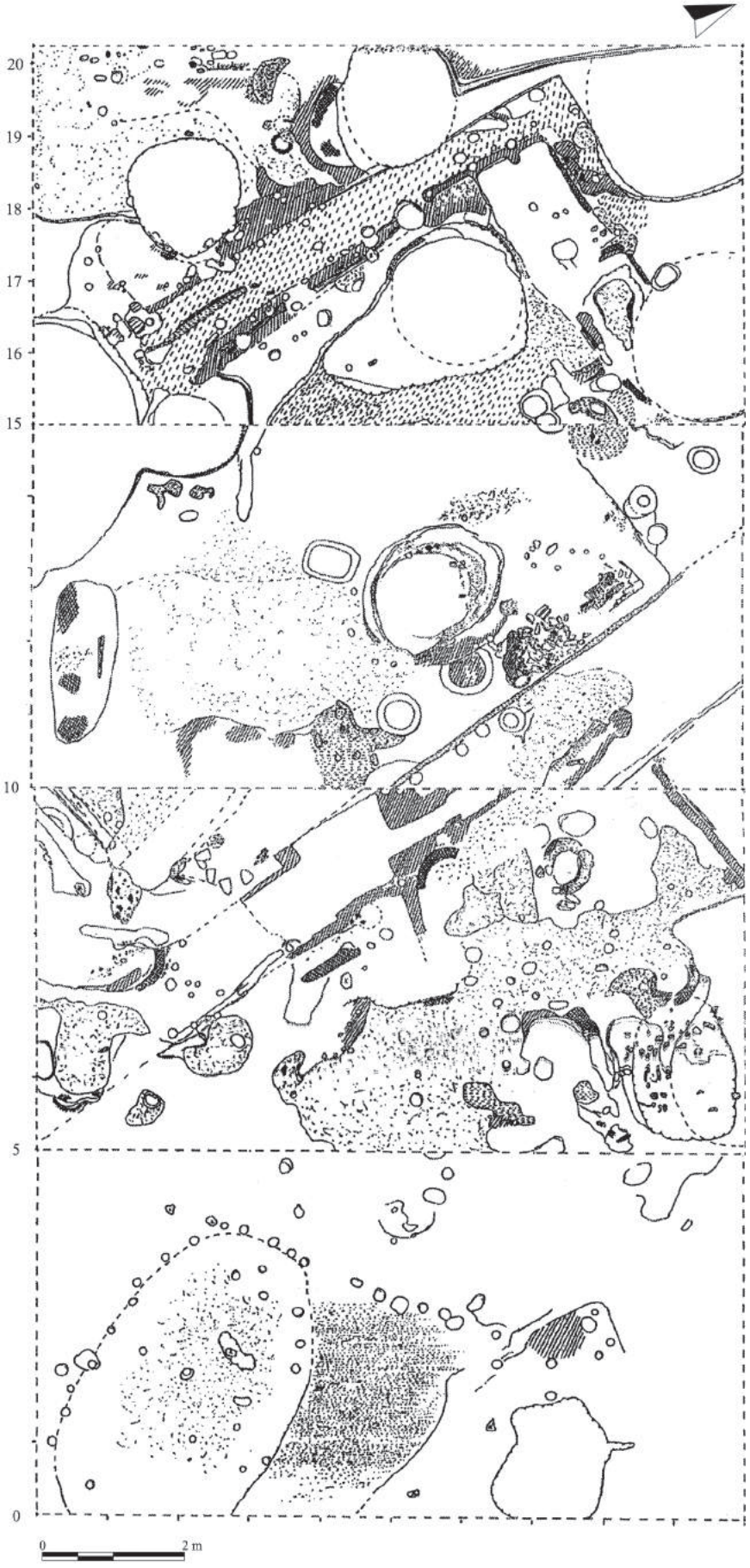


Fig. 23. Százhalombatta. Remains of dwellings 1-3, level III (after Poroszlai 2000).

used by metallurgists. Relying on her observations, she developed an interesting interpretation whereby craftsmen, forming a separate social group, exchanged their experience and borrowed technological solutions from one another (Sofaer 2006: 141).

Some Vatya culture settlements is divided into separate sections (see chapter 5.3.). Investigations of the settlement at Lovasberény-Mihályvár justify an assumption that its individual sections may have served different functions. Within the site, an exceptionally large area of 3,000 sq. m was investigated (Petres, Bándi 1969: 173) including one of its smaller sections (known as Kisvár), which was investigated virtually in its entirety. However, we lack any detailed information on discovered structures. A publication concerning bone remains collected at the site mentions the discovery of three houses and 80 pits (Choyke, Bartosiewicz 1987: 7). The pits were used for extracting clay and storing grain. In addition, the remains of a metallurgist's workshop were unearthed as well (Petres, Bándi 1969; Kovács 1982: 283) (Fig. 26). Some of the investigated area did not yield any archaeological features and was interpreted as a grazing area (Kovács 1982: 283).

The investigations of the Lovasberény-Mihályvár settlement were exceptionally extensive (see Vicze 2000: 121, Table 1). The question of its functional division, however, long remained a research proposition which has never been taken up by the publication of full results of the excavations. The correctness of the interpretation may be borne out, however, by the geomagnetic surveys of the settlement in Kakucs-Turján. They produced a map of magnetic anomalies which shows clearly three different sections of the settlement (Pető et al. 2015: 221). Only one section shows outlines of structures which in part follow a regular layout. They were probably huts partially arranged along the course of fortification. Remains of a very large building were detected in the central section of the settlement. In another section of the site, the survey revealed many anomalies that can be interpreted as remains of storage pits of varied purposes (Fig. 25).

In contrast, the geomagnetic survey of the third section of the settlement detected the least number of anomalies. This and its location in the immediate vicinity of the river valley make it plausible to assume that this section was set aside for a livestock enclosure. Although the survey results should yet be verified by excavations and some special analysis, they can provide grounds for a claim that at least some Vatya culture fortified settlements were divided into sections according to function[16].

The paucity of available information on inner layout and structures reflects the extremely narrow scope of excavations at the sites and permits to describe only some general layout characteristics of individual sites. What can be seen in the first place is the absence of any differences, induced by the cultural change, in the way huts were built and space arranged. The change from Nagyrév to Vatya characteristics is observable only in the pottery style. On the contrary, there are several pieces of evidence suggesting a close connection between the architecture of both cultures and a 'smooth' nature of the transition process (Kalicz 1982: 129; Bóna 1992a: 19; Poroszlai 1993: 62-63; 2000: 126). Neither is there any data confirming that settlement fortification, after all an important development, at a specific stage of settlement functioning (see comments in chapters 5.3 and 5.5) had any impact on the planning or constructing of space.

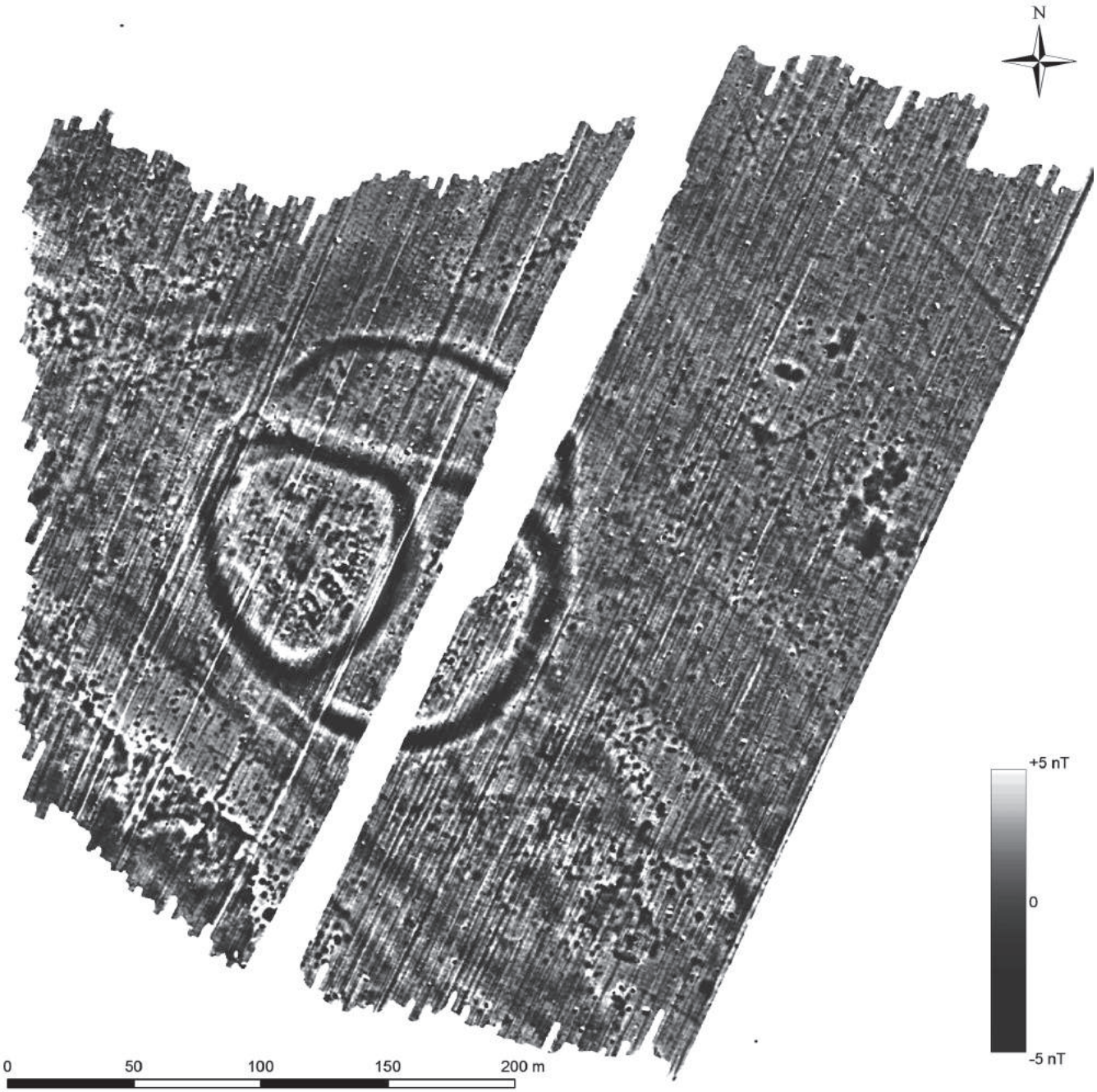
Moreover, small areas of excavations prevent one from drawing any conclusions on possible social differences that could be reflected in a settlement layout and structure by, for instance, unusually large, specially-appointed or untypically located houses.

The sources we have suggest a pragmatic use of settlement space by building huts close to one another (e.g. Nagykőrös-Földvár, Poroszlai 1988: 33, 36-37, Fig. 9) and adherence to certain rules concerning the location of household features, such as furnaces and hearths, next to huts (e. g.

[16] Research aimed at verifying the hypothetical functional siginifcance of the tripartite division of the Kakucs-Turján settlement are currently in progress.

Alpár; Bóna, Nováki 1982: 115). Furthermore, it can be tentatively assumed that specialized economic activities such as pottery firing and metalworking were carried out in specifically designated places. This may be evidenced by the discoveries of clusters of kilns at Százhalombatta (Poroszlai 1996: 10) and the remains of a metallurgist's workshop in Lovasberény-Mihályvár (Kovács 1984a: 226).

Fig. 24. Kakucs-Turján. Geomagnetic plan of the fortified settlement with a visible three-partite division of the interior (Kakucs Archaeological Expedition, unpublished).



5.3. Fortifications

Vatya culture fortified settlements, occurring in two areas, differed in size and layout. In Transdanubia, settlements tended to be larger (about 150-200 m in diameter) than those located between the Danube and Tisza rivers (about 100 m in diameters) (Poroszlai 1988: 30-31; Vicze 2000: 121, Table 1). Another distinctive characteristic was the form of fortifications. In the former region, fortifications surrounded the whole settlement, which was divided into two or three sections (Bóna 1975: 59), while in the latter region, fortifications protected only a part of a settlement known as the 'citadel' (Poroszlai 1988: 31; Poroszlai, Vicze 2004: 231). Few exceptions only prove the rule. The practice of dividing settlements into sections could decide their location in many instances. In natural depressions separating individual elevations, entrances might have been located so that they would be protected from both sides (Kovács 1982: 282-283; 1984a: 219; 1998: 489; Horváth, Kozak, Petö 2001: 12). Some od the settlements were founded in locations having natural defensive capabilities in the first place (Kovács 1984a: 219; Endrődi, Gyulai 1999: 24). A case in point is the site in Pákozd-Vár located on a hill rising to 352 m above sea level (Horváth, Kozak, Petö 2001: 13).

The basic types of defences used in these settlements were a rampart and a ditch. Due to the poor state of research described earlier, it is hardly possible to determine exactly the original size of ramparts. Preserved wall fragments are from 0.5 m (Kajászó-Várdomb), 1.0-1.5 m (Lovasberény-Mihályvár), 2.0 m (Aba-Belsőbárándpuszta-Bolondvár) to 2.5 m (Alpár-Várdomb) in height, indicating that their original size may have been quite imposing (Bóna, Nováki 1982: 107, 115; Horváth, Kozak, Petö 2001: 7, 10, 12). Occasionally, there were double ramparts (e.g. Pákozd-Vár; Horváth, Kozak, Petö 2001: 14, Plate XI). Archival, 19th c. data on Bölcske-Vörösgyűrű refer to a horseshoe rampart. However, it was not visible any more already in the 1960s (Wosinsky 1896: 236-237, quoted in: Poroszlai 1993: 62). Virtually, there are no sources testifying to the occurrence of wooden fortification elements. A single example of an unidentified structure made up of beams and wattle is mentioned in relation to the Baracs-Földvár settlement (Kovács 1982: 287). In the absence of a relevant publication, it is barely possible, however, to determine with any certainty the form, size and stratigraphic position of the structure. In many cases, wooden elements originally located closer to rampart tops could have been destroyed in later settlement periods[17].

Earth to build ramparts came from ditches. Often, terrain features were taken advantage of, after making them deeper. In this way ditches were built in Igar-Vámpuszta-Galástya (Horváth, Kozak, Petö 2001: 8), at Százhalombatta (Füleky, Vicze 2007: 134-135, Fig. 1-2) and probably in Lovasberény-Mihályvár (Kovács 1982: 283). Ditches around Vatya culture settlements varied in size. Some information on ditches comes from settlements explored only by surface surveys and refers exclusively to their today's state of preservation (Fig. 25). In Aba-Belsőbárándpuszta-Bolondvár, a ditch protected probably only the east portion of the settlement. Another ditch, 25.0 m wide and about 2.0 m deep divided the settlement in two. Within the smaller section, a ditch of the preserved width of about 6 m and the depth of about 0.5 m marked off a circular space 26.0 m in diameter – the so-called bastion or citadel (Horváth, Kozak, Petö 2001: 7, Plate III). In Kajászó-Várdomb, a ditch of the preserved width of 2.0-3.0 m and the depth of about 0.80 m did not encircle the whole settlement, either (Horváth, Kozak, Petö 2001: 10, Plate VI). The few excavations that have been carried out prove that ditches were originally rather imposing in size. In Lovasberény-Mihályvár, the ditch was 7.0 m wide and 4.0 m deep (Bóna, Nováki 1982:

[17] Researchers investigating the Alpár-Várdomb settlement allow for the possibility that wooden structures could have been employed there although originally they could be located in the rampart portion that was destroyed by the construction of Medieval fortifications (Bóna, Nováki 1982: 111).

114). Although data concerning the ditch in Nagykőrös-Földvár is incomplete, its uncovered portion can be said to be 4.0 m wide and 3.0 m deep (Poroszlai 1992c: 157, Abb. 111). A fuller picture is provided by investigations at the settlement in Soroksár--Várhegy. They included making a digital terrain model and conducting a geomagnetic survey using a proton magnetometer (Endrődi, Gyulai 1999: 7). The picture is consistent with the results of earlier excavations at the site when a V-sectioned ditch was recorded. Its greatest width in the uncovered place was 3.60 m while its depth reached 1.67 m (Endrődi, Gyulai 1999: 8-9, Fig. 6). The geomagnetic plan showed that the ditch could have varied in width from 3.0 to 5.0 m (Endrődi, Gyulai 1999: 7, Fig. 4; 23). At Százhalombatta, a large portion of the settlement together with the ditch were destroyed by extracting clay for a local brickyard (Poroszlai, Vicze 2004: 231, 238, Fig. 4). The preserved portion of the fortification was explored by a series of drillings (Varga 2000: 77, Fig. 1). The obtained profiles show that the 5-metre-deep ditch had originally a V-shaped cross-section and a characteristic – benched – inner wall (Varga 2000: 76, 79, Fig. 3). The drillings supplied enough data for the researchers to assume tentatively that a palisade stood in the ditch bottom (Varga 2000: 76, 80, Fig. 4; Füleky, Vicze 2007: 135, Fig. 2a). Only in the northeast portion of the settlement did remains of a rampart accompanying the ditch survive (Poroszlai, Vicze 2004: 231). At the Kakucs-Turján site, the ditches identified on the map of magnetic anomalies surrounded the entire settlement and separated its interior into the aforementioned three sections. Their structure and dimensions were determined by means of test drillings. The ditches had a trough-like profile and considerable dimensions, ranging from 6 to 8 m in width and 4 to 4.5 m in depth in various surveyed sections. It is highly probable that they were filled with water. The hypothesis is supported by the presence of a large circular feature – a water-collecting reservoir collecting which, together with the outer ditch constituted a singular hydrological system utilising water resources found in the immediate vicinity of the settlement (Pető et al. 2015).

The location of some other settlements justifies a supposition that the ditches surrounding them could have been originally filled with water too (e.g. Sárbogárd-Cifrabolondvár; Horváth, Kozak, Petö 2001: 16).

Despite inconclusiveness of research findings and deficiency of publications, relying however on available data, an attempt can be made to assess the functionality of the fortifications. The ditches were approx. 4.0-7.0 m wide and 2.0-5.0 m deep. In the two examples referred to above, they had a V-shaped cross-section. A ditch of this shape is the most difficult to excavate but at the same time it forms the most effective barrier. Owing to the way its walls are inclined, attackers cannot hide behind them; it is also highly resistant to erosion[18]. In historical times, known as *Fossa Fastigata,* it was the type of a ditch most often used by Roman legions (Keeley, Fontana, Quick 2008: 58-62). Rarely recorded measures, such as placing a palisade in the bottom of a ditch or filling it with water, made ditches even harder to cross.

As mentioned earlier, a ditch was one of the elements in the common combination of defences (Ivanova 2008: 112-113). The other one was an earthen rampart. Unfortunately, there is virtually no data available on the width of rampart bases; if there were any, it would be possible to estimate the original height of walls. What we also lack is hard evidence for the use of additional wooden elements crowning the ramparts (e.g. palisades) whereby making them higher.

A special characteristic of some Vatya culture settlements is their internal division (Poroszlai 1988: 31; Kovács 1998: 489; Vicze, Czajlik, Timár 2005: 252-253, Fig. 4) (Fig. 24, Fig. 25:2). The excavation results in Lovasberény-Mihályvár and those of a geomagnetic survey in Kakucs--Turján, mentioned earlier, suggest that individual settlement sections could have served different functions. Presumably, such arrangements of space could have had military significance as is shown by eth-

[18] Relatively well-preserved and often still visible, many ditch fragments seem to bear out this claim (see site and elevation plans, Nováki 1952: 5, 7, 9, 12).

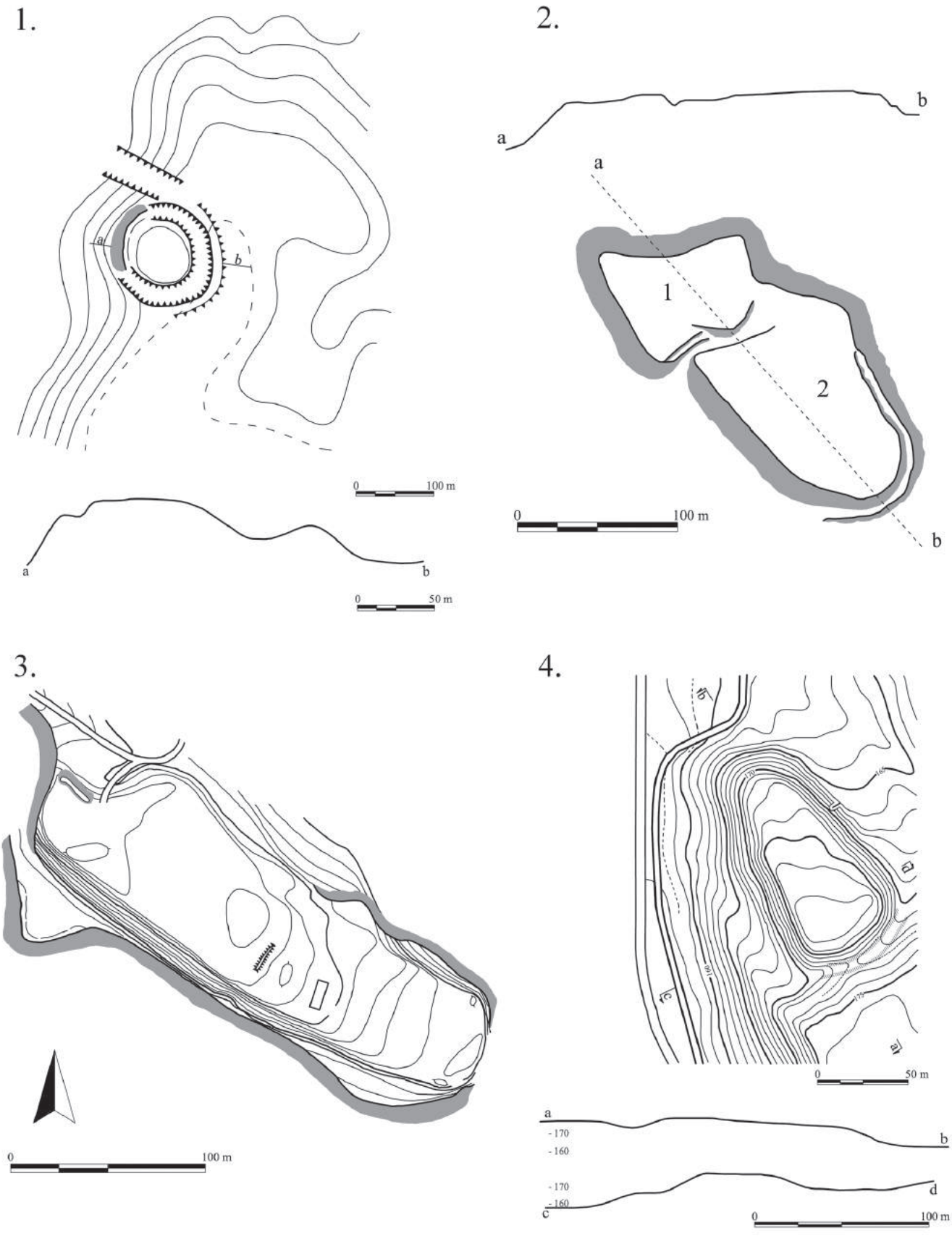


Fig. 25. Examples of elevation maps of the Vatya culture settlements.
1 – Káva, 2 – Lovasberény-Mihályvár, 3 – Százhalombatta, 4 – Mende (after Poroszlai 2000; Gogâltan 2008).

nographic data concerning New Guinea. Dividing settlements into smaller sections was meant there to impede the movement of attackers about the settlement: they were forced to split into smaller bands and attack individual settlement sections at the same time. Alternatively, attackers could concentrate their forces on one section only, thus leaving the others safe (Roscoe 2008: 514). Admittedly, data from ethnographic observations should not be treated as a source of definitive occlusions but it may point to driving forces – in this case motivations of human behaviour – that cannot be made out from archaeological sources. Another argument in favour of recognizing the division of settlements as a manifestation of a certain defensive tactic is a large size of the majority of Vatya culture settlements. The area of many of them reached about 2.0-3.0 hectares (Vicze 2000: 121, Table 1). The sheer size of the fortifications and settlements themselves could have been a demonstration of the power and might of their inhabitants (David 2002: 414). Yet, in real danger, a long line of defences takes a lot of effort and people to man (Podborský, Kovárník 2006: 48; Neustupný 2006: 2). The division of a settlement into smaller sections prevented, in theory, attackers from getting access to the whole settlement space if they breached the defences in a single place. Separating the dwelling quarters, suggested in the case of Vatya culture settlements, would significantly improve the chances of defenders by shortening the lines of defence directly protecting the inhabitants and their homes.

5.4. Metallurgy

To the metallurgy of the Vatya culture, three publications by Horváth (2004a; 2004b; 2012) have been devoted recently. What they chiefly deal with is stone casting moulds and related questions of technology and raw materials. In addition, in 2001 a report of a survey was published concerning fortified settlements in the Fejér region. Next to the information on the current state of preservation of sites (see chapter 5.3), it rendered many fragments of moulds used for casting ornaments and tools (Horváth, Kozak, Petö 2001).

In the area where the Vatya culture thrived there were no significant deposits of raw materials. Ready-made goods and raw materials were imported from the areas occupied by the communities of the Encrusted Pottery culture and through the agency of Wieselburg and Gáta groups (Bóna 1975: 48; 55). In the later phases of the Vatya culture (Middle Bronze Age), imports came also from the Mitterberg region (Horváth 2004a: 183-184). The growing interest in the new raw material is reflected in objects deposited in graves. Only 5 per cent of burials contain any bronze goods which come in great variety. This proves how extensive contacts were maintained by the Vatya culture communities for the purpose of obtaining them (Bóna 1992b: 51-52; Vicze 2003: 155-156).

Local metalworking has a clear development trend. Its early phase is associated with the tradition of the Early Bronze Age and the *Blechkreiskulturen* circle while the assortment of goods found at sites is limited above all to small objects (ornaments for the most part) made by cold forging (Bándi 1966; Bóna 1975: 48-51; Kovács 1984a: 222; Szathmári 1996: 75; Kadrow 2001: 89). In the successive development phase, next to the already known elements keeping to the style of 'sheet metal and wire', there appear objects of central European provenance, showing affinities with the Únětice circle metallurgy (Bóna 1975: 55-56; Szathmári 2002: 240). The third development phase witnessed the flourishing of local bronze processing observable in the appearance of new forms, including weapons and tools, frequently deposited as hoards. Characteristic objects of those times include axes, hatchets, spearheads, sickle-shaped pins and such special forms as belt buckles and diadems (Mozsolics 1967; Bóna 1975: 69--72; Kovács 1975; 1984a: 222-223; 1984b; Szathmári 1996: 75; David 1998b; 2002; Ke-

menczei 2003: 169) (Fig. 28, 50). The boom in local production was fed by the influx of large amounts of raw material from Alpine deposits and the Harz mountains (Horváth 2004a: 184; Kiss 2009: 330).

Metalworking in the Vatya culture is evidenced by many settlement finds throughout its lifetime. At Bölcske-Vörösgyűrű, in layer E2 (phase Vatya I/post-Nagyrév; Poroszlai 1992a: 142), a mould for casting chisels was found. Layers A-D1 and E1 (phase Vatya III), yielded, in turn, a clay pipe – a tuyère element – and a small coil of gold wire[19], respectively (Poroszlai 2000: 116-117, 137; Fig. 3, Fig. 22:10).

The greatest number of records, however, concern stone casting moulds. At Kajászo--Vardómb, a sandstone form was discovered. Its one side was prepared for making axes/chisels, while the other was used for making unidentified objects, probably pins (Horváth, Kozak, Petö 2001: 11, Table VII:60.80.5; Horváth 2004b: 25, Fig. 10:1a--1b) (Fig. 27). A mould from Lovasberény-Mihályvár had one side prepared for casting pins while the other was used for making other type of ornaments (Horváth, Kozak, Petö 2001: 13, Table IX-X). At the settlement at Soroksár-Várhegy, a discovery was made of a sandstone mould which could be used for manufacturing both dagger blades and pins (Endrődi, Gyulai 1999: 23, Fig. 18:6a, 6b; Horváth 2004a: 28, Fig. 12:3a, 12:3b). The use of the same moulds for manufacturing various objects is rather characteristic and has no analogy, if only in very numerous Otomani-Füzesabony culture finds in Slovakia[20].

As mentioned earlier, at the settlement at Lovasberény-Mihályvár, the remains of a metallurgist's workshop were found together with associated finds of a casting mould and a crucible (Kovács 1982: 283; Horváth, Kozak, Petö 2001: 12). A feature discovered at the site is believed to be remains of a clay structure used for casting bronze objects directly in moulds impressed in clay (Petres, Bándi 1969: 175) (Fig. 26). One of the objects that could have been manufactured in this way, in the opinion of the researchers, were so-called ingots of raw material in the form of biscuits, known, for instance, from the Százhalombatta hoard (Kemenczei 2003: 169, Fig. 36). Assuming that this interpretation is right, it must be noted that the structure would be a unique source confirmation of a technique of casting bronze in sand (in this case in clay) proposed for the Bronze Age (Kuijpers 2008: 89-91). Some authors believe that this manner of producing bronze objects explains in part a strong disproportion between mass finds of ready-made goods and still relatively few finds of casting moulds (Goldmann 1981).

More evidence of metalworking comes from Százhalombatta and consists chiefly of stone casting moulds and tuyère fragments (Poroszlai 2000: 116; Horváth, Kozák, Pető 2000: 113; Horváth 2004b: 29--32, Table 13-16).

There are also indirect arguments to support the claim that local metalworking played a role in the life of Vatya culture societies. The first relates to peculiar style and technique of making pottery at the settlement of Százhalombatta. As a result of close scrutiny of one of ceramic forms – the Rákospalota jug – it was found that, next to peculiar formal traits echoing a long tradition of imitating metal forms in clay, such as the *ansa lunata* handle and the sharp vessel profile, a technique taken from metalworking was used to produce them. High handles were fastened with rivets, imitating rivets known from metal objects. The technique was used in spite of the fact that it weakened a specific part of the vessel, frequently resulting in cracks (Sofaer 2006: 133-137, Fig. 5).

Another argument is offered by many hoards of the Koszider type found within settlement themselves (Poroszlai 2003a: 153). They were found at: Mende-Leányvár (Kovács 1975: 22, with footnote 4), Százhalombatta (Kemenczei 2003: 169, Fig. 36), Pákozd, Sárbogárd and Dunaújváros-Kosziderpadlás (3 deposits; Fig. 28) (Mozsolics 1988: 57, Liste II). Next to the hoards of the Hajdúsámson-Apa horizon, they constitute the main category of collective

[19] In addition, 19th century records mention the discovery of a hoard of bronze ornaments close to or inside the settlement at Bölcske-Vörösgyűrű (Mozsolics 1988: 52).

[20] However, examples of such casting moulds are known from the area of the present-day Romania (Găvan 2012).

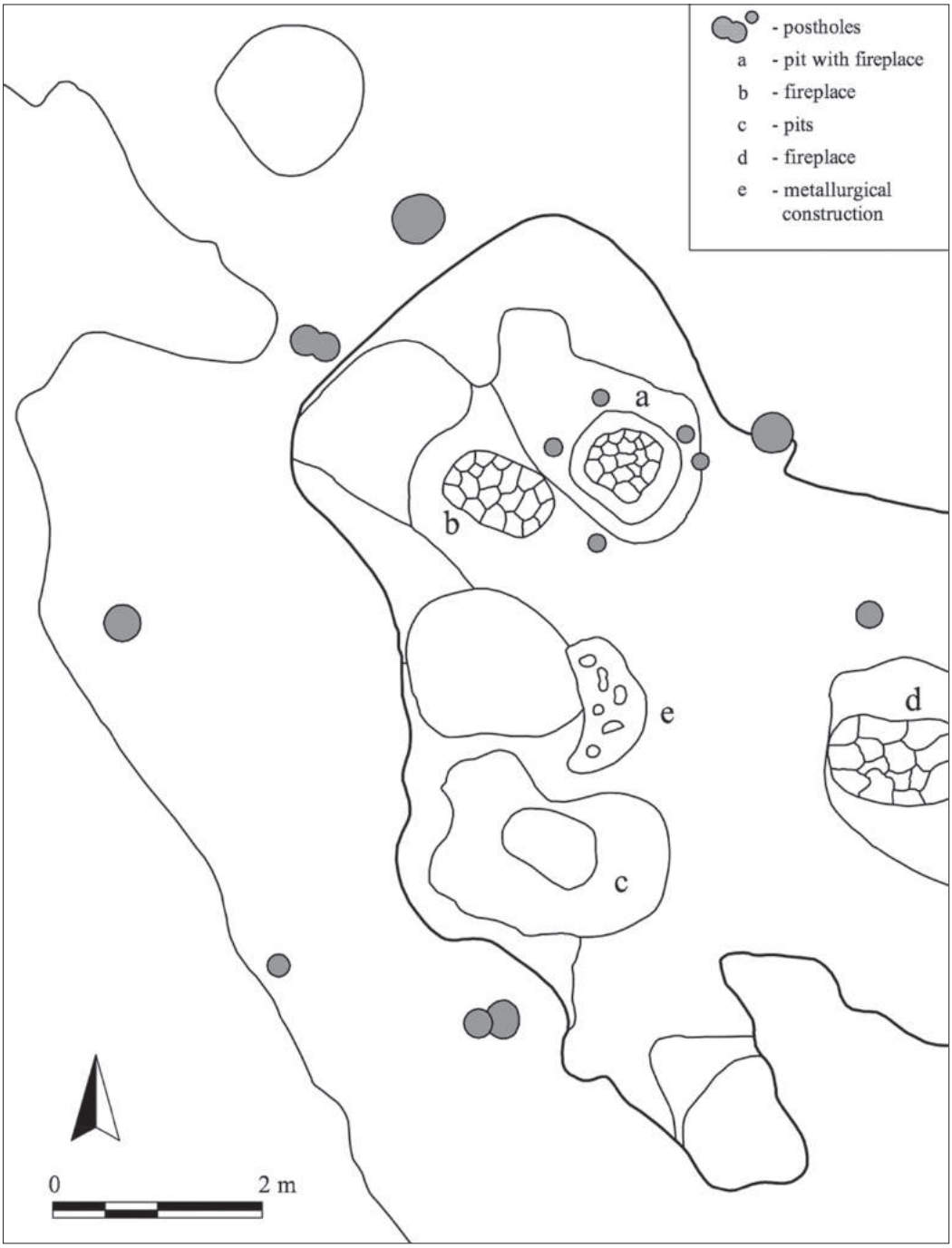


Fig. 26. Lovasberény-Mihályvár. Remains of a metallurgical workshop (after Petres, Bándi 1969).

finds of metal objects in the Carpathian Basin. It is suggested that their chronological position is different[21]. The former are supposedly older. The chronological difference between the two phenomena, however, is not clear and measurable in calendar years[22] (David 2002). What they clearly differ in, however, is their structure and deposition context. Unlike the deposits of the Hajdúsámson-Apa horizon, Koszider hoards included, next to weapon forms (spearheads, dagger blades), tools (axes),

[21] Furthermore, individual hoards of the Hajdúsámson-Apa horizon itself are believed to differ in age (Bóna 1992b: 56, 60).

[22] See comments concerning the controversy aroused by the absolute dating of the Koszider horizon (chapter 5.5).

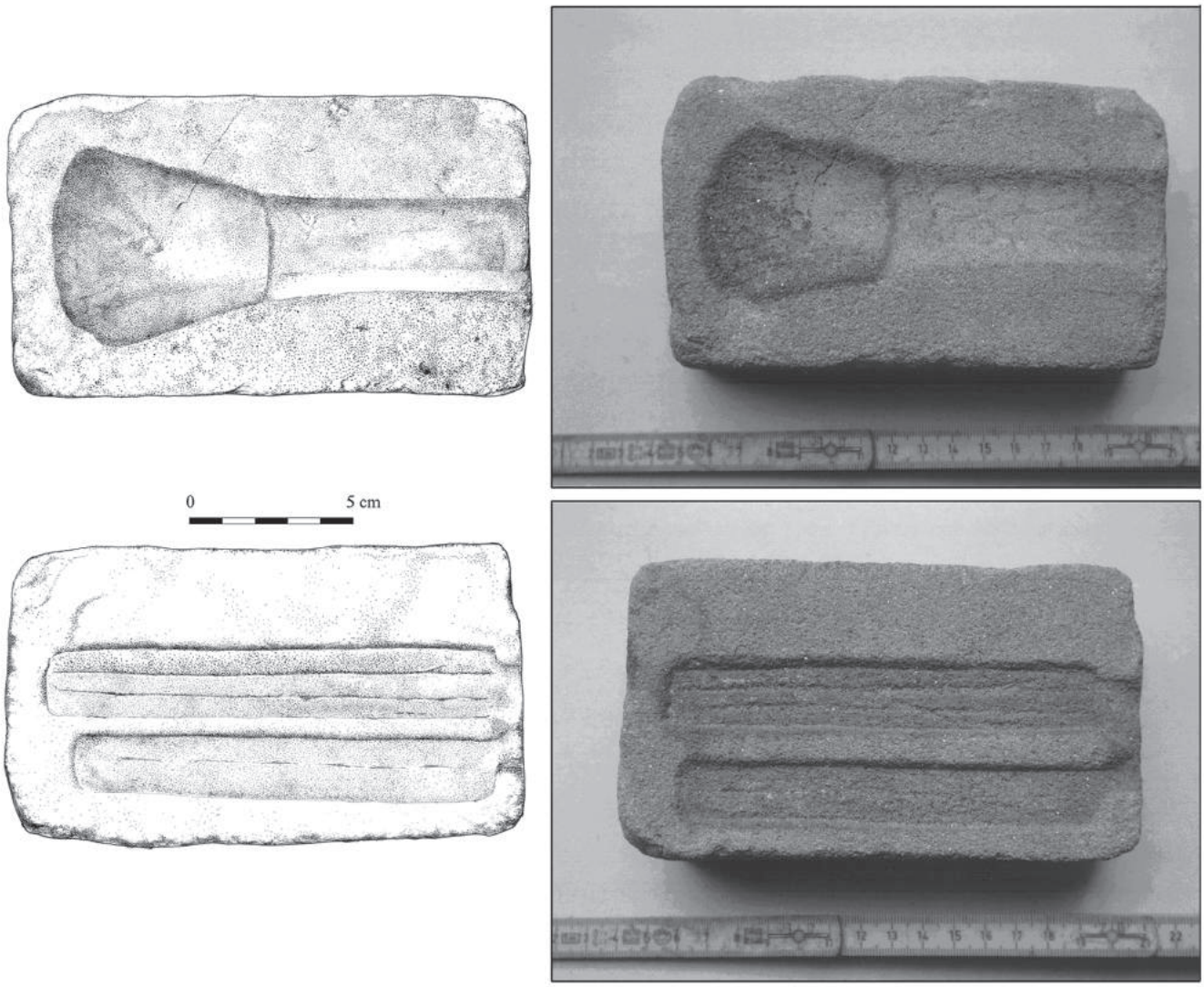


Fig. 27. Kajászo-Vardómb. A bilateral casting mould (after Horváth 2012).

bronze waste or raw material and numerous ornaments (pins, pendants) (Fig. 28, 50). The hoards are highly heterogeneous and their individual instances are included in the category of Koszider deposits on the strength of single telltale forms[23].

What else can bee seen is the contextual relationship of the hoards with settlements. The hoards were often deposited in vessels within settlements or in their immediate vicinity (Mozsolics 1988). Both phenomena must have been different forms of ritual and social behaviour.

From the Vatya culture context, we know of a single, relatively modest burial of a metallurgist. Grave 1029 from the Dunaújváros-Dünadülő cemetery, linked to the nearby settlement of Dunaújváros--Kosziderpadlás, contained a ceramic vessel, a stone mould for casting ornaments and two stone pads (Bóna 1975: 55) (Fig. 29).

[23] The chief telltale objects are circular pendants bearing a cross ornament in the centre and others of a lily shape with arms separated by a Y-shaped element; Bóna 1992b: 59, Abb. 28).

Fig. 28. Dunaújváros-
-Kosziderpadlás
(deposit I). Pendants
typical of the Koszider
type hoards (after Bóna
1992b).

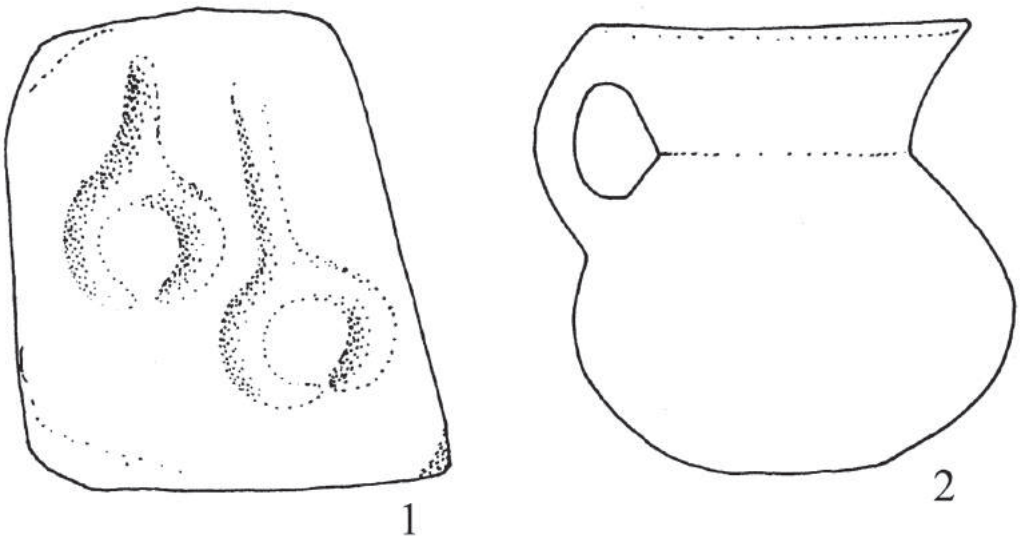


Fig. 29. Dunaújváros-
-Dünadülő, grave
no. 960. Some elements
of the equipment of
a metallurgist's burial
(after Bátora 2006).

5.5. Chronology

The wide-ranging issues of the Bronze Age chronology in the Carpathian Basin is a problem that deserves a separate study. The most important attempts to bring order into the chronology before the Second World War and over last fifty years of the 20th century were described in detail by David (2002: 3-46)[24]. The schemas are based solely on stratigraphic observations of settlement and cemetery sites and the typology of pottery and metal objects, hoards included (Gogâltan 1998: 191; David 2002: 3). The reason of such situation is the scanty number of radiocarbon datings (Raczky, Hertelendi, Horváth 1992; Forenbaher 1993; Görsdorf, Marková, Furmánek 2004: 79-80, Fig. 1).

The crucial issue for the subject matter of this part of the present study is the chronology of the Vatya culture and the Koszider horizon, traditionally connected with the end of the so-called autochthonous tell cultures.

The classic three-tiered classification of the Vatya culture into phases I (subphases a and b), II and III was proposed by Bóna (Bóna 1975: 25, 73; Kreiter 2007: 33). He refered to three subperiods of the Middle Bronze Age he had isolated (Kovács 1984a: 223; *Mittlere Bronzezeit 1, 2, 3*). The sequence closes with the Koszider period[25]. Originally included by the author in the Late Bronze Age, it is currently connected with the Middle Bronze Age (David 2002: 21, with footnote 131; Poroszlai 2003b: 161; Vicze, Poroszlai, Sümegi 2013).

In accordance with Hungarian terminology in the perspectives posited by Kemenczei, Kovács and Kálicz the beginning of the Vatya culture (Vatya I) is related to the emergence of period MB I, phase Vatya II roughly corresponds to period MB II, and MB III contains the late variants of cultures: Vatya-Koszider, Alpár, Rákospalota (David 1998a: 232-233; 2002: 32, Abb. 2.7; 34, Abb. 2.8). In the view of Gogâltan phase Vatya I coincides with his horizon 3 of the tell cultures development (the turn of FB III and MB I; ca 2300-1950 BC), phase Vatya II with horizon 4 (MB II; ca 1900-1700 BC) and phase Vatya III with horizon 5 (MB III; ca 1650-1500 BC) (Gogâltan 2005; 2008: 40-41, Fig. 2). A different opinion is presented by Bóna in the catalogue for the exhibition *Bronzezeit in Ungarn*[26]. Drawing on an outdated Bronze Age chronology he proposed a general view of the chronology of the Vatya culture over the period from ca 1650 to 1350 BC (Bóna 1992a: 40). Thus, accordingly, phases Vatya I and Vatya II are linked with period MB I, phase Vatya III with MB II, and the late variants Vatya-Koszider, Alpár, Rákospalota with period MB III (Bóna 1992a: 17; David 2002: 30, Abb. 2.6).

The chronological views briefly discussed above follow primarily from the typological findings concerning local pottery stylistics and, to a lesser degree, metallurgy. On account of the registered high stability of the stylistic development of the Vatya culture pottery (Kovács 1984a: 220; Poroszlai 2000: 22) a preliminary study of finds from the Százhalombatta settlement

[24] It is symptomatic that the author did not use in his work any of the chronological systems referred and stuck to the classic terminology of the schema proposed by Paul Reinecke.

[25] The controversies concerning the Koszider horizon have even touched its nomenclature. Particular authors have adopted different terms such as: Vatya-Koszider horizon, period, phase and even culture (Mozsolics 1988: 42; Bóna 1992b: 58-64; Vicze, Poroszlai, Sümegi 2013, see there for more literature) to describe separate phenomena such as depositing of hoards or settlement development. The complicated picture is further obscured by the employment of terms referring to the growth of particular cultural groups and often used in a more or less similar sense as synonyms for the Koszider-horizon – phase Streda nad Bodrogom, Bodrogszerdahely (Otomani-Füzesabony culture) (Novotná 1998: 357; Koós 2001), Alpár phase, Rákospalota phase (Vatya culture) (Kovács 1975: 310; Bóna, Nováki 1982: 113; Kreiter 2005: 17-18).

[26] The catalogue was also published with no significant changes in a French language version entitled *Le bel Age du Bronze en Hongrie* (Coudrot, Thevenot 1994). Since years it is one of basic sources of information about Hungary's so-called Bronze Age tell cultures. This fact unambiguously defines the state of research and publications on the issues discussed.

(Poroszlai 2000; Kreiter 2005), which draws on the classic approach of Bóna (1975:44--48, 52, 60-69), can be applied to a description of its main typological features.

On level IV, connected with the oldest stage of the Vatya culture in the settlement, there are still visible traces of the Nagyrév tradition, such as deep brushing of the surface of vessels and an altogether modest decoration limited to incised lines (Poroszlai 2000: 23). There still remain in use vessels referring to forms known from the early Bronze Age, among them urns with a marked S-profile, handleless or with a ribbon-shaped handle, with no decoration or only with rib decoration with finger impressions (Szathmári 1996: 77, 82, Fig. 1:8, 84, Fig. 3:1) and bowls with an arched shoulder and one handle (Bóna 1975, Tafel 10:1); Kovács 1984a: 220; Poroszlai 2000: 23, 58, XVIII:2, 3). Furthermore, forms specific to the early Vatya culture phase are cups with a spherical belly with one handle, found on this stratigraphic level (Bóna 1975, Tafel 3:5; Poroszlai 2000: 23, 54, Plate XIV:5).

An increase in the quantity of ornamented vessels can be observed in the classic phase of the Vatya culture. There also appears a characteristic form of a deep bowl with 1, 2 or 4 handles and a specific way of modelling the arched rims of bowls (Poroszlai 2000: 22, 56, Plate XVI:3), in many cases decorated with a web of incised lines in the lower part (Poroszlai 2000: 22). Urnshaped storage vessels are often adorned with a web of large rhombs and rib decoration with finger impressions (Poroszlai 2000: 22, 54, Plate XIV:1; Kreiter 2007: 166, Fig. 88:11). Also, small handles placed on the necks of vessels are a typical element. They appear only during the middle period of the Vatya culture (Kreiter 2005: 12, 21, Plate 2:2).

The final phases of the Vatya culture (phase III and Vatya-Koszider) constitute the zenith of the development of pottery production. Pit no 2 on level II of the Százhalombatta settlement yielded, among others, an assemblage of specific thin-walled vessels burnt black, known as Rákospalota type pitchers with an *ansa lunata* handle (Schreiber 1967; Poroszlai 2000: 21, 25, 50, Plate X:3). The vessels occur both in an undecorated form (Bóna 1975, Tafel 49:8; Kreiter 2005: 20, Plate I:4-5) and with an ornament of incised horizontal lines, small pits and hatched triangles in arrangements located above the long neck of the belly (Poroszlai 2000: 21, 50, Plate X:3; Kreiter 2005: 16, 20, Plate I:1-3, 6; Sofaer 2006: 133, Fig. 3). The sharp long neck of the belly is sometimes emphasised by rib decoration also adorned with small dots or notches (Bóna 1975, Tafel 45:12). During the Vatya-Koszider phase there also appear vessels richly decorated with garland motifs, hatched triangles and knobs channelled with dots or accompanying "hanging" lines ending with dots (Kovács 1984a: 221; Szathmári 1996: 77; Poroszlai 2000: 41, Plate I:7, 44, Plate IV:3, 49, Plate IX:1; Kreiter 2005: 11-12, 22, Plate 3). In this period the forms that appeared earlier, such as one-handle cups, undergo marked stylistic changes – the spherical belly is replaced by sharp profiling of that part of the vessel and *ansa lunata* handles occur in some cases (Kreiter 2005: 17, 24, Plate 5:6-8, Plate 6).

The pottery of the late phase of the Vatya culture is characterised by vessels decorated with plastic figural elements. Objects showing some features of anthropomorphisation (ornaments symbolising breasts, eyes, a hand) and weaponry (a dagger, a hatchet) are known from the settlements in Százhalombatta, Dunaújváros, Mende--Leányvár, Igar-Vámpuszta and Pákozd--Vár (Kovács 1973; Kreiter 2005).

Some chronological relevance can be also ascribed to fragments of encrusted ware registered in the Százhalombatta settlement and connected with the tradition of the late phase of Kisapostag culture, the early phase of the Encrusted Pottery culture and the classic phase of the Encrusted Pottery culture dated respectively to the earliest and the late phases of the Vatya culture (Kiss 1998: 166-167; Fekete 2005: 48-49, 54).

Some of the sites discussed in the present study were inhabited continually from the Early Bronze Age (the Nagyrév culture) (David 1998a: 231). The available stratigraphic data reveal that both over that period and in the early phases of the Vatya settlement they functioned as open settlements. Fortifications were mainly con-

structed during the late Vatya phase (David 1998a: 234). There is also a group of settlements which grew and functioned only in that period (Bóna, Nováki 1982: 112, 115; Kovács 1982: 289; Poroszlai 1991: 59).

As mentioned above, the vanishing of fortified settlements and more broadly of the tell autochthonic cultures of the Carpathian Basin is related to the Koszider period. Traditionally, the wane of tell settlements is placed at the turn of the 15th and 14th century (Poroszlai 1991: 66; Bóna 1992a: 40), with ca 1350 BC most often indicated as the dividing line that marked the moment of the end of human settlement in defensive sites (Kovács 1982: 289; Poroszlai, Vicze 2004: 231).

Until recently we possessed a limited collection of radiocarbon datings which did not allow to specify the Vatya culture chronology (Forenbaher 1993: 244-245, 251, Fig. 11). Over the last years the most complete list of determinations was published in the *Bronzezeit in Ungarn* (Raczky, Hertelendi, Horváth 1992) catalogue mentioned elsewhere. The dates it contains, however, fail to provide the basic information concerning the location of samples within sites and the material from which the determinations were obtained. This is the reason why they do not constitute a reliable source for drawing conclusions. The probability of an erroneous interpretation of such determinations is illustrated by the examples of date Bln-341 from Dunaújváros-Koszideripadlás and the dates from Bölcske-Vörösgyűrű. The former was obtained from charred grain which according to the author had been discovered in the layers connected with the Nagyrév culture. The results of the analysis seem to indicate its relation with the Vatya culture settlement (Quitta, Kohl 1969: 241; cf Raczky, Hertelendi, Horváth 1992: 45). However, this cannot be fully verified due to the lack of excavation documentation of the context of the sample. As far as the Bölcske dates are concerned, the technique of spade-deep digging (Poroszlai 2000: 113) that for a time was used to investigate the site is open to doubt: as it were, it rules out by definition a solid stratigraphic and contextual observation. The impression of an overwhelming information chaos is further intensified by the different values of the same dates published in the admittedly scarce sources[27]. The problem involves the determination of the age of samples from Mende-Leányvár (Bln-1942) and Tószeg (Bln-1923). While for the first site the discrepancy is relatively small (20 years) and carries a laboratory error (3280±45 Raczky, Hertelendi, Horváth 1992: 45; 3280±65 Forenbaher 1993: 245), in the case of the second determination the difference involves both the laboratory error (5 years) and the defined BP age that reaches as long as 100 years (3490±45 Raczky, Hertelendi, Horváth 1992: 45; 3590±50 Görsdorf, Marková, Furmánek 2004: 90).

The only information concerning the kind of the analysed material (charred grain; Quitta, Kohl 1969: 241) is available for the Dunaújváros date. All dates in the catalogue were arbitrarily attributed to the Vatya culture, with no reference to its typochronology and the division into particular phases (Raczky, Hertelendi, Horváth 1992). In view of the above, they contribute little to the argument about the elaboration of the inner Vatya culture chronology and the absolute chronology of the defensive settlement in the Vatya culture area.

Five radiocarbon dates connected with the Vatya culture published in the catalogue mentioned earlier and obtained from the settlements in Bölcske (2 determinations), Dunaújváros, Mende and Százhalombatta indicate the period of ca 2000 – 1600, 1500 BC (Raczky, Hertelendi, Horváth 1992; Forenbaher 1993: 244-245, 251) (Fig. 32).

Adding to the knowledge concerning the temporal extent of the Vatya culture settlement can be helped by the results of the recently obtained datings from Százhalombatta and Kakucs-Balla-domb sites (Uhnér 2010: 347; Jaeger, Kulcsár 2013). A series

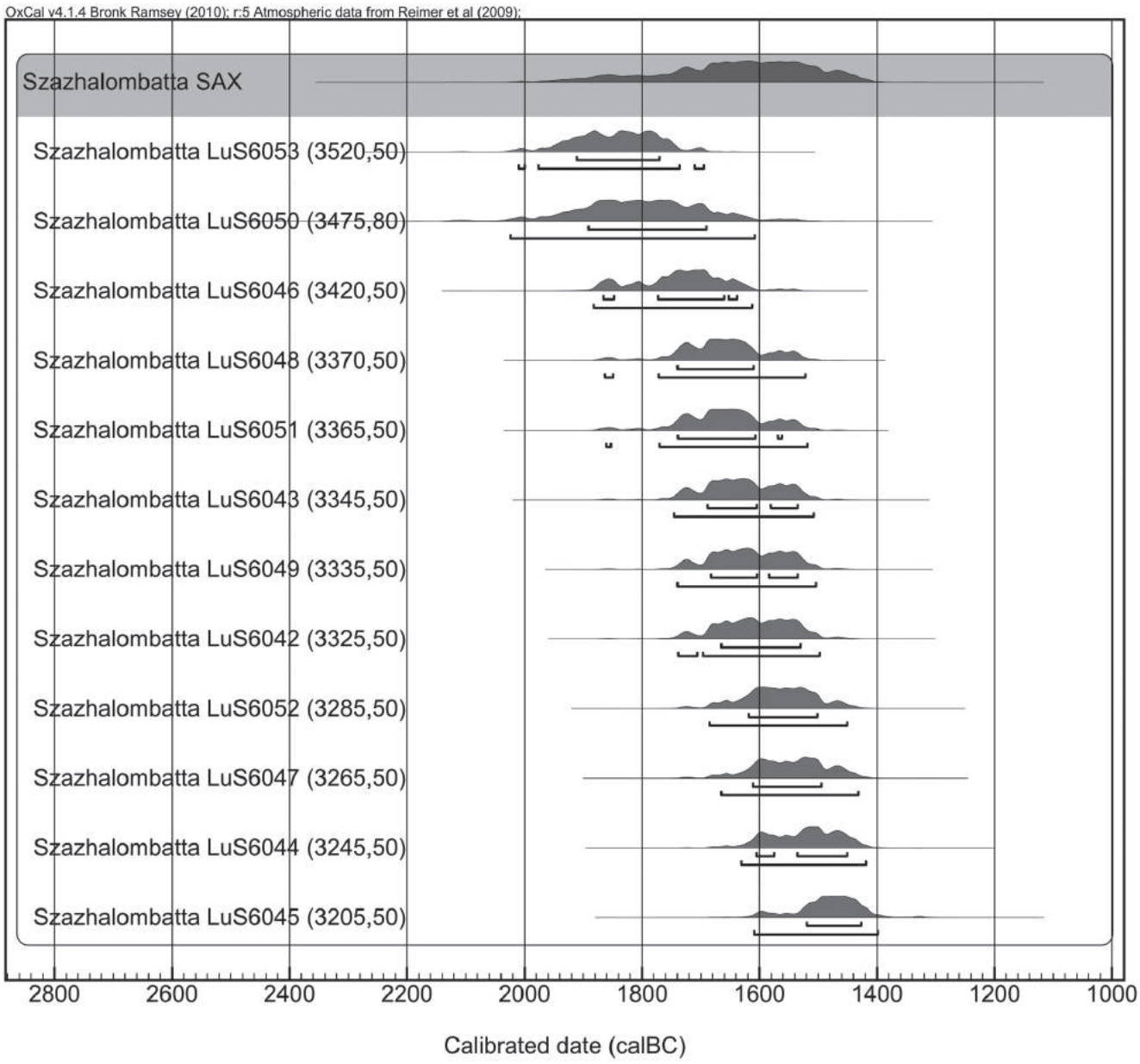
[27] The determination of sample no 1942 from Mende-Leányvár is also published in the literature carrying the symbol of two different laboratories: Hannover's (Forenbaher 1993: 245) and Berlin's (Raczky, Hertelendi, Horváth 1992: 45). Kovács, however, mentions the date as one having been obtained in the 14C Niedersächsisches Landesamt für Bodenforschung laboratory (Kovács 1973: 12, also footnote 10). There is no information that might suggest several determinations being taken from one sample of the Mende-Leányvár origin.

of 12 datings, altogether comprising maximally the 1900-1400 BC period, has been presented for the former (Fig. 30).

In view of the full developmental cycle of the Vatya culture in the Százhalombatta settlement the absence of precise information on the relation of datings to particular typological phases, stratigraphic levels is particularly distressing. Datings for Kakucs--Balla-domb site, are maximally contained in the 2050/2000-1450 BC period (Fig. 31). The settlement was occupied from the late Nagyrév/early Vatya to the Vatya III/ /Vatya–Koszider period (Jaeger, Kulcsár 2013: 295, 300). The most relevant information to be gained from the datings is the evident precedence of all developmental phases of the Vatya culture in comparison to the suggested conventional dating models (Gogâltan 2005; 2008).

Furthermore, it should be stressed that radiocarbon datings indicate a considerably bigger complexity and dynamics of the material culture diversity embodied in the 'fluid' emergence of pottery stylistics connected with Vatya's particular developmental phases. Even though the absolute chronology of the stratigraphic sequence from Kakucs-Balla-domb is for the time being an exception, it should be treated as a clear hint signalling the necessity of a revision of the viewpoints presented so far and a less

Fig. 30. The sum of the probability distribution of radiocarbon datings from the Százhalombatta settlement (the SAX project) (after Uhnér 2010).



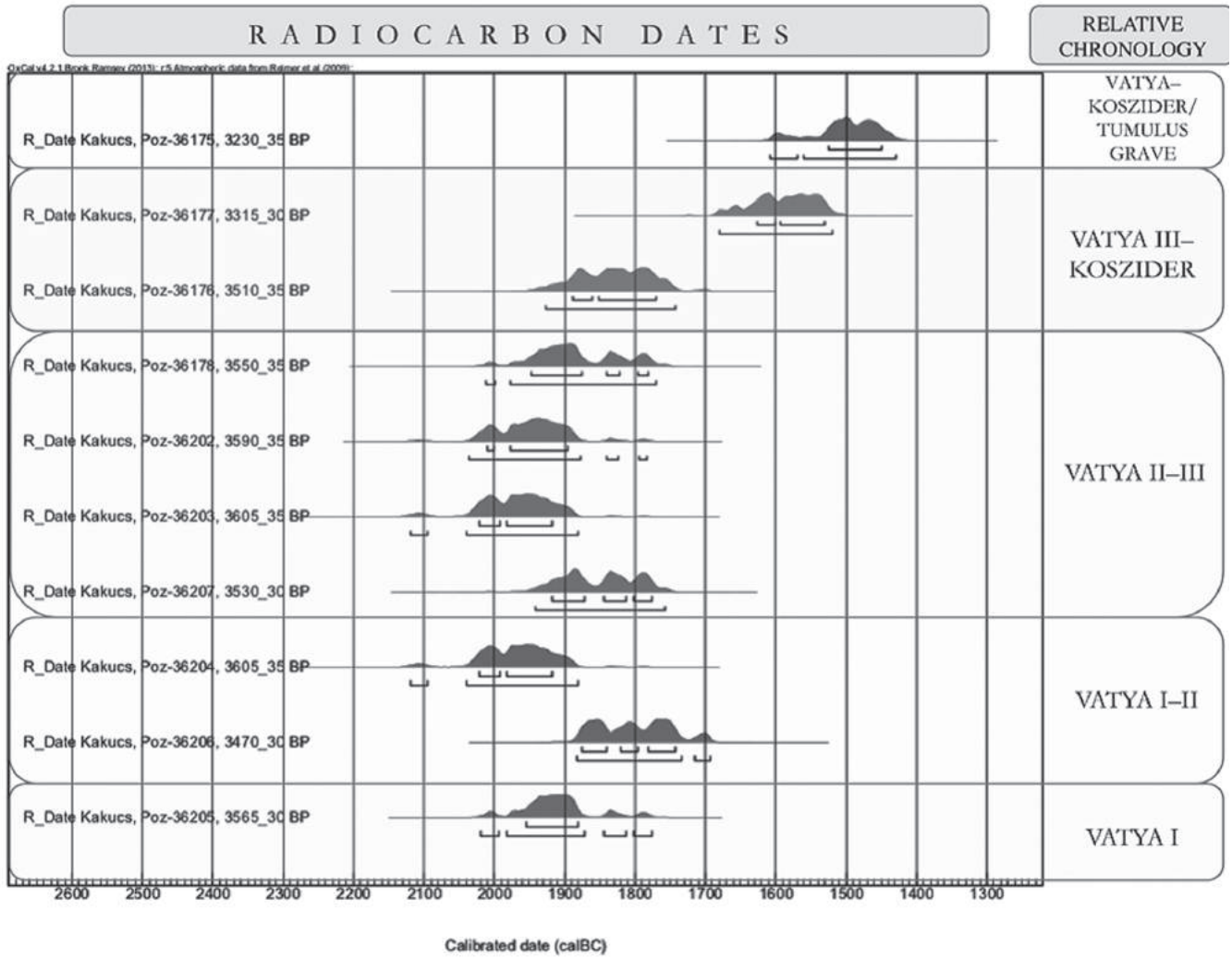


Fig. 31. Kakucs–Balla-domb. The sum of the probability distribution of the radiocarbon dates for Phases I–II–III and the Koszider period of the Vatya culture (after Jaeger, Kulcsár 2013).

restrictive approach to typochronological models. Only an enlargement of the pool of radiocarbon determinations for the Vatya culture and linking the Százhalombatta series with specific phases will make a full verification of the chronology more possible.

The datings from Százhalombatta and Kakucs-Balla-domb point to the possibility of a longer period of decline of the Vatya culture than that suggested by the quoted dates from the *Bronzezeit in Ungarn* catalogue. The chronological framework of defensive settlement can be maximally defined as the period between 2000-1400 BC (Fig. 32).

A larger number of datings exist for the Koszider period, but they are spread over a big geographical area, culturally much diversified during the Bronze Age. The available dates were obtained from the sites of the Hatvan, Otomani-Füzesabony and Vatya cultures Raczky, Hertelendi, Horváth 1992; Forenbaher 1993; Koós 2002; Görsdorf, Marková, Furmánek 2004; Jaeger, Kulcsár 2013). They demonstrate a relatively long period between 1950/1900 and 1500/1450 BC (Fig. 33). With information concerning the archaeological context non-existent, it is impossible to comment on the precedence of date Bln-1217 from the settlement in Jászdózsa. It is crucial, however, that this date together with the youngest one from the Kakucs-Balla-domb sequence cross the dividing line of the year 1500 BC, signalling a late moment of the decline of defensive settlement in the Carpathian Basin.

In the group discussed the dates devoid of information concerning archaeological context prevail. It should be emphasised, however, that they point to a more complex and long-lasting nature of the

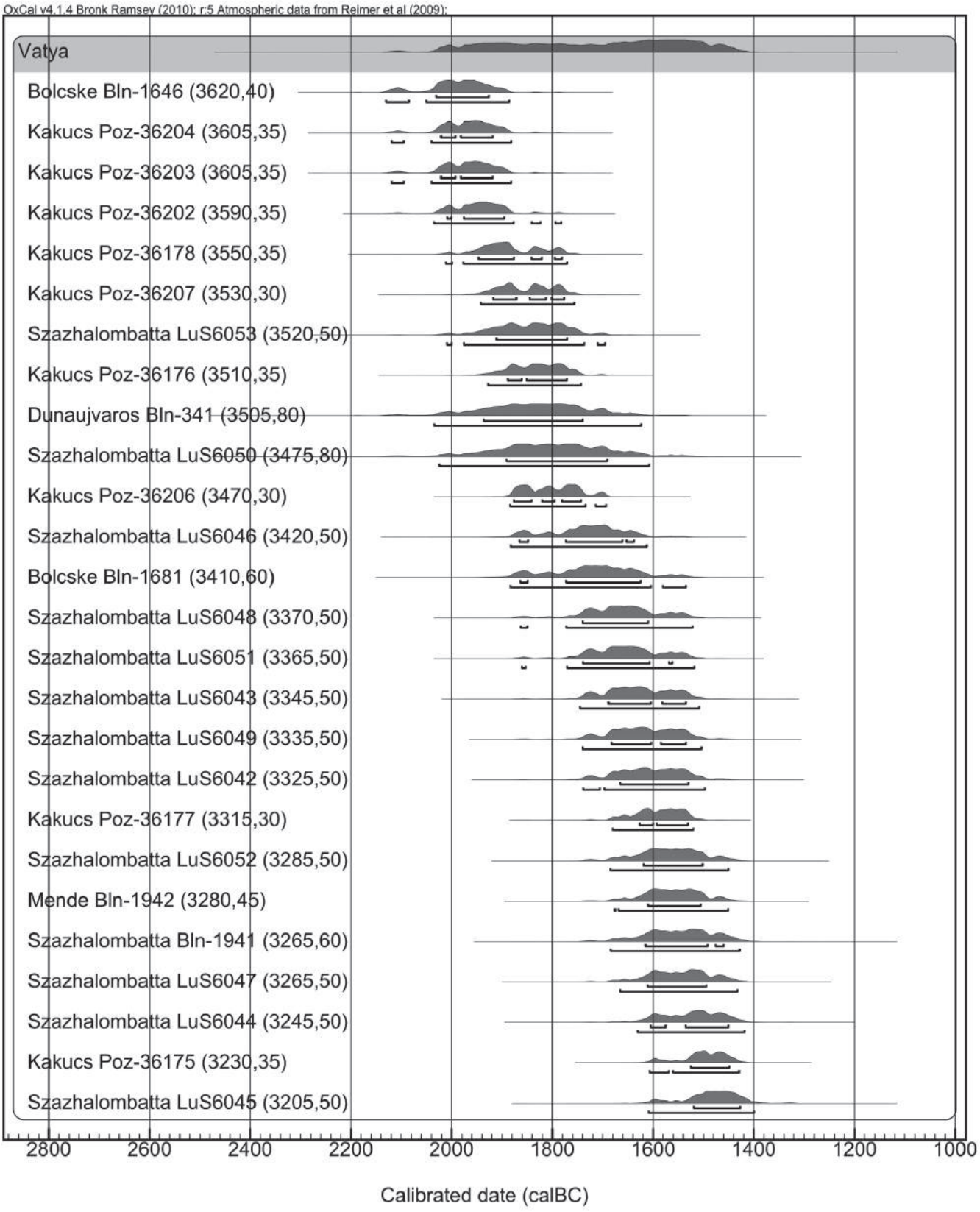


Fig. 32. The sum of the probability distribution of radiocarbon datings from the fortified settlements of the Vatya culture (after Jaeger, Kulcsár 2013).

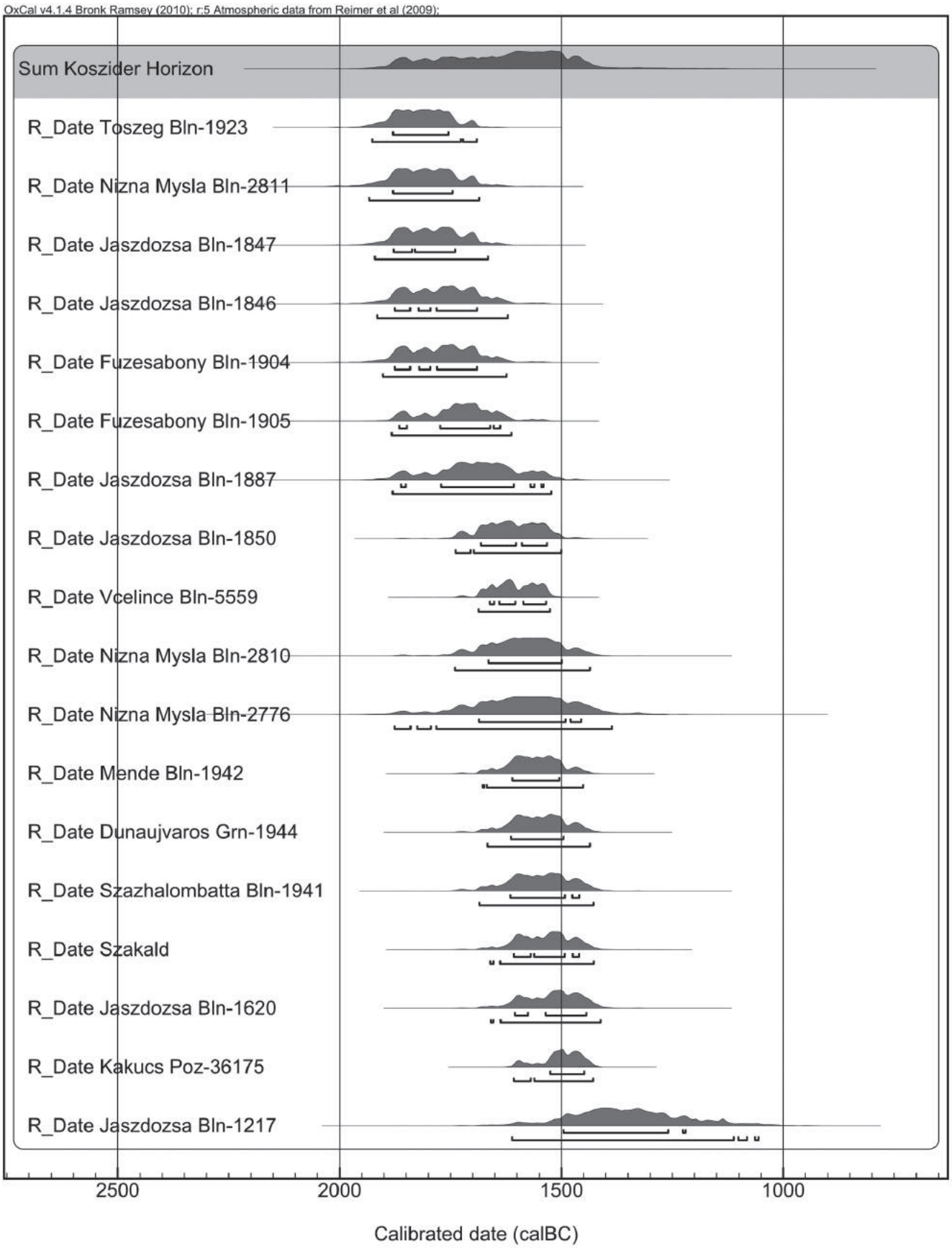


Fig. 33. The sum of the probability distribution of radiocarbon datings connected with the Koszider horizon (after Jaeger, Kulcsár 2013).

Koszider period and the related cultural transformations in the Carpathian Basin (Jaeger 2011: 173-174). Traditionally, the occurrence of hoards of the Koszider type are linked solely with the late phases of the Otomani-Füzesabony, Mad'arovce and Vatya. After their disappearance the hoards were not deposited, though some of objects contained therein were typologically developed and their production continued (Novotná 1998: 357).

Summing up, it must be noted that it is still practically impossible to chart the chronology of the key periods in the settlement development: the cultural transformation Vatya → Nagyrév registered in part of the sites (e.g. Százhalombatta; Poroszlai 1996: 5), the stage of fortifying the originally open Vatya culture sites (eg Dunaújváros, Százhalombatta, Pákozd-Vár; David 1998a: 234) and the period when there appeared new fortified settlements related with the territorial expansion of the group postulated in the literature of the subject (e. g. Alpár; Bóna, Nováki 1982: 115; Mende, Nagykőrös; Kovács 1982: 288). Still, the increase in the amount of radiocarbon datings connected with particular settlements (Százhalombatta, Kakucs-Balla-domb) does allow to hope for a change of the present situation. Building up a series of radiocarbon dates related to complete stratigraphic sequences of specified sites will surely help overcome the current obstacles in reconstructing the dynamics of the Vatya culture defensive settlement in the future.

5.6. Summary: role and function of Vatya culture fortified settlements

In Hungarian archaeology, a view prevails that Vatya culture fortified settlements had a military and defensive significance. Arguments in favour of this opinion include not only the size or structure of settlements but their peculiar distribution. They are positioned in a way suggesting a desire to close off some specific space coveted because of its favourable environmental conditions and a possibility it offers to control individual routes (Poroszlai 2000: 13; Vicze 2000: 120). Some authors speak even of marking out a *tribal territory* (Bóna 1975: 59; Poroszlai 2000: 13) to hold out against neighbouring cultural groups (Encrusted Pottery culture; Bóna 1992a: 24). The available maps of distribution of all site categories[28] of the Vatya culture (Kovács 1969: 167, Fig. 5; 1982: 281, Abb. 1; Vicze 2000: 127, Fig. 2) suggest that settlement concentrated between two lines of fortified settlements (Fig. 20) (critical comments in: Szeverényi, Kulcsár 2012: 288-293). The viewing of Vatya culture fortified settlements as facilities having military significance has a long tradition in Hungarian archaeology. The view is related to two developments. First concerns the proposed crucial moment when fortifications appeared around originally open settlements. They began to raise defences in the late period (phase III) of the Vatya culture (Poroszlai 1988: 34; Bóna 1992a: 24; David 1998a: 234; horizon V according to Gogâltan, see 2005: 162, Abb. 2; 170-171). This period is frequently called Vatya-Koszider phase (Bóna, Nováki 1982: 112) because of the second development – depositing of hoards of the so-called Koszider horizon (see chapter 5.4). Characteristic sets of metal objects, often unearthed in the youngest strata of settlements belonging to various cultural units in the Carpathian Basin (Mozsolics 1988: 42-44), were interpreted by Bóna and Mozsolics in their already classic publications as possessions hidden by inhabitants from invaders belonging to the Tumulus culture – *people of long swords* (Mozsolics 1957; 1967: 123-125; Bóna 1958; recently: Csányi 2003). Although now the disappearance of tell settlement (including the defensive variety) in the first half of the 2nd millennium BC is described as a combination of many different factors (Mozsolics 1988: 51; David 1998a) and the deposition of Koszi-

[28] In total about 300 sites (Kovács 1982: 280; Vicze 2000: 120).

der type hoards is not viewed anymore as a result of a one-off event (Bóna 1992b: 60), the fortifications built around Vatya culture settlements are still treated as a response to the pressure by neighbouring population groups (Bóna 1992a: 24; Vicze 2000: 122) and the invasion by the populations of the Tumulus culture has been named as one of the reasons for the demise of the Vatya culture for years[29] (Trogmayer 1975: 156; Poroszlai 2000: 25). This picture, however, stands in contrast to available archaeological data. For so far, no sources have been recovered that would testify to the violent destruction of any settlement (Vicze 2000: 122). On the contrary, the falling into disuse of defences around many sites seems to be a rather slow and natural process as shown by stratigraphic observations. What we see there is ditches being gradually filled and bearing no evidence of sudden destruction (Füleky, Vicze 2007: 134). Other facts worth noting in this context are the absence of any traces of settlement by potential "invaders" – Tumulus culture populations – at deserted fortified settlements or in their immediate vicinity (Bóna, Nováki 1982: 116; Kovács 1984a: 224; Poroszlai 1988: 39; Gogâltan 2005: 172; Vicze, Earle, Artursson 2005: 238) and the ending of settlement at certain sites (e.g. Nagykőrös--Földvár, Bölcske-Vörösgyűrű) before the Koszider period without any evidence of violent occurrences, if only layers of burnt material (Poroszlai 1993: 66; David 1998a: Poroszlai, Vicze 2004: 233).

As has been mentioned earlier some of the settlements were founded in places that had been colonized earlier (Bóna 1992a: 20; Kovács 1998: 488; Poroszlai 2000: 14). In many cases the cultural change from Nagyrév to Vatya can be seen only in pottery inventories (a gradual process) while the structure of settlements or even their location and construction details of individual houses remain unchanged (Poroszlai 2003a: 153). It can be ventured that next to strategic, economic and environmental factors, cultural reasons were responsible for the continuity as well – it was important to stay in a *named* place associated with the *ancestral tradition* (Fontijn 2002: 259). Tell settlements, being dominating topographic points (Neustupný 1995), towered over their surroundings, offering their inhabitants safety but also tying them to ancestral traditions and past buried in successive settlement layers (Chapman 1997: 143).

[29] This reason is used also to explain other major cultural processes taking place in the area in question. For example, the appearance of some elements of Encrusted Pottery culture style east of the culture's oecumene, i.e. in the area occupied by the Vatya culture, is interpreted as a result of the flight of local populations from the invasion by the populations of the Tumulus culture (Bándi 1969: 56-58; Kiss 1998: 162, 167).

CHAPTER 6

Research Area IV. Upper Tisza Basin, eastern Slovakia: Otomani-Füzesabony culture

Otomani-Füzesabony culture settlement in today's east Slovakia concentrates in the north zone of the Otomani-Füzesabony cultural complex oecumene. Three major groups of sites can be distinguished now. These are: the East Slovakia Lowlands, Spiš and the Košice Basin (Jaeger, Olexa 2014: 163-164, Fig. 1). Otomani-Füzesabony culture sites are grouped above all on the upper Tisza, and on the Hornád, Torysa and Latorica rivers. However, the most important fortified settlements are found in the Košice Basin (Fig. 34). Next to Nižna Myšľa, only several kilometres away, there are two more fortified settlements: Košice-Barca and Rozhanovce and also numerous cemeteries, for instance Čaňa, Gača, Valaliký, and the open settlement at Veľká Ida (Olexa 1982a: 396, Abb. 5; Gašaj, Olexa 1992: 9, Karte 1). Otomani-Füzesabony culture settlement in mountainous Spiš was, in turn, a result of a greater expansion of the culture whereby it reached the Lower Beskids in Poland as well (Gancarski 1994: 97).

6.1. Natural environment and economy

The basic information on the use of the natural environment is supplied by few and incomplete archaeobotanical and archaeozoological analyses. Their informative content, however, is very limited. In the middle 1990s, in Slovakia, palaeobotanical material was recorded only with respect to about 100 sites (altogether about 700 archaeological features) of varying chronology: from the Palaeolithic to the Middle Ages (Hajnalová 1993: 10). The small group of about a dozen Bronze Age sites that were investigated included the fortified settlements at Košice-Barca, Nižná Myšľa and Spišský Štvrtok and the sites at Včelince and Zemplinske Kopčany – also linked to the Otomani-Füzesabony culture (Hajnalová 1989: 15-17; 1993: 111--113). Available archaeobotanical analyses are not a result of a methodical sample collection during excavations and a greater part of them concerns a special group of sources, namely plant impressions left in daub. On the whole, the washing of feature fills is rarely used in Slovakian archaeology (Furmánek, Veliačik, Vladár 1999: 130). With respect to the sites mentioned earlier, the flotation method was used to a limited extent only during the investigations at the settlement at Nižna Myšľa (Hajnalová 1996: 131).

Relying on fragmentary published data, one can currently make only a list of crop and wild plant species used by the inhabitants of fortified settlements. In the case of the site at Spišský Štvrtok, macrobotanical remains in the form of charred seeds came from three different contexts: a cultural

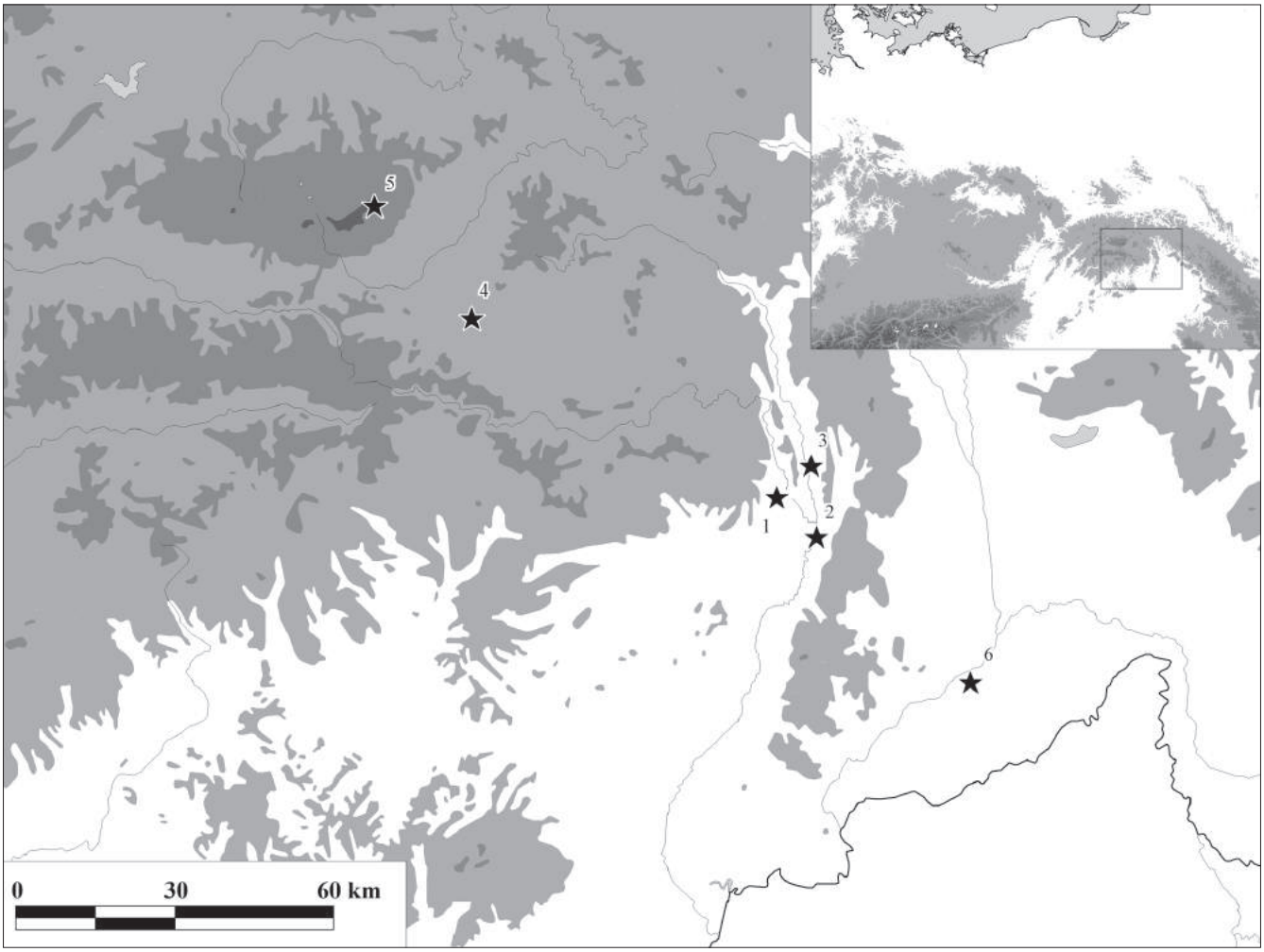


Fig. 34. Slovakia. Distribution of Otomani-Füzesabony culture fortified settlements:
1 – Košice-Barca,
2 – Nižna Myšľa,
3 – Rozhanovce,
4 – Spišský Štvrtok,
5 – Lomnica,
6 – Streda nad Bodrogom.

layer, burned daub and cultural layers from a profile[1]. Next to the most common emmer wheat, seeds of the following species were identified: common wheat, small spelt, rye and barley (Hajnalová 1972; 1983: 606). In a large set of daub fragments, there were 36 pieces bearing impressions left by plant remains, including the seeds, ears and chaff of barley, emmer wheat, common wheat and a single fragment with an impression of blackthorn (Hajnalová 1983: 606-607; 1993: 113). A careful examination of charcoals found in feature 40 – described in detail below – showed that they came from the species that must have grown in the immediate vicinity of the settlement. The following were identified: maple, hornbeam, apple, spruce, willow, oak and conifer (Hajnalová 1983: 607).

Archival information on the settlement at Košicce-Barca mentions a discovery of a grain pit, in which grains of three kinds of wheat were identified: emmer wheat (70 per cent), clubed wheat (9 per cent), and small spelt (1 per cent) as well as barley (20 per cent) (Gašaj 2002b: 43). The spectrum of crop plants was supplemented by legumes: lentil and pea (Hajnalová 1993: 112), the absence of which in the samples from Spišský Štvrtok may be explained by the imperfect methodology of sample collection (Hajnalová 1983: 607). Legumes were probably grown in home gardens and harvested crops were kept in storage vessels inside huts. Due to complete absence of any palaeobotanical studies of Bronze Age dwelling features in Slovakia, this hy-

[1] No more specific information on the location of the palaeobotanical material is available.

pothesis cannot be verified (Furmánek, Veliačik, Vladár 1999: 130).

As has been mentioned earlier, the investigations at the site at Nižna Myšľa employed the flotation method to wash features fills. It must be observed, however, that the method was not used regularly or consistently: only the contents of six pits were washed while in total several hundred ground features were recorded at the site (see below, chapter 6.2.). In addition, the contents of 19 vessels found in graves were examined as well as daub fragments of which some bore plant impressions. Daub fragments collected at the older settlement bore impressions of emmer wheat and spelt, while those gathered at the younger settlement displayed traces of barley, spelt, common wheat and a single impression of cornel tree (Hajnalová 1993: 112; 1996: 131, 133, Tab. 1). In the washed clay samples, the content of cereal remains was in no case high enough to call any of the six features a storage pit. However, traces of cereals were found in them (emmer wheat, einkorn, spelt, common wheat, barley, millet) as well as of legumes (pea, lentil) and fruit (cornel tree, dewberry, hazel, dog rose) (Hajnalová 1996: 134-135, Tab. 2-3; 2001: 32-33). Moreover, many charcoals were recorded. Among them oak was dominant followed by less numerous hornbeam, maple, elm and willow. In the opinion of the researcher, all the tree species grew in the immediate vicinity of the site. Only charcoals testifying to the presence of European beech are, in her opinion, a proof that wood procured from more distant areas, economically exploited by settlement inhabitants, was used at the site (Hajnalová 1996: 139).

An exceptional source of macrobotanical remains at Nižna Myšľa, a clay object shaped like a loaf of bread (Olexa 2002b: 90, Fot. 105) was found to contain in the clay it was made of many charred remains of such plants as emmer wheat, einkorn, spelt, brome and goosefoot (Hajnalová 1991). The object was found in a pit together with pottery fragments, bones and animal skulls and a fine gold object (Hajnalová 1996: 137).

Objects related to land cultivation included tools dating back to the Neolithic such as grinders, querns, ards, and hoes as well as bronze sickles, being, no doubt, an innovation of the times (Gašaj 2002b: 41, 43; Olexa 2003: F46).

Next to crop cultivation, animal breeding was the other source of subsistence for the settlements. Also in relation to this question no reliable publications of any major collections of osteological material are available. What can be found in the literature on the subject is only general information on identified species. There are no data whatsoever that would specify the methodology of any unpublished analyses, underpinning the general conclusions mentioned earlier.

Generally speaking, Otomani-Füzesabony culture fortified settlements reflect the trend present in the Bronze Age where domesticated species dominate over wild ones. Their percentage ratio is believed to be roughly 85:15 per cent (Furmánek, Veliačik, Vladár 1999: 131; Gašaj 2002b: 43). The researcher investigating the settlement at Nižna Myšľa mentions, however, that the raising of cattle, goats/sheep and pigs satisfied only about 60 per cent of the demand for animal proteins (Olexa 2003: 53). In this case, other supplementary forms of procuring food would be vital; they included hunting, fishing and gathering of molluscs (Gašaj, Olexa 1992: 19; Olexa 2003: 53). Next to hunting big game, such as deer and boar for their meat, the inhabitants of Nižna Myšľa caught beavers in large numbers for their fur, which is seen in a surprisingly large number of beaver bone remains at the site (Gašaj 2002b: 43; Olexa 2003: 53). Hunted animals provided also antlers and bones for making elements of horse harnesses. The settlements at Nižna Myšľa, Košice-Barca and Spišský Štvrtok yielded a large collection of richly ornamented bone objects related to the use of the horse as a draught and riding animal (Vladár 1973: 303-311; Olexa 1992: 193; Gašaj 2002b: 42, Fot. 36; Olexa, Pitorák 2004). Perhaps, the horse was the animal harnessed to wagons, the use of which is attested, in the first place, by clay models found at the cemetery and settlement at Nižna Myšľa[2] (Olexa 1983b; Olexa, Pitorák 2004).

[2] At Nižna Myšľa, the horse could have been, to a very small extent, used as a source of food,

The location of the fortified settlements on water courses stands in stark contrast to a low number of sources attesting to fishing. An explanation lies in imperfect research methodology and not in local communities' lack of interest in river resources[3] (Furmánek, Veliačik, Vladár 1999: 133). At present, we know only of single finds of bronze hooks (Gašaj 2002b: 42, Fot. 37) and a small amount of fish bones and vertebrae discovered in Nižna Myšľa (Hajnalová 1996: 132).

It can hardly be missed that the above data looks rather modest in comparison to the informative potential of so complex sites as Otomani-Füzesabony culture fortified settlements. A specific research strategy decided the quality of obtained information. Currently, we are not able to go beyond a rudimentary, almost banal, way of approaching the question of economic underpinnings of the fortified settlements. All we can say is that it was an intensive agro-breeding economy based on cereal growing and the breeding of cattle, small ruminants and pigs. The available information virtually prevents researchers from assessing the state of the natural environment when the settlements functioned and determining the degree of human impact on the surrounding landscape. Neither does it allow to grasp the changes and any development trends in subsistence strategies of individual settlements.

which is evidenced by the traces of slaughtering visible on some remains (Olexa 2003: 53).

[3] The influence of the excavation technique on the quality and quantity of archaeozoological sources is well illustrated by a comparison of two methods of investigation of settlement features at an Early Bronze settlement at Rybiny (Poland). In the case of traditional manual collection of remains a domination of mammals over molluscs and fish was established; however, in the case of sieving the contents of pits, the ratios were reversed (Makowiecki, Makowiecka 1998: 274, 277, Fig. 1).

6.2. Inner layout

As mentioned earlier, despite many excavation projects carried out sometimes for many years on Otomani-Füzesabony culture fortified sites in today's east Slovakia, no complete publication of investigation results is available. Some basic information on the layout, size and form of huts, not to mention any construction details, does appear incidentally in many available publications.

Located on a hill at the confluence of the Hornád, Torysa and Olšava rivers, the site at Nižna Myšľa comprised two Otomani-Füzesabony culture fortified settlements. Within the perimeter of the older of them, measuring 50 × 60 m, 25[4] huts were explored and one feature called a well (Olexa 1983a: 122). All the three publications mention also remains of a stone structure, interpreted as a bastion (Olexa 1982a: 388; 1983a: 122). However, more recent publications do not mention this feature at all; it seems that remains of an unidentified structure (perhaps a stone and timber structure of a gate identified in later investigation stages?; Gašaj 2002b: 27; see below) were mistakenly called a bastion in earlier excavation seasons.

In the explored eastern portion of the older settlement (Gašaj 2002b: 26, Fig. 4), huts stood in two rows parallel to the bow-like line of defences (Olexa 2003: 42-43) (Fig. 35).

The publications of the 1980s (Olexa 1982a; 1983a) mention geophysical surveys conducted at the site (Olexa 1983a: 122). However, the geomagnetic plan has not been published yet. Oriented E-W, the huts were built of logs laid on stone underpinnings[5] (Olexa 1982a: 388; 1985:

[4] In a 1982 publication, the author of the investigations mentions the discovery of 20 huts (Olexa 1982a: 388). However, the text was sent to press after the fourth excavation season. The paper of 1983 was published with information about the completion of the fifth season (Olexa 1983a: 122).

[5] In one of later publications, information appears about lower portions of walls and hut corners being lined with stones (Olexa 2003: 43, Fot. F434). Absence of any drawings makes it impossible, however, to determine unequivocally what use of stones was made in constructing the huts.

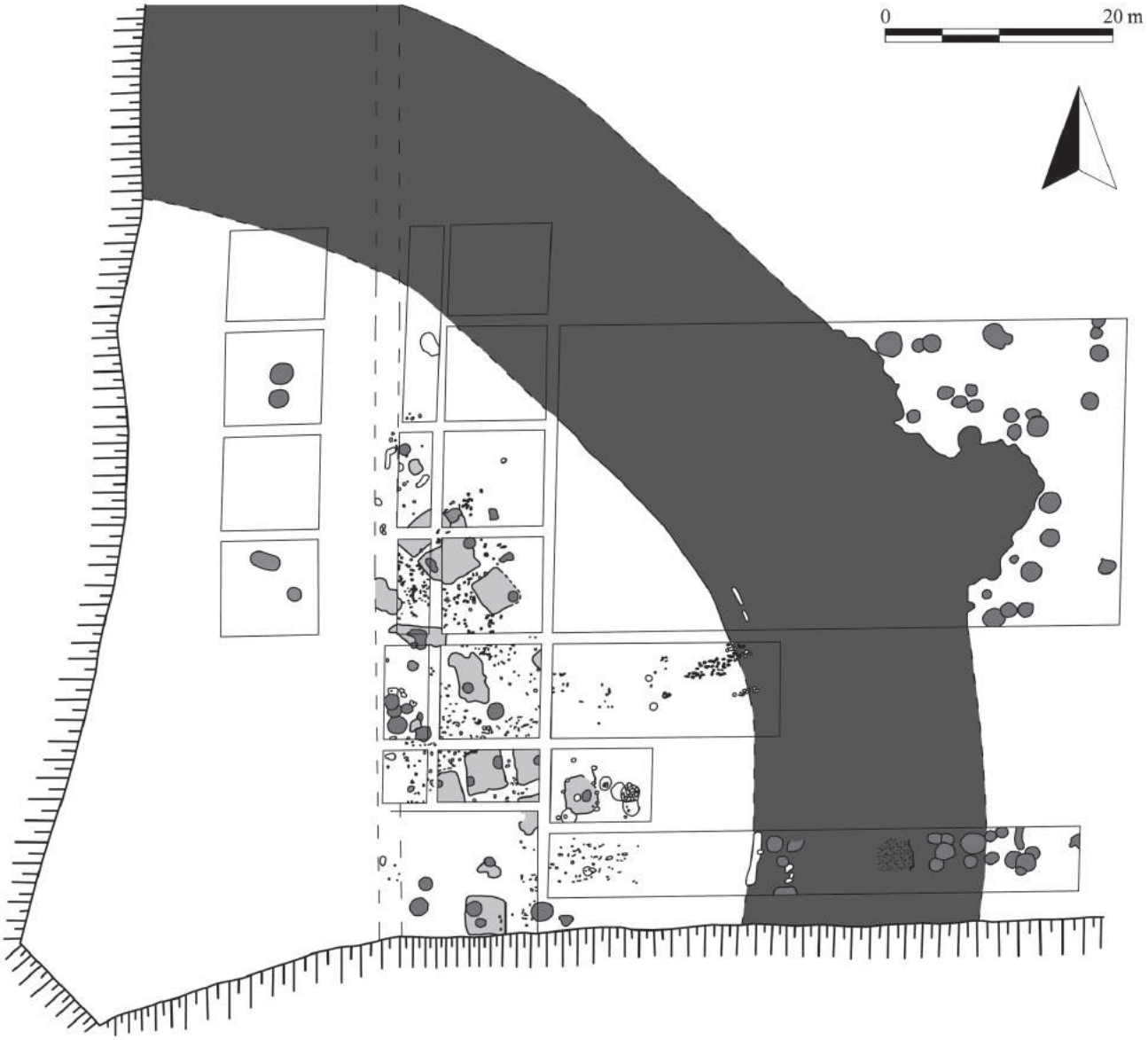


Fig. 35. Nižná Myšľa. Plan of the older settlement with excavated elements of the inner layout, fortifications, and location of trenches (after Gašaj 2002b).

174), known also from the settlement at Spišský Štvrtok (Vladár 1975: 10). Floors of compacted clay were slightly elevated above the ground level (Olexa 1992: 191; 2003: 43), unlike the hut floors at the settlement at Košice-Barca, where clay and clay-timber floors were placed at the ground level (Kabát 1955a: 596; Vladár 1973: 279, Abb. 24). In one Nižna Myšľa huts, the floor was paved with river stones/pebbles (Olexa 1986: 174). Inside the huts, there were hearths (sometimes centrally located) and pits to which ashes were swept in some cases (Gašaj 2002b: 27). The wooden structures of walls, likewise in the case of some huts at Spišský Štvrtok, were covered with clay mixed with chaff and seeds (Hajnalová 1983: 606-607; 1996: 131; Olexa 2003: 43). Some daub fragments from Spišský Štvrtok bore traces of incised ornaments (Hajnalová 1983: 606).

In the case of the Košice-Barca settlement, the wattle structure of walls is attested to by a daub fragment with impressions of thin twigs tightly bound together[6]

[6] From the Otomani-Füzesabony settlement at Ároktő-Dongóhalom in Hungary, we know of single finds of daub fragments that can be remains of frames placed around windows or doors

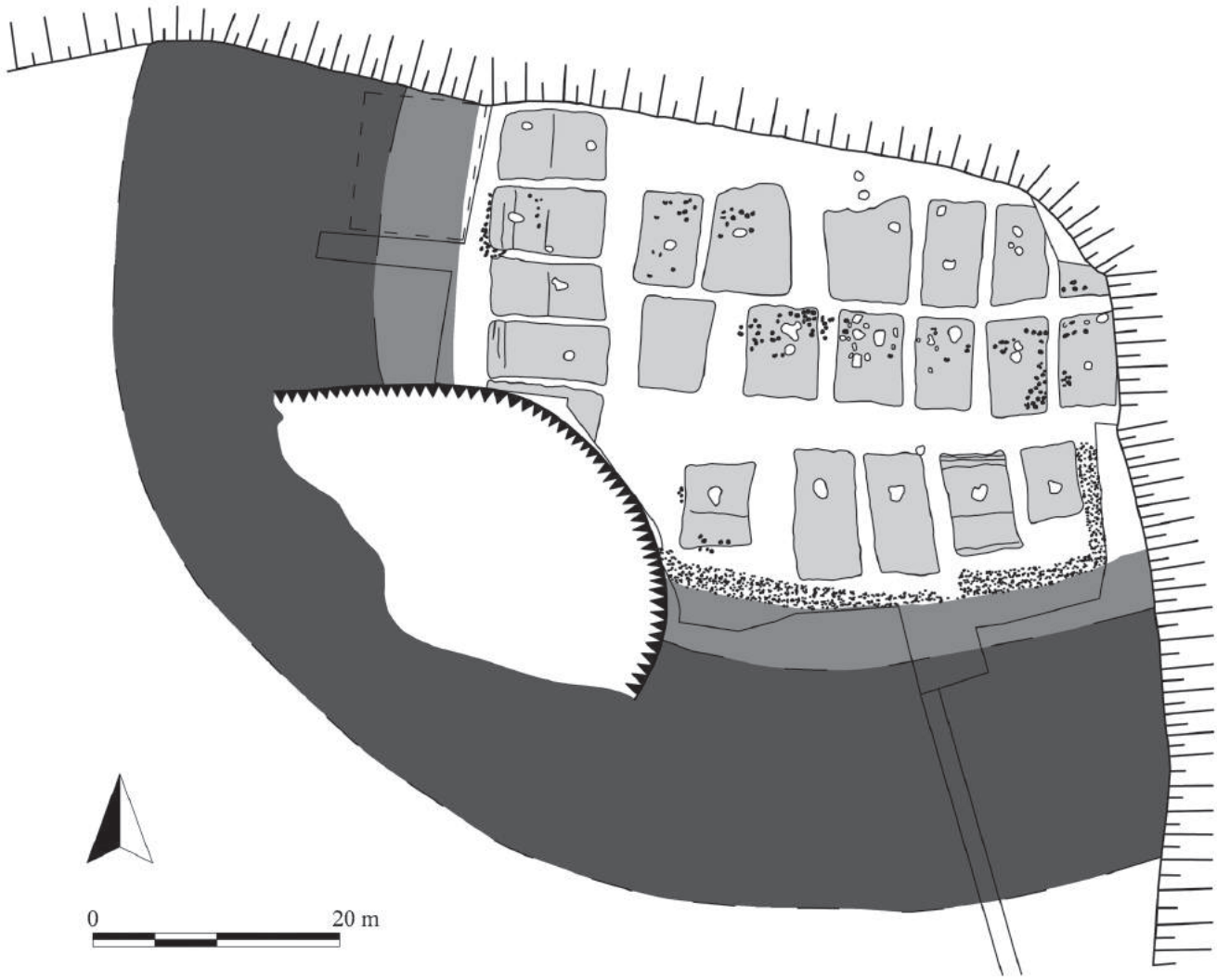


Fig. 36. Košice-Barca. A "classic" plan of the settlement with reconstruction of the regular inner layout (after Gašaj 2002b).

(Kabát 1955a: 598, 611, Obr. 282; Furmánek, Veliačik, Vladár 1999, Taf. 20 a, b). Between the huts, there ran alleys slightly sunk into the ground (Olexa 1983a: 122). One of the main alleys ran from the gate, crossing the settlement roughly east-west, while the other followed the fortifications. The alleys were paved with river stones (Gašaj 2002b: 27; Olexa 2003: 42-43), as in the case of the settlement at Spišský Štvrtok (Jockenhövel 1990: 216, Abb. 4). Frequently recorded elements of the Otomani-Füzesabony culture settlement layout in Slovakia, in several cases alleys were part of a regular design called with some exaggeration a *town plan*. A discussion about specific proto-urban elements in the layout of the settlements stemmed from the discoveries at the settlement at Košice-Barca. In one of early publications of investigation results at Košice-Barca, a plan was published featuring 23 huts compactly arranged in rows (Kabát 1955a) (Fig. 36).

Three of the rows (altogether 19 huts) were oriented north-south, while the fourth row (altogether 4 huts) stretched east-west. The huts varied in size and interior arrangement. The major hut types were as follows: huts with a single room (and 1 hearth), huts with two rooms (and 1 hearth) and huts with three rooms (and 1 or 2 hearths) (Kabát 1955a: 596-597). Inside huts, there were

(Fischl 2006: 200). The fact that nothing is known of such finds from Slovakian settlements does not exclude a possibility that they are there for daub fragments of these sites have not been thoroughly examined.

postholes recorded that must be traces left by hut furnishings (Vladár 1973: 290).

In 1994, a paper was published by the doyen of Slovakian archaeology, Anton Točik. Relying on the preserved documentation of the excavations by Hájek and Kabát, and available publications, he set out to reinterpret the development and chronology of the older and younger settlements at Košice-Barca (Točik 1994; David 1998a: 245-247). The verification relied on the study of the alleys crossing the site. Točik observed that only some structures respected the course of the alley following the fortifications (Točik 1994: 63). This observation allowed him to put forward a hypothesis according to which the plan of the settlement that had been relied on for years was in fact a combination of two construction phases occurring at different times. The correct history of the development of the settlement supposedly looked as follows. In the older phase, an alley ran along the rampart and dwelling structures respected its course, i.e. structures oriented north-south; the north and south rows consisted of huts with two rooms while the middle row comprised huts with a single room. In the younger phase, in turn, the rampart alley had fallen into disuse and huts with three rooms were built; the first group in the south portion of the settlement (5 huts oriented north-south) and the second group in the northwest portion of the settlement (4 huts oriented east-west) (Točik 1994: 63). These findings concerned horizon/layer II distinguished at the site (Kabát 1955a: 597, Obr. 260). In the case of the younger settlement (horizon I), despite a much greater thickness of strata, it was not possible to capture any remains of structures in the form of clay floors, hearths, etc. The only traces of any structures were postholes 0.80-1.0 metre deep, with the diameter of posts varying from 0.25 to 0.30 m. According to Točik, they were all that remained of robust dwelling structures, which were probably two-storeys high and rectangular in shape (Točik 1994: 61).

Točik's findings are significant inasmuch they are one of the few examples of critical voices in the discussion of the presence of *Aegean* elements, which were supposedly imitated in the architecture of the Carpathian Basin (Točik 1994: 61). Next to the regular layout of dwelling structures, one of the arguments in favour of the Aegean inspiration involved examples of internal divisions proposed in the case of the settlements at Nižna Myšľa and Spišský Štvrtok. The division was supposedly manifested by the presence of the so-called acropolises (Olexa 1982b: 331-332). They were first alluded to by Vladár (1972: 21; 1975: 9-10). The general plan of the settlement, persistently reprinted and uncritically referred to for over 30 years in different publications (recently: Vandkilde 2004; Gogâltan 2008: 49), does not offer any details that could help identify an acropolis and verify the claim made (Fig. 37).

According to the author of the investigations, it occupied the northwest portion of the settlement. The huts with stone underpinnings, smaller than those in the settlement portion inhabited by craftsmen, supposedly formed, owing to a special arrangement in the form of the letter U, a kind of a square, paved with stones, in this portion of the settlement[7] (Vladár 1973: 290; 1975: 9-10). To the special status of the inhabitants of the acropolis supposedly testified rich deposits found in the huts, in particular hoards of gold and bronze objects (Vladár 1973: 290; Gašaj 2002b: 40, Fot. 30). Sometimes, they were placed in stone boxes hidden under floors (Vladár 1972: 21-22). Equally unclear are the source foundations of the hypothesis about an acropolis at the older settlement at Nižna Myšľa. No plan showing its location has been published so far. What seems most probable is that the whole area enclosed by the fortifications[8] was called an acropolis in order to distinguish this part of the settlement from features located in the

[7] The plan showing the outlines of houses and a sacrificial pit was published in the catalogue *Między Mykenami a Bałtykiem* (*Between Mycenae and the Baltic*) (Gašaj 2002b: 36, Fig. 6), however, we do not know any source foundations of the presented picture; in addition, Jockenhövel, following Vladár's descriptions, published a general plan showing the proposed division into an acropolis, craftsmen's part, etc. (Jockenhövel 1990: 213, with footnote 26, 216, Abb. 4).

[8] As in the case of the settlement at Rozhanovce (Gašaj 1983: 130).

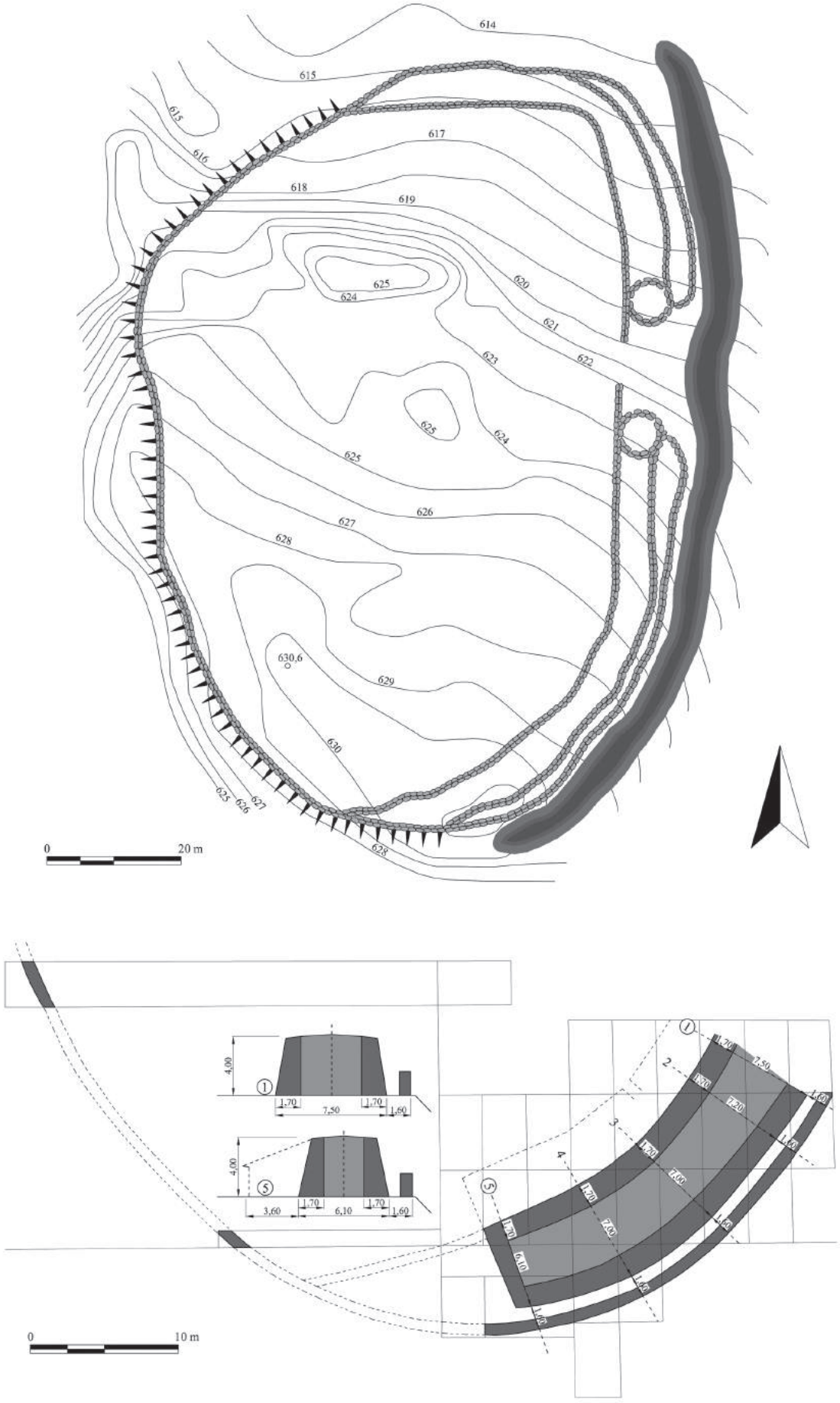


Fig. 37. Spišsky Štvrtok. Reconstructed course and schematic cross-sections of fortifications (after Vladár 1975).

open zone, lying between the fortifications and the cemetery (Olexa 1978: 179; 1986: 173)[9]. What we know with respect to the so-called acropolis is limited to the form of floors, stone underpinnings, orientation and a regular arrangement of huts. Some of this information has already been referred to (Olexa 1982b: 331-332). However, these characteristics by no means justify the use of so specific a term and evoking so strong associations as the term *acropolis* does (see Loukaki 1997).

The regular layout of Otomani-Füzesabony culture fortified settlements was also a strong argument for alleged ties between the *defensive architecture* of the Carpathian Basin and the *architecture* of the Mycenaean culture in the opinion of some scholars bound and determined to trace them (Vladár 1973: 283-294). Without going into a lengthy discussion, it is worth stressing an important characteristic of the settlements which, more probably, made the inhabitants plan their layout and follow some order in building them. In the case of all the settlements, at which houses were built along alleys, we deal with relatively small sites. The area of the older settlement at Nižna Myšľa measured 50 × 60 m (Gašaj 2002b: 27), the dimensions of the settlement at Košice-Barca were 50 × 45-50 m (Točik 1994: 63), while the Rozhanovce settlement covered approx. 3,200 sq. m (Gašaj 1983: 130)[10]. As Ordentlich astutely observed, referring to Otomani-Füzesabony culture settlements in Romania, with so small space, to ensure efficient transport and movement (both people and wagons) inside settlements, they had to be laid out in a regular manner (Ordentlich 1968: 143). The more so as the number of unearthed huts and population estimates point to populous communities. Relying mainly on the number of graves divided by the number of generations (approx. 30 years), the population of the older settlement at Nižna Myšľa can be estimated at 150-200 people while the younger one could have been inhabited by 300 to 350 people at any one time, assuming that there were 50 houses inhabited by 6-7 people each (Olexa 2003: 55). At Rozhanovce, 11 huts were discovered after exploring about one-fourth of the settlement area (Fig. 38). The author drew conclusion that there were about 40 huts at any one time (Gašaj 1983: 132).

In the light of the above, I believe that attempting to find any Mycenaean stimuli in the regular layout of Otomani-Füzesabony culture settlements is groundless and denies local communities basic pragmatism in arranging the space of their settlements. In fact, such pragmatism was deeply rooted in the Neolithic tell building tradition of the Carpathian Basin (Gogâltan 2003: 230; 2009).

As mentioned earlier, similarly to Košice--Barca, in Nižna Myšľa the remains of two settlements were recorded as well. The younger settlement phase witnessed the rise of fortified settlement, covering almost 70,000 sq. m of the first settlement and a cemetery associated with it[11] (Olexa 1992: 191; Gašaj 2002b: 33, Fot. 23; Olexa 2003: 41, Tab. V).

Some younger phase huts were placed in a depression left after a previous ditch (Olexa 1982a: 394; 2003: 49, Tab. IX) to give them a measure of protection against the elements, for instance, a strong wind (Gašaj, Olexa 1992: 16). Despite much damage caused by intensive ploughing, huts survived relatively well in the north portion of the site where they were protected by clay which had slid from a damaged rampart (Olexa 2003: 50). The huts, as in the case of the older settlement, were built of logs[12] (Olexa 1999: 127). They were

[9] At Spišský Štvrtok, the author of the research mentions a probe exploration of an open settlement, being an economic background area in the approaches to the fortified settlement (Vladár 1976: 216). However, no plan showing this part of the site has been published.

[10] For the Rozhanovce settlement, publications give only a diameter of 50 m (Gašaj 1983: 130) or 40 m (Gašaj 2002b: 35) for the area enclosed by fortifications. The first of the quoted texts, however, says that 800 sq. m have been explored which represented about one-fourth of the settlement area. Hence, 3,200 sq. m were adopted as the total area of the settlement.

[11] A cemetery associated with the younger settlement has not been discovered yet.

[12] In one of their earlier publications, the authors of the investigations mention a 'clear change in the type of huts' – from log ones to post ones (Gašaj, Olexa 1992: 16). The appearance of post structures in the younger phase of settlement at

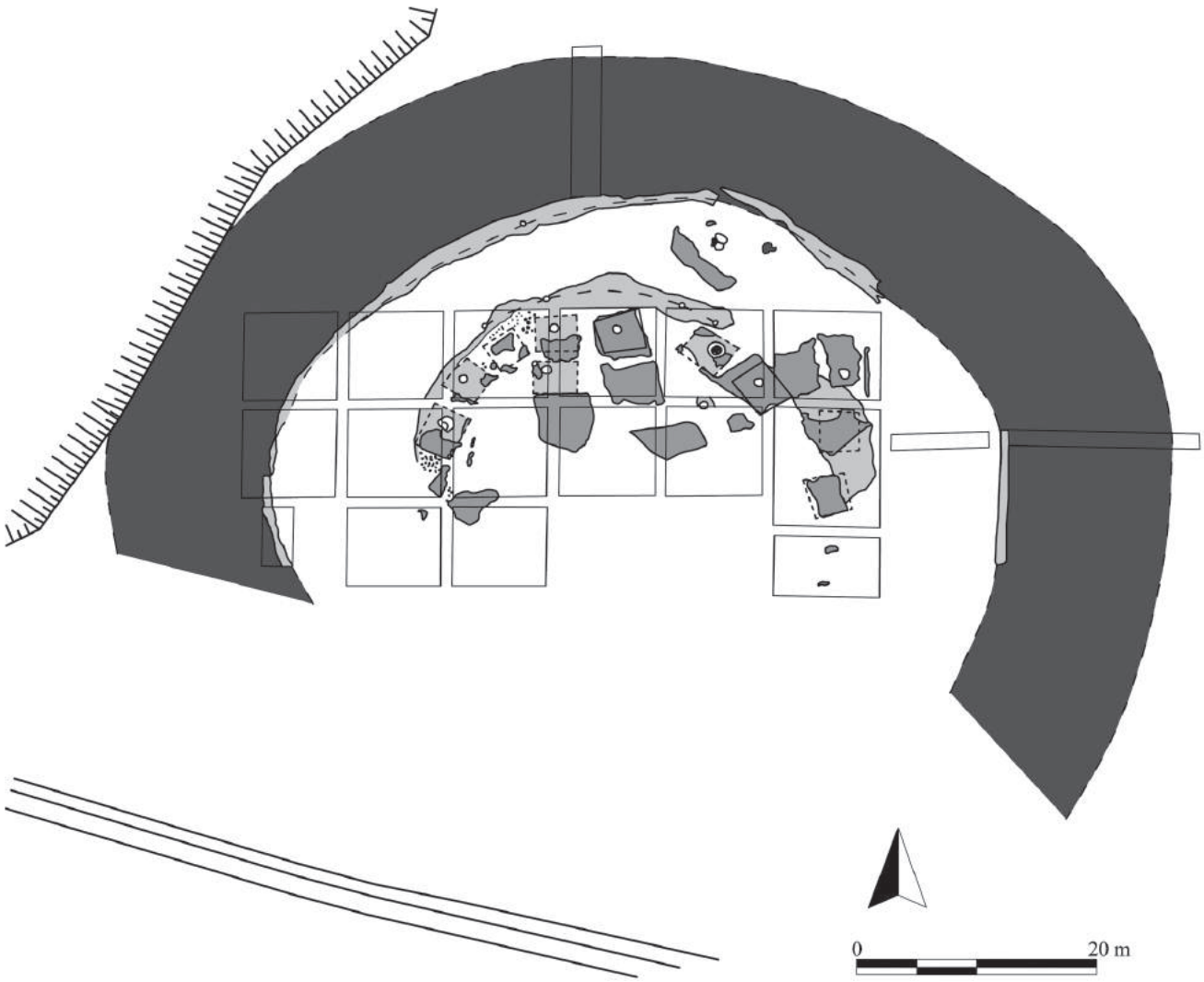


Fig. 38. Rozhanovce. Plan of the settlement with excavated elements of the inner layout and fortifications, and the location of trenches (after Gašaj 2002b).

rather small structures of about 20 sq. m, resembling in terms of size houses known, for instance, from Rozhanovce, which had uniform dimensions of 4-4.5 × 4-4.5 m; Gašaj 1983: 132). Larger houses were found at the Košice-Barca site: a hut measuring 12.5 × 4.5 m was recorded there; similar dimensions were shared by all the houses with three rooms (Kabát 1955a: 596-597, 599, Obr. 261).

At most sites, huts had clay floors and central hearths lined with clay or pottery fragments (Olexa 2003: 50). In the case of the large hut found at the Košice-Barca settlement, the floor in each of the three rooms had a different structure. Two side rooms had a clay floor while the middle one had a wooden structure for a floor, providing insulation against dampness[13]

the site would coincide with the situation observed in the case of structures belonging to the younger phase of the Košice-Barca settlement (see above; Točik 1994: 61) and the younger settlement horizon at Spišský Štvrtok (David 1998a: 246). Indirectly, the presence of post huts with wattle and daub walls is demonstrated by daub fragments bearing impressions of twigs/rods 2.0--5.0 cm thick, which, however, have not been unequivocally assigned to the phase when the huts were built (Hajnalová 1996: 131).

[13] At the Otomani-Füzesabony culture settlement at Dealul Vida (Romania), a distinctive trait, in the case of huts with flooring, involved thin layers of charcoal underneath it. Initially, it was believed that the charcoal was remains of the beams that supported floors of compacted clay. However, there are no beam impressions that could corroborate this opinion; it seems that the charcoal layer

(Kabát 1955a: 599, Obr. 261; Furmánek, Veliačik, Vladár 1999, Tafel 5b).

In the younger phase of construction at the Nižna Myšľa settlement, huts were separated by alleys, too (Olexa 2003: 50). Within its perimeter, over 400 pits of different uses were discovered. These were household or storage pits or pits left by clay extraction. Some of them were located immediately next to hearths or huts (Olexa 2003: 53). From some of them, samples for radiocarbon dating were recovered (Olexa 1992: 193; see below, chapter 6.5). In a portion of the younger settlement, a large number of characteristic pits about 1.0 m deep were discovered. They had vertical walls and flat bottoms. Inside them stones were found that must have stabilized heavy posts of an above-ground structure, which was tentatively interpreted by the author of the investigations as stables (Olexa 2003: 53). Despite information about numerous[14] archaeological features found in every excavated part of the younger settlement (Olexa 2003: 54), no publication included a plan of excavations with their precise distribution. In turn, a specific characteristic of the Spišský Štvrtok settlement is almost a complete absence of features sunk into the ground. At the site, altogether 47 features were discovered, including 39 huts. A small group of features sunk into the ground comprised three burials in vessels (two child burials and one animal burial) and a sacrificial pit (Vladár 1975: 8; 1976: 218; 1977: 187). The last-mentioned feature was very specific but not exceptional. Because identical sacrificial pits had been encountered at two Otomani-Füzesabony fortified settlements (Spišský Štvrtok and Nižna Myšľa), it was decided to discuss them briefly. They should be seen as an integral part of the structure of settlement interior, creating an area where the non-utilitarian dimension of inhabitants' life ruled.

Feature 308 at Nižna Myšľa merited a separate and detailed study, including an anthropological analysis. A roughly circular pit 2.6 m deep with widening walls (diameter at bottom about 2.6-2.7 m), recorded as superimposed over grave 582, is unquestionably linked to the younger settlement (Gašaj, Olexa 1995: 47; Jakab, Olexa, Vladár 1999: 93-95, Abb. 3-4; Gašaj 2002b: 33). Nine major strata were distinguished in it of which most (strata 4-8; Jakab, Olexa, Vladár 1999: 94-95, Abb. 3-4) contained human remains, pottery, clay wheels, daub fragments, charcoals, river shells, a quern stone fragment and animal bones, including an undamaged cranial vault of a cow (Jakab, Olexa, Vladár 1999: 91, 93). The discovered skeletons belonged to five individuals (two children aged 3-5 and 9-13 years; two women aged 30-40 and 19-24 years and one man aged 14-18 years) (Jakab, Olexa, Vladár 1999: 94-95) (Fig. 39). In addition, a discovery was made of a skull (probably earlier cooked or subjected to high temperature?) of a child (aged 3-5 years) possibly suffering from macrocephaly (Jakab, Olexa, Vladár 1999: 113). All the victims were thrown into the pit and killed (Jakab, Olexa, Vladár 1999: 98--99, 101, Abb. 7-9). Possibly, one of the victims (young man) had been tightly bound before he died. All the victims, shortly before their death were in a sitting position, which is seen from a specific arrangement of the parts of their skeletons (Jakab, Olexa, Vladár 1999: 121-124). This suggests a specific manner of making a human sacrifice, with which we undoubtedly deal in this case. The final act of the grim spectacle was starting a fire which left a layer of ash in the pit (Olexa 2003: 85).

Feature 40/74 at Spišský Štvrtok has not been properly documented. However, an anthropological study of the remains found in it conveys a similar picture of human sacrifices (Vladár 1975: 14; Gašaj 2002b: 40, Fot. 31-32; Jakab 2004: 285--287, Obr. 1-4). In the pit, remains of nine individuals were found (man aged 20-30 years, three women aged 40-50, 50-60 and above 60 years and five children aged 3-4, 4-6, 7-8 and 7-9 years[15]; Jakab 1978: 140; 2004: 288-299). Their skeletons bore traces

could have been a kind of insulation (Ordentlich 1968: 146-147).

[14] Prior to 1999, within the younger settlement, in total 388 features were explored (Olexa 2000: 94).

[15] Wrong data is given in the catalogue *Między Mykenami a Bałtykiem* (*Between Mycenae and the*

Fig. 39. Nižná Myšľa. Feature no 308 – a pit with human sacrifices (photograph L. Olexa).

of extensive mutilation/quartering (Jakab 1978: 140; Gašaj 2002b: 39). Most of the blows were to the head of the victims and were struck with stones, a great amount of which covered the skeletons (Jakab 1978: 139). Specific character of some injuries to the bones justifies a presumption that the tool used was a hatchet or axe (Jakab 1978: 140).

Human remains are relatively often found in the context of Otomani-Füzesabony domestic sites, including fortified settlements (Furmánek, Jakab 1997: 19-20)[16].

There is no way of knowing today what the nature and motivation of described rituals. Two aspects of these practices, however, are worth drawing attention to. The anthropological analysis did not reveal any other criteria (except for the case of suspected macrocephaly), apart from the age and sex structure, used to select victims. They were mostly very young people, children and women. The other important aspect is the location of such sacrificial pits within settlements, contradicting the division, in principle, into the zones of the *sacred* and the *profane* which is observable in

Baltic): nine individuals, including seven children (Gašaj 2002b: 39).

[16] Bones of a human hand wearing bronze ornaments were found in the famous, owing to the find of the alleged oldest iron knife, well in Gánovce (Gašaj 2002b: 41), lying only several kilometres away from the Spišský Štvrtok settlement. A considerable amount of human bones (13 per cent of osteological material), found in the same contexts as animal remains and bearing traces of cutting, is known from the Nižna Myšľa settlement. They were interpreted as traces of anthropophagy (Jakab 1999).

a large majority of Bronze Age societies[17]. The exceptional nature of these features is certainly caused to some extent by their function as a communal element – shared by all settlement inhabitants. We do not have any specific information on the marking, if any, of these features on the surface. Possibly, some stones and dressed travertine fragments, found in the top layer of feature 40/74, were part of an original overground structure (Jakab 2004: 285, Obr. 1). Beyond question, making sacrifice of many people, including children, must have been a shocking spectacle which was long remembered and thus contributed, if only to a small extent, to the collective identity (a group?) of inhabitants.

[17] This principle is well illustrated by the layout of the Nižna Myšľa site where a burial ground is located not far from the older settlement but outside of its fortifications.

6.3. Fortifications

As in the case of Vatya culture sites discussed earlier, Otomani-Füzesbony fortified settlements were protected by combinations of two common elements: a rampart and a ditch. However, unlike the settlements on the middle Danube, the settlements on the Tisza River had fortifications of more varied types. Moreover, Otomani-Füzesabony culture settlement fortifications were frequently excavated, hence there is a noticeable quality difference as regards information available on them. It refers, more often than in the case of Vatya culture settlements, to dimensions, materials used, technical solutions and their location within sites.

All settlements were specifically located, which in a natural way contributed to their defensibility. The settlement at Nižna Myšľa was founded on a hill known as *Várhegy,* rising to the relative elevation of 217 m above sea level (Gašaj 2002b: 25). Access to the promontory on which the settlement at Košice-Barca stood was, in turn, barred by the river flowing around it. In similarly strategic places, the Rozhanovce and Spišský Štvrtok settlements were located – both overlooked the valleys of nearby water courses (Gašaj 2002b: 21, 35, 39).

According to the first results of investigation held at Nižna Myšľa, the older settlement was supposedly enclosed by a ditch 30 m wide and 6 m deep (Olexa 1978: 179; 1982b: 332; 1983a: 124) or 24 m wide and 6 m deep. The latest publications, however, describe the ditch as about 20-21 m wide (Gašaj 2002b: 27-28, Fot. 10; Olexa 2003: 40, 42, F 31, F 59) (Fig. 35). It was renewed twice. The younger settlement, in turn, was protected by a ditch 25--27 m wide and 5-6 m deep (Gašaj 2002b: 31). A smaller ditch was uncovered at Rozhanovce; its depth was almost 4 m while the width was 15-16 m (Gašaj 2002: 35). At Košice-Barca, only the ditch linked to the older construction phase had equally imposing dimensions: it was 18 m wide and 2.5 m deep (Kabát 1955b: 743-744). In the younger phase, the width was reduced almost by half (to 10 m) while keeping a similar depth of about 2 m (Točik 1994: 64). With respect to these settlements, there is no information that would unequivocally indicate the existence of other barriers, e.g. palisades, inside ditches[18].

Additional protection to settlements was afforded by ramparts. In the case of the settlements mentioned earlier, they were diversified constructions of very large dimensions. The basic materials they were built of were timber and earth/clay. In addition, facings of timber, stone or clay were used to reinforce the main timber-earthen structure.

As I have mentioned earlier, in the first excavation seasons at Nižna Myšľa, the remains of some other structure must have been mistakenly taken as the scattering of

[18] At Cetățuia-Otomani, the south side of the site was protected by a ditch 20 m wide and 4.3 m deep (Ordentlich 1969: 461, Abb. 2). At the depth of about 2 m, traces of posts and daub fragments were captured – they may have been remains of an additional barrier in the form of a palisade plastered with clay (Ordentlich 1969: 460).

a bastion, guarding the entrance to the settlement (Olexa 1983a: 124). The settlement was protected, in the first place, by the ditch and a massive rampart. With the progress of investigations, the data concerning the rampart size must have been made more specific. Originally, its width at the base was estimated at 15 m (Olexa 1978: 179; 1982b: 332; 1992: 191). Now, it seems that it was much narrower, yet still quite massive with its base about 8-10 m wide (Olexa 2003: 40). The rampart could have been topped by a palisade and its construction could have been made more stable by timber piles and a stone wall of an estimated width of 1 m (Olexa 2003: 40, 42). Stones, in the form of two parallel stone walls supported also the walls of the entrance to the settlement, providing support for the log construction of the gate[19] (Gašaj 2002b: 27-28, Fot. 9; Olexa 2007: 153) (Fig. 35). A rampart of a similar size – 8 m wide at the base – surrounded on two sides the settlement at Rozhanove. Built from clay and loess, it had been reinforced on both sides by piles driven into the ground and a wattle construction[20] (Gašaj 1983: 132; 2002b: 35). Other structural elements of a rampart were observed at Košice-Barca. In the older phase, the settlement was protected on two sides by a rampart 7 m wide. A timber-earthen construction, was reinforced on the outside by piles 0.10 m in diameter driven about 1 m into the ground roughly 0.80 m from one another. Its facing was made of thin beams (0.04 m in diameter) laid horizontally and plastered with 0.08-m-thick layer of clay. Interestingly enough, the rampart wall slightly inclined towards the settlement interior[21]. The rampart base, built from the layers of material obtained when digging the ditch, i.e. clay and gravel, was about 4.0 m wide. On the inside, 1.80 m away, it was reinforced by a timber structure similar to that described earlier. The rampart walls were joined by a kind of a latticework (Točik 1994: 63)[22].

The fortifications of a successive phase looked different. The younger settlement was not protected by a structurally complex rampart but only a simple mound topped by a palisade of an estimated height of approx. 4.5 m (Točik 1994: 64).

These examples of fortifications are typical of Otomani-Füzesbony settlements, including those located in today's Romania and Hungary (Ordentlich 1969; Bóna 1975: 148). Despite certain variations in design, a common type of fortifications combined a rampart and a ditch. The basic materials used to build fortifications were earth/clay, timber and stone, albeit much more rarely. Stone was used mostly in the constructions of the 'dry wall' type or for building additional stabilizing elements of timber-earthen fortifications. Chief characteristics of the fortifications are large dimensions and adjustment of their course to terrain.

The model of timber-earthen settlement fortifications prevailing in the Carpathian Basin in the Middle Bronze Age (Gogâltan 2008: 45) differs considerably from the structures uncovered at Spišský Štvrtok (Vladár 1975: 22, Abb. 2)[23] (Fig. 37).

What sets this settlement apart is the use of stone for building its fortifications. What's even more interesting, the stone, in the form of characteristic broken slabs, was used for building the major elements

[19] During the investigations at the entrance to the settlement at Nižna Myšľa, the remains of a structure were found and tentatively interpreted as a tower which must have topped the construction of the gate (Olexa 2007: 153). Absence of any drawings, photographs or detailed data on the form and size of the structure prevents, however, a comprehensive assessment of the information given in the quoted publication.

[20] A similar wattle construction reinforced the outer facing of a rampart at the Mad'arovce culture settlement at Nitrianski Hrádok (Furmánek, Veliačik, Vladár 1999: 119, Abb. 57).

[21] The palisade topping the rampart of the first fortifications of the settlement at Trzcinica, linked to the Pleszów group of the Mierzanowice culture, also inclined towards the interior at an angle of 70 degrees (Gancarski 2002: 107).

[22] Again, a perfect analogy is presented by a structure known from Nitriansky Hrádok (Furmánek, Veliačik, Vladár 1999: 119, Abb. 57).

[23] It is worth stressing that the published plan of fortifications at the Spišský Štvrtok settlement (Vladár 1975: 22, Abb. 2) is a kind of reconstruction (see comments by Harding 2006: 107) as part of the site was destroyed in modern times. Characteristic stone slabs, of which the fortifications had been built, were in part removed by local residents; the site was also treated for some time as a sand pit (Novotny, Kovalčík 1967: 26; Vladár 1970: 37; 1973: 284).

of the fortifications (Vladár 1973: 281-282, Abb. 27-28; 1974: 227-228, Abb. 9-10).

When compared to the other examples of Otomani-Füzesabony culture fortified settlements, the fortifications at Spišský Štvrtok, measuring in total 160 m, were very complex and surrounded the whole settlement (Vladár 1973: 286; 1975: 22, Abb. 2; Jaeger 2014: 296). From the west, owing to terrain shape, the settlement was protected by a palisade only founded on a stone underpinning (Vladár 1970: 38). In the north and south, the palisade joined a rampart of characteristic construction. It was made of two stone walls whose estimated width at the bottom was 4.8 m while its top was 4.0 m wide. A tentative assumption was made about a palisade that topped the rampart and raised its height to 6.0 m (Vladár 1973: 284, 286; 1975: 23, Abb. 3). In the east of the settlement, the rampart was preceded by a stone wall approx. 120 m long. Between it and the outer facing of the rampart, there was an empty space about 0.80 m wide getting wider in parts adjoining the bastions guarding the entrance to the settlement. The bastions were the most spectacular element of the uncovered fortifications. These were circular stone[24] constructions about 5.9 m in diameter[25] (Vladár 1973: 284-285, Abb. 31). In addition, in the east where the entrance was, the settlement was protected by a ditch 6.0 m wide and 2.0 m[26] deep (Vladár 1973: 286).

An absolutely exceptional character of the stone fortifications uncovered at Spišský Štvrtok made the author of the investigations look for analogous designs in the architecture of the Aegean, more specifically, in the architecture of the Mycenaean culture (Vladár 1972: 20). The stone fortifications were treated as an element that was to testify to the contacts between the lands of modern-day Slovakia (more broadly, of the Carpathian Basin and central Europe) with the Mediterranean (Vladár 1973; 1974; 1979; 1982). In the discussion[27] lasting for many years, no recourse was actually taken to the sources concerning the defensive architecture of the Aegean. Meanwhile, a comparative analysis of the fortified structures of the Bronze Age from former Czechoslovakia and the Mycenaean architecture of Mainland Greece and Crete showed no analogies that could attest to direct relationships (Alusik 2007; 2012; Jaeger 2014).

The fortifications uncovered at Spišský Štvrtok do not have any analogy not only in the Aegean but also within the Otomani-Füzesabony culture oecumene and other so-called tell cultures. What is unique about them is the form of stone material and the way it was used. Unlike rare examples of the use of natural stones in the defensive architecture of the Carpathian Basin (Vladár 1973: 280-28; Bader 1990: 182; Gašaj 2002b: 27), at Spišský Štvrtok dressed stone was used. It was formed into characteristic slabs and used for building the main elements of the fortifications. This contradicts the rule observed in other cases where stone was used in the form of natural concretions for building additional stabilizing elements, which, in most cases, were built of timber (see above piles reinforcing the rampart at Košice-Barca). What's more, the settlement at Spišský Štvrtok was fortified on all sides, whereas the other discussed sites in east Slovakia had defences only where the approach was the easiest. At Spišský Štvrtok, admittedly, the terrain made fortification builders use a different construction only in the west portion of the settlement because it was

[24] There is no way of telling how high the stone walls of the bastions were. Taking into account the small width of the uncovered wall base, as seen in the published photographs, and the absence of any mortar that would keep stones together, it seems that the bastions were built of timber at least for the most part. Had stone alone been used, it is doubtful if the structure would be stable enough to reach the height of 4-6 m as estimated for the rampart.

[25] The published photographs of the bastions are not helpful in determining the exact width of their walls.

[26] In one of his later publications, the author of the investigations mentions that the ditch structure was not explored in full (Vladár 1976: 216). Absence of a plan showing location of individual excavations makes it impossible to tell which part of the ditch (and other fortification elements) and to what degree was excavated.

[27] A basic review of literature on the question of long-distance ties between central Europe and the Mediterranean is given in Bader (1990: 181, with footnote 1), David (2007: 411, with footnote 1) and Suchowska (2010).

protected best by special surface features. Hence, it was strengthened only by a palisade on a stone underpinning. In the eastern, most easily approachable portion of the site, the entrance was located and strongly guarded by a ditch and bastions. The ditch was rather small when compared to the defences of this kind found at the settlements at Nižna Myšľa, Košice-Barca and Rozhanovce. However, a defence type, discovered at Spišský Štvrtok, departing furthest from the model of fortifications known from the Bronze Age in the Carpathian Basin, or even central Europe, is the stone bastion. Two such structures guarded the gate. They were built, like all other stone fortification elements at Spišský Štvrtok, using the 'dry wall' construction (Fig. 40).

Consequently, the fortifications at Spišský Štvrtok are an absolute exception among other Otomani-Füzesabony fortified settlements. What makes them so exceptional is the use of unusual stone building material and complex defences guarding the entrance to the settlement. I believe that both these characteristics may be strong arguments in building a case for an alternative interpretation of 'Slovakian Mycenae' (Furmánek 2004).

A petrographic study of stones from the Spišský Štvrtok fortifications showed that rocks naturally occurring at the site had not been used for raising them. The building material used came from an area about 2-3 km away (Vladár 1973: 284). This is a significant piece of information as it permits to exclude local availability of stone material as the main reason for the rise of the stone fortifications. The use of this particular material was an effect of a decision made beforehand and an implementation of a construction plan of fortifications, a plan which was totally alien to the tradition of Otomani-Füzesabony culture defensive architecture or that of related tell cultures of the Carpathian Basin for that matter.

In 1988, Mozsolics expressed an opinion that the stone fortifications at Spišský Štvrtok belonged to the younger settlement of the Púchov culture (Mozsolics 1988: 43--44, with footnote 113). There are reasons to believe that this way of thinking is right. The area of Spiš was one of the regions of north Slovakia in the La Tène period where Púchov culture settlement was identified (Pieta 1982: 16, Abb. 2). The publications on the Spišský Štvrtok site contain information that artefacts of the culture were found at the site, within the fortifications (Novotny, Kovalčík 1967: 25, 27, 45; Vladár 1970: 41; 1976: 220).

Defensive architecture is one of the distinctive characteristics of the Púchov culture. In the group of fortified settlements, there were distinguished two separate categories interesting for the current discussion. These are small strongholds (*Kleinburgen*) and central strongholds (*zentrale Burgwallanlagen*) (Pieta 1982: 134). The two categories differed chiefly in their size and kinds of defensive structures. The first category sites were rather small (from 80 × 70 to 20 × 20 m) and were fortified with timber-earthen structures only sometimes reinforced with stone walls (Pieta 1982: 134). The second category sites were much larger as they occupied up to several hectares (e.g. Liptovská Mara 1,5 ha, Veľký vrch Divinka 12 ha; Pieta 1982: 136). The elements of fortifications of these settlements were very often built of stone. As in the case of the Spišský Štvrtok settlement, the building material was characteristic dressed stone slabs (sandstone and limestone) (Pieta 1982: 139; 1996: 76, Abb. 20; 87, Abb. 24) (Fig. 40). At the site at Liptovská Mara, structures surrounding the whole settlement varied in terms of their construction. The north side of the settlement, where entrance/gate was, as at Spišský Štvrtok, was guarded by a double stone wall (Pieta 1982: 137, Abb. 18). The use of double walls is interpreted as an influence of the defensive architecture of the Celts, likewise the practice of building complex structures to protect entrances to the settlements of the Púchov culture (Pieta 1996: 73).

Only few of identified gates have been excavated. The gate of the Liptovská Mara settlement was placed in a special breach in fortifications (so-called baffle gate; Keeley, Fontana, Quick 2007: 62). One of overlapping fortification walls deflected towards the settlement interior while the other continued straight. In this way a space was created flanked by a rampart practically on all sides, hence, exceptionally easy to control and de-

Fig. 40. Stone defensive constructions. At the top – Špišsky Štvrtok; at the bottom – Liptovská Mara (after Vladár 1973; Pieta 1982).

fend (Pieta 1982: 137, Abb. 18). Next, the gate of the settlement at Podtureň-Velínok was protected by two additional defences. The first had the form of a protruding bent section of the rampart, sweeping around the approach to the settlement, and protected the gate from the north and east. The second, interpreted as a tower, guarded the gate from the south (Pieta 1982: 141-142, Abb. 19). It was a rectangular stone-timber structure with one of its sides adjacent to the fortification line. In addition, some Púchov culture settlements were protected by ditches, too (Pieta 1982: 142-143).

The rampart construction at Spišský Štvrtok seems to bear similarities to that of Púchov culture settlements whereas the defences guarding the gates of the settlements do not resemble much one another in terms of design. What seems much more significant, however, is their functional similarities. The examples of structures guarding gates described earlier are undoubtedly military in character (see Keeley, Fontana, Quick 2007: 62-67). The defences used at Púchov culture settlements were clearly meant to bar access to the most sensitive part of the fortifications – the gate – while ensuring it the most effective defensive capacity. The bastions discovered at Spišský Štvrtok should be treated in the same way for a number of reasons. Above all, they were placed on both sides of the entrance to ensure protection to the gate. Second, the bastions were not placed entirely outside the line of fortifications, which made them easily accessible for the defenders and afforded them additional cover in battle. The military effectiveness of the bastions was improved by the fact that they had been built only 12 m apart (Vladár 1975: 22, Abb. 2). This distance made any missiles hurled from the bastion tops (arrows, spears, stones, etc.) deadly effective against attackers as the whole approach to the gate was covered by the defenders' shot (Keeley, Fontana, Quick 2007: 70-77, Fig. 8).

In the light of the current state of our knowledge, so complex fortifications, in terms of both form and function, are absolutely alien to Otomani-Füzesabony defensive architecture while at the same time being a standard on Púchov culture settlements in the La Tène period.

The above arguments are not conclusive chiefly because of the deficiency of hard data on the settlement at Spišský Štvrtok, hence, paradoxically, due to the lack of arguments in favour of the Otomani-Füzesabony stratigraphic position of the stone structures. A virtually total lack of publications, containing any documentation of Vladár's excavations, precludes any possibility of verifying the chronology of the stone fortifications he suggested. Vladár hinted at the complexity of stratigraphy within the strata attributed to the Otomani-Füzesabony culture by distinguishing within them two settlement horizons (Vladár 1975: 16-18; 1976: 218-219; 1977) and a settlement phase probably associated with the Piliny culture (Vladár 1976: 220). He also pointed to the presence of different settlement layouts and structures as well as postholes in the youngest strata. What his publications lack, however, is any information on stratigraphic relationships and provenance of finds associated with the Púchov culture. Hence, the data he did publish does not permit to unequivocally determine the attribution of particular characteristic elements discovered within the settlement. Next to the stone fortifications, it would be equally important to verify the stratigraphic position of the stone-paved road leading to the gate and that of a stone stela (Vladár 1975: 14). For both such elements were found at the Púchov culture settlement at Liptovská Mara (Pieta 1996: 87, Abb. 24; 89, Abb. 25), which may indicate a different chronology, not an Otomani-Füzesabony one.

Adopting a hypothesis about a younger chronology of the stone fortifications at Spišský Štvrtok makes it necessary to create an alternative scenario for the site. One possibility is revising the assessment of stratigraphy at the site because the current assessment may have led to the failure to register any older timber-earthen fortifications than the stone ones. This possibility is indicated, I believe, by unclear information supplied by the author of the investigations, concerning the character of the older Otomani-Füzesabony culture settlement horizon. Vladár linked the stone fortifications to the younger Otomani-Füzesabony horizon (classic phase of Otomani-Füzesabony culture). At the same time, however,

because of the presence of older features only in the area enclosed by the fortifications, he hinted at a possibility that fortifications may have existed in the first settlement horizon as well (Vladár 1976: 219). This conclusion is difficult to assess as no hypothesis has been presented concerning the form of possible older Otomani-Füzesabony culture fortifications. In this situation, the Spišský Štvrtok site could have had timber-earthen fortifications, characteristic of the Otomani-Füzesabony culture milieu, in both settlement horizons. The fortifications could have been destroyed at a later stage when stone fortifications were constructed in the La Tène period[28].

The latest research suggests still another scenario. Recent publications describe open Otomani-Füzesabony culture settlements that are equal to fortified settlements in the abundance of sources. In this connection, two sites merit a mention: Füzesabony-Öregdomb (Szathmári 1992) in Hungary and Včelince in Slovakia (Furmánek, Marková 1992; 2001; 2008). The last-mentioned example is particularly significant. The settlement, although deprived of any Otomani-Füzesabony fortifications, yielded rich settlement sources, including evidence of local metalworking and hoards of bronze goods (Furmánek, Marková 1996; Furmánek, Illášová, Marková 1999).

[28] We are faced with a similar situation of a part of Bronze Age fortifications and strata being destroyed by younger settlement, in this case Medieval, at Otomani-Füzesabony settlements in the Lower Beskids, at Trzcinica and Trepcza (Gancarski 2002: 109; Gancarski, Ginalski 2001). Otomani-Füzesabony fortified settlements had been located at the strategic topographic points which were re-used in the later periods of prehistory and in Medieval times.

6.4. Metallurgy

Owing to the manner and form of publication, described elsewhere, of the results of investigations carried out at Otomani-Füzesabony culture fortified settlements, metallurgy, supplying spectacular finds, is one of the best documented phenomena in the available literature on the subject. Investigations at the sites brought a number of discoveries related to the various stages of copper, bronze and gold processing[29]. To some degree, the rich representation of some sources, e.g. stone casting moulds and ready-made metal goods, can be caused by their high durability, successfully withstanding destructive post-deposition processes (see comments by Bartelheim 2002: 36). Nevertheless, the fact that all sites described below yielded a large number of objects related to metalworking reflects to a high degree the original advanced technological development of Otomani-Füzesabony societies and widespread knowledge of relevant technologies among them[30].

With respect to no settlement we have full information on and a catalogue of finds, belonging to the category of interest to us here. The metallurgy of the Carpathian Basin, however, was often discussed in general terms in synthetic works, stressing the importance of the region for the development of bronze production in other parts of Europe (Sherratt 1987; 1993; Liversage 2000: 73-75; Kristiansen, Larsson 2005). Metallurgy, in the context of the fortified settlements of the Carpathian Basin, so far has been the subject of a single work (Novotná 1983). The work discusses a small group of finds (chiefly, casting moulds and tuyères), originating with both Otomani-Füzesabony culture settlements and others belonging to the Mad'arovce culture.

Monographs were devoted to the hoards of the Hajdúsámson-Apa horizon, associ-

[29] Probably, it was also in the Otomani-Füzesabony culture milieu that Europe's one of the first iron objects (a sickle) was made, found in a well in Ganovce (Furmánek 2000).

[30] Numerous finds related to metalworking were made at Otomani-Füzesabony culture sites in Hungary and Romania, too (Bóna 1975: 156, 256; Găvan 2012).

ated mainly with the Otomani-Füzesabony culture milieu (David 2002; Vachta 2008). Much space was given in them to the Apa type swords and different types of hatchets (see also Kovács 1994; Bartík, Furmánek 2004). Their elite character and the charge of social associations is directly linked to fortified settlements (Sherratt 1987: 58; David 2007: 415 with footnote 26).

The greatest number of finds and the most fully published ones, related to the metalworking of both bronze and gold, were supplied by many years of investigations at Nižna Myšľa. Information coming from settlements was, in this case, supplemnented by data gathered from grave finds.

Within both fortified settlements at Nižna Myšľa, a very numerous assemblage of finds was collected that unequivocally testify to the local production of a broad range of objects. They were found in remains of huts, their immediate surroundings, pits and the ditch fill (Olexa 1999: 94; 2003: 59). No settlement zone showed a special concentration of finds related to metalworking or accumulation of telltale objects (e.g. casting tools) or features (e.g. furnaces) that would indicate the original location and number and type of possible places of production.

Within both fortified settlements, a very large and varied assemblage of bronze objects was collected, including many gold objects as well. Certainly, a vast majority of them were made by local metallurgists. The bronze objects, the local production of which is attested by the finds of casting moulds, include both jewellery (pins) and weapons (spearheads, daggers) as well as tools (axes) (Gašaj 2002b: 44, Fot. 39; Olexa 2003: 46, Tab. VII; 52, Tab. XI; 58, Tab. XIII). Some ornaments, as for instance small string ferrules, were made locally also of gold (Fig. 41). This is attested by the finds of such objects in local graves and the finding of a mould for casting them at the settlement (Gašaj 2002b: 47; Olexa 2003: F57). Next to stone casting moulds, metalworking is evidenced also by numerous metallurgist's tools, including crucibles (sometimes containing metal remains; Olexa 1982c: 209-210), ladles and tuyères (Gašaj 2002b: 24, Fot. 4; Olexa 2003: 52, Tab. XI:1, 2, 6) as well as unfinished or damaged objects, representing production waste (Olexa 1992: 193).

As regards the Nižná Myšľa site, 11 bronze objects and 1 gold item underwent metallographic analysis in order to determine the provenance of the material. The conclusion drawn from the investigations stated that the material originated from local deposits (copper ores located near Bankov, gold deposits in the vicinity of Telkibánya and gold found in the bed of the river Ida) (Luštík, Mihok, Olexa 1991; Olexa 2003: 61). However, it should be noted that the hypothesis has now to be verified using new analytical procedures, which in the first place include combined analyses of lead isotopes and trace elements in available artifacts and samples from the potential sources (Gale, Stos-Gale 2000; Villa 2009; Pernicka 2014).

More evidence for the use of local copper ores was supplied by investigations at the settlement at Spišský Štvrtok. Within its limits, a deposit of malachite ore was discovered (Vladár 1976: 217). Although no proper chemical analyses have been made, it can be deemed in all likelihood a store of raw material destined for further processing. Local metalworking at the site is attested by the finds of casting moulds (Vladár 1976: 217; Novotná 1983: 67) and a broad set of bronze and gold objects (Gašaj 2002b: 40, 47, Fot. 30, Fot. 33; Vladár 2012). In two features at the site, semifinished products were found for making gold ear wraps (Vladár 2012: 384). In all likelihood, also in this case some local deposits of metal were used (Vladár 1975: 11). According to the author of investigations, a large majority of the objects were deposited in boxes/'troves' underneath floors and within huts located in the 'acropolis'. One feature (no. 4/68) held even as many as three such deposits (Vladár 1975: 10). Rich hoards are known from other fortified settlements, too. At Košice-Barca, within one hut, a collection of gold jewellery was found (Hájek 1954; Gašaj 2002b: 46, Fot. 47). This site yielded also deposits of flanged axes and bronze jewellery (Gašaj 2002b: 22, Fot. 1; 46, Fot. 45). At Nižna Myšľa, a hoard of bronze pendants was found as well (Gašaj 2002b: 30, Fot. 18). Exceptionally valuable, deposits found within individual huts suggest the

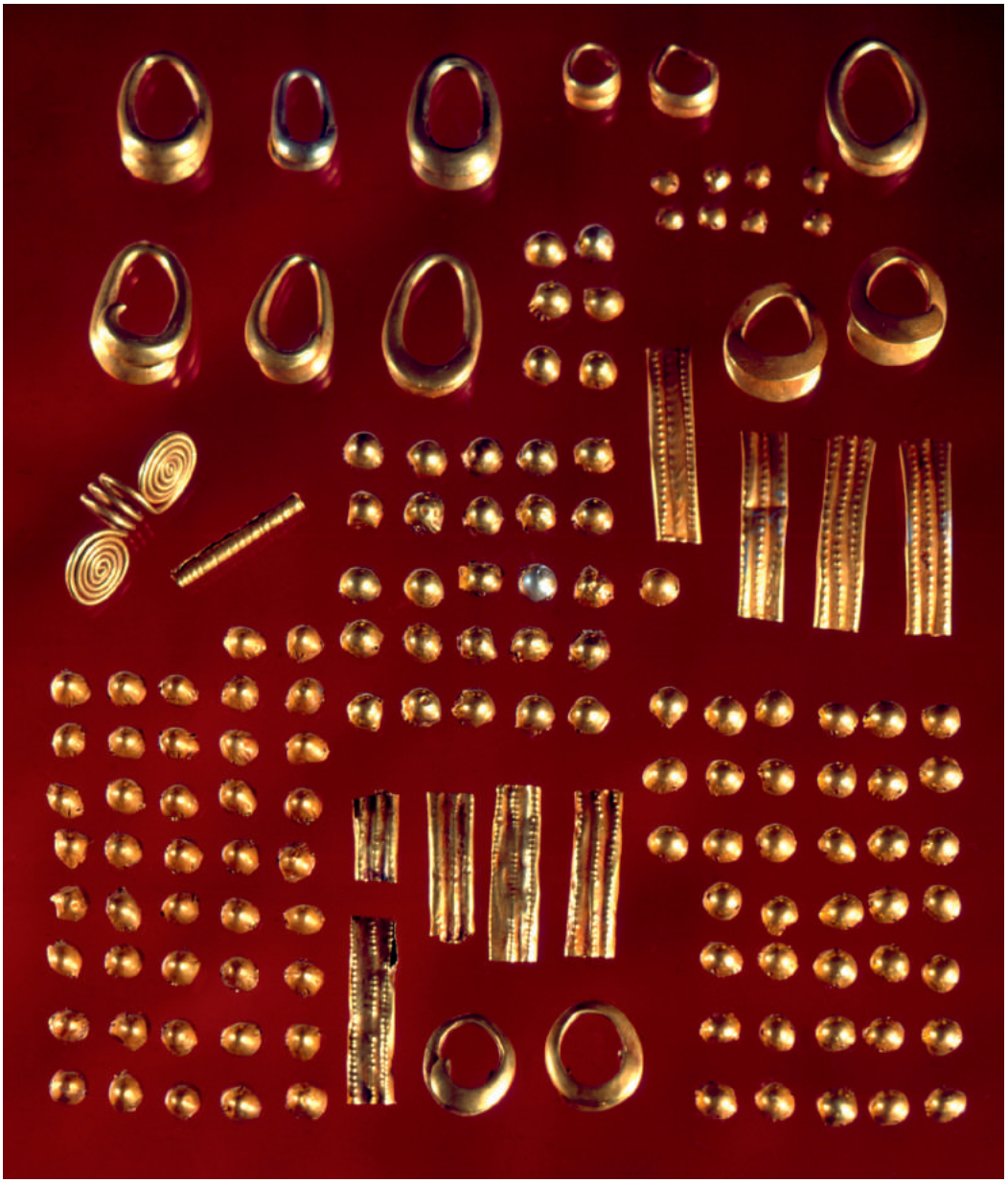


Fig. 41. Nižna Myšľa. Gold ornaments (photograph L. Olexa).

existence of private property and accumulation of bronze and gold in private hands (e.g. as property of a single family)[31].

The elaborate forms, technological sophistication, and rich ornamentation of basic weapon types included in the hoards of the Hajdúsámson-Apa horizon, i.e. swords with full handles and hatchets, justify a tentative assumption that there existed a highly specialized group of craftsmen/metallurgists who produced them. The assumption seems to be confirmed by discoveries made at Nižna Myšľa.

One of the significant finds, although apparently a modest one, among numerous bronze objects recovered from the site, is a fragment of a richly decorated hatchet (possibly with a button-shaped butt) (Olexa 2002a: 80, Fot. 94; 2003: 57, Tab. XII:17). This is the only find that may represent a proof of relations linking fortified settlements and hoards of prestigious objects of Hajdúsámson-Apa horizon.

[31] The scale of this phenomenon may be potentially illustrated by the finds from Spišský Štvrtok, where 21 hoards in total were discovered (Vladár 2012).

The investigations at the vast cemetery at Nižna Myšľa have yielded so far two graves interpreted as metallurgists' burials (Fig. 42, 43, 44) (Olexa 1987; Jaeger, Olexa 2014). Considering how few discoveries of this type are in the vast expanses of Europe in the Early Bronze Age (Bátora 2002: 193--195, 199-207), the two graves are a unique source of information. Both are dated to the pre-classic phase of the Otomani--Füzesabony culture, i.e. to the beginning of period BA2, from which the oldest burials at the site come (Olexa 1987: 255, 257 with footnote 1; Gašaj 2002c: 95).

In the first grave, designated as number 133, in a rectangular pit measuring 100 × × 200 × 200 cm (width/length/depth), a man had been buried in a crouched position on his right side, a position typical of the Otomani-Füzesabony culture. The grave goods were: a bronze spiral placed next to the deceased's right elbow, two flakes (one carelessly made flake of hornstone and one good quality flake of obsidian), seven wild boar tusks halved lengthwise and a shell-shaped stone mould for casting pins or awls (Olexa 1987: 259-260, Abb. 2) (Fig. 42).

The other grave (no. 280) was a roughly rectangular pit measuring 155 × 250 × × 210 cm (width/length/depth), slightly disturbed in its south portion by an unfinished robber dig. The grave held also a man's body in a crouched position, lying on the right side. The grave goods consisted of 49 plates made from boar tusks (with 8 or 10 perforations; Olexa 1987: 263, Abb.) (Fig. 43, 44), an antler clasp, a spiral bracelet placed on the bone of the right forearm, a massive tuyère in front of fingers, a hammer for breaking up ore, a pin with a massive globular, obliquely perforated head placed next to the left hand, a necklace of shells and bronze spirals and tubes next to the left hand, and three boar tusk pendants. The following objects had been placed next to the deceased's feet: an obsidian flake, a bronze pin (or, perhaps, a needle), two bone chisels, a shell-shaped sandstone mould for casting pins with obliquely perforated heads and three vessels (Olexa 1987: 260, 262, Abb. 4; 264, Abb. 6; 2002a: 78, Fot. 91; 84, Fot. 100).

Some grave goods recovered from the two graves justify assigning them to the category of metallurgists' burials. In the case of grave 133, it is above all the casting mould (Fig. 42:5) but also the halved boar tusks (Fig. 42:2, 3). The latter are interpret-

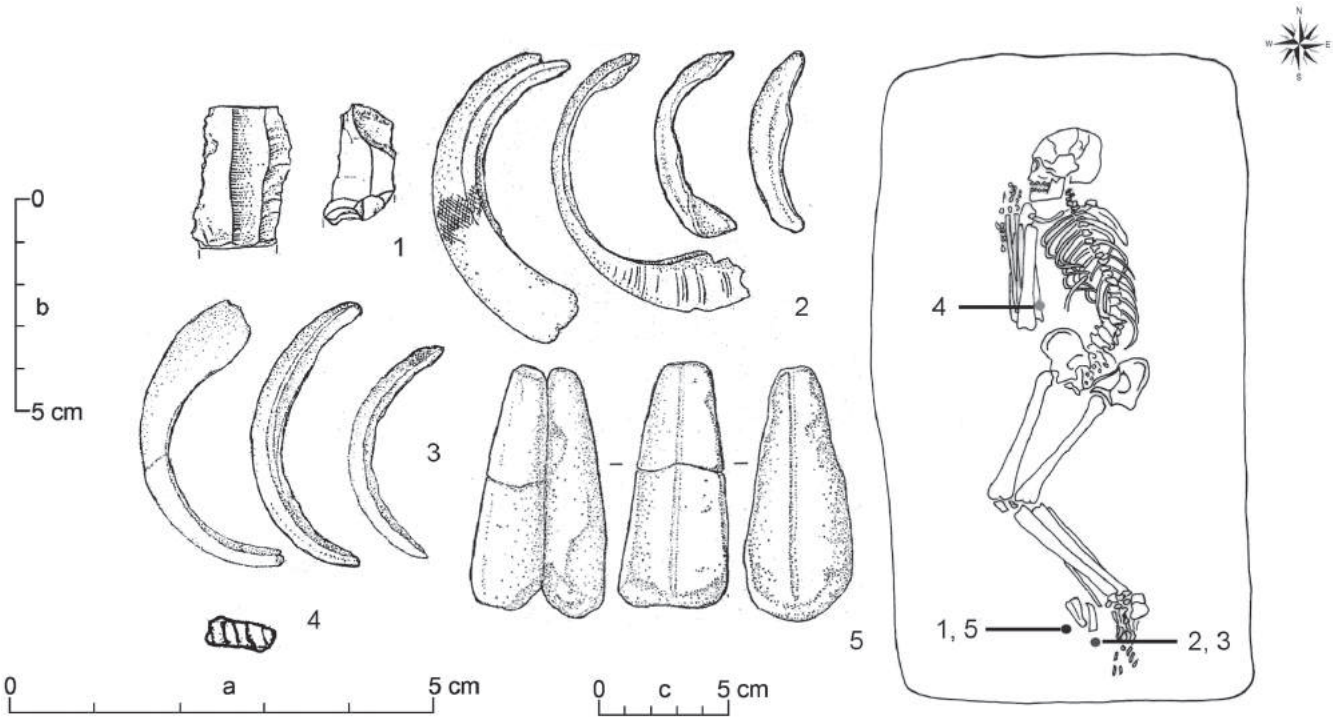


Fig. 42. Nižná Myšľa, grave no. 133. Furnishings of a metallurgist's burial (after Jaeger, Olexa 2014).

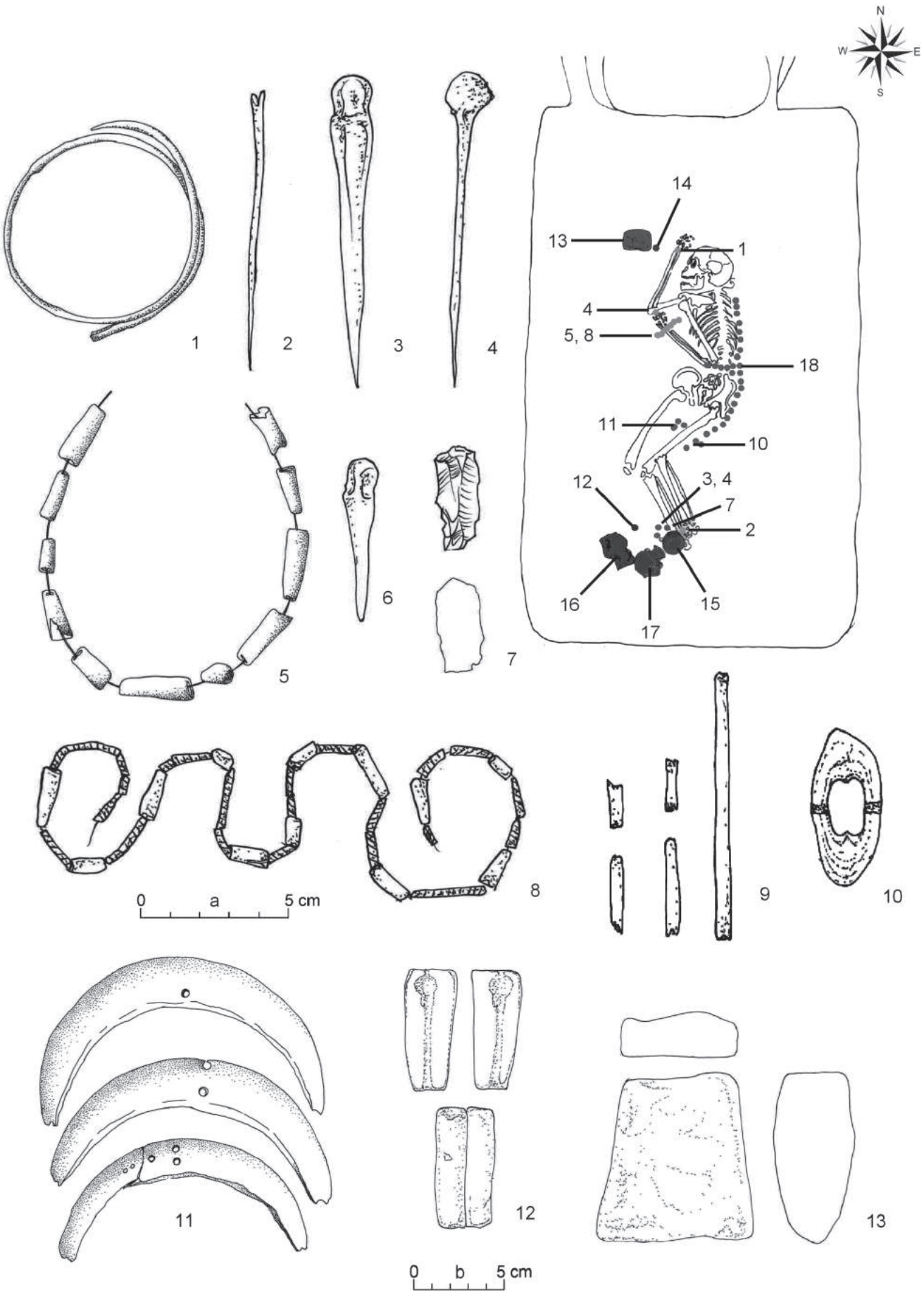


Fig. 43. Nižná Myšľa, grave no. 280. Furnishings of a metallurgist's burial (after Jaeger, Olexa 2014).

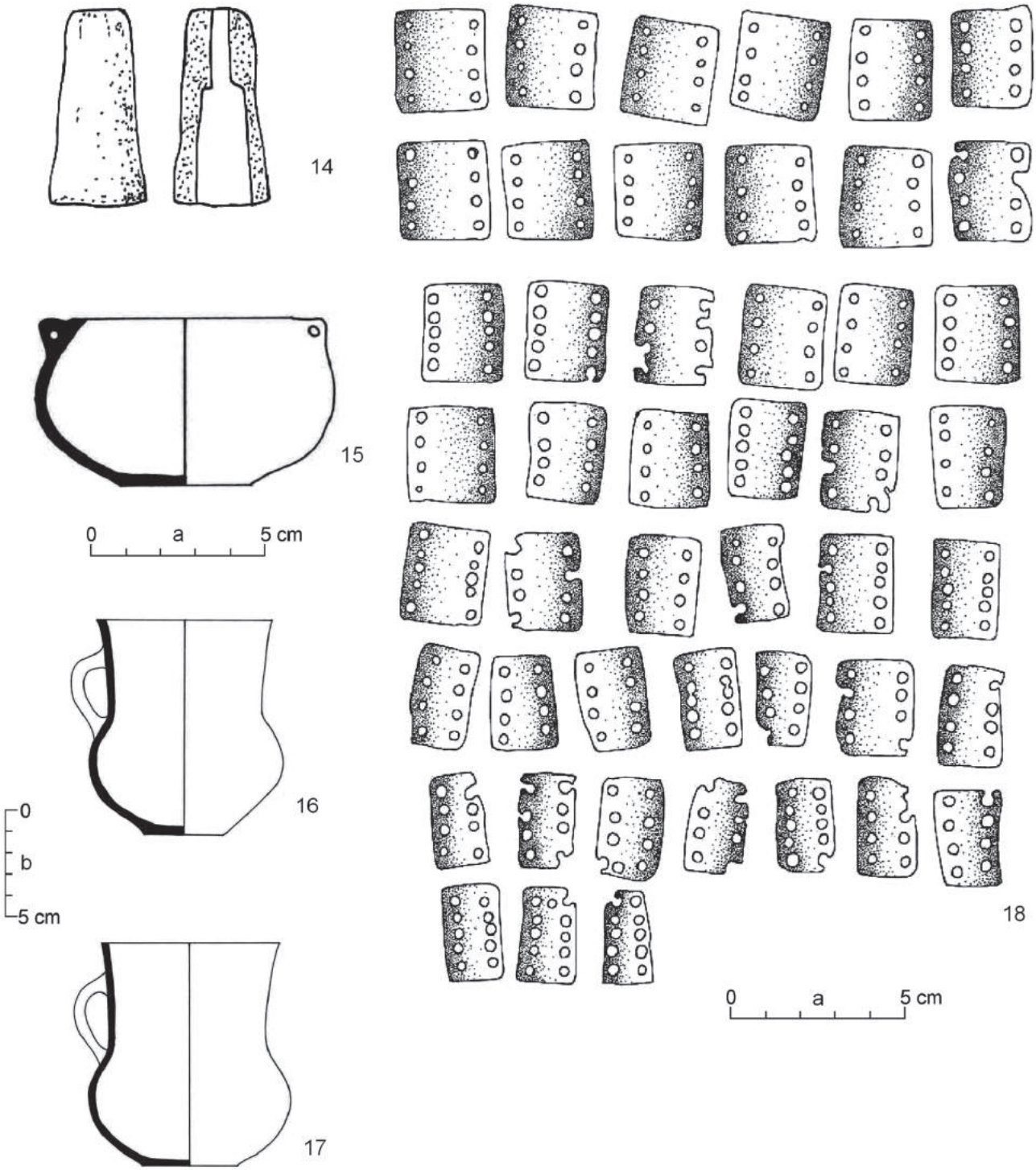


Fig. 44. Nižná Myšľa, grave no. 280. Furnishings of a metallurgist's burial (after Jaeger, Olexa 2014).

ed as tools used to hold hot crucibles or ladles. Grave no. 280 yielded more objects unequivocally related to metallurgy: a casting mould (Fig. 43:12), a tuyère (Fig. 44:14) and a heavy hammer for crushing ore (Fig. 43:13).

The two graves differ not only in their grave goods but also in the overall richness of their furnishings. Unlike grave 133, in which the deceased had been given only a small bronze ornament and two flints, grave 280 held many bronze ornaments, an antler clasp, and an exceptionally large set of boar tusk implements (Fig. 44). A special arrangement of the latter in Nižna Myšľa graves suggests that in some cases they were an element of clothing in the form of an 'armour' (Fig. 43). The few dead, in whose graves similar implements were discovered, are viewed as individuals of special social status (Olexa 2002a: 77-78, 83).

The above data suggests that the two graves are features which can be classified as 'metallurgists' burials'. The clear difference in the richness of their furnishings possibly reflects a different valorisation of the dead as metallurgists. Suggested in the literature, the dual character of metalworking (Rowlands 1971; Levy 1991; Kuijpers 2008) assumes that artisans practising the same craft could have differed in their qualifications. Experience, individual skill and aptitude could have narrowed down specializations and brought about social stratification of individuals engaged in metalworking. Grave no. 133 held only objects related to the casting of metal in moulds while grave no. 280 supplied finds suggesting that the deceased had broader qualifications, including mechanical (hammer) and heat (tuyère) working of ore and casting specific objects (casting mould and a finished specimen of a pin) (Jaeger, Olexa 2014: 170-172). Both craftsmen, given the convergent dates of burial determined by means of radiocarbon dating (Jaeger, Olexa 2014: 170), were active in the settlement at the same time, performing works which varied in terms of difficulty and required different skills.

A special characteristic of the Nižna Myšľa site, numerous faience beads[32] show that the local community mastered pyrotechnics. The technology of making them called for high temperatures, which are present in the metallurgical process (Olexa 1987: 258). As it seems, faience could have been a secondary effect (not a side effect) of the work of local metallurgists.

The above review of available data concerning metallurgy as practised at Otomani-Füzesabony fortified settlements permits to draw some general conclusions. What strikes the eye in the first place is the universality and variety of the discovered sources, which is a hallmark of the sites. It must be stressed that they include many not only ready-made goods (a potential effect of exchange) but also objects related to metalworking such as moulds, crucibles, ladles, tuyères, semi-finished products and waste. No settlement, however, has yielded so far any furnaces or other features that would identify a metallurgist's workshop[33].

A good example is the settlement at Nižna Myšľa where many years of investigations accumulated sources showing that local communities were in large measure self-sufficient in respect of both procurement of raw materials and all the other stages of copper/bronze and gold working.

Casting moulds found at fortified settlements certainly do not illustrate the full range of manufactured goods. That some of them (e.g. swords and hatchets) were locally made is to be guessed. Next to the objects that were important in everyday economic life (axes, chisels, hooks etc.), non-utilitarian or symbolic goods were manufactured as well (richly decorated daggers, hatchets, swords, gold and bronze ornaments). The metallurgists' burials at

[32] Close to the richer of the metallurgists' graves (no. 280) a double burial of a woman and a girl was discovered (no. 282/283). Next to bone tools, bronze ornaments and pottery, there was found also a necklace of ca. 2500 faience beads (Olexa, Novaček 2013: 105, 271-273, Tab. 137-139).

[33] Despite many excavation projects carried out at fortified settlements in the Carpathian Basin or, more broadly, southeast Europe, discoveries of metallurgist's workshops are absolutely rare. One can name, in this context, above described feature at Lovasberény-Mihályvár and a well-documented workshop from the settlement at Feudvar (Hänsel 2009: 112, Abb. 117).

Nižna Myšľa justify a presumption of the existence of not only craftsmen of different status but also recipients of different needs. Some of them demanded objects of special forms and ornaments to be used in the process of cultural and social reproduction. One of its presumed manifestations, the rich deposits of the Hajdúsámson-Apa horizon are in large measure associated with the Otomani-Füzesabony milieu.

In the monograph on the metallurgy of fortified settlements in Slovakia mentioned earlier, its author claimed that metallurgist's workshops were only locally significant (Novotná 1983: 67). In her opinion, local metallurgists in the first place catered for the demand from settlement inhabitants and their neighbours. I believe that in the light of current knowledge this view has to be revised by pointing to a potentially greater role of metallurgy at Otomani-Füzesabony fortified settlements.

Many years of investigations at the cemetery at Nižna Myšľa revealed metal arte-

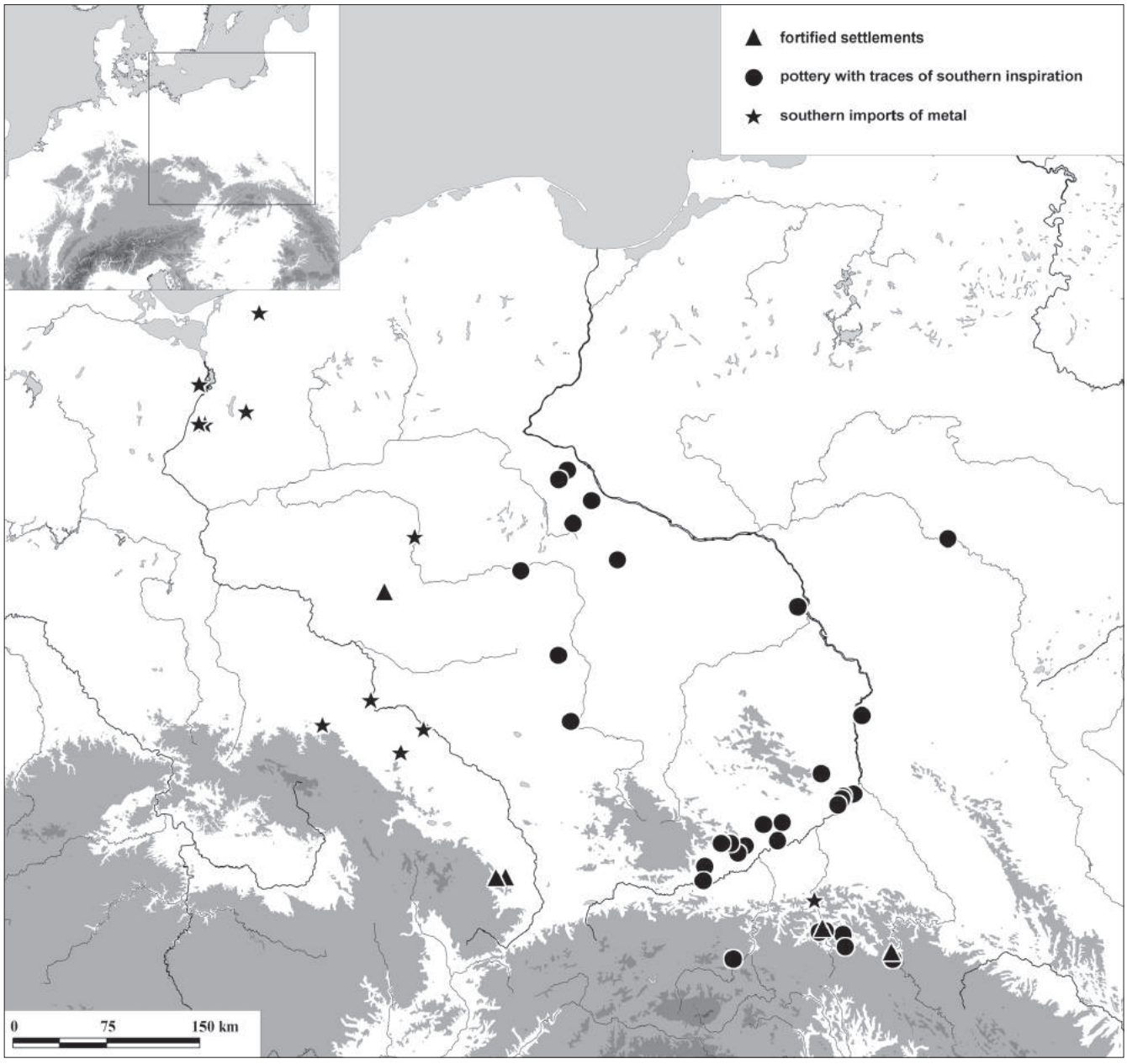


Fig. 45. Distribution of fortified settlements, pottery with traces of Carpathian influences and Carpathian bronze imports in the territory of Poland (after Jaeger 2011).

facts in a vast majority of excavated graves. These were chiefly bronze and gold objects (Olexa, Nováček 2013).

Large numbers of metal objects found in Nižna Myšľa and strong evidence of local metalworking may, in principle, support a conclusion that bronze (and gold) objects were made to satisfy local needs, i.e. those of settlement inhabitants and their neighbours. However, if the hypothesis about the dual nature of metalworking at the site is accepted, it can be claimed, I believe, that at least at some Otomani-Füzesabony fortified settlements the significance of metallurgy extended beyond their immediate vicinity. After all, the hypothesis is indirectly confirmed by the difference in the amount of grave goods in the metallurgists' graves at Nižna Myšľa. Some high quality goods (e.g. swords, hatchets, gold ornaments), made to meet the needs of local elites, could have been exchanged by them with populations living in other regions (David 1998: 252-254; 2002: 410-416; Kristiansen, Larsson 2005: 147, 149).

The Carpathian Basin, owing to local deposits of copper ores, grew in importance after the times when Únětice circle metallurgy dominated. Fortified settlements as local manufacturing centres, lying at strategic topographic locations, began to develop their own style and a network of ties. The ties extended both south and north (Sherratt 1993: 26-27, Fig. 7). The dynamically developing methods of chemical analyses of metal objects systematically provide new particulars which add to our knowledge about the relationships between the metallurgy of the Carpathian Basin and the areas in the north (Scandinavia – Liversage 2000; Ling et al. 2014; Poland – Hensel, Dąbrowski 2005). However, despite the accrual of new information, the notion presupposing prevalent influence of the Carpathian communities on the development of the Nordic Bronze Age still appears to be valid (Vandkilde 2014).

The literature carries claims about the presence of Trans-Carpathian elements in the lands of today's Poland; the alleged imports are supposedly visible above all in pottery linked to the Trzciniec cultural circle. The purported southern presence can be partially traced to the impact of Otomani-Füzesabony culture settlement in the Lower Beskids/Western Carpathians (Makarowicz 1999; Górski 2003; Przybyła, Skoneczna 2011; Przybyła, Skoneczna, Vitoš 2012). However, the influx of characteristic metal artefacts of Trans-Carpathian provenance (associated chiefly with the Otomani-Füzesabony culture) can also point to an alternative route of transmission of cultural stimuli from that area (Fig. 45). Such objects concentrate mainly in western Poland, in Silesia, Wielkopolska and Western Pomerania (Jaeger 2011; Swieder 2013).

Among them hatchets with button-shaped butts, Apa-type swords with full handles and small ornaments (Fig. 46). They are known not only from single finds but also from deposits which, on the strength of some forms and a characteristic structure, may be called Koszider-type hoards. The character of metal imports from beyond the Carpathians found in western Poland (richly ornamented, high quality objects, deposits) justifies treating them as a result of the transmission of Otomani-Füzesabony cultural patterns to northern Europe. An area that absorbed new patterns particularly well was Scandinavia (Sherratt 1993: 29; Thrane 1990; Kristiansen, Larsson 2005: 186-227), where some innovations, traced to the Carpathian Basin (above all, chariots and Apa-type full-hilted swords), were incorporated into the tools and weapons of local elites (Kristiansen, Larsson 2005: 213-225; Jaeger, Olexa 2014: 172-173).

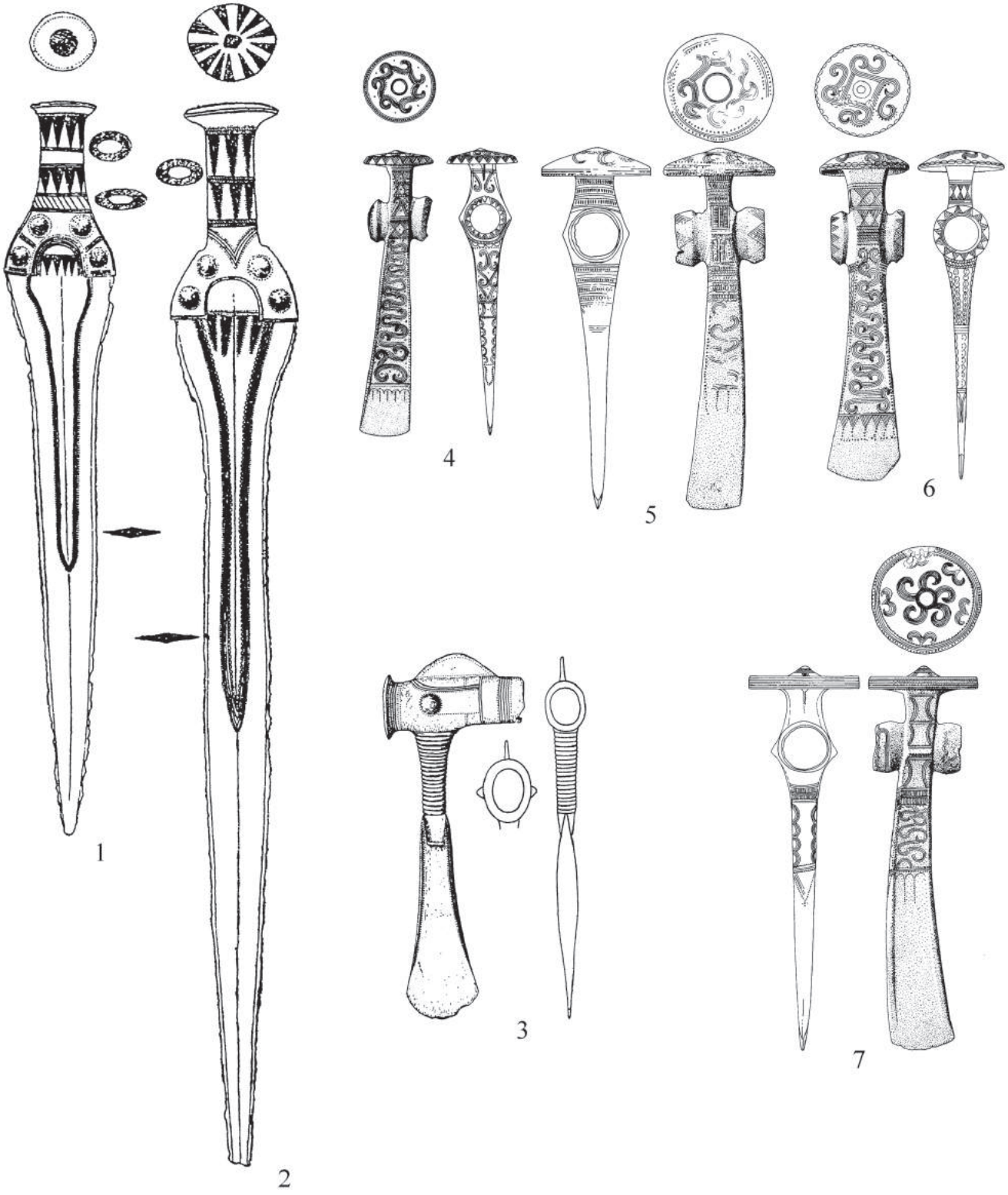


Fig. 46. Selection of metal imports of Carpathian origin from the area of Poland:
1-2 – Rożnowo, 3 – Przećmino, 4 – Cisek, 5 – Gliniany, 6 – Kurcewo, 7 – Mirosławice (after Jaeger 2011).

6.5. Chronology

The discussions of the complex issue of Otomani-Füzesabony culture chronology throughout its oecumene are based mainly on typological studies of pottery and metal objects conducted in an almost total absence of absolute age measurements (Boroffka 1999; Kacsó 1999; Thomas 2008)[34]. Crucial for this work, the Otomani-Füzesabony culture chronology in Slovakia is no exception in this respect. For we do not have many radiocarbon measurements for Slovakia that could help make typochronological sequences suggested in the literature more precise with respect to the first half of the 2nd millennium BC (Furmánek, Veliačik, Vladár 1999: 17, Tabelle 2; Barta 2001; Görsdorf, Marková, Furmánek 2004: 79).

In the course of the long history of Otomani-Füzesabony culture investigations in Slovakia, several different chronological sequences and approaches to its internal development have been proposed (Bader 1998: 65-69). The most recent sequence, used also in relation to the Otomani settlement enclave in the Lower Beskids in Poland, divides Otomani-Füzesabony culture development into three basic periods and subdivides it still further into phases, namely, early (old Otomani phase, pre-classic phase), classic (older classic phase, younger classic phase) and late (post-classic phase, decline phase) (Gašaj 2002c: 94). This approach to the Otomani-Füzesabony culture development, however, bears no precise relationship to the calendar age (Bader 1998: 69) and its individual stages are not clearly defined with respect to all source aspects. The chief category of artefacts that is studied is pottery. In the pottery-making of the early period of Otomani-Füzesabony culture development in Slovakia, one can trace in the first place the impact of Košťany and Hatvan cultures (Thomas 2008: 339-341). The period predates the rise of Otomani-Füzesabony fortified settlements in Slovakia (Gašaj 2002c: 97). For the defensive structure of the Hatvan culture at Včelince, a radiocarbon date of 3518±37 BP (1890-1750 BC) was obtained and linked to the Hatvan-Otomani horizon distinguished at the site (Görsdorf, Marková, Furmánek 2004: 89).

The older phase of the Otomani-Füzesabony classic period (correlated with the transition between BA2 and BB1) supposedly witnessed the rise of the fortified settlements at Košice-Barca, Rozhanovce, Nižna Myšľa and Spišský Štvrtok[35] (David 1998: 239-241). The most common pottery forms in this period are jugs and shallow bowls with a low, horizontal or oblique, bend of the belly, amphorae with two handles, cups and bowls with their lips turned inward. Distinctive ornaments include large bosses, occurring alone or in combination with incised or fluted circumambient spirals. This phase witnessed also the occurrence of characteristic portable furnaces (pyraunoi) (Fischl, Kiss, Kulcsár 2001: 126-127; Romsauer 2003: 62) and figural art in the form of anthropomorphic representations (simplified female idols) (Gašaj 2002b: 38, Fot. 26; 2002c: 97, 99; Olexa 2002b: 88, Fot. 102).

In the younger phase of the classic period, a new stage of building fortified settlements took place. It is then that the second settlement at Nižna Myšľa and the settlement at Košice-Barca were built and the settlement at Rozhanovce was reconstructed (David 1998: 246-247; Gašaj 2002c: 100). In this period, the leading ceramic forms included S-profiled pots with flat or slightly marked bottoms and the so-called sun amphorae. At its apogee were distinctive spiral ornaments of pottery and objects of

[34] A large set of radiocarbon measurements related to the Otomani-Füzesabony culture in Hungary is included in the catalogue *Bronzezeit in Ungarn* (Raczky, Hertelendi, Horváth 1992). As in the case of dates referring to the Vatya culture discussed elsewhere, however, also Otomani-Füzesabony culture dates lack exact information on their context, kinds of analyzed samples and associated artefacts. More dates from Hungary are given in the publication by Forenbaher (1993: 244).

[35] Slovak researchers traditionally consider the settlement at Spišský Štvrtok the youngest Otomani-Füzesabony fortified settlement in eastern Slovakia and link it to the post-classic period, roughly synchronized with period BB1 (Gašaj 2002c: 100).

antler, bone and bronze (Gašaj 2002c: 100). The Otomani-Füzesabony culture post-classic period is associated with ceramic forms typical of the cemetery at Streda nad Bodrogom, the name of which has become a synonym of the late development period of the Otomani-Füzesabony culture. Forms distinctive of this period include large and small jugs, bowls and amphorae on an empty foot (in the form a ring). Pottery ornaments feature sharp, pointed bosses, relief fins, as well pushed and incised ornaments. A significant marker of this stage of Otomani-Füzesabony culture development is a boom in gold and bronze production – manufactured objects included daggers, spearheads, pins with plate-shaped heads and plate-like pendants. Some settlements yielded deposits dated to the post-classic stage, for instance, hoards of plate-like pendants from Nižna Myšľa, of crescentic pendants from Spišský Štvrtok, and deposits of ornaments from Košice-Barca (Vladár 1973: 312, Abb. 65; Mozsolics 1988; David 1998: 246-247 with footnote 86; Gašaj 2002b: 30, Fot. 18). This stage should be also linked to a large group of finds of pins with a plate-shaped head discovered at Nižna Myšľa and Spišský Štvrtok (David 1998b; Gašaj 2002b: 40, Fot. 33; Olexa 2002a: 80, Fot. 92). The metalworking of this stage is related to the development of Koszider style.

There is no exact chronological data concerning the period of decline of the Otomani-Füzesabony culture in Slovakia. However, there is source evidence indicating the lapsing of this cultural tradition and its coexistence with the Piliny culture at the beginning of phase BB2 (Gašaj 2002c: 100). Layer II of the Včelince settlement yielded two radiocarbon dates linked to the early phase of the Piliny culture (Bln-5557, 3225±44 BP, 1530-1430 BC; Bln-5558, 3200±32 BP, 1500-1430 BC; Görsdorf, Marková, Furmánek 2004: 90). The site is the only example of an Otomani-Füzesabony settlement (in this case without any fortifications) for which we have well-documented radiocarbon dates, accompanied by full contextual information and published together with relevant ceramic artefacts.

In the case of Otomani-Füzesabony fortified settlements, absolute age measurements are available only for Nižna Myšľa. With respect to the earlier settlement, no dates from the settlement features have been obtained. So far, only two radiocarbon dates have been published relating to the grave of metallurgists, from a burial site associated with the first settlement. Their age is estimated between 1965 and 1754 BC (Jaeger, Olexa 2014: 170). In the later settlement, samples from four storage pits have been dated (pits no.: 89, 112, 120a, 470)[36].

In all likelihood, three dates were obtained from the samples of charcoal (dates Bln-2776, Bln-2810, Bln-2811), which may follow from a piece of information to be found in a publication. Its author mentions a discovery of charcoals in pits located within the younger settlement and sending them to radiocarbon dating (Olexa 1992: 193). Only in the case of date MKL-367 is it certain that it was made from charred grains. A combined calibration of all the dates from Nižna Myšľa sets a relatively long period from 1800 to 1250 BC (Fig. 47). It must be observed, however, that in spite of three dates, obtained by the Berlin laboratory, being coincident, they carry the risk of being made older than they are due to the old wood effect. Unquestionably, the most certain of the dates is the one designated as MKL-367 as it was made from a short-lived sample of charred grains. The date, setting the period of 1450-1260 BC, is a crucial information, attesting to the long life of the fortified settlement at Nižna Myšľa, going far beyond the traditional time frame of the Koszider horizon. It is associated with the end of fortified settlements in the Carpathian Basin (see chapter 5.5). Accepting the hypothesis about so long a life of the

[36] In the publication *Die Bronzezeit im slowakichen Raum,* in a list of ^{14}C dates from Slovakia, the dates from Nižna Myšľa (from pits 89, 112, 120a) are mistakenly described as coming from a cemetery (Furmánek, Veliačik, Vladár 1999: 17, Tabelle 2). Moreover, the date designated as Bln-2811 can be found in two publications with different values (3380±50, Furmánek, Veliačik, Vladár 1999: 17, Tabelle 2; 3480±50, Görsdorf, Marková, Furmánek 2004: 90). This inconsistency is not explained in any way. The date from pit no. 470 has not been published. I know about it thanks to Dr. Ladislav Olexa, for which I am grateful.

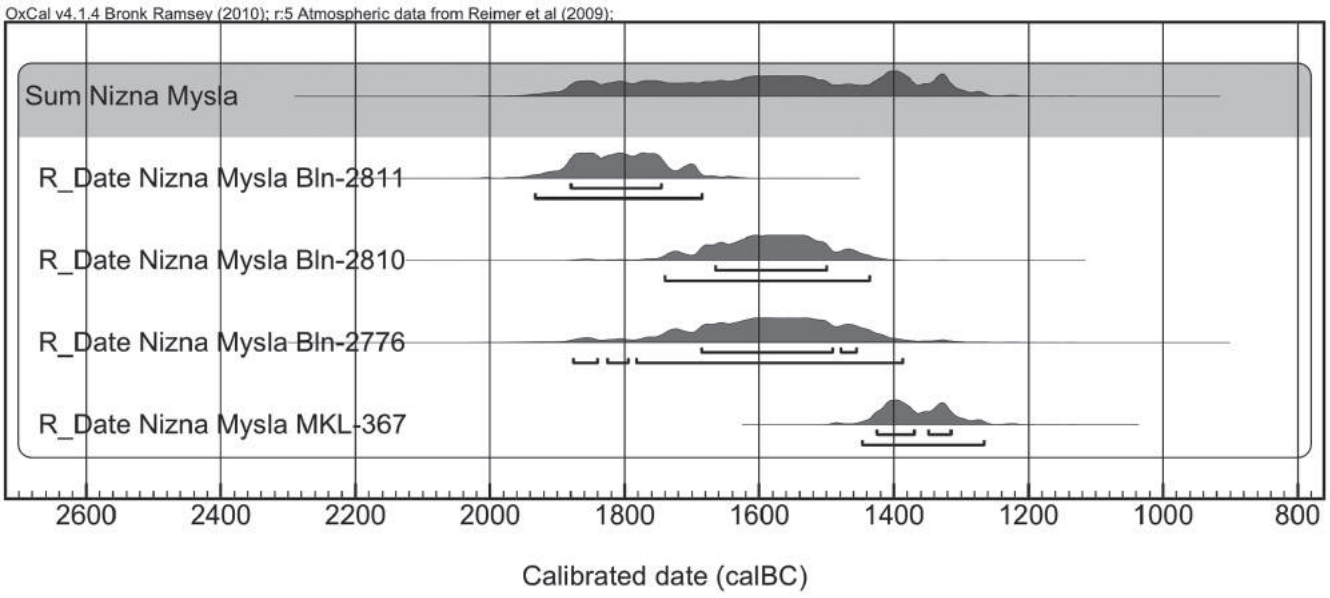


Fig. 47. Nižna Myšľa. The sum of probability distribution of radiocarbon dates related to the younger settlement (after Furmánek, Veliačik, Vladár 1999; L. Olexa unpublished).

settlement at Nižna Myšľa casts doubt on the development of fortified settlements and the Otomani-Füzesabony culture itself in Slovakia, mentioned in the literature. In Vladár's approach, it supposedly looked as follows. Relying on stratigraphic observations, he correlated the beginnings of the settlement at Košice-Barca (layer III) with BA2, while layer I (1-3) and horizon II of the Spišský Štvrtok settlement, he correlated with BA3; the youngest Otomani-Füzesabony fortified settlement in Slovakia was supposedly that represented by the remains of horizon I of the Spišský Štvrtok settlement, associated with z BB1 (Vladár 1977: 181). The process must have been more complicated.

Since the radiocarbon dates for Nižna Myšľa lack full information on relevant artefacts (ceramics), the dates are not helpful in making the accepted typochronological sequences more accurate.

6.6. Summary: role and function of Otomani-Füzesabony fortified settlements

It is the above mentioned region that has given birth to the best known fortified settlements, which have revealed several spectacular finds. It is also thanks to these Otomani-Füzesabony defensive structures that such sites began to be associated with the creation and maintenance of long-distance communication networks. In the above traditional view, however, these settlements represented cultural agglomerations under the direct genetic influence of the Minoan and Mycenaean cultures (Vladár 1973; Kristiansen, Larsson 2005: 161-163, Fig. 65).

Views attributing Aegean origins to Otomani-Füzesabony fortification architecture were based on only a few traits ascribed to particular settlements. Thus in this context the following were given in support: the 'urban planning' of interior design in the Košice-Barca settlement, the regular style and stone architecture (ramparts, bastions), interior division (existence of the acropolis and parts of the artisan settlement on the outskirts at the Spišský Štvrtok site) (Vladár 1973: 280-293; Jockenhövel 1990: 215-216, Fig. 4; Gašaj 2002b: 39; Gogâltan 2010: 28, 31) as well as the assumed Minoan and Mycenaean architectural and functional elements transposed in well known constructions in the Carpathian Basin (Kristiansen, Larsson 2005: 162). In fact, however, as far as Slovakian Otoma-

ni-Füzesabony settlements are concerned, finds that speak clearly of their provenance do not exist or cannot be verified (Jaeger 2014).

Apart from architectural elements, influences from the Aegean-Anatolian area (in particular the Mycenaean culture) were hailed as further evidence of the above in the categories of relics discovered in Otomani-Füzesabony fortified settlements. Foremost in this regard were particular forms of spiral[37] ornamentation present on bone and metal objects. These were considered to be directly analogous in respect to iconographic elements and material finds of the Aegean Bronze Age and to have arisen under the influence of contacts with the Minoan (Kristiansen, Larsson 2005: 161) and Mycenaean cultures (Vladár 1973: 296-318).

As stated above, these archaeological finds under research do not provide a credible justification to consider the above mentioned as examples of 'Mycenaean origin' architecture. As in the case of the Spišský Štvrtok settlement and that of Košice-Barca, it is most likely that the stratigraphy and chronology of sites was not interpreted correctly (Jaeger 2014). The most far-reaching conclusions concerning these sites still remain little more than propositions, rather than documented research based on appropriate data drawn from finds. This is especially clear in the case of the hypothetical division of the settlements and the extent of organisation in settlement constructions.

An assessment of spiral ornamentation as a trait providing evidence that long-distance contacts of Otomani-Füzesabony communities existed is potentially a more complex proposition.

It may be argued therefore that our present store of knowledge in regard to some materials with this characteristic ornamentation does in fact stand as evidence of supra-regional communication networks. Not only the Carpathian Basin and Peloponnesus were to be found in this context but also Anatolia and the Northern Pontic area (David 2001: 73; 2007: 416; Maran, Van de Moortel 2014).

The phenomenon of a wide dissemination of such ornamented goods with so-called *karpatenländisch-ostmediterrane Wellenbandornamentik* is clearly limited in time to the turn of the Early and Middle Bronze Age (according to Reinecke; David 2001: 72). This is, no doubt, related to the functioning of a larger network of circulation, both in terms of material culture and its elements as well as its views of the world, as may testify the nature of goods ornamented in a particular way. The latest find of horse-bridle piece from the LHI of the site in Mitrou, Greece, reveals the complex nature of the long-range relationships linking Bronze Age communities across Europe. The hitherto dominant notion presuming the culture-building and civilisational impact of Aegean influences on the communities northwards (e.g. Carpathian ones) does not hold valid anymore. At its peak development, Mycenaean culture was largely a "taker" of specific goods (and ideas? cf. the solar connotations of amber; Czebreszuk 2011: 164-171) originating from remote parts of the continent (Maran, Van de Moortel 2014: 543-545).

Among the societies of the Carpathian Bronze Age, spiral ornamentation appears primarily on elements of horse harness and weapons, equipment related to the emerging warrior ideology (Kristiansen, Larsson 2005: 217; Maran, Van de Moortel 2014).

It is in this context that particular metal goods of hoards found in the Hajdúsámson-Apa horizon ought to be viewed (Fig. 48). Its deposits were entirely of weapons, some made with high precision and their rich spiral ornamentation very often was of a highly individual nature[38]. These traits allow us to assume they were prestige items, certainly not ones fulfilling a practical function. The unique, highly individual

[37] Ornamentation described as 'spiral' in this context is a deliberate simplification on the part of the author. For a detailed study of ornamentation of goods out of bone, antlers and metal, and a relevant typology please see David (2007: 412).

[38] As perfectly exemplified by the hilt pommel of sword no 1 from the Apa hoard. Though during comparative studies its similarity in this context has been suggested to that of goods discovered in the Carpathian Basin, Aegean area and even Egypt, research is yet to demonstrate a convincing analogy for this (Bader 1990: 204-205).

Fig. 48. The hoard from Hajdúsámson (after Bóna 1992b).

form notwithstanding of some of these weapons, they were deposited en masse, beyond the direct context of settlements, cemetery complexes or individual graves.

This fact would seem to indicate the 'communal' nature of deposits and is an argument for the existence of groups bearing a unique, elite social status (Kristiansen, Larsson 2005: 215). In contrast to Únětice culture communities where the existence of distinguished individuals is documented by exceptional and singular 'princely graves', the Otomani-Füzesabony culture would appear to function on different social terms. Thus a significant number of graves furnished with goods of bronze and gold at the Nižná Myšľa cemetery complex demonstrates a society at a very advanced stage of development, one where new raw materials were made available to a wider

cross-section of its community. Further, a productive system of economy based on farming, animal husbandry and local deposits of copper and gold brought gains to all the community, though no doubt there were visible differences in the society itself. It can be said that to a large extent the strength of the elites was based on the organisation and maintenance of long-distance contacts.

Elements of the horse harness no doubt are related in part to the innovation that the chariot represented. This vehicle could be said to be a common denominator connecting all the above mentioned areas that were interactive (Pare 2004: 356). Moreover, it was an important element of the reconstructed ideology of the member-warrior of the elite in covering distances for travel. This vehicle was by no means revolutionary, however, in the field of battle but meant to underscore the prestige and particular status of its owner.

The elements of horse harness, foremost the cheekpiece made out of bone and antlers (to a lesser degree also clay models of spoked wheels) discovered at fortified settlements may prove that local communities were familiar with the chariot (Vladár 1971; Olexa 2003: 88, Table XXIII; Boroffka 2004). The appearance of this invention that become tradition among the cultures of the Carpathian Basin during the Bronze Age for a long time was perceived as the effect of cultural impact from the Aegean area (Vladár 1973: 299; Bader 1990: 185). At present, however, the spread of the chariot is approached as a more complex process, in which particular innovations disseminated from the north to the south of Europe (Maran, Van de Moortel 2014).

Although at present the documented finds bearing spiral ornamentation from the North Pontic area are the ones with the least documentation (David 2001: 53-57), there is no doubt that this region played a key part in the spread of chariot. Apart from the invention itself of such form of transport, the North Pontic area was no doubt the origin, at least in part, of horses exploited in distant regions of the Carpathian Basin, Anatolia and the Aegean (Sherratt 1993: 26; Kristiansen, Larsson 2005: 185). The oldest finds testify to the use of a light, two-wheel vehicle pulled by horses, have their origins in the Abashevo culture and are dated to the turn of the 3rd and 2nd millennium BC (Epimachov, Korjakova 2004: 231-233).

From the region between the Volga and southern Urals, the chariot found its way to the Carpathian Basin and a little later, to the Aegean (Pare 2004: 356). Material evidence of this comes in the form of the cheekpiece and its circulation (Kristiansen 2004: 448, Fig. 3; Makarowicz 2009: 325, Fig. 20). Apart from numerous finds in the Carpathian Basin, the cheekpiece is known from several sites in present-day Poland (Makarowicz 2010: 354-355) and the fortified settlements in south Germany as well as Toos-Waldi in Switzerland (Burgi 1982; Rind 1999: 160). The latter suggests that some of the finds ought to be associated with the exploitation of this animal for riding horseback. Both of these settlements are located in mountainous areas where the possibilities of using the chariot were highly limited.

Particular finds that testify to the acceptance of the chariot as an innovation came from Scandinavia. It is most probable that the Carpathian Basin was also in this context a circulation point. In the Nordic region, the chariot became an important element of the social apparatus of elites, often presented in the unique forms of rock art (Randsborg 1993; Coles 2002; Larsson 2004; Kristiansen, Larsson 2005: 220-223).

In regions that were part of a communication network it is clear there existed a small, elite group interested in owning and using this prestigious vehicle. In reality, the Bronze Age saw the chariot as an indisputably luxury object. The level of technical complexity of its construction and the need for owning and keeping the right animals meant that this two-wheel transport was not affordable on a wider scale. The complex knowledge required and training of horses in this context excludes the formation of a long chain in the transfer of information. It is most likely therefore that such a transfer took place with the aid of specialists travelling from one geographical point to another (Kristiansen, Larsson 2005: 170-186).

The activeness of Otomani-Füzesabony communities in the creation of inter-regional ties did not limit itself only to contacts from the Aegean and Anatolian areas. On the contrary, it could be argued that of greater significance for the functioning of local agglomerations was the growth and maintenance of relations with regions to the north of the Carpathian Basin as well as those within it. The expansive nature of Otomani-Füzesabony culture models and their dissemination ought to be foremost seen in terms of its rich and attractive metallurgy design forms, raw materials such as copper and gold, amber as well as the above mentioned elements of the horse harness. The impact of metallurgy from the Carpathian drainage area reached the circles of the late Únětice culture as well as communities in Scandinavia.

An excellent illustration of the high value attached to Carpathian imports are the swords from Nebra. Their original value underscored not only the unique disc presenting a map of the sky but a one of its kind gilded ornamentation of the sword hilt (Meller 2002). Another particular example in this context is the discovery of a unique halberd from Przećmino (Fig. 46:3). The only known analogies for this object are those of the Otomani-Füzesabony cemetery in Tiszafüred (Kovács 1992; 1996, 100-101, Fig. 6:1, 7:1-2), which represent only some of the instances of the halberds penetrating the Carpathian communities (Kovács 1996).

In the case of the Nordic region it can be said that a particular development of spiral ornamentation occurred in the local metallurgic production directly as a result of the impact of Otomani-Füzesabony models (Thrane 1990: 176-178; Sherratt 1993: 29; Kemenczei 2004: 169; Kristiansen, Larsson 2005: 186-227). The Nordic region became a secondary centre of full-hilt swords modelled on those of the Apa type (Bergerbrant 2013) (Fig. 49). In addition, no doubt the ceremonial forms of Scandinavian axes were derivative examples of hatchets from the Carpathian Basin area (Kristiansen, Larsson 2005: 195, Fig. 84).

Metal goods associated with the Otomani-Füzesabony communities also reached in significant numbers Polish territories as well as regions further to the east, around the Dnieper and Dniester, In the oecumene of the Trzciniec cultural circle (Makarowicz 2009: 311-321; Jaeger 2011; Makarowicz 2010: 338-341).

Next to finished goods, of far greater significance as a means of exchange between the Otomani-Füzesabony societies and communities north of the Carpathian Arch were copper and gold. From the former region of Otomani-Füzesabony it can be said came probably at least part of raw materials for the working of bronze and gold, which made their way to the Polish Lowland and Scandinavia (chapter 6.4). The Otomani-Füzesabony societies took a leading role in the development of central European bronze metallurgy after the downfall of the Únětice agglomerations (Sherratt 1993: 29).

The above mentioned finds mark out the influence of Otomani-Füzesabony communities. Their interest in the northern part of Europe was no doubt related to the deposits of Baltic amber as evidenced by numerous discoveries of amber beads from Otomani-Füzesabony settlements (Marková 2003: 340; Makarowicz 2010: 336, Fig. 6.1), out of which were made necklaces of mixed formation (amber, animal teeth, bronze and faience). In this context research has unearthed a veritable mine of riches in the settlements of Košice-Barca and Nižná Myšľa (Gašaj 2002b: 22, Fot. 3; Olexa 2003: F33, 41, 63) (Fig. 50).

In addition to exploiting succinite for their own needs, the local cultures were most likely engaged in its exchange. In this context the Otomani-Füzesabony settlement network proved to be an important link on the route where amber made its way from the Baltic coast and North Sea onto Mycenaean communities (Harding, Hughes-Brock 1974; Czebreszuk 2007; 2011).

As mentioned earlier, in considering the importance of Otomani-Füzesabony fortified settlements as centres of trade and exchange, in addition to the importance of long-distance relations, it is important to emphasise also the vital nature of Otomani-Füzesabony model designs and their dissemination into neighbouring cultures.

The functioning of described societies within the Carpathian network of contacts is supported by numerous finds. Here, it is

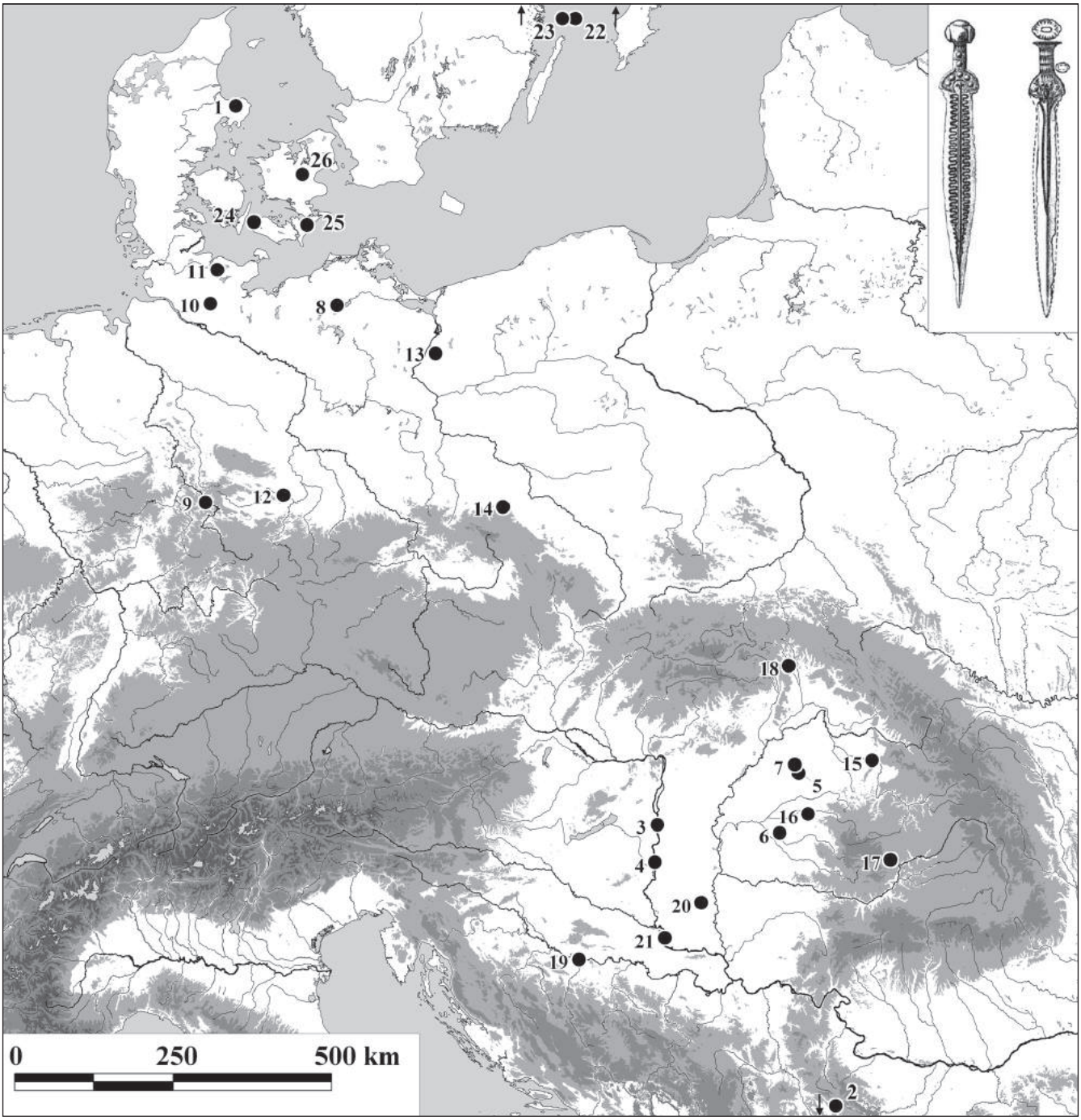


Fig. 49. Distribution of swords with solid hilts referring to the Apa type:
1 – Dystrup, 2 – Pella, 3 – Dunavecse, 4 – Fajsz, 5 – Hajdúsámson, 6 – Sarkadkeresztúr, 7 – Téglás, 8 – Alt Sührkow, 9 – Eschwege, 10 – Oering, 11 – Rastorf, 12 – Nebra (2 specimens), 13 – Rożnowo, 14 – Złotoryja, 15 – Apa (2 specimens), 16 – Oradea, 17 – Rimetea, 18 – Topl'a-Fluss, 19 – Donja Dolina, 20 – Tornjoš (Törniospuszta), 21 – Vajska, 22 – Bragby, 23 – Mosstugan, 24 – Stensgård, 25 – Torupgård, 26 – Sandbygård (after Bartík, Furmánek 2004 with the author's supplements).

Fig. 50. Nižná Myšľa. Amber ornaments (photograph L. Olexa).

necessary to point out the vast circulation of hoards similar to Hajdúsámson-Apa, and the presence in these collections of hatchets from a variety of regions (*Nackenscheiben-*, *Nackenkamm-* and *Schaflochäxte*) (David 2002). Moreover, in hoards analogous to Koszider, apart from the variety of regions represented, there were cultural elements that had crossed previous geographic and cultural borders, which manifested themselves subsequently in an intensification of intra-regional exchange and contacts (Novotná 1998: 357; Marková 2005).

One particularly relevant illustration of the above are particular ornaments (*Lockenringe*). These would appear to create an extra-cultural item that is eagerly accepted by representatives of the privileged classes. Their unique value lies foremost in the fact that they are often made from gold and many such have been found in comprehensive settlement deposits. These hoards and single finds of gold and bronze have their origins in the settlements of Košice-Barca, Nižná Myšľa and Spišský Štvrtok (Gašaj 2002b: 24, 40, 46, Fot. 6, 30, 47) and several other sites (often also fortified) that are associated with neighbouring cultures (Mozsolics 1988: 35-36; Hänsel, Weihermann 2000; Kadrow 2001: 90-91; David 1998a: 252-253).

At the above mentioned area of Slovakia under discussion, apart from the Otomani-Füzesabony oecumene, associated finds whose concentration is particularly visible around the upper Hron (Furmánek, Marková 1999: 74, Fig. 1), are known to have their provenance in the western and to a lesser extent, central part. Both pottery and bronze goods associated with the Otomani-Füzesabony culture are from sites of all the neighbouring cultural areas through time (Maďarovce, Hatvan and Encrusted Pottery cultures) in Slovakia, including the fortified settlements of Nitriansky Hrádok, Malé Kosihy and open settlement in Včelince (Furmánek 2003: 100-101; Furmánek, Marková 1992; 1999).

The last mentioned of these sites is a particularly notable example of a process of diffusion in Otomani-Füzesabony settlements. The appearance of Otomani-

-Füzesabony pottery stylistic at the initially fortified settlement of Hatvan can be seen in the transitory horizon (Hatvan-Otomani) of settlements (Görsdorf, Marková, Furmánek 2004: 80). The appearance of Otomani-Füzesabony in areas hitherto occupied by the Hatvan culture has been documented at several Hungarian sites. The degree to which pottery styles became 'integrated' in many cases is so significant that it has led in fact to problems now in documenting the cultural provenance in the case of particular sites (Stanczik, Tárnoki 1992: 125; Dani, Máthé, Szabó 2003: 94; Thomas 2008: 289-291).

The emergence of Otomani-Füzesabony culture elements in Slovakia beyond the oecumene of the eastern territories ought to be seen in the light of a further process of dissemination into the lands north of the Carpathian Arch. The archaeological finds in this context allow to accept the hypothesis of there existing two independent communication routes that exercised influence beyond the Carpathian in present-day Poland and Scandinavia. The first, the eastern, is associated with the rise of an Otomani-Füzesabony settlement enclave in the Polish part of the Carpathians (Lower Beskids) and the activation of Trzciniec communities in the creation of a route linking the Carpathian Basin with the territories of the Vistula estuary (Makarowicz 1999; 2010: 337). The second route with a long Neolithic tradition (Sherratt 1993: 21, Fig. 6, bottom; Jaeger 2011: 182-183), on the other hand began to play a significant role, mediating the cultural circle of Maď arovce-Věteřov--Böheimkirchen and that of the route leading through the Moravian Gate, along the course of the Odra towards the Baltic coast (and southern Scandinavia) as well as the Vistula estuary. In both cases the catalysts of interaction were movements of copper towards the north and amber towards the south. Most likely it is the territorial expansion and widening of Otomani-Füzesabony influences in which the presence of hoards should be considered, ones such as Koszider on the Moravian-Slovakian border (Makov; Furmánek 2003: 101) as well as those in Poland (Jaworze Dolne, Kurcewo, Steklno; Blajer 2003: 239-243, 246; Jaeger 2011: 175-179).

CHAPTER 7

Comparative analysis of research areas

The points of view put forward so far perceived defensive settlement as a homogenous phenomenon that covered a vast swathe of the continent (David 1998a: 256-260; Kristiansen 1998: 370; Kadrow 2001: 86; David 2002: 413). The proposed homogeneity of the phenomenon in question involves an assumption that the territories in which defensive settlement was registered were in contact. The mobility of Bronze Age communities and particularly of the elites engaged in creation and preservation of relations based on distribution of the main resources of the period – copper, tin, amber and gold – led to some degree of unification in life-style and the emergence of comparable forms of fortified sites (David 2004: 413). The similarity between fortified settlements over such a vast area of Central Europe was to follow from the same principal role they performed in the production and (re-)distribution of goods, often executed with consummate artistry by craftsmen dependant on local elites (Vladár 1975: 8-13; Točik 1982: 411-413; Kadrow 2001: 87-88; Gašaj 2002b: 41-49). Even if such scenario is not totally unfounded, it does not embrace all the analysed areas and all the relevant sites involved. The aspect description presented in previous chapters of this work allows to indicate both the features connecting particular research areas and the evident differences that set them apart.

In view of the quoted exhaustive data, two levels of the diversity of the defensive settlement phenomenon can be discerned.

The first is general and refers to differences between area situated to the north (inner-Alpine Bronze Age groups and the Kościan Group of Únětice culture) and south (Vatya and Otomani-Füzesabony cultures) of the Carpathian Arc.

The second level of diversity is connected with local and exceptional features of defensive settlement manifested within the earlier mentioned larger geographico-cultural areas of the "north" and "south" as well as within the research areas themselves.

The first feature setting apart the "southern" research areas from the "northern" ones is the long tradition dating back to the 5th millennium BC of erecting fortified settlements within the Carpathian Basin and altogether in south-eastern Europe (Gogâltan 2003; Link 2006; Ivanova 2008). Not only the construction of fortifications combining two basic elements – the wall and the ditch (Ivanova 2008: 122-123) – and regular spatial arrangement of the settlement buildings were of Neolithic origin, but so was above all the often registered specific stability in occupation of particular sites leading to the emergence of tell forms. On the northern side of the Carpathian Arc defensive settlement appeared together the expansion of allochthonic groups of the Linear Pottery cultural cycle (Kaufmann 1990; see there for more literature). This phenomenon, however, had no impact on the formation of settlement tradition in Wielkopolska and the Alpine area. In the context of Linear Pottery culture, fortified

settlements seem to be unique organisms ensuing from the emergence of specific and obviously local conditions (Keeley 1997).

The second feature differentiating the two settlement zones can be seen in the custom of depositing metal objects and different features of bronze metallurgy.

Except for a few cases linked with the late phase of the Únětice culture in Slovakia, unified hoards containing one type of object (known as *Barrenhorte*) only incidentally appear in the Carpathian Basin. In great measure deposits from the region reveal a mosaic of various metallurgical traditions (Novotná 1998: 353). The first phenomena unifying (to some extent) the vast territories of the Carpathian Basin are the assemblages of the Hajdúsámson-Apa and Koszider type (Mozsolics 1967: 109--126; David 1993; 1998: 251-255; 2002).

As mentioned above, the hoards of the Hajdúsámson-Apa horizon contain only weapons. Full-hilted swords and various types of hatchets predominate. Those objects demonstrate highly distinctive features: a characteristic manner of spiral decoration, individualism visible in details of ornamentation and form, and an intercultural range evidenced by extensive distribution and the presence of hatchets of different regional tradition in the hoards. The main area in which the deposits of the type discussed occur is the eastern part of the Carpathian Basin (David 2002, Karte 1). Lavish decoration of weapons, indicative of its symbolic and ceremonial significance, can be linked with the widespread innovation of the chariot. Bone and antler objects connected with the two-wheeled vehicle, such as cheek-pieces, were ornamented with a similar spiral decoration (Kristiansen 2003: 447-450). The bulk of the finds, together with the more and more frequently used spear, ought to be linked with the emerging privileged group of warriors. Distribution of particular products points to the development of a network of extensive relations between the elites of the Carpathian Basin, the eastern basin of the Mediterranean and the steppe zone (North Pontic area). The last mentioned area excepted, the animators of the exchange (both of material culture artefacts and ideas) between these regions were connected by a number of objects of ostentatious wealth: pottery of exquisite quality, time-consuming and elaborate spiral ornamentation of bone/antler objects and, first and foremost, ceremonial weapons with exclusive features that suggest their production for a concrete individual. The style and intricacy of the decoration of swords and hatchets rule out the existence of a home mass production (Fig. 48). The rules of the composition of decoration and the technique of its application on metal and bone/antler objects probably remained the domain of a limited number of specialists. It might be cautiously stated after David that a *"a style of lords"* (*Herrenstil*), with spiral decoration as its main motif, had emerged (David 1997; 1998: 254).

Apart from weapons, the deposits of Koszider type contained ornaments and tools (Fig. 51). Their distribution is mainly confined to the western part of the Carpathian Basin (David 2002, Karte 1). They are often found in settlements or in their immediate vicinity (Mozsolics 1988). Its specificity is the contextual connection with individual homesteads, registered in defensive settlements and which suggests their ownership by particular individuals/families. Hoards of this type are known from sites of Otomani-Füzesabony culture, Vatya culture (Mozsolics 1988: 57, Liste II) and settlements connected with neighbouring cultural units. At this juncture one should first and foremost mention the deposits from defensive settlements in Nitrianský Hrádok and Jászdózsa-Kápolnahalom (Stanczik 1982: 384, 387; Novotná 1998: 354).

In contrast to the hoards from the Carpathian Basin, a large number of deposits containing only one type of object can be documented for the context of the Únětice culture and the zone of its influence. Many contained large amounts of a given product (e.g. Hodonin ca 650, Piding Mauthausen ca 700-800 *Ösenringe*; Butler 2002: 235). In the case of at least some of the deposited products (*Ösenringe*, *Ösenhalsringe*, *Spangenbarren*) there is plausible evidence to see them as ingots or even primitive forms of commodity money (Lenerz de Wilde 1995; Pernicka, Krause 1998: 223; Müller 2002: 272; for an opposite view concerning the Salez type axes cf. Kienlin 2010: 175-176). This is not to say that north of

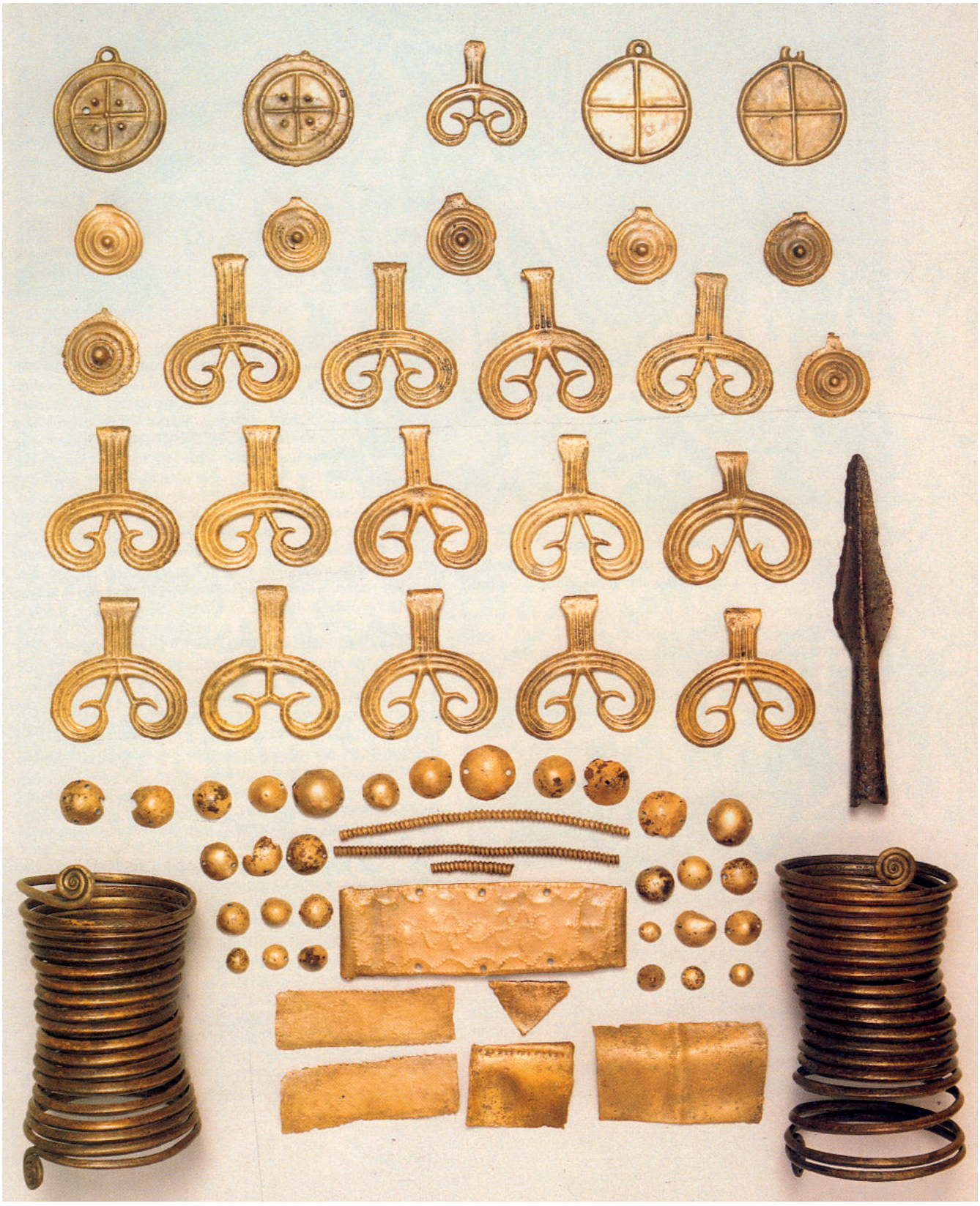


Fig. 51. Ócsa (except of diadem). A hoard of Koszider type bronze objects (after Bóna 1992a).

the Carpathians bronze underwent the commodification process more quickly: the deposits of standardised objects mentioned above often reveal traits of ritual behaviours (Innerhofer 1997; Junk, Krause, Pernicka 2001: 361).

Irrespective of the idea behind the massive hoards, it must be emphasised that it was probably foreign to Carpathian communities. This is well exemplified by *Ösenhalsringe*. In the group of southern cultures they constituted elements of ornament sets (Schumacher-Matthäus 1985, Taf. 42; Novotná 1998: 354, Abb. 3) as well as grave furnishings (Bátora 2006: 229-230), while in the areas of the Únětice oecumene they were primarily components of massive hoards described earlier, and were often the best represented ornaments in the ring-shaped category (Moucha 2005: 25-32; Lorenz 2010: 69, Abb. 7.16).

Advantages offered by the knowledge of tin bronze and the technological development of its production seem to have been accessible to a wider group of the population in the Carpathian Basin. Bronze was not 'consumed' in massive hoards and 'princely graves' by Carpathian communities. Deposits in individual dwellings, the large number of rich burials equipped with metal objects: weapons, tools and above all ornaments – essentially impractical luxurious items, demonstrate that to a large extent the production served to satisfy the sense of aesthetics grown from many varied cultural stimuli. In this context the examples of opulent graves from the cemetery in Nižná Myšľa are highly representative. The extensive cemetery yielded a considerable number of burials furnished with bronze and gold articles (Olexa 2002a: 76-77, 83), probably largely produced by local metallurgists. Even if there are practically no completly studied Otomani-Füzesabony cemeteries directly related with fortified settlements in Slovakia, it can be assumed that the magnificence of burials registered in Nižná Myšľa was no exception. During rescue excavations in the region of modern Polgár (Hungary) a number of graves equipped with gold (ornaments) and bronze (daggers, a hatchet, ornaments) objects were discovered in the vicinity of settlements (Dani, Szabó 2004).

Against such a background the relative poverty of burials on the northern side of the Carpathian Arc is striking. In this part of the Únětice oecumene metal objects, and specifically those perceived as status symbols (halberds, daggers and gold items) were rarely deposited (Sarnowska 1969: 23; Butent-Stefaniak 1997: 204, 209-210). In this context the Únětice 'princely graves' are an absolute exception (Fig. 18). They were clearly a spatially and chronologically limited phenomenon. The only burial discovered directly in the Bruszczewo settlement contained no metal objects (Kneisel 2010d: 718; Jaeger 2012b), in contrast to the 'princely grave' situated nearby in Przysieka Polska (Schwenzer 2004). Similarly, in the case of the Alpine area, metal objects mainly prevail in small deposits and loose finds and rarely appear in graves (Kienlin, Stöllner 2009: 90-98).

Further divisive differences appear in the metallurgy of the trial areas. Here the relevant issue is the accessibility of material recourses. The Alpine area is a special case. Its defensive settlement should be related to the exploitation of local copper deposits. Significantly, however, none of the sites provided definite evidence of bronze production. In view of our present knowledge they were probably only a link in the production chain and connected with preliminary stages of ore processing and mining.

Fortified settlements in the remaining research areas supplied plenty of evidence of local production of bronze.

In the current discussion on the relations of Alpine settlements with local deposits two extreme opinions prevail, suggesting either minimum (Shennan 1995; Bartelheim 2007; Kienlin, Stöllner 2009) or maximum (Krause 2002; 2009) profits following from the exploitation of local deposits by the communities of fortified settlements. The sources at our disposal suggest that the scepticism concerning the central role of defensive settlements in the Alpine area is well-founded (Bartelheim 2009: 36-39). Profits gained from the new raw material grew with each successive stage of working and distribution as well as the geographical distance from the ore sources in-between, as exemplified by the accumulation of power and prestige vis-

ible in the Kościan Group situated in the north-eastern borderland of the Únětice oecumene (Jaeger, Czebreszuk 2010).

Absence of unambiguous evidence confirming the existence of separate elites and a generally complex social structure in the Alpine area is all the more astonishing in view of the fact that at least part of the local communities must have been involved, indirectly at least, in the long-distance exchange that reached the regions on the middle Danube. As emphasised above, the Vatya culture metallurgy had a deep-rooted relationship with the *Blechkreiskulturen* circle. The contacts were not confined only to the first stages of the development of local metalworking during the Early Bronze Age. The period of the greatest heyday of bronze production was also connected with the access to the ore in the Mitterberg region. Apart from the spectacular example of an import of a Vatya culture vessel into the territories of modern Austria (Poysbrunn) (Benkovsky-Pivovarová 1979) there also exist archaeometallurgical data. The analysis of 158 artefacts of Encrusted Pottery culture provided evidence that the raw material came from deposits in the Mitterberg area (Kiss 2009: 330). The Vatya culture, bordering in the west with the mentioned group, probably made use of its "liaison" position (Fig. 52).

Numerous Encrusted Pottery finds at the Vatya culture sites testify to intensive relations between the two cultures (Kiss 1998; Fekete 2005: 54-55). Otomani-Füzesabony groups functioned in a different network of relations. They mainly drew on deposits located in Transylvania and on locally accessible ores. The above information is of relevance, since it demonstrates that within the Carpathian Basin the existing mosaic of Bronze Age cultures did to a large extent reflect powerful local traditions. Bearing this is mind, attempts to discuss the issue without referring to high diversity of the region[1] carries a considerable margin of error.

The relations connecting the western part of the Carpathian Basin with the region of eastern Alps described above are an issue rarely exposed in the literature of the subject. Surprisingly, Trans-carpathian connotations were more easily attributed to Bruszczewo. Scholars would seek for features that linked the settlement with the Mad'arovce-Věteřov-Böheimkirchen circle in sources obtained during the first seasons of excavations. The very construction of fortifications around the headland apparently was a result of Trans-carpathian influences and indirectly of the east Mediterranean (Niesiołowska-Wędzka 1980: 65; Gediga 1983: 345; Kłosińska 1997: 103). In that case the source basis chiefly consisted of bone products – specific tools made of animal blades, a fragment of an alleged cheek-piece of Tószeg type (Kłosińska 1997: 98) and some pottery features, textile prints in particular (Kłosińska 1997: 104). A detailed analysis of some bone and antler artefacts found in Bruszczewo demonstrated a similarly wide spectrum of forms as that known from the Mad'arovce culture (Kneisel 2010c: 680). It must be noticed, however, that the Únětice cultural context has revealed no collection of sources that in sheer numbers might come close to that from Bruszczewo. Thus, at the present stage of research it is difficult to draw conclusions about the origins of bone working in Bruszczewo. The antler object presented in the literature and interpreted as a cheek-piece eludes an unequivocal functional estimate, mainly due to its partial preservation (Kłosińska 1997: 97, Fig. 13:1). Dimensions of the object and a fragmentarily visible and sloppily made opening do not offer features credible enough to define it as a cheek-piece.

Above mentioned intensive relations between the Encrusted Pottery culture and Vatya are not the only examples demonstrating the dynamic picture of Carpathian communities.

[1] In a maximalist version this perspective was adopted by Kristiansen and Larsson. In their comprehensive synthesis of the section of the Bronze Age at issue they decided to use the term "Otomani culture" (Kristiansen, Larsson 2005: 125) to describe a number of diversified autochthonic cultures/pottery stylistics. As a result, in their discussion on the relations between defensive settlement in the Carpathian Basin and the Minoan/ /Mycenaean architecture they freely reached for analogies from sites of absolutely different character resulting from a distinct cultural tradition and development (Kristiansen, Larsson 2005: 162).

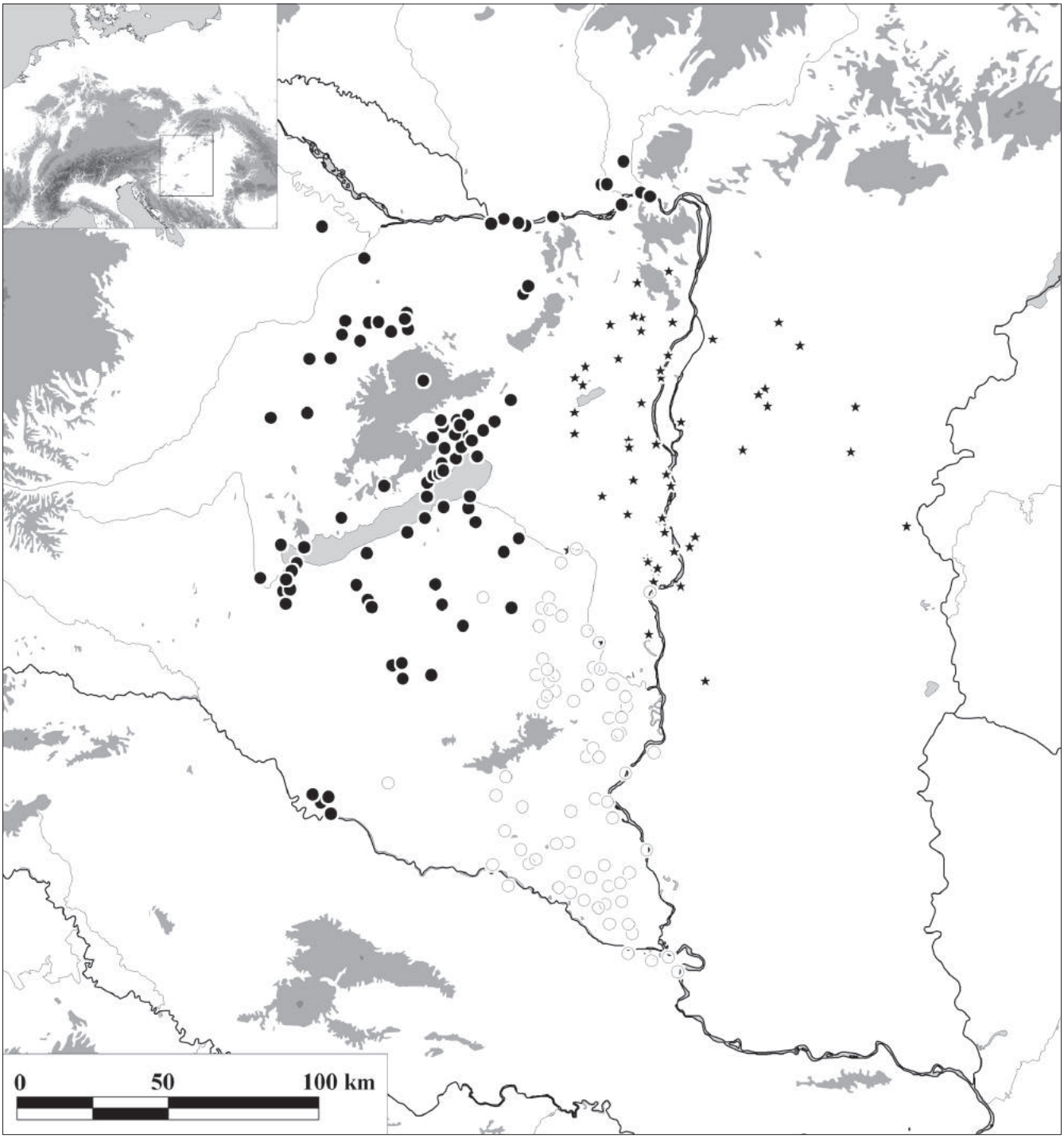


Fig. 52. Distribution of the Vatya culture and Encrusted Pottery culture sites. Asterikses – Vatya fortified settlements; black circles – sites of the northern Encrusted Pottery group, grey circles – sites of the southern Encrusted Pottery group (after Kovács 1982; Vicze 2000; Kiss 2012).

This phenomenon is illustrated by hoards of described Koszider type, known from the late phases of Otomani-Füzesabony, Vatya and Mad'arovce cultures. Widespread distribution and regional differences in their content, observable mainly in hatchet and sickle pin types, testify to the increased mobility of the Carpathian Basin societies in the Middle Bronze Age (Novotná 1998: 57).

As well as metal objects, pottery too indicates a multidirectional exchange and contacts between the communities in question – or rather a creation of a cultural melting pot. Starting with the development phase II, vessels of the Vatya culture are covered with decorative motifs connected with the stylistics of the Otomani-Füzesabony culture (Kreiter 2005: 12). In the late phase (Vatya III-Koszider) there appeared

the distinctive channelled knobs (Kreiter 2007: 19). The period is generally characterised by the openness of Vatya culture communities to impulses from neighbouring groups, also noticeable in the "mitigation" of the rigours of funerary rites. Next to traditional urn graves there began to appear skeleton graves, often furnished with vessels with foreign stylistics (Vicze 1992a: 95). The expansiveness of the Otomani-Füzesabony culture is best perceived in the slow fusion of its elements with the Hatvan culture. A number of settlements of the latter were inhabited by Otomani-Füzesabony communities during the middle Bronze Age. In some cases it was connected with the fortifications erected by Hatvan groups being buried and a reorganisation of the settlement space (e.g. Včelince in Slovakia, Furmánek, Marková 2001: 106-107; Árőkto-Dongóhalom in Hungary, Fischl 2006: 207). However, the cultural changes that can be followed in the pottery stylistics were not abrupt in character. On the contrary – in many sites a fusion of stylistic traditions was recorded, often accompanied by elements of stylistics of the late phases of Vatya culture and Encrusted Pottery culture (Stanczik, Tárnoki 1992: 125; Fischl 2006: 208). In Jászdózsa-Kápolnahalom and Polgár-Kenderföld (Hungary) Otomani-Füzesabony stylistics dominates in the so-called fine ware, while the form and decoration of others are characteristic of the Hatvan culture (Stanczik, Tárnoki 1992: 125; Dani, Máthé, Szabó 2003: 93). In the case of the Včelince site the smooth process of cultural change can be observed in the separate Hatvan-Otomani settlement horizon (Furmánek, Marková 2001: 106). A telling example comes from Polish territories. The appearance of Otomani-Füzesabony material culture (population?) in the fortified settlement in Trzcinica, built by the Pleszów group of the Mierzanowice culture, shows no evidence of a violent event. The area of the settlement was enlarged, and new elements were added to Pleszów fortifications that never stopped functioning (Gancarski 1999: 139). The recalled example from the region of the Lower Beskids is connected with the northward expansion of the Otomani-Füzesabony culture from the territories of modern Slovakia through the Carpathian passes, described elsewhere. The process, however, also covered areas situated west of its oecumene. In this context the evidence of the presence of Otomani-Füzesabony pottery in fortified settlements of Mad'arovce culture is of particular importance for the present discussion (Točik 1964: 162; Furmánek, Veliačik, Vladár 1999: 49). Probably due to the "liaison" role of that region spectacular objects such as Apa type swords and hatchets found their way into Polish territories and further north to Scandinavia (Fig. 49). The commodity that went south was amber (Marková 2003; Jaeger 2011). Objects made of amber, mostly small beads, were recognised in the fortified settlements in all research areas discussed (Shennan 1995: 242; Horváth 1999: 279, Table 1; Marková 2003; Czebreszuk, Kneisel, Müller 2010; Jaeger 2016). The so-called amber route reconstructed for the period in question ran overland from the shores of the Baltic (an area of natural succinite deposits) to the southern coast of the Adriatic (Czebreszuk 2007; Jaeger, Czebreszuk 2010: 230; Jaeger 2011: 181, Fig. 7). From there amber travelled to the regions of the Aegean area (Mycenaean culture) by way of the Aegean-Ionian zone of interaction that had been already created in the 3rd millennium BC (Maran 1998; Czebreszuk 2011). Czebreszuk suggests the following course of the overland stage of amber's journey south: the Baltic coast at the mouth of the Vistula → Kujawy → Wielkopolska → Dolny Śląsk (Lower Silesia) → Moravian Gate → the region on the upper Tisza → Caput Adria (Czebreszuk 2011: 161-162). It should be emphasised, however, that the numerous finds in the Carpathian Basin (Marková 2003: 351, Karte 1) demonstrate, besides the "liaison" role of the Otomani-Füzesabony communities in the transit of amber further south (Mycenaean culture), the existence of something that might be called an "inside Carpathian" market of its distribution (Jaeger 2016). Amber finds in the cultures of Vatya, Encrusted Pottery, Mad'arovce and Otomani-Füzesabony and Hatvan were mostly elements of grave furnishings and objects from the so-called ritual sites (eg the sacrificial well in Gánovce) (Stanczik, Tárnoki 1992: 124-125; Marková

1999; 2003: 340-341; Horváth 1999: 279, Table 1). The context of the finds suggests that amber was not just a raw material to be exchanged far and away but an important and exclusive commodity used by the local communities. In the Carpathian Basin, succinite was the predominant type of amber. However, one has to stress that the use of local types of resins is evidenced by fairly numerous examples (Jaeger 2016). The interest in the latter is likely to have resulted from the original influx of material from the coasts of the Baltic Sea.

The sources described above clearly indicate the intensive inter-regional relationships within the Carpathian Basin. I believe that it was this complex network of relations linking particular groups that decided about their strength and permitted progress up to the moment when Carpathian communities became equal partners with the civilisation of the eastern part of the Mediterranean.

Engagement of these communities in the far-reaching exchange was essentially connected with desire for obtaining locally unavailable resources – copper, tin, gold and amber. Along with those there travelled ideas, new elements of worldview and life-style. Bearing in mind the importance of exchange and the openness of fortified settlements communities, it cannot be forgotten that their stability and survival were in fact guaranteed by their efficient economic system.

Accessible sources concerning the economy of fortified settlements, though frequently incomplete, allow to draw a few important conclusions. Settlements were not immersed in some ecological niche. Their communities possessed a considerable ability of adapting to the existing environmental conditions. This is testified by the quota of respective domesticated species, particularly of goat/sheep and pig (Choyke, Bartosiewicz 1999: 244, Fig. 3) and by changing strategies of animal husbandry. The Százhalombatta settlement produced unambiguous data showing that the number of sheep slaughtered at a mature age increased with time (Vretemark, Sten 2005: 162-164). Due to lack of appropriate analyses, capturing similar trends in most of the settlements under discussion was not possible. Wild animal species were basically of little significance (Jaeger 2012c: 150-151), though even in that case there might have been extraordinary situations, as exemplified by the considerable amount of beaver remains recorded in the collection from Nižná Myšľa (Olexa 2003: 53) and the postulated exceptional meaning of hunting and consumption of game in the settlements of Százhalombatta (Choyke, Vretemark, Sten 2003: 183) and Bruszczewo (Makowiecki, Drejer 2010: 294, 300). The most important domesticated animal was cattle. Numerous herds probably constituted the basic wealth of the communities and at the same time were an object of competition of particular groups (Louwe Kooijmans 1998: 334-335; Fokkens 1999).

The crucial role of crop production can be assumed for most fortified settlements. Similarly to archaeozoological data, the analyses of plant macroremains reveal a diversification of the contribution of particular crops in the trial areas. The postulated spatial pattern of domination of some wheat species in the Vatya culture settlements is particularly telling (Nováki 1969: 40-41, Abb. 1; Gyulai 1993: 25-26, Fig. 1). Furthermore, the available sources indicate the possibility of obtaining and storing large quantities of grain (Bóna 1975: 74; Endrődi, Gyulai 1999: 27; Kneisel 2010a: 146). The storing jars/granaries in the Alpár settlement (Bóna, Nováki 1982: 42--43, Fig. 11-12) notwithstanding, no special constructions or buildings connected with grain storage were found. Also, one of the huts in Kakucs-Turján revealed numerous accumulations of a large number of grains and lentils. Some of those most likely represent a proof that grains were stored in organic containers, which have not survived. The St. Veit Klinglberg settlement is an outstanding case among the sites. Absence of traces of grain processing was interpreted as a proof of "ready-made", that is, threshed, grain being obtained from valley-located regions (Shennan 1995: 285). Accepting that this thesis is hard to verify, it must be stressed that the remaining Alpine area settlements provided evidence testifying to both utilisation and production of crops. Apart from macroremains, finds of sickle fragments, querns and grinding stones have

been known (Rageth 1986: 83-84; Swidrak, Oeggl 1998; Schmidl, Oeggl 2005: 305). What is more, palynological data from some regions show a distinct decrease in the quota of tree pollen with simultaneous growth of the crop pollen curve (Krause, Oeggl, Pernicka 2004: 10-11).

Some of the sites produced data indicative of a skilful and gradual broadening of the range of cultivated plants. In each of the relevant regions pulses were cultivated, and wild fruit from the nearest vicinity collected (Gyulai 1992: 66; Swidrak, Oeggl 1998; Hajnalová 2001: 32-33; Kroll 2010: 264).

The postulated special situation of St. Veit Klinglberg excepted, the communities inhabiting fortified settlements with their diversified farm and husbandry economies were totally self-sufficient. In none of the settlements any symptoms of crisis, such as the prevalence of wild animal remains over domesticated ones, were registered.

Absence of detailed analyses most often hinders a full estimation of the productive potential of the fortified settlements' communities. The data for Bruszczewo show high efficiency of crop production, as exemplified by relatively big weight of the preserved grain (Kroll 2010: 266). Due to its fairly good level of recognition the settlement also yielded exceptional data demonstrating the scale of anthropological pressure that could have led to a local ecological disaster. Along with substantial deforestation at the final stage of the settlement's existence the quality of water in the lake fell dramatically. Palynological studies revealed the presence of parasites and coprophilic fungi related to the contamination of the reservoir with a large amount of excrements (Haas, Wahlmüller 2010: 78, 80).

An efficient economy was crucial for the demographic success of the communities discussed. The number of inhabitants ascribed to particular defensive settlements oscillates between several to a few hundred. Populations inhabiting the Alpine area settlements are estimated at the lowest figures, between 16-20 individuals for Sotćiastel (Krause 2005: 397) up to 100-110 at a time in the St. Veit Klinglberg settlement (Shennan 1995: 283). The low number of inhabitants would correspond with the small size of the areas in which the eastern Alpine defensive sites were erected. In the case of Bruszczewo, the surviving traces of buildings suggest that the population of the settlement consisted of 50-100 persons. For the Carpathian Basin the estimated populations stand much higher, reaching even up to 300-350 people (Nižná Myšľa, Olexa 2003: 5) and 400-500 (Százhalombatta, Poroszlai 2003: 153) inhabiting the settlement at a time.

The cited differences in the hypothetical numbers of communities in fortified settlements are vital for their estimation as objects of defensive, military character.

Undoubtedly, warfare was an important element constituting the Bronze Age – a period during which there appeared and spread objects performing solely the function of weapons (Kristiansen 1984; Carman, Harding 1999; Osgood, Monks, Toms 2000; Kristiansen 2002; Harding 2007) and when a huge number of defensive settlements grew up in various parts of Europe (Rind 1999: 4, Abb. 1, 342-345). A total negation of the military meaning of fortifications surrounding Bronze Age settlements would be a risky and somewhat pointless task. Yet, I do believe that it was not by sheer coincidence that in the large body of excavated settlements there are no traces of violent events that might be connected with a possible invasion/aggression. I will return to that issue in the further part of this chapter.

Fortifications in the selected trial areas were highly diversified in terms of technologies applied as well as their size and building material.

Cases of locating fortifications only in places not defended by the topography of the terrain are known in some regions. Most of Otomani-Füzesabony settlements in Slovakia and those in the Alpine area were fortified in this way (Shennan 1995: 75, Fig. 5.1; Gašaj 2002b: 21, 35, 39; Krause 2005: 396, Abb. 5).

Size-wise, the fortifications differed considerably. The most impressive ones are to be found in Otomani-Füzesabony settlements in Slovakia. The ditch of the younger settlement in Nižná Myšľa was 25-27 metres and 5-6 metres deep, and behind there was a wall 8-10 metres wide, additionally reinforced with a stone wall ca 1 meter wide

(Gašaj 2002b: 31; Olexa 2003: 40, 42). In Bruszczewo, apart from the ditch up to 20 metres in width and ca 4.5 metres in depth (Czebreszuk, Ducke, Müller, Silska 2004: 71-72, Abb. 26) rows of palisades were also constructed. Furthermore, the part of the settlement bordering on the lake was strengthened with three lines of wooden constructions (Fig. 14). Fortifications of such dimensions must have offered effective protection. The stone defences surrounding some of the Alpine area settlements seem to be less functional. In Gschleirsbühel the stone wall in the preserved part of the base was less than 1 meter wide (Zemmer-Plank 1978: 182) (Fig. 3). Walls of some dwellings were parts of sections of the surrounding wall. In the case of the Friaga Wald settlement huts were situated directly next to the wall (Fig. 2). Solutions of that kind put the buildings in considerable danger, the more so that they were probably taller than the fortifications themselves. In Bruszczewo and Alpár an empty space separating huts from the fortifications lines was registered (Bóna, Nováki 1982: 115; Czebreszuk, Ducke, Müller, Silska 2004: 73).

Diversity of defensive constructions noticeable at the level of particular research areas can be most easily seen within the Carpathian Basin, while the defensive structures of the eastern Alpine area, with stone as the building material common to all sites, appear to be the most homogenous. Due to the considerable impact of post-depositional processes it is difficult to decide whether the partially preserved wooden elements reinforcing stone constructions, sometimes registered in the settlements, were also to some extent concurrent. In the Carpathian Basin defensive constructions were built of clay/earth and wood. The biggest amount of information was provided by the Otomani-Füzesabony sites. In their case stone was an incidental material for additional elements reinforcing the fortifications proper (Olexa 2003: 40, 42). Reinforcements of individual settlements differed considerably in details. In some cases unique solutions were introduced, such as inward-leaning wall in Košice-Barca (Točik 1994: 63) or stone-reinforced walls of the gate in Nižná Myšľa (Gašaj 2002b: 27-28, Fot. 9).

The traditional use of stone for the construction of fortifications in the Carpathian Basin settlements was perceived as a civilisational impact of the Aegean-Anatolian zone. As it has been shown above, the most spectacular example of stone construction known from the Spišský Štvrtok settlement is open to doubt, the most serious one concerning the chronology of fortifications (Jaeger 2014). It is probable that stone constructions discovered there date to the La Tène period and should be linked with the Púchov culture. It is worth emphasizing that the remaining examples of defensive structures made of stone in the Carpathian Basin do not seem to be reliable, either (Bader 1990: 182). Some scholars believe that the Olomouc site, mentioned as an instance of stone architecture developed under the influence of Mycenaean culture (Vladár 1973: 280, Abb. 26), also should be connected with the Púchov culture (Novotná 1996: 23-24).

Certain elements of the fortifications, like for instance wattle structures registered in settlements geographically as far-flung as Bruszczewo (Müller 2004: 125-133), Rozhanovce (Gašaj 1983: 132, Abb. 64-78) and Baracs-Földvár (Kovács 1982: 287) resulted from the similar Neolithic tradition of construction of dwellings.

In the case of the Vatya culture it is difficult to relate to the problem of diversity in the construction of fortifications, since we have no relevant information for most sites. One can observe, however, varied planning of the settlements' structure. Some of them had a simple form, ie the space of the settlement was surrounded by fortifications, be it a wall, a ditch or a palisade (e.g. Százhalombatta, Nagykőrös-Földvár), while others were partitioned inside. Particular sectors probably performed different functions. Such interpretation is supported by the results of geomagnetic research conducted in the settlement in Kakucs (Fig. 24). As I have mentioned above, the procedure of dividing up the settlement into smaller sectors could have had a military significance. By grouping the dwellings it was possible to enclose them with a relatively shorter and thus more easily defensible line of fortifications. The inside partitioning of fortified settlements is a phenomenon exclusive to

the Vatya culture. It should be noted that it had nothing in common with the postulated rather than confirmed division of fortified settlements in the Carpathian Basin into the "core" – fortified – part and the "artisan" – open – sector (Vladár 1973: 288; Bóna 1975: 123-124, 146, 172). In the Vatya culture all separated sectors of the settlements were encircled with fortifications. The opinion just mentioned refers to the existence near defensive sites or tells, "satellite" or "outer" settlements which served as an economic base of the "core" (Fischl et al. 2014: 344). No complex of sites of this type has been excavated so far, and for this reason it is still difficult to take a stand on chronological and functional relations between the open and defensive (or tell) settlements. The hypothesis claiming that tells were only elements of larger complexes surrounded by smaller settlement forms is placed within the framework of research into the Neolithic of south-eastern Europe (Reingruber, Hansen, Toderaş 2010: 172). Its verification could point to yet another vital element of the Neolithic tradition observable in the defensive settlement of the "southern" trial areas during the Bronze Age.

The effort invested into the construction and maintenance of fortifications suggests their authentic military function. The reconstructed model of warfare for this section of Bronze Age presumes principally small-scale conflicts. The main method of warfare were probably raids (Otterbein 1989: 40). Small groups of warriors would set out to neighbouring territories a few days' march away from home to abduct women, capture slaves, steal cattle or other easily transferable goods (Louwe Kooijmans 1998: 338; Uhnér 2010: 285-286). Taking into consideration the posited size of populations of particular settlements, groups of several dozen warriors can be stipulated only for the Carpathian Basin. It is possible that variously estimated sizes of human groups inhabiting defensive settlements in different trial areas account for the diversity in the massiveness and level of complexity of fortifications. Assuming that the thesis is correct, it has to be accepted that the manner of fortifying settlements corresponded with the level of real danger in a concrete region. The raid model mentioned above presumes warfare of relatively short duration. On the one hand, warriors could not leave their homes for a longer period of time, and on the other there must have considerable logistic and organisational limitations concerning supplies (Christensen 2004: 153). It is open to doubt that during raids it was possible to besiege a fortified settlement awaiting the surrender of its defenders. Rather, the only way was to try to get inside the settlement using the element of surprise, eg under the cover of darkness (Roscoe 2008: 508; Uhnér 2010: 307). In the outcome there was probably little substantial damage that could have left a legible trace in archaeological sources. The primary aim of the raids was to swiftly achieve the goal by killing encountered individuals and obtaining locally unavailable goods while minimising the risk of casualties within one's own "ranks" (Christensen 2004: 131). In view of the above information the defences of fortified settlements in the Bronze Age, and particularly the massive fortifications known from Otomani-Füzesabony and Vatya settlements, provided an effective protection for the inhabitants and their belongings. The size of fortifications was a clear signal of organisational capabilities and strength of the inhabitants. This had a crucial preventive implication and could result in few real conflicts. Sources mentioned above reveal a frequently smooth nature of changes in material culture (pottery stylistics) in settlements and intensive contacts between regions and concrete fortified sites, indicative rather of possible alliances and other type of relationships oriented towards cooperation. The aggressiveness demonstrated in rich hoards of arms functioned on ideological level, but did not translate into military power of the communities to be directly employed in accumulating economic and social capital (Uhnér 2010: 287). Kadrow (2001) presented an opposite view. Describing the communities of fortified settlements as supra-local political organisms (Kadrow 2001: 162), he pointed to the possibility of a specific condition of permanent danger and war, grown out of competition and rivalry between particular centres. In his opinion, the main argument are traces of

destruction registered in settlements and their considerable instability perceivable over the short period of their functioning. A survey of sources made for the needs of the aspect description of trial areas fails to present evidence that would validate the above thesis. On the contrary – information provided by the work of the SAX project shows the possibility of the existence of a larger political unit (which meets the criteria set by Kadrow in reference to a supra-local political organism) consisting of a few fortified settlements and several open ones situated in the Benta river valley (Uhnér 2010: 146-148, Fig. 66). The main actor of the arrangement was the settlement in Százhalombatta. Radiocarbon dating demonstrates that it could have functioned even for few hundred years (Uhnér 2010: 347-348).

As I have mentioned above, some Vatya culture settlements were characterised by a specific structure. The results of geomagnetic studies in Kakucs revealed huts located probably only in one sector of the settlement, partially arranged in a regular way along the line of fortifications (Pető et al. 2015: 221). The regularity of development was traditionally seen as a manifestation of urban planning grown from familiarity with Mycenaean architecture (Vladár 1973: 288). Location of huts in rows or lines was registered in the "southern" settlements of the research areas, connected with both the Otomani-Füzesabony (Olexa 2003: 42-43) and Vatya cultures (Poroszlai 1992c: 158). Linear arrangements of buildings were also found in the settlements of Friaga Wald (Krause 2007a: 125, 134, Fig. 20) and Savognin-Padnal (Rageth 1986: 68). The formerly mentioned Neolithic tradition in the Carpathian Basin notwithstanding, it must be emphasised that similar arrangements of dwellings situated quite close to one another appeared independently in all cases and followed from the determination to optimally exploit the settlement space. Some settlements were probably built over in a less regular way. In the case of Bruszczewo and more broadly – the Únětice culture – we can assume the existence of dwellings with the same orientation but irregularly and less closely situated (Pleiner, Rybová 1978: 370, Fig. 102; Schunke 2010: 274, Abb. 1).

The manifestation of a planned development was not just the way dwellings were located. Some of the settlements provided data indicating a separation of zones with definite functions and a planned location of out-buildings. A grouping of kilns was found in the Százhalombatta settlement (Poroszlai 1996: 10). The one in Alpár was characterised by kilns constructed near the dwellings and storage pits situated close to the walls (Bóna, Nováki 1982: 109). With the most complete source basis in the case of Bruszczewo, it was possible to capture the spatial arrangement of particular zones of economic and artisan activities reflected by the concentrations of particular categories of sources (Kneisel 2010e: 187--188, Abb. 17). The small number of data confirming the existence of the so-called metallurgists' workshops is of relevance. We known them only from Lovasberény--Mihályvár (Petres, Bándi 1969: 175, kép 6) and the alleged fortified settlement in Savognin-Padnal (Rageth 1986: 67). In Bruszczewo it was possible only to demonstrate the sector of the settlement in which the artefacts related with founding were accumulated (Jaeger, Czebreszuk 2010: 223; Kneisel 2010e: 187).

Conclusion

The aim of the present work was a presentation of the fortified settlement communities from the angle of specific archaeological sources. The study has revealed a series of gaps in our knowledge. They mainly result from the complexity of fortified settlements which provide plenty of sources that often elude the analytical capabilities of traditional archaeology. The history of research conducted so far demonstrates an obvious scarcity of interdisciplinary projects within the compass of which archaeology could be supported by natural sciences. Yet the level of diversity and dynamics of the fortified settlement populations observable in the sources makes an employment of a single scientific procedure impossible. In many cases essential issues were neglected. One of them is above all the absolute chronology calendar. The body of radiocarbon datings currently available does not permit a study of the potential synchronisation of cultural processes in the trial areas. We can say equally little about the economy of the communities involved. The macroscale adopted by European archaeology for presenting fortified settlement issues allowed to wave aside the gaps mentioned above – and many others as well.

An attempt to overcome the research problems diagnosed above can have serious consequences. First of all, I believe that it is essential to discard the hitherto typical perspective of approaching the communities *en bloc*. The present work has clearly demonstrated that, as the proverb has it, the devil's truly in the detail. Similarities between regions and particular settlements within their reach are limited to the big picture. Each of the sites discussed, even at the current level of archaeological recognition, demonstrates unique features demanding an individual research strategy. The available sources allow the presumption that in many cases (in the majority of cases?) particular settlements were not isolated islands but on the contrary – they stayed in stable networks of cooperation, often forming larger socio-economic and political organisms. The use of previous research procedures renders their recognition in archaeological sources impossible. Excavation work devoid of analytical opportunities offered by natural sciences will not yield good results.

The overall picture of the communities of fortified settlements has to be made up anew, this time of small pieces that will include properly – that is, interdisciplinarily – recognised sites.

The outlined scenario is not the easiest one. Its realisation is possible in a long-term perspective only, and overcoming mundane financial and organisational problems involved demands a cooperation, on the international level as well, of many bodies. These are not, however, difficulties to hinder modern archaeology from opening a new episode in the research into the vital issues of the communities of the Bronze Age fortified settlements.

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