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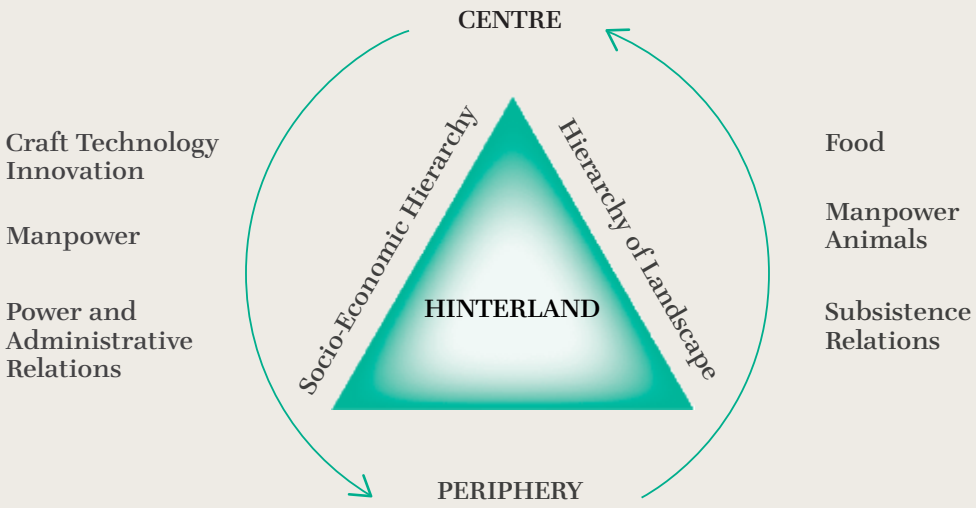
SBM

STUDIEN ZUM BURGWALL VON MIKULČICE

GREAT MORAVIAN SETTLEMENT IN MIKULČICE-TRAPÍKOV AND ECONOMIC HINTERLAND OF THE POWER CENTRE

Rural Economy, Centres and Organisational and Functional Principles of Great Moravia



Marek Hladík – Marian Mazuch – Michaela Látková

INSTITUTE OF ARCHAEOLOGY OF THE CZECH ACADEMY OF SCIENCES, BRNO

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With contributions from
Peter Barta – Petra Brukner Havelková – Gabriela Dreslerová – Rastislav Milovský

Czech Academy of Sciences, Institute of Archaeology, Brno
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1. Introduction

Economic and social relationships are the building blocks of any historical or present-day society. These relationships are a prerequisite for the functioning of communities and the formation of complex social systems and are the primary focus of archaeological research as we understand it (Hladík 2012, 111–135; 2019; Mazuch/Hladík/Skopal 2017, 14–20; Nakoinz 2013). The concept of this book is based on this statement. None of the archaeological record involved in our research should be studied separately, in isolation. We aim to maximise their information potential and place them in a wider time and space context. This means that localisation and dating of the archaeological materials are fundamental to the issues under consideration because they define (delimit) the community whose spatial and temporal relationships were studied.

The primary archaeological record studied mostly come from the rescue excavations at the Mikulčice-Trapíkov site on the periphery of the Mikulčice agglomeration (fig. 1). These were carried out over 15 years in the late 20th and early 21st century (see Chapter 5). This enabled us to approach the fieldwork in the last period (2010–2012 and 2015) not as rescue excavations where previously the site had been *terra incognita*, but as systematic excavations. These enhanced our knowledge of the components of the settlement network and were functionally interpreted based on previous excavations. The situation enabled us to predict many circumstances of the research during the excavations and to modify the methodology to focus on specific historical issues.

Thus, the excavations at Trapíkov in the cadastral territory of Mikulčice could be included in the concept of the research into socio-economic interactions and social organisation in Great Moravia and interactions with the landscape, which includes several case studies recently published (fig. 2; Hladík/Hladíková/Tamaškovič 2018). The concept is based on the principles of relational archaeology (Mazuch/Hladík/Skopal 2017, 14–20; Watts 2013), which to a large extent, draw on Kristiansen's concept of renewed modernity in archaeology (Kristiansen 2014). In line with these theoretical concepts, we intend to study global topics using the most complex study of data on a lower local level as possible. Relational archaeology and the renewed modernity theory form an ideal theoretical, linguistic and methodological framework for research designed in this way (Hladík 2019). The power of both these concepts crosses the boundaries of individual research scopes. At the same time, the research scope is a crucial factor influencing the final output in many ways. However, it significantly affects the entire research process, from excavations through description methodology to data analysis and synthesis.

In terms of specific historical issues, the main ambition of our long-term research is to engage in a debate on the form, description and interpretation of social and economic relations in Great Moravia. This has been taking place among Moravian, Czech and Slovak archaeologists and historians in recent years (see below). Before we progress to our model of the socio-economic relations in Great Moravia, or more specifically, to a model of the socio-economic relations of the Great Moravian central site of Mikulčice-Valy and the neighbouring settlements along with the relationship of this settlement to the landscape, we can present actual archaeological materials discovered at the Trapíkov site. As mentioned, we aim to study the relationships in early medieval society in a more global scope, which we deem possible by using the data from the excavations of unfortified settlements around the central agglomeration of Mikulčice-Valy. Generally, in such research, the starting point we have defined about the types of burial pits, wooden structures in graves and tombs in Mikulčice (Mazuch/Hladík/Poláček 2018, 87–117) holds true. The research into the phenomena that provide us with plentiful resources to construct an image of the social and economic relations in Great Moravia, such as subsistence strategy, building/architecture, craft and trade, is based primarily on data from the central sites. However, to extract information from archaeological sources as efficiently as possible, it is essential to focus on the settlement outside the centres to balance the disproportion in the archaeological materials from the centres with those from the neighbouring areas. If this was not reflected and the disproportion remained unbalanced

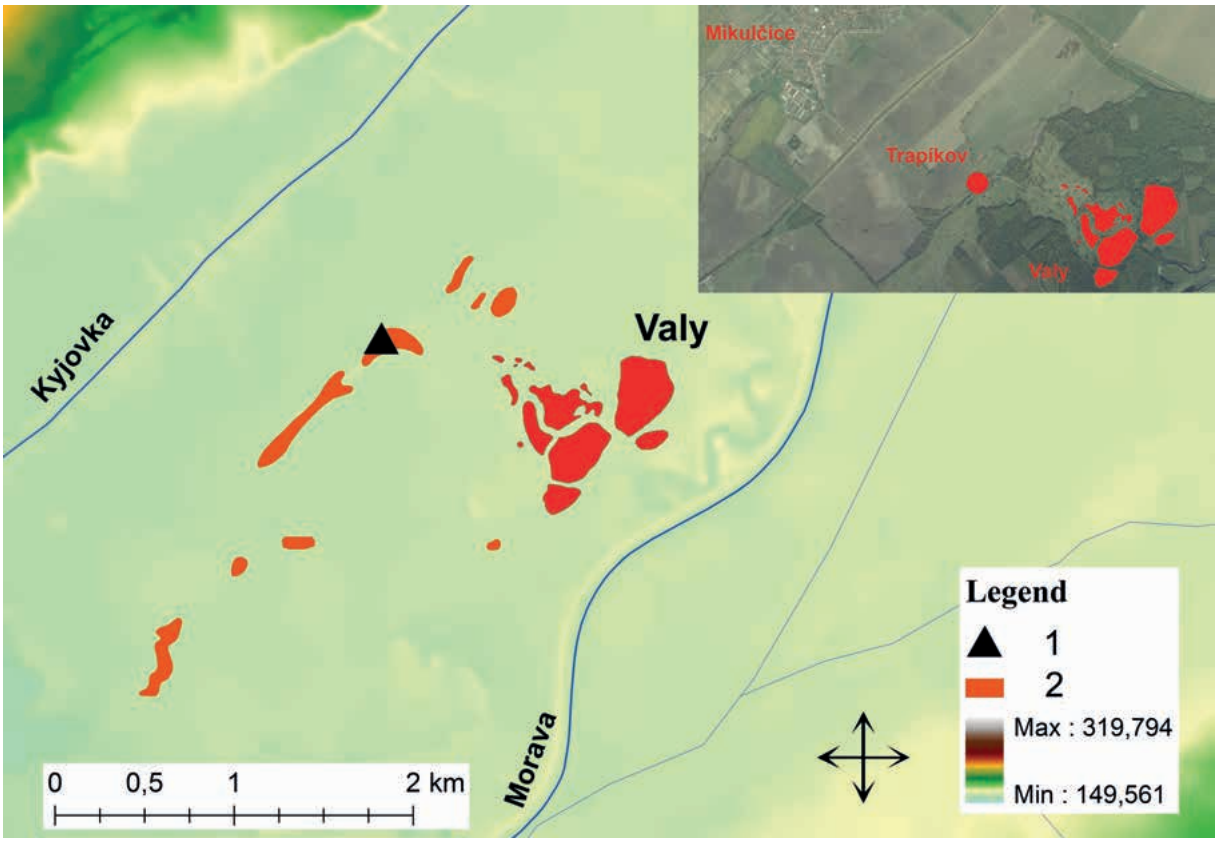

FIG. 1 | The position of the Trapíkov and Virgásky dunes, where the described archaeological records were excavated. Legend: 1 – Trapíkov and Virgásky, 2 – sand dunes.

then conclusions and comparisons would be made based on abnormal data. If only data from the central sites were used, this would just take into account a small "anomaly" – a segment of a wide range of social and economic interactions in the studied society. The central sites, the notional tops (anomalies) of the entire settlement and economic hierarchy, accumulated a great concentration of functions and meanings, which makes it difficult to extract the basic economic, social and spiritual patterns of the functioning of the society. On the other hand, if we used only data from the area outside the centres, we would not be able to reveal the important parameters of the relations between the centres, the adjacent area and the periphery. This is why it is necessary to study the Great Moravian society in a spatially and functionally variable "landscape". When using such research, we must accept a certain ambiguity in our conclusions and that the interpretative narrative models constructed on them are never going to offer simple, or even unambiguous, answers to most questions. Although such a statement might make us feel desperate with ambiguity and relativisation of any attempt at objectivity, thinking it through more thoroughly will reveal the correctness of the presented concept. This is particularly because studying historical societies means looking into an extremely complex network of relationships. Therefore, our models cannot offer simple – or even unambiguous – explanations. In other words, if something in the past used to be complex, the image of it must also be complex.

The Trapíkov settlement, where the archaeological record used in this work was primarily discovered, has a unique position in terms of the proposals mentioned above. As will be discussed in the interpretative parts of this book, the Trapíkov settlement is situated at the border of the agglomeration and its hinterland. This allows us to see the agglomeration and its surroundings from the unique perspective of a link connecting two worlds, two levels of reality, and two links in the chain of social relations in Great Moravia.[1]

1 As the present text contains many mentions of "surroundings" and "hinterland" in various contexts, we consider it necessary to define our understanding of these terms in our research. The surroundings denote an area geographically close to the agglomeration or another component of the settlement network. It is a term that is used analytically, without the burden of historical or cultural interpretation. However, the term hinterland is interpretive, and is used as such in our text. It is used in passages addressing specific social and economic relationships between the centre and other components of the settlement network in its surroundings.

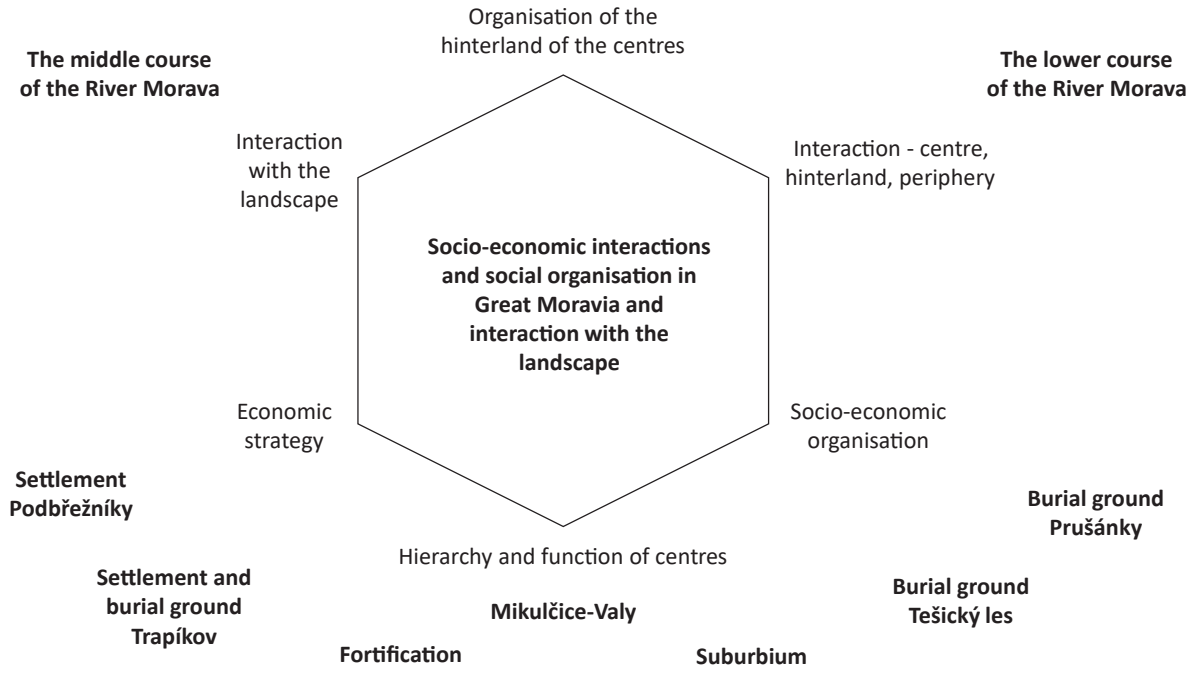

FIG. 2 | Concept of the research into the socio-economic interactions and social organisation in Great Moravia and the interaction with the landscape. Selected case study references: Middle Morava: HLADÍK 2014, Lower Morava: HLADÍK/HLADÍKOVÁ/TAMAŠKOVIČ 2018; TAMAŠKOVIČ/HLADÍK 2015; TAMAŠKOVIČ 2016, Podbřežníky settlement: MAZUCH 2008, fortification: HLADÍK et al. 2014; MAZUCH 2014, Mikulčice: MAZUCH 2013; LÁTKOVÁ 2017, suburbium: HLADÍK/MAZUCH/POLÁČEK 2008, Tešický les burial ground: HAVELKOVÁ et al. 2013; HLADÍK 2010, Prušánky burial ground: MAZUCH et al. 2017.

2. Comments on the Historical, Methodological and Methodical Framework of the Research

Research into social economic and environmental interactions in Great Moravia has had a decades-long tradition in Central European archaeology. Relatively soon after the beginning of the extensive excavations at the major Great Moravian central sites, such as Břeclav-Pohansko and Mikulčice-Valy, the researchers turned their attention to the relationships between these centres and the near and more distant settlements, and the relationship between the settlements and the environment. The aims and the methodological background of the research changed over the decades. These changes naturally reflected the development of archaeological theories as well as the social situation in Central Europe. Over time, all this research has created the foundations for state-of-the-art models and hypotheses. We will address the relevance and further development of these in this book.

The first, more fundamental, papers were written in the 1980s and 1990s and upheld the spirit of the chronological-typological paradigm. They were aimed at a basic description and quantification of the settlement structure in the wider surroundings of major Great Moravian centres such as Mikulčice and Pohansko (e.g. Měřínský 1980; Unger 1993; Klanica 1987). This period saw the first analyses of the relationship between settlements and the environment (e.g. Unger 1992). In the second period, which mostly covered the 1990s, scientific papers focused on complex topographies of the middle reaches of the River Morava. They also emphasised the importance of the natural environment in the formation of the settlement network around the Great Moravian centres and the spatial formation of the organisational structure directly in the Great Moravian agglomerations (Poláček 2001; 2002). To a large extent, these works drew on the German-school settlement archaeology (Hladík 2014, 49). The first comprehensive model of social, economic and environmental interactions in the middle Morava region in the Great Moravian period was proposed, which was based on data from the surroundings of the Mikulčice agglomeration (Poláček 2008).

The last research, which took place in the 2000s, saw a massive use of geoinformation technologies and statistical analyses. Significantly, it applied holism, which became an important methodological tool for supporting the understanding of complex systems and their division into subsystems and individual relationships.[2] Institutionally, the research needed to be conducted by two parallel workplaces: Břeclav-Pohansko and Mikulčice-Trapíkov.[3] Both the workplaces developed strong interpretation models, which although largely based on identical archaeological data, contradict each other in their various parts.[4] This situation is an excellent example of the complexity of archaeological research where the aim is to provide a historical narrative (for our understanding of the term, see Hladík 2019; Mazuch/Hladík/Skopal 2017, 14–20) that goes beyond a simple description and analysis of archaeological materials. We consider this as a positive thing. This publication aims to engage in a debate that has been held primarily among our colleagues from Pohansko in recent years.

Earlier in this text, we outlined our methodological background, which was described in detail in our 2017 book on the importance of wooden structures in Great Moravian graves (Mazuch/Hladík/Skopal 2017, 14–25) and our 2019 paper *On theoretical pragmatism in archaeology* (Hladík 2019). Therefore, we will refrain from describing this theoretical concept here. However, we deem it appropriate

2 Dresler/Macháček 2008; Dresler/Macháček 2013; Dresler 2016; Hladík 2014; these papers contain an overview and critical analysis of earlier research.

3 They are the branches of two institutions: Department of Archaeology and Museology of the Masaryk University in Brno (Břeclav-Pohansko) and the Czech Academy of Sciences, Institute of Archaeology, Brno (Mikulčice-Trapíkov).

4 Biermann/Macháček/Schopper 2015; Dresler 2016; Dresler/Macháček 2008, 2013; Hladík 2014, 2020; Látková 2017.

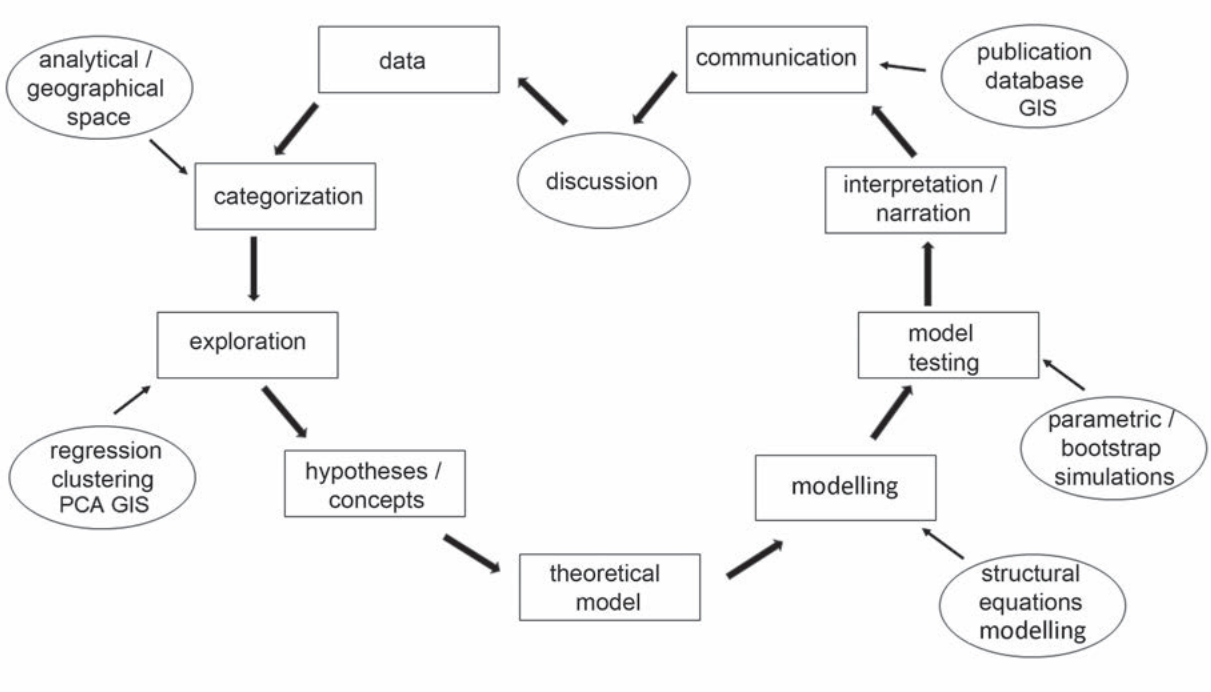

FIG. 3 | The research procedure.

to briefly present the basic research methodology, which is essentially identical to that applied to the above-mentioned research into the social and economic relations in Great Moravia, which was based on the funerary rite (MAZUCH/HLADÍK/SKOPAL 2017). The research results that we present follow the same aim (for more details, see Chapter 3), but compared with the funerary area of the burial sites, our archaeological materials illustrate a more profane environment of the settlements. This is a crucial element of our theoretical background and the methodological processes we use. Archaeological record from different environments of the culture allows us to depict various components of past lives. However, various phenomena, which we have studied in case studies, go beyond the borders, which leads us to attempt to merge the conclusions of individual studies into a single consistent whole. In the long term, our primary goal is to describe and understand the social and economic interactions within the studied society and the interaction of the community with the landscape. Archaeological record from different environments of the historical reality holds potential information, which reflects a particular segment (for an overview of such relationships as we understand them in our research, see FIG. 2). In research, such spatially and functionally diverse archaeological materials provide the opportunity to find the answers to various questions or rather issues, which eventually co-create a single whole. This whole cannot be achieved by simply blending the results of the case studies into a single narrative representation. It is more about using the case studies to ascertain the phenomena beyond the partial aspects of the local relationships, thus revealing the level of complexity of the studied society.

To achieve such goals, we apply a methodical approach, which contains a wide range of analytical tools, logical thinking and mathematical modelling and are applied in a logical sequence. It is important that, under certain conditions, research can commence at any step in this methodical process.

It is the application of the process described by D. O'Sullivan and M. N. Gahegan and partially modified by F. VERHAGEN and T. G. WHITLEY (2012).

An idealised scheme of the research process is depicted in FIG. 3. Research begins with data collection (and naturally, data cannot be collected without a particular question in mind). This is followed by the analytical phase, which is about finding the data properties that can answer the questions. Statistical survey methods are useful in this phase for detecting patterns, and at the same time, it is the stage in which the basics are classified. A theory is created based on the patterns detected in the second step. Specifying the relationship between the variables that determine the patterns detected during the statistical survey and classification should be transparent. The next step is the generalisation of the theory, at which point inductive methods can be used. Another method of generalising the detected pattern is the use of logical reasoning and modelling (both deductive and inductive). A test phase follows, which should ideally confront the models with new data. The final step is to create a narrative interpretation, which should reflect as much of the structure of the past events and their causal relationships as possible.

A significant circumstance associated with such a research scheme concerns the relationships between inductive and deductive research, between the normative and non-normative construction

of scientific theories in archaeology and, most generally, the issue of interpretative versus naturalistic discourse in social science. Although this issue has long been reflected in a large number of works that address the theory of science (for an overview, see e.g. Ochrana 2010; Hladík 2014, 19–23; 2019; Paleček 2018), it is clear that the application of certain axioms of social-science theory in archaeology requires particular attention. In social sciences, a combination of inductive and deductive research is probably the most frequent (see Ochrana 2010, 50). This is reflected in our research process. To recapitulate, the process is the basic classification of data, detection of patterns in this data and a generalisation of these patterns. Importantly, in this case, it is not about formulating premises in the form of axioms – statements that do not need proof. Therefore, it is not possible to draw conclusions only logically (by deduction). It is at this point that empirical verification – induction – of premises enters the research (Hladík 2014, 20).

In this step, it is most effective to use both induction methods and proof of deduction. Among the main motives for choosing such a procedure is the theoretical base of narrative logic, which reflects on the second fundamental problem of social science: the relationship between social sciences and exact science methodology. In his 1983 work on narrative logic, Frank Ankersmit wrote that while in exact sciences research begins with a certain vantage point, "seeing as..." is not the beginning but the result of a historical inquiry. Ankersmit claims that historiography is not accumulative and that it is problematic to use the term paradigm in connection with it; rather, we should talk about *fashions* (Ankersmit 1983, 84).

In other words, in exact sciences, the studied object exists and is directly observable from the beginning of the examination. In social sciences, in our case archaeology, the subject of our study – a historical narrative – does not exist but is created by us. Accepting this idea brings many consequences. Of course, this cannot apply to social sciences in general. For instance, sociology examines contemporary society: the studied object exists, which is why a research perspective is defined at the beginning. The same is true for cultural anthropology when dealing with living populations. Therefore, we must carefully choose between anthropological, or more generally social-science, axioms that are acceptable in archaeology (for more details, see Hladík 2019).

3. Research Objectives and Methodology

As mentioned, spatially and functionally diverse sources provide the opportunity to find the answers to various questions, or rather issues, which eventually constitute a single whole. This complexity, which we ultimately aim at, can be described as an image of the economic strategy of the studied community and the interaction of the settlement with the landscape. What answers to what questions can be answered by the archaeological record from the Trapíkov settlement? And how do these archaeological materials fall into the overall concept of our research? The flow graph (FIG. 2) depicts the research process of the "Trapíkov settlement" case study. The main aim of the long-term research is in the centre of the graph, surrounded by a polygon with a sub-topic at each of its angles. The margins of the diagram contain various case studies that we are either working on or that we have published. These case studies are positioned so that the archaeological record they deal with has stronger links to the issues that are closest. The Trapíkov settlement is most closely related to the issues of the economic strategy, hierarchy and functions of the Great Moravian centre and the interaction of the settlements with the landscape.

3.1 RESEARCH AIMS

The following research aims appear to be the most fundamental:

1) Economic strategy
   - The preserved artefacts and ecofacts from the Trapíkov settlement enable us to analyse the position of the settlement among other settlements and thus decipher the economic functions at the time of the greatest prosperity of Great Moravia.
   - We aim to identify the type of relations between the settlement, the agglomeration and the surrounding area as well as their direction (the direction in which energy – goods, labour, foodstuffs etc. – moves in the system), plus the intensity and repeatability (frequency, regularity or isolation) of such interaction.

2) Settlement hierarchy and the function of the centres
   - The Trapíkov settlement is situated in a very specific area on the border – both geographically and economically/socially – between an agglomeration (a Great Moravian centre) and its hinterland. It is the "frontier" between two interacting worlds, and it reflects certain phenomena from both ends of the social and economic reality.
   - Another aim is to reveal the primary functions of the central agglomeration in relation to its closest surroundings by analysing the archaeological material from Trapíkov and comparing it with the material from the Mikulčice centre. The question is the extent to which the agglomeration influenced its closest surroundings (geographically and economically), whether it changed it in any way – and if so, how – and to what extent and by what means it set its boundaries.

3) Interaction with the landscape
   - The Trapíkov settlement lies in a flood plain of the River Morava. Trapíkov and the settlement at Kačenáreň near the Church of St Margaret of Antioch in Slovakia are among the few open settlements in the flood plain with a population contemporary to that in the central parts of the Mikulčice agglomeration. Even if we disregarded the immediate surroundings of the Mikulčice centre, these are the only two examined settlements in the flood plain of the Morava near the centre. Such peripheries of the agglomeration offer unique opportunities for research into the relationships of its 9th-century community and the landscape. As this is a highly specific natural environment, it can be justifiably assumed that the landscape around the settlement determined its layout and both the internal and external relations.
   - Therefore, we aim to ascertain the type of environment in which it existed and how the environment determined its form and function, and vice versa, how the settlement influenced the nature around it.

As stipulated in the introduction, none of the archaeological record included in our research should be studied in isolation. We aim to exploit the information potential of the archaeological material within the widest possible time and space context. As we understand it, the context is the Great Moravian environment, or to be more precise, the lower and middle reaches of Morava in the 9th and early 10th century (see Hladík/Hladíková/Tamaškovič 2018). Geographically and archaeologically, it is a region that contains all the prerequisites for complex archaeological research into the social and economic interactions in Great Moravia. Of course, the region cannot be studied in isolation. As mentioned, the theoretical concepts on which our research is built, constitute an ideal logical, terminological and methodological framework for crossing research boundaries; local-scale relational analyses enable us to explore relations on a more global level. In our case, Great Moravia can be considered an entirety. To engage in a discussion about the nature of the Great Moravian social order, we need to examine the specific relations between the constituent parts of the whole system. We consider the area of the middle Morava region, which includes the centres of Mikulčice-Valy and Břeclav-Pohansko, and other components of the settlement network, a model territory. We consider the archaeological materials from this region to be the foundation for a model/picture of the relations between the Great Moravian agglomerations and their surroundings.

3.2 RESEARCH METHODOLOGY

The current theoretical model of social and economic relations in the Mikulčice area (Hladík 2014; 2020) emphasises the importance of the relationship between the function and the status of a particular settlement in the settlement hierarchy and its geographical location. As for the change of function – apart from the distance from the centre – the variability of the environment played an important role. This means we assumed different functions and economic strategies in the settlements in the vicinity of the centre (in the Morava flood plain), the settlements at the fertile river terrace beyond the inundation border (but still close to the centre), and on the outskirts of the hinterland where settlements existed on the borders of the flood plains of some of the tributaries of the River Morava (for instance, the Prušánky valley). Therefore, the concept of this research is designed to analyse sufficient data to verify this model as comprehensively as possible.

The archaeological source base from the surroundings of Mikulčice is more complex than that from Pohansko. This is because there were more open settlements examined and more comprehensively studied Great Moravian burial sites within 10 km from the centre (for an overview, see Hladík 2014, 89–94). As at Pohansko, the surroundings of Mikulčice were subjected to systematic prospection (surface collection, geophysics). Despite this, it is indisputable that for more comprehensive knowledge of the economic strategy of the Great Moravian communities and the interaction of the centres with the surrounding areas, as well as the interaction of the settlements with the landscape, new research into the unfortified settlements that coexisted with the Great Moravian centres in time and space is needed. Such research must focus on the collection of archaeobotanical, palynological, archaeological and geological samples (*cf.* Hladík 2014, 195; Dresler 2016, 248). This is the only way to complete the source base, which is now primarily comprised of data from centres and burial grounds. Despite its considerable volume, the current data set can no longer be considered representative, as it lacks "control" data from rural settlements that were at various distances from the centre. Such new data and the subsequent analysis would make it possible to test and verify the presented hypotheses.

The main objective of our research, which includes this publication, is to design an archaeological model of economic and social relations between the Mikulčice agglomeration and the settlements in its surroundings. This is based on data from unfortified rural settlements in the closest surroundings of the Mikulčice agglomeration (this currently concerns the following settlements: Mikulčice-Trapíkov, Mikulčice-Podbřežníky, Moravská Nová Ves – Padělky od vody, Prušánky-Podsedky), which would be compared with data from older non-destructive research in the surroundings of Mikulčice. Based on this model, we will be able to participate in the debate on socio-economic interactions and social organisation in Great Moravia, which has been taking place primarily between archaeologists and historians from Moravia, Bohemia and Slovakia.[5] The intensity of this debate demonstrates how topical this issue is. The discussion points to what appears to be an obvious problem: the lack of archaeologically examined unfortified Great Moravian settlements. Therefore, obtaining data sets from this type of settlement network components and incorporating them into interpretation models is highly topical and necessary. This requirement appears to be a necessary research step, whether in archaeological or exact-science analyses. The development in exact sciences has led to the frequent use of isotope analysis in archaeology, intending to discover different details concerning diet, subsistence and the migration of people. We study this phenomenon in the region of our interest. However, the level of the research confined these promising methods solely to analysing data from burial grounds (Kaupová et al. 2018). Again, in this context, there is an urgent need to obtain relevant data from open rural settlements.

Among these settlements, Mikulčice-Trapíkov is currently the one that has been most complexly examined. This is why the archaeological materials

5 Alimov 2012; Kalhous 2014a; Lysý 2014; Macháček 2012; 2015; Profantová/Profant 2014; Štefan 2014.

from Trapíkov constitute the basis for the archaeological model we present in this work. However, it is by no means a model built exclusively on the Trapíkov data. To construct the narrative model, we used all the available data from the settlements examined in the surroundings of Mikulčice within an approximate 10 km radius (see Hladík 2014 for a border as defined in research methodology).

In terms of fieldwork methodology, it is essential that the processing of the archaeological data from Trapíkov directly follows on from our earlier research in the surroundings of Mikulčice, only transitioning from the collection of data using non-destructive methods to traditional destructive research of selected open settlements. An important methodological component of research is the compilation of the widest possible framework of environmental data and their implementation into the final archaeological model. Data analysis and synthesis are based on basic descriptive statistics, exploratory statistics and mathematical and geoinformation modelling. The results of statistical analyses (archaeological and environmental data) and mathematical models are implemented in the GIS environment, where the resulting archaeological model is complemented by spatial statistics. Based on this archaeological model, we present a narrative model of social, economic and environmental interactions in Great Moravia.

Our need for new archaeological data from the open settlements was transformed into a research concept, which is based on our non-destructive research of a settlement network and settlements conducted earlier (Prušánky-Podsedky, Mutěnice-Zbrod) and more recently (Mikulčice-Podbřežníky, Mikulčice-Trapíkov) (Klanica 2008; Mazuch 2008; Hladík 2014).

Before expanding on the results of the research into the Trapíkov settlement in terms of spatial relationships, let us briefly deal with the problem of the chronology and dating of archaeological record. As the dating of the Great Moravian ceramic material and the monitoring of its post-Great Moravian development is problematic (which is clearly shown by the situation in the Pohansko hinterland described below), our primary aim is to date the examined components as reliably and accurately as possible. Thus, a crucial part of such research is the collection of samples for radiocarbon dating. The sampling for ^{14}C dating is naturally adapted to specific archaeological contexts at the sites although the primary aim is to collect and date samples of several types of organic material (plant macroremains, animal or human bones), which ideally come from clearly defined and stratigraphically closed archaeological contexts. If the conditions concerning the dating of the examined components to the Great Moravian period and the condition of a uniform methodology for fieldwork and analytical processing of archaeological and environmental data are met, the comparative results will be meaningful and essential for modelling Great Moravian society in the second half of the 9th century. However, if the dating of the newly studied components confirmed the use of their area after the demise of Great Moravia in the 10th/11th century, the planned comparison will be particularly important for the chronological monitoring of changes. The differences and similarities in the data from individual components would then have to be explained on the socio-economic rather than the chronological level.

4. Theoretical Models of Economic and Social Relations Between the Great Moravian Agglomerations and the Nearby Settlements

The main aim of the research is to study the social and economic relations of the community that lived in the Mikulčice-Valy agglomeration and its immediate surroundings in the Great Moravian period. Based on the knowledge provided by this research, it should contribute to creating a picture and a discussion regarding the social organisation in Great Moravia and the interaction of the Great Moravian population with the landscape it inhabited. Although chronologically, we are primarily interested in creating a picture of social, economic and environmental interactions in Great Moravia and the period with the greatest upswing in central sites, such as Břeclav-Pohansko and Mikulčice-Valy, our research also addresses the issues connected to the collapse and transformation of Great Moravia over the 10th century. Our research for this is similarly grounded to that of the social organisation of Great Moravia. Thus, to present an image of the demise and transformation of Great Moravia, the first step must be based on the situation during the greatest boom, i.e. before the changes that ensued. To understand the changes that took place in the dynamic 10th century, we need to understand the original situation as comprehensively as possible. Only then we will be able to find the causes and describe the course of the demise and transformation of Great Moravia and to better understand the new attempts at creating a state in the middle course of the River Morava, or wider Central Europe, from the 10th to 12th centuries.

In general, archaeological research into the economic and social relations between central sites and their surroundings in early medieval Central Europe arrived at the assumption that the centres were not able to supply themselves with agricultural produce and that the basic energy needs of their inhabitants had to be saturated by supplies from the surrounding area (for an overview, see Dresler 2016, 185–188). This relationship between the centre and the surrounding area was not limited to the saturation of the basic energy needs of the people living in the centre. Centres accumulated functions, and in turn, they ensured the stability and functioning of the whole society. Current research hypotheses concerning the structure of these functions and their allocation across the settlement network vary (e.g. Gringmuth-Dallmer 1999, 9–20). Therefore, exploring the relationship between central areas and their surroundings is a highly topical issue, which is by no means limited to the archaeology of Great Moravia. Numerous archaeological literature has been published in the neighbouring countries – the Czech Republic, Poland and Germany.[6] The research conducted to date indicates that there is a need to allow for a certain variability in the function of early medieval central areas in different geographical regions. This is in addition to the chronological phases of the Early Middle Ages, which, among other things, depended considerably on the overall structure of the society and the technical, material and social conditions (see Staňa 1999, 77).[7] Therefore, the search for the basic features of the central sites and their relationship with their surroundings is a very difficult task. It is also highly questionable whether the archaeological data we have enable us to design a universal theory of social relations (in this case, the relationships of the centres with their surroundings),

6 Examples with literature: Klápště 2005; Frolík 2008; Możdzioch 1999; Biermann 2008.

7 An excellent example of such variability is in Dresler's work in which he compares the centre-hinterland relationship in Great Moravia and the North Sea region and the Baltic states. In the Nordic states, a hinterland is not seen as a source of primary energy for the centre and the entire system, but rather as the market for the centre's products. This is connected with the specific functions of the centres/emporia (for more details, see Dresler 2016, 185–188).

the universality of which would parallel the universality in exact sciences. This is why our baseline is that we are building a narrative model of specific causal relationships in a defined time and geographical region.

We previously mentioned that the concept of our research is based on the principles of relational archaeology, the network analysis (Knappett 2013; Watts 2013) and is significantly influenced by Kristiansen's concept of renewed modernity in archaeology (Kristiansen 2014). We are interested in studying global topics in line with these theoretical concepts, only using a study of data on a lower local level that is as complex as possible. We emphasise this at this point because to briefly describe the current level of knowledge and the main parameters of the debate concerning the subject, we are faced with the problem of the research scope. There are two levels on which interpretation and discussion have been taking place. These are in line with the above-mentioned statement that our research aims are global subjects but studied at a lower, more local, level. A more global picture, the main aim of our long-term research, is to describe and understand the social, economic and environmental interactions in Great Moravia and the local case studies at which our interpretation will address the economic, social and environmental relations between the Mikulčice agglomeration and its surroundings. The current level of knowledge concerning this topic can be summarised on these two levels.

First, we present the basic parameters of the archaeological models of middle Morava – the central part of Great Moravia – at a lower local level. We then present the basic parameters for interpretation and discussion of the social and economic relations in Great Moravia from a more global perspective.

Studying the social, economic and environmental interactions in Great Moravia, we are currently working with several models that describe the relationships of the centres with their immediate surroundings and the general relations in the residential network. The latest discussion on this subject took place among our colleagues from Pohansko (Dresler 2016, 247–248). We can now take a closer look at the models created using the data from Pohansko and its surroundings.

The first consistent model of settlement structure and relationships in the middle course of the Morava was published by the Pohansko archaeologists about ten years ago (Dresler/Macháček 2013). It can be briefly described as follows. The early medieval settlement in the lower Dyje region, above the confluence of Morava and Dyje, and the area to the north – the middle reaches of the Morava around Mikulčice – was the core of Great Moravia. The settlement structure in this area was highly differentiated in the Great Moravian period. Its basic structure consisted of strongholds. The entire settlement structure in the lower Dyje region was adapted to the needs of the centre – the agglomeration in Pohansko near Břeclav, which was one of the central points of the entire Great Moravian structure (Dresler/Macháček 2013). According to this model, the Břeclav-Pohansko central site was not self-sufficient and could not exist without its closest economic hinterland, which secured the supplies of foodstuffs and other important raw materials (Dreslerová/Hajnalová/Macháček 2013). The site was situated in a flood plain, surrounded by river branches. Therefore, the immediate surroundings of Pohansko cannot be considered suitable for extensive agricultural production. In the Great Moravian period, the population of Pohansko grew significantly, which also supports the hypothesis that the agglomeration was not autarkic. The surrounding area was not suitable for agriculture and could not cover the enormous food consumption of the agglomeration. The inhabitants of the central site did not primarily engage in agricultural activities. The agricultural tools discovered at central sites are proof of their production in this area rather than their use by the inhabitants of the agglomeration (Dresler/Macháček 2013, 663–705). The concentration of settlements around central sites indicates that this was a case of at least partly controlled colonisation. Areas on the boundaries between the hinterlands of two neighbouring centres were inhabited only sporadically. In addition to the production of basic foodstuffs, the population settled in the closest hinterland of the Great Moravian centres was probably also able to construct communication and fortification systems (Dresler 2011, 125–126).

The research in the Dyje region and the middle course of the Morava shows that the Early Middle Ages saw significant qualitative and quantitative changes in the settlement network and its strategies. One of the most significant turning points took place at the beginning of the 10th century, after the collapse of Great Moravia (Dresler/Macháček 2013, 692). In the first half of the 10th century, the settlement network was significantly transformed. Central sites such as Břeclav-Pohansko and Mikulčice-Valy were abandoned, or their population dwindled considerably. These changes might have been linked with the demise of Great Moravia, military attacks or climate change. Not only centres but also some of the common Great Moravian settlements around the middle course of the Morava were abandoned. What used to be a central area during the Great Moravian times became a pauperised enclave in the 10th century. Anyhow, the area was not completely ravaged and depopulated. This situation changed as late as the 11th century. After the conquest of Moravia by Prince Oldřich around 1030, the settlement structure in this area was rebuilt. It drew on the original Great Moravian settlement. New Late Hillfort centres were built near the Great Moravian agglomerations, only more towards the edges of the floodplains. Among the new elements in the settlement structure were so-called market villages, documented in written sources. A village with such a function has been archaeologically proven in the Kostice-Zadní hrúd settlement. Its main function was linked with long-distance trade: it was an important stop on the trade

route from the Danube region to the north, in the direction of an older Amber Road (Dresler/Macháček 2013, 697).

A different model of economic relations and social organisation in the middle course of the Morava and the development of a settlement immediately after the collapse of Great Moravia was presented by P. Dresler (2016). He wrote that the surroundings of Pohansko in the Great Moravian period cannot be interpreted as an economic hinterland. Having processed the finds from surface prospection and trial trenches, he concluded that the components, which had been considered as agricultural settlements supplying Pohansko in the previous model (Dresler/Macháček 2013), could not be unequivocally dated to Great Moravia. He questioned their contemporariness with Pohansko during its greatest economic and political upswing in the second half of the 9th century. He pointed out that archaeological excavations (not only prospection) and ^{14}C dating at the settlements confirmed pottery associated with the Great Moravian tradition as well as Late Hillfort pottery with an admixture of graphite in the fabric. Such a combination of finds has also been repeatedly found during surface prospection. Based on these facts, Dresler hypothesised that the artefacts found during surface prospection are not evidence of a Great Moravian settlement but of a diaspora of the Great Moravian population from Pohansko and their continuous development in the 10th and 11th centuries (Dresler 2016, 247). This hypothesis has serious implications on the interpretation of the economic and social relations in Pohansko during the Great Moravian period. Essentially, the fact that the Pohansko agglomeration is considered to be autarkic, means that its inhabitants had to engage in agricultural production and could cover their energy needs. A further argument supporting this claim by P. Dresler is the large concentration of agricultural tools found at central locations such as Pohansko and Mikulčice. However, he does not consider this concentration as proof that they were produced at strongholds, as presented by an older model. Instead, he considers it as direct proof of agricultural activity at the stronghold. This conclusion is also supported by traces of wear and tear, which Dresler identified on a ploughshare (Dresler/Beran 2019).

We also present the basic parameters of the interpretation models – the outcome of our research in Mikulčice (Hladík 2014; 2020; Látková 2017), of which this publication is an inseparable part. As early as in the first work on the structure of the settlement and economic relations in the surroundings of the Mikulčice agglomeration (e.g. Klanica 1987), the settlement in this area, contemporary with the fortified agglomeration, was highly structured and functionally differentiated. This was confirmed by further research (Poláček 2008), including the last examination dealing with this issue, which we draw on in this work (Hladík 2014; Látková 2017). In the Great Moravian period, the Mikulčice agglomeration was a supracommunity centre, which was not completely autarkic in terms of food resources. This centre topped the settlement, economic and social hierarchies. The hinterland was structured in the sense that we assume there was a connection between the function of the individual settlements, and therefore the social status of the inhabitants and their location concerning the centre. This was confirmed by the differences between the open settlements studied to date (Mikulčice-Trapíkov, Mikulčice-Podbřežníky, Prušánky-Podsedky, Mutěnice-Zbrod, Kopčany-Kačenáreň). The differences included food composition, documented animal species (both domestic and wild) and further archaeological proof of economic strategies, such as storage vessels, roasting trays and agricultural tools (for details, see Hladík 2014, 171–181; Látková 2017, 101–106). These differences prove the tense relationship between the centre and its surroundings. The Great Moravian agglomeration at Mikulčice can be described as a systematically managed and exploited hinterland. The individual geographical areas within this area (conventionally inscribed in a circle with a maximum radius of 10 km; for details, see Hladík 2014, 53–56) fulfilled specific functions and the population in the hinterland accommodated most of the needs of the centre.

There is a model of the Mikulčice agglomeration, which reconstructs the character of socio-economic relations based on archaeobotanical finds of plant seeds (Látková 2017). This model is based on a different type of data and evaluation principles and methods than the previous models. Archaeological studies based on material culture have reconstructed the relationship between the Great Moravian centres and the settlements in their hinterland as a close dependence – especially the dependence of the centres on the hinterland.[8] As archaeobotany can determine whether a specific area or its part is a place of production or consumption of crops, this hypothesis was tested more thoroughly. Based on the results of archaeobotanical analyses (Látková 2017, 87–96), it is assumed that plant foodstuffs for the Mikulčice agglomeration were not produced exclusively by the settlement in its economic hinterland. However, they have not been studied archaeobotanically. This type of settlement generally consisted of a few households, which was insufficient to organise the workforce required for the most stressful times of the agricultural year when they would harvest excess produce for the central part of the agglomeration (Látková 2017, 101–106). Therefore, it is highly likely that part of the population of the centre also participated in the production of plant food, which saturated the needs of the central part of the agglomeration.

The system of subsistence relations between the centre and its hinterland described in the archaeobotanical model corresponds with the conclusions of the archaeological model of a systematically

8 Klanica 1987; Dresler/Macháček 2008; Mařík 2009; Hladík 2014.

managed and exploited Mikulčice hinterland. It is essential that the archaeobotanical model points to the need for the inhabitants of the centre and the people from the hinterland to cooperate on securing the basic energy needs of the entire community. The model also describes the basic parameters of this collaboration.

These models are based on data from two neighbouring agglomerations and their surroundings. They are central points, which most likely had specific functions within the economic and administration system in Great Moravia (e.g. Dresler/Mazuch 2019, 165–177). Therefore, it is possible that the organisation of the relations in their surroundings was also different, which presents greater opportunities for the interpretation of more global issues concerning social, economic and environmental interactions in Great Moravia.

As previously mentioned, creating an interpretative narrative model of these interactions – in other words, that of the Great Moravian society – is essentially the main long-term aim of our research. The discussion that has unfolded in recent years on the nature and development of early-medieval society in Central Europe is quite broad (for an overview, see Macháček 2012; 2015). The central point of this discussion is whether the 9th-century Moravians achieved the highest degree of complexity – meaning a state (Macháček 2015, 468). Among other key phenomena discussed in this debate are the market, long-distance trade, means of exchange in Great Moravia, the (non)existence of a monetary system, a slave trade, the collection of taxes and tributes, and the location of the Great Moravian boundaries. All these issues are directly related to the economy, or more specifically, to the origin and redistribution of resources sustaining the entire society. This is one of the motives behind our approach to the problem described above. We want to be knowledgeable of and thoroughly understand the economic interactions in a particular geographical area where economic, political and religious powers were concentrated. Only then shall we present our model of economic and social relations in Great Moravia.

5. Archaeological Research at the Mikulčice-Trapíkov Site (Chronological Overview, Methodology of Field Research, Basic Records and Publication of Archaeological Data)

The first archaeological excavations of the moderate elevation that lies 1 km to the west of the fortified centre of Mikulčice-Valy were carried out by the Archaeological Institute of the Czechoslovak Academy of Sciences in Brno[9] in the mid-20th century (FIG. 4). In 1957 and 1958, M. Kostelníková explored part of the burial ground from the 9th or early 10th century, which was found on the Virgásky dune, 300 m to the southwest of the Trapíkov settlement (KOSTELNÍKOVÁ 1958). Other field activities at Trapíkov followed several decades later and were connected with the construction of telecommunication networks in 1998 (POLÁČEK 2001, 365–366) and a trial excavation carried out by the Institute of Archaeology in Brno in 2003 (POLÁČEK/RUTAR 2004). They explored several features from the 9th to the early 10th century in the open settlement. In addition to the settlement features (six dwellings and ten sunken features), there were four graves within the settlement (FIG. 5).[10]

Extensive fieldwork at Mikulčice-Trapíkov started again in 2010, in connection with the rescue excavations before the construction of the new ARÚB archaeological base (FIG. 5–6). This publication is one of the results of the excavations carried out from 2010 to 2012 (area M17) and in 2015 (area M20).

Area M17 directly neighboured the parts of the Trapíkov sand dune excavated in 1998 and 2003. In terms of geology and geomorphology, the crucial fact is that the area is situated on a sandy dune in the middle of a flood plain of the River Morava (POLÁČEK/ŠKOJEC/HAVLÍČEK 2005, 154–163, Abb. 5–7). As for historical interpretations, this was an area where the border between the extramural settlement and the economic hinterland of the early medieval settlement agglomeration in Mikulčice-Valy is hypothesised (POLÁČEK 2001, 365–366; 2008, 270, *cf.* HLADÍK 2014, 164–166).

The rescue excavations in 2010–2012 were primarily due to the planned construction; at the same time, from the perspective of systematic research, the excavations in M17 correlated with the research into settlement structures around the central early medieval agglomeration of Mikulčice-Valy (HLADÍK 2014; 2020). The planned building project was taken into account and an excavation area of 2,290 m² (89 squares of 5 × 5 m) was designed. This area was further extended to include the embankment, on which the building stands today, and the access road (FIG. 6–7). An overall area of 4,214 m² was excavated in this phase. This area was at an altitude of 157.8–160.9 m A.S.L. and sloped down to the west and north (HLADÍK 2014, Fig. 103).

The last excavation phase was carried out in June 2015. Area M20, east of M17, was excavated between 2010 and 2012 (FIG. 5). The excavations in this part of the Trapíkov dune started because of the groundworks preceding the revitalisation of the LU100 oil probe, which was part of a remediation of contaminated sites. After a trench for an electric line was dug and the forest stand and the overburden in the endangered area of 202 m² removed, two sunken settlement features from the 9th/10th century were discovered.

A total area of 5,381 m² has been excavated and examined at Trapíkov dune. Geoarchaeological probing suggests the overall area of the dune is 34,000 m². Approximately 15% of the entire area has been excavated. Most likely, the area of the settlement and

9 Today the Czech Academy of Sciences, Institute of Archaeology, Brno (ARÚB).

10 Unfortunately, an analysis of the material from these excavations cannot be done as it was destroyed along with the documentation during a fire at the archaeological base in 2007.

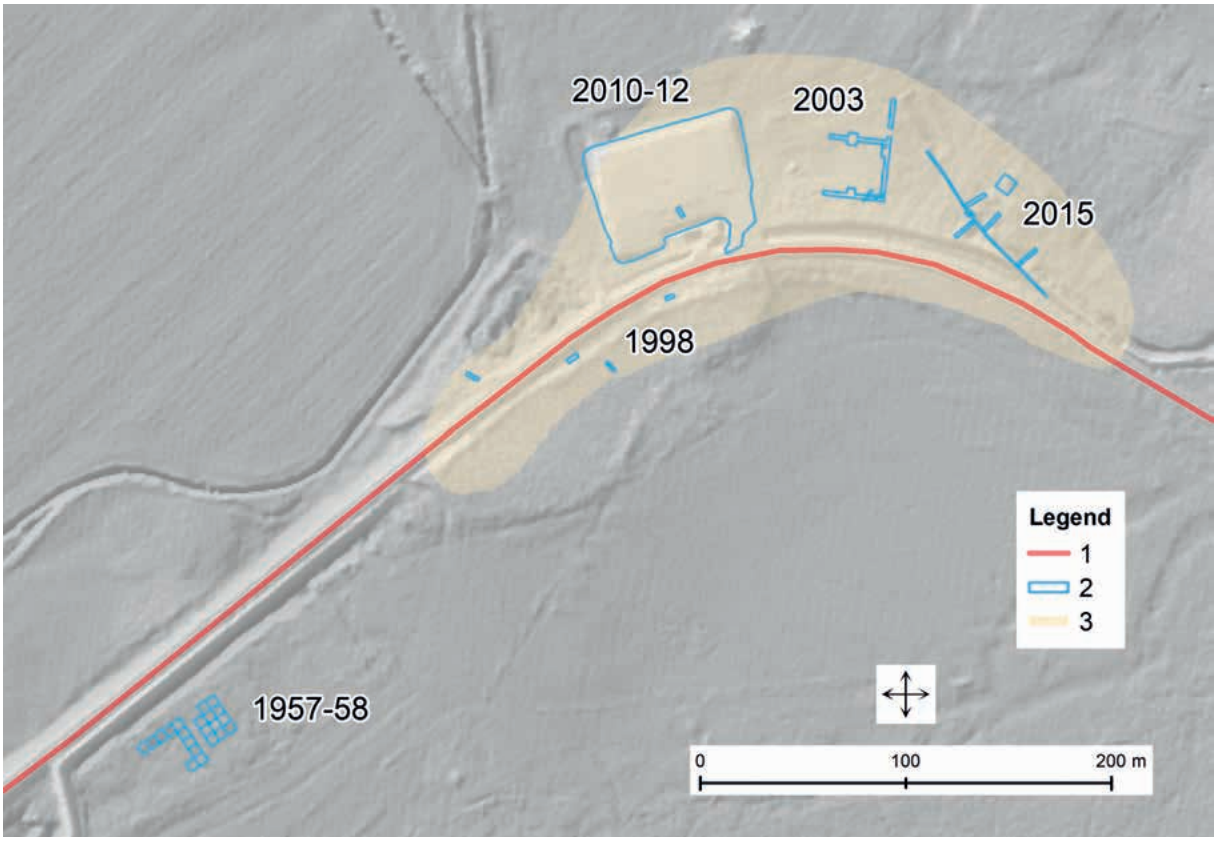

FIG. 4 | Plan of the range of archaeological excavations on the Virgásky and Trapíkov dunes. Legend: 1 – present-day road, 2 – excavated areas, 3 – estimated extent of the Trapíkov sand dune.

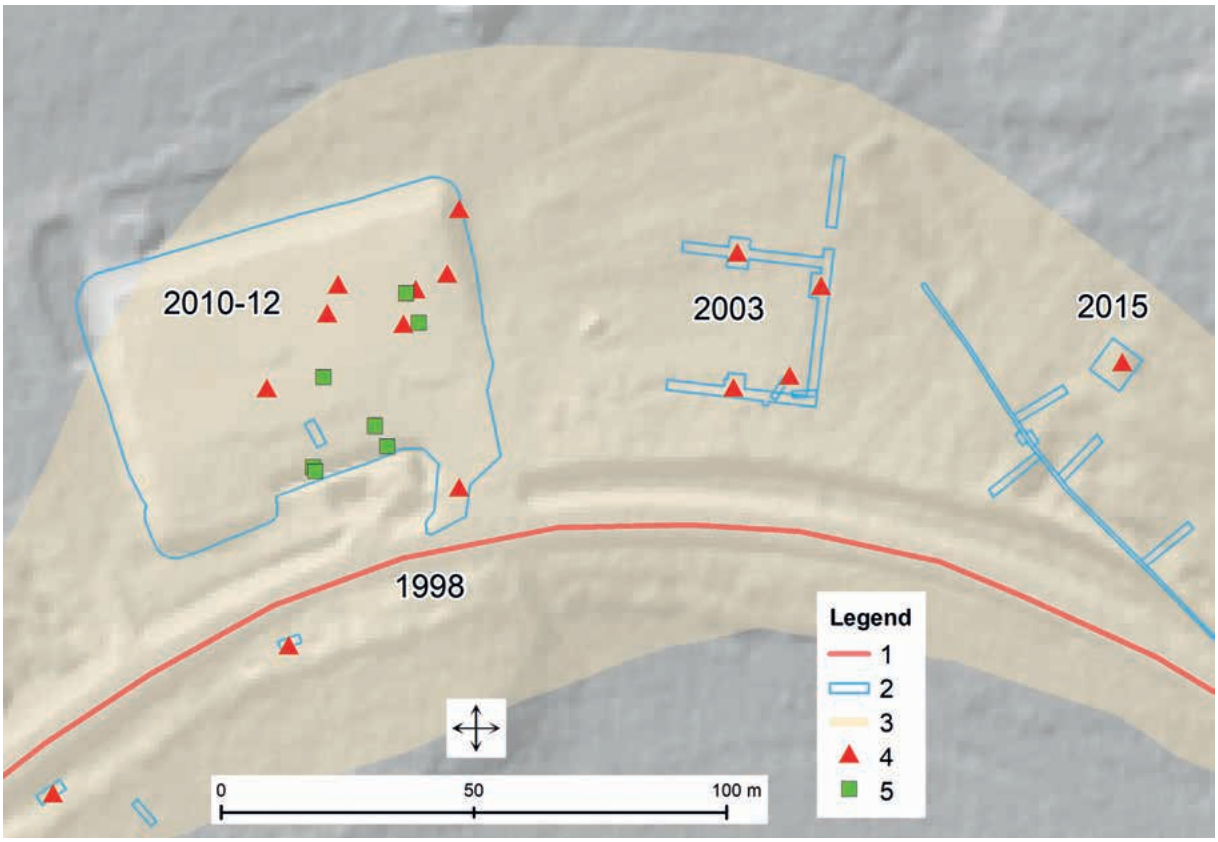

FIG. 5 | Plan of the area excavated in 1998–2015 with the main documented archaeological contexts highlighted. Legend: 1 – present-day road, 2 – excavated areas, 3 – estimated extent of the Trapíkov sand dune, 4 – 9th-century dwellings, 5 – 9th-century graves.

FIG. 6 | Plan of the area excavated in 2010–2012 with the ground plan of the new archaeological base. Legend: 1 – boundaries of the area excavated in 2010–2012, 2 – ground plan of the new archaeological base.

1
2

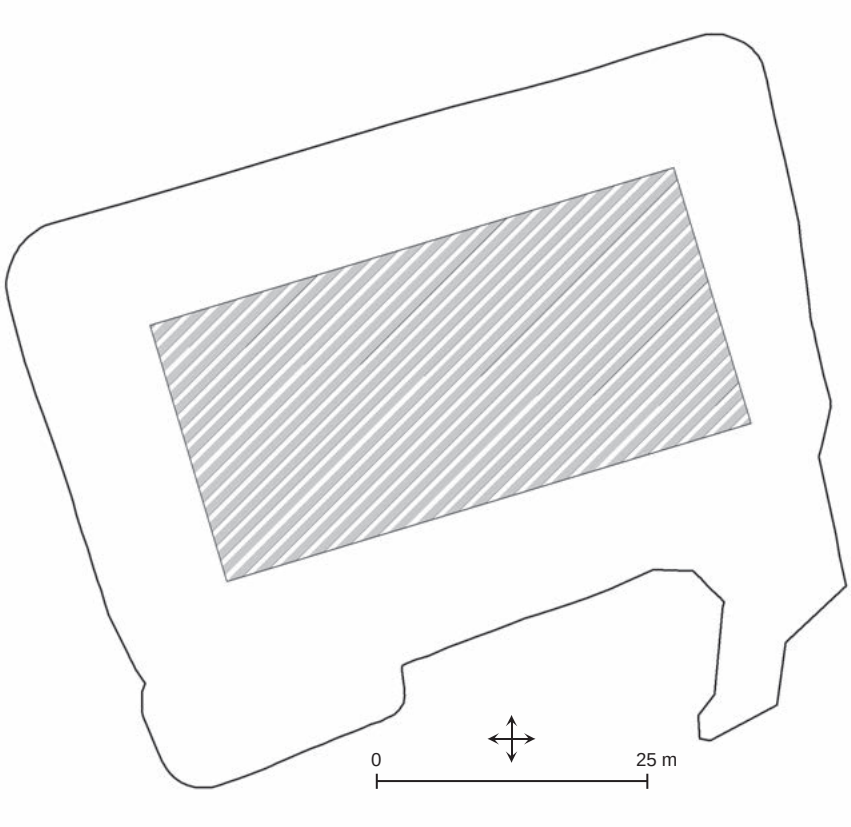

FIG. 7 | Plan of the area excavated in 2010–2012, showing the main 5 × 5 m² units and documented cross-sections. Legend: 1 – boundaries of the area excavated in 2010–2012, 2 – grid system with square units, 3 – auxiliary trenches made during the excavation, 4 – documented cross-sections.

1
2
3
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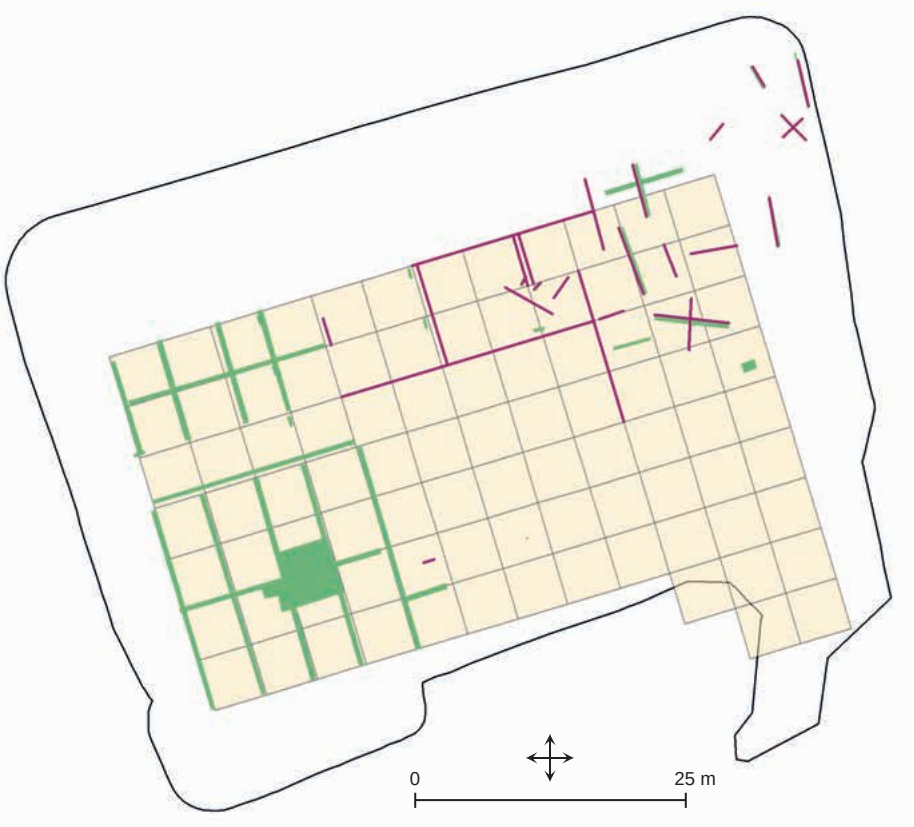


burial ground at Trapíkov is much larger than the area excavated to date. Despite this, the archaeological material uncovered by the excavation enables us to understand many aspects of the system of social and economic relations in the surroundings of Mikulčice.

The excavation methodology was essentially based on a contextual approach, which was partly modified due to the specific character of the site – a dune in the middle of a flood plain. Contextual excavation of individual structures was not possible in the homogeneous overburden. Therefore, we excavated by arbitrary layers when removing the overburden. We documented the position of portable finds within the studied area using auxiliary sectors, the artificial layers mentioned earlier, and, where possible, specific interpretation contexts. The basic identification spatial unit was a 5 × 5 m². These square units were further divided into sectors of 2.5 × 2.5 m and 1 × 1 m. All portable finds were documented using this grid system. Selected categories of finds (such as artefacts made from non-ferrous metals, iron and bone and so-called "small finds"), were positioned in the JTSK coordinate system. Non-portable finds were documented by drawing and photography – oblique imaging and photogrammetric method for single scanning – and localised in the JTSK coordinate system. We documented the plans of the archaeological contexts and the vertical profiles of the main 5 × 5 m² using either drawings or photogrammetric method for single scanning, especially in areas with the greatest concentration of archaeological contexts (FIG. 7). We went on to digitise the orthogonal images and drawing documentation (georeferencing and vectorisation). We thus obtained an orthoimage plan of the overall archaeological context in the area examined and then created an overall interpreted vector-based research plan (FIG. 8). Based on the detailed surveying of functionally interpreted objects, we created 3D models of the documented remains of dwellings (HLADÍK 2014, Fig. 102). Observations and information about the research circumstances were recorded in a technical log. We registered individual archaeological contexts and their relationships in the relevant forms and systematically collected environmental data throughout the whole area. We focused primarily on flotation sediments from individual archaeological contexts to harvest as many botanical and zoological macroremains as possible. To answer the questions, we took specific samples from several contexts to determine the micromorphology of the deposits. The obtained ecofacts were used for isotopic analyses, ^{14}C dating and geoarchaeological analyses (see Chapter 12).

The entire field documentation and the results of all environmental analyses were processed in ArcGIS Desktop and ArcGIS Online. There is a hyperlink that connects the basic vector-based plan of archaeological contexts in the ArcGIS project to other parts of the field documentation, such as orthogonal images, oblique images and drawing documentation. The vectorised interpreted plan is also linked to the results of environmental analyses. The project comprises three main parts: (a) documentation (original documentation – photographs, plans, measurements), (b) analysis (databases, orthophotographs, vector plans), (c) interpretation (3D models of features, results of environmental analyses, theoretical models of studied relationships and the results of spatial analyses, for instance, the fragmentation of pottery). The entire project is accessible from ArcGIS Online (FIG. 9–10). The project will also be part of a virtual model of the Mikulčice agglomeration, which is being developed as an interactive online map as part of the NAKI applied research project.[11]

The study of the settlement and burial grounds at Trapíkov is also an integral part of the research into the social and economic relations of the communities that lived in the middle and lower reaches of the River Morava in prehistory and the Early Middle Ages (the SEEI project).[12] This research aims to complement an image of the social organisation of populations across historical/archaeological periods and the interactions between the prehistoric and medieval populations with the landscape. Due to the long-standing excavations in the middle and lower reaches of the Morava, a rich geoinformation database with the components of the settlement network dated from the Neolithic to the Early Middle Ages was created from archaeological data collected in Záhorie and South Moravia. In the project, archaeological material was divided into two basic groups, which were collected and entered into a data model (FIG. 11–12). The primary data are archaeological data and the secondary data include environmental data (altimetry, hydrological map, geological map, soil map) and cartographic data (such as Austrian-Hungarian military maps).

Archaeological data are divided into two groups. The first group contains information from publications as well as from unpublished excavation reports and field documentation from older excavations carried out in the area by other institutions. The basic analytical and geographical unit in the geoinformation database is a component of a settlement network. The components are qualitatively and quantitatively divided based on dating, function, type of fieldwork and research scope. The second group contains data obtained specifically from our field research. This is further divided into three sub-groups: (1) non-destructive research; (2) standard archaeological excavations; (3) environmental analyses. As in the first group of archaeological data, the individual

11 The project *Virtuální vědecký model velkomoravských Mikulčic jako systému interaktivní dokumentace, prezentace a archivace dlouholetého systematického archeologického výzkumu [Virtual scientific model of Great Moravian Mikulčice: A system of interactive documentation, presentation archiving of long-time systematic archaeological excavations]* was supported by the Czech Ministry of Culture in 2018–2022.

12 The project SEEI – *Social Economic and Environmental Interactions*, implemented as part of the institutional project of ARÚB No. RVO: 68081758 (see HLADÍK/HLADÍKOVÁ/TAMAŠKOVIČ 2018).

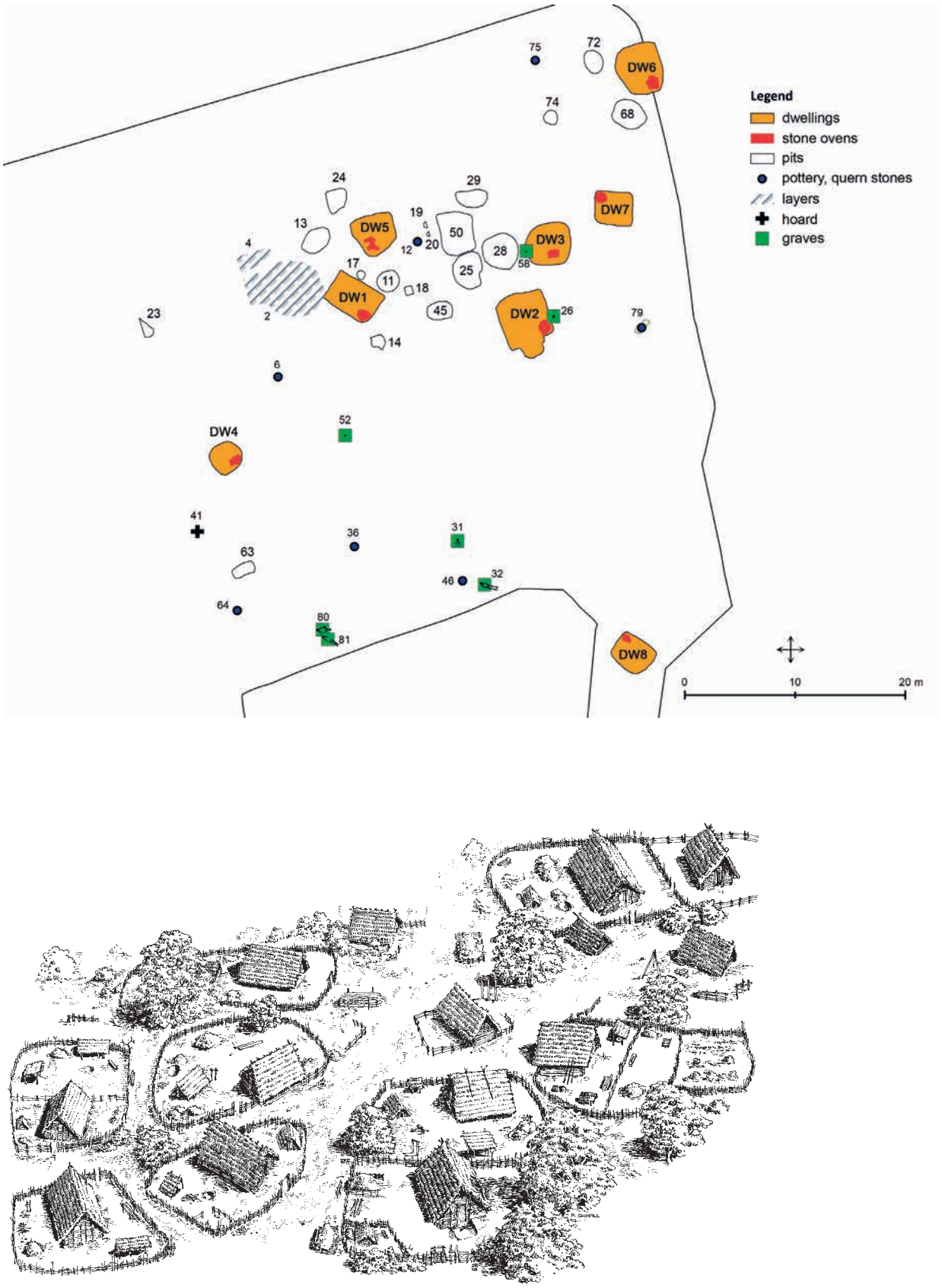


FIG. 8 | A: Overall interpreted vectorised plan of the archaeological contexts excavated in 2010–2012. B: Ideal reconstruction of the Great Moravian settlement at Mikulčice-Trapíkov (drawing R. Skopal; after HLADÍK/MAZUCH/POLÁČEK 2020).

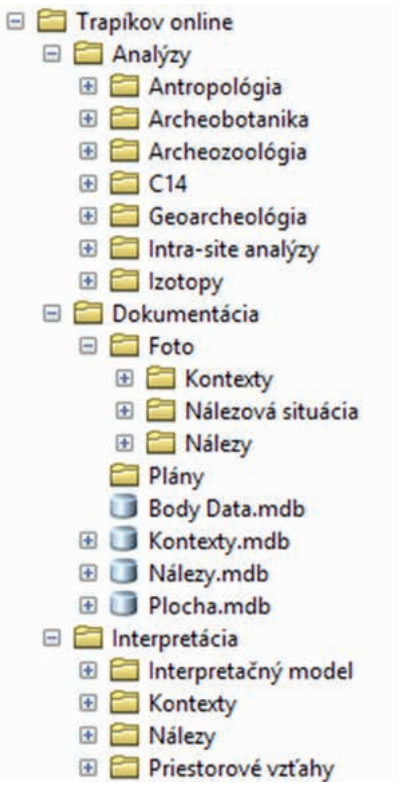
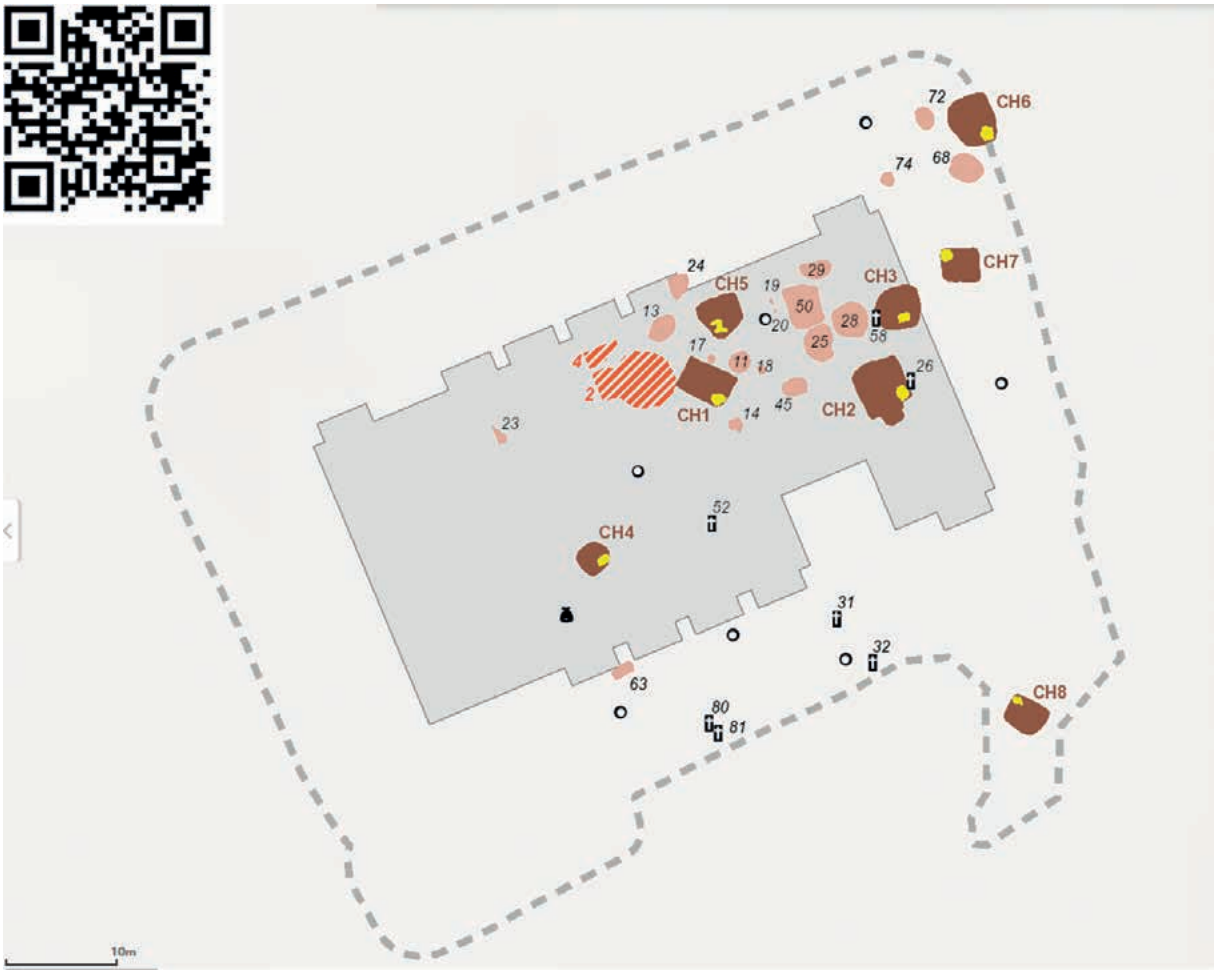


FIG. 9 | Structure of the "Great Moravian settlement at Trapíkov" GIS project published at ArcGIS web application.

FIG. 10 | Image from the online web application: the Great Moravian settlement at Trapíkov.



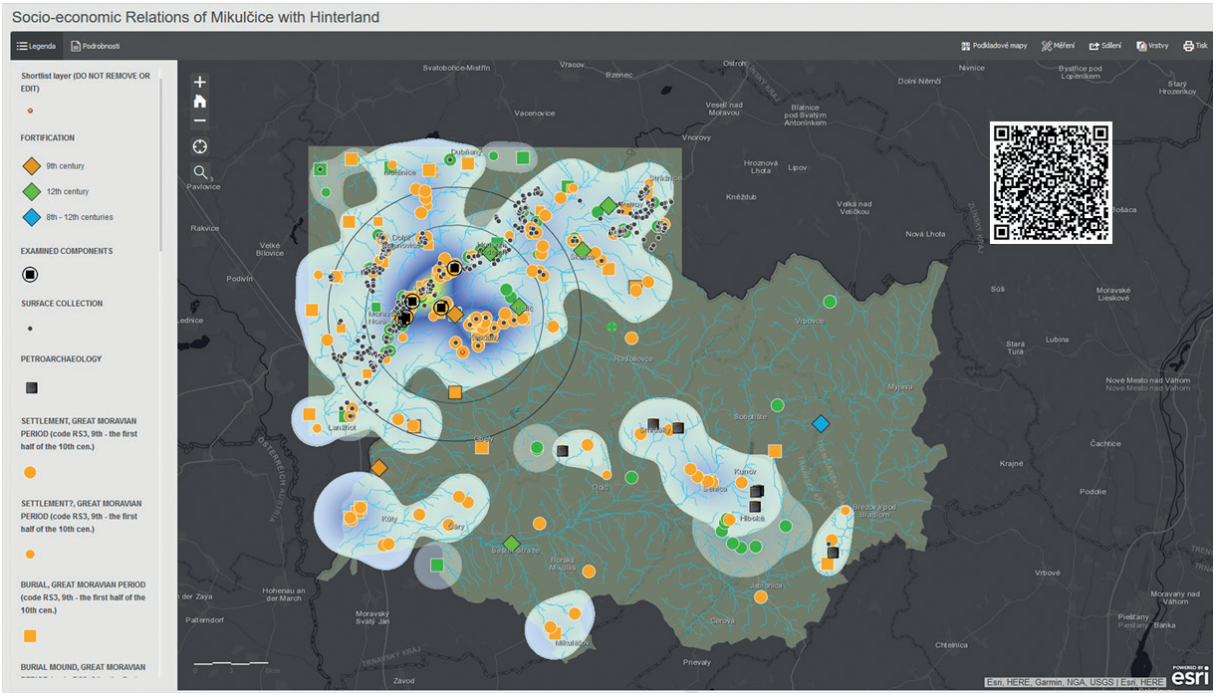


FIG. 11 | Image from the ArcGIS Online application – social and economic interactions in the hinterland of the early medieval agglomeration at Mikulčice-Valy.

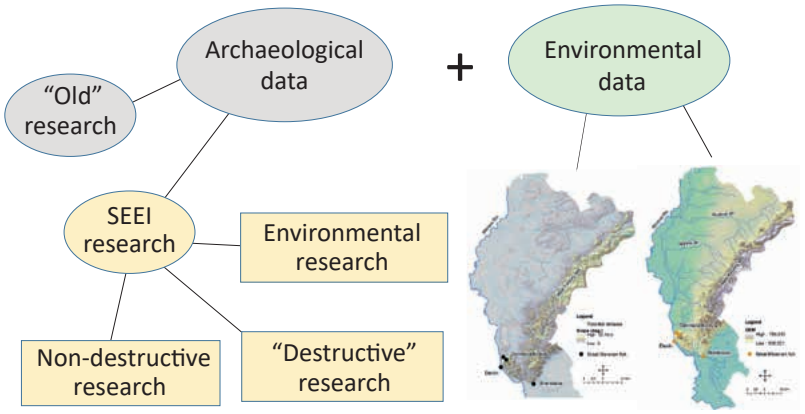


FIG. 12 | Basic overview of the data model of the SEEI project.

components are qualitatively and quantitatively divided and hierarchised. When exploring the data model, we can skip from the highest description level – a component as a whole – to individual details (features, artefacts, ecofacts).[13]

In addition to the global (mother) database, which covers the whole of the explored area (both geographically and analytically), there is another important element within the project: data from specific components of the settlement network, which are also structured into geoinformation databases. Among the examples are the geodatabases for the Prušánky burial ground, the burial ground in the extramural settlement of the Mikulčice agglomeration in Těšický les and the Mikulčice-Trapíkov settlement. As in the previous case, these data models include primarily archaeological data (contexts, context groups – graves, dwellings) with direct links to portable finds and supplemented with secondary environmental data.[14]

13 See Hladík 2014; Tamaškovič 2016; Tencer 2008.

14 For links to these databases and the results, see Mazuch/Hladík/Skopal 2017, 145–152 (Prušánky), Havelková/Hladík/Velemínský 2013, 237–251 (Mikulčice – Těšický les), Hladík 2014, 131–134 (Mikulčice-Trapíkov).

6. Excavation Results, Archaeological Contexts

Although the basic research results – primary photographic and drawing documentation, descriptions, 3D models of settlement pits and graves as well as functionally interpreted archaeological contexts (residential features) – have been published online (FIG. 9, 10), Chapter 13 of this book contains the description of individual sunken features and interpreted context series, including the links to portable finds and drawing or photographic documentation. Chapter 6 describes and explains the overall archaeological context and relative stratigraphy at the Trapíkov settlement as well as the evidence of burying at the Trapíkov site. We will focus on such properties of portable and non-portable archaeological finds that appear to be significant for the reconstruction of the picture of social and economic relations in the closest vicinity of the Mikulčice agglomeration.

The archaeological context described in this paragraph was excavated and described in 2010–2012 and 2015. The thickness of the overburden layer (loamy sand deposit), ranges from 20 cm at the top of the dune to 100 cm on its "bottom" on the northeast side. The studied areas were in the northern part of the dune. To the northwest and west of area M17, the wind-blown sand was gradually replaced by flood sediments (FIG. 13).[15] In the western part, no archaeological finds were discovered in their original place of deposition, i.e. with a direct connection to archaeological contexts. Only exceptionally, did we register secondarily relocated pottery fragments. Excavated archaeological contexts were concentrated in the northeast part of M17. Portable finds, particularly pottery fragments and iron artefacts (such as knives, arrowheads and bucket fittings), were found in the overburden, basically from the surface (see Chapter 7.2). Their concentration increased at the interface between the overlying layer and the sand layer underneath. In this horizon, we were also able to identify individual settlement features. The proof of settlement discovered by the excavations was concentrated on the sand dune. This concerned part of an open settlement with evidence of funerary activities. The first remains of these were discovered by earlier excavations approximately 50 m east and 50 m south of area M17 (of the 2010–2012 excavations) (FIG. 5).

During the excavations in area M17, we were able to find and document part of a settlement and graves – possibly part of a cemetery (FIG. 8). A total of 72 archaeological contexts (layers, pits, backfill, constructions, features and graves) were interpreted (FIG. 14). Based on spatial relations and portable archaeological material, the excavated context was interpreted as follows. The settlement of the explored area was concentrated at the sand dune. Most of the archaeological contexts were found at the interface of the cultural layer and subsoil. Between 2010 and 2015, we discovered nine dwellings (FIG. 8, 15–17), which date back to the 9th/10th century (see Chapter 8).

A total of 19 settlement pits, most of them oval (FIG. 8, 18, 19; TAB. 40, 41) were found near these dwellings. The average length of their longer axes was 2 m. In most cases, they were sunk into the sand by only a few dozen centimetres. The poor condition of the preservation of these contexts and portable finds prevents a functional interpretation. These features are likely to have been linked to different construction and economic activities. Particularly remarkable in terms of shape and dimensions is the feature denoted as pit 50 (TAB. 41) where all the parameters are very similar to the features we have interpreted as dwellings. However, in this pit, it was not possible to document activities that would allow such an interpretation (particularly evidence of heating).

A specific type of context, mostly discovered on the interface between the overburden and the sand base, were seven concentrations of pottery and quernstone fragments. These contexts lacked a clear link to other features at the site (FIG. 8). Some of the destroyed vessels were most probably grave goods from graves that could not withstand the aggressive

15 For the geological aspects of these deposits, see ŠUŠOLOVÁ et al. 2014.

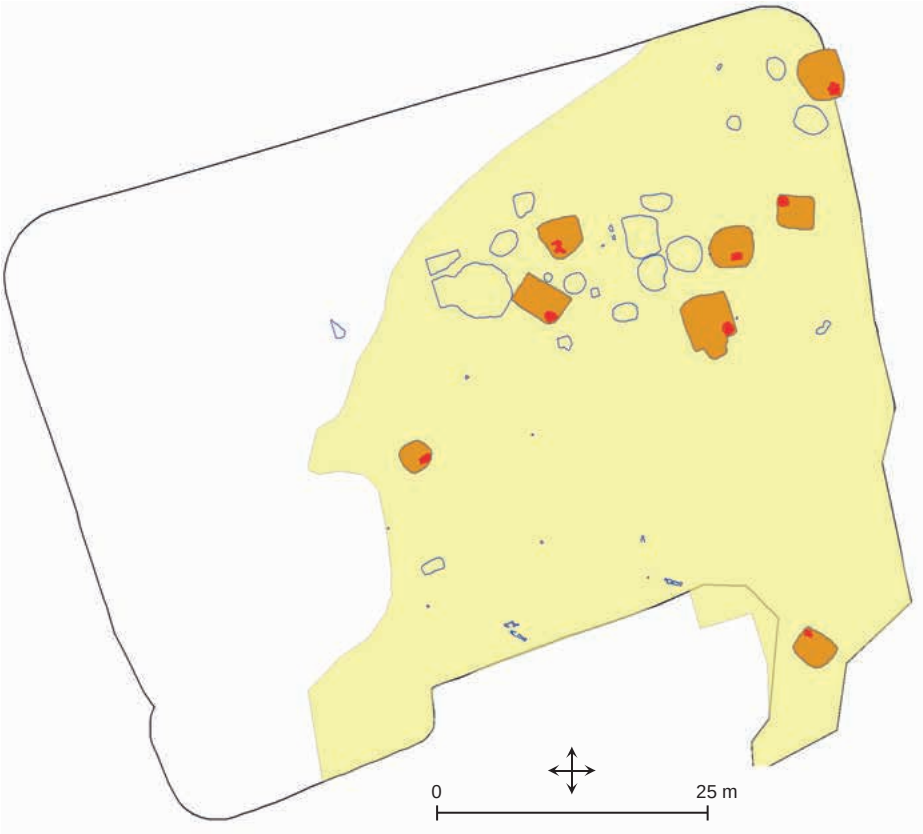


FIG. 13 | Plan of the area excavated in 2010–2012, the boundary between the sand dunes and riparian sediments in the subsoil (approximately 1 m below the surface). Legend: 1 – excavated area, 2 – residential features (dwellings), 3 – contexts outside the dwellings, 4 – sand sediments.

base sand layer. However, this cannot be fully proven. The last type of context of a settlement character discovered at the site is a hoard containing iron artefacts (FIG. 8; TAB. 28, 29:1).

In addition to the evidence of settlement, the excavations unearthed seven graves in the area. Five of them contained grave goods (graves 31–32, 58, 80–81) (FIG. 8, 20; TAB. 17:18, 25:8, 26, 31:6–8, 36:11). As previously mentioned, the function of the sunken settlement features, which were not interpreted as dwellings, could not be clearly defined. What is also remarkable, and also important for the interpretation of the function of the Trapíkov settlement within the relational network in the economic hinterland of the Mikulčice agglomeration, is that none of the features in the settlement area could be remotely interpreted as a granary or other storage pit.

We will now briefly outline the formal and spatial properties as well as the interrelations of the contexts and their chronological interpretations. The dwellings and the settlement features were concentrated in the north, slightly towards the northwest part of the sand dune, which slopes down to the northwest (FIG. 8). Two facts were observed concerning their layout: 1 – No superposition of settlement features occurred; all of them respected each other. Functionally uninterpreted pits were mostly found around houses (except for one case – pit 63). Similar to the dwellings, they form groupings that lie in an irregular line around a notional northeast-southwest axis (FIG. 8). 2 – Worth noting is the spatial distribution of the graves. Two of them were found directly in the settlement. More precisely, grave 26 was above dwelling 2 and grave 58 in the backfill of dwelling 3. Therefore, these graves are stratigraphically later and prove human activity after, or during, the demise of the dwelling function of these dwellings. The remaining five graves were concentrated on the top of the dune (graves 31–32, 58 and 80–81 in the southern part of area M17), where there was only sporadic evidence of settlement features. These graves are more than 15 m from the nearest dwelling. Most of the grave finds discovered in area M17 come from these graves (31–32 and 80–81) (FIG. 8, 20; TAB. 17:18, 25:8, 26, 31:6–8). Graves excavated on the top of the dune were not in a superposition to any other context and respected each other. The concentration of graves that were not in settlement features, their nature and the presence of grave goods prompts the question as to whether this place was not a periphery of a larger burial ground that is still undetected. Unfortunately, we will probably not be able to confirm this hypothesis in the future either because the hypothetical burial ground would have been under what is now the access road to the Mikulčice stronghold.

All the studied dwellings were of the same type (FIG. 16, 17). They had a rectangular or square ground plan, with the shorter axis 3–4.5 m long and the longer axis ranging from 4 to 6 m. The floors of these dwellings were partially sunken into the subsoil. However, we failed to determine the terrain level at which the digging would have begun in the dark overburden. In some of the dwellings, it was not even possible to identify their layout at the level from

which they were dug (see Chapter 13). The assessment of the spatial distribution of the artefacts from the cultural layer (see Chapters 7–8), which was made to interpret the possible boundaries of dwellings and other settlement features in the overburden, showed that the dwellings might have been dug out from the level of the settlement overburden as it existed in the 9th century. However, identifying the level from which the individual settlement features were dug out is complicated because the subsoil (the surface of the sand dune) is relatively significantly sloped – up to 15% in some parts containing the remains of the settlement. As a result, we observed significant concentrations of finds at the foot of the dune in the northern part of the settlement (see Chapter 7.2.1).

All the dwellings contained a heating feature – a stone oven (FIG. 23; TAB. 38–39), situated in a corner of the dwelling. In five cases it was the southern or southeast corner (dwellings 1–3, 5–6), and in two cases a northern or northeast corner (dwellings 7–8). In one case (dwelling 4), the poorly preserved dwelling did not allow a precise determination of its entire ground plan, and in another case, it was not possible to locate a heavily destroyed, only marginally preserved oven (dwelling 9). All the ovens had a very similar construction. The inner, more or less regular rectangular chamber was covered by a stone vault. The heating ovens were built from stones and, secondarily, from the fragments of quernstones (this applies especially to dwellings 1 and 4) (FIG. 23). We were able to identify the orientation of the main axis in five ovens from dwellings 1 to 4 and 8. Except for the one case in dwelling 1, where the oven was turned towards the centre of the house (TAB. 38), the ovens in Trapíkov were typically parallel to the walls of the sunken houses. The same situation – only dating to a chronologically earlier phase of the Early Middle Ages – was observed at such sites as Roztoky near Prague (KUNA et al. 2013, 67). In the closest vicinity of Mikulčice, very similar ovens have been found at the site of Mikulčice-Podbřežníky (MAZUCH 2008, 165–181).

The remains of an entrance have been recorded and studied in a single case: dwelling 2 (FIG. 16; TAB. 38). The entrance was on the south side. On the right from the entrance, in the southeast corner of the pithouse, was an oven (FIG. 23). In dwelling 2, we studied another remarkable archaeological context: after removing the backfill from the sunken part of the feature, a large irregular clay block (FT39) (FIG. 16) emerged, with three whole vessels and three quernstones within or at the edge of this clay mass (TAB. 32:3, 33). We examined it in detail and sampled it for micromorphological assessment. Stratigraphically, this structure was on the bottom of the sunken dwelling, but it did not interfere with its floor. It respects both the stone oven and the entrance to the dwelling. One of the working hypotheses assumes this may have been the destruction of a wall or a ceiling (however, the material is not burnt). We have also considered the possibility that it was the storage of raw material – clay – that was used in construction and economic activities or crafts, such as pottery. However, the micro-mineralogical comparison of this material with the pottery found in Trapíkov excluded that it was pottery clay used for the production of the local ceramics (GREGEROVÁ 2013).

The dwellings discovered in the Trapíkov settlement are typically single-room semi-sunken square or slightly rectangular huts. However, their construction is difficult to describe in more detail because they were very poorly preserved. No traces of posts or other wooden structural elements have been excavated in the immediate vicinity of the dwellings, which opens up the possibility that they were dwellings of a log-type construction. In most cases where the ground plan was sufficiently preserved to provide this information, the roof ridge was in the northwest-southeast direction. The only documented entry to a dwelling (dwelling 2) was found in the shorter – gable – wall of the house.

A hoard of iron artefacts (FIG. 8; TAB. 28, 29:1) was found on the western edge of the settlement, 5 m to the southwest of dwelling 4. It was on the boundary of the cultural layer (where the dark silt layer gradually changed into floodplain sediments) and the underlying sand. The pit in which the hoard might have been deposited was not detected. However, the hoard included the remains of the iron fittings of a wooden bucket, in which the other iron artefacts might have been deposited. It is possible that the iron artefacts were not intentionally buried or hidden, but that they were tools left behind at the time of the abandonment or demise of the settlement. The hoard does not contain chronologically sensitive items.

The poor condition of the preservation of graves 26, 52 and 58, which were found directly in the settlement, does not permit a more accurate description. The graves on the top of the dune – 31, 32, 80 and 81 (FIG. 8) – were in the sand subsoil, a mere 20 cm from the surface. The ground plans of the graves could not be discerned in the overburden or the subsoil. The graves were heavily decomposed – only parts of skulls and long bones were preserved (see Chapter 12.2). The remains were buried in a standard ritual position, on the back with the hands along the body. Most of the graves were oriented in the westeast direction, only grave 31 was aligned with the north-south axis. The grave goods found in graves 31–32 and 80–81 were standard for the Great Moravian period. Apart from chronologically insensitive knives, grave 32 contained spurs and grave 81 contained a plate finger ring decorated with ornamental motifs (for chronology, see Chapter 7.2). Grave 80 contained a knife and a vessel lying to the left of the pelvis of the deceased (TAB. 17:18).

We can now summarise the conclusions of the research carried out to date on the Trapíkov and Virgásky dunes, which are mere 1 km from the Mikulčice-Valy site. The excavations at Trapíkov unearthed 15 dwellings dated to the 9th and 10th centuries and approximately 19 settlement pits from the same period (due to the loss of documentation from earlier excavations in the fire at the Mikulčice

Context	Type	Sector	Horizon	Description
1	layer	all	1, 2, 3	"grey to black sandy loam layer with more silt in the north-eastern part; the layer contains stones, ceramic fragments and iron artefacts"
2	layer	7–3, 7–4, 8–3, 19–2, 20–1	1	black humus layer with an unclear boundary, traces of ploughing, small stones and fragments of ceramics
3	feature	20–4, 21–3	2	stone oven
4	layer	7–1, 7–2	1	black humus layer with an unclear boundary, traces of ploughing and small stones and fragments of ceramics
5	feature	9	2	accumulation of stones (sandstones, traces of burning), destruction of an oven
6	feature	31–1	2	ceramics accumulation
7	feature	21–1	2	ceramics accumulation
9	pit	20–4, 21–3, 8–4	2	pit and a layer constituting the floor of a dwelling – set of features 1, dark clay-sand, contains small pieces of charcoal
10	pit		2	trench and thin dark grey-black layer under an accumulation of stones (feature 5)
11	pit	21–1, 21–2	2	pit in subsoil, east of feature 9
12	feature	10–3	2	accumulation of ceramics
13	pit	8–1, 8–2	2	pit in subsoil
14	pit	33	3	terrain depression containing ceramics, irregular shape, boundaries difficult to ascertain
16	pit	9	3	black-brown deposit in the overburden, grey-brown sandy silt deposit below it
17	pit	9, 21	3	pit in subsoil, north of feature 9, backfill identical to the one in layer 1
18	pit	21–2	3	pit in subsoil, backfill identical to the one in layer 1
19	pit	10	3	shallow depression without finds, backfill identical with layer 1
20	pit	10	3	shallow depression without finds, backfill identical with layer 1
22	layer	21–3	2	black burnt layer under feature 3
23	pit	5	3	pit in subsoil, black loam sand backfill, contains pieces of charcoal
24	pit	9s	2	dark loamy layer directly above subsoil, pit in subsoil, dark layer sunken into the pit, black loamy layer on the bottom of the pit
25	pit	22–2, 22–4, 23–1, 23–3	2	pit cutting through the level directly above the subsoil, its bottom in the sand subsoil
26	grave	26–3	2	top of the skull lying on the boundary between the subsoil and overburden
27	pit	24–1 – 24–4	2	pit cutting through the level directly above the subsoil and its bottom in the sand subsoil
28	pit	23–1, 23–2	2	pit in subsoil
29	pit	11–1, 11–2	3	pit in subsoil
31	grave	81–1	1	fragments of skull and long bones of the legs
32	grave	81–4	1	well preserved skeleton with finds
34	feature	36–3	2	destruction of a stone oven
35	pit	35–1, 35–4, 36–1, 36–3, 47–2	2	pit cutting through the level directly above the subsoil, its bottom in the sand subsoil
36	feature	67	1	vessel fragments on the divide between the subsoil and the overburden
39	layer	35–2, 35–4	2	clay layer, in the backfill of context 35
41	feature	53–3	4	iron hoard, on the boundary between cultural layer and subsoil
45	pit	22–3, 22–4, 34–1, 34–3	2	pit cutting through the level directly above the subsoil, its bottom in the sand subsoil
46	feature	81–3	1	vessel slightly sunken in subsoil
47	feature	41–2, 41–4	2	destruction of a stone oven
48	pit	41–2, 41–4	2	pit cutting through the level directly above the subsoil, its bottom in the sand subsoil

FIG. 14 | Simplified table with a record from the database of archaeological contexts excavated in 2010–2015. Part 1.

Context	Type	Sector	Horizon	Description
49	layer	35–2, 35–4	2	sand layer on top of layer 39, occasionally layered in reverse order
50	pit	10–2, 10–4, 11–1, 11–3, 22–2, 23–1	3	pit cutting through the level directly above the subsoil, its bottom in the sand subsoil
52	grave	44–3	2	part of skull, leg bones, imperfectly preserved
56	layer	36–3	2	clay layer between the stones of oven 34
57	feature	36–3	2	animal bones
58	grave	24–1, 4–2	2	human teeth and very poorly preserved bones, on the edge of pit 27
59	feature	24–1	2	vessel on the bottom of context 27
60	feature	24–4	2	remains of an oven in the context of pit 27
61	layer	24–4	2	black burnt layer under feature 60
62	feature	24–1 - 24–4	2	backfill of pit 27 c. 40 cm from bottom, level under a stone destruction, dark loamy sand with charcoals, small stones, ceramic fragments
63	pit	65	2	shallow pit in subsoil, backfill containing a large amount of charcoal and fragments of a ceramic roasting tray
64	feature	77–1	2	vessel on the boundary between the subsoil and overburden
65	layer	41–2, 41–4	2	black burnt layer under oven 47 with pottery fragments and a quernstone on top of it
66	pit	embankment	3	pit cutting through the level directly above the subsoil, its bottom in the sand subsoil
67	feature	embankment	3	destruction of a stone oven
68	pit	embankment	3	pit cutting through the level directly above the subsoil, its bottom in the sand subsoil
72	pit	embankment	3	pit cutting through the level directly above the subsoil, its bottom in the sand subsoil
74	pit	embankment	3	pit cutting through the level directly above the subsoil, its bottom in the sand subsoil
75	feature	embankment	3	pit cutting through the level directly above the subsoil, its bottom in the sand subsoil
76	pit	embankment	3	pit cutting through the level directly above the subsoil, its bottom in the sand subsoil
77	feature	embankment	3	destruction of a stone oven
78	layer	embankment	3	black burnt layer under feature 67
79	feature	embankment	3	burnt stones and aninmal bones directly above the subsoil
80	grave	embankment	1	grave slightly sunken in the subsoil, fragments of a skull, a jaw, teeth, knife near the loins, vessel near the legs, preserved long bones
81	grave	embankment	1	grave slightly sunken in the subsoil, fragments of a skull, a knife near the loins, preserved long bones, ring (find number 371) above the grave
82	grave	embankment	2	grave in the backfill of pit 85, only bone fragments have been preserved, a bronze arrowhead near the grave (determined as animal bones by post-excavation analysis, see Chapter 12.2)
83	feature	embankment	2	destruction of a stone oven
84	layer	embankment	2	backfill of a pit, feature 83, loamy sand with charcoals
85	feature	embankment	2	shallow pit in subsoil with ceramic fragments, animal bones and vessels in the backfill
86	feature	embankment	2	concentration of small stones and clay lumps in the backfill of pit 85
87	feature	5–1	3	accumulation of sherds, early Slavic pottery
88	layer	year 2015		backfill of pit 89
89	pit	year 2015		trench
90	layer	year 2015		backfill of pit 91
91	pit	year 2015		trench

FIG. 14 | Simplified table with a record from the database of archaeological contexts excavated in 2010–2015. Part 2.

Sets of features	Contexts	Interpretation
DW1	3, 7, 9, 22	dwelling
DW2	34, 35, 39, 49, 56, 57	dwelling
DW3	27, 59, 60, 61, 62	dwelling
DW4	47, 48, 65	dwelling
DW5	1, 5, 10, 16	dwelling
DW6	66, 67, 78	dwelling
DW7	76, 77	dwelling
DW8	83, 84, 85, 86	dwelling
DW9	90, 91	dwelling

FIG. 15 | Table with a record from the database of archaeological contexts – an overview of defined sets of features interpreted as dwellings (DW).

archaeological base in 2007, the exact number of settlement features excavated before 2010 is unclear. However, they included around 10 sunken features. In addition, 11 graves were found in Trapíkov, some of which fall within the final stage of the settlement (graves above settlement features). At the Virgásky dune, around 300 m from area M17 in Trapíkov, part of a burial ground with 29 Great Moravian graves was examined in the 1950s (FIG. 5, 8). None of the areas researched within the Trapíkov dunes has suggested the presence of granaries or other storage pits (for the issue of food storage, see Chapter 7.2.3.4).

FIG. 16 | Photographic documentation of dwellings (DW) excavated in 2010–2012.

FIG. 17 | Photographic documentation of dwellings (DW) excavated in 2010–2015.

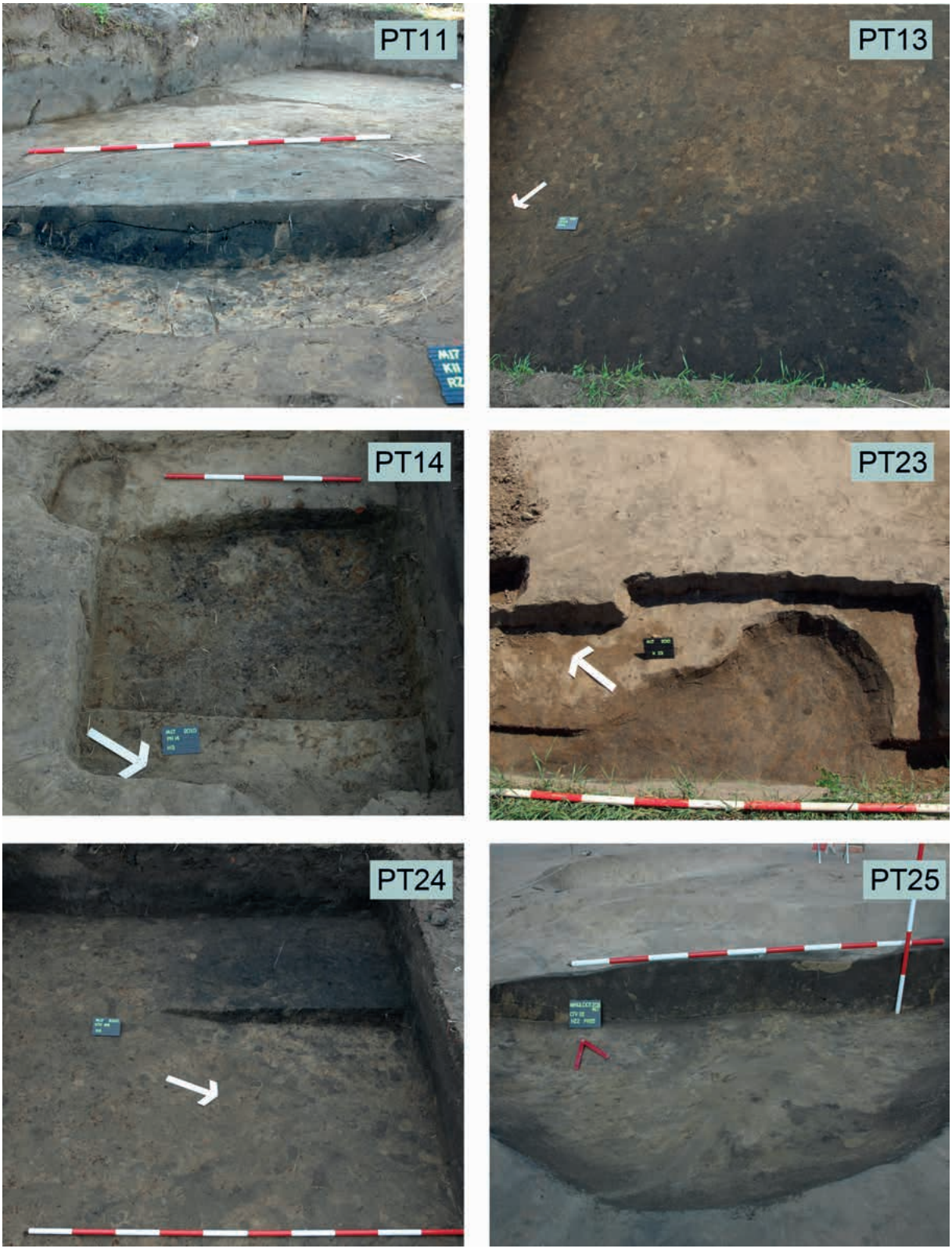


FIG. 18 | Photographic documentation of settlement features (pits – PT) excavated in 2010–2012 (selection of features containing the pottery published in the tables).

FIG. 19 | Photographic documentation of settlement features (pits – PT) excavated in 2010–2012 (selection of features containing the pottery published in the tables).

FIG. 20 | Ground plan of the burial ground and photographic documentation of graves (GR) excavated in 2010–2012.

7. Results of Fieldwork and Portable Finds: Artefacts and Ecofacts

7.1 METHODS OF DESCRIPTION, ANALYSIS AND SYNTHESIS OF ARCHAEOLOGICAL DATA

Before a detailed examination of the results of the analyses of archaeological material from Trapíkov, we need to focus on the methodology of the analysis of artefacts (mainly ceramics) and ecofacts (mainly botanical macroremains), as well as on the methodology of the geoinformation analyses carried out before creating an interpretation archaeological model of the relations between Trapíkov, the Mikulčice agglomeration and its hinterland.

7.1.1 Intra-Site Spatial Analyses

Intra-site spatial analyses are a vital tool for a complex understanding of the structure of the settlements and the interpretation of their function in the whole system of social and economic relationships within the studied community. However, this tool has not been frequently used in the Czech and Slovak archaeology for the analysis of early medieval settlements, or more precisely, for analysing open agricultural settlements dating to the Great Moravian period. All instances of the use of such analyses in this territory have almost exclusively focused on protohistoric burial grounds or settlements (e.g. Šmejda 2010). In the case of the early medieval settlements, this is mainly caused because there is a very limited number of excavated residential components. If we disregard the central sites, for which these tools have been used in several studies, some of the few exceptions are the early medieval settlements of Roztoky near Prague and Kostice near Břeclav (Kuna et al. 2013; Macháček et al. 2013). Even though the settlement has not been comprehensively examined, which is likely to distort the results of an intra-site analysis, we naturally reached out for this tool in our attempt to understand the function of Trapíkov within the relational system of Great Moravia as comprehensively as possible. We were fully aware of the possible distortion when carrying out the analyses; however, we consider the results significant. Together with the other analyses presented below, they constitute one of the pillars of the interpretative model we have been designing.

Like other spatial analyses, intra-site analyses are linked with the 1970s when the introduction of quantitative methods provided effective tools for the identification and subsequent interpretation of spatial patterns (Hodder/Orton 1976; Blankholm 1991; Kroll/Price eds. 1991).

Whenever an intra-site analysis identifies the spatial distribution of contexts, artefacts or ecofacts at a settlement, the next step must be to find the phenomena behind such distributions. Furthermore, it is crucial to discern between background cultural phenomena and natural phenomena, which are linked to different preservation conditions of the artefacts and post-depositional events (Giligny 2014). The process used to distinguish between them can be summarised as follows:

1) Post-depositional events must be identified.
2) Spatial patterns of selected categories of artefacts or contexts must have the greatest potential to detect economic and social activities.
3) An appropriate method of spatial analysis must be chosen.
4) The obtained structures must be interpreted in the terms of cultural and historical narration.

The intra-site analyses we carried out at the Trapíkov site were based on two main algorithms. The selection of the categories of archaeological finds was primarily driven by the preservation condition. The environment strongly influenced the archaeological record and created significant differences in the preservation of artefacts and ecofacts.

All the selected categories of archaeological finds were processed using distribution maps that enabled us to create an elementary data visualisation based on the weight or number of fragments per defined area unit (archaeological context or excavation sector). The choice of the units to which spatial patterns were linked was driven by find contexts or by how the artefacts or ecofacts were recorded on-site during the excavations. The second method included creating interpolated surfaces that enabled us to estimate the probable values of different parameters in the area (for the particular interpolation procedures for different categories of finds, see Chapter 7.2.1). The interpolated surfaces enable us to predict the density of different categories of finds within the settlement area and accordingly interpret the areas where recurring activities related to specific cultural or agricultural events can be assumed.

7.1.2 Artefacts: Ceramics

The ceramics found in Trapíkov constitute a closed assemblage from an unfortified, undoubtedly Great Moravian, settlement. Such a pottery assemblage from the hinterland of the Mikulčice stronghold is unique for the Great Moravian period as there is no similar material that it could be compared with. This is due to the lack of research into the open Great Moravian settlements. It is one of the largest published pottery assemblages from a single settlement in the hinterland of the Mikulčice centre, also because the material and data from the excavations at Mikulčice-Podbřežníky (*cf.* Mazuch 2008) were destroyed by the unfortunate fire at the Mikulčice archaeological base in 2007. This pottery assemblage would have been ideal for comparison. The material from another partly excavated rural settlement, Prušánky-Podsedky, has not been published.

The most suitable pottery assemblage that can be, at least remotely, used for a typological and chronological comparison with the Trapíkov assemblage is the material from the excavations of the northern suburbium of the Mikulčice Great Moravian power centre. However, this site is by no means an open agricultural settlement despite formally lying beyond the fortified part of the centre. Great Moravian pottery is highly unified, both morphologically and technologically: the vessel shapes are limited to pots with minimum differences in proportions, a few basic types of rims and only three types of decorative motifs. It is also difficult to determine the fabric, which is caused by the finishing on the surfaces and firing. Due to this uniformity, we cannot rely on multi-dimensional statistical methods in data synthesis. We would either break the pottery analysis by using too many descriptors, which will be difficult to objectively assess by the human senses, and thus make it difficult to hold onto a uniform way of assessment or the variability of the attributes would be so small that there will be nothing to assess. Moreover, certain parts of the vessels are clearly homemade, and thus difficult to typologise. They are unique, as is the case with applied folk art. However, there are groups of vessels, which show clear signs of workshop production: their typology is unified and extends beyond the boundaries of sites of regional and supra-regional importance, which can be distinguished in the "grey area" of Great Moravian ceramics. These include the Blučina ceramic group (BCG) and Mikulčice ceramic group (MCG), which were comprehensively processed and defined some years ago (Mazuch 2013; for the definition of the ceramic group, see Bubeník/Frolík 1995). This work also presented the so-called Late Great Moravian Horizon (Mazuch 2013, 68–84), mainly using Mikulčice material,[16] which was stratigraphically and chronologically dated to the late 9th or the beginning of the 10th century. Several local pottery types were discerned within this pottery horizon (Mazuch 2013, 69; further details about these groups are included in this book). Apart from proving the contemporaneousness of the two main Great Moravian pottery groups, the pottery horizon mentioned above can be described as almost identical with the pottery from Trapíkov. This is obvious at first sight, without a complex assessment. Using statistical analysis of the proportion of (mostly) the aforementioned ceramic groups in the Trapíkov assemblage, we compare it with their proportion of the finds from the extramural settlement of the Mikulčice stronghold. This is where the tendency for the increasing numbers of the Mikulčice Ceramic Group (MCG) in stratigraphically later contexts was discovered. In the northern extramural settlement, where there were no superpositions and material-wise the settlement appears to be single-phase, the difference between the stratigraphically earliest horizons and the final horizon was up to several dozen per cent (Mazuch 2013, 68–84).

Of a total volume of almost 100 kg of ceramics from Trapíkov, almost one-third (30.66 kg) came from the overburden layer (context 1), 15.30 kg from pits or part of the features[17] and the remaining 53.48 kg was pottery from residential features – dwellings (fig. 21). The dwellings contained sets of contexts – meaning there were more in a single dwelling – including feature backfills and features (such as ovens and/or their contents). There was a clear difference between the fragmentation of pottery in the overburden (context 1) and the pits and dwellings. Layer 1 contained very small sherds, which were not worth collecting for publication. Concerning fragmentation, the contents of this layer almost do not differ across the settlement. This is further evidence of the secondary transport of material to the dwellings, or more precisely, of the assumed concentration of human activity close to the residential features. Naturally, among the prevailing atypical sherds in layer 1, there

16 For the term "pottery horizon", see Boháčová/Čiháková 1994, 176, 179; Boháčová 1995, 125.

17 Pottery is represented by sherd concentrations in a layer: broken vessels or sherds found between stone structures; this feature is a type of context defined in the methodology of the Mikulčice excavations, see Mazuch 2005.

FIG. 21 | Table with the record of the weights of pottery fragments from individual contexts and sets of features. DW – dwelling, PT – pit, FT – feature, GR – grave.

Feature type	Total mass of pottery fragments (g)	Mass of analysed fragments (g)	Proportion of analysed pottery from the features (%)
DW1	5,380	3,620	67.3
DW2	10,410	7,695	73.9
DW3	4,440	2,435	54.8
DW4	10,005	5,940	59.4
DW5	2,445	2,445	100
DW6	4,575	3,295	72
DW7	7,690	4,350	56.6
DW8	1,920	1,920	100
DW9	6,615	2,005	30.3
total	53,480	33,705	63
PT11	370	170	45.9
FT12	320	305	95.3
PT13	775	325	41.9
PT14	505	290	57.4
PT23	745	90	12.1
PT24	595	30	5
PT25	1,850	825	44.6
PT28	205	45	22
PT29	365	220	60.3
FT36	615	615	100
PT45	350	350	100
FT46	350	350	100
PT50	255	250	98
FT64	420	420	100
PT68	3,450	1,120	32.5
PT74	495	155	31.3
FT79	660	395	59.8
GR80	1,080	590	54.6
PT89	1,895	560	29.6
total	15,300	7,105	46.4
context C1	30,660		

were also decorated fragments or rim fragments. However, these are identical to the sherds from different stratigraphies, such as sunken features, where fragmentation is generally much lower. The above-mentioned elements are also present in layer 1, part of which certainly served as communication at the time of the existence of the settlement: it contained pottery sherds, which can be assembled into complete or largely complete vessels. Assessing fragmentation in relation to spatial distribution is not required for Trapíkov.

In the first phase, the pottery from Trapíkov was reconstructed based on the numbers of sachets, i.e. units from a certain context, which, in the case of larger contexts, differed only by an auxiliary (vertical) arbitrary layer and, horizontally, with their localisation in 1 × 1 m sectors. The fragments from each context were then completed and after the terrain was interpreted generally, this was done for the whole set of stratigraphic units (contexts) in the case of the dwellings. This completion was done in several cycles to maximise the number of fragments involved, grouping them into larger units and identifying as many pottery specimens as possible. For the statistical evaluation of the proportion of typologically identifiable items, it was necessary to distinguish pottery specimens, i.e. vessels or fragments thereof, based on the assessment of the rims. Considering the uniformity of the decoration, it was almost impossible to do this based on sherds from the vessels' walls. The only exception was the assemblage of the pottery from dwelling 9 from later excavations, M20, which took place only once due to the particular circumstances. This was reflected by the typical pottery selected for publication. In dwelling 9, the proportion of vessel fragments selected this way was substantially lower than in other dwellings. Due to repeated efforts, a large part of atypical sherds could easily be associated with typical ones, which made the volume expressed by the weight of the selected collections from each dwelling significantly greater (FIG. 21).

The selection of pottery for the analysis and pictorial presentation of the Trapíkov ceramic horizon was as follows. All the rims were gathered from all the contexts except context 1. To correctly count the pottery artefacts and determine the proportion of ceramic groups in the production used in the

settlement, the identical rims, which might have come from the same vessel, were removed from the selection after careful assessment. The sherds from vessel walls were selected in such a way as to represent all typical decorative motives. Fragments of vessel bottoms usually do not carry much information, which is why they were only included in the selection if they contained a mark (either positive – plastic, or negative – such as an imprint of the throwing wheel) or when the fragment contained part of the wall or a larger part that was decorated.

Of the total volume of the ceramic material from the Trapíkov dwellings (for an overview, see Fig. 21), almost two-thirds of the sherds (63%) were selected for publication and analysis, and almost half from the features, including sunken features (46.4%). As features are the type of context, which often has the form of an accumulation of sherds, it was almost always possible to reconstruct the ceramic artefacts and subject them to typologisation. The only exception was FT79, while for the pits, whose functional interpretation is always difficult, it was just over one-third of the volume (37.4%). This relatively simple comparison shows that the dwellings contained pottery that was actively used before the demise of the settlement, while the pottery preserved in pits was probably primary or secondary waste.

Therefore, the analysis of the pottery assemblage chosen as described above consists of an assessment of the samples from the Great Moravian pottery groups and a statistical evaluation of their proportion. Due to the key characteristic feature – a typical finishing of the rim – we could precisely assess the proportion of this group (all pottery specimens). As for BCG, this was slightly more difficult although experienced assessors can make a relatively qualified estimate of the rims belonging to this group. The situation is the complete opposite for the bodies. We gave up on ascertaining the proportion of MCG although we will attempt to determine the proportion of BCG because of the decoration, which is its key feature. However, the methodology is a problem at this point because there is no method for determining individual pottery based on decoration. Despite our maximum effort to complete the pottery from this settlement, it was impossible to assign all typical walls to individual pottery – a vessel. It is possible to count all fragments regardless of how many of them constitute a vessel or to weigh them, which we consider the more meaningful option. Unfortunately, the processing of the pottery was preceded by its completion, which took place several years ago so made weighing impossible. Thus, we will calculate simply using the number of fragments and assume that there will be no significant differences in fragmentation between different features from the same settlement.

Apart from the proportion of the BCG and MCG pottery, we also analysed larger samples of these two groups. This was based on the description of the Mikulčice material that was carried out several years ago (see Chapters 7.2.2.1 for MCG and 7.2.2.3 for BCG; for more detail, see Mazuch 2013). Due to the small size of the Trapíkov assemblage, the sample was statistically not very significant (especially for BCG, which has always been significantly less represented than MCG pottery). However, we considered it useful to attempt to compare the results with material from the Mikulčice centre,[18] at least for the sake of contributing to the dating of the Trapíkov pottery assemblage.

Therefore, the following analysis (Chapter 7.2.2) will first focus on the pottery representing the two pottery groups – BCG and MCG. We will identify the individual pottery that can be classed into these groups, compare their typology with the pottery from the Mikulčice centre, and finally, quantify the proportion of pottery from both groups and then make one more comparison. This will be with the pottery from the Mikulčice extramural settlement. The morphological and technological aspects of these groups were determined based on the description of basic traits, which have been defined for both groups based on the material from Mikulčice. The most important of these is the analysis of the MCG pottery, which has a definite dating potential.

7.1.3 Ecofacts

The plant macroremains (PMR) presented in this book include seeds and charcoal retrieved between 2003 and 2015 during the archaeological research of the Mikulčice-Trapíkov settlement. The assessed macroremains come from the backfill of sunken features, mainly dwellings and waste pits. Based on the accompanying archaeological material, these features were dated to the 9th century. This was confirmed by the results of absolute dating of selected plant macroremains – wheat and rye grains (see Chapter 12.4).

The site was excavated in several time intervals between 2003 and 2015 by different researchers using various research regimes and different extent. Due to this combination of factors, the methods of archaeobotanical sampling were not uniform. In most cases, a judgment sampling strategy (*sensu* Jones 1991) was used – the samples were taken randomly, only from outstanding contexts, or only seeds were taken and graphically recorded on-site during the excavation. This method was replaced by more intensive sampling in two cases (pit 89, dwellings 2 and 9). A systematic point sampling strategy (Jones 1991)

18 It was compared exactly as the material from the Mikulčice stronghold, which was selected in the same way: it includes larger vessel fragments suitable for a general morphological and technological delimiting of the boundaries of the two pottery groups (for BCG, see Mazuch 2013, 44–53; for MCG, see Mazuch 2013, 61–67); due to the fact that the original terminology was published in Czech, the description must be partly republished here, in an English book – otherwise the whole presentation would be rendered incomprehensible for the foreign archaeological community (see Chapter 7.2.2).

FIG. 22A | Mikulčice-Trapíkov. Flotation station, Mikulčice 2015 (photo by M. Látková).

employing a 1 × 1 m² grid system was used to examine these features.

Plant macroremains from all the features were extracted in a flotation tank (FIG. 22A, modified type Shiraff) (WILLIAMS 1973, 288–292). The PMR from Mikulčice typically remained in the heavy residuum in the tank after flotation because they were saturated with metal salts, mainly manganese and iron oxide. Because of this, the normally light charcoals did not float, and sometimes did not even rise in the water column. This is why the heavy residuum on the bottom of the tank was subjected to manual wash-over (*sensu* STEINER/ANTOLÍN/JACOMET 2015; BADHAM/JONES 1985; HAJNALOVÁ/HAJNALOVÁ 1998, Fig. 2 and 3). The results confirm that the failure to use the above method in 2003 and 2010–2012[19] caused a loss of data, particularly heavy mineralised cereal and legume seeds and part of the charcoal.

The residuum was dried, sorted and classified under a stereomicroscope (Nikon SMZ with a magnification of 75×). All the samples were completely sorted.

The charcoals for anthracological analysis were picked manually; first, during the archaeological excavations and then from archaeobotanical samples during stereo microscopy. Carbonised finds greater than 2 mm were analysed. Fractured surfaces (radial, transversal and tangential) were made in the charcoals so that they could be examined by reflected light microscopy at the magnifications of 50×, 100× and 200×. The numbers and mass ratios of the analysed material were recorded.

When identifying plant material (seeds and charcoal), comparative collections of seeds, fruits, charcoals and wood were used along with the drawings and photographs in seed and wood atlases, such as ANDERBERG (1994), BERGGREN (1969; 1981), JACOMET (2006), SCHERMAN (1967), SCHWEINGRUBER (1979) and in archaeobotanical publications (KOHLER-SCHNEIDER 2001).

Detrended correspondence analysis (DCA) was used to process the data from Mikulčice-Trapíkov (Fig. 22B). The analysed assemblage was poor in PMR, which is why all the samples were included in the analysis. Different types of contexts (settlement features and pits) were sampled, and the numbers of PMR in them varied greatly. Absolute numbers of finds in the individual samples were not used. Instead, the density of the species was considered. This variable was one of the discriminants in the analysis

19 The wash-over method was used primarily under the direct supervision of an archaeobotanist. This method was probably not used at other excavation areas, where flotation was performed by technical staff.

Analysis	Variables	Preservation	Standardisation
DCA1	cereals	carbonised	average density
DCA2	cereals	carbonised	average density
DCA3	wild	carbonised	presence/absence
DCA4	wild	carbonised	presence/absence

FIG. 22B | DCA analyses carried out for the purpose of examining samples.

where the number of finds or densities were entered. The samples were evaluated and grouped based on this data. The second step was the presence/absence method; the advantage of this is that the samples are grouped based on the composition of species rather than the quantity of PMR. The approach described above was applied to all types of multi-dimensional analyses.

To better understand the taphonomic processes involved in the formation of the archaeobotanical assemblages, four rounds of DCA analyses were performed:

7.2 RESULTS OF THE ANALYSIS AND SYNTHESIS OF ARCHAEOLOGICAL DATA

Pottery generally dominates the excavated portable research finds. The mass of the whole assemblage of ceramic fragments is 99.4 kg. The dating of the settlement to the 9th/10th century is based on typical fragments from the Mikulčice and Blučina pottery groups. The most intensive population is assumed in the second half of the 9th century and at the turn of the 10th. The pottery assemblage also contains fragments dated to the pre-Great Moravian period (7th/8th century) although this only concerns several fragments (probably from two vessels) found on the western edge of the settlement, in the deepest depression (TAB. 17:19, 18:3). Although the rare finds of pre-Great Moravian pottery are interesting in the context of the Great Moravian settlement on the outskirts of the agglomeration, the uniqueness of such finds does not allow us to formulate consistent hypotheses or interpretations. As in other contemporary settlements, the excavations at Trapíkov unearthed fragments of roasting trays (TAB. 37:3–10) (see MAZUCH 2008). The Trapíkov assemblage of roasting trays contains a large assemblage with a total weight of 10.1 kg. The concentration of this specific material at the settlement creates interesting possibilities for interpretation, particularly concerning the function of the settlement in the network of economic relations (see Chapter 8).

The second most numerous assemblage of finds constitutes iron artefacts (TAB. 19–31). A total of 2.6 kg (140 artefacts or fragments) of metal or metal fragments was found at the Trapíkov settlement and burial site. Considering this is a border of an agglomeration and its hinterland outside the fortified area of a stronghold, this is an exceptional assemblage when compared to the finds from other researched open Great Moravian settlements. The majority of the iron artefacts, or rather fragments, were found in surface layer 1. The iron finds contain items for everyday use, such as knives and sharpening steel (TAB. 19:1, 20:4, 25:4, 6, 8, 26:1, 31:6, 7; the sharpening steel has not been preserved despite conservation), fragments of door locks (TAB. 19:5, 27:13) including keys (TAB. 19:2, 29:2) and bucket fittings (TAB. 27:6, 7, 29:1). Craft and agricultural tools constitute the second group of finds. Iron pliers (HLADÍK 2014, Tab. 3:7) were found in a dwelling or its immediate surroundings,[20] a chisel (TAB. 28:1), axes (TAB. 28:2, 22:1 – incomplete), a scythe (TAB. 30:1, probably also fragment TAB. 22:2, possibly of a sickle), a sickle (HLADÍK 2014, Tab. 3:2), a socket-like tool ("plough scraper"; TAB. 20:3, 28:7 – this tool can be interpreted as a scrape for debarking lumber). Another group of iron artefacts contains weapons and fighting equipment. Arrowheads were discovered in the settlement area (TAB. 21:13, 31:10 – bronze, HLADÍK 2014, Tab. 3:9, 11); the cultural layer also contained spurs, a small fraction of a stirrup (TAB. 20:6, 21:4, 20:5) and a fragment of a horseshoe (TAB. 19:4). Another pair of spurs with partially preserved strap fittings was found in grave 32 (TAB. 26:2–6). Many unidentified fragments and rods are probably fragments of building fittings, some of which are difficult to determine – such as nails (TAB. 19:6–8, 20:2, 24:8–10, 25:3 probably also 21:6, 18, 19). There were also three fragments of axe-shaped ingots (TAB. 19:3, 24:2–3) and an artefact that probably served as a stylus (TAB. 25:5).

Apart from iron artefacts, several artefacts of non-ferrous metals were found. Probably the most noteworthy is a bronze plate finger ring (TAB. 31:8), from grave 81, which was found together with an iron knife. In most cases, these are chronologically insensitive artefacts, and their general dating corresponds to the dating of the ceramics in both the Mikulčice and Blučina pottery groups. In the case of the plate rings, there was a strong connection to the Blučina pottery group at several Great Moravian burial sites in southern Moravia. We processed the database for this when studying the finishing of the burial pits and wooden constructions in Great Moravian graves (MAZUCH/HLADÍK/SKOPAL 2017; generally MAZUCH 2012, 153). Rings from Great Moravian burial sites in what is now Moravia have been recently studied by Š. UNGERMAN (2017). Although his work primarily focused on finger rings made of precious metals, he also touched on less luxurious jewellery, which is the case of the find from Trapíkov. In his work, Ungerman modified Grigorov's typology of finger rings found in Bulgaria (GRIGOROV 2007, 46–66). According to this typology, the finger ring from Trapíkov falls within type II, which is described as a metal ring with a diamond or oval plate. This type of ring has been known in the Middle Danube Region

20 Most of the artefacts found in Trapíkov were very poorly preserved and despite attempts at conservation they no longer existed or had disintegrated at the time this book was written. This is why they are quoted from a more recent work where their selection was published.

and is part of the so-called Danube jewellery (Dostál 1966, Fig. 12:6–24).

As for the chronology of the settlement, the finds of four spurs (two in a settlement pit and a pair with fittings in grave 32) must be mentioned. Three have a plate with three rivets in a horizontal groove. Based on the latest information, the boom in this type is dated to the second half of the 9th century with a possible culmination in the last third. This type survived until the beginning of the following century (*cf.* Kouřil/Tymonová 2013, 141–144). It is probably the most common type in the assemblage of spurs from the Mikulčice stronghold. The fourth spur, with one preserved parabolic plate and a projected rib running longitudinally through the centre, generally does not defy the above dating. The finds of equestrian equipment include an interesting fragment of a stirrup – a rarely found type of artefact – that was probably harvested for secondary forging (fire welding) as was the case with many other fragments found at the settlement. However, it is inappropriate to draw definitive conclusions concerning social issues based on a single fragment.

Quernstones hold a special position among the finds (tab. 32–35). We have recorded the use of whole quernstones or their fragments in the construction of ovens (fig. 23). Quernstones were often found in the dwellings. Up to three quernstones were excavated in two of the dwellings (see Chapter 13). Disregarding the small quernstone fragments built into ovens, a total of 17 quernstones and large fragments were found at the settlement. Such observations are remarkable in the context of the situation in the centre of the agglomeration. The excavations at the Mikulčice stronghold unearthed a large assemblage of quernstones. However, these were often found in secondary positions, mainly under the rampart (Marek/Skopal 2003) and in the riverbed in the flood sediments (Hladík/Poláček 2013). Significant concentrations of quernstones were found in the area of the gates and bridges. Also, when found directly in the fortified area at the acropolis of the stronghold, they are closely linked with the latest stratigraphic horizons associated with the violent demise of the stronghold (Marek/Skopal 2003, 515). In this context, the possibility has been discussed that the quernstones in secondary positions are evidence of fighting in that they were used to defend the fortified areas (Hladík/Poláček 2013, 16). This conclusion is supported by the fact that almost no quernstones have been found in the northern extramural settlement (Mazuch 2012). The Trapíkov quernstones constitute a rather unique assemblage from the area of the agglomeration (even though it was its periphery) found in the places of its original use: directly at the settlement, in the residential features. Unfortunately, the finds of quernstone in stratigraphically significant positions do not allow for a more exact analytical comparison of the discussed assemblages.

The last group of finds contains small finds that include relatively unique finished bones and clay spindle whorls and glass beads (tab. 36). A significant decline in the quantities of finds from organic materials, such as bones, wood and textiles in the sandy subsoil, are expected as a result of post-depositional processes; the human and untreated animal bones were also in very poor condition, see Chapters 12.1 and 12.2). Only grave 32 contained corrosion-preserved textile fragments in the form of metamorphosed fibres (fig. 24; tab. 26).

7.2.1 Spatial Relationships of Contexts and Spatial Distribution of Artefacts and Ecofacts at the Settlement – Intra-Site Analyses

In the previous chapters, we have pointed out that ceramic fragments and metal artefacts and their fragments were also found in large numbers in the overlying cultural layer in addition to those found in features sunken in the subsoil. To understand the inner structure of the settlement area, we decided to use the GIS environment to analyse the distribution of the finds and the relationship of this distribution to the various contexts. In the first step, we will take a closer look at the spatial relationships of the contexts. The dwellings will be the main elements of the spatial relationships within the settlement. The spatial analysis also needs to include sunken features and graves. However, due to the small numbers of graves, we will only work with tendencies below the level of statistical significance). In the intra-site analyses of the Trapíkov settlement, the above categories of artefacts (pottery, metal artefacts) and non-portable finds (dwellings, graves) are complemented by ecofacts in particular botanical macroremains and animal bones.[21] We consider all these categories to be strongly linked to the economic and social activities that might have taken place in the 9th-century settlement. During the analytical process, it transpired that it is mainly pottery that enables us to identify the importance of post-depositional processes for the distribution of the finds from the settlement.

The analyses presented focus primarily on interpreting and understanding the relationships between individual residential and agricultural features and features created during the construction of dwellings. Therefore, our primary objective is to identify areas in the settlement where repetitive activities can be assumed and to define the function of the individual parts of the settlement. Given the level of research and the archaeological materials, we will not be able to answer these questions comprehensively. Therefore, we will use intra-site analysis to seek answers to questions concerning the function of the settlement and the reasons for its location. These questions are defined as follows:

21 During the research of the Trapíkov settlement, we also sampled backfill from the dwellings for chemical analysis to understand how the area for the individual dwellings was used (fig. 25). At the time of writing, these chemical analyses have not been finished yet so an intra-site analysis at this microlevel will be presented in our future work.

FIG. 23 | Photographic documentation of heating devices excavated in residential units (dwellings – DW) in 2010–2012.

1) Is the settlement, which is situated in the flood plain of the River Morava on the peripheries of the Mikulčice agglomeration, spatially determined by the relationship with the Mikulčice centre, and if so, how can this relationship be described?
2) Is the structure of the settlement area determined by any of its functions? More precisely, are we able to interpret the primary function of the settlement from the spatial patterns of the archaeological finds?

FIG. 24 | Detail of a spur from grave 32 with textile remains in the form of metamorphosed fibres. Before conservation.

7.2.1.1 Contexts

The analysis of spatial relations is based on an interpreted vectorised plan of the settlement and the burial site (FIG. 8). As previously mentioned, there are two observations concerning the layout of the dwellings and settlement features – both in the horizontal and vertical stratigraphies. First, no superposition of the settlement features was discovered. They all respected each other. Functionally uninterpreted sunken pits were mostly found around the houses (except for a single case). Together with radiocarbon dating (see Chapter 12.4), the relative stratification of the settlement leads us to conclude that it was relatively short-term, and all the contexts and artefacts were analysed as contemporary. This is a crucial fact, which will be addressed in the interpretive and narrative parts of this work as we are emphasising this in relation to the intra-site analyses. The point is that the main spatial patterns defined by the analyses are not a result of developments over time. Therefore, they should be interpreted on a social and economic level.

The second key observation, which is evident without sophisticated spatial analyses, is that the sunken settlement features together with the dwellings create groups that lie in an irregular northsouth line. They divide the area of the settlement into several zones although they cannot be interpreted without a more comprehensive intra-site analysis.

We designed a basic structure of the settlement based on the position of the non-portable finds using an analysis of Euclidean distances and the calculation of buffers around residential features in ArcGIS Desktop (FIG. 26). We also used interpolation methods to produce an interpolated surface, which expresses the probable intensity of the use of the individual parts of the settlement based on the concentration of the features sunken into the subsoil and the features discovered in the overburden or on the interface of the overburden and subsoil (FIG. 27).

Figure 26 shows the result of an analysis of the Euclidean distances between individual dwellings and settlement features. The settlement is divided into three main zones. Central part A, situated in the middle, is typical for an almost complete absence of non-portable finds; it is a "void" surrounded by dwellings. The next zone, B, was densely built-up. It was

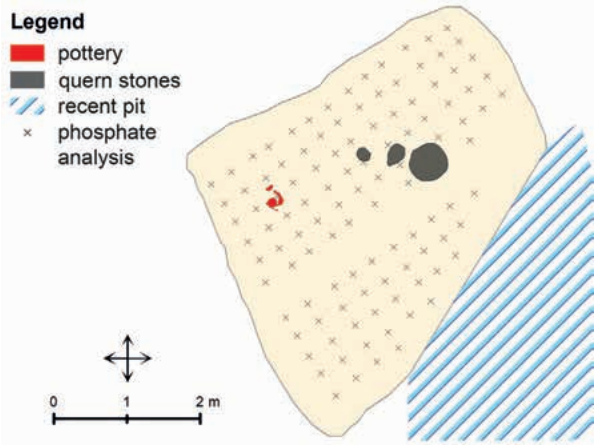


FIG. 25 | Plan of the remains of a dwelling dated from the 9th to the first half of the 10th century (dwelling 9) with the location of samples taken for chemical analyses (primarily phosphate analysis).

the most intensively used area, which "wrapped" the central part, A. Zone C was on the periphery of the settlement and is where the settlement activities subsided.

This spatial pattern was essentially confirmed by the interpolated surface on (FIG. 27). In the first step of this interpolation, we used the *Feature to point* tool in ArcGIS Desktop to calculate the centroids of all the polygons that represent individual dwellings, sunken contexts and features. This point layer gave rise to an interpolated surface using the *Kernel density* tool. Statistically, *Kernel density* estimation (KDE) is a non-parametric way of estimating the probability density function of a random variable. *Kernel density estimation* is a basic data smoothing process that helps to make conclusions about a population based on a final data sample. This is why it is suitable for processing the data from the settlement and burial site in Trapíkov.

7.2.1.2 Artefacts and Ecofacts

Interesting results were shown by the spatial analysis of the distribution of artefacts and ecofacts. We worked with four categories of finds: ceramics, metal artefacts, botanical macroremains and animal

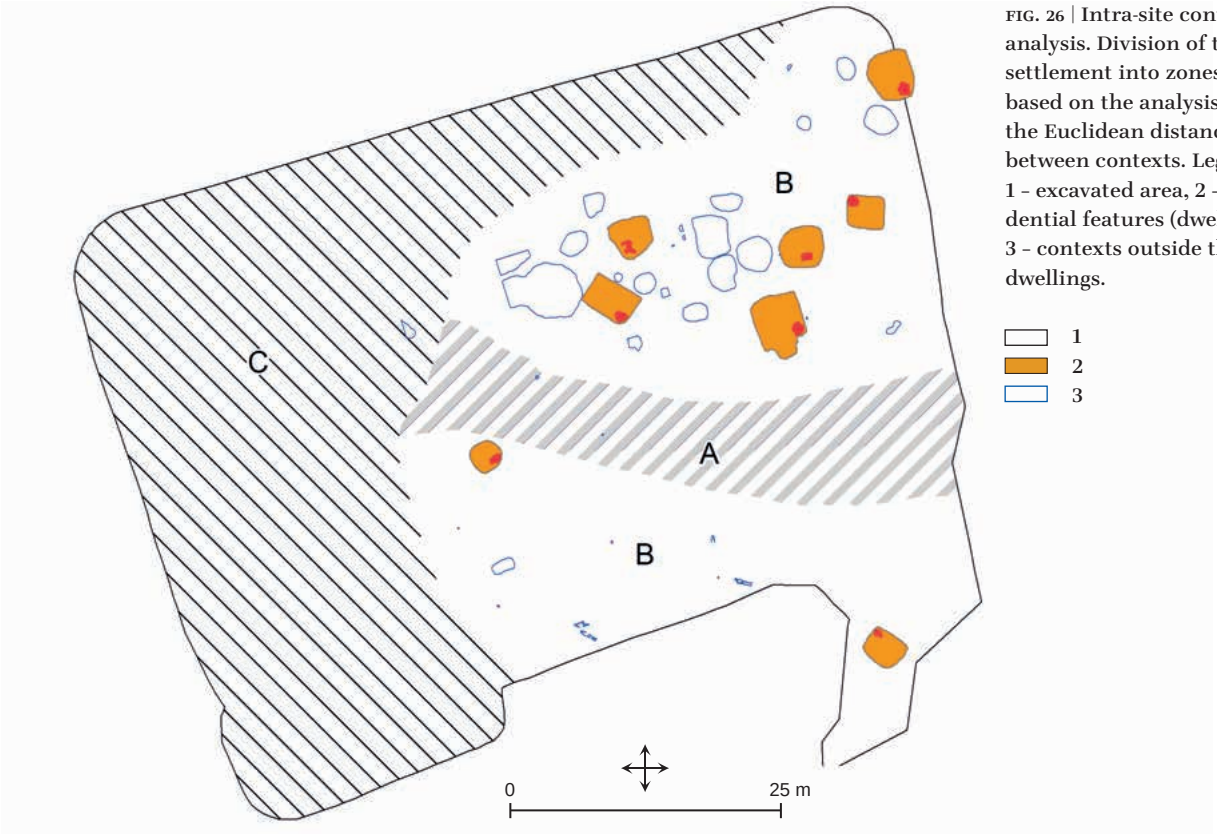


FIG. 26 | Intra-site context analysis. Division of the settlement into zones based on the analysis of the Euclidean distances between contexts. Legend: 1 – excavated area, 2 – residential features (dwellings), 3 – contexts outside the dwellings.

1
2
3

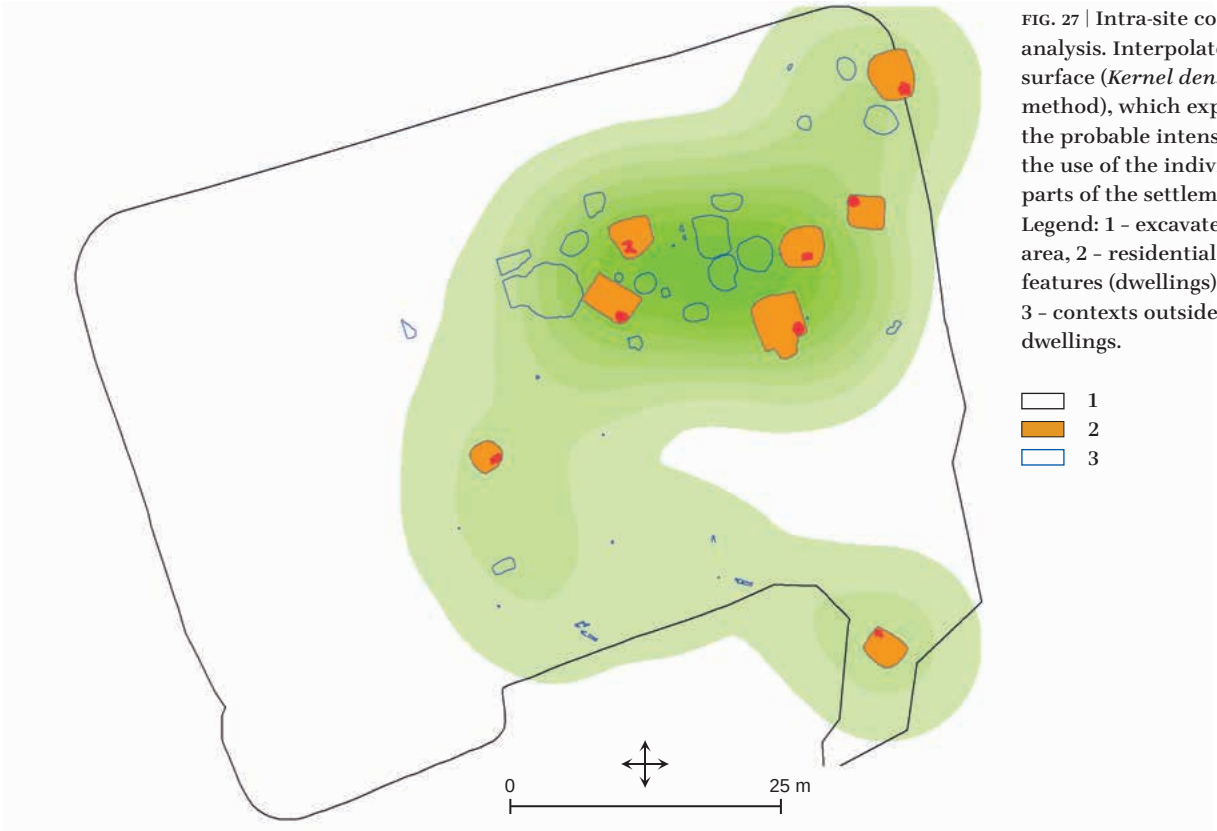


FIG. 27 | Intra-site context analysis. Interpolated surface (*Kernel density* method), which expresses the probable intensity of the use of the individual parts of the settlement. Legend: 1 – excavated area, 2 – residential features (dwellings), 3 – contexts outside the dwellings.

1
2
3

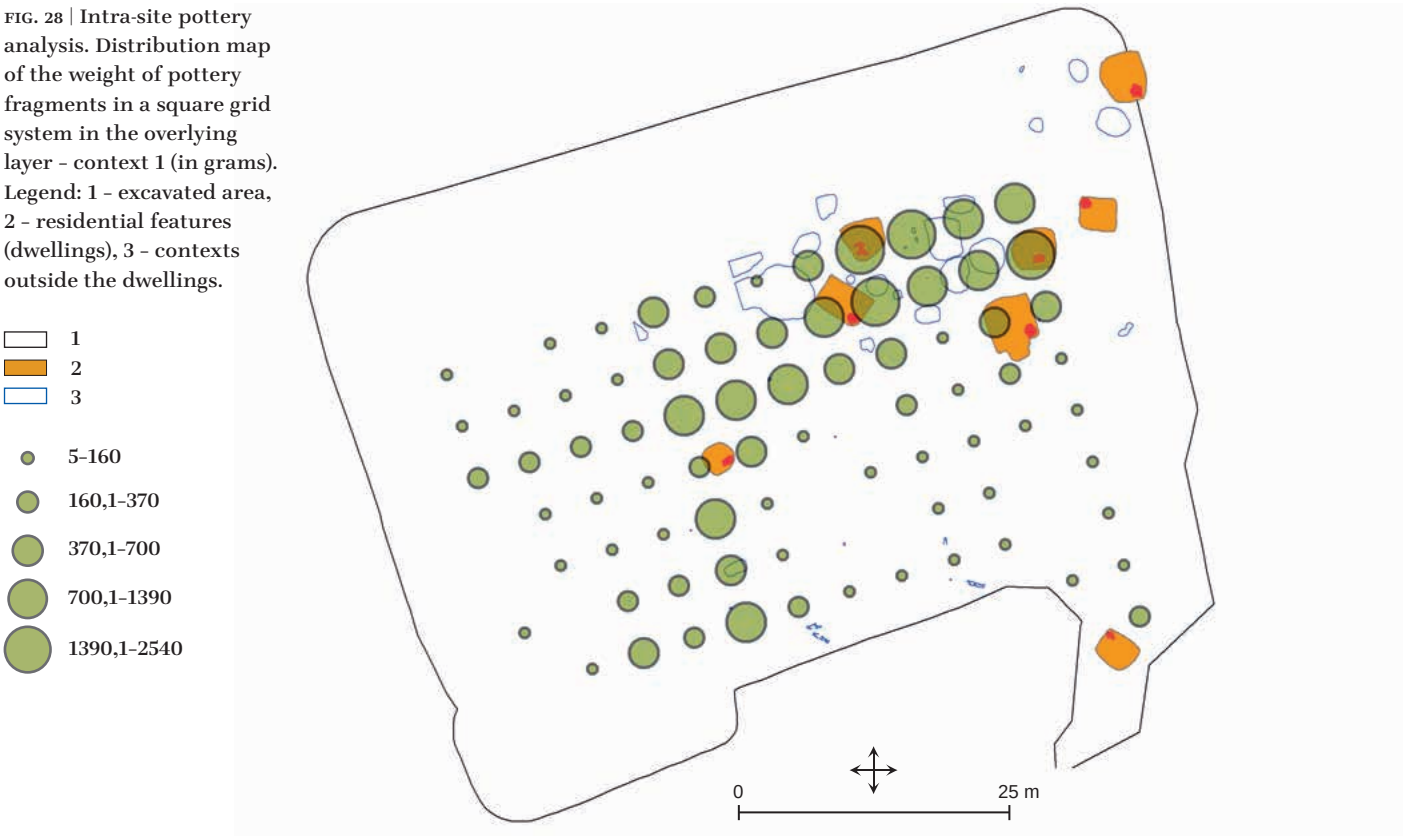


FIG. 28 | Intra-site pottery analysis. Distribution map of the weight of pottery fragments in a square grid system in the overlying layer – context 1 (in grams). Legend: 1 – excavated area, 2 – residential features (dwellings), 3 – contexts outside the dwellings.

bones. The primary display was created in two steps. First, we created distribution maps and then, using several interpolation methods, we interpolated the originally discrete data into a surface reflecting the likely value of the parameters in the area.

We used the *Kernel density* tool in ArcGIS Desktop to interpolate the density of the distribution of selected categories of artefacts and ecofacts. The second interpolation method applied in our analyses was the *Trend* method, which uses a linear regression model to interpolate surfaces. It is a global polynomial interpolation method that adapts a smoothed surface of an input set of points using a mathematical function (regression). The surface created by this method is gradually changing and captures rough data patterns.

Pottery

The largest quantity of pottery was found in the overburden. Because of the records of the finds in the square grid system, we were able to use the ArcGIS Desktop interpolation algorithms to detect concentrations of pottery fragments and then analyse the links between the pottery in the overburden and the settlement pits in the subsoil. Before interpolating the surface, we weighed the pottery fragments in each square. We used the *Feature to point* tool to convert the entire square network to a layer of points and then added the weights of the fragments to each of the points in the attribute table. The weight distribution of the pottery within each square is in the distribution map (FIG. 28). We interpolated the surface from this layer of points using two interpolation methods. First, we used the *Kernel density* method and implemented the weight of the ceramics as a *population field* for density calculation (FIG. 29). We then applied the *Trend* method (FIG. 30).

Both the resulting interpolated surfaces provide interesting explanations for the distribution of pottery fragments in the settlement area. *The Kernel density* algorithm revealed two particular facts. Pottery is concentrated on the northern edge of the settlement. In the overburden, the greatest density of pottery was above dwelling 1 and dwelling 5. This is remarkable, particularly in the case of dwelling 5. During fieldwork, the outline of this dwelling was very indistinct and its boundaries were very problematic to define – both in the overburden and subsoil. As a result, only a very small proportion of ceramic fragments were linked to it. However, the analysis of pottery distribution in the overlying layer presented in FIG. 29 demonstrated that the concentration of pottery in the sectors above dwelling 5 is related to this dwelling, although its boundaries could not be identified in the overburden. Thus, during post-excavation analyses, we linked the pottery from this area to other pottery fragments coming directly from dwelling 5 and only then did we analyse and quantify the pottery from the dwellings and settlement pits (see Chapter 7.2.2).

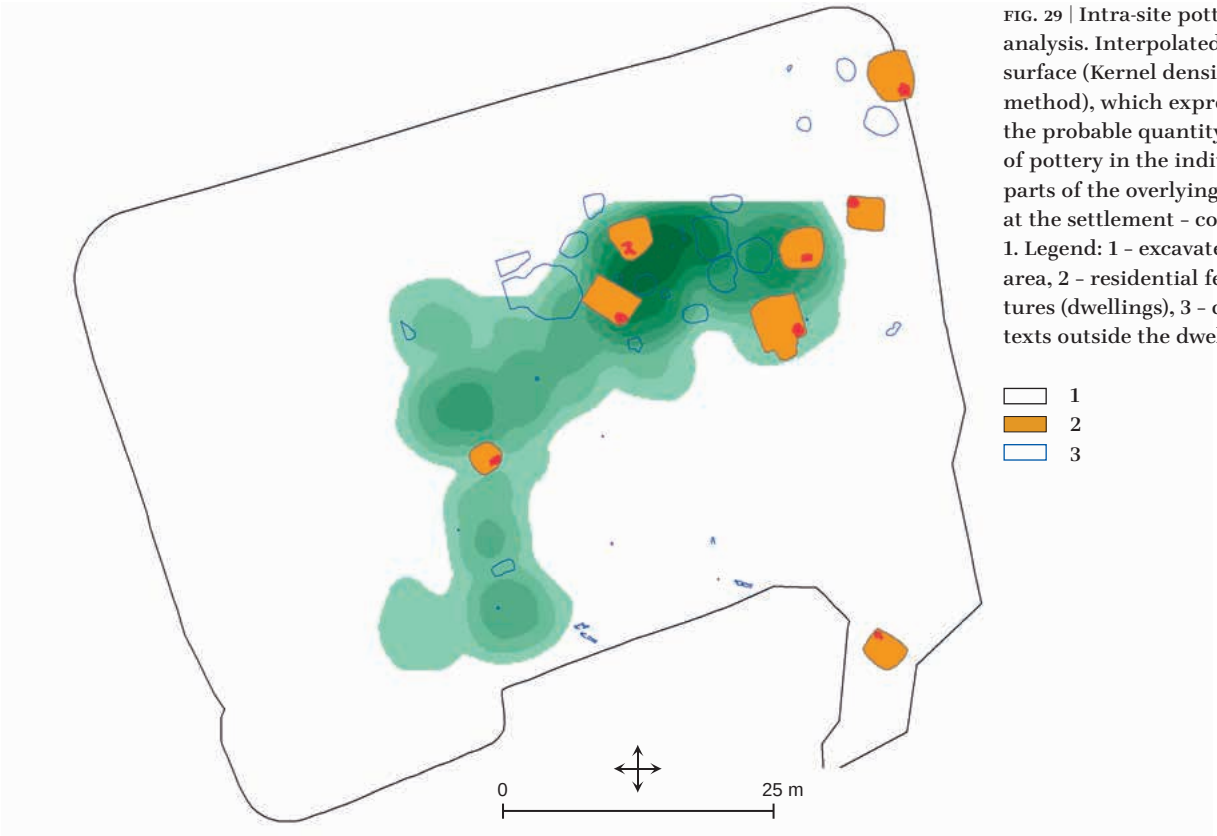


FIG. 29 | Intra-site pottery analysis. Interpolated surface (Kernel density method), which expresses the probable quantity of pottery in the individual parts of the overlying layer at the settlement – context 1. Legend: 1 – excavated area, 2 – residential features (dwellings), 3 – contexts outside the dwellings.

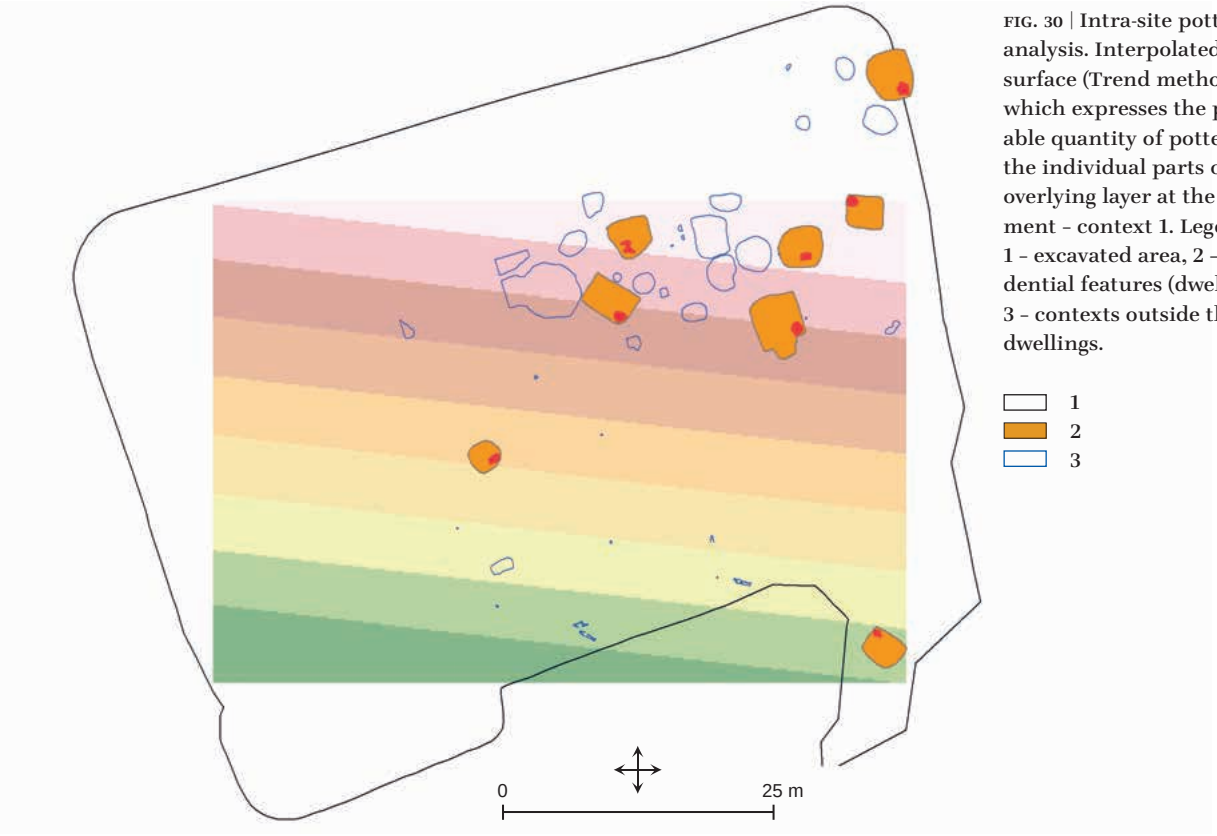


FIG. 30 | Intra-site pottery analysis. Interpolated surface (Trend method), which expresses the probable quantity of pottery in the individual parts of the overlying layer at the settlement – context 1. Legend: 1 – excavated area, 2 – residential features (dwellings), 3 – contexts outside the dwellings.

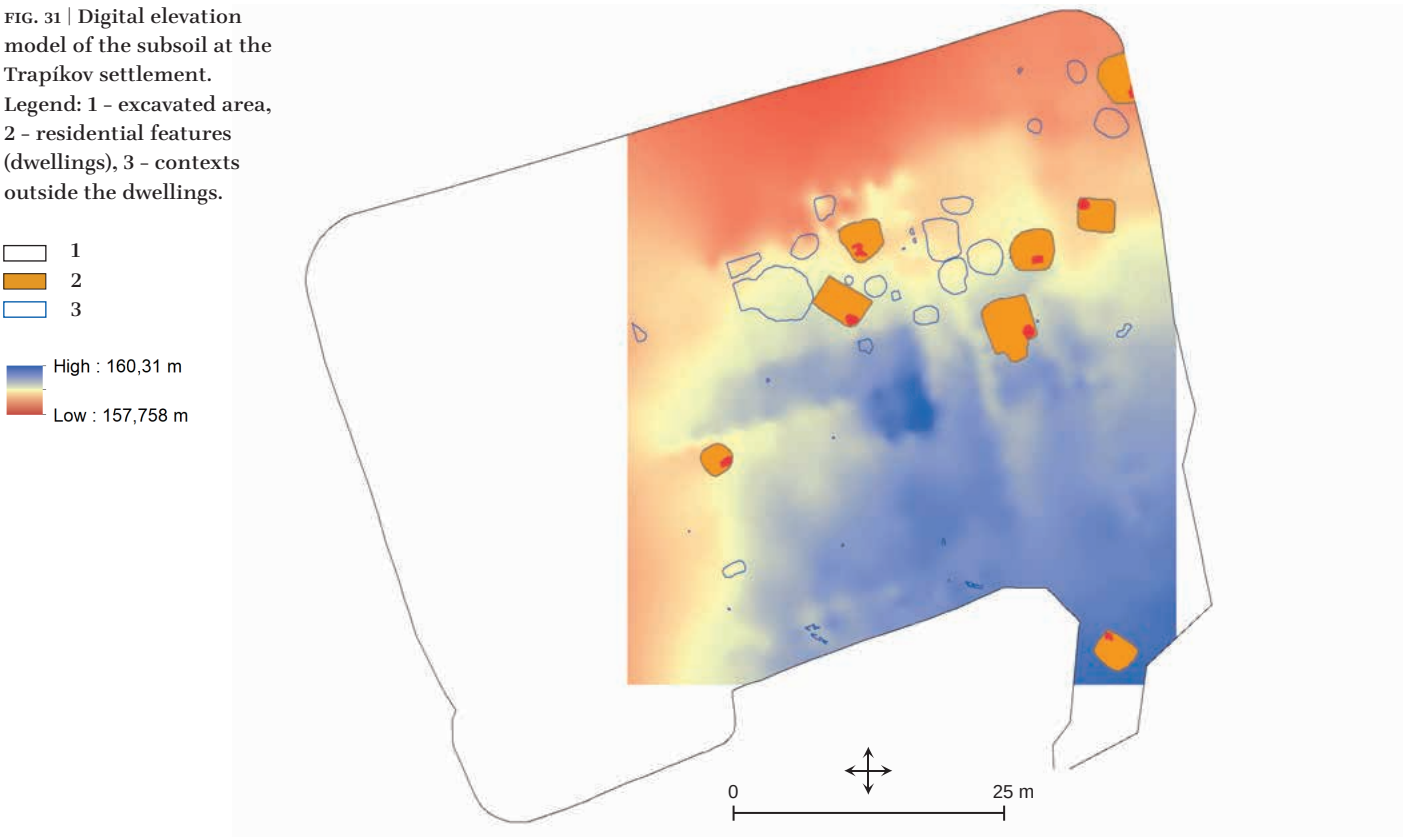


FIG. 31 | Digital elevation model of the subsoil at the Trapíkov settlement. Legend: 1 – excavated area, 2 – residential features (dwellings), 3 – contexts outside the dwellings.

Another fact, observed on both the interpolated surfaces, is to a large extent related to post-deposition processes in the settlement area. In both cases, there was a strong upward trend in the concentration of pottery finds in the northeast direction. This was especially marked on the surface, which was interpolated by the *Trend method*. As the surface created by this method changes slowly, it mainly detects rough data patterns. As the subsoil slopes down in the northern direction, it is likely that the overburden – together with the archaeological material contained in it – gradually shifted to the north after the collapse of the settlement (FIG. 31).

Metal artefacts

Although the sandy subsoil in the area of the Trapíkov settlement is unsupportive of the preservation of organic and other unstable materials, such as certain metals, we managed to salvage a relatively large collection of metal artefacts. The whole assemblage weighs 2.6 kg and contains approximately 140 metal artefacts and fragments. As with the pottery, a large part of this assemblage was retrieved from the overburden. When analysing the distribution of metal artefacts, we followed the same approach as in pottery fragments. In the first step, we created a layer constituting points (centroids of individual squares) to which we linked the presence or absence of metal artefacts from the cultural layer and the dwellings and sunken features. Two interpolated surfaces were calculated based on this surface (FIG. 32, 33). Figure 32 shows the surface calculated by the *Kernel density* method and Figure 33 shows the surface calculated by the *Trend* algorithm.

Both the analyses confirm that the distribution of metal artefacts in the settlement are subject to very similar patterns as the pottery. Unlike the pottery, the iron artefacts were more concentrated in two zones; one in the northern part of the settlement, which corresponds to the distribution of pottery. The second zone was on the southern edge of the settlement (towards the top of the sand dunes) and there was a relatively strong connection between the metal artefacts and graves. However, it is important that the metal artefacts respected the area defined as zone A employing an intra-site analysis of contexts (FIG. 26). This zone is typical for the absence of non-portable finds. As confirmed by the intra-site analyses of portable finds, a statistically significant absence of pottery and metals has been recorded in this area.

Botanical macroremains and animal bones

To understand the importance of the settlement in relation to the social and cultural activities of the community that used to inhabit it, it is important to detect the distribution patterns of botanical and zoological artefacts. The results of the analysis of botanical macroremains and animal bones in terms of their composition and taphonomy as well as the interpretation of the diet of the population are presented below (see Chapters 7.2.3, 8, 9 and 12.1). We can

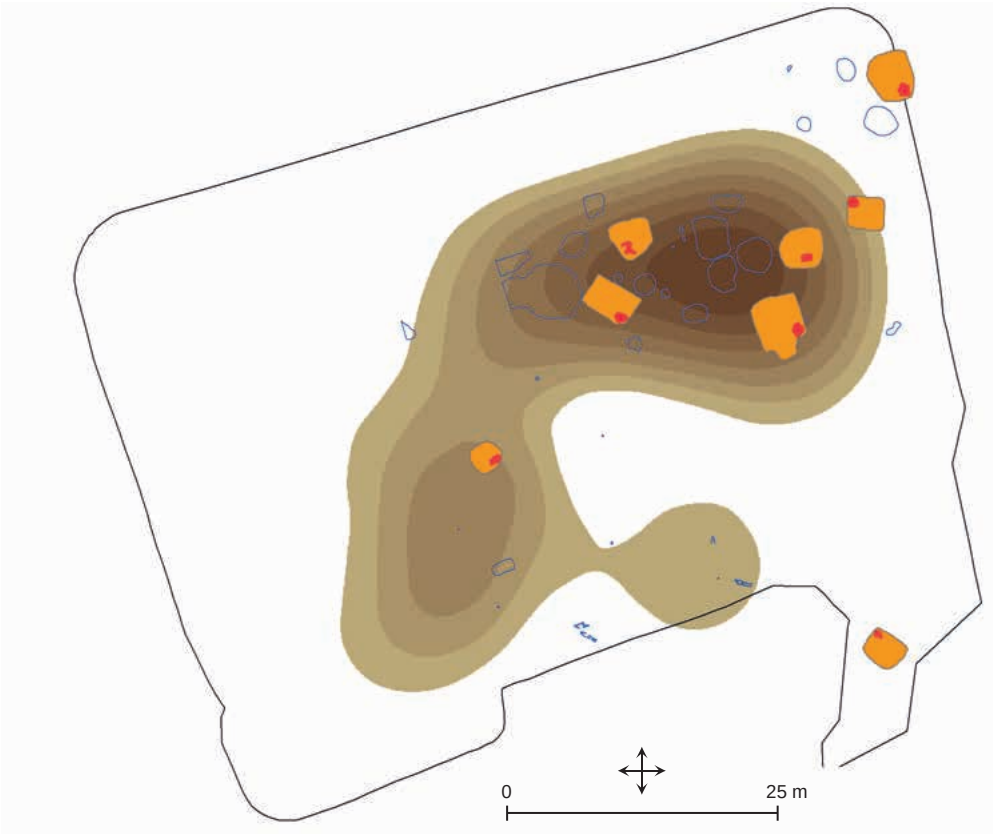


FIG. 32 | Intra-site analysis of metal artefacts. Interpolated surface (Kernel density method), which expresses the probable quantity of metal artefacts in different parts of the settlement. Legend: 1 – excavated area, 2 – residential features (dwellings), 3 – contexts outside the dwellings.

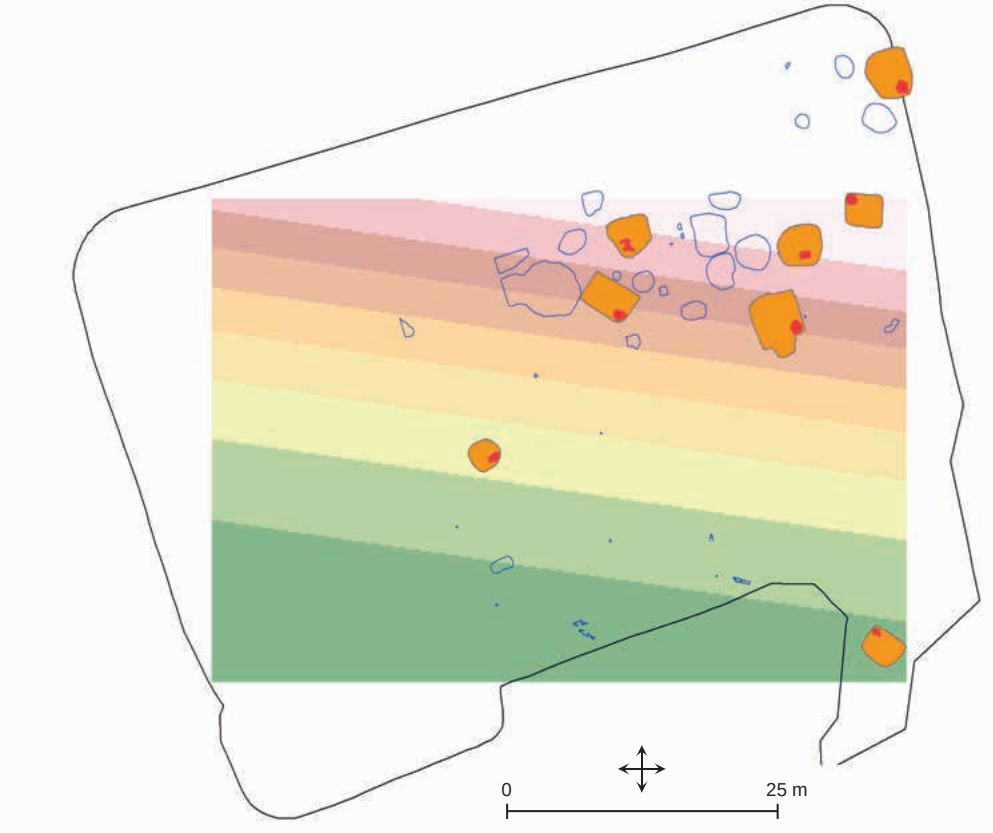


FIG. 33 | Intra-site metal analysis. Interpolated surface (Trend density), which expresses the probable quantity of metal artefacts in different parts of the settlement. Legend: 1 – excavated area, 2 – residential features (dwellings), 3 – contexts outside the dwellings.

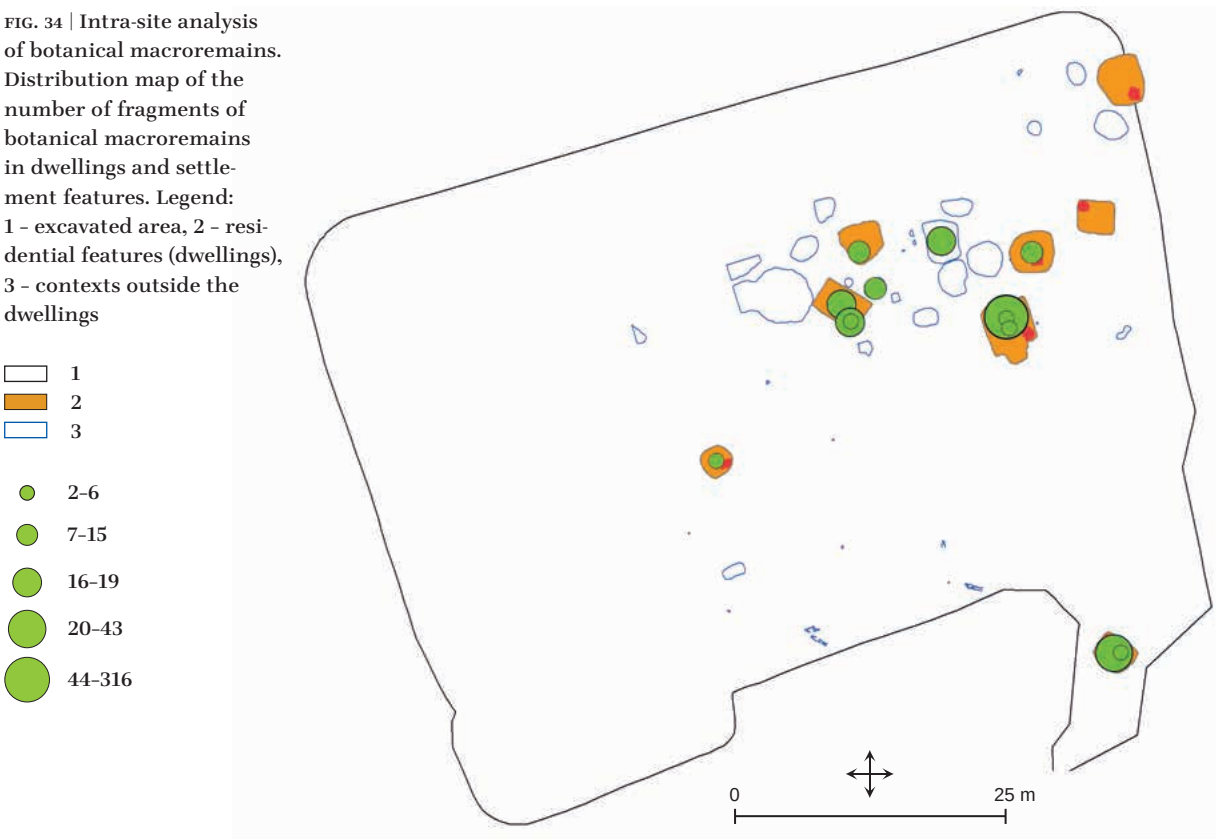


FIG. 34 | Intra-site analysis of botanical macroremains. Distribution map of the number of fragments of botanical macroremains in dwellings and settlement features. Legend: 1 – excavated area, 2 – residential features (dwellings), 3 – contexts outside the dwellings

now take a closer look at the spatial distribution of ecofacts and their relationship to artefacts and contexts (FIG. 34–39). Unfortunately, the extent to which these records have been preserved does not allow for a deeper analysis of the distribution of ecofacts in the overlying cultural layer. A distribution map of botanical macroremains from features and dwellings is in FIG. 34. FIGURE 35 shows the interpolated surface of the distribution of botanical macroremains from dwellings and sunken features. It is expected that the largest concentration will be in the centre of the settlement and that there will be no ecofacts on its southwestern outskirts. Interesting findings were made when we interpolated the surface separately for cultivated crops (FIG. 36) and wild species (FIG. 37). While cultivated crops were dominantly linked with the interior of the dwellings, wild species were more dispersed and were found in the vicinity of the dwellings in the settlement features.

Due to the aggressive subsoil, archaeological material is highly fragmentary (see Chapter 12.1). When examining the distribution map of animal bones and at the interpolated surface that reflects the concentration of animal bones based on the number of fragments found in different archaeological contexts (FIG. 38, 39), patterns can be seen that slightly differ from those of the botanical finds. Like botanical fragments, animal bones concentrate in the central part of the settlement. Unlike in the botanical macroremains, there is a second significant concentration in the features on the northeast outskirts of the settlement.

7.2.1.3 Relations Between the Spatial Distribution of Selected Categories of Finds, Contexts and their Interpretation

The intra-site spatial analyses presented so far have only been conducted on the area studied between 2010 and 2014. However, the results can be extended to the relationships with all the residential features investigated in Trapíkov during other excavation seasons, thus answering the two questions defined in the introduction to this chapter. These were: Was the Trapíkov settlement spatially determined by the agglomeration centre? And do the spatial patterns revealed by the intra-site analyses show any of the functions of the settlement in the economic and social hierarchy of the agglomeration?

The analysis of the distribution of all the categories of selected archaeological sources confirms one basic formula. In the middle of the settlement is a zone typical for an absence of finds. The spatial relations of all the analysed artefacts and ecofacts confirmed that this zone was lined by areas that contained evidence of intensive economic and social activities. This evidence was more plentiful to the north of this zone. The condition of the preservation of the archaeological materials does not allow a more precise division of the area of the settlement. However, it is clear that there were spatial relationships that proved a systematic (consciously planned and developed) use of individual areas.

In terms of the questions we are attempting to answer, it is essential to know that the central zone

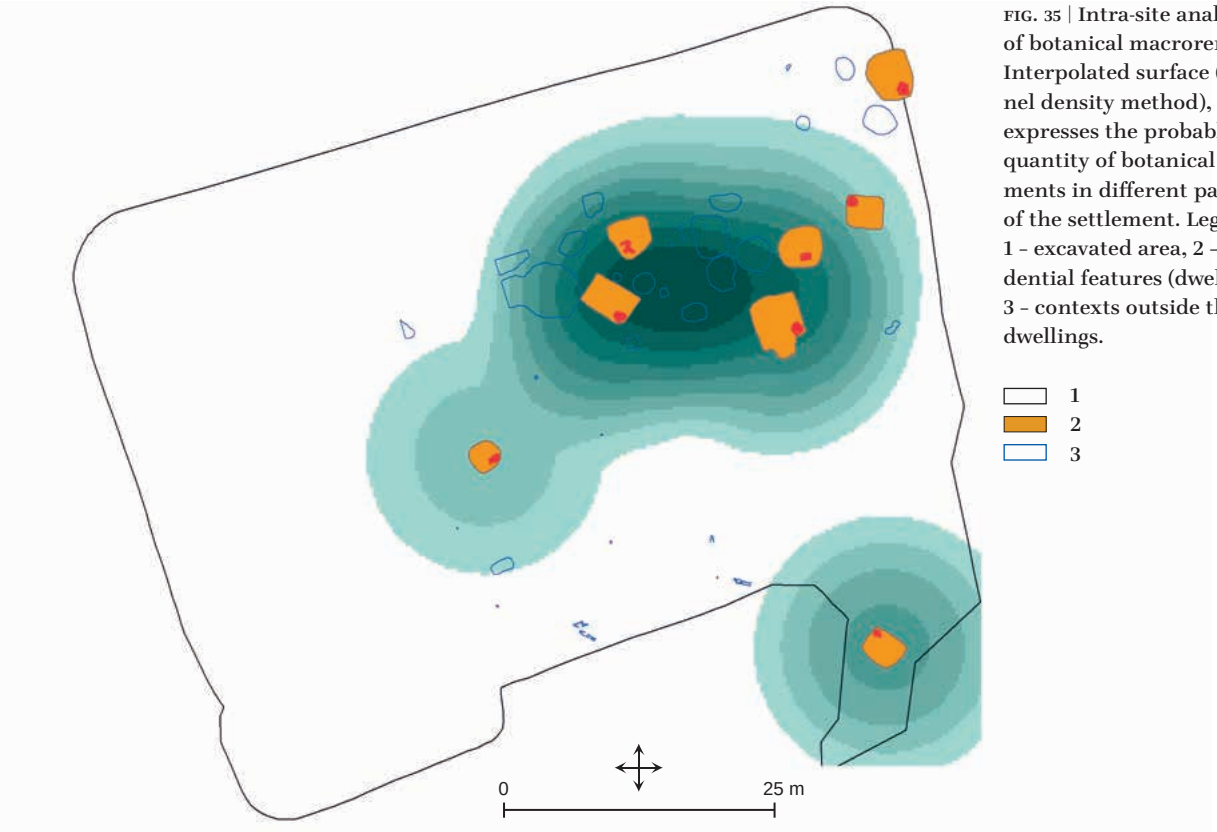


FIG. 35 | Intra-site analysis of botanical macroremains. Interpolated surface (Kernel density method), which expresses the probable quantity of botanical fragments in different parts of the settlement. Legend: 1 – excavated area, 2 – residential features (dwellings), 3 – contexts outside the dwellings.

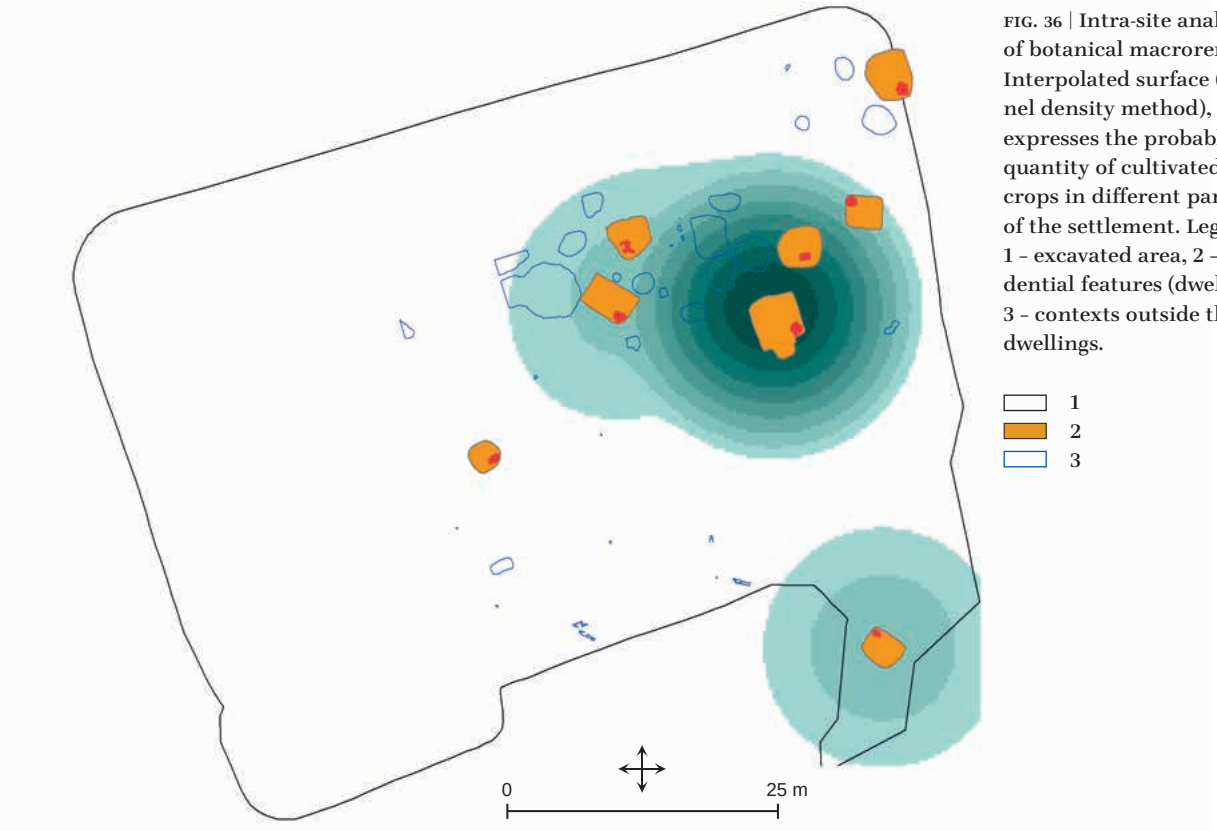


FIG. 36 | Intra-site analysis of botanical macroremains. Interpolated surface (Kernel density method), which expresses the probable quantity of cultivated crops in different parts of the settlement. Legend: 1 – excavated area, 2 – residential features (dwellings), 3 – contexts outside the dwellings.

FIG. 37 | Intra-site analysis of botanical macroremains. Interpolated surface (Kernel density method), which expresses the probable quantity of wild crops in different parts of the settlement. Legend: 1 – excavated area, 2 – residential features (dwellings), 3 – contexts outside the dwellings.

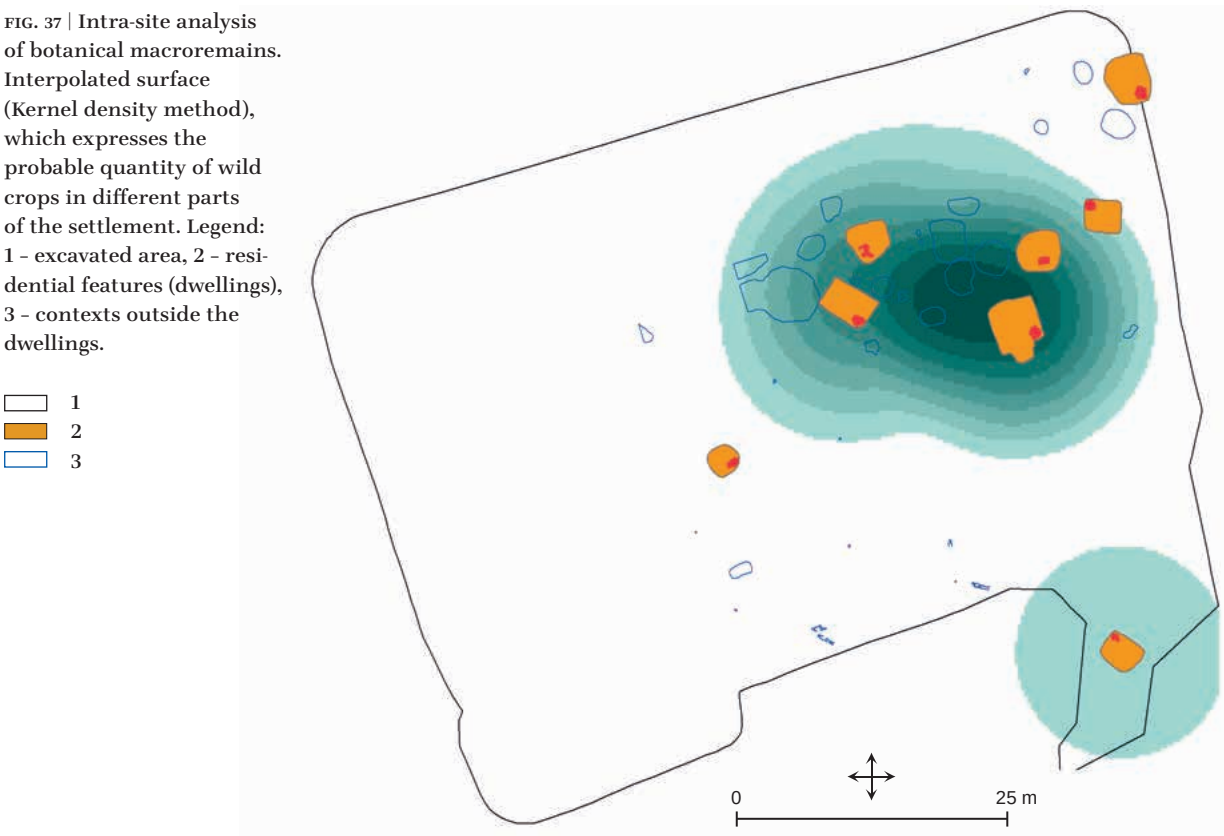
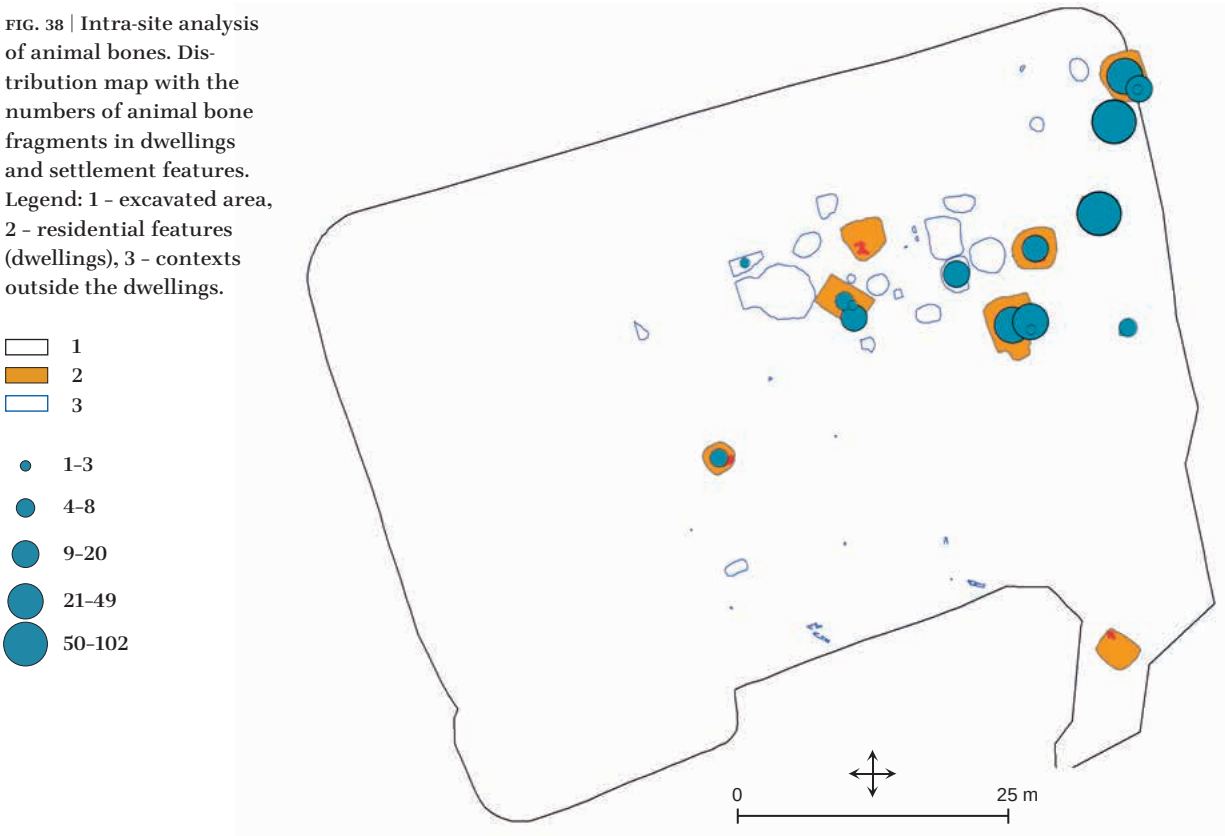


FIG. 38 | Intra-site analysis of animal bones. Distribution map with the numbers of animal bone fragments in dwellings and settlement features. Legend: 1 – excavated area, 2 – residential features (dwellings), 3 – contexts outside the dwellings.



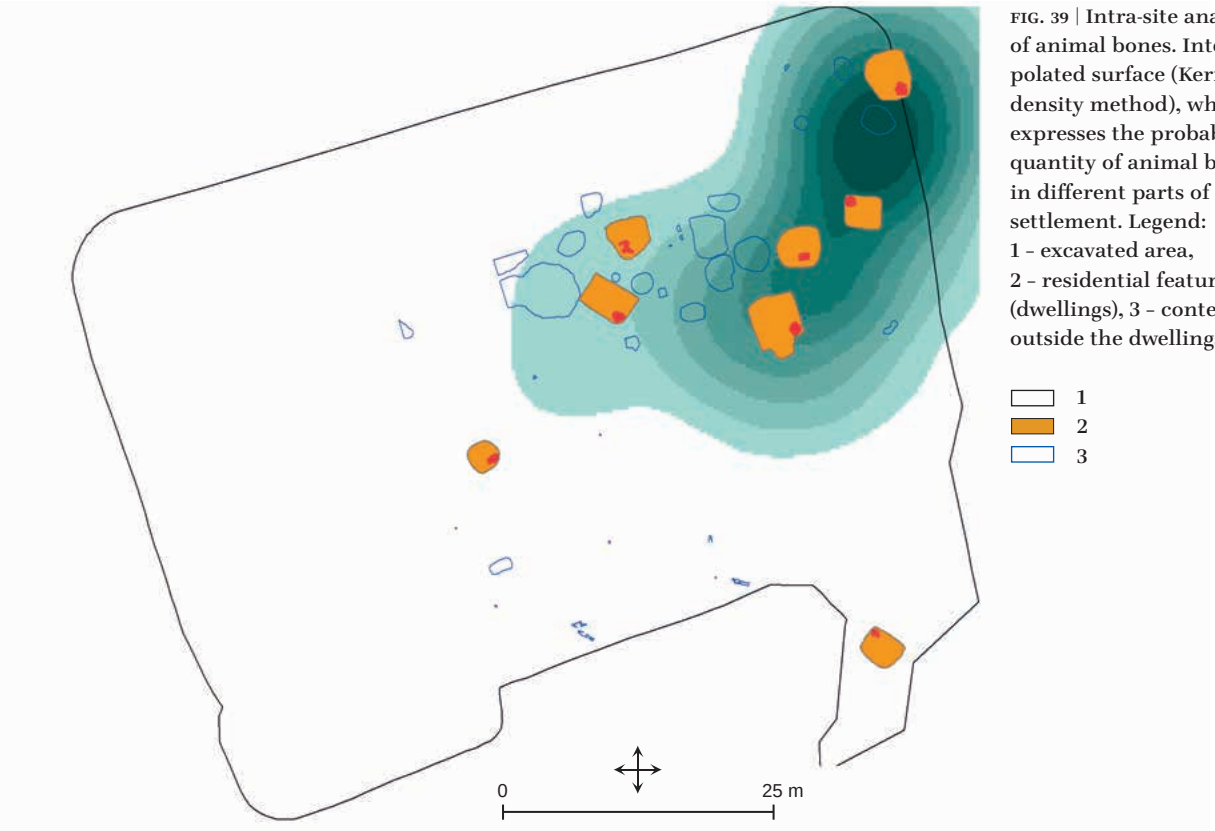


FIG. 39 | Intra-site analysis of animal bones. Interpolated surface (Kernel density method), which expresses the probable quantity of animal bones in different parts of the settlement. Legend: 1 – excavated area, 2 – residential features (dwellings), 3 – contexts outside the dwellings.

in the settlement has analogies in other parts of the settlement. These were excavated in other years, even though they constitute a small proportion of the entire sand dune. By studying the plan of all the previously studied dwellings on the Trapíkov dune, which depicts this zone and are defined by intra-site analyses, as well as the hypothetical course of this zone in the unexcavated area, it may be possible to detect the possible causes for the spatial determinants of the plan of the settlement (FIG. 40).

The zone runs parallel to the longitudinal axis of the dune with all the 9th-century dwellings aligned alongside. This is why we deem it to be a communication road running towards the central part of the stronghold. The presence of the centre thus significantly influenced the layout of the Trapíkov settlement, which was situated on the periphery of the agglomeration. The entire settlement probably lay along the access route. The second question is more difficult to answer based on intra-site analyses. The spatial patterns, together with other analyses, show certain trends, which can be interpreted in the sense that the function of the settlement within the agglomeration was of an intermediate interlink between the centre and its wider surroundings. This area most probably supported activities related to the distribution of foodstuffs from the hinterland to the centre (for further details, see Chapters 8, 9).

7.2.2 Artefacts – Pottery

7.2.2.1 Description of Pottery Features in the MCG Pottery from Trapíkov

All ceramic vessels can be classified and assessed based on two key criteria: morphology, which includes rim profile, the overall shape, decoration (in which case, the term "typology" is more appropriate), and fabric type, which is defined by the ceramic material used, the firing and the manufacturing technology (BUBENÍK/FROLÍK 1995, 129–130).

Morphology and technology – in terms of workmanship – cannot be separated in pottery, although formally, this is exactly the case in archaeology.

For instance, waves and combed waves – which fall under morphology – were incised into the vessels by potters whose various levels of aptitude and experience were reflected in the decoration. Similarly, the potter's skills were reflected in the overall shape of the vessel and how the base, body and rim were designed. Tall and sloping waves show the proficiency of the early medieval potters and the tilting of the waves, be it to the left or right, reflects the individual styles of the potters (unless reflecting something as prosaic as the angle at which they leaned over the vessel, the decorated side of the vessel or the hand they used). Similarly, different directions of turning

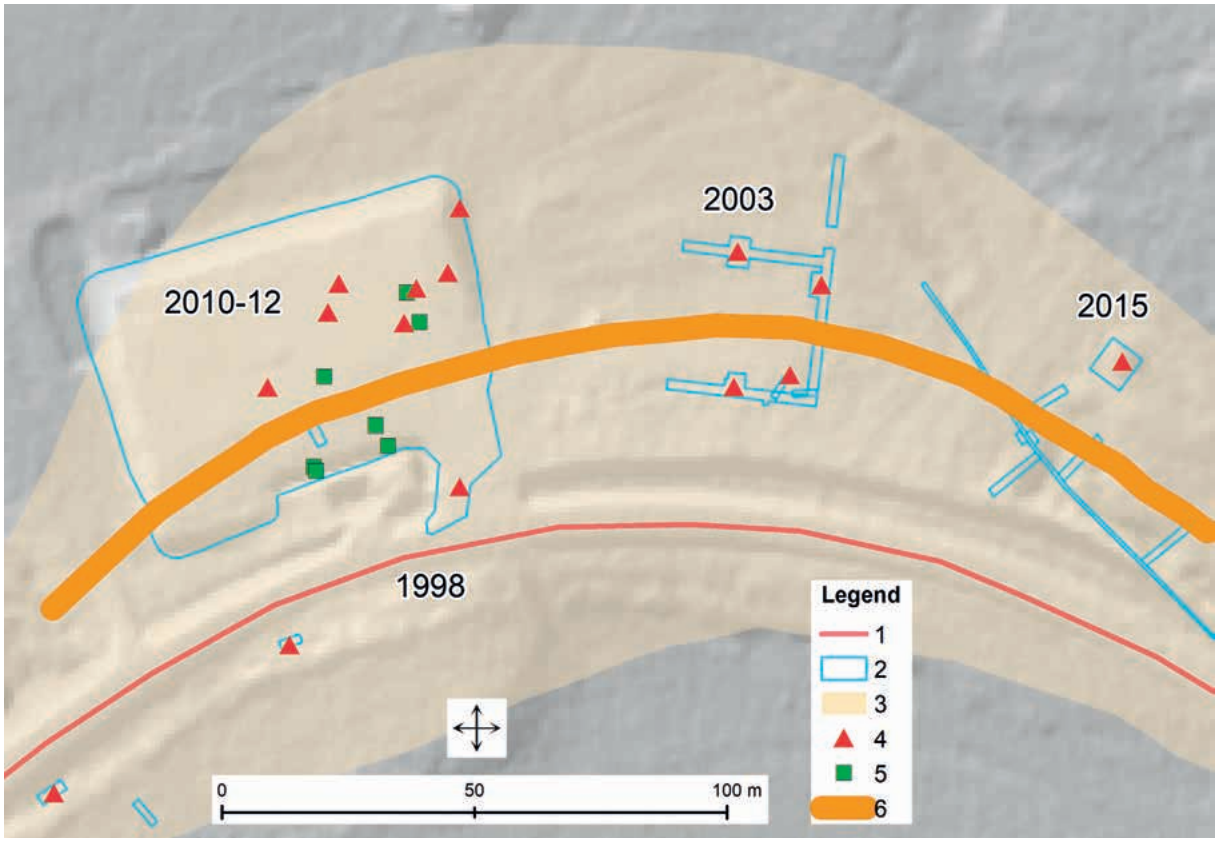


FIG. 40 | Relation of the residential units in the settlement to the hypothetical road running through the Trapíkov dune towards the central part of the Mikulčice-Valy agglomeration. Legend: 1 – present-day road, 2 – excavated areas, 3 – estimated extent of the Trapíkov sand dune, 4 – 9th-century dwellings, 5 – 9th-century graves, 6 – hypothetical course of the road towards the centre of the agglomeration.

helixes on the BCG vessels and the use of templates for finishing the necks and the inside of the rims in the MCG pottery were a matter of technology (read more below).

When describing pottery features, one can hardly avoid subjectivity when classifying their various expressions on particular vessels into the types of features mentioned above (which had already been affected with a certain degree of subjectivity). Similarly, some features, such as fabric or firing, are almost impossible to ascertain. Thus, we must admit that a certain degree of subjectivity is inherent in archaeological work, simply because of the nature of archaeological artefacts, which are produced by individuals, and that we must deal with it – for instance, by assessing assemblages with large numbers of artefacts and thus eliminating spurious subjective features.

MORPHOLOGY

Rims

The rim – and its edge – is undoubtedly the most typical pottery feature of the MCG vessels. Apart from the groove in the rim edge, which is the most conspicuous at first sight, there is the relatively high rim and its edge with the use of templates. Another frequently mentioned typical feature of the MCG pottery is the everted rims. As with the seemingly omnipresent grooved rim edge, which we elaborate on later, it is not always present.

Several steps in the pottery-making process can be noticed around the rim, especially in the MCG pottery; some are preparatory and were later covered by finishing: for instance, rim cutting followed by grooving. The number of these steps differs although they do not determine the quality of craftsmanship. The question of whether the use of a particular number of steps was a potter's signature way of shaping vessels, their production know-how or a matter of a momentary inspiration applied on a particular vessel, will probably remain unanswered. The wide range of the combinations of these steps with other pottery features mostly attests to the second option.

Two rim features are assessed in the MCG pottery: **rim edge finishing** and **rim shape** (from the neck to the rim edge).

Rim edge finishing (REF)

Whenever a rim edge was finished – which is the case in almost all Great Moravian settlement pottery – the description systems mention the type of cutting of the rim, i.e. the angle of the cut in relation to the horizontal plane of a standing vessel: horizontal,

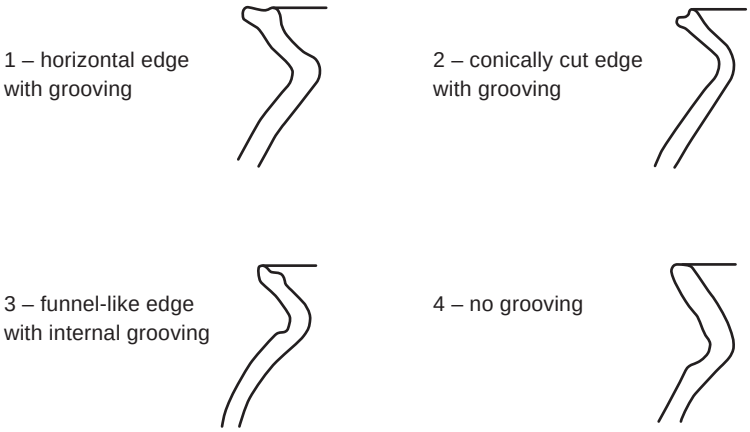


FIG. 41 | Schematic description of the rim edge finishing characteristics for MCG pottery (after MAZUCH 2013).

conical or funnel. Usually, the cut was perpendicular to the rim, and thus the angle was determined by the extent to which the rim was inturned or everted. Some rims were obviously not cut before grooving – the groove was made into a naturally rounded rim. Thus, if we take the rim as the axis, most of the finishing (cut, grooving) will be perpendicular to it.

There were many different types of typical grooving – from subtle, merely indicated,[22] to pronounced – sometimes made by slitting the fabric, which then partially closed back again, thus resembling a cleft rather than a groove.

We can now introduce an important finding based on the study of a large number of pottery fragments categorised as MCG from Mikulčice: there is a large group of vessels that show unambiguous traits of the MCG pottery (different numbers and combinations of rims, decoration, fabric and technology), but lack the single most typical feature of the MCG pottery – a rim finished with a groove. However, this finding clearly shows that even these vessels need to be included in the MCG pottery. In quantitative evaluations, for instance, a good knowledge of the MCG pottery allows one to notice these rims and classify them as MCG pottery even if they had been broken off as high as at the neck.

In the descriptive code for the **rim edge finishing**, the assessed rims can have the following codes (FIG. 41):

- rim edge finishing: grooved, horizontal – code **1**
- rim edge finishing: grooved, inclined, conical – code **2**
- rim edge finishing: grooved, inverted, inclined – code **3**
- rim edge finishing: not grooved or subtly grooved, horizontal – code **N1**
- rim edge finishing: not grooved or subtly grooved, everted – code **N2**
- No N variant with the rim inverted askew has been found in the material although it is theoretically possible; if it was found, it would have been coded **N3**.

Rim shape (RS)

In the MCG pottery, it is possible to evaluate the bending of the rim and the way its surface was finished on the inside and outside. The typical feature of this pottery, which is almost always present to a certain extent, is the thinning of the entire wall of the rim. This thinning occurred on the outside and the inside (usually both) and was achieved using either a finger or, more probably, a template. This is what resulted in the typically extended rim edge (as opposed to the rest of the rim). When a more significant modification was made to the outer or inner side of the rim – or both – using a template, the material of the rim was reduced so significantly that it formed a type of false transition under the neck. When such an angle is present on a vessel, it is formally described (in an attempt to capture the extent to which it is typical of the MCG pottery).

In the description system, the type of rim (**Rim, shape and angle**) comprises two features – **rim shape and rim angle** (outside/inside/both sides):

Rim shape (FIG. 42)

- chalice-like bend (including subtly bent rims) – code **1**
- straight (inclined or everted) – code **2**

Rim angle

- angle outside – **zero "0"** following the rim shape code
- angle inside – **double zero "00"** following the rim shape code
- angle on both sides – **triple zero "000"** following the rim shape code

The rim codes can thus have the values of 1 or 2 (in the absence of an angle); 10, 100 or 1000 (everted, chalice-shaped, with various types of transitions); 20, 200 or 2000 (straight, direct or askew everted rim with various types of transition). The profiling of the

22 When the groove is only subtle, there might be a problem with drawings for publication purposes if the artist was not instructed that the groove must be included in the drawing. Sometimes, archaeologists do not convey this information and the rim profile is not included in publications, which prevents the readers from noticing the presence of this pottery group.

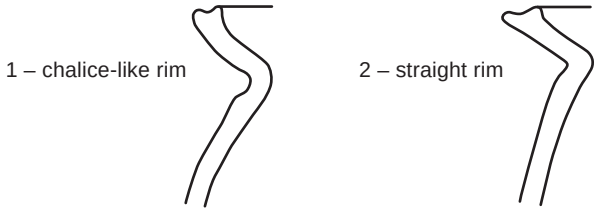


FIG. 42 | Schematic description of the rim shape characteristics for MCG pottery.

outer and inner sides of the rims, which is reflected by the transitions mentioned above, leads to the typical fragmentation of the MCG vessels. A large part of the rims in this group has been broken off precisely in the narrowest point of the vessel – at the angle between the neck and rim.

The MCG rims are typically tall (as much as 3 cm from the neck to the rim edge). Lower (shorter) rims – 2 cm and less – are marked A (as "affirmative") in the MCG description system in the **Low rim** column.

Decoration (D)

This feature of the MCG pottery is described by a code in the Decoration column, which comprises the following components (in the following order): the type of **implement** used, **decoration** type, **distinction of a complete decorative motif as opposed to a partially preserved motif** on the evaluated fragment, **the height and angle of the waves** and **the overlapping of the decorative elements**.

Type of engraving implement:
- **combing** – code **1**
- **combined** engraving – code **2**
- engraving with **simple engraver** – code **3**

Decoration type – variants depicted on in FIG. 43
No other decorative motif than those depicted was found in the course of our long-standing research of the MCG pottery (there is a complete absence of such features as inclined notches, decoration of the inner side of the rim, and – except for a single case – plastic horizontal strips).

In **small fragments**, where it was unclear how the decorative motif continued under the rim, a combination of two codes was used (**AB** or **CD**). Because, for the reasons given above, only fragments of rims were used to ascertain the typology of the MCG pottery, there was no need for the coding of the bottom parts of the body, as is the case in the description code of the decoration of the BCG pottery (see Chapter 7.2.2.2).

In case the decoration type could not be precisely identified (for instance, A1, A2 or A3), the suffix **n** ("something follows") was added to the decoration description code. A code without the suffix **n** denotes complete decorative motifs. Any exceptional cases in decoration are coded as **Y** and expanded on in the **Notes** column similar to the rims.

Height, angle and overlapping of combed waves
The MCG pottery is typical for its mellow combed waves, unlike the MCG pottery with its high waves (see below), which is why high combed waves are always coded in the Decoration column. The combed waves where the height of the arc is somewhat larger than its width are coded as **h** (higher). When this denotation is absent, it is a case of a low, mild combed wave. Extremely low and irregularly carved combed waves are described in the respective **Notes** column.

Wave angle
Because the vessels also contain waves that are inclined to the left or right, this feature is also described by a code (as in BCG).
- **left tilt** – code **l**
- **right tilt** – code **p**
- a straight wave, approximately perpendicular to the plane of the vessel's base, is not coded

Overlapping of motifs
In cases where the decorative motifs overlap (a combed wave over a strip or two combed waves) is coded as **x** in the **Decoration** column (as in BCG).

Shape (S)

In the case of the Great Moravian pottery, the shape of the vessels is probably the least defining pottery feature of all, even though it does show certain typicality. Typologically, the MCG and BCG vessels basically include only pots;[23] further classification and terminology of these have been published extensively, even though it includes many contradictory opinions.

Based on our long-standing research into Great Moravian pottery, it appears that the best model for distinguishing the vessel shapes is one that detects the basic features, which could reflect the practical use of the vessels in a living culture. More significant differences in the shape and size of the pots were, in our opinion, mostly caused by the purpose for which they were made. Logically, cooking vessels should have a significantly wider neck than vessels for storing loose or liquid foodstuffs. A wider neck broadens the handling perimeter and allows better access to the food preparation process – the diameter of the vessel is not that important in this case – while a narrow neck is advantageous for the storage of liquids. The same holds for different vessel sizes

23 The excavations at the Mikulčice stronghold unearthed the fragments of a single bowl decorated with motifs resembling the Blučina ones, and no MCG pottery at all. No use of the MCG or BCG pottery traits on a different type of vessel has been published either.

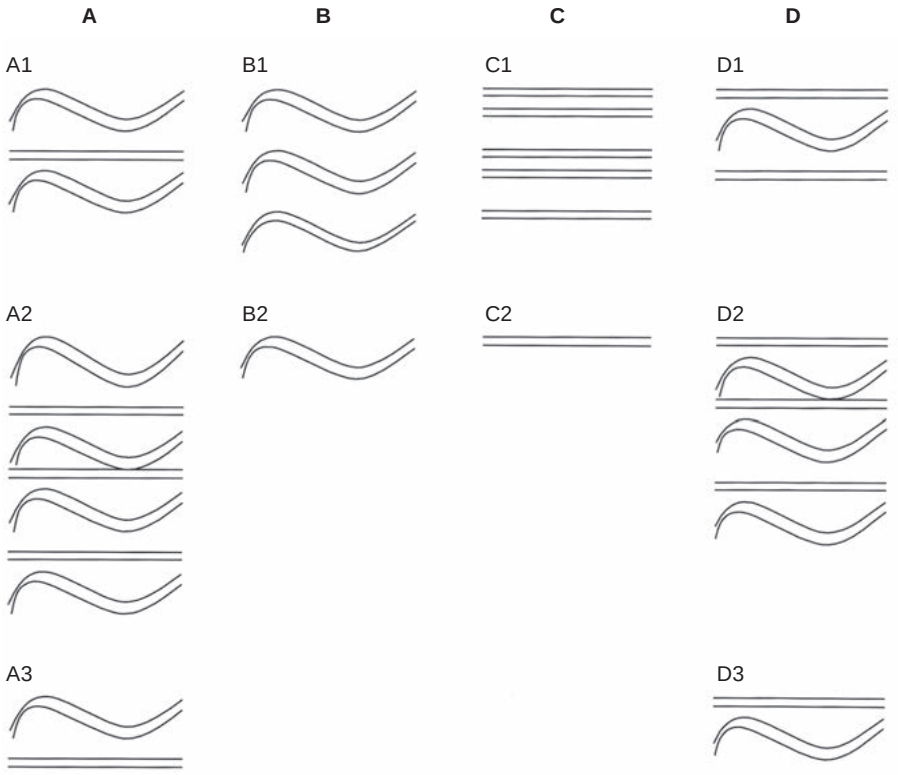


FIG. 43 | Schematic description of the pottery decoration characteristics for MCG pottery (after MAZUCH 2013).

as this is a purely practical matter. Even today, it is commonplace that kitchens are equipped with a wide assortment of pots and kitchenware with different volumes that cater for different requirements for food preparation, and especially the amount of cooked or stored foodstuffs. From time to time, archaeologists have attempted to determine the exact volumes of vessels, while even many people today do not know the precise volumes of the pots we use daily – it takes only a little practice to choose a pot or another vessel of the right size. The idea that someone in the Middle Ages chose their cooking vessels based on their exact volume – or even measures adopted from the ancient world – seems rather anachronistic.

For these reasons, when assessing the **shape differences** and proportions of the MCG (and BCG) vessels, we consider **only two basic features**: the **position of the largest diameter on the body** (**feature A**) and the **neck diameter** (**feature B**). However, we do not measure these parameters and do not calculate length-width-height indexes – we merely visually compare the proportions of a vessel (disregarding absolute dimensions and taking into account the relative ones – that is the proportions of a certain feature to the others or the overall construction of the vessel).

Feature A – the position of the largest diameter on the body relative to the height of the vessel; in a two-digit code for the shape, this feature comes first

- **code 1** – pots with the largest diameter situated roughly in the upper third of the vessel's height – "situla shape"
- **code 2** – pots with the largest diameter lower than in variant 1, around the middle of the vessel's height or above it. Variant 2 includes barrel-shaped vessels – those with a prolonged widest part with a centre around the mid-height of the vessel height, measured from the bottom to the neck

Feature B – in theory, it differentiates storage vessels from cooking vessels; the diameter of the neck in relation to the overall proportions, particularly the diameter of the largest diameter and the diameter of the base; in the two-digit code for the shape, this feature comes second and has the value of 1 or 2.

- **code 1** – the diameter of the neck is almost equal to the diameter of the base; there is a significant increase in width towards the largest part of the vessel and the neck is significantly smaller than the largest diameter)
- **code 2** – the diameter of the neck is relatively large compared to the other proportions of the vessel; almost as large as the largest diameter

The shapes of the pots can thus be described and classified using a simple combination of two variants of the two features, comprising a two-digit numerical code, in which the first digit describes feature A and the second digit feature B. **The types are thus described in the Shape column by codes 11, 12, 21 or 22**. Although it is a mere database entry, the code enables us to obtain a basic idea of their overall shape. In the fragmentary material from the settlement, it is only possible to evaluate this

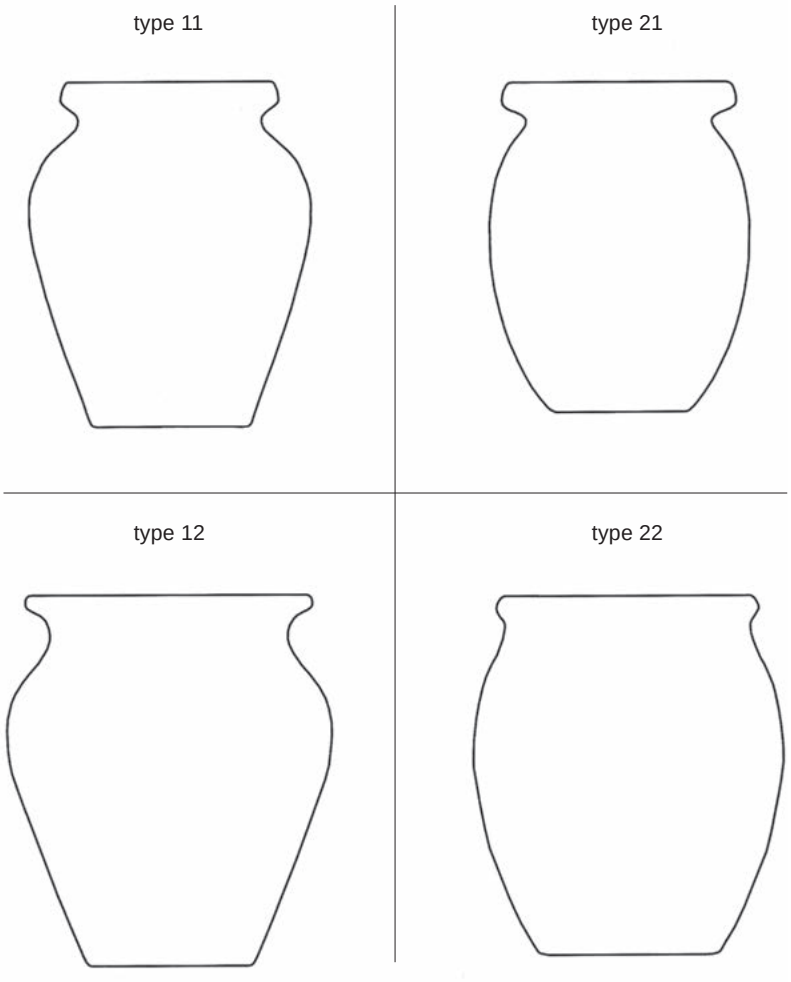


FIG. 44 | Schematic description of the pottery shape characteristics for MCG and BCG pottery (after MAZUCH 2013).

feature in fragments that cover at least part of a vessel, which enables to at least determine a trend in the overall profile, and therefore both the features, A and B. Unfortunately, the shape cannot be determined in most of the sherds, and thus are assigned the **code zero – "0"**).

Accordingly, the shape types take the following forms (FIG. 44):
In unclear cases, where the vessels are difficult to assign to a certain shape type, one cannot avoid subjectification. However, subjective assessment is also present in the exact methods of determining vessel shape groups because eventually, it is necessary to draw a line between individual types that had been designed based on measurement. Regardless, our experience with the assessment of the Great Moravian pottery shows that there is a minimum of unclear cases, where there is serious doubt as to whether it is a case of variant 1 or 2 of the B feature, although some theoretical difficulty can be assumed here.

Vessel size (VS)

As mentioned in the introduction to the description of the vessel shape, size does not appear to be a significant characteristic of clay vessels. There is a peculiar observation concerning the material from the Mikulčice settlement. There is a significantly small number of vessels with a rim diameter of 15–20 cm: three times less of those have been found than vessels with a diameter of 10–15 cm and five times less than vessels with a diameter of 20–25 cm. Even vessels with a rim diameter of 25–30 cm are about three times as numerous as those with the rim 15–20 cm wide. The question is whether it was a choice of the potters who reflected the needs of the homemakers, or whether this concerned the function of the vessels (drinking from vessels with a diameter smaller than 15 cm and food preparation in significantly larger vessels, 20–25 cm in diameter and more), or whether it is a reflection of a technological aspect of vessel production that has not yet been identified.

To get a clear picture of the character of the MCG and BCG vessels, we have simplified their size typology with an emphasis on the quantitative gap between the diameters of 15 and 20 cm:

› **small vessels** with a diameter of up to 15 cm. Logically, the height of the vessels is directly proportionate to their width, which is why the expected height of these pots is 15–20 cm, based on experience. These are more typical for burial grounds. They are coded **S** in the **Size** column in the table

- **medium** – predominant, with rim diameters from 15 to 25 cm (and the corresponding height around 20–35 cm) – code **M** in the **Size** column
- **large to giant** (probably always settlement vessels) – code **LG**, rim diameters start at 25–30 cm, but there are also giant specimens with the rim diameter of 30–40 cm

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Fabric (F)

The assessment of fabric in Great Moravian pottery, which was made from clayey riparian sediments, is highly subjective. While in some regions, fabric type is the main feature based on which the pottery groups are ascertained, in the Moravian floodplain strongholds, such as Mikulčice and Pohansko near Břeclav, the composition of the fabric is not hugely significant. Fabric does not allow to distinguish between pottery types from a single site, or even dating. Similarly problematic is the assessment of the type and quality of firing (see the polemic in Macháček 2001, 225). Although the type of firing (reduction vs oxidation) is important to ascertain, in our opinion, it is not essential in pottery typology. However, what is essential is whether – and how – the different ways of firing are reflected on the vessels and their sherds. The existing contradictory opinions concerning this issue, illustrate our hypothesis that we have not been able to identify these ancient techniques based on the final product – excavated pottery.

Eventually, macroscopic classification always depends on the colour of the sherd, which in turn, is a combination of the fabric used, the firing method, the way the ceramic product is used and the extent and form of the post-deposition processes. Although the colour is usually considered somewhat problematic due to the notorious problem with shade recognition, it is colour that paradoxically plays a key role in the distinction of the two pottery groups presented in this work. While black-grey to grey-black is typical of BCG, the MCG vessels are usually light ochre to grey with orange or orange and red spots. The firing of BCG, regardless of the method actually used, appears to have resulted in harder, more compact ceramics than those in MCG (read more in the assessment of the material types of BCG). The fabrics of the two groups can be distinguished rather well, even in small fragments.

Based on the above, we distinguish two features in the feature denoted **Fabric**:

Feature A – fabric composition – the first of the two digits of the code – has one of the following values:

- fine fabric with a low content of mica, smooth surface – code **1**
- granulated surface, sandy temper contains stones with a diameter under 1 mm – code **2**
- coarse fabric, temper with large particles – code **3**

Feature B – colour of the surface – second of the two digits of the Fabric code – can have the following values:

- light beige to grey-brown shades with pink to orange spots – code **1**
- black-grey to grey-black (close to the colour of BCG) – code **2**
- light grey (mostly secondarily fired ceramics) – code **3**

Thus, this feature, which is coded in the **Fabric** column, can theoretically have the following values: **11, 12, 13, 21, 22, 23, 31, 32, 33.**

Sherds damaged on the surface were mostly deposited at low altitudes, which were regularly found under the surface of groundwater or in permeable soils (which is the case of the sandy bottom layer at Trapíkov). This type of fabric cannot often be assessed – thus code **zero, "0"**; such waterlogged sherds with an "infused" surface appear macroscopically coarser (because the finer particles have been extracted by water). A **specific type of fabric**, which does not fall under the established features, might bear the **code Y**, as in the previous pottery features.

Traces of technology on the inside of the vessel

The MCG pottery has the inside of the walls finished, unlike BCG, where such finishing is almost absent – and thus not monitored and coded. Three features are coded in the description table in the **Inside Finishing** (**IF**) column. These consist of two digits and a letter:

Feature A – traces of tools used for the finishing, the first digit of the two-digit code, which can have the following values:

- unworked **wooden stick** (**wide, deep and pronounced grooves**) – code **1**
- **grooves** left by rough shaping with fingers – code **2**
- **fine, but distinct grooves made by pads of the fingers** or a soft material able to make such traces (possibly textile or leather) – code **3**
- **round dimples** after fingertips (often below the rim) – code **4** (no feature B)

Feature B – direction of final touches, first of two digits, have the following values:

- **vertical** – code **1**
- **inclined** – code **2**
- **horizontal** – code **3**
- **horizontal** (**grooves with irregular overlaps**) – code **4**

Feature C – finishing coverage, from the neck to the base, the letter after the two-digit number

- all over the vessel or more than half the vessel – code W
- only under the neck (or less than half the vessel) – code H

If no verifiable traces were found on the vessel (and there is a sufficiently high fragment available) – code zero, "**0**".

Where it was **impossible to determine** whether there were **traces of finishing on the inside** of the vessel (in small, low fragments, sherds broken off immediately below the neck or waterlogged fragments), code **N** was used. The code **N** was also used after **code H** (traces under the neck or covering less than half the vessel) in cases where the fragment was broken off in a way that did not allow to determine whether the finishing of the inside wall continued below the middle of the vessel or whether it ends under the neck.

Technological level (TL)

The widely adopted opinion that Great Moravian pottery was made on a hand-powered wheel (which probably had different variants and speeds) using the technique of turning semi-finished pots by layering clay coils and finishing them with templates (especially on the outside of the upper parts of the vessels), is no longer sustainable in the case of MCG and BCG. There are no traces of the imperfect joining of the clay coils on the inside of the vessels, which would document the use of this method. The vessels have relatively thin walls of regular thickness, which are perfectly finished both inside and outside. A single joint is sometimes visible in some of the BCG vessels at the largest diameter, at which point they bend significantly toward the neck. The bases are also perfectly shaped, even at the transitions to the body where the temper grains are visibly pulled diagonally upwards, which is completely contrary to the use of the passive treatment of walls primarily made from coils.

In the Early Middle Ages, a time of an emerging state with power centres, i.e. fortified settlements, and local and long-distance trade, we expect great differences in the quality of crafts in these centres and their hinterland or peripheries. The skills of the potters from the specialised workshops, probably situated directly at these central strongholds, were likely advanced, greatly exceeding the skills, possibilities and knowledge of the progressive technologies of vessel production by the individual potters from the rural environment. Tools and equipment, including potter's wheels, were probably much better in the workshops in the strongholds. Although one hand is always used for spinning the hand-powered wheel, it is not always the case. With a wheel with a construction supporting a certain degree of inertia, a potter was able to use the other hand to also form a vessel. If we admit the existence of pottery workshops, we can reasonably assume that more potters and their helpers worked here. This allows us to assume that the potter could work with both hands, while the helper turned the worktop.

In our opinion, the pottery in both the Great Moravian groups was made by "kneading", which was practically tested and described by V. Štajnochr (1998) in his seminal article addressing this issue. His experiments show that the quality of pottery does not directly depend on the speed of the potter's wheel. To produce pottery with the qualities of the MCG and BCG vessels, it is important to ensure merely continuous or at least prolonged, rotation combined with suitable technique, such as the "analogue kneading" using the repetitive short-term use of both hands. This technology appears to be attested by the regularity and relatively thin walls of the vessels, the traces of pulling or squeezing the fabric upwards and the occasional untreated joints on the inside of the vessel at the greatest diameter, which might indicate the use of a new ceramic fabric load. The final product could then be further surface-treated in various ways and decorated after partial hardening.

Three codes, **1-3,** were introduced to describe the **overall technological level** of MCG (as well as BCG). This is an auxiliary, largely subjective division based on the evaluation of all the monitored pottery features. These levels are an internal qualitative division of the individual groups that cannot be compared, even though globally, similar criteria are considered. The qualitative grade 1 describes vessels with perfectly finished rims, regular decoration, regular body shape and good firing. In this case, the subjective aesthetics of any feature cannot be favoured, for instance, a chalice-like everted rim cannot be graded better than a straight one. Grade 2 describes a standard quality vessel, while grade 3 describes pottery, which can be denoted as "derivative" of a certain group. In grade 3, some of the easily imitable features are preserved, although only roughly (such as artlessly imitated rims, thick walls, disproportionate shape of the vessels), while others are completely botched (mishandled rim edge finishing – where templates were used in technologically advanced pieces, maintaining a basic decoration scheme, but using heavily artless engraved decoration, etc.). Earlier quantifications have shown that the lowest grade, 3, is much more common in pottery from graves than those from the settlement (see Mazuch 2013, 52).

7.2.2.2 Description of Pottery Features in the BCG Pottery from Trapíkov

The description of larger BCG pieces, which can be typologically evaluated, consists of the following codes: **decoration** (type, wave angle, overlapping of decorative elements – see below), **direction of** the **rotation** of the vessel during the engraving of decoration, **rim type**, vessel **shape type, size**, **presence of marks** on the base, **fabric** and technological level (see description of pottery features and fig. 56 with the coded description of larger BCG specimens).

Decoration – BCG

While in the MCG pottery, the most defining feature is the rim, in the BCG pottery it is decoration.

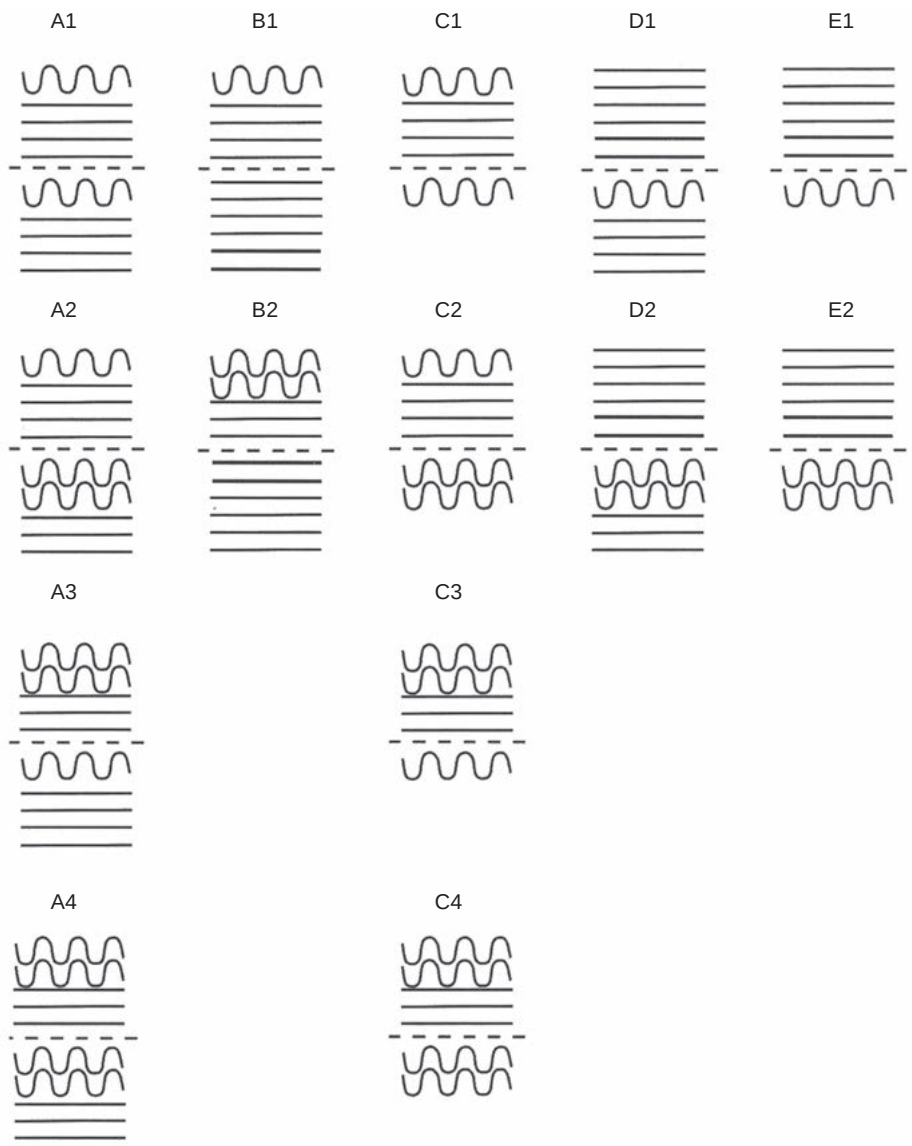

FIG. 45 | Schematic description of the pottery decoration characteristics for BCG pottery (after MAZUCH 2013).

The basic decorative feature of the BCG vessels is the use of a simple engraver – not a comb – and the combination of two decorative motifs – a simple engraved wave with a simple engraved helix – a line with horizontal revolutions (which never takes the form of joined parallel horizontal circles). The waves can be both very steep and very low/mild although the latter is rare), and sometimes both width and height change within a single decorative band. The upper wave below the neck is usually much smaller than the bottom wave. Individual decorative motifs often overlap: a higher band is overlaid by the one below it, which suggests that the potters usually decorated the vessels from the top down. However, there are also vessels on which a wave was engraved over two helixes as well as cases of waves engraved directly across a helix.

In the most proficiently made BCG vessels, the helix is turned absolutely regularly, with small spacing between the revolutions, which never overlap (this does not apply to technologically poorer vessels) and the waves are engraved in a regular rhythm, which assumes considerably skilled craftsmanship). The spacing between the revolutions of the helix usually increases toward the bottom of the vessels.

If there is an **overlapping** of individual decorative motifs, the letter **x** appears in the code in the Decoration column – even if two waves engraved under each other overlap.

When the **arcs** of the waves are as wide as high – or wider – they are considered **low/mild** (they are not the typical high waves) and are marked with an **asterisk**, **"*"**, in the coded description.

The waves are often tilted, sometimes even flipped to one side or the other. **The angle of the wavy lines is coded in the same way as the combed waves in the MCG.** However, there are cases where the upper wave is tilted to one side and the bottom

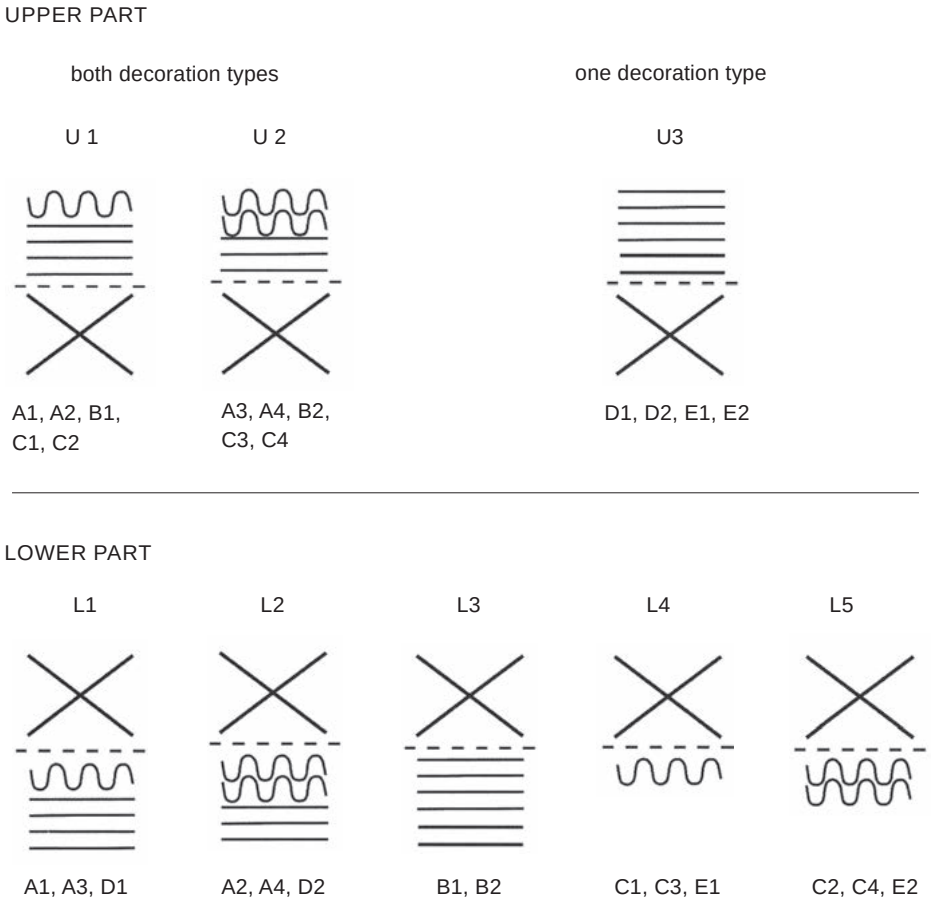

FIG. 46 | Schematic description of the decoration characteristics on small fragments of BCG pottery (after MAZUCH 2013).

one to the opposite side. In such cases, the vessel is described with both the codes, i.e. **lr**.

An important feature characterising the BCG vessels is decoration covering two-thirds of the height and sometimes even the entire surface of the vessel that is more than a half of the height, taken from the neck to the base – with some exceptions, of course. Unfortunately, this has always significantly affected the statistical comparison of the frequency of the BCG pottery finds and other material from various settlements – simply because there will always be much more "typical" (mostly decorated) body sherds than other pottery without decoration.

Since there is always at least one helix on each of the BCG vessels, we can observe one more interesting phenomenon related to the production process of the vessels – namely **the direction in which the helices were made, based on the start of their engraving**. Logically, the vessels could be rotated in two directions – clockwise (code **l**) or counterclockwise (code **r**) – in the column denoted **Spin**.

The number of waves and the order of individual decorative motifs typical of the BCG pottery varies. To describe all the possibilities, a code was created based on the finds of complete vessels and their "typical" decoration (from the rim down): a wave – a helix/a wave – a helix, which is a scheme designed and first published by J. POULÍK (1948) who singled out the Blučina Ceramic Group.

If we take this scheme and notionally divide a vessel into two halves above the bottom wave (upper part – H, lower part – S), there are only five theoretical combinations possible. These combinations, more precisely decorative schemes, are therefore the most common types of decoration of this ceramic group (described from the rim to the bottom; see the diagrams in FIG. 45.

This coding is suitable for the description and classification of whole vessels or fragments that cover most of the profile in such a way that there is no doubt about the type of decoration. However, different categories must be introduced for smaller sherds. Small ceramic fragments and sherds from certain parts (especially from around the notional horizontal border between the upper and lower parts) cannot be classified for decoration at all. On the other hand, in fragments that clearly come from the uppermost parts of the vessels (ideally from the neck or the point where the eversion or inturn of the rim begins), where the order of the decorative motifs on the upper part can be identified, or from the area around the largest diameter and below, where the decoration on the bottom half of the vessel can be identified, the coding depicted in FIG. 46 should be used.

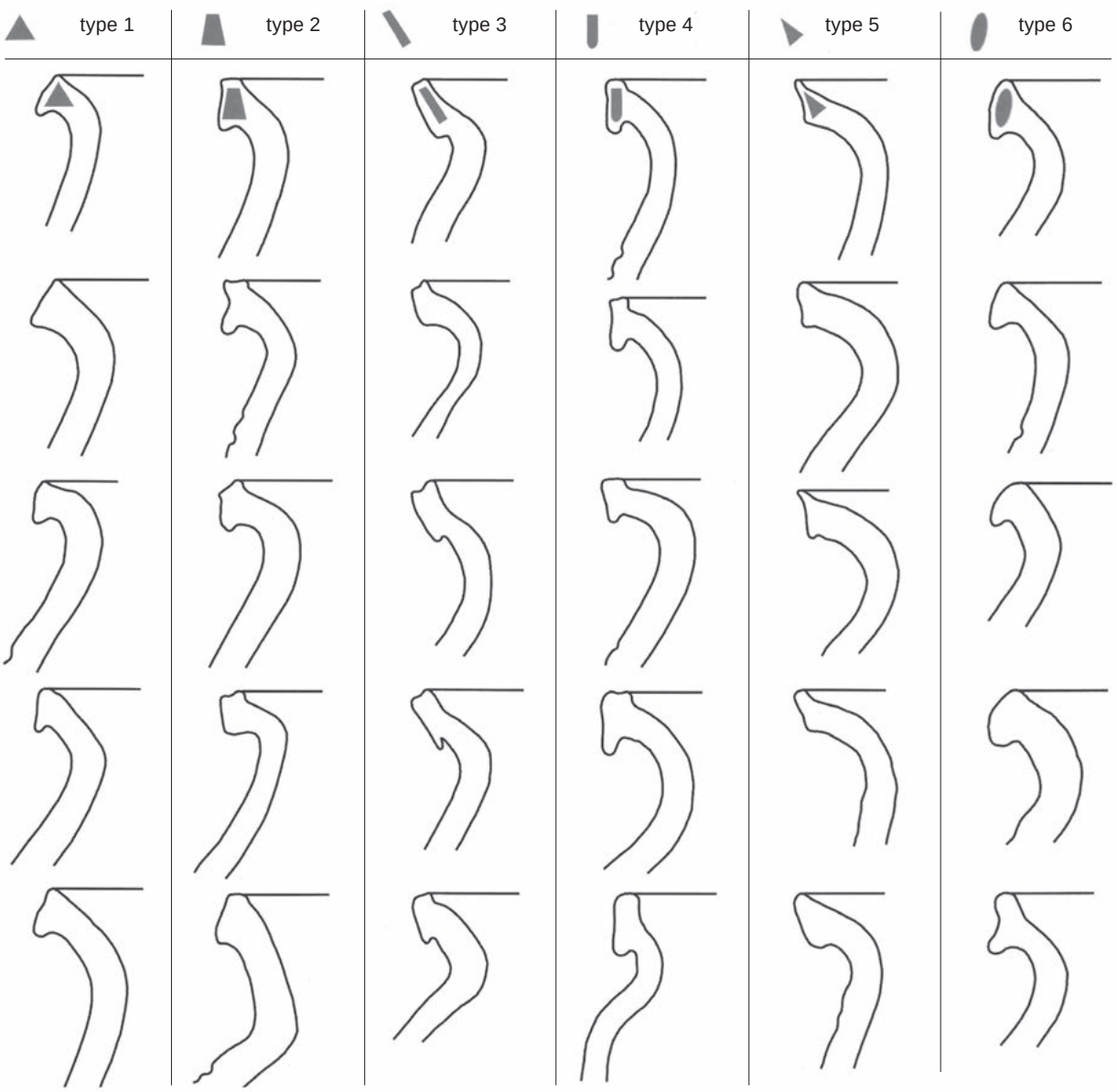

FIG. 47 | Schematic description of the rim characteristics for BCG pottery (after MAZUCH 2013).

The information value of sherds, which can be described by these codes (and thus the information value of the codes used in pottery processing), is necessarily smaller than the information value of whole vessels and fragments, which can be mechanically assigned to entire decorative types A to E.

Rim

We understand the evaluation of the rims on the BCG vessels as recognising the basic tendency of the shape (profile) of the rim edge, with no special consideration for minor differences in the shapes of the outer and inner profiles of the rims or differences caused by large or small bending of the **entire** rim from the neck, which was probably caused by unintentional deflection of the tools the potter used for rim profiling and finishing. It is therefore the basic type of rim edge, which reflects the actual intention of the potter to create this particular rim. If we kept monitoring small details, this would result in a huge number of rim variants, which would have to be individually described or drawn. This would be complicated and would ultimately force us to generalise, highlighting some of the fundamental common features. This might lead to establishing groups whose individual representatives might not have a common origin – technologically and from the point of view of the initial intent.

In most cases, the rims of the BCG pottery have everted necks (for terminology, see ideally PAVLŮ 1971, 31), i.e. a smooth S-shaped transition between the body, neck and the entire rim (no chalice-like rims, no angle on the body or neck, and no strongly everted parts). Thus, their description is basically about determining the types **of rim edge finishing**.

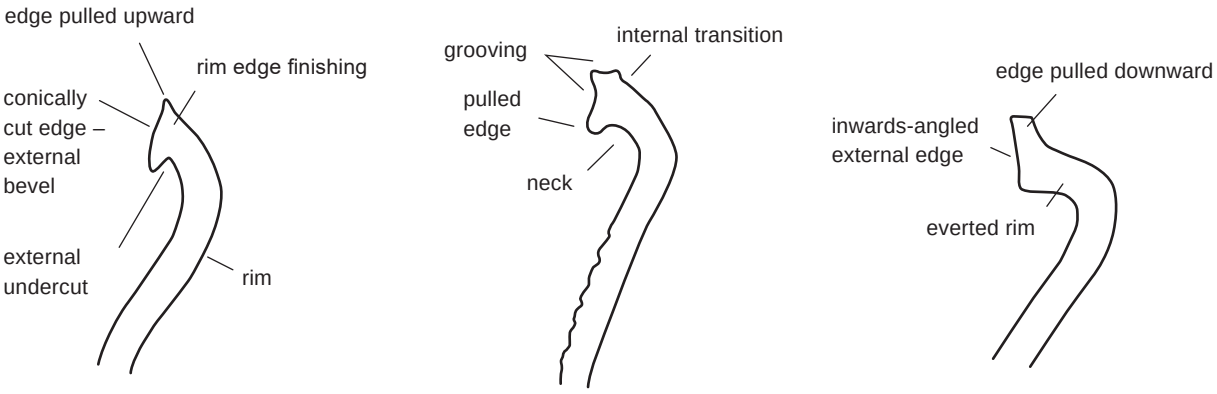

FIG. 48 | Terminology scheme for the description of BCG rims (after MAZUCH 2013).

Based on the study of the BCG pottery from Mikulčice, the six most common types of rim edge finishing were defined (we continue to use the shortened term "rim", although it is not terminologically correct), which are present on vessels bearing other features typical for BCG, as they have been introduced in this chapter. All these types, coded with numbers 1 to 6 in the description column **Rim**, have complicated profiles, which indicates a thorough execution by someone who mastered the technology (for the description scheme of the rims, see FIG. 47; for description terminology, see FIG. 48).

The "traditional" rim types (VÁŇA 1968, 136–138; DOSTÁL 1975, 151) or more appropriately rims with "simple profiles" (PAVLŮ 1971, 31) – that is everted rims that are simply rounded or shaped cylindrically, conically or into a funnel, are intentionally excluded. Among the excluded rims are those without any further finishing, such as the pulling of edges, grooving and transitions (for terminology, see FIG. 48). All the excluded rims, along with others, which **do not fit the six basic rim types,** are coded **Y** in the **Rim** column.

Shape and size of the vessels

In BCG, the descriptors of these pottery features are completely identical with the definition in the description of pottery features of the MCG vessels (see Chapter 7.2.2.1)

TECHNOLOGY

Fabric

There are four types of fabric distinguished in the BCG vessels from the Mikulčice stronghold. However, assigning the pottery fragments to these groups was very difficult, as the boundaries between them were rather unclear.

Type 1

- **clayey fabric** with relatively fine temper consisting of small stones, subjectively soft, with "greasy" touch
- sandy **surface**
- grey-black to black-grey **colour**, occasional orange to orange-red spots

Type 1a

- **fabric** same as type 1
- smooth, matte metallic **surface**
- **colour** same as type 1

Type 2

- **fabric** heavily tempered with sand, with fine mica admixture, rough "dry" touch
- smooth **surface**
- **colour**: shades of brown to black-brown

Type 3

- partly sandy **fabric** with an admixture of larger stones (1 mm in diameter, sometimes more), much harder touch compared to type 1 (harder firing)
- sandy **surface**
- **colour**: shades of grey, often orange to orange-red on the surface; in this type, it is obvious that the colour mostly reflects firing (the "sandwich" phenomenon in the cross-section)

Type 4

- clayey **fabric**
- **colour**: shades of brown
- smooth **surface**

The codes for **devalued surface** and **untypical fabric** composition are the same as for the MCG: **zero, "0"** and **Y**, respectively.

Technological level

Technologically, the process of making the BCG vessels was the same as in MCG (for more detail, see the previous chapter). The same three quality grades as in MCG – 1 to 3 – were used to describe the technological level of the BCG vessels.

7.2.2.3 Analysis of the Features of the MCG and BCG Pottery Assemblage from Mikulčice-Valy and Neighbouring Burial Grounds

MCG POTTERY

As with MCG pottery from Mikulčice-Trapíkov, we were able to perform a detailed analysis of pottery features using the description key presented in the previous chapter in a total of 31 pottery samples in which most of the features could be identified (see description table in FIG. 49; the asterisk (*) means the remaining part is unknown because of fragmentation). It is not a very large sample; however, even long-lasting excavations of the Mikulčice stronghold did not yield many more pottery specimens suitable for an overall typological assessment. A total of 172 specimens were analysed (MAZUCH 2013, 61–67). There is a comparative assemblage with 82 funerary pottery specimens yielded by the excavations of the burial grounds in the hinterland and wider surroundings of the Mikulčice stronghold (rural cemeteries Mikulčice-Panské, Čejč–Za hřbitovem, Prušánky-Podsedky I and II, Nechvalín I and II and Josefov-Záhumenica) (MAZUCH *ibid*.). We will now compare these three assemblages, taking each pottery feature – and its properties – at a time. Considering the number of specimens in the assemblages, we are aware that any similarities and/or differences are barely statistically conclusive; however, they can point to certain tendencies. In the future, we might be able to follow up with an analysis of modern (documented and stratified) excavations conducted at different sites of the stronghold or much-needed excavations of the rural settlements in its hinterland.

The properties of the MCG vessels – which are based on an analysis of pottery features of the settlement vessels from the centre (i.e. the Mikulčice-Valy stronghold) – can be now compared with the results from Trapíkov. An overview of the representation of each type or the properties of the pottery features is in the tables in FIG. 50 to 55. Only features that showed significant differences in the three assessed assemblages are mentioned in the following text.

Rim (FIG. 50)

The rims – the part from the neck to the edge – of the MCG vessels are generally quite high and significantly everted. Low rims are rare in the settlement material (8% of all rims), but make up a quarter of grave finds, and as much as a third (34%) of the vessels from Trapíkov. This is definitely linked with the higher number of finds of small vessels on burial sites (55% versus 15% of settlement finds), the dimensions of which are naturally smaller considering their overall size. Regardless, low rims are very likely linked to technologically less-advanced vessels. In the analysed vessels from three assemblages, low rims were found in 2 of the 99 vessels rated as quality grade 1, which is a mere 2%. The difference mentioned above can thus be another manifestation of functional social differences between the centre and the peripheral zone of the agglomeration.

A relatively typical distinctive feature of the MCG pottery is rim finishing that uses templates – outside, inside or on both sides of the wall. More forceful template finishing causes transitions (edges) under the neck or inside the rim. Such transitions are present on more than half of all the vessels (on 55% of the settlement pottery from the Mikulčice centre and 61% from Trapíkov, and somewhat less, 47%, on funerary pottery from the hinterland and wider surroundings). A transition on the outside (code 10, 20, or *0, for more details, see below) is clearly the most common use of the margin template. It is not surprising that the surface finishing of vessels is easier done on the outside than on the inside, surely for aesthetic reasons. This transition on the outside is mostly found in settlement pottery from the centre (three-quarters of all vessels with any type of transition) and 71% of vessels from Trapíkov; in funerary pottery, this proportion is lower – two thirds. Inside transition only (*00) is most common in the settlement pottery from the centre (16%) and is below 10% in the funerary pottery from Trapíkov. Worth noting is the use of templates on both sides of the wall (*000). In this case, the percentages are directly opposite: in the Mikulčice pottery, bilateral template finishing occurred in a mere tenth of all vessels with any finishing, and in 25% of finds from the cemeteries and Trapíkov; the presence and type of transition are unaffected by the type of rim – the proportion of transitions is similar in chalice-like and straight rims. We do not have an explanation of the above phenomenon at the moment – possibly, the imbalance in the numbers of the statistically evaluated vessels played a role. It will only be possible to interpret this phenomenon more clearly after a general increase in the available data concerning MCG pottery from other sites.

Further proof of the use of the templates on the neck and rim edge is the occasional clear erasing of the uppermost wave arc in cases where it begins with the whole decorative motif. Finishing with a template were therefore done, at least in some cases, after decoration.

The finishing of the vessel rim edges mostly includes grooving of an untreated round end, which was in some cases trimmed. However, some edges are cut but not grooved (N-type edge finishing). The proportion of the rim edges without grooving is by no means negligible. This is about 15% of all MCG rims – both in settlement and funerary pottery – and the percentage is similar for Trapíkov (10%). Unlike in the grooved rims, horizontal trimming is dominant in N edge finishing – 80% of cases are horizontal, which means only 20% of the N rims are trimmed diagonally/conically. In a small number of cases, the trimming of N rims from Trapíkov and the cemeteries was not evaluated.

In vessels with grooved rim edges, almost half of cases are oriented conically at an angle to the base

Inv. No.	Dwelling (DW)/ feature No.	Rim edge finishing	Rim shape & transition	Low rim	Decoration	Shape	Vessel size	Mark	Complete vessel	Fabric	Inside finishing	Tech. level	Notes	Table No.
M17/152/1	DW1	2	10	Yes	1A2l	12	M	0	Yes	11	33H	2	assembled from find numbers (fn.) 28, 152, 31; the largest diameter is somewhat lower in respect to the overall height, but still 12	1:1
M17/152/6	DW1	2	10	Yes	1A3	21	S			21	4H, 32W	3	more bands, possibly 3, under the combed wave; the rim matches base with decoration M17/152/19, they only cannot be assembled together, vessel profile is possible	2:10
M17/250/1	DW2	2	1000		1An	12?	M			13	33H	1	2 combed waves above the band	3:3
M17/250/2	DW2	1	20		1A1ln	12	M			21	0	1		3:17
M17/250/4	DW2	1	2		1B1	12	M			21	13H, 12H	1	finishing 12H under the neck, lower than 13H; traces of connecting the neck and rim	4:4
M17/251/1	DW2	2N	2		1B2Y	12	M	0	Yes	23	33H	2	combed wave only with upper arcs – "interrupted waves"; only a single decorative band on a rather large vessel	3:1
M17/262/1	DW2	1N	1000		1B1	12	S	0	Yes	22	4H	2	combed waves turning into a band at some places, the lowest wave attests right-left direction of engraving, the ends significantly overlapping	3:19
M17/262/2	DW2	2	1	Yes	1A3	11	S		Yes	12	4H	2	combed lines, probably repeated several times, with no spacing between; round finger imprints only directly under the neck	2:12
M17/264/2	DW2	3	1		1ABxn	0	M			21	33Hn	1	finishing 33 also on the outside of the vessel!	3:18
M17/264/3	DW2	3	10		1Aln	0	M			23	0	2	secondary firing	3:16
M17/297/1	DW3	2	20		1A3	12	M		Yes	21	22H	1	irregular combed wave	5:12
M17/300/1	DW4	2	1		1A3lh	12	M			21	0	1	2 combed waves above the band	6:5
M17/300/2	DW4	2	200	Yes	1Aln	12	M			21	0	2	waterlogged sherd, 3 combed waves above subtle band, thin walls, irregular decoration	7:4
M17/300/3	DW4	1	20		1A3l	22	M			21	0	1	2 combed waves above the band	6:1
M17/303/1	DW4	2	200	Yes	1A3l	12	S	0	Yes	12	4H	2	very irregular inner surface	6:10
M17/344/1	DW4	2	2	Yes	1A3l	12	M	0	Yes	21	12H	2	skewed incisions on the inside, probably made by the potter's nails when finishing the transition between the body and neck	6:8
M17/350/1	DW4	2	2		1B1l	12	M			12	32Hn	1		6.9
M17/350/2	DW4	2	2		1Bln	0	M			21	0	1		7:11
M17/86/1	DW5	2	2000	Yes	1ABn	22?	M			21	32Hn, 33Hn	2	assembled from fn. 28, 152, 31; the largest diameter is somewhat lower in respect to the overall height, but still 12	8:3
M17/113/1	DW6	2	100		1ABln	0	M			21	N	1		8:25
M17/368/1	DW7	2	2	Yes	1A3lh	22	M	0	Yes	21	0	2	2 combed waves above the band	9:10
M17/368/5	DW7	1	1		1An	12	M			21	23H	1		10:3
M17/379/1	DW8	2	2	Yes	1A3h	21	S	0	Yes	21	33H, 4H	2	2 combed waves, 2 bands	11:13
M17/379/2	DW8	1	10		1A1	12	M			11	0	1		11:16
M20/12/1	DW9	3	10		1An	0	M			22	N	1	waterlogged sherd, heavily chalice-like rim	12:23
M17/205/1	25	2	2000	Yes	1A3l	12	S			23	32H	2	traces of finishing the transition between the body and neck, subtle outer transition of neck	14:5
M17/295/1	25	2	10		1Aln	0	M			22	0	2	traces of finishing the transition between the body and neck	13:19
M17/246/1	36	2	20		1A3	12	M	T	Yes	21	31W, 33H	1	2 combed waves, 2 bands	15:1
M17/356/4	68	2	20	Yes	1A1ln	12	M			22	32H	2	traces of finishing the transition between the body and neck	16:7
M20/16/1	89	2	2		1Aln	0	M			21	0	1		18:14
M20/16/7	89	1N	10		1A3n	0	S			21	N	2	waterlogged sherd	18:11

FIG. 49 | List of the description of pottery characteristics in selected MCG pottery from Trapíkov.

Properties of pottery features	% of settlement pottery from Mikulčice	% of all grave finds	% of Trapíkov finds
RS – 1* (out of 1*+ 2*)	45.6	32.4	45.2
RS – 2* (out of 1*+ 2*)	54.4	67.7	54.8
RS – transition*	55.2	47.1	61.3
RS – transition 0 out of 0*	74.5	65.6	70.6
RS – transition 00 out of 0*	16	9.4	5.9
RS – transition 000 out of 0*	9.6	25	23.5
RS – low	7.6	25	34.5
REF 1	33.9	35.3	16.1
REF 2	48.5	42.7	64.5
REF 3	3.5	5.9	9.7
REF – groove (1 + 2 + 3)	86	83.8	90.3
REF – N*	14	16.2	9.7
REF – N1 out of N*	79.2	N/A	N/A
REF – N2 out of N*	20.8	N/A	N/A

FIG. 50 | Comparison of the percentage of pottery characteristics in the MCG pottery from Trapíkov with the results of the analysis from the Mikulčice-Valy stronghold and some Great Moravian burial sites; pottery characteristic: rim. RS – rim shape, REF – rim edge finishing.

Note: * = unknown continuation of property due to fragmentation.

(REF2 code), while about one-third of all rim edges are oriented horizontally (REF1). The pottery from Trapíkov shows different parameters here: conical rim edges (REF1) are clearly dominant – they are present in almost two-thirds of the vessels, while the horizontal rim edges constitute only 16%. Rim edges oriented towards the inside of the vessels are rare (about 3.5% of rims from the settlement and 6% of funerary finds); interestingly, as many as 10% of the Trapíkov rim edges occur in this case.

Decoration (FIG. 51)

It results that the most important feature of MCG pottery is the almost exclusive use of combs for decoration. Only a single evaluated fragment had combined decoration (one combed wave, one simple wave). Single-line decoration was only present on two vessels (both belonging to the settlement pottery from the centre). Both carry the decorative scheme C, which is the most precious on MCG containers, and one has several features that are not characteristic of MCG, which makes it a good example of pottery on the very margin of the definition of this group. No decoration other than combed waves was found at the burial grounds around Mikulčice centre and Trapíkov.

The most typical decorative scheme on MCG pottery is type A – a combination of combed waves and horizontal combed lines (in this order from the neck down). This decoration type is present on about two-thirds of all the evaluated fragments from the centre, in vessels from the burial grounds in the hinterland and the wider surroundings of the stronghold and can be found in three-quarters of the Trapíkov vessels. Considering the fragmentariness of the pottery from the settlement (which does not always allow the recognition of the exact form of the decorative scheme) and the small number of large fragments, it makes little sense to quantify all the variants within individual decorative schemes (e.g. A1, A2, A3). This is why they were not statistically evaluated. In the cemetery assemblage, where whole vessels prevail (although the small number of individuals representing each variant is so small that the results should be only considered a tendency), variant **A3** (combed wave and combed lines) is, surprisingly, significantly **predominant**. This fact seems unimpacted by the large number of small vessels. This variant is also found on large vessels where the size of the decorative elements was usually proportionally adjusted to the size of the vessels (smaller and denser combed waves, using a finer comb for lines in smaller containers, and vice versa).

The second most common decoration scheme is type B – a combed wave only – which is found in more than one-fifth of the vessels from the centre and in somewhat fewer vessels from Trapíkov and the burial sites (16% and 12%, respectively). The occurrence of decorative schemes C and D is practically identical.

A major general finding concerning the characteristic of MCG is thus the absolute predominance of decorative schemes starting with combed waves (types A and B). This is how almost 90% of all MCG vessels are decorated. MCG vessels begin with a band of horizontal cuts (types C and D) on top. The decoration on the Trapíkov assemblage never begins with a band of combed lines.

The decoration of MCG from the centre contains mainly low combed waves (often extremely low with long arcs), which are present in about 90% of cases. The pottery from Trapíkov had the same results. Only 10% of the vessels have a high combed wave in some part of the decoration. Staggeringly, none of the funerary vessels had a high combed wave. In MCG pottery, left-tilted combed waves are more common than those without lateral asymmetry. Left-hand sloping occurs in more than half of all the vessels (this is true for all analysed assemblages). In the pottery from the Mikulčice centre, combed waves occur in about 40% of finds and 49% of the Trapíkov finds; combed waves tilted right, and the combination of right and left tilt

FIG. 51 | Comparison of the percentage of MCG pottery characteristics in the pottery from Trapíkov with the results of the analysis from the Mikulčice-Valy stronghold and some Great Moravian burial sites; pottery characteristic: decoration (D).

Properties of pottery features	% of settlement pottery from Mikulčice	% of all grave finds	% of Trapíkov finds
D – 1 (combed)	98.3	100	100
D – 1 (combined)	0.6	0	0
D – 1 (simple)	1.2	0	0
D – A* without AB, CD	65.7	75.4	74.2
D – A out of A* without n	N/A	32.7	N/A
D – A2 out of A* without n	N/A	0	N/A
D – A3 out of A* without n	N/A	67.3	N/A
D – B* without AB, CD	22.1	11.6	16.1
D – B out of B* without n	N/A	87.5	N/A
D – B2 out of B* without n	N/A	12.5	N/A
D – C* without AB, CD	2.9	2.9	0
D – C out of C* without n	N/A	N/A	N/A
D – C2 out of C* without n	N/A	N/A	N/A
D – D* without AB, CD	8.6	10.2	0
D – D out of D* without n	N/A	85.7	N/A
D – D2 out of D* without n	N/A	14.3	N/A
D – D3 out of D* without n	N/A	0	N/A
D – A*B* (wave)	87.6	87	N/A
D – C*D* (band)	11.4	13	0
D – D	9.9	0	9.7
D – l	56.4	56.5	51.6
D – p	3.5	20.3	0
D – lp	1.8	14.5	0
D – x	12.8	15.9	N/A

Note: * = unknown continuation of property due to fragmentation.

was present in a negligible number of finds (and in none of the Trapíkov finds). Interestingly, symmetrical waves – without a tilt – were the least numerous (less than 10%). Even vessels with combined tilts were more common than symmetrical ones (14% of cases). Every fifth funerary vessel was decorated with a combed wave tilted right.

The overlapping of decorative elements (feature x) is not very common in the MCG pottery (approximately 13%, with 16% in the funerary pottery); a single vessel from Trapíkov contained decorative elements that overlapped each other.

Shape (FIG. 52)

A basic evaluation of the shape of the vessels resulted in interesting findings, especially when comparing settlement and funerary pottery. Three-quarters of the settlement pottery specimens and 100% of the funerary pottery (complete or almost complete samples) could be classified into one of the four types – 11, 12, 21, 22 – that were mentioned above. Most of the artefacts that could be classified are type 12. As for settlement pottery, other types (11, 21 and 22) are represented relatively evenly (between 10–15%; only type 11 is marginal at Trapíkov – 4%) In funerary pottery, types 11 and 21 form about one-fifth each, and type 22 was hardly found (about 4%).

The shape features stand out even more if we break down the individual properties. In MCG, there is the situla shape – with the maximum diameter in the upper third of the vessel (feature coded "1", in types 11 and 12, see FIG. 52).

More significant differences were found in the relative width of the neck (feature coded "2", the first of the two digits in types 12 and 22). Vessels with a wide neck are much more common among settlement vessels than funerary ones (where wide and narrow necks are almost equally represented), which supports our assumption that a wider neck is linked with food preparation. In the Trapíkov archaeological material, wide necks are predominant, even more than in the pottery from the stronghold (87%, and 74%, respectively). If it is not a case of a statistical error again, this might be related to a specialised function of the settlement, where everyday village life is assumed – unlike in the centre.

Vessel size (FIG. 52)

In the settlement pottery from the centre, 15% of small vessels (rim diameter up to 15 cm) and the same amount of large vessels (rim diameter over 25 cm) were found; the remaining 70% are logically medium-sized vessels with rim diameters from 15 to 25 cm and corresponding heights of about 20–35 cm). At Trapíkov, there were a little over one-fifth of smaller vessels, while the number of small vessels was as high as 55% on the burial grounds. The percentage of large vessels in both assemblages was identical – 7%.

Properties of pottery features	% of settlement pottery from Mikulčice	% of all grave finds	% of Trapíkov finds
S – identifiable	72.1	100	74.2
S – 11 (of the identifiable)	15.3	21.7	4.4
S – 12 (of the identifiable)	61.3	52.2	73.9
S – 21 (of the identifiable)	10.5	21.7	8.7
S – 22 (of the identifiable)	12.9	4.4	13
S – *1 (narrow neck)	26.6	43.5	13
S – *2 (wide neck)	73.4	56.5	87
S – 1* of the identifiable (situla-shaped)	76.6	73.9	78.3
S – 2* of the identifiable (rounded jars)	23.4	26.1	21.7
VS – S	15.1	55.1	22.6
VS – LG	15.1	7.3	6.5

Note: * = unknown continuation of property due to fragmentation.

FIG. 52 | Comparison of the percentage of pottery characteristics in the MCG pottery from Trapíkov with the results of the analysis from the Mikulčice-Valy stronghold and some Great Moravian burial sites; pottery characteristic: shape (S) and size (VS – vessel size: S – small vessels LG – large to giant).

The results for the settlement pottery are thus similar. The significant numbers of small vessels in the graves clearly indicate that they were preferred because of their specific purpose. We would certainly arrive at this fact when evaluating the size differences between settlement and funerary vessels in general.

Fabric (FIG. 53)

Despite the difficulties mentioned above in the description of the features, the identification of fabric was successful in almost all vessels. The proportion of various fabric types in all the assessed assemblages was very similar. Type 21, pottery with an admixture of sand with grains below 1 mm, which creates a regular granulated surface, and light grey-brown tones with pink to orange spots (over 50%), undoubtedly predominates in the assemblage. The other types are evenly represented, and except for type 11, their occurrence does not exceed 10%. No sample made from coarse material (types 31 to 33) was identified.

As for fabric composition (feature A), 70% of vessels were made from pottery with sand admixture with grains smaller than 1 mm, which creates a regular granulated surface, 18% from fine fabric (type 1) and only 10% from rough fabric (type 3). The proportions of fine and rough fabric are reversed in funerary pottery. The surface colour ratios (feature B) basically copy the ratios of the fabric types and are equal in all the analysed assemblages. More than 70% of the vessels are colour 1 (light grey-brown or brown-grey tones with pink to orange spots), 17% are colour 2 (dark grey to grey-black, around 22% in the funerary vessels), colour 3 (light grey) is rare and basically supports the preliminary hypothesis that it reflects the secondary firing of vessels in which the original colour cannot be determined.

Traces of technology on the inside of the vessel (FIG. 54)

Modifications to the inner side of the vessel walls are present on most MCG vessels and were identified in more than 80% of the cases. This number is somewhat lower in the pottery from Trapíkov, also because of the smaller fragments where traces of technology could not be determined in the lower parts of the body. Considering the excessive distortion, it was better not to evaluate the traces on whole walls – code **W** – and the presence of vertical traces. In two-thirds to three-quarters of the vessels, the finishing on the inside of the wall (code **H**) is present on the upper part. Finishing of the whole inner side is not so frequent. A large proportion of inner-wall finishing that runs under the middle of the vessel may be related to a larger number of small vessels, possibly with substandard technology (again, there is a risk of false reduction of the actual proportion among settlement pottery where fragments from below the neck are rare).

The most common finishing on the inner side of the vessel walls was made by gentle finger pressure where the papillary ridges left fine grooves (feature expressed by digit 3 in the first place in the two-digit number). These traces are present in 60% to 70% of the vessels.[24] It would be difficult to assess the proportion of other finishing techniques because such a comparison would be distorted by the fact that the determination of type 4 (dimples under the neck made by pressing with fingers) began only with the analysis of the Trapíkov pottery and was not part of the original description of the other two assemblages. Even though this finishing is present in one-fifth of the Trapíkov vessels, it does not show the real level of use because this phenomenon pertains to the higher parts of the vessels. Therefore, with a higher proportion of preserved fragments from around the neck, there is a higher proportion of finishing types from this part compared to those from the lower parts of the vessels. For the sake of comparison, it can be pointed out that there is an interesting difference in the use of a piece of wood and traces of the papillary ridges in the finishing on the inside of the

24 This and other results are always calculated proportionately, i.e. by only counting vessels on which any traces of finishing were observed; note that some vessels may contain two finishing types used on a single piece.

FIG. 53 | Comparison of the percentage of pottery characteristics of the MCG pottery from Trapíkov with the results of the analysis from the Mikulčice-Valy stronghold and some Great Moravian burial sites; pottery characteristic: fabric (F).

Properties of pottery features	% of settlement pottery from Mikulčice	% of all grave finds	% of Trapíkov finds
F – identifiable	96.5	100	100
F – 11	14.5	10.2	6.5
F – 12	3.6	0	9.7
F – 13	0.6	0	3.2
F – 21	51.2	53.6	58.1
F – 22	9.6	14.5	12.9
F – 23	10.2	4.4	9.7
F – 31	6	8.7	0
F – 32	4.2	7.3	0
F – 33	0	1.5	0
F – 1* (fine)	18.7	10.2	19.4
F – 2* (medium)	71.1	72.5	80.7
F – 3* (coarse)	10.2	17.4	0
F – *1 (pink)	69.9	72.5	64.5
F – *2 (grey-black)	17.5	21.7	22.6
F – *3 (grey)	10.8	5.8	12.9

Note: * = unknown continuation of property due to fragmentation.

FIG. 54 | Comparison of the percentage of pottery characteristics of the MCG pottery from Trapíkov with the results of the analysis from the Mikulčice-Valy stronghold and some Great Moravian burial sites; pottery characteristic: inner finishing (IF).

Properties of pottery features	% of settlement pottery from Mikulčice	% of all grave finds	% of Trapíkov finds
IF – yes	81.8	84.1	67.7
IF – no (code "0")	18.2	15.9	32.3
IF – H	73.7	67.2	64.3
IF – C	26.3	36.2	N/A
IF – 11*	5.1	0	N/A
IF – 12*	7.1	5.2	6.5
IF – 13*	3	6.9	3.2
IF – 14*	0	0	0
IF – 21*	8.1	31	N/A
IF – 22*	4	1.7	3.2
IF – 23*	4	6.9	3.2
IF – 24*	2	0	0
IF – 31*	17.2	6.9	N/A
IF – 32*	41.4	25.9	16.1
IF – 33*	7.1	24.1	19.4
IF – 34*	9.1	3.5	0
IF – 1* (wooden stick)	15.2	12.1	16.7
IF – 2* (finger shaping)	18.2	39.7	11.1
IF – 3* (papillaries/textile)	72.7	60.4	66.7
IF – 4 (round holes)	N/A	N/A	22.2
IF – *1 (vertical)	28.3	37.9	N/A
IF – *2 (skewed)	52.5	32.8	38.9
IF – *3 (horizontal)	14.1	37.9	44.4
IF – *4 (horiz.-irregular)	10.1	3.5	0

Note: * = unknown continuation of property due to fragmentation.

Properties of pottery features	% of settlement pottery from Mikulčice	% of all grave finds	% of Trapíkov finds
TL classifiable	96.5	100	100
TL 1 (of the classifiable)	43.4	22.6	41.9
TL 2 (of the classifiable)	52.4	61.3	54.8
TL 3 (of the classifiable)	4.2	16.1	3.2

FIG. 55 | Comparison of the percentage of MCG pottery characteristics in the ceramics from Trapíkov with the results of the analysis from the Mikulčice-Valy stronghold and some Great Moravian burial sites; pottery characteristic: technological level (TL).

settlement and funerary pottery (18% versus 40%, respectively). However, we are unable to explain this.

Another assessed factor is the direction in which the finishing of the inside of the vessels was made. Surprisingly, in over a half of all the assessed vessels, this finishing is askew; in almost 30% of them it is vertical and in a quarter of them it is horizontal – regular or irregular, overlapping – some vessels are finished inside in different directions, which is why the sum of all types of inner finishing exceeds 100%. In funerary pottery, these proportions are different. The proportion of the direction of finishing is basically identical, only the askew direction, usually on settlement vessels, is the least frequent. Due to the absence of a sufficient number of large fragments, we did not assess the Trapíkov pottery because there was a risk of a distortion of the actual state – mainly because it is difficult to prove top-bottom smoothening of walls in small fragments, which often come from the tops of the vessels (rims, sometimes with a part of a neck).

Technological level (FIG. 55)

As for the technological level of the features classified by quality grades, the settlement pottery from Mikulčice and Trapíkov was the same. The highest grade, 1, included 40% of the settlement pottery and only 23% of funerary vessels. Grade 2, a standard of a sort of this ceramic group, contains over half of all of the assessed specimens and almost two-thirds of funerary pottery. Grade 3, which includes vessels on the notional verge of the definition of a ceramic group, is represented by a mere 3–4% of settlement pottery and as many as 16% of funerary pottery. Most of the technologically developed MCG vessels can be easily distinguished from the rest. They are often larger while more slender, have a regularly built body and balanced proportions, technically well-finished decoration and often traces of burning on the outside. In our opinion, most of these vessels were brought into the funerary context after being used in everyday life, which cannot be said of the other vessels.

Typological evaluation of MCG pottery from Trapíkov

The most characteristic feature of the settlement MCG pottery, of which many of the specimens were found in Trapíkov, is not the **grooved rim edge**, as it might appear, but typical **decoration with low, rolling combed waves created almost exclusively by a comb.**

Most **rims** are **finished from the outside with a template**, which causes a visible **transition between the neck and the body**.

An absolute majority of the **decoration** on these vessels **begins with a band of combed waves** on top. These combed waves are mostly **tilted left** or **symmetrical**.

Most settlement vessels have a **wide neck** with a diameter almost as large as the greatest diameter of the body and greater than the base – they were possibly used for food preparation. About **three-quarters of the vessels are situla-like**, while a **quarter of them are rounded jars**.

In three-quarters of the vessels, the fabric is of medium granularity and granulated surface, the colour is typically light beige to grey-brown with pink to orange spots; this applies to more than two-thirds of the cases although the number can be lower due to secondary firing.

In most of the vessels, we observed traces of **technology – the finishing on the inner surface** below the neck. Fine skew and horizontal grooves after shaping with fingers are predominant. Marks on the bases of the vessels are sporadic.

MCG pottery from the settlement is characterised by vessels with a rim diameter between 15 cm and 25 cm (about two-thirds of the assemblage); larger and smaller vessels are represented roughly equally – one-sixth each.

Compared to other Great Moravian pottery, the technological level of the MCG vessels is much higher. Craft-wise, they are the best quality in the entire pottery horizon of the high phase of Great Moravia (if we disregard the somewhat specific phenomenon of so-called pottery of ancient shapes). They are surpassed, although mainly aesthetically and with surface treatment, perhaps only by some pieces of grade 1 BCG pottery. The actual shape of the walls is regular, the vessels are relatively thin-walled compared to other pottery (including BCG). Only the surface finishing of the MCG vessels is somewhat worse than in BCG – the outer surface is often bumpy, with traces of fingers as they narrowed them, which is rarely the case in BCG. In our opinion, this phenomenon is indicative of a certain degradation, which can be compared to the phenomenon of series manufacture at times before the mass use of technological conveniences and machines when the precision of certain operations decreased due to the large volume of production. Nowadays, we can observe this in Asian, often handmade, production. The thickness of the vessels' walls naturally increases with the larger volume. However, even giant MCG vessels often have relatively

thin walls while maintaining balanced proportions (size and design of the rim, thickness of the base, neck transition), which indicates a perfect mastery of the craft.

BCG POTTERY

Unfortunately, we do not have enough large fragments of the Blučina ceramic group (BCG) from Trapíkov where it would make sense to determine the decorative scheme or make an overall evaluation of all the studied features. A mere 11 specimens could be described using our scheme; these included vessels where both the decorative scheme and rim type could be determined as part of their typology and morphology (see description table in FIG. 56). However, in three of these pieces, the shape type of the vessel could not be determined and in two other vessels, the type was determined only as a matter of probability. At the same time, not one BCG vessel from Trapíkov was preserved in its entirety. However, we can describe the most common forms of the pottery features of this group, which is the result of the analysis of BCG settlement pottery from Mikulčice (for an overview, see FIG. 57, based on MAZUCH 2013, 45–47). We can at least touch upon some of the aspects, which are the result of an analysis of the BCG settlement pottery from Trapíkov.

MORPHOLOGY

Decoration (D)

The "classic" decoration, which combines waves and helices, which is type A, clearly dominates BCG pottery – it is present in about half the cases. The next most represented is type D, where waves are engraved between two helices – this is present in 20% of the cases. The same proportion is taken up by a group of vessels where the decoration escapes the five decorative schemes for some reason[25] – although the rest of the features enable us to classify this pottery as part of BCG. About 10% of the vessels are decorated with type B decoration, which uses only waves and combed waves under which there are only helices on the rest of the vessel. The last two types, C and E, are so marginal (1% of cases) that they are considered exceptions. Decorative motifs, which consist of a single wave in each decorative band (type *1), are present on three-quarters of all vessels, while all the other types (*2, *3, *4) form the remaining quarter.

The tilt of the waves is very close to the one in MCG. Waves, both symmetrical and tilted left, were found in a similar percentage of cases: 48% and 46%, respectively, while a right tilt is rare – 6%. This shockingly low number of cases of right tilt, which is also reflected in the direction of the engraving of helices (see below) and in wave tilt in MCG, might mean that they were made by left-handed potters.

The analysis confirmed the assumption that high waves are typical of BCG pottery. Combed waves incised so slowly that the width of their arcs is larger than their height (code *) occur in 10% of vessels from this group (these are usually the small waves on top, under the neck).

Partial overlap of decorative bands (waves over helices and vice versa – code x) occurs in one-fifth of settlement pottery from the BCG.

The direction of the helices is even more polarised than wave tilt. Clockwise turning (right-left, code l) occurred in 97.5% of vessels where the direction could be ascertained, while counter-clockwise turning (left-right, code p) was found in less than 3% of cases.

The decoration on the vessels from Trapíkov shows similar tendencies: it is always type A, one of the two types that were determined; fragments with code H3 suggest a significant proportion of what is probably type D decorative motif. Apart from the dominant left tilt of waves, there is one of type P (right tilt), which is rare. Although our sample cannot be adequately statistically assessed, the overlapping of decorative motifs is more frequent than in the pottery from Mikulčice.

Rims (RIM)

The six types of rims that are part of the typology of the BCG pottery form 94% of all rims, while the remaining 6% are exceptional rims coded Y. Types 1 and 2 form 3/4 of all cases. These results prove the consistency of the BCG pottery even concerning the diversity of rims. Apart from a certain uniformity of decoration and inconsistent quality of firing, this is another phenomenon that points to a uniform concept of vessel-making, and thus a workshop origin of the pottery. There is a thin line between rim types 1–6: a change in bending, direction or cutting of the edge also suffices for the type to change. Overall, these vessels are on a higher technological level than their contemporaries due to the rim and edge technological quality. The percentages of rim types in BCG pottery, ascertained by an analysis of the settlement vessels from Mikulčice, are very similar to those in the small sample of the Trapíkov rims where rims 1 and 2 also clearly dominate.

Shape (S)

Interesting findings occur when comparing the BCG and MCG vessel shapes. In BCG, type 11 is predominant (over 50%), while type 12, which is dominant in the MCG pottery, occurred only in one-third of the BCG vessels. A total of 15% were type 21 (three times as much as in MCG) and type 22 was exceptional (5%, which is the same as in MCG). When we distribute the features as we did in the chapter about the MCG pottery, we see that situla-like shape

25 It is often a matter of adding some other decorative element or replacing one of the typical ones with multiple waves, oblique punctures, etc., or, conversely, omitting, for example waves, and leaving only helices all over the body of the vessels.

Inv. No.	Dwelling (DW) / feature No.	Decoration	Turning	Rim	Shape	Size	Mark	Complete	Fabric	Tech. level	Notes	Tab. No.
M14/211/1	DW3	A1lx	0	1	11	M	0		3	1	oxidation firing prevails	5:1
M17/355/1	DW6	A2?	0	2	11	S	0		1	1	only a subtle trace of the 2nd wave on the lower part of the decor, further on the decor is uncertain, possibly A2 or C2	8:26
M17/368/4	DW7	U1l	0	1	0	S	0		2	2		9:12
M17/368/6	DW7	U2lx	1	2	11?	S	0		1	2	dense, sharp but relatively low waves, 4 under each other	10:1
M17/368/12	DW7	U3	0	2	12	M	0		1a	1	trace of wave on the lower part of the decoration	9:18
M17/368/30	DW7	U1lx	0	2	11?	M	0		2	2		9:16
M17/151/1	12	Y	0	5	11	S	0	Yes	4	2	low for its diameter, significantly everted rim 5, decoration: only helix, untypical pottery features, but high technological level	13:1
M17/205/2	25	U1lx	0	3	0	M	0		2	2		13:18
M17/327/1	25	U3	0	Y	11	M	0		2	2	peculiar rim between 2 and 3; decoration as high as the neck	14:1
M17/356/1	68	U3	0	5	12	M	0		3	1		16:1
M20/16/3	89	U1rxY	0	2	0	M	0		3	2	decoration complemented with bands of skewed incisions; diameter slightly smaller than in large vessels	18:10

FIG. 56 | Description of pottery characteristics in selected BCG samples from Trapíkov.

(number 1 as the first digit of two) – types 11 and 12) is again clearly dominant, but in BCG it is even more frequent than in MCG (80% of cases). Rounded jars (number 2 as the first digit of two – types 12 and 22) have the same incidence as in MCG – about 20% of all vessels. This gives the impression that shape is a natural, spontaneous reflection of pottery-making technology, rather than a result of deliberate planning for the best function or aesthetics.

However, there is a decisive difference in feature B, which is the proportion of neck diameter. Clearly, narrow necks are typical for the BCG vessels (number 1 as the second digit of two – types 11 and 21), which occur in about 60% of cases while the wide neck, which is dominant in the MCG pottery (75% and even more in Trapíkov), occurs in 39% of the BCG pottery. These results might support the hypothesis that originally there was a functional preference in the BCG pottery – it might have been tableware or vessels for the transport of specific liquids (see Mazuch 2013, 95, 98).

One very unusual vessel was found in Trapíkov, which can be described as a bowl-shaped pot (TAB. 13:1). Apart from its unusual shape, it is interesting that the decoration does not contain any waves – only a helix.

TECHNOLOGY

Fabric (F)

Macroscopically, pottery fabric types were very difficult to discern. There are only small differences between the four established types, denoted 1 to 4. In about one-fifth of all the analysed fragments, the composition of fabric, firing and surface finishing combined in such a way that they could not be classified into any of the material types (coded as Y). Although this is a rather large assemblage, it does not contain a group that would have something in common in terms of pottery class. In two-thirds of all BCG fragments (67%), the fabric was characterised as type 1 (1a) or 3. The rest of the types are marginal (maximum 10%). As for the composition of the fabric, the assemblage of larger BCG fragments from Trapíkov was similar in the case of the percentages of types 1, 3 and 4, but overall, type 2, which was marginal in Mikulčice, dominates with 36%. Its proportion increased by the proportion of sherds from the stronghold, which could not be classified into any of the fabric types (coded Y). Again, because of the small proportion of specimens, this result is currently difficult to interpret.

Technological level

In the settlement pottery from Mikulčice, the most technologically advanced category (1) contained 7% of vessels and fragments with rims. The Trapíkov pottery also included fragments classifiable into the highest technological category. This concerns four pieces (FIG. 56, with references to tables), which form

one-third of the assemblage. This difference is crucial, and it would be rather surprising if the proportion of best quality BCG pottery was so much higher at a settlement outside of the centre, but it should be noted that we are comparing assemblages with very uneven numbers of finds (over 500 vessels and rims from Mikulčice and a mere 11 from Trapíkov). Probably, this result cannot be interpreted in a relevant way. All the BCG ceramic material from Trapíkov was classified as grade 1 or 2. There was not a single example of grade 3, which mostly includes imitations, not actual BCG pottery. Apart from the 11 pottery specimens, which have more pottery features (they have rims as the first consideration), it is possible to also find larger fragments of decorated bodies, which are also very well executed, both in terms of decoration and technology (see, for instance, TAB. 5:17, 5:19, 6:11, 6:14, 8:14, 10:15).

Generally, there are two basic pottery features typical of the settlement BCG pottery – **specific decoration and technology level**. Vessels in this group thus **must show a high level of craft, precise shape and even wall thickness**, which reflects mastery of the vessel building technologies that use a potter's wheel. The vessels also must be characterised by **excellent surface finishing** and regular routine execution of morphological features (in cases where morphology meets technology, as mentioned earlier): **intricate profiling** of bent and cut rims and **regular decoration**, which is clearly on a higher technological level than common pottery (except for MCG and possibly the vessels belonging to the Morava River Group). The decoration combines distinct waves and helices (prevailing decorative types are A and D, which consist of three to four decorative bands and together constitute over two-thirds of decoration), always made with a **simple engraver**. This motif is basically absent from contemporary pottery material from Moravia, which makes it a novelty in the Middle Hillfort period. The most significant difference between the Blučina and Mikulčice Ceramic Groups is the use of the engraving tool – it makes them the exact opposites.

Apart from the vessels with pottery features meeting the general definition of BCG as presented earlier in this text, this ceramic group can be amended with all vessels where the two main features (decoration and technological mastery) comply with the definition, but with differences in other features (such as simple rim edges, lower position of the greatest diameter – i.e. types 21 and 22). We can also add vessels, which show certain exceptions in decoration, but where the overall rendering is typical for the Blučina ceramic group (decoration Y) and where all the other pottery features comply with it. We classify them as such even though it might appear that in doing so we deny the definition of the BCG decoration, the pottery feature presented in the previous chapter. We do this because, without these peculiarities in decoration, there would be no doubt they belong to BCG because the rest of the pottery features are typical. The most difficult decision is in the case of vessels that have the typical technological level but have unusual decoration and in addition, lack more typical BCG pottery features although technology-wise, these are rendered satisfyingly. In such cases, the borders are difficult to exactly set (even using exact mathematical methods as such data primarily reflect human activity and invention, which, in its particularities, is abnormal).

The fact that the Goethean green tree of life stands above the proverbial (grey) theory is excellently illustrated by a vessel fragment from dwelling 3. It is unbelievable how many pottery features it contains that defy the whole typology of the two Great Moravian ceramic groups. This vessel (TAB. 4:15, 16) is the only one at the settlement with

Properties of pottery features	% of BCG in general
D – A	51.5
D – B	11.3
D – C	0.6
D – D	17.7
D – E	1.3
D – Y	17.6
D – types *1	75.5
D – types *2, 3, 4	22.14
D – * (low waves)	11.2
D – l	45.5
D – r	6.4
D – x	21.1
D – turning to the left	97.5
D – turning to the right	2.5
RIM – 1	35.4
RIM – 2	36.9
RIM – 3	5.6
RIM – 4	6.5
RIM – 5	7.9
RIM – 6	1.9
RIM – Y	5.8
S – 11	45.7
S – 12	34.2
S – 21	15.4
S – 22	4.7
S – *1 (narrow neck)	61.1
S – *2 (wide neck)	38.9
S – 1* of classifiable (situla-like vessels)	79.9
S – 2* of classifiable (rounded jars)	20.1
F – 1	33.1
F – 1a	10.1
F – 2	2.1
F – 3	24.2
F – 4	11.1
F – Y	19.4

Note: * = unknown continuation of property due to fragmentation.

FIG. 57 | Percentages of pottery characteristics in the BCG pottery. D – decoration, S – shape, F – fabric.

a shape classified as a bowl while having typical BCG decoration (type D), type D fabric and a gently grooved rim edge. No other vessel combining the features of the two ceramic groups has been found. Moreover, the specific decoration with an expressive, extremely high and sharp wave and decorative motif D corresponds with the BCG vessels of type Mik 1 (compare with Mazuch 2013, 51, Tab. 29–30).

Overall analysis showed that typologically, the pottery of the two mentioned ceramic groups from Trapíkov fully corresponds with their general definition. We can now observe whether the percentages of these groups across the whole assemblage correspond with the pottery horizon, which was defined based on material from the Mikulčice stronghold, mainly the areas in the suburbium.

7.2.2.4 Quantification of the MCG and BCG Pottery from Trapíkov and Comparison with the Suburbium of the Centre

The areas in the suburbium of Mikulčice centre are single-layer sites without superpositions, which were inhabited relatively briefly but intensively. As a result, they provide a surprising but undeniable advantage for pottery research. Due to the short period of existence and probably the violent demise of the settlement, which was probably never renewed, the pottery horizon, which is typical for this settlement, is basically "clean". There is no earlier pottery and contamination by later material (Mazuch 2013). We can thus present a pottery assemblage that was used over a single period, too short for the current dating methods to chronologically diversify. Of course, there is no possibility to outline the relative chronology of the ceramic groupings (groups, types) based on vertical stratigraphy combined with typology. However, the actual absence of vertical stratigraphy – groups of strata and superpositions of features – is advantageous for singling out and presenting later Great Moravian pottery. Based on the assemblage of archaeological material, the settlements in the suburbium of the Mikulčice centre are dated to a high phase of the Great Moravian era (compare with Mazuch 2012).

A quantification of the proportion of the BCG and MCG Great Moravian ceramic groups in these areas (see Mazuch 2013, 69–77, 84 and 86, which includes an analysis of part of the settlement in the northern suburbium and Church 2), proved an enormous increase in the proportion of the MCG pottery. In the stratigraphically earliest backfill of pits, the proportion of the MCG pottery is about 30%; in layers associated with the everyday life of the settlements, it is up to 50%, while in the destruction horizon of the settlement it is as much as 60%. This suggests that the demise of the Mikulčice stronghold came at a point when the production of the Mikulčice ceramic group vessels was at the height of its activity.

Unlike MCG pottery, the proportion of the BCG fragments in stratigraphically different settlement contexts in the suburbium was constant, somewhere between 2% and 6%. The explanation of this phenomenon is functional (read more in the previous chapter) – not chronological (in areas that were inhabited earlier, the presence of the BCG fragments is so sporadic that any finds are probably intrusions).

On the other hand, none of the contexts in the suburban settlement contained features with pottery of the Old Hillfort character (as is the case of the stratigraphically earliest pits in the area of the central part of the stronghold) – apart from MCG and BCG, well developed Great Moravian pottery with signs of professional manufacturing prevails. Fragments with relatively worse craftsmanship or the rendering of some of the pottery features (such as simple rim edges, massive walls, overall proportional awkwardness, substandard shape of the vessel), which are usually dated to the earlier Middle Hillfort period, were not found in the destruction horizon of the settlement in the northern suburbium. They were found in the stratigraphically earliest horizon above the bedrock – thus, they were used at the time of the foundation of the settlement.

The above facts thus date the peak of the making and use of the MCG pottery to the end of the Great Moravian period – to the late 9th century and early 10th century. The pottery of the Mikulčice ceramic group is thus a typical example of the so-called late Great Moravian horizon. Contemporary occurrence (in the same contexts) of BCG and MCG has also been unequivocally proven. The earliest occurrence is now impossible to determine, even with the help of natural sciences.

It appears that the proportion of MCG pottery in contexts and settlement horizons does bear chronological information, no matter how impossible to express in absolute terms. Considering how short-lived the settlement in the northern suburbium was (at least with regard to the possibilities of archaeological and historical dating), it probably saw an enormously dynamic increase in the production and use of this ceramic group at the end of the Great Moravian period. The assessment of the overall context in the northern suburbium, as well as in other areas, showed that the high phase – like other craft production – was suddenly disrupted, probably by the violent downfall of the Mikulčice stronghold sometime at the beginning of the 10th century (Mazuch 2012, Dresler/Mazuch 2019). Therefore, what is the position of the pottery from Trapíkov in regard to the pottery horizon described above?

The quantification of the proportions of the two ceramic groups based on individual features is shown in fig. 58. Considering the small number of fragments in various features, it is more appropriate to note the overall results of the analysis.

In the case of BCG, we performed a calculation for both the rims and bodies (regarding the pitfalls of this process, see Chapter 7.1.2 on methodology). Among rims (i.e. real pottery samples), the

Feature	Type	Rims – total No.	Out of which BCG	BCG %	Out of which MCG	MCG %	Out of which NR	NR %	Out of which SG	SG %	Body BCG – No. of pc.
1	DW	9	0	0	3	33.3	0	0	0	0	2
2	DW	23	1	4.4	13	56.5	0	0	1	4.3	5
3	DW	15	2	13.3	9	60	1	6.7	1	6.7	24
4	DW	12	1	8.3	10	83.3	1	8.3	0	0	3
5	DW	10	1	10	4	40	0	0	0	0	3
6	DW	9	1	11.1	5	55.6	0	0	0	0	16
7	DW	27	7	25.9	13	48.2	0	0	3	11.1	21
8	DW	5	0	0	4	80	0	0	0	0	0
9	DW	33	3	9.1	20	60.6	1	3	1	3	0
11	PT	4	0	0	1	25	0	0	0	0	1
12	FT	1	1	100	0	0	0	0	0	0	21
13	PT	5	0	0	1	20	0	0	0	0	0
14	PT	4	0	0	0	0	0	0	1	25	0
23	PT	3	1	33.3	0	0	0	0	0	0	0
24	PT	2	1	50	0	0	0	0	0	0	0
25	PT	9	2	22.2	3	33.3	0	0	0	0	8
28	PT	1	0	0	0	0	0	0	0	0	0
29	PT	1	1	100	0	0	0	0	0	0	4
36	FT	1	0	0	1	100	0	0	0	0	0
45	PT	1	0	0	0	0	0	0	0	0	4
46	FT	1	0	0	1	100	0	0	0	0	0
50	PT	1	0	0	0	0	0	0	0	0	1
64	FT	2	0	0	2	100	0	0	0	0	0
68	PT	22	2	9.1	9	40.9	0	0	1	4.5	11
74	PT	6	0	0	2	33.33	0	0	0	0	1
79	FT	4	0	0	1	25	0	0	0	0	2
80	GR	1	0	0	1	100	0	0	0	0	0
89	PT	11	1	9.1	6	54.6	0	0	0	0	0
Total		223	25	11.2	109	48.9	3	1.3	8	3.6	119

FIG. 58 | Quantification of the proportions of the MCG, BCG and local pottery types in the entire pottery assemblage from Trapíkov. DW – dwelling, PT – pit, FT – feature, GR – grave.

proportion of BCG in the whole pottery assemblage from Trapíkov was 11%, while the simple proportion of BCG body fragments in all decorated bodies was 8% (119 fragments of BCG bodies vs a total of 1,464 decorated sherds). In some of the rims without decoration, there might be doubts regarding their classification as BCG. However, we also know that, unlike the rest of Great Moravian pottery, BCG vessels tend to be decorated on a larger part of the surface. Thus, the actual proportion of BCG pottery in the assemblage will be somewhat lower. Regardless, it roughly corresponds with the percentages of this ceramic group at the Mikulčice stronghold.

The proportion of pottery samples (unique rims) from all Trapíkov features was 49% of all the discovered rims (109 MCG rims from a total of 223). This proportion basically corresponds with the proportions of MCG pottery in the contexts in the suburbium of the Mikulčice centre, which stratigraphically corresponds with the existence of the settlements – probably the late 9th century.

In the pottery assemblages from the suburbium of the Mikulčice stronghold, several pottery specimens represented what were probably three local pottery types (Mazuch 2013, 69), two of which were also found in Trapíkov.

Type **NR** (narrowed rounded rims) – these rims are usually longer (higher), everted at 45° from the axis of the vessel. The rims get narrower towards the edge – sometimes they are slightly bent in a chalice-like way, with rounded ends. In some of the pieces, slight finishing with a template can be observed (similar as in the MCG although the finishing is not distinct enough to create a transition). Not enough decorated pottery material has been found, which is why this feature could not have been analysed; the only exception is the vessel from dwelling 4 in Trapíkov (TAB. 7:5), which is decorated with a helix – probably incised – although parallel circles cannot be excluded as the fragment does not contain the beginning or the end of an incision. Another larger fragment, which can be tentatively classified

as this type, comes from dwelling 3 (TAB. 3:7) – here the rendering of the rim does not correspond with the above definition (the rounding is somewhat flattened). Its decoration basically corresponds with the standard of MCG, but its fabric is almost identical to that previously mentioned. It is a very fine material with a large proportion of sand admixture; the fabric is ochre, and firing is even and high quality. This type also includes a rim from dwelling 9 (TAB. 12:20).

Type **SG** (strangulated, grooved rims) – thick short rims with a sub-oval cross-section, sometimes intricately shaped, with fine flutes or grooves on the inside. Some of the rims get narrower towards the end and are left rounded; some are cut off at the edge (one extra operation for the potter). The transition from the neck to the rim is rather sharp, not S-shaped, as is the case in most Great Moravian pottery; some rims are finished with a template, which creates a transition on the outside, which is typical for MCG. The template was definitely also used for the profiling of the rims from the inside, which is the most characteristic feature of this type of pottery. The Mikulčice assemblages did not contain any fragments where decoration would take up most of the surface. The pottery from Trapíkov usually comes from the features, due to which it is less fragmented, which in turn led to the preservation of several pieces with a decorative motif. It was mostly incised by a comb, and in three cases out of four, the decoration begins with a combed band (TAB. 3:4, 9:13 and 12:3) and once with an irregular combed wave (TAB. 13:10). On the rim depicted in (TAB. 9:13), the decoration continues under the combed band with a high combed wave. The only rim with a combed wave is broken off directly under it, and thus the rest of the decoration cannot be ascertained. The other **NG** rims are depicted in TAB. 5:8, 10:5, 10:11 as 16:23.

The proportion of the NR pottery specimens in the whole pottery assemblage from Trapíkov is 1.3%, while the SG forms 3.6%. This fully corresponds with the proportion of these types in the pottery horizon of the Mikulčice suburbium, where their proportion ranges from 1% to 3%. Thus, the presence of these two local types satisfyingly completes the overall picture of the pottery from the Trapíkov settlement. Due to the analysis of the MCG and BCG pottery presented above, it can be stated that it is very similar to the pottery horizon of the settlements in the Mikulčice suburbium, which lay directly behind the fortification, beyond what used to be a river branch (read more in Chapter 8).

7.2.3 Ecofacts

The plant macroremains described in this chapter were discovered at the Mikulčice-Trapíkov site during the archaeological excavations carried out in 2003, 2010–2012 and 2015. The Mikulčice-Trapíkov site is situated in what is now Slovakia, on the periphery of the Mikulčice settlement agglomeration, approximately one kilometre from the acropolis at Valy. Unlike the central part of the agglomeration, where all the dwellings used to be above-ground, only sunken huts were excavated at the Mikulčice-Trapíkov and Kopčany-Kačenáreň sites. These features were subject to archaeological and archaeobotanical examination.

Most of the archaeobotanical analyses carried out to date focused on the finds from the fortified central part of the agglomeration and the rich waterlogged plant material from the surrounding extinct river branches. The rural settlements around the Great Moravian centre have attracted relatively little attention. Samples were taken randomly and often lacked precise dating and context. However, we know that botanical remains from such sites as Trapíkov are crucial for the understanding of the complex economic strategy of the Great Moravian centre. Other systematically examined sites, i.e. Kopčany, the Slovak part of the Mikulčice agglomeration (LÁTKOVÁ 2014a) and Kostice–Zadní hrúd on the periphery of the Břeclav-Pohansko agglomeration (DRESLEROVÁ/HAJNALOVÁ/MACHÁČEK 2013) show similar traits as Mikulčice-Trapíkov. All three sites enabled us to reconstruct the trends and importance of different crops in the Great Moravian period.

A comparison of the results with those from Kopčany and Zadní hrúd shows the relationship between the Great Moravian settlements of central importance and their peripheries. This chapter aims to present archaeobotanical material from the Great Moravian site of Mikulčice-Trapíkov. It is based on the presence – or absence – of common traits in the composition of the remains of cultivated and wild plant species.

7.2.3.1 The Character and History of the Archaeobotanical Research of the Site

The most extensive and most important archaeological excavation – area M17 at Mikulčice-Trapíkov – was actually a preliminary research excavation prior to the construction of the new archaeological base. The settlement at this site had been known since the 1980s. Different types and functions of the settlement features – dwellings, pits and hearths – were excavated in 2003, 2010–2012 and 2015 (HLADÍK 2014). Their dating from the late 9th to the early 10th century is based on the analysis of archaeological finds (HLADÍK 2014, 131) and is supported by the results of the absolute dating of plant macroremains (Chapter 12.4).

Unfortunately, the methodology for extracting the material presented here was not always correct. Three types of extraction were used. The earliest excavations in 2003 unearthed five randomly acquired samples after a technician noticed a significant concentration of carbonised cereal seeds, which turned out to be barley. The cereal grains from this accumulation were collected without the sediment that surrounded it or any other sampling of the feature. During the 2010 and 2011 excavation seasons, samples

were flotated by trained technical staff, but without the daily professional supervision of an archaeobotanist. Most of the focus was not on the spatial distribution of the sampling points within the features; in some cases, a complete feature backfill was taken as a single unstratified sample. The year 2012 saw a positive change: the backfill of the only dwelling discovered at the site at that point was excavated using systematic sampling. Also, features examined in 2015 – a dwelling and an undetermined pit – were systematically sampled for archaeobotanical analysis and scrutinised by flotation. The backfill of whole vessels found inside of the dwellings was also flotated.

The archaeobotanical analyses carried out to date revealed that the samples extracted by the trained technician contained relatively large seeds (wheat, barley and weeds), while the samples flotated by the archaeobotanist contained both the large seeds and the finds of millet and legumes, which tend to remain in the heavy residuum (HR) after (imperfect) flotation. Based on these findings, it can be hypothesised that the result – the (dis)similarity of samples – was influenced by the human factor. The samples that were flotated by the technician contained a smaller number of species compared to those flotated by the archaeobotanist. All these factors must be considered when assessing and interpreting the PMR assemblage from Mikulčice-Trapíkov.

7.2.3.2 Results and Discussion

The aim of this chapter is a complex evaluation of all the archaeobotanical data obtained from the Mikulčice-Trapíkov site up to 2015. A total of n = 4,609 finds (3,293 seeds and 1,316 charred remains, see FIG. 59) were retrieved from 11 assessed features – 8 dwellings and 3 pits. No finds preserved by other processes than carbonisation (imperfect burning) were found. The above total of plant macroremains contained 61 plant taxons (43 herbaceous plants and 18 woody plants and shrubs), all of them known from the central areas of the agglomeration (FIG. 60).

Other finds, such as fish scales and the bone fragments of small and large mammals – poultry, birds and fish – were made during flotation and laboratory sorting. There also were sporadic finds of 1–2 mm large snail shells. The character of the finds of animal bones and plant remains is similar to common household – especially kitchen – waste, which indicates a rich spectrum of foodstuffs.[26]

PMR numbers and density

One of the important criteria for the assessment of the archaeobotanical assemblages is the density of finds per litre of flotated deposits (KUNA et al. 2013, 90). One of the problems of this evaluation method is that the technician discarded c. 70% of the 2010/2011 samples with no (or little) plant remains, together with basic documentation. The samples, which were retrieved and analysed in 2012 and 2015, contained more plant material with only six samples considered sterile. The evaluation of the number and density of finds in this assemblage showed that most samples (FIG. 61) contained 1 to 10 seeds per litre of sediment and the density ranged from 0.1 to 1 PMR/l. The second most populated category contains samples with the numbers of seeds ranging from 11 to 50 and a seed density of 2 to 5 per litre of flotated sediment. The third-largest group contained 5 or more seeds per litre. The most samples, with an average density of over 5.1 seeds per litre, come from the finds retrieved in 2015 (dwelling 9) and 2003 (dwelling 6). The assemblage of samples categorised in this way is rather varied. The problem is that both the numbers of finds in the samples and the average densities of seeds per litre of sediment differ significantly. The sampling strategies in different years are a problem of their own making – there are also vast differences, which can render biased results.

In exceptional cases, the number of seeds in common settlement layers exceeded 5 per litre. The average densities suggest that the analysed assemblages of PMR did not contain significant concentrations of seeds (except the 2003 samples from dwelling 6) and that the samples were domestic waste and semi-finished cereal products.

Sample composition

To make qualified economic interpretations, it was important to monitor samples for the presence of the main components (crops and wild species seeds, cereal chaff). The components were divided into three groups and then subjected to a presence/absence analysis. The most numerous group included cultivated crops (cereals and legumes). The second most numerous group includes the finds of wild species. The third group of components included the finds of cereal chaff. No chaff has been documented in the samples from Mikulčice-Trapíkov, which is a phenomenon typical of the entire early medieval period. Therefore, only the first two categories were evaluated.

The Early Middle Ages saw the boom in the use of naked cereals, which may have caused the lack of chaff in the archaeobotanical assemblages. As for the presence of weeds, it can generally be concluded that samples with a low weed content (up to 10%) can be considered cleaned storage. Samples with up to 25% of wild species are considered semi-cleaned storage. Samples and contexts with up to 50% of weed finds are considered uncleaned storage or, more precisely, a mixture of waste from crop processing.

In this case, it was not necessary to split the samples into "rich" and "poor". The composition of the main components is described on two levels: first, the composition of each sample, and second, an analysis of the main components expressed as their percentual representation in the examined features.

26 Production waste (such as dross and glass drops) has not been detected.

Ordinal number	1	2	3	4	5	6	7	8	9	10	11	12
Context number	C 9a	C 22	C 9a	C 3a	C 82	C 83	C 9a	C 9a	FT 33	C 49	FN 262	C 35
Sample number	201/12	203/12	210/12	205/12	148/12	145/12	207/12	208/12	199/12	200/12	99/12	100/12
Cereal grains												
Avena sp.	-	-	-	-	-	-	-	-	-	-	-	-
Hordeum vulgare vulgare	-	-	-	-	-	-	-	-	1	-	-	-
Panicum miliaceum	2	3	-	3	2	1	-	-	1	-	-	-
Secale cereale	-	2	-	-	-	2	-	-	-	-	2	-
Triticum aestivum	-	-	-	-	-	-	-	-	-	-	-	-
Triticum dicoccum	-	-	-	-	-	-	-	-	-	-	-	-
Triticum/Hordeum	-	-	-	-	-	-	-	-	-	-	-	-
Cerealia indet (grain fragment)	2	8	-	1	2	7	-	-	1	-	3	-
Legumes												
Lens culinaris	-	-	-	-	-	-	-	-	-	-	-	-
Pisum sativum	-	1	-	-	-	-	-	-	-	-	-	-
Leg. Sat.	-	-	-	-	-	-	-	-	-	-	-	-
Fruits/Nuts												
Vitis vinifera	-	-	-	-	-	-	-	-	-	-	-	-
Oil/fiber plants												
Cannabis sativa	-	-	-	-	-	-	-	-	-	-	-	-
Linum cf. usitatissimum	-	-	-	-	-	-	-	-	-	-	-	-
Wild plants												
Agrostemma githago	-	-	-	-	-	-	-	-	-	-	-	-
Alchemilla vulgaris/ arvensis	-	-	-	-	-	-	-	-	-	-	-	-
Anthemis tinctoria/ arvensis	-	-	-	-	-	-	-	-	-	-	-	-
Asperula arvensis	-	-	-	-	-	-	-	-	-	-	-	-
Avena/Bromus	-	1	-	-	-	-	-	-	-	1	-	-
Brassicaceae	-	-	-	-	-	-	-	-	-	-	-	-
Brassica nigra	-	-	-	-	-	-	-	-	-	-	-	-
Bromus secalinus	-	-	-	-	-	-	-	-	-	-	-	-
Bupleurum rotundifolium	-	-	-	-	-	-	1	-	-	-	-	-
Carex divulsa	-	-	-	-	-	-	-	-	-	-	-	-
Carex sp.	-	-	-	-	-	-	-	-	-	-	-	-
Carpinus betulus	1	-	-	-	-	-	-	-	-	-	-	-
Centaurea/Carduus/ Cirsium	-	1	-	-	-	-	-	-	-	-	-	-
Cerastium sp.	-	-	-	-	-	-	-	-	-	-	-	-
Echinochloa crus galli	-	-	-	-	-	-	-	-	-	-	-	-
Fabaceae	-	-	-	-	-	-	-	-	-	-	-	-
Fallopia convolvulus	-	-	-	-	-	-	-	-	-	-	-	-
Fragaria vesca	-	-	-	-	-	-	-	-	1	-	-	-
Galium aparine	-	-	1	-	-	-	-	-	-	-	-	-
Galium palustre	-	-	-	-	-	-	-	-	-	-	-	-
Galium spurium	-	-	-	-	-	-	-	-	-	-	-	-
Galium sp.	-	-	-	-	-	-	-	-	-	-	-	-
Gypsophila muralis	-	-	-	-	-	-	-	-	-	-	-	-
Humulus lupulus	-	-	-	-	-	-	-	-	-	-	-	-
Chenopodium album agg.	-	2	-	-	-	5	1	1	-	-	-	-
Chenopodium hybridum	-	-	-	-	-	-	-	-	-	-	-	-
Lamiaceae	-	-	-	-	-	-	-	-	-	-	-	-
Linum sp.	-	-	-	-	-	-	-	-	-	-	-	-
Malva sp.	-	-	-	-	-	-	-	-	-	-	-	-
Melilotus/Medicago	-	-	-	-	-	-	1	-	-	-	-	-
Matricaria matricarioides	-	-	-	-	-	-	-	-	-	-	-	-
Mentha/Salvia	-	-	1	-	-	-	-	-	-	-	-	-
Poa palustris	-	-	-	-	-	-	-	-	-	-	-	-

FIG. 59 | Mikulčice-Trapíkov. List of identified taxons. Part 1.

Ordinal number	1	2	3	4	5	6	7	8	9	10	11	12
Context number	C 9a	C 22	C 9a	C 3a	C 82	C 83	C 9a	C 9a	FT 33	C 49	FN 262	C 35
Sample number	201/12	203/12	210/12	205/12	148/12	145/12	207/12	208/12	199/12	200/12	99/12	100/12
Poaceae	-	-	-	-	-	-	-	-	-	1	-	-
Polycnemum arvense	-	-	-	-	-	-	-	-	-	-	-	-
Pyrus/Malus	-	-	-	-	-	-	-	-	-	-	-	-
Polygonaceae	-	-	-	-	-	-	-	-	-	1	-	-
Potentilla argentea	-	-	-	-	-	-	-	-	-	-	-	-
Potentilla supina	-	-	-	-	-	-	-	-	-	-	-	-
Potentilla/Fragaria	-	-	-	-	-	-	-	-	-	-	-	-
Prunus spinosa	-	-	-	-	-	-	-	-	-	-	-	-
Prunus sp.	-	-	-	-	-	-	-	-	-	-	-	-
kernel *cf. Prunus sp.*	-	-	-	-	-	-	-	-	-	-	-	-
Bud	-	-	-	-	-	-	-	-	-	-	-	-
Rumex conglomeratus	-	-	-	-	-	-	-	-	-	-	-	-
Rumex sp.	1	-	1	-	-	-	-	-	-	-	-	-
Scirpus/Carex	-	-	-	-	-	-	-	-	-	-	-	-
Setaria viridis/verticilata	-	-	-	-	-	-	-	-	-	-	-	-
Stachys/Galeopsis	-	-	-	-	-	-	-	-	-	1	-	-
Stellaria media	-	-	1	-	-	-	-	-	-	-	-	-
Thlaspi arvense	-	-	-	-	-	-	-	-	-	-	-	-
Veronica hederifolia	1	-	-	-	-	-	-	-	-	-	-	-
Vicia sp.	-	-	-	-	-	-	-	-	-	-	-	-
Violacea	-	-	-	-	-	-	-	-	-	-	-	-
Xanthium strumarium (fragment)	-	-	-	-	-	-	-	-	-	-	-	-
Indeterminate seeds	3	1	-	2	-	-	-	1	1	2	-	1
Seeds sum	10	19	4	6	4	15	3	2	5	6	5	1
Soil volume	195	27	140	20	18	14	30	50	5	60	1.8	0.5
Avg. density of seeds / 1 litre of sediment	0.051	0.704	0.029	0.3	0.222	1.071	0.1	0.04	1	0.1	2.778	2
Charcoal												
Abies alba	-	-	1	-	-	-	-	-	-	-	-	-
Acer sp.	-	-	-	-	-	-	-	-	-	-	-	-
Alnus sp.	20	-	-	-	-	-	1	7	-	-	-	-
cf. Betula	-	-	-	-	-	-	-	1	-	-	-	-
Carpinus betulus	-	-	-	-	-	-	-	1	-	-	-	-
Cornus sp.	-	-	-	-	-	-	-	-	-	-	-	-
Fagus sylvatica	-	26	-	-	-	-	-	5	-	-	-	-
Frangula alnus	-	-	-	-	-	-	-	4	-	-	-	-
Fraxinus sp.	3	7	-	-	-	-	-	-	-	-	-	-
Ligustrum vulgare	-	-	-	-	-	-	-	-	-	-	-	-
Lonicera xylosteum	-	-	-	-	-	-	-	-	-	-	-	-
Pinus sylvestris	-	-	-	-	-	-	-	-	-	-	-	-
Prunus sp.	-	-	-	-	-	-	-	-	-	-	-	-
Pomoideae	2	-	-	-	-	-	-	-	-	-	-	-
Populus/Salix	8	-	-	-	-	-	1	8	-	-	-	-
Rosa sp.	-	-	-	-	-	-	-	-	-	-	-	-
Quercus sp.	6	11	2	23	-	-	1	16	-	-	9	-
Ulmus sp.	-	1	-	-	-	-	-	-	-	-	-	-
Deciduous trees	11	9	-	2	-	-	-	8	-	-	1	-
Coniferous trees	1	-	-	-	-	-	-	1	-	-	-	-
Indeterminate seeds	-	-	-	-	-	-	-	-	-	-	-	-
Charcoal sum	51	54	3	25	-	-	3	51	-	-	10	-

FIG. 59 | Mikulčice-Trapíkov. List of identified taxons. Part 2.

Ordinal number	13	14	15	16	17	18	19	20	21	22	23	24	25
Context number	C 39	C 35	FT 27	FT 48	C 39	C 5a	C 84	C 85	C 88	C 50	C 11a,b	FT 50A	PT 17
Sample number	199/12b	194/12	197/12	97/12	195/12	209/12	147/12	146/12	143/12	193/12	202/12	196/12	204/12
Cereal grains													
Avena sp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hordeum vulgare vulgare	-	1	-	-	15	-	3	3	-	-	-	-	-
Panicum miliaceum	1	1	2	-	15	1	-	-	-	-	-	3	-
Secale cereale	-	-	4	-	76	-	-	1	-	-	2	-	-
Triticum aestivum	-	-	-	-	63	-	1	-	-	-	1	-	-
Triticum dicoccum	-	-	-	-	-	-	-	-	-	-	-	-	-
Triticum/Hordeum	-	-	-	-	15	-	-	-	-	-	-	-	-
Cerealia indet (grain fragment)	1	2	5	1	82	2	11	3	-	-	5	5	-
Legumes													
Lens culinaris	-	-	-	-	1	-	-	-	-	-	-	-	-
Pisum sativum	-	-	-	-	-	-	-	-	-	-	-	-	-
Leg. Sat.	-	-	-	-	3	-	3	-	-	-	-	-	-
Fruits/Nuts													
Vitis vinifera	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil/fiber plants													
Cannabis sativa	-	-	-	-	-	-	-	-	-	-	-	-	-
Linum cf. usitatissimum	-	-	-	-	-	-	-	-	-	-	-	-	-
Wild plants													
Agrostemma githago	-	-	-	-	1	-	-	-	-	-	-	-	-
Alchemilla vulgaris/ arvensis	-	-	-	-	-	-	-	-	1	-	-	-	-
Anthemis tinctoria/ arvensis	-	-	-	-	-	-	-	-	-	-	-	-	-
Asperula arvensis	-	-	-	-	-	-	-	-	-	-	-	-	-
Avena/Bromus	-	-	-	-	1	-	-	1	-	-	-	-	-
Brassicaceae	-	-	-	-	-	-	1	-	-	-	-	-	-
Brassica nigra	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromus secalinus	-	-	-	-	-	-	-	-	-	-	-	-	-
Bupleurum rotundifolium	-	-	-	-	-	-	-	-	-	-	-	-	-
Carex divulsa	-	-	-	-	-	1	-	-	-	-	-	-	-
Carex sp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Carpinus betulus	-	-	1	-	1	-	-	-	-	-	-	-	-
Centaurea/Carduus/ Cirsium	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerastium sp.	-	-	-	-	-	-	-	-	1	-	-	-	-
Echinochloa crus galli	-	-	-	-	1	-	1	-	-	-	-	-	-
Fabaceae	-	-	-	-	1	-	-	-	-	-	-	-	-
Fallopia convolvulus	-	-	-	-	2	-	-	-	-	-	-	-	-
Fragaria vesca	1	-	-	-	1	-	-	-	-	-	-	-	-
Galium aparine	-	-	-	-	-	-	-	-	-	-	-	-	-
Galium palustre	-	-	-	-	-	-	-	-	-	-	-	-	-
Galium spurium	-	-	-	-	7	-	-	-	-	-	-	-	-
Galium sp.	-	-	-	-	-	-	-	-	-	1	-	-	-
Gypsophila muralis	-	-	-	-	-	-	-	-	-	-	-	-	-
Humulus lupulus	-	-	-	-	1	-	-	-	-	-	-	-	-
Chenopodium album agg.	-	-	-	-	-	-	-	-	-	-	-	-	-
Chenopodium hybridum	-	-	-	-	2	-	-	-	-	-	-	-	-
Lamiaceae	-	-	-	-	-	3	-	-	-	-	-	-	-
Linum sp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Malva sp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Melilotus/Medicago	-	-	-	-	-	-	-	-	-	-	-	-	-
Matricaria matricarioides	-	-	-	-	-	-	-	-	-	-	-	-	-
Mentha/Salvia	-	-	-	-	-	-	-	-	-	-	-	-	-
Poa palustris	-	-	-	-	-	1	-	-	-	-	1	-	-

FIG. 59 | Mikulčice-Trapíkov. List of identified taxons. Part 3.

Ordinal number	13	14	15	16	17	18	19	20	21	22	23	24	25
Context number	C 39	C 35	FT 27	FT 48	C 39	C 5a	C 84	C 85	C 88	C 50	C 11a, b	FT 50A	PT 17
Sample number	199/12b	194/12	197/12	97/12	195/12	209/12	147/12	146/12	143/12	193/12	202/12	196/12	204/12
Poaceae	-	-	-	-	-	-	-	-	-	-	-	-	-
Polycnemum arvense	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrus/Malus	-	-	-	-	-	-	-	-	-	-	-	-	-
Polygonaceae	-	-	-	-	1	-	-	-	-	-	-	-	-
Potentilla argentea	-	-	-	-	-	-	-	-	-	-	-	1	-
Potentilla supina	1	-	-	-	-	-	-	-	-	-	-	-	-
Potentilla/Fragaria	-	-	-	-	-	-	-	-	-	-	-	1	-
Prunus spinosa	-	-	-	-	-	-	-	-	-	-	-	-	-
Prunus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-
kernel *cf. Prunus sp.*	-	-	-	1	-	-	-	-	-	-	-	-	-
Bud	-	-	-	-	-	-	-	-	-	-	-	-	-
Rumex conglomeratus	-	-	-	-	-	-	-	-	-	-	1	-	-
Rumex sp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Scirpus/Carex	-	-	-	-	-	-	-	-	-	-	-	1	-
Setaria viridis/verticilata	-	-	-	-	-	-	-	-	-	-	-	-	-
Stachys/Galeopsis	-	-	-	-	-	-	-	-	-	-	-	-	-
Stellaria media	-	-	-	-	-	-	-	-	-	-	-	-	-
Thlaspi arvense	-	-	-	-	-	-	-	-	-	-	-	1	-
Veronica hederifolia	-	-	-	-	-	2	-	-	-	-	-	-	-
Vicia sp.	-	-	-	-	1	-	-	-	-	-	-	1	-
Violacea	-	-	-	-	-	-	-	-	-	-	1	-	-
Xanthium strumarium (fragment)	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeterminate seeds	1	-	1	-	21	1	-	-	-	1	4	2	-
Seeds sum	5	4	13	2	311	11	20	8	2	2	15	15	0
Soil volume	5	12	12	1.5	40	65	13	17	0.8	5	70	50	35
Avg. density of seeds/ 1 litre of sediment	1	0.333	1.083	1.333	7.775	0.169	1.538	0.471	2.5	0.4	0.214	0.3	0
Charcoal													
Abies alba	-	-	-	-	-	-	-	-	-	-	-	-	-
Acer sp.	-	-	-	-	1	-	-	-	-	-	-	1	-
Alnus sp.	-	-	5	-	-	-	-	-	-	-	-	-	-
cf. Betula	-	-	-	-	-	-	-	-	-	-	-	-	-
Carpinus betulus	-	-	-	-	-	-	-	-	-	-	-	-	-
Cornus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Fagus sylvatica	-	-	-	-	-	2	-	-	-	-	8	-	-
Frangula alnus	-	-	-	-	-	-	-	-	-	-	-	-	-
Fraxinus sp.	-	-	-	-	2	-	-	-	-	-	-	-	-
Ligustrum vulgare	-	-	11	-	1	-	-	-	-	-	-	-	-
Lonicera xylosteum	-	-	-	-	-	-	-	-	-	-	-	-	-
Pinus sylvestris	-	-	-	-	-	-	-	-	-	-	-	-	-
Prunus sp.	-	1	1	-	-	-	-	-	-	-	-	-	-
Pomoideae	-	2	7	-	3	-	-	-	-	-	-	1	-
Populus/Salix	-	-	-	-	1	-	-	-	-	-	3	-	1
Rosa sp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Quercus sp.	-	3	21	-	34	10	-	2	-	-	24	22	2
Ulmus sp.	-	1	-	-	7	-	-	-	-	-	1	9	1
Deciduous trees	-	3	2	-	2	10	-	4	-	-	14	16	2
Coniferous trees	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeterminate seeds	-	-	-	-	-	-	-	-	-	-	-	-	-
Charcoal sum	-	10	47	-	51	22	-	6	-	-	50	49	6

FIG. 59 | Mikulčice-Trapíkov. List of identified taxons. Part 4.

Ordinal number	26	27	28	29	30	31	32	33	34	35	36	37
Context number												
Sample number	1321/15	1294/15	1277/15	1012/15	1288/15	1295/15	1286/15	1320/15	1287/15	1324/15	1293/15	1276/15
Cereal grains												
Avena sp.	-	-	-	2	-	-	-	-	-	-	-	-
Hordeum vulgare vulgare	1	1	-	21	2	2	-	3	-	-	4	3
Panicum miliaceum	9	15	11	2	16	5	13	19	9	12	14	14
Secale cereale	1	-	2	10	1	1	-	-	3	3	1	-
Triticum aestivum	7	9	12	-	11	1	12	15	5	24	3	6
Triticum dicoccum	-	-	-	-	-	-	-	-	1	-	-	-
Triticum/Hordeum	9	-	3	134	9	5	8	21	11	-	13	12
Cerealia indet (grain fragment)	10	12	18	212	22	10	20	19	5	28	26	9
Legumes												
Lens culinaris	-	-	1	2	-	-	2	-	-	-	-	-
Pisum sativum	1	2	-	3	-	-	-	1	1	1	1	1
Leg. Sat.	-	-	-	2	-	-	-	-	-	1	2	-
Fruits/Nuts												
Vitis vinifera	-	-	1	-	-	-	-	-	-	-	-	-
Oil/fiber plants												
Cannabis sativa	-	-	-	1	-	-	-	-	-	-	-	-
Linum cf. usitatissimum	-	-	-	-	1	-	-	-	-	-	-	-
Wild plants												
Agrostemma githago	-	-	-	-	-	-	-	-	-	-	-	-
Alchemilla vulgaris/ arvensis	-	-	-	-	-	-	-	-	1	-	-	-
Anthemis tinctoria/ arvensis	-	-	-	-	-	-	-	-	-	-	-	-
Asperula arvensis	-	-	-	-	-	-	-	-	-	1	-	-
Avena/Bromus	-	-	-	-	-	-	-	-	-	-	-	-
Brassicaceae	-	-	-	-	-	-	-	-	-	-	-	-
Brassica nigra	-	-	-	-	-	-	-	-	-	-	-	1
Bromus secalinus	-	-	-	-	-	-	-	-	-	-	1	-
Bupleurum rotundifolium	-	-	-	-	-	-	-	-	-	-	-	-
Carex divulsa	-	-	-	-	-	-	-	-	-	-	-	-
Carex sp.	-	-	-	-	-	-	-	-	-	1	-	-
Carpinus betulus	-	-	-	-	-	-	-	-	-	-	-	-
Centaurea/Carduus/ Cirsium	-	-	-	-	-	-	-	-	-	-	-	-
Cerastium sp.	-	-	-	-	-	-	-	-	-	-	-	-
Echinochloa crus galli	-	-	-	-	-	1	1	-	-	1	-	-
Fabaceae	-	-	-	-	-	-	-	-	-	-	-	-
Fallopia convolvulus	-	-	1	-	-	-	-	-	-	-	-	-
Fragaria vesca	-	-	-	-	-	-	-	-	-	-	-	-
Galium aparine	-	-	2	1	-	-	1	1	-	1	-	-
Galium palustre	-	-	-	-	-	-	-	-	-	-	-	-
Galium spurium	2	1	1	-	1	-	-	2	-	-	1	-
Galium sp.	-	1	-	-	-	-	-	-	-	-	-	1
Gypsophila muralis	-	-	1	-	-	1	-	-	-	-	-	-
Humulus lupulus	-	-	-	-	-	-	-	-	-	-	-	-
Chenopodium album agg.	-	-	10	1	4	1	-	4	2	-	2	1
Chenopodium hybridum	-	-	-	1	-	-	-	-	-	-	-	-
Lamiaceae	-	-	-	-	-	-	-	-	-	-	-	-
Linum sp.	-	-	-	-	-	-	-	-	-	-	-	-
Malva sp.	-	-	-	-	1	-	-	-	1	-	-	-
Melilotus/Medicago	-	-	-	-	-	-	-	-	-	-	-	-
Matricaria matricarioides	-	-	-	-	-	1	-	-	-	-	-	-
Mentha/Salvia	-	-	-	-	-	-	-	-	-	-	-	-
Poa palustris	-	-	-	-	-	-	-	-	-	-	-	-

FIG. 59 | Mikulčice-Trapíkov. List of identified taxons. Part 5.

Ordinal number	26	27	28	29	30	31	32	33	34	35	36	37
Context number												
Sample number	1321/15	1294/15	1277/15	1012/15	1288/15	1295/15	1286/15	1320/15	1287/15	1324/15	1293/15	1276/15
Poaceae	-	-	-	1	-	-	-	-	-	-	-	-
Polycnemum arvense	-	-	-	-	-	1	-	-	-	-	-	-
Pyrus/Malus	-	-	-	-	-	-	-	-	-	-	-	-
Polygonaceae	-	-	-	-	-	-	-	-	-	-	-	-
Potentilla argentea	-	-	-	-	-	-	-	-	-	-	-	-
Potentilla supina	-	-	-	-	-	-	-	-	-	-	-	-
Potentilla/Fragaria	-	-	-	-	-	-	-	-	-	-	-	-
Prunus spinosa	-	-	-	-	-	-	-	-	-	-	-	-
Prunus sp.	-	-	-	-	1	-	-	-	-	-	-	-
kernel *cf. Prunus sp.*	-	-	-	-	-	-	-	-	-	-	-	-
Bud	-	-	-	1	-	-	-	-	-	1	-	-
Rumex conglomeratus	-	-	-	-	-	-	-	-	-	-	-	-
Rumex sp.	-	-	-	-	-	-	-	-	-	-	-	-
Scirpus/Carex	-	-	-	-	-	-	-	-	-	-	-	-
Setaria viridis/verticilata	-	-	1	-	-	-	1	-	-	2	1	-
Stachys/Galeopsis	-	-	-	-	-	-	-	-	-	-	-	-
Stellaria media	-	-	-	-	-	-	-	-	-	-	-	-
Thlaspi arvense	-	-	-	-	-	-	-	-	-	-	-	-
Veronica hederifolia	-	-	-	-	-	-	-	-	-	-	-	-
Vicia sp.	-	1	-	4	-	-	-	-	-	-	-	-
Violacea	-	-	-	-	-	-	-	-	-	-	-	-
Xanthium strumarium (fragment)	-	-	-	-	-	-	-	-	-	-	-	-
Indeterminate seeds	2	1	-	3	8	4	6	9	2	2	5	1
Seeds sum	42	43	64	681	77	33	64	94	41	78	74	49
Soil volume	11	14	12	7.5	16	12	11	8	18	16	17	12.5
Avg. density of seeds/ 1 litre of sediment	3.818	3.071	5.333	90.8	4.813	2.75	5.818	11.75	2.278	4.875	4.353	3.92
Charcoal												
Abies alba	-	-	-	-	-	-	-	-	-	-	-	-
Acer sp.	-	-	-	-	-	-	2	-	-	-	1	-
Alnus sp.	-	2	1	-	-	1	-	-	1	-	1	-
cf. Betula	4	1	4	-	-	-	-	-	-	1	-	1
Carpinus betulus	-	-	1	-	-	1	-	-	2	-	-	-
Cornus sp.	-	-	-	-	1	-	-	-	-	-	-	-
Fagus sylvatica	-	1	-	4	-	-	-	-	1	-	-	1
Frangula alnus	-	3	1	-	-	1	2	-	-	-	-	1
Fraxinus sp.	-	1	-	-	1	-	-	-	-	1	1	1
Ligustrum vulgare	-	-	-	-	-	-	-	-	-	-	-	-
Lonicera xylosteum	-	-	-	-	-	-	-	-	-	-	-	-
Pinus sylvestris	-	-	-	-	-	-	-	-	1	-	1	-
Prunus sp.	1	-	1	-	2	2	1	1	-	-	-	-
Pomoideae	4	1	9	6	4	4	2	-	9	1	6	5
Populus/Salix	1	1	1	3	3	1	4	-	6	3	3	4
Rosa sp.	-	-	-	-	-	-	-	1	-	-	-	2
Quercus sp.	21	6	18	18	14	18	27	14	8	23	16	8
Ulmus sp.	10	3	2	1	7	9	5	9	3	13	7	13
Deciduous trees	8	13	9	19	18	14	8	12	18	8	14	14
Coniferous trees	-	-	-	-	-	-	-	1	1	-	-	-
Indeterminate seeds	-	-	-	-	-	-	-	-	-	-	-	-
Charcoal sum	49	32	47	51	50	51	51	38	50	50	50	50

FIG. 59 | Mikulčice-Trapíkov. List of identified taxons. Part 6.

Ordinal number	38	39	40	41	42	43	44	45	46	47	48	Sum
Context number												
Sample number	1322/15	1303/15	1279/15	1323/15	1304/15	1278/15	1-6/03	2-6/03	3-6/03	4-6/03	5-6/03	
Cereal grains												
Avena sp.	-	-	-	-	-	-	1	-	-	-	-	3
Hordeum vulgare vulgare	4	-	2	-	3	4	694	-	21	-	-	788
Panicum miliaceum	33	8	36	5	19	20	-	-	-	-	-	295
Secale cereale	1	1	3	1	1	4	44	-	1	-	-	167
Triticum aestivum	12	5	23	1	14	25	13	-	7	-	-	550
Triticum dicoccum	-	-	-	-	-	-	-	-		-	-	1
Triticum/Hordeum	6	4	17	3	-	10	71	-	11	-	-	362
Cerealia indet (grain fragment)	23	8	46	9	31	51	85	-	18	-	-	803
Legumes												
Lens culinaris	-	-	-	-	2	1	3	-	-	-	-	12
Pisum sativum	1	2	1	1	1	-	-	-	-	-	-	18
Leg. Sat.	1	-	-	-	1	-	-	-	-	-	-	13
Fruits/Nuts												
Vitis vinifera	-	-	-	-	-	-	-	-	-	-	-	1
Oil/fiber plants												
Cannabis sativa	-	-	-	-	-	1	1	-	-	-	-	3
Linum cf. usitatissimum	-	-	-	-	-	-	-	-	-	-	-	1
Wild plants												
Agrostemma githago	-	-	-	-	-	-	-	-	-	-	-	1
Alchemilla vulgaris/ arvensis	-	-	-	-	-	-	-	-	-	-	-	2
Anthemis tinctoria/ arvensis	-	-	-	-	-	1	-	-	-	-	-	1
Asperula arvensis	-	-	-	-	-	-	-	-	-	-	-	1
Avena/Bromus	-	-	-	-	-	1	-	-	-	-	-	5
Brassicaceae	-	-	-	-	-	-	-	-	-	-	-	1
Brassica nigra	-	-	-	-	1	-	-	-	-	-	-	2
Bromus secalinus	-	-	-	-	-	-	-	-	-	-	-	1
Bupleurum rotundifolium	-	1	-	-	-	-	-	-	-	-	-	2
Carex divulsa	-	-	-	-	-	-	-	-	-	-	-	1
Carex sp.	-	-	-	-	-	-	-	-	-	-	-	1
Carpinus betulus	-	-	-	-	-	-	-	-	-	-	-	3
Centaurea/Carduus/ Cirsium	-	-	-	-	-	-	-	-	-	-	-	1
Cerastium sp.	-	-	-	-	-	-	-	-	-	-	-	1
Echinochloa crus galli	-	-	-	-	-	-	-	-	-	-	-	5
Fabaceae	-	-	-	-	-	-	-	-	-	-	-	1
Fallopia convolvulus	-	2	-	-	-	-	-	-	-	-	-	5
Fragaria vesca	-	-	-	-	-	-	-	-	-	-	-	3
Galium aparine	-	1	-	-	-	-	-	-	-	-	-	8
Galium palustre	-	-	-	-	1	-	-	-	-	-	-	1
Galium spurium	1	-	1	-	1	-	-	-	-	-	-	18
Galium sp.	-	-	1	-	-	-	-	-	-	-	-	4
Gypsophila muralis	-	-	-	-	-	-	-	-	-	-	-	2
Humulus lupulus	-	-	-	-	-	-	-	-	-	-	-	1
Chenopodium album agg.	-	1	-	-	1	-	-	-	-	-	-	36
Chenopodium hybridum	-	-	-	-	-	-	-	-	-	-	-	3
Lamiaceae	-	-	-	-	-	-	-	-	-	-	-	3
Linum sp.	-	-	1	-	-	-	-	-	-	-	-	1
Malva sp.	-	-	-	-	-	-	-	-	-	-	-	2
Melilotus/Medicago	-	-	-	-	-	-	-	-	-	-	-	1
Matricaria matricarioides	-	-	-	-	-	-	-	-	-	-	-	1
Mentha/Salvia	-	-	-	-	-	-	-	-	-	-	-	1
Poa palustris	-	-	-	-	-	-	-	-	-	-	-	2

FIG. 59 | Mikulčice-Trapíkov. List of identified taxons. Part 7.

Ordinal number	38	39	40	41	42	43	44	45	46	47	48	Sum
Context number												
Sample number	1322/15	1303/15	1279/15	1323/15	1304/15	1278/15	1-6/03	2-6/03	3-6/03	4-6/03	5-6/03	
Poaceae	-	-	-	-	-	-	-	-	-	-	-	2
Polycnemum arvense	-	-	-	-	-	-	-	-	-	-	-	1
Pyrus/Malus	-	-	-	-	-	1	-	-	-	-	-	1
Polygonaceae	-	-	-	-	-	-	-	-	-	-	-	2
Potentilla argentea	-	-	-	-	-	-	-	-	-	-	-	1
Potentilla supina	-	-	-	-	-	-	-	-	-	-	-	1
Potentilla/Fragaria	-	-	-	-	-	-	-	-	-	-	-	1
Prunus spinosa	-	-	-	1	-	-	-	1	-	-	-	2
Prunus sp.	-	-	-	-	-	-	-	-	-	-	-	1
kernel *cf. Prunus sp.*	-	-	-	-	-	-	-	-	-	-	-	1
Bud	-	-	-	-	-	-	-	-	-	-	-	2
Rumex conglomeratus	-	-	-	-	-	-	-	-	-	-	-	1
Rumex sp.	-	-	-	-	-	-	-	-	-	-	-	2
Scirpus/Carex	-	-	-	-	-	-	-	-	-	-	-	1
Setaria viridis/verticilata	1	-	3	-	1	-	-	-	-	-	-	10
Stachys/Galeopsis	-	-	-	-	-	-	-	-	-	-	-	1
Stellaria media	-	-	-	-	-	-	-	-	-	-	-	1
Thlaspi arvense	-	-	-	-	-	-	-	-	-	-	-	1
Veronica hederifolia	-	-	-	-	-	-	-	-	-	-	-	3
Vicia sp.	-	-	-	-	-	1	-	-	-	-	-	8
Violacea	-	-	-	-	-	-	-	-	-	-	-	1
Xanthium strumarium (fragment)	-	-	2	-	-	-	-	-	-	-	-	2
Indeterminate seeds	3	-	6	-	6	9	-	-	-	-	-	109
Seeds sum	86	33	142	21	83	129	912	1	58	0	0	3,293
Soil volume	18	14	17	4	16	14	?	?	?	?	?	1,090.6
Avg. density of seeds/ 1 litre of sediment	4.778	2.357	8.353	5.25	5.188	9.214						
Charcoal												
Abies alba	-	-	-	-	-	-	-	-	-	-	2	3
Acer sp.	-	-	-	1	-	1	-	-	-	-	-	7
Alnus sp.	-	-	-	-	-	-	-	-	-	-	-	39
cf. Betula	2	-	1	-	-	-	-	-	-	-	-	15
Carpinus betulus	-	-	-	-	-	1	-	-	-	-	-	6
Cornus sp.	-	-	-	-	-	-	-	-	-	-	-	-
Fagus sylvatica	-	-	-	-	1	2	-	-	-	-	-	51
Frangula alnus	-	-	5	-	1	2	-	-	-	-	-	20
Fraxinus sp.	6	-	-	1	1	-	-	-	-	-	-	25
Ligustrum vulgare	-	-	-	-	-	-	-	-	-	-	-	12
Lonicera xylosteum	-	-	-	-	-	-	1	-	-	-	-	1
Pinus sylvestris	-	-	-	-	-	1	-	-	-	-	-	3
Prunus sp.	-	-	-	-	2	-	-	-	-	-	-	12
Pomoideae	5		4	1	1	2	-	-	-	-	-	79
Populus/Salix	-	-	-	2	2	1	1	-	-	-	1	59
Rosa sp.	2	-	-	1	-	-	-	-	-	-	-	-
Quercus sp.	14	15	26	15	20	24	5	-	13	-	19	528
Ulmus sp.	13		8	4	11		1	-	-	-	-	139
Deciduous trees	10	6	6	9	11	17	3	-	2	-	-	303
Coniferous trees	-	-	-	-	-	-	-	-	-	-	-	-
Indeterminate seeds	-	3	-	-	-	-	-	-	-	-	-	3
Charcoal sum	52	24	50	34	50	51	11	-	15	-	22	1,316

FIG. 59 | Mikulčice-Trapíkov. List of identified taxons. Part 8.

Year of the excavation	Performed by	Collected samples	Positive samples	Σ PMR	Volume per litre	Avg. density (PMR/l)
2003	technician	5	5	1,021	?	?
2011	technician	?	21	761	1,277	0.59
2012	archaeobotanist	10	10	154	87.1	1.76
2015	archaeobotanist	18	18	2,673	238	15.43

FIG. 60 | Mikulčice-Trapíkov. Characteristics of the input data used for further analyses.

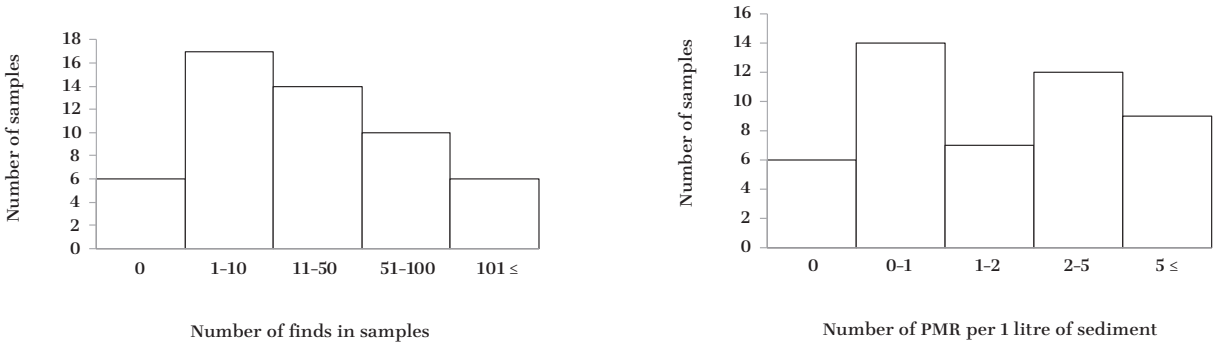

FIG. 61 | Mikulčice-Trapíkov. Histogram of the frequency of finds and their density per litre of sediment.

The analysis of the main components where these differences were considered in the samples (FIG. 62), showed a clear trend – or better, a clear difference. The samples of plant material were divided based on sampling and flotation methodology. Those sampled and flotated by technicians (group one) contained a smaller number of finds. In contrast, group three, which was sampled without flotation, contained a very high number of finds. The processing of groups one and three was negatively affected by the choice of sampling and extraction methodologies. Also in group one, which was poor in samples, the wild species seeds outnumbered the crop seeds. When considering taphonomy, the samples with a lower density of PMR per litre of sediment may represent contexts that underwent multiple transformations where the original mass was significantly diluted in favour of the deposit (KUNA et al. 2013). Such contexts may have originated, for instance, by exposing the original mass of organic remains to erosion, human or animal activities, transport and mixing with other deposits. From the taphonomic point of view, the plant macroremains got into the place of excavation – an archaeological deposit, the backfill of a feature or a cultural layer – secondarily. Group one contained a high proportion of wild species, while cultivated species accounted for a third of all finds. Contrarily, group three contained almost exclusively cultivated crops. This may have been due to the targeted collection of the concentrations of cereal grains.

Group two, in which the systematic collection of archaeobotanical samples (point sampling interval strategy) and a consistent flotation methodology were employed, provides a different picture than the other two groups. It contained a high number of finds, dominated by the seeds of cultivated species (cereals and legumes). These samples contained a maximum of 20% of wild species. Given the relatively high incidence and high density of the finds, these samples can be considered as the remains of storage rid of weeds, which were not subject to complex pre- or post-deposition transformation. The proportion of cultivated crops and wild species is more balanced in these samples and may thus be the remains of uncleaned storage or the waste and products resulting from post-harvest processing and cleaning of crops.

When the samples were grouped based on the features in which they were found, the results of the comparison of the main components were completely different than when grouped based on the individual samples (FIG. 63). As the graphic shows, cultivated crops outnumbered wild species in most of the examined features. However, wild species dominated in features that had not been methodically sampled and flotated.

At a single-phase settlement of the Trapíkov type – a site with an uncomplicated stratigraphy and similarly dated features that do not overlay each other and the dating of which is confirmed by the results of absolute dating – a significantly diverse composition of PMR is highly improbable. If found, it is probably the result of substandard sampling and flotation methodology in some of the samples.

Macroremains analysis

We can now present a detailed assessment of the studied material from the point of view of the utilitarian value of the cultivated plants and the ecological value of wild species in the Great Moravian period.

Cultivated crops

A total of 11 crop species were identified and divided into four groups based on their importance for people: cereals, legumes, fruits and fibre crops.

Cereals

In the assessed assemblages, cereals were the most commonly found macroremains. A total of 27% of the 2,969 charred cereal grains were damaged beyond recognition. Such undetermined finds were excluded from some of the analyses that followed. The assemblage did not contain any spike rachises or other types of cereal chaff.

Among the closely determined finds was a high proportion – over 50% – of millet in almost all of the assessed samples. In group one, the combination of millet and rye was dominant, while group three was dominated by millet (in two samples) and barley. The samples from both groups were flotated by technicians. Group-two samples provide a different picture: this group most often contained a combination of millet and common wheat (FIG. 64). The composition and range of cereal species were similar to the data from the acropolis and the fortified outer bailey (LÁTKOVÁ 2017, 47–55).

The high proportion of common wheat, a quality cereal used for bread making, is surprising; such a composition of cereals tends to be more common in the central part of the Mikulčice agglomeration. At the Kopčany settlement, the archaeobotanical research has proven the combination of rye and millet (LÁTKOVÁ 2014a, 116–117). Earlier data (samples from 2011 and 2012) from Mikulčice-Trapíkov also indicated such a composition of cereals as common at the settlement (LÁTKOVÁ 2014a, 113–128, LÁTKOVÁ 2017, 169). This is why such differences in the composition of cereals are worthy of attention. They were probably caused by differences in the sampling methodology of archaeobotanical material. Unless there is a revision excavation, it is impossible to say whether these differences were not caused by variations in the flotation technique.

Exceptional finds in this context include a single whole grain and the apical part of the grain of emmer wheat, *Triticum dicoccum*. The occurrence and cultivation of awned wheat – including emmer wheat – was typical mainly of early Prehistory (KOČÁR/DRESLEROVÁ 2010, 207–208). It is not supposed that awned wheat have been cultivated in the Middle Danube area as early as the Early Middle Ages (HAJNALOVÁ 1993, 47–53, KOČÁR/DRESLEROVÁ 2010, 207–208). In this archaeological context, it is probably the case of contamination from earlier, prehistoric layers (phases) of the Mikulčice stronghold, which had been documented from the Eneolithic (Poláček/Marek 1997).

The evaluation of the frequency of the occurrence of the finds of various crops showed that the most commonly found crop is millet, which was found in over 97% of all samples containing cereals.

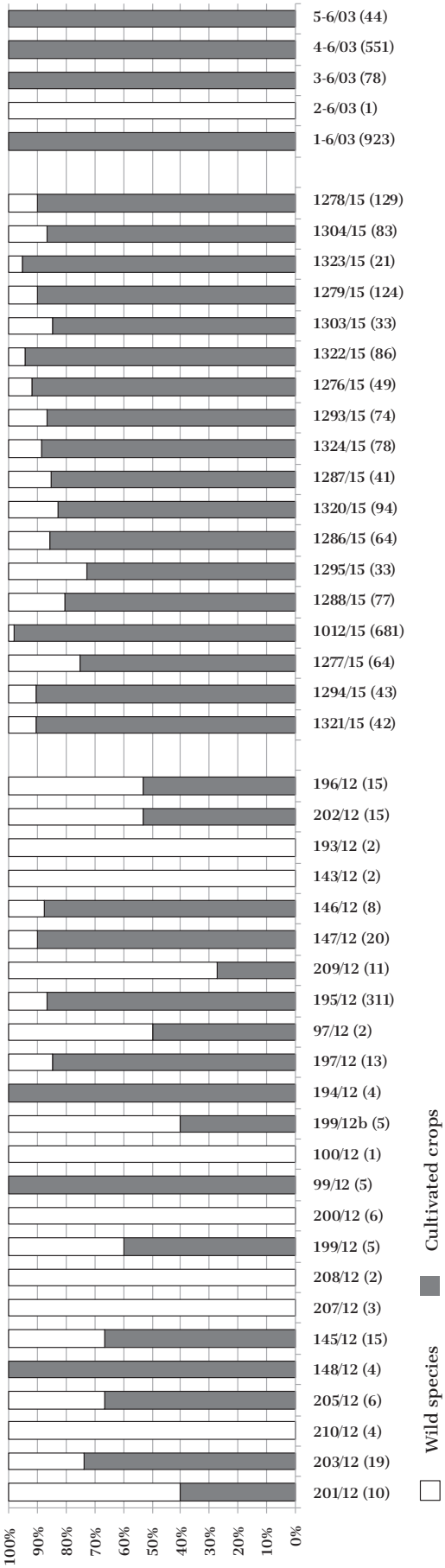

FIG. 62 | Mikulčice-Trapíkov. Composition of the main components in the samples, n = 3,919 (the numbers in brackets indicate absolute numbers of finds).

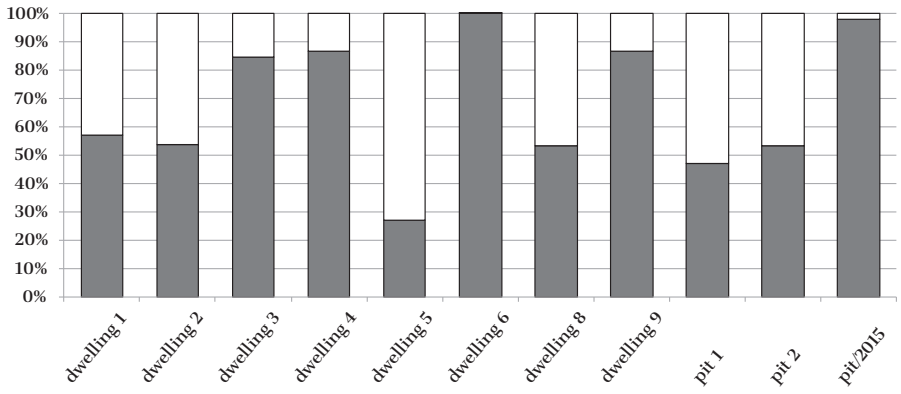

FIG. 63 | Mikulčice-Trapíkov. Composition of the main components in features, n = 3,919.

The second most common was common wheat, followed by husked barley and rye (FIG. 65). Labour-wise, millet is a more demanding crop as it needs a lot of care at the beginning of its vegetation cycle (BERANOVÁ/KUBAČÁK 2010, 74). Overall, it can be stated that the range of cereals and the proportions of different species in Mikulčice-Trapíkov is equal to those in both the fortified and unfortified parts of the agglomeration.

The value of seed density – the number of finds per litre of sediment – is one of the most objective indicators of the samples' properties. The variance of the density of the archaeobotanical finds from the sediments is also demonstrated on the box plots (FIG. 66). The greatest variance was determined in millet and common wheat. The variances in density in the remaining cereals (rye and barley) were low, with values in the same interval. A comparison of the variance of the values for cereals showed that the finds of wheat and millet are more typical of this site and that they were found in higher average densities than other cereals.

Legumes

A total of 43 charred seeds and fragments of legumes were retrieved from the sediments. This group of finds contains only two species – the lentil (*Lens culinaris*) – 12 finds in 7 samples – and the pea (*Pisum sativum*) – 18 finds in 14 samples. A total of 13 fragments of cultivated legumes (*Leguminosae sativae*) were found in 7 samples, which could not be closely determined.

Fruits

Cultivated fruits were represented in Mikulčice-Trapíkov by a single find – grapevine. A grape seed was preserved by carbonisation in dwelling 9, which was the only one to have been methodically sampled and flotated by an archaeobotanist. This proof of the existence of grapevine at the periphery of the Mikulčice agglomeration is both unique and exceptional because most remains of delicacies have come from the fortified part of the agglomeration. As in Trapíkov, a single carbonised grape seed has been found in Kopčany, while other cultivated fruit species come from the agglomeration's centre (LÁTKOVÁ 2017, 180).

Fibre crops

The finds of seeds from fibre and/or oil crops were sporadic in the Mikulčice-Trapíkov assemblage of macroremains. They contained three hemp seeds (*Cannabis sativa*) and one linen seed (*Linum usitatissimum*).

Wild species

The wild species assemblage contained 276 finds from 41 samples, which were classified into 29 plant taxons. As at other sites, the finds were preserved in the form of carbonised remains. Based on their life form (woody plants, herbs, grasses), their modern ecology, yield and use, they were categorised into the following groups: gathered fruits, arable weeds, ruderals, meadow and pasture species, forest species, woody plants and shrubs (FIG. 67).

The **gathered fruits** category contained only three closely identified taxons (6 finds) and two unspecified fragmentary finds, which could not be classified. This category of finds is represented by utility species (e.g. *Carpinus betulus* and *Humulus lupulus*), which, hypothetically, might have served as diet enrichment, as medicine or for other purposes. The plum, *Prunus spinosa*, might have been part of the human diet; some plum stones could not be closely identified (*Prunus sp.*). Cultivated forms of the above species have been known from Mikulčice (OPRAVIL 1962; 1972; 1978; 1983; 1998; 2000; 2003; LÁTKOVÁ 2017), which is why we cannot exclude that the stones come from cultivated fruit.

The Trapíkov archaeobotanical assemblages contained numerous finds of hornbeam, *Carpinus betulus* – both carbonised fragments and whole fruits. Carbonised finds of hornbeam fruit have been found in settlement contexts, cultural layers as well as at the acropolis and outer bailey. Waterlogged sediments retrieved during the excavations contained non-carbonised hornbeam nuts (LÁTKOVÁ/HAJNALOVÁ 2014). Carbonised hornbeam seeds and fragments thereof have often been found in different parts of the Mikulčice agglomeration, which suggests that

they were utilised in some way. Young twigs with fruits might have served as leafy fodder[27] while crushed/pressed fruits produced oil (*cf.* Bui 2014).

Information on utility species from Mikulčice-Trapíkov is fully in accordance with archaeobotanical findings, which come from the central fortified part of the agglomeration (although it has turned up a broader range of botanical taxons) as well as other early medieval sites (such as Břeclav-Pohansko, Žatec and Praha – Malá Strana). The smaller number of taxons of gathered species in Trapíkov was caused by local ecology (low groundwater) and the method of archaeobotanical sampling and extraction.

Arable weed species constitute a group of 110 finds categorised in 23 taxons. These include species also known from the settlement contexts at the acropolis and the fortified outer bailey (Látková 2017, 61–63). The most common and most numerous are *Fallopia convoluvulus, Galium spurium, Chenopodium album agg.* – plants that are today classified as common field and garden weeds. Among these are also species that are now scarce in fields (such as *Matricaria matricarioides, Bupleurum rotundifolium, Agrostemma githago* and *Asperula arvensis*).

Weed communities are represented by species from field systems and most often are ruderal species and weeds associated with spring crops, roots and tubers. Phytologically, these communities are close to the habitats of the *Polygono-Chenopodietalia* and *Sisimbrietalia* orders. Spring crop weeds often come from millet fields, which is indicated by species such as *Chenopodium album agg.*, *Chenopodium hybridum*, *Echinochloa crus-galli* and *Setaria viridis/verticilata*, which are also documented in the archaeobotanical samples from Trapíkov.

Meadow and pasture species are relatively rare in the samples (3 taxons, 6 finds). These include species that flourish in fresh to slightly wet soils, as well as dry site species, such as *Alchemilla vulgaris/arvensis*, *Fragaria vesca* and *Potentilla argentea*.

Hygrophilous species are also rare (6 taxons, 7 finds) in the periphery of the Mikulčice agglomeration. Rather than in permanently wet biotopes and river banks, the hygrophilous species (*Rumex conglomeratus, Carex divulsa, Poa palustris* and *Potentilla supina*) come from wet and waterlogged meadow biotopes. Reed and sedge biotopes were represented by the relatively common finds of different species of high sedge (*Carex sp.*), which have been commonly found in settlement features.

The seeds of wild species from biotopes other than field cultures are evidence of thermophilic **ruderal vegetation** communities. These are communities thriving in landfills near human dwellings that are disrupted and relatively rich in nutrients. This community was represented by the finds of *Xanthium strumarium*. Ruderal communities with perennial plants were represented by the finds of *Galium spurium*, seeds, another weed in cereal fields.

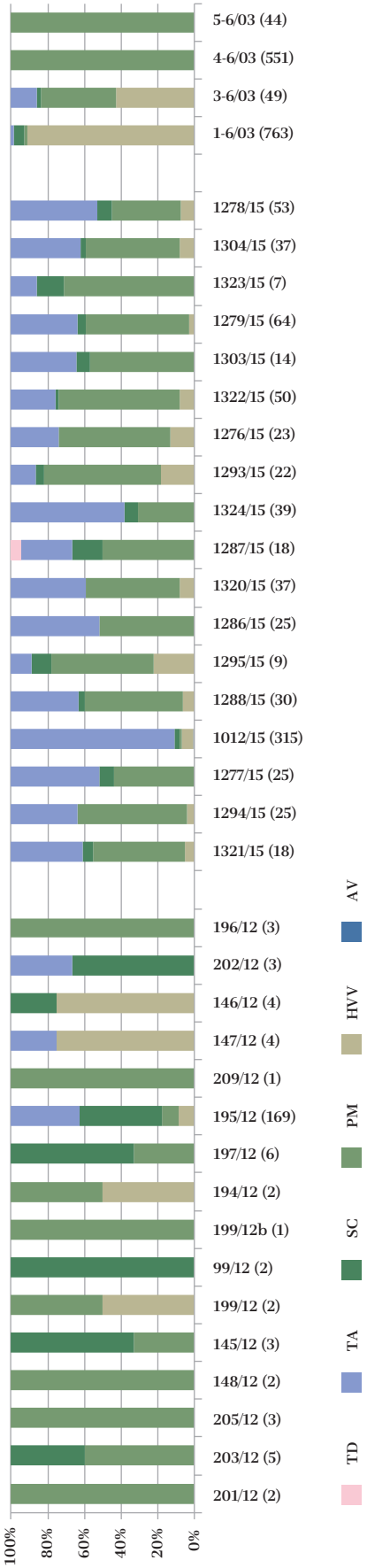

Fig. 64 | Mikulčice-Trapíkov. Proportion of grain species, entered as absolute numbers after excluding all unidentified fragments, n = 2,969. Legend: SC – rye, *Secale cereale*, TD – emmer wheat, *Triticum dicoccum*, TA – common wheat, *Triticum aestivum*, PM – millet, *Panicum miliaceum*, HVV – common awned barley, *Hordeum vulgare-vulgare*, AV – oat *Avena sp.*

27 Hornbeam nuts ripen in September and fall off as late as winter (Dostál/Červenka 1991, 132).

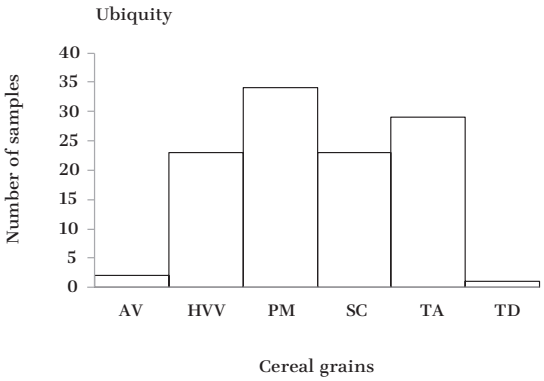

FIG. 65 | Mikulčice-Trapíkov. Presence of cereal species in terms of crop significance (frequency of occurrence). Legend: SC – rye, *Secale cereale*, TA – common wheat, *Triticum aestivum*, PM – millet, *Panicum miliaceum*, HVV – common awned barley, *Hordeum vulgare-vulgare.*

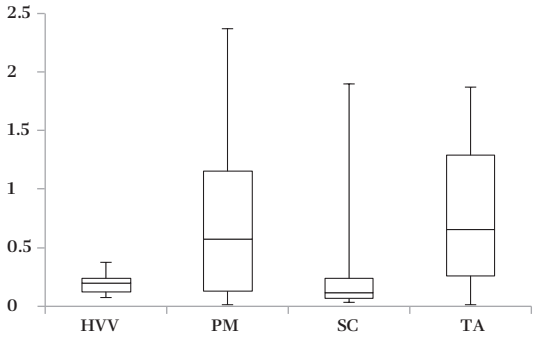

FIG. 66 | Mikulčice-Trapíkov. Box plot of the crop seeds finds.

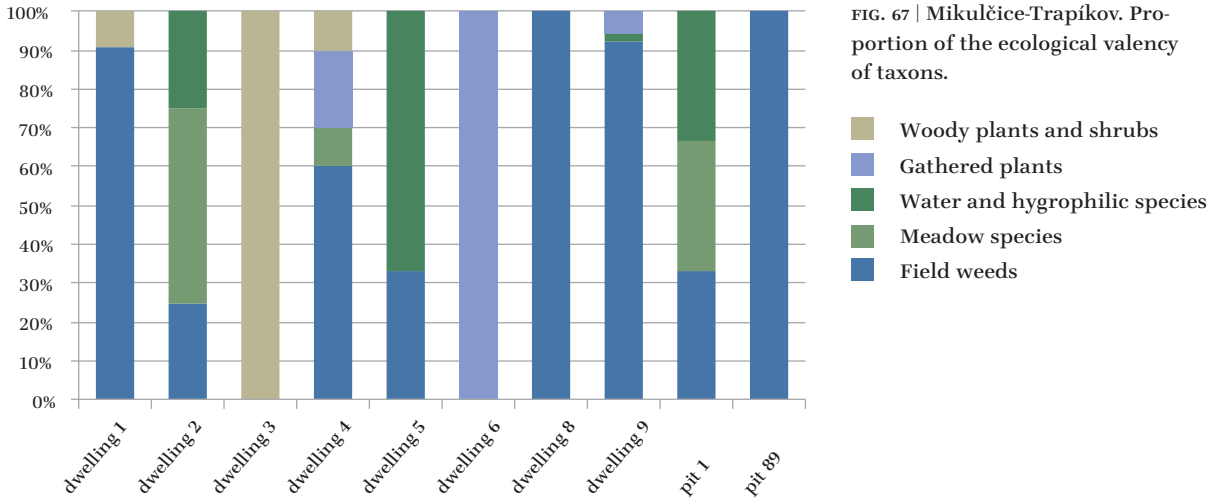

FIG. 67 | Mikulčice-Trapíkov. Proportion of the ecological valency of taxons.

Anthropologically influenced peripheral communities in the vicinity of human settlements were represented by the common hop (*Humulus lupulus*).

7.2.3.3 The Relationship Between the Mikulčice-Valy Stronghold and Its Peripheries

To determine the similarities – or a lack of them – between the samples from the peripheries of the Great Moravian sites of Mikulčice-Valy and Mikulčice-Trapíkov, we used detrended correspondence analysis, a multidimensional statistical method. The input matrix with the data for the multidimensional statistical analysis included the most frequently occurring cereals as variables (after excluding the finds of emmer wheat and unidentifiable cereal grains) and all samples containing over five finds. The value entered for the individual taxons was density. The result of the correspondence analysis (DCA1) showed that all the samples were more or less similar and formed a single, relatively uniform, group. The two factors that most significantly influence the positioning of the samples is the combination of species and the density of the finds in the samples. While samples rich in wheat (left) and millet (right) were divided along the first gradient (the horizontal axis), the second gradient (the vertical axis) divided the

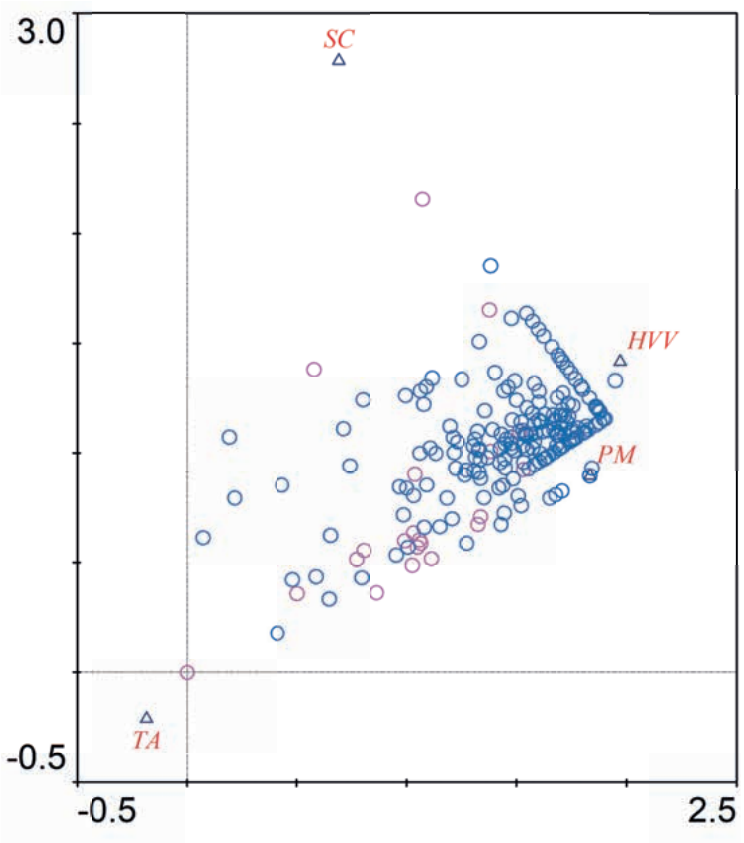

FIG. 68 | Mikulčice-Trapíkov. DCA1-biplot, showing the examined sites in relation to the cultivated crops.

samples containing wheat (bottom) from those containing rye (top). When highlighting information on excavation sites (FIG. 68), it became clear that the samples were similar, constituting a single whole, which was divided according to the cultivated cereals. The samples from the sites on the periphery of the agglomeration were richer in wheat and millet. The finds of these cereals were generally denser in Mikulčice-Trapíkov, while the samples from the Great Moravian stronghold at Valy were richer in the grains of millet, barley and rye.

Another analysis (DCA2), based on similar principles, was carried out for sites on the peripheries of several Great Moravian central sites. This analysis included samples from the periphery of the Great Moravian stronghold of Břeclav-Pohansko and seven samples from GM phase at Kostice – Zadní hrúd.

The output of the correspondence analysis, where information on the origin of the samples was put in a graph, also showed clear differences between the sites (FIG. 69). The distribution of samples from different sites was similar to that in the previous analysis (DCA1). The samples were also very similar in this analysis – all crops were present at all sites. As in the previous case, the Kopčany samples, which were characterised by a high density of rye finds, stood out the most. Samples from Kostice – Zadní hrúd (all from GM phase), which were not characterised by a particular crop, also differed slightly. The samples from Kostice appeared to be very singular, with different dominant cereal species in each sample. However, in general, the samples from Kostice were more similar to those with higher densities of wheat and millet finds, as was the case at Mikulčice-Trapíkov. Millet was the most characteristic crop at all the examined sites and represents what they all had in common.

Overall, the situation at the four sites regarding cultivated crops was different. The central fortified part of the Mikulčice agglomeration is characterised by samples with higher densities of the finds of millet, barley and rye. While the significantly greater proportion of rye in the Kopčany samples may indicate the exploitation of different soils or the use of other agrotechnical processes – and thus a different source of food – the greater proportion of wheat in the samples from the Mikulčice acropolis may reflect the consumption of food with a different "status". The notable similarity of the finds of wild species from all positions (except Kopčany) indicates that the fields were situated in similar biotopes and farmed using similar agrotechnical processes.

When assessing the results of the DCA3 analysis, which focused on the relationship of the PMR and the character of the wild species, the presence/absence method was used rather than a method factoring in the numbers of seeds in the samples (for arguments, see LÁTKOVÁ 2017, 107–108). It is assumed that only a short time passed between the circulation of the PMR in a living culture and their depositing in the examined contexts. These are typically the remains of common kitchen processes (e.g. in the floors of dwellings), finds from places serving the accumulation of kitchen waste or waste from cereal processing (waste pits or depressions in the place of the defunct sunken dwellings).

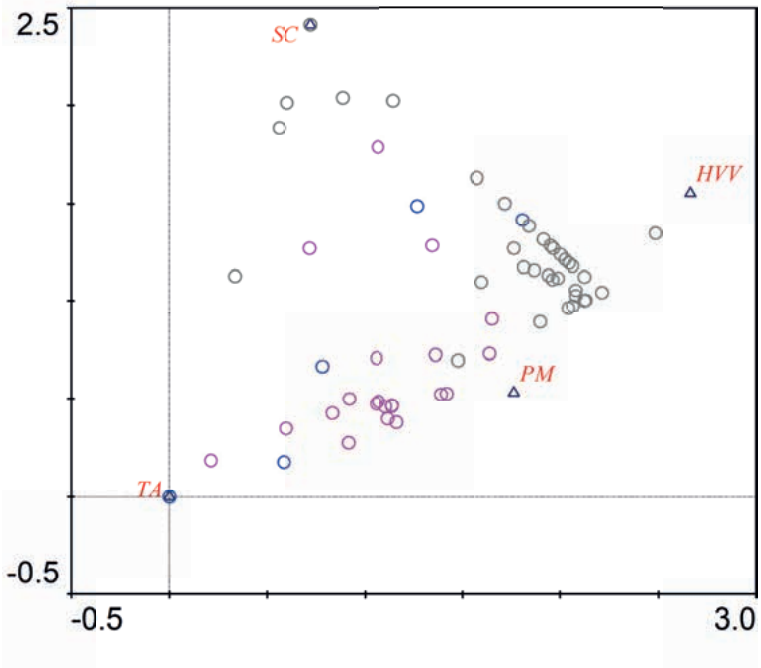

FIG. 69 | Mikulčice-Trapíkov. DCA2-biplot showing the examined sites in relation to the cultivated crops.

Species
△

Samples
○ Trapíkov
○ Kostice – Zadní hrúd
○ Kopčany

The results of DCA3 showed that the Kopčany contexts have the highest data variance (FIG. 70). In Kopčany, this problem is due to the PMR having a wider range of plant species and that they are dislocated – mixed in the deposits (LÁTKOVÁ 2014b). The samples from the Mikulčice-Trapíkov and Kostice – Zadní hrúd sites, which mostly come from common settlement features, show more similarities in their position in the ordination chart. The DCA4 analysis demonstrates the relationship of the samples of wild species from the agglomeration's periphery (Trapíkov) and the central part (acropolis and outer bailey) (FIG. 71). A similar location of samples enables us to assume that their character was similar. The similarity of the composition of the PMR in the cultural layers and the backfill of "common" settlement features is understandable as the formative process is closely linked to similar settlement activities. The similarity of the samples in these contexts indicates that they were formed by similar settlement activities and waste deposition. The similarities and differences in the spectrum of species in the PMR from different sites depend on what settlement activities they reflect, how quickly the PMR was deposited and what formative and post-disposal processes were involved in the formation of the deposit. The fact that samples from the same site are scattered and not concentrated in a single part of the ordination charts indicates that each feature contains the remains of different settlement activities.

Multi-dimensional statistical analyses, applied to the assemblage of archaeobotanical samples, show that there are significant differences between the examined sites, which are caused by different combinations of cultivated cereals and the accompanying wild species. These differences between some of the areas are probably due to the different taphonomic processes involved in the formation of waste and intermediate products contained in the examined archaeobotanical assemblages.

7.2.3.4 The Formation and Taphonomy of the Samples

Before evaluating and interpreting an assemblage of archaeobotanical material, it is important to consider the processes and factors that led to its formation and affected the composition of the samples.

The first factor is **the preservation of the plant macroremains.** All the finds in the evaluated assemblage were preserved by carbonisation. Carbonised finds usually include the remains of crops, the plants that grew on the same fields, ruderal vegetation – which possibly grew and was burnt at the same place – and gathered plants.

When reconstructing past agrotechnical practices based on the assessment of the common occurrence of crop and arable weed species, it is important **to eliminate spurious combinations of species** due to the mixing of species/finds from different sources – different crop communities, different settlement activities or depositional events. An extreme solution would be to include only PMR from "closed" contexts (*sensu* JACOMET/KREUZ 1999, 77–78), i.e. those with a high density of PMR, the deposition of which was probably the result of a single event (e.g. burnt storage) (BOGAARD 2004, 61). A. Bogaard (*ibid.*) also pointed out that in such samples, all crop and weed remains are likely to derive from harvested fields, possibly even from the same field or cluster of fields. Unfortunately, such samples are rare and often contain very little or no weed seeds, which are important for the reconstruction of agricultural practices. On the other hand, they can contain edible "contaminants", such as delicacies and gathered fruits, which got into the storage in a different manner and do not reveal any agrotechnical practices. On the contrary, "open contexts", such as waste deposits, which generally have a lower density of PMR and were generated over a longer period, also contain waste from post-harvest crop processing. As several

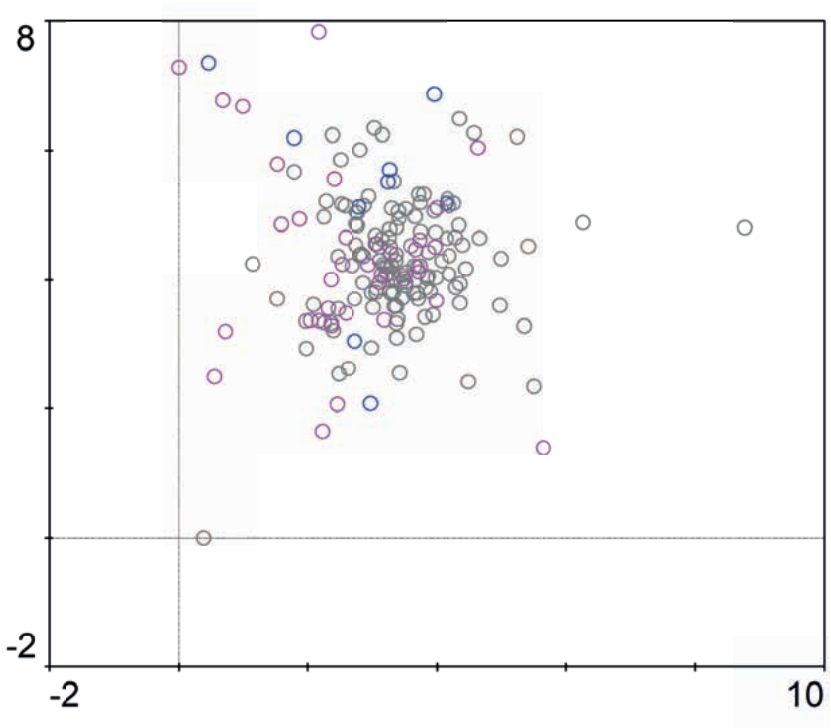

FIG. 70 | Mikulčice-Trapíkov. DCA3 showing the examined sites in relation to the wild species.

Samples
- Trapíkov
- Kostice - Zadní hrúd
- Kopčany

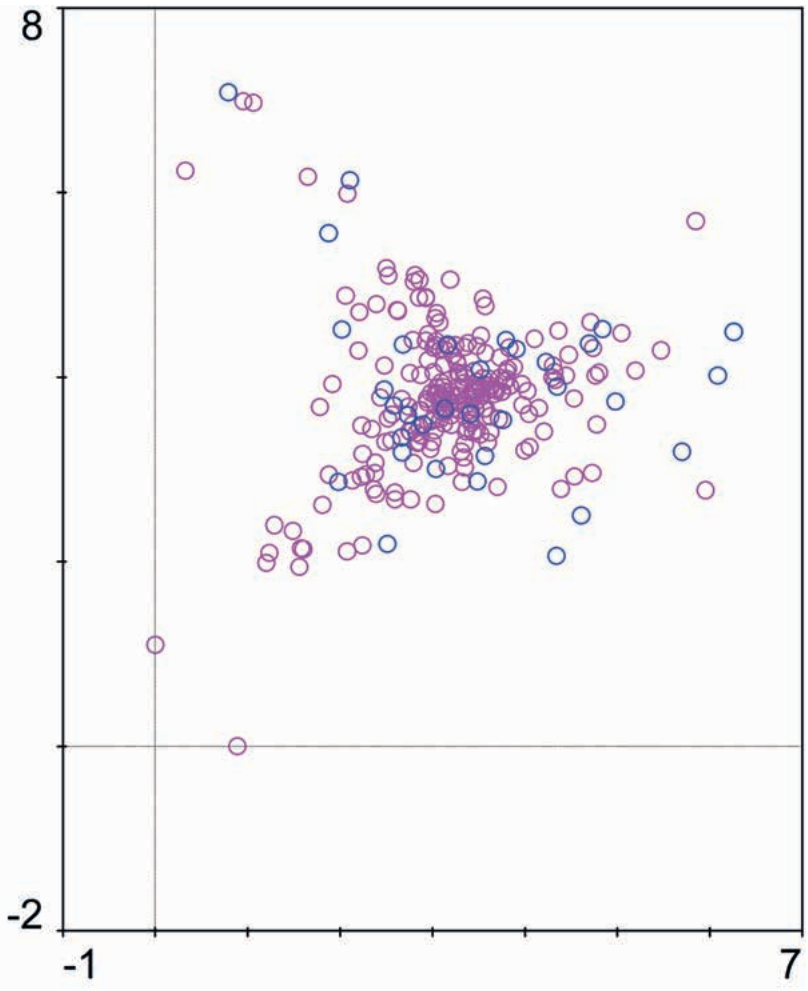

FIG. 71 | Mikulčice-Trapíkov. DCA4 showing the examined sites in relation to the wild species.

Samples
- Mikulčice
- Trapíkov

authors (e.g. Hillman 1984; Jones 1984) have demonstrated that it is the processing waste that provides important information about past arable culture communities – and thus indirectly gives evidence of agrotechnical practices and subsistence strategy – both types of contexts have been used in the analyses presented below. Third, it is important to determine the origin of the samples, using such methods as taphonomic analysis to determine whether the samples are products (storage) or different types of waste resulting from post-harvest processing.

The (paleo)economic nature of the Mikulčice-Trapíkov archaeological site

The archaeobotanical methods, which help us to determine the origin of samples in terms of the steps in post-harvest crop processing are based on ethnographic observations of traditional pre-industrial farming practices and processes (Hillman 1984; Jones 1984; 1990; Fuller/Stevens 2009). Two taphonomic methods were used to determine the origin of the samples in this respect – a method examining the physical properties of the seeds of arable weed species (Jones 1984), and a method which evaluates the crop/weed ratio and the proportion of large and small weed seeds (Fuller/Stevens 2009). The results of both the methods applied at the Mikulčice-Trapíkov site were published in a paper dedicated to a comprehensive evaluation of the processing of the archaeobotanical material from Mikulčice, including the plant material from Trapíkov (Látková 2017, 86–96). To repeat the results here would be unnecessary although they must be re-interpreted in the light of new facts.

In the case of the method based on discriminate analysis, which focused solely on wild species and their physical properties, the archaeobotanical samples from Mikulčice-Trapíkov were classified into two out of four possible categories: fine sieving waste and products. Winnowing and coarse sieving have not been identified in the Trapíkov settlement area (Látková 2017, 86–96). It is evident that the sampling and extraction methodology contributes, to a certain extent, to the results. Given that no archaeobotanist was present during these two basic steps, we should admit to a certain loss of information that most probably influenced the results. The second method is also based on the assumption that impurities are gradually eliminated in a series of steps. In this way, the proportion of crop seeds gradually increases to a point where they prevail in storage. In addition, the proportion of large seed weeds gradually increases, while the small weed seeds have been eliminated at the beginning (Fuller/Stevens 2009). As when using the previous method, the samples were classified only in the later stages of post-harvest crop processing. The samples were entered into a graph where waste from partially cleaned storage was expected to occur. As in the previous method, categories representing the initial stages of crop processing were not evidenced (Látková 2017, 86–96). A similar, but not identical picture is given by data from the fortified areas in the central part of the stronghold (Látková 2017, 86–96), which proves that similar taphonomic processes – post-harvest crop processing – were involved in the formation of the archaeobotanical PMR assemblages from the peripheries of the Mikulčice agglomeration.

Agricultural activities in Mikulčice-Trapíkov

The (paleo)economic assessment of the peripheries of the Mikulčice agglomeration focuses on answering the question of whether there is archaeobotanical evidence of local crop production or the consumption of crops grown and processed elsewhere. These issues can be addressed using taphonomic methods (above), which can be interpreted from an economical point of view. Ethnographic observations (Hillman 1981; 1984; Jones 1984) have shown that intermediate products and waste from both the early and final stages of crop processing are found at sites where the entire processing takes place – production sites. Places, where only final products are imported, do not contain waste from the initial crop processing phases; they contain only waste from the final steps in the post-harvest process – final products and/or waste from cleaning before consumption. If such finds are archaeologised – i.e. they undergo carbonisation and deposition – production and consumption sites will differ by the presence and absence of waste from the early stages of post-harvest processing. The results of taphonomic analyses show that at the peripheries of the Mikulčice agglomeration, no evidence of activities associated with the early stages of post-harvest crop processing has been found. These arguments picture the assessed unfortified areas on the outskirts of the Great Moravian agglomeration as areas of consumption (Látková 2107, 101–102).

The second method addresses the ability of the community to mobilise labour during one of the most stressful periods of the agricultural year – harvest. According to D. Fuller and C. Stevens (2009), archaeobotanical material can be used to distinguish settlements with inhabitants who produced crops at the household level and those where they produced it at a higher level of social organisation (community and/or centrally managed). At the same time, communities producing food at a higher level of social organisation should indeed have been able to mobilise enough labour to ensure that the crops were processed as much as possible immediately after harvest. Such archaeological material contains only clean storage (grain-free of chaff and straw but with large weed seeds) or waste from the cleaning of storage before consumption (large weed seeds). Communities on the level of households are not able to perform all the steps of post-harvest processing at once. They usually store only partially processed crops and then go through the remaining stages over the following months. Archaeological material from household-level communities contains

a large number of small seeds, husks and straw (Fuller/Stevens 2009). The data from the peripheries of the Mikulčice agglomeration mainly documents the presence of the remains of storage and/or waste from the cleaning of relatively well-cleaned storage (Látková 2107, 102–103). Considering this model, it can be assumed that a community that produced such storage (and waste) would have been able to secure and organise sufficient labour at harvest.

Identical results were obtained by applying these two models to data from other parts of the agglomeration (Látková 2017, 86–96). The archaeobotanical material thus indicates that there are no differences between the fortified parts and the periphery of the agglomeration in terms of the type of storage, the type of waste from crop processing and the ability to mobilise the workforce during crop production. Considering the above findings, it can be assumed that there were no differences between the central and peripheral parts of the Mikulčice agglomeration in terms of the economic strategy involving the procurement of plant foodstuffs. These findings confirm the hypothesis concerning the organisation of agricultural labour in the Mikulčice agglomeration, which assumes that at times of labour shortage, people who were not farmers participated in agricultural work, such as harvesting and the initial processing of crops. It has recently been hypothesised that the inhabitants of the acropolis at Valy participated in agricultural activities, thus helping the farmers who lived in the peripheries. They probably carried out this work outside of the examined parts of the agglomeration (Látková 2017, 103–104).

Storage and processing of agricultural products

Among other archaeological material and artefacts, the finds from Mikulčice-Trapíkov contained a relatively large spectrum of fragments of burnt clay. Part of this is the remains of roasting trays – equipment used for the roasting (or possibly drying) of grains. The remaining finds are fragments of daub used for spreading on wooden structures. A total of 202 fragments with a total weight of 13,135 g were examined and 415 imprints of plant macroremains and tissues were obtained from these fragments. The major differences between the two types of finds from the site were the amount and character of the organic admixtures in the material: the material from which the roasting trays were made contained a high proportion of organic material (70%) in the form of grains, husks, stalks and leaves. All the analysed fragments had approximately the same thickness of walls, which ranges from 2 to 2.5 cm.

The analysis of seed imprints in the roasting trays revealed a different range of cereals than the evaluation of grains retrieved by flotation. The most frequently identified imprints on the roasting trays belonged to husked barley and millet. Because of the high number of barley grains, it can be assumed that the straw admixture was also barley. It is too soft to be suitable for construction purposes. When determining the imprints of seeds and other vegetative parts of plant material, the problem is that the species can easily be confused as the imprints can only be observed from a single angle. Therefore, the analysis of seed imprints cannot be relied on when reconstructing the crops consumed at a certain site. Such information can only be used to confront plant material obtained by standard and methodologically correct procedures.

In daub, the organic admixture was often replaced by an inorganic one, which is why the presence of organic material could not be confirmed visually or microscopically. Nevertheless, the organic admixture is an essential part as it is the "frame" in daub/soil used for smearing buildings. Daub with no organic admixture had to be renewed more often. The daub fragments from Trapíkov contained the imprints of thin twigs, construction details and fingerprints. These are the remains of wattle, which was subsequently covered with daub. This type of artefact possibly comes from lighter architectural constructions, such as interior walls/partitions or smaller household equipment, for example, vessels for the storage of cereals made from wattle sealed with liquid clay. It cannot be excluded that they are the remains of a certain form of above-ground granaries.

The issue of storing crops is a fundamental problem in terms of the knowledge concerning the economic aspect of the Mikulčice agglomeration. No archaeological structures, which could be clearly defined as storage facilities, have been found throughout the area. Ethnographic material shows that grains (and other agricultural products) can be stored in a wide range of both immobile and mobile structures (Hajnalová 2012, 30–32, 119–120). Two of these have been extensively archaeologically documented: grain pits and ceramic vessels. Much more difficult (or impossible) to detect are above-ground structures (granaries). Archaeological literature indicates that above-ground granaries and other high-volume forms of above-ground crop storage are used where the conditions do not allow the digging of deep pits (unsuitable subsoil, as is the case of the Mikulčice acropolis and its vicinity) or when there is a need to access the crops daily (van der Veen/Jones 2006). It is thus reasonable to assume that cereal grains were stored in special above-ground buildings (granaries), facilities (wattle-and-daub or wooden chests) and vessels.

Cereal pits closest to the Mikulčice agglomeration are at Mikulčice-Podbřežníky (3 km from the centre; Mazuch 2008, 165–181) and Mutěnice-Zbrod (9 km from the centre; Klanica 2008, 185). Based on the above information, and the most recent archaeobotanical analyses (Látková 2017, 105), we assume that the early medieval grain (storage) pits from Podbřežníky were used for long-term storage of grain intended for consumption. It is also possible that they contained overproduction or exports.

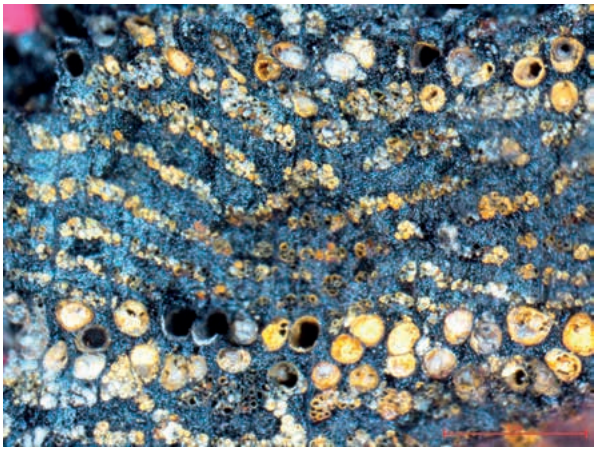

FIG. 72 | Mikulčice-Trapíkov. The transversal fold atoms (*Ulmus sp.*) where the vessels are filled with ferric nodules.

7.2.3.5 Anthracological Analysis

The second group of plant macroremains evaluated in this study are carbonised woody plants. Like seeds, the finds of charcoal come from the backfill of settlement features (dwellings and pits). A total of 1,316 charcoals were obtained from the assemblage, which were classified into species or genera. The identification of the Mikulčice charcoal was complicated because iron oxide concretions had spread through the organic material due to high iron and manganese content in the local sediments (which, in turn, occurred there as a result of the rise of groundwater). Based on the type and layout of vessel elements and tracheids in the charcoals, the finds are commonly determined. However, it was very difficult to determine the material from Mikulčice, which is relatively often filled with iron oxide concretions (FIG. 72). Also, such heavy charcoal pieces remain in the heavy residuum in the flotation tank. Therefore, a relatively large amount of charcoal pieces have been only broadly categorised (e.g. as broad-leaved).

The assemblage of determined finds is dominated by oak, *Quercus sp.*, which was present in 76% of the samples. The second most numerous was elm, *Ulmus sp.* (48% of samples). Also fairly common were the finds of poplar/willow (*Populus/Salix*), where the wood structure is very difficult to distinguish. Species such as alder (*Alnus sp.*), ash (*Fraxinus sp.*) and glossy buckthorn (*Frangula alnus*) were also found quite frequently. The apple subfamily (*Pomoideae*)[28] was represented by 79 fragments found in 21 samples (44%). There were also rare finds of conifers. Two of these could be categorised as silver fir (*Abies alba*) and Scots pine (*Pinus sylvestris*). A total of 10 fragments (0.75%) were classified as conifers, while 303 charcoals (23%, FIG. 73) were classified as deciduous wood.

28 This taxon includes such species as rowan, hawthorn, apple and pear tree.

The combination of species from different objects is significantly different. Finds of oak (*Quercus sp.*) charcoal were common in all the features. High numbers of oak charcoal were common in almost all archaeobotanically studied areas of the agglomeration. Visual examination of the oak charcoal fragments revealed highly varied widths of the annual rings. The large distance between the annual rings, which is typical for the Mikulčice finds of both carbonised and non-carbonised wood, make dendrochronological dating immensely difficult. Even relatively large pieces of wood and whole stakes (e.g. from the bearing construction of the Mikulčice bridge) contain less than the 40 annual rings that make dendrochronological dating possible. This problem is because some of the oaks grew close to watercourses, in areas with high groundwater levels. Such wood has relatively large increments of the woody mass. However, the assessed file from Mikulčice-Trapíkov also contained wood remains with very small annual increments, which may indicate that some oaks grew in significantly drier and probably also higher positions in the surrounding terrain.

The most varied charcoal assemblage comes from dwelling 9, the flotation of which was an example of correct methodology (see Chapter 7.1.3) and contained 18 taxons. Oak charcoals were again dominant in this dwelling; however, less common or new species were also discovered there (FIG. 74). Despite the apparent disproportionality between individual objects, it is evident that the assemblage relatively often contains woody species that do not have suitable properties to make good fuel or construction material. Common finds of the fragments of fruit trees (*Pomoideae* and *Prunus sp.*) and shrubs (e.g. *Cornus sp.*, *Ligustrum vulgare*, *Rosa sp.* and *Lonicera xylosteum*) prove the use of less suitable woody plants, which were obviously more accessible in the forest stand. It is also possible that this composition of wood finds indicates certain forest depletion and significant deforestation, which led to the use of less suitable (atypical) species as fuel. From the point of view of agro-mass occurrence in the individual features, the highest number of charcoals was again in dwelling 9, where 174.5 g of charcoal were recorded (FIG. 75). Charcoal pieces weighing under 50 g were found in other pits and dwellings except for dwelling 1.

The archaeological context did not help determine whether the charcoals are the remains of fuel, construction wood or wood used for making tools and other artefacts. Therefore, it is difficult to assess them from economic and ecological perspectives. However, when applying the principle of least effort (ZIPF 1949), they prove that these woody plants grew around the Mikulčice stronghold, and were used by people.

The reconstruction of the forest vegetation on the outskirts of Mikulčice, which was based on the results of an anthracological analysis, reflects the spectrum of species of the forest and shrub vegetation. Oak forest is assumed to have existed in the vicinity of the site although it is relatively difficult to reconstruct it in greater detail.

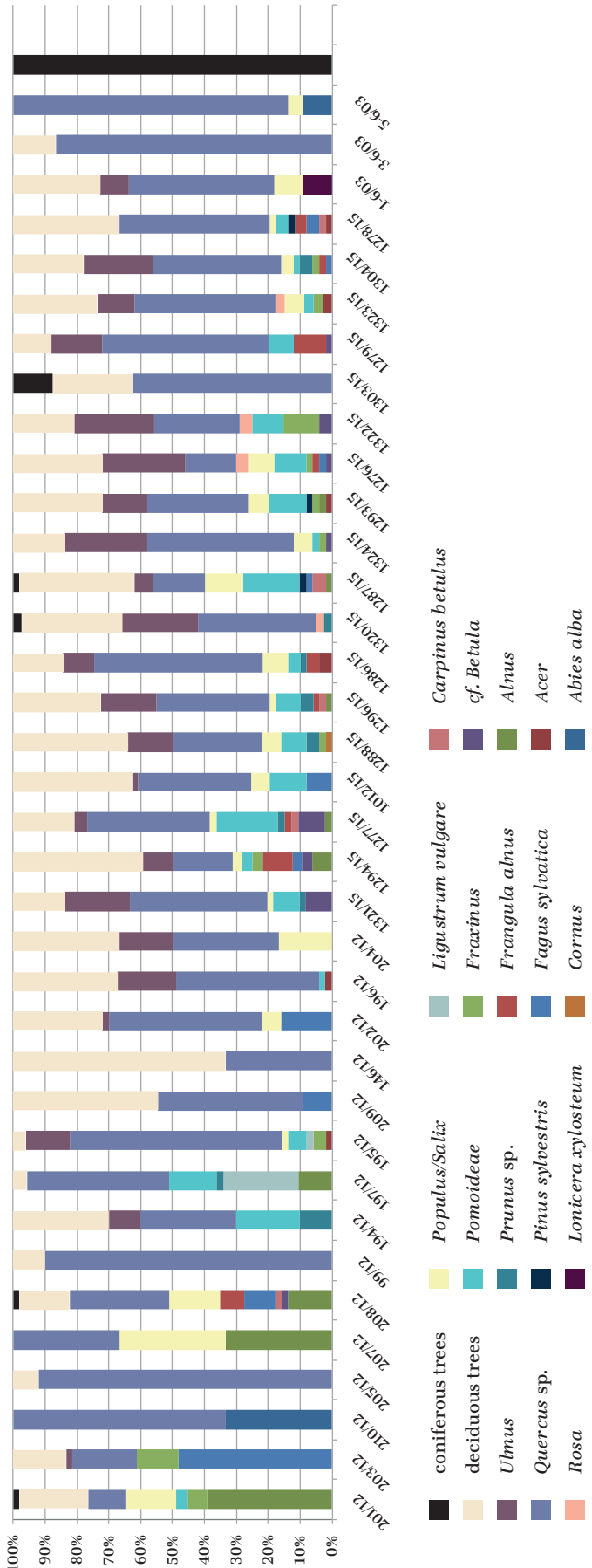

FIG. 73 | Mikulčice-Trapíkov. Results of anthracological analysis (n = 1,316).

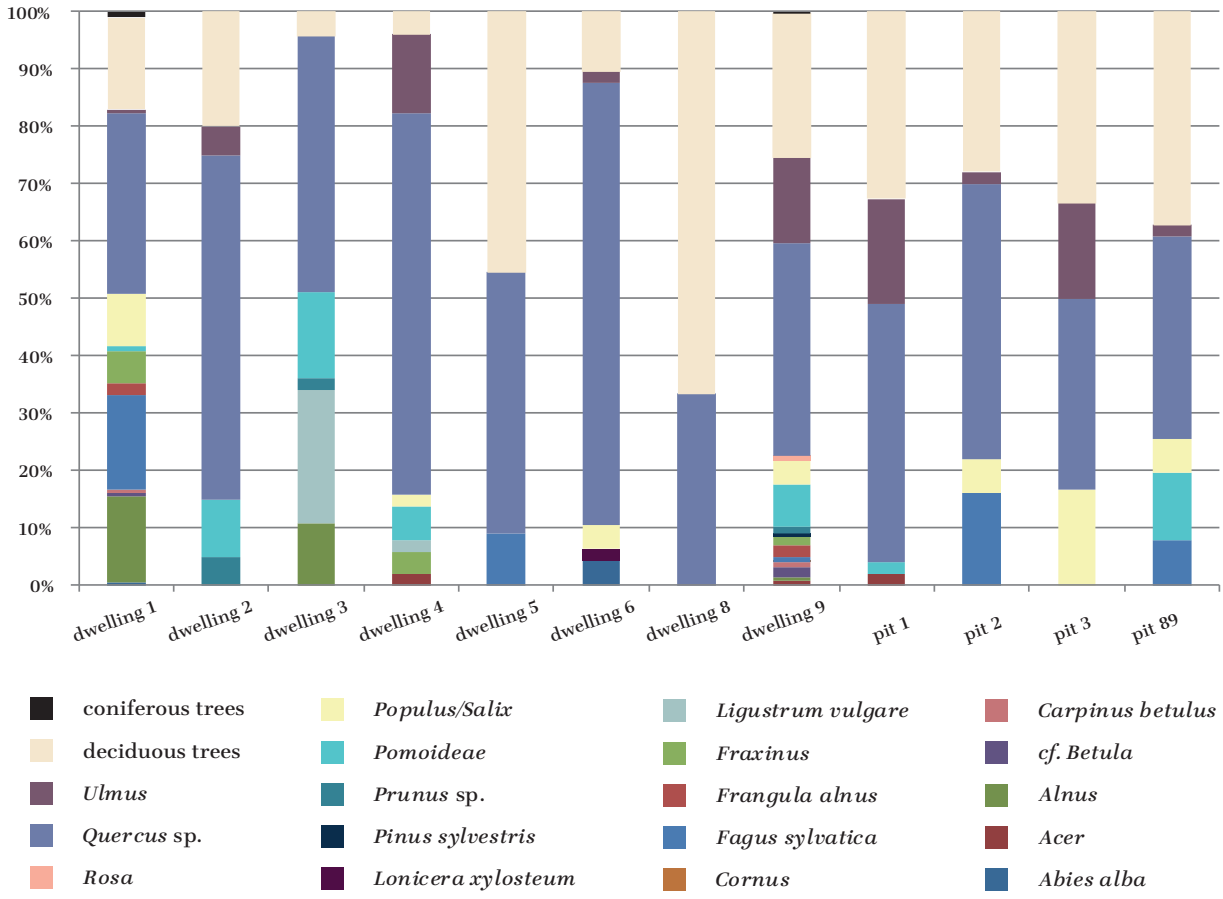

FIG. 74 | Mikulčice-Trapíkov. Species representation of charcoal in contexts (n = 1,316).

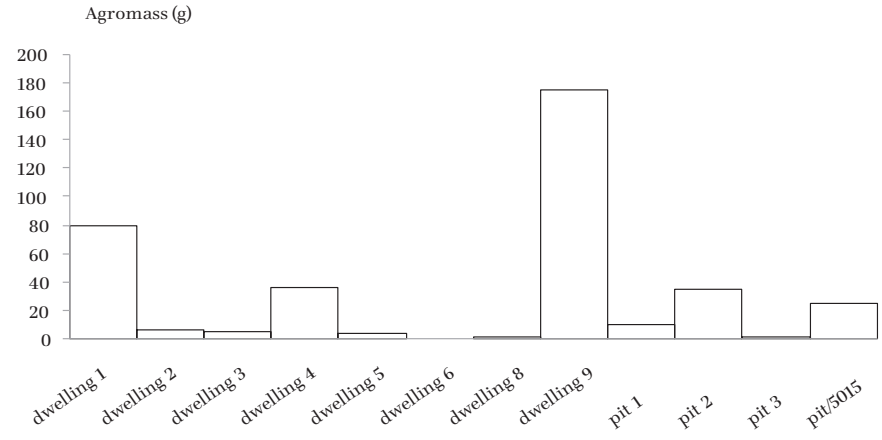

FIG. 75 | Mikulčice-Trapíkov. Occurrence of charcoal agromass in contexts (n = 1,316).

The communities of mesophilous oak and oak-hornbeam forests

This group of forest stands also includes the oak-hornbeam forest communities that are still found in the modern-day landscape. These are dominated by oaks (common oak, *Quercus robur*, and sessile oak, *Quercus petraea*) with a certain proportion of hornbeam and maple. The low number of hornbeam finds among the anthracologically examined material does not match the finds of hornbeam fruits/nuts in the settlement features (which is also true for Trapíkov). This leads to a deduction that hornbeam was not a dominant tree in the forest stands but was frequently used because it made animal fodder and its nuts were pressed for oil.

The analysed assemblage from Trapíkov also contained species representing the communities of mixed forests growing in higher positions. Species such as silver fir and beech were represented marginally. Small quantities of beech were probably present in the vicinity of the examined site (Látková 2017, 65) although this is not true for the finds of charcoal and wood of the silver fir (Opravil 2003). In the stronghold and its hinterland, silver fir has been documented quite often; it was used mainly for coffin making (Opravil 2003; Mazuch/Hladík/Poláček 2018, 283). The presence of this species suggests the importing of wood from higher positions and greater distances.

Hardwood riparian forest

The existence of hardwood around the site is indicated by a significant proportion of the charcoals of such species as oak, birch, ash and maple. Today, oak and ash can be found in several types of deciduous forests – in wet and dry soils, and both dense and open stands (Dostál/Červenka 1991, 134). In forests, they tend to be in both glades and edges.

Softwood riparian forests and alder groves

This group includes species such as willow, poplar, alder and alder buckthorn. These species settle in regularly flooded and waterlogged places in the countryside. Among the species from these genera are *Salix caprea* and *Papulus tremula*, which also grow in dry sites. However, other indicators have confirmed that their presence at the biotope in the vicinity of the examined site can be legitimately assumed. A typical species that grows close to watercourses is the alder, which has been documented by numerous finds both from the central part of the agglomeration (not only by the finds of wood but also seeds and strobiles) and its peripheral parts.

Shrub community

The number of finds documenting shrubs in the surrounding vegetation is rather low. This habitat can often be reconstructed based on the finds of seeds and fruits. Unfortunately, in this case, the shrub community was only proven by anthracological analysis. The results proved two taxons (sloe and rose), which contributes to a clearer picture of the early medieval landscape.

8. Archaeological Model of the Trapíkov Settlement and the Hinterland of the Mikulčice-Valy Agglomeration

The narrative model presented in this chapter is based on the analyses of the spatial relationships between contexts, archaeological material and on the environmental analyses presented in Chapter 12.[29] The section on research objectives (Chapter 3.1) defines three main issues, which we believe can be resolved using the analysis of archaeological material from the Trapíkov settlement and burial site. Hence the conception of the model presented here. Of course, the data from a single settlement cannot answer all the questions comprehensively. However, it is one of the first pillars supporting our interpretation models. The model factors in our understanding – however partial – of the following core phenomena: the organisation of the hinterland of Great Moravian centres, the economic strategy of communities living around them, the interaction of the Great Moravian centres with their closest surroundings as well as more distant – peripheral – parts of the hinterland and the interaction of the studied communities with the landscape.

8.1 CHRONOLOGY

When working with archaeological material, the first prerequisite for creating a narrative interpretation is to obtain the most precise source dating possible. Unless this condition is met, there is a risk that the sources that are put into one model are not contemporary. A model burdened with such an error would be rendered irrelevant. Once we discover relationships, causalities or patterns in archaeological data, it is necessary to define whether they will be explained at a synchronous or diachronous level. Therefore, we can now briefly consider the dating of the Trapíkov settlement and its consequences.

Generally, when analysing any component of a settlement network, the first prerequisite for considering a chronology is an analysis of context stratigraphy. The existing relative spatial relationships define the contemporaneousness and temporal development of the contexts relatively clearly. As discussed in detail in Chapter 6, which examines the archaeological context, the settlement stratigraphy is relatively simple, and the features respect each other. This is the first prerequisite for claiming that these are remains of a relatively short-term, although intensive, population of the area. Although the stratigraphy suggested this conclusion, it did not provide clear evidence. There was still a possibility that the features were intact vertically, but that there were horizontal shifts of the settlement within the Trapíkov dune. Therefore, it is not clear from the stratigraphy that all the contexts in the settlement are contemporary.

To obtain further evidence for the conclusion that this was a case of an intensive, short-term settlement and to pin down relative stratigraphy both in time and on the absolute level, we carried out an analysis of pottery, which was the most numerous and stratigraphically the most informative type of archaeological material unearthed at the settlement (see Chapter 7.2.2). The third pillar, which complements the analyses of stratigraphy and pottery, is radiocarbon dating (see Chapter 12.4).

We selected eight samples of botanical macroremains – all cereals – from five dwellings for ^{14}C dating: one sample from CH2 (sample 39) and CH8 (sample 40), and two samples from dwellings CH4 (samples 37, 38), CH6 (samples 35, 36) and CH9 (samples 33, 34). The choice was made based on the requirement to cover the whole area of the settlement that has been examined to date (FIG. 8). Dwellings CH4 and CH9 comprise the two poles of the east-west axis, dwellings CH6 and CH8 are the poles in the north-south direction, and CH2 lies in the middle of the settlement. A detailed commentary on the

29 For more details on our understanding of the narrative model, see MAZUCH/HLADÍK/SKOPAL 2017, 14–25.

results can be found in Chapter 12.4. Radiocarbon dating places the settlement to the second half of the 9th century, with a possible overlap to the beginning of the 10th century (see Chapter 12.4).

The pottery assemblage unearthed in Trapíkov is one of the largest published collections of Great Moravian pottery that does not come directly from the central part of a power centre. Apart from a single exception (an accumulation of Old Hillfort pottery from context FT87), the design corresponds with the pottery of the Late Great Moravian Horizon (Mazuch 2013). This is illustrated by its similarity to the pottery horizon in the north and east extramural settlements in Mikulčice. This is particularly supported by the analysis of two important ceramic groups, MCG and BCG, which showed a typological match in the design of the representatives of the Trapíkov pottery with the individuals unearthed at the Mikulčice centre (see Chapter 7.2.2) – and by the quantification of the ratio of both these groups in relation to the whole pottery assemblage unearthed in Trapíkov. In both groups, the proportion of pottery among all the vessels that constituted the equipment of the settlement is very similar to the proportions in the examined areas in the extramural settlements in Mikulčice. The proportion of BCG unearthed in Trapíkov (the number of individuals, which was counted based on the finds of rims and the proportion of typical "Blučina" decoration among all decorated fragments) is slightly higher: almost 10%, and 3% to 6% at the northern extramural settlement.[30] The proportion of MCG pottery from Trapíkov (expressed as the number of individuals, which is based on the assessment of rims) is less than half of the total number of the vessels found at the settlement (48.9%), which corresponds with the early layers and the backfill of features contemporaneous with the settlement, at least within the pottery horizon of the northern extramural settlement in Mikulčice. It is somewhat smaller than the proportion typical for the final horizont phase. Statistically, the MCG assemblage from Trapíkov is sufficiently large enough to conclude that the backfills of the features – refuse pits or sunken dwellings – contained pottery used at the times of the existence of the settlement, which can be – based on a comparison of the numbers of MCG finds from Mikulčice – dated to the end of the 9th century. This dating, which is based on the hypothesis that there is a chronological potential in the proportion of the MCG pottery, corresponds with the ^{14}C charts for cereals excavated together with pottery in Trapíkov. The proportion of MCG pottery grew throughout the second half of the 9th century to constitute two-thirds of overall pottery production at the beginning of the 10th century when Mikulčice ceased to be settled (see Chapter 7.2.2 and for more detail, see Mazuch 2013, 69–77, 84, 86).

In terms of relative chronology, all the analyses supported our claim regarding a short-term intensive settlement. In terms of absolute chronology, radiocarbon dating combined with pottery analysis dated the settlement to the final decades of the 9th century. The settlement was clearly contemporary with the heyday of the Mikulčice agglomeration – and Great Moravia. The possibility of the sudden demise of the settlement is indicated by the low fragmentation of pottery and its significant concentration in the residential features (see Chapter 7.1.1) as well as the finds of household equipment, for instance, the large number of quernstones found directly in the features.

8.2 ECONOMIC STRATEGY, THE HIERARCHY OF SETTLEMENTS, THE IMPACT OF THE CENTRE AND THE USE OF LAND

Previous research has proven that the Mikulčice agglomeration had a significant impact on its surroundings. On the social level, this is reflected by the structure of the settlement and its surroundings (see Hladík 2014; 2020) and on the environmental level, by the botanical and palynological records from the 9th and 10th century archaeological records where the significant influence of human activity on the surrounding landscape has been observed.[31]

In our opinion, locating the settlement is a key point in the understanding of its position in the complex social and economic relationships existing in the vicinity of the Mikulčice agglomeration. The settlement was probably situated on one of the main roads leading to the power centre (fig. 40). This was more precisely to the bridge and the gate to the outer bailey, or possibly directly under the fortification of the outer bailey, around Church 8 to the open settlement in the northern part of the extramural settlement. This road had a decisive impact on the layout of the Trapíkov settlement, which was on the periphery of the agglomeration. When combined with the results of other analyses, the spatial patterns show certain trends, which can be interpreted in the sense that the function of the settlement within the agglomeration was of an intermediate, an interlink between the centre and its wider surroundings. It was a buffer zone in which the interests of the centre and its surroundings naturally clashed and confronted each other. Its counterpart on the eastern edge of the agglomeration might have been the settlement Pri kačenárni, at the Za jazerom pri sv. Margite.[32]

30 The difference may be because the settlement was outside the centre or that the pottery from the Mikulčice stronghold was assessed without atypical samples, which is a specific, closely undefined pottery assemblage. This was excluded – and sometimes even discarded – during earlier research as it was considered less provable. This selection was not subject to the same criteria and varied significantly in the years of long-term excavations in Mikulčice (see Poláček 1995, 152, Anm. 28, Abb. 30a–b). Decorated walls and rims have often fallen into this category. This may have caused distortions in quantification. Pottery from future excavations using modern methods will be needed to verify these calculations.

31 Opravil 2000; 2003; Jankovská/Kaplan/Poláček 2003; Hladík 2014; Hladík et al. 2014; Látková 2017.

32 Hladík 2014; Látková 2017; Baxa 2010; 2011 including references.

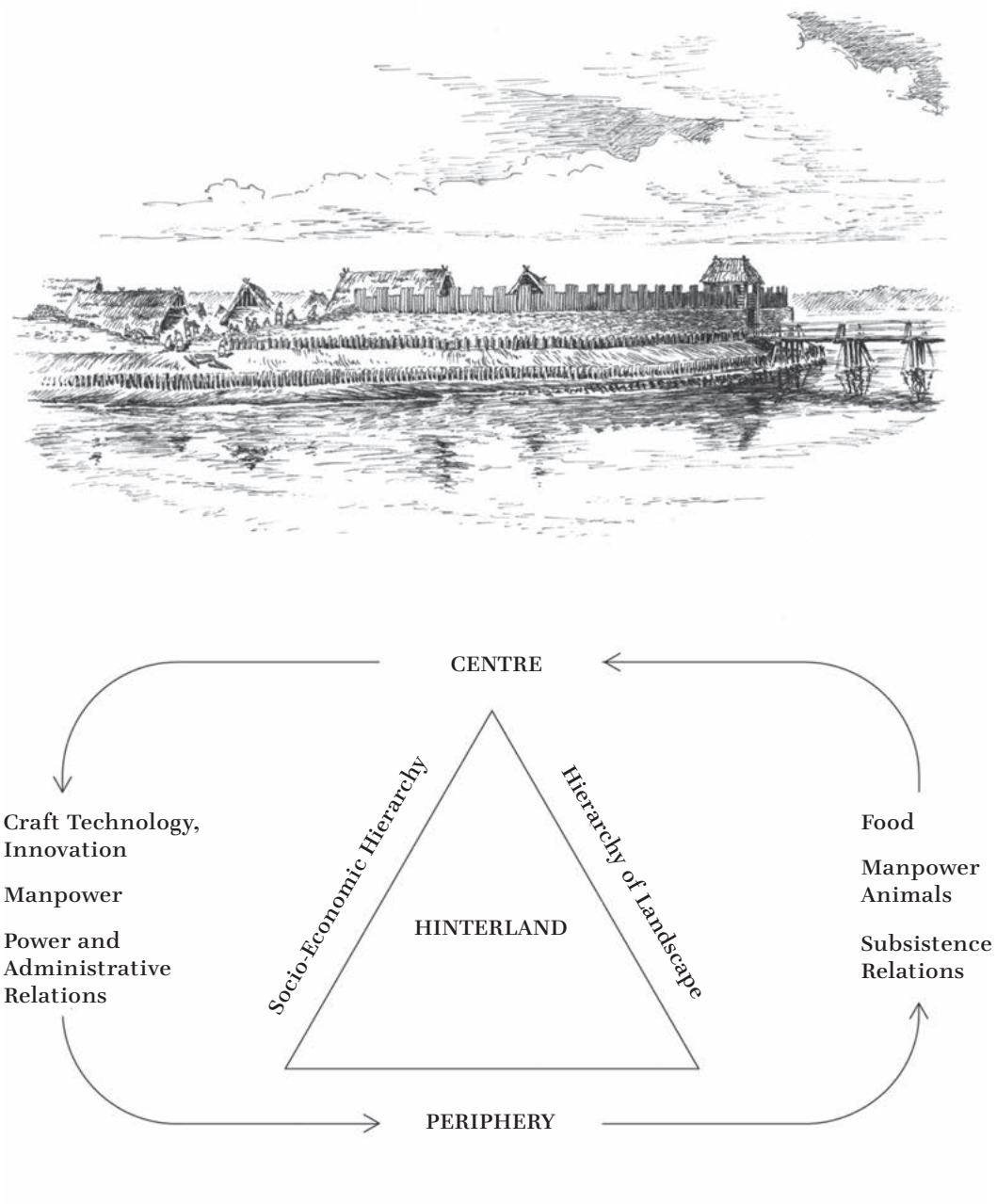

FIG. 76 | Visualisation of the social and economic relations between Mikulčice and the hinterland described in the archaeological model.

Activities related to the distribution (and partial processing) of foodstuffs from the hinterland to the centre were most likely carried in this area. A significant part of the crafted products, used in the wider hinterland of Mikulčice, were distributed in the area. This was most likely accompanied by a targeted penetration of power and administrative structures into the surroundings of the agglomeration. In our view, the bearers of this movement were the inhabitants of the centre.

We have thus defined two basic types of relationships, which had opposing directions. The first is the movement of foodstuffs (and/or other raw materials) from the surroundings to the centre, and the second is the movement of craft products (pottery, tools, construction fittings and jewellery) from the centre to its surroundings (FIG. 76). This model reflects the natural movement of energy in the studied system. While the primary source of energy (food) goes from the primary production site to the place of the greatest demand, i.e. the centre with the most concentrated population, this energy is subsequently transformed into a system of social and economic relations directed from the centre to its surroundings. This implies two important conclusions. 1) The source of energy – food – was largely outside the centre (this does not exclude farming directly in the agglomeration although it could not be the primary food source).

2) The people from the centre contributed to providing the energy for the whole system – the entire community being studied (Látková 2017). The inhabitants of the centre actively participated in securing subsistence for the whole community. However, the available sources do not allow us to define the exact parts of the chain secured by the people from the centre. It is clear that the centre produced craft products. However, an analysis of archaeobotanical data also points to the fact that in the most stressful parts of the agricultural cycle (around the harvest), the inhabitants of the centre had to contribute to the agricultural work (see Chapter 7.2.3.4) (Látková 2017).

The material from the Trapíkov settlement provides a number of arguments that confirm these conclusions. By studying the most significant expression of centralised craft production that can be found in the surroundings of the Mikulčice agglomeration – pottery – the following facts can be observed.

The Great Moravian pottery production excavated at the Mikulčice stronghold, which was mainly quantitatively analysed in the extramural settlement, constituted of the MCG and BCG pottery. This was made using the most advanced technology employed in the workshops in the centre, as well as different local pottery types of varying technological quality. Many of these types have not been selected from the Mikulčice pottery fragments, which is mainly due to the problem of their stratification in the high Great Moravian horizon in areas with complicated vertical stratigraphy. The process is complicated due to the immense size and fragmentariness of the assemblage. Among the representatives of such local types are NR (narrowed round rims) and SG (strangulated grooved rims), which were presented earlier. At this point, we can merely hypothesise that these local pottery types were made by the workshops in the agglomeration or its close surroundings. However, no pottery kilns, or workshops for that matter, have been found in Mikulčice. The uniform "grey area" that constitutes 30%–40% of pottery, which does not fall within any of the studied ceramic groups or the two local pottery types, might contain both of the other hypothesised types from specialised pottery workshops and homemade pieces. However, we have no knowledge of the production and distribution of this pottery. Nevertheless, it is known that the pottery production constituting the 30%–40% is basically identical both in the centre and in Trapíkov. It is very difficult to compare this pottery with the produce used by the inhabitants of the Great Moravian peripheries. As previously mentioned, pottery found at burial grounds must be disregarded, although we know more about it than about the pottery from the settlement. It is the marginal knowledge of the settlement pottery and its difficult dating that prevents us from solving this problem. The remarkable uniformity of the morphologic features of the Great Moravian pottery and the significant macroscopic variability of its technological features – mainly the ceramic fabric – make these finds a "grey zone" that is difficult to figure out, although it is typical for this environment. The issue of pottery distribution might be solvable by spectrum analyses or the assessment of the chemical composition of the pottery in a large assemblage. We consider this the primary task to be attended to in the future. What is different about the morphology of the "grey zone" pottery from Trapíkov and the Mikulčice suburbium is the complete absence of simply finished rims without the traces of any further finishing. In almost all cases, there is a certain type of cut rim combined with pulled edges, undercutting or other additional finishing. This is probably where this pottery differs most from the types unearthed at the burial grounds and in the settlements in the hinterland (which must be studied in much more detail, as mentioned elsewhere in this book).

The Trapíkov pottery, at least the part where we were able to apply typology, and thus differentiate it from the "grey area" Great Moravian pottery, probably comes from the pottery workshops in the Mikulčice stronghold, except for the homemade pieces. Technologically, it is identical plus there are local types characteristic of the Mikulčice stronghold (types NR and SG, see Chapter 7.2.2).

Although all the pottery from the Mikulčice-Podbřežníky settlement, which used to be near the stronghold, was destroyed in the 2007 fire at the Mikulčice research base, we were able to compare its Great Moravian pottery with the Trapíkov collection by our own personal experience. Unfortunately, we do not have any other larger assemblages from other open rural settlements (except for pottery found as grave goods, which is technologically and generally more archaic as it was often created as funerary; see Mazuch 2013, 28). This prevents us from sufficiently understanding the influence of the proximity of the primary power centre and its pottery production on the quality of the pottery used daily in the settlements. The Trapíkov pottery may be of higher quality than the pottery from the more distant hinterland or periphery. The quality of the MCG production is almost identical to the quality of the production from the Mikulčice centre. This is not surprising if we are correct about MCG being the highest form of workshop pottery, which was certainly distributed to the settlements outside the centre. A similar assumption can also be made about the settlement at Pohansko near Břeclav. The only question is whether the MCG pottery was made in the workshops in both centres, which we assume it was. The small number of larger pottery items from Trapíkov does not allow for a reliable comparison of its technological level with the level of the Mikulčice production. However, the overall characteristics of this assemblage are identical with the pottery horizon identified at single-phase extramural settlements in Mikulčice. In other words, if the place of the find of this pottery was unknown it could be easily confused with the pottery from Mikulčice.[33] The interrelatedness of the

33 This assumption was verified after the unfortunate fire at the Mikulčice archaeological base when the pottery fragments from the Mikulčice-Podbřežníky settlement could

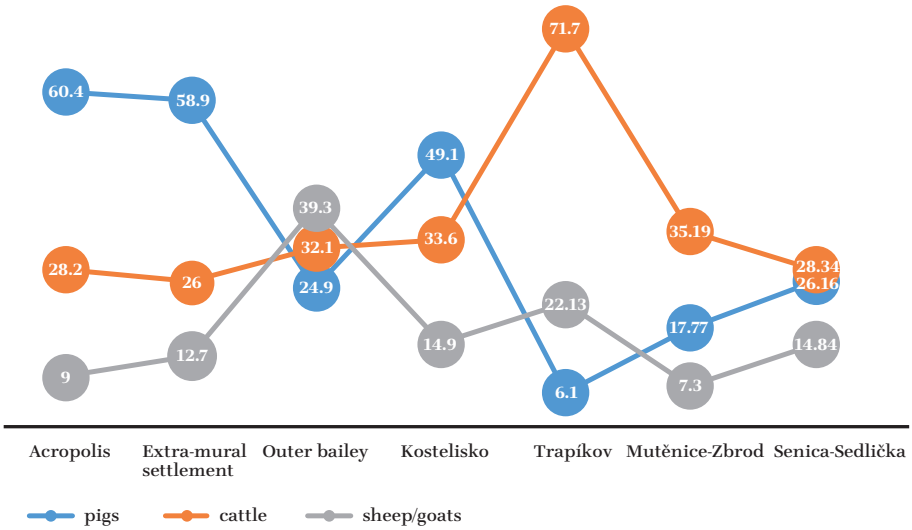

FIG. 77 | Percentages of the species of domestic animals in selected areas of the Mikulčice agglomeration and settlement in its surroundings (based on data published in HLADÍK 2014, 175–179).

pottery from Mikulčice and Trapíkov is supported by the existence of two plastic marks on the bottoms of the vessels from Trapíkov, which have identical counterparts in the pottery from the Mikulčice power centre (TAB. 7:8, 11:8).

The conclusion regarding the movement of the crafted products from the central part of the agglomeration to Trapíkov is also supported by the quantity and typological composition of iron artefacts discovered there. Like the pottery finds, the iron assemblage strongly resembles those from the other areas of the Mikulčice stronghold and compared with other at least partially excavated 9th-century settlements, such as Podbřežníky, Prušánky and Mutěnice, it is superior in quantity and composition. A relatively large amount of iron slag was discovered at the Trapíkov settlement, which can be linked to the production and maintenance of tools and agricultural implements.

The direction from the centre to its surroundings, in which the craft products moved, is mainly evidenced by pottery and the tendencies observed in iron artefacts. However, they are too fragmentary and poorly preserved to allow a more complex comparative analysis, similar to that employed in pottery. However, the presence of some types of metal artefacts found in the settlement area and adjacent graves, such as spurs and a bronze finger ring, indirectly corroborate the above-mentioned conclusion that the luxury goods were carried directly by the people from the centre, who are also considered to be the bearers of power and administrative relations.

Further arguments concern the movement of foodstuffs between the centre and its surroundings. This phenomenon has been examined in detail in our previous studies (HLADÍK 2014, 172–181). We compared archaeozoological, archaeobotanical and archaeological data (mainly the number and size of silos) in the open settlements in the wider surroundings of Mikulčice and our conclusions support the theory of foodstuff and raw material movement in the direction from the surroundings to the centre. The archaeozoological data obtained from the previously examined settlements in the surroundings of Mikulčice and directly from certain parts of the agglomeration showed interesting trends in the comparison of the representation of individual livestock species. Figure 77 shows the proportion of livestock in the settlements and some areas of the agglomeration, while the components are charted from left to right based on their distance from the centre. The left margin features the acropolis of the Mikulčice stronghold, while the settlements at Mutěnice-Zbrod and Senica-Sedlička are 10 km and 20 km respectively from the centre. However, they are currently the only at least partially researched settlements in the area with archaeozoological material available. In the fortified parts of the agglomeration (acropolis, outer bailey), pig bones dominated (60%). An identical observation concerning the predominance of pig bones was made in the fortified areas of Pohansko (see MACHÁČEK 2007, 331–334; DRESLEROVÁ/HAJNALOVÁ/MACHÁČEK 2013). Around 30% of the bones were from cattle and 10% from sheep and goats. In the open extramural settlement, which borders on the fortified acropolis, the proportion of all the monitored species was balanced, between 30% and 40% although there was a stark predominance of cattle over pigs in Trapíkov in a ratio of 72:6%. In the more peripheral settlements, the proportion of cattle and pig bones is relatively balanced, with a slight predominance of cattle over pigs. A similar proportion of cattle and pig bones was ascertained by a comparison of data from the settlements around Pohansko (MACHÁČEK 2007, 331–334). The high proportion of cattle bones in Trapíkov is consistent with the settlement at Břeclav – Na včelách (for more details, see Chapter 12.1).

This simple visualisation demonstrates the direction in which food – or energy in a more complex understanding of energy sources – which we

not be discerned from the pottery from the Mikulčice centre because the evidence numbers were destroyed.

presented in our model. Animal bones from the last consumption phase were concentrated in the fortified parts of the agglomeration. This is evidenced by the composition of the bone fragments presented above, which showed the dominance of pig bones as well as their fragmentation and further taphonomic observations, which were successfully performed on previously unpublished material from one of the latest excavations of the fortification of the acropolis in 2012 (Mazuch 2014; Poláček et al. 2013). An analysis by Kovačiková (2014) concluded that a significant part of the contexts in the body of the fortification contained animal osteological material, which can be interpreted as butchering and kitchen waste. The first principal component identified by principal components analysis was a latent variable, which has a high positive correlation with the presence of bone fragments, cuts and slits (fig. 78). This principal component also explains as much as 42.3% of the variability of the entire analysed assemblage. Higher meat consumption in the fortified parts of the agglomeration is supported by analyses of stable carbon and nitrogen isotopes (Kaupová et al. 2018). These analyses have helped to prove that the consumption of animal protein in the central part of the agglomeration was more frequent than in its hinterland. This is particularly true for the male population (Kaupová et al. 2018, Table 4).

Moving away from the fortified area of the stronghold towards the extramural settlement, there is a gradual balancing of the ratios of the remains of various livestock species. This brings us to the idea that animals that were kept, including those intended primarily for consumption (pigs), met repeatedly with animals primarily used for work (cattle). The areas in the extramural settlement served as places of redistribution, selection and primary processing of meat, a large part of which went to the social elites who lived in the fortified areas. We also assume the concentration and redistribution of plant food, which can be associated with the presence of draught animals. Last but not least, the importance of cattle in dairy production must be considered. The phenomenon of milk and dairy products consumption must also be taken into account when interpreting the increased concentrations of animal protein isotopes in the fortified parts of the stronghold (Kaupová et al. 2018; Kovačiková 2020).

While a dynamic mix of processes, from distribution to food processing, is assumed to have taken place in the area directly under the fortification, the situation was different in Trapíkov, which represents the peripheries of the agglomeration. A significant dominance of cattle, primarily a utility, draught species (Hladík 2022), in the archaeological sources from the settlement, serves as an additional argument for us to assume that the peripheral areas of the agglomeration served mainly for activities related to the distribution of foodstuffs from the hinterland to the centre. If we compare the ages of the animals whose remains were discovered in Trapíkov and the centre, we can see that it was mostly older individuals who lived in Trapíkov (see Chapter 12.1), while the bones of younger animals were dominant in the fortified parts of the agglomeration (Kovačiková 2014). This is also in line with our model.

This is further supported by other archaeological data directly from Trapíkov and the surrounding open settlements. The function and position of a settlement within the settlement network were largely determined by the distance from the centre. Thus, if we consider Trapíkov – a settlement on the outskirts of the agglomeration, but still in the flood plain of the River Morava – to be a redistribution centre, we assume that production, primary processing and long-term storage of what was mainly plant foodstuffs, took place at the very edge of the flood plain. So far, we have been able to archaeologically identify two settlements: Mikulčice-Podbřežníky and Moravská Nová Ves – Padělky od vody. In the latter, non-destructive research has been carried out to date (see Hladík 2014). At Mikulčice-Podbřežníky, we discovered a significant concentration of silos, the amount of which was significantly excessive considering the number of Great Moravian dwellings discovered there (Mazuch 2008; Hladík 2014, 173). Interestingly, no such archaeological context has been found in Trapíkov. Therefore, it is possible that plant foodstuffs, which were brought to Trapíkov from nearby villages, were further processed there. This is suggested by the relatively large assemblages of quernstones and roasting trays found there.

We associate the presented model of relations between the agglomeration and the hinterland with a society that achieved a high level of complexity. Clearly, economic activities as well as the acquisition of raw materials used to be organised and intensive. This is a feature of a centrally managed society. Furthermore, analyses of stable isotopes of carbon and nitrogen, which we carried out on the samples of 9th-century cereals from Trapíkov and compared them with the isotopic signal of recent plant samples from the surroundings of the stronghold, support the above conclusion. Although this was a small test set, there is an obvious tendency, which suggests that the Great Moravian crops were cultivated on intensively fertilised fields (Chapter 12.3). In turn, this suggests intensive and organised landscape management. We have discovered further evidence of advanced organisation in obtaining raw material resources in the Great Moravian society due to another case study, which as with this book, is part of our complex research concept (fig. 2). During research on the importance of wood in Great Moravian graves (Mazuch/Hladík/Skopal 2017), we discovered that wooden constructions and coffins were commonplace in the funerary rite around Mikulčice and the wider surroundings of the lower and middle Morava region. A crucial piece of information was that the wood used in graves came from conifers, which did not grow in this area (Opravil 2000a). To ensure such a high demand for this raw material, intensive and organised timber harvesting and organised logistics over relatively long distances must have been in place.

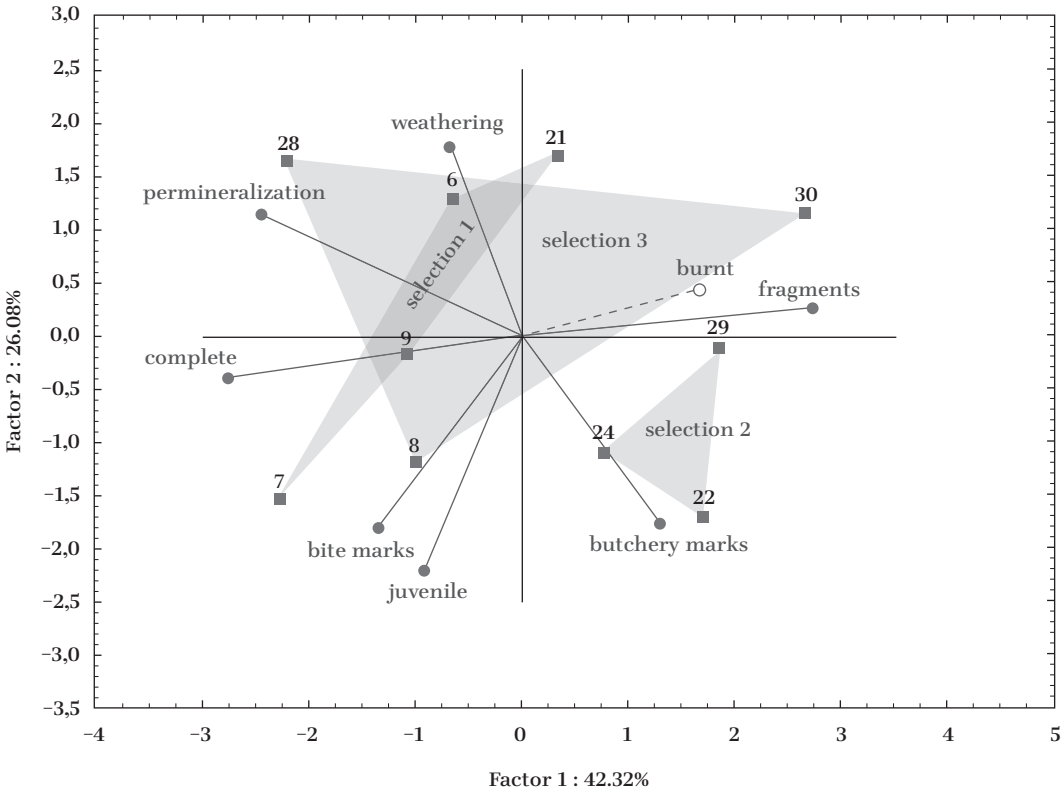

FIG. 78 | Results of the principal components analysis of animal bones from excavations R 2012-I (fortification of the acropolis) (according to KOVAČIKOVÁ 2014).

We have verified and refined this model using archaeobotanical data from Trapíkov. In Chapter 7.2.3, we presented an interpretation of the assemblage of macroremains from Trapíkov, which included a total of 4,609 plant macroremains (3,293 of which were seeds and 1,316 carbonised remains). This analysis was intended to identify differences in plant composition (both cultivated and wild species) between the central and peripheral parts of the Mikulčice settlement. The analyses also focused on a better understanding of the subsistence economy of the settlement on the periphery of the Great Moravian stronghold of Mikulčice-Valy.

Cereals were the most numerous (2,969 pieces) among the cultivated crops. Millet dominated the assemblage, both in terms of quantity and frequency of occurrence. This was followed by wheat, rye and barley. An exceptional find of two grains of emmer wheat (*Triticum dicoccum*), were discovered there, which had not been found in Mikulčice before. Since they are unique finds, they are considered to be contamination from older settlement layers. The possibility that it originated in the Early Middle Ages (in the form of weed admixture) can only be confirmed or disproved by Accelerated Mass Spectrometry that can date finds. The legumes assemblage (43 pieces) contained only two species – lentils and peas. The spectrum and combination of cereal and legume species in the samples from the extramural settlement was identical to those from the fortified parts of the agglomeration. The range of cultivated crops on the periphery is not as rich as in the central fortified parts of the agglomeration, but this is the only relevant difference between these areas. No proof of "luxury crops" and delicacies (fruits and vegetables), which were present at the acropolis and outer bailey, have been discovered at the Mikulčice-Trapíkov settlement to date. Such finds might be evidence of elite members residing at the acropolis, and thus it is not surprising that they are not found at the open settlements (this is similar in Kopčany). However, the range of basic crops (cereals and pulses) that were among the finds from Mikulčice-Trapíkov fully comply with the image of the Early Middle Ages.

Taphonomic and economic analysis of the PMR assemblages indicates that the cereals consumed at the settlement were cultivated and processed outside the archaeologically studied area, which also applies to the excavated parts of the fortified area. The community that cultivated and processed the crops was able to mobilise sufficient labour at the time of harvest, which means its level of social organisation exceeded its household level. To reach such a level and be able to release and mobilise sufficient labour, a community at the early medieval technological level had to be very large and well organised (centrally or communally).

Archaeobotanical finds from the forest habitat and anthracological analysis of charcoal confirmed that the forest was a source of harvested fruits, which are particularly rich in vitamins and trace elements and many are medicinal. Evidence of

unusual collecting of forest fruits is provided by the frequent finds of charred hornbeam nuts in Mikulčice, which have been found in samples together with cereals. The reason for their presence in the samples and how they got on the site remains unclear. It is known from ethnobotany that they were traditionally pressed for oil (Bui 2014). The finds of forest species indicate the presence and exploitation of mainly dry, open stands and forest clearings, and to a lesser extent moist shady forests. Palynological records from the early medieval centres and their vicinity, as well as anthracological analyses, show a significant amount of treeless areas (Macháček et al. 2007, 302; Svobodová 1990, 173–178; Unger 1992, 90; Jankovská/Kaplan/Poláček 2003), which indicates intensive use of the surrounding landscape. Opravil's description of the forested area (Opravil 1962; 1972; 2000) – hardwood riparian forest with hornbeam stands and softwood riparian forest with large glades in the river branches – is consistent with the results presented in this study.

The forest vegetation reconstructed in the vicinity of Trapíkov corresponds with a rather simple but typical picture of floodplain vegetation. Sites unaffected by water – mainly raised positions further away from watercourses – contained hardwood riparian forest communities, such as oak and hornbeam stands and mesophilous oak groves with a lower proportion of hornbeam and a proportion of other woody plants (such as beech). Mainly alder and willow-poplar stands grew in the proximity of water bodies.

Considering their ecological and site requirements, the spectrum of woody plants used on the periphery of the Mikulčice agglomeration ascertained by atracological analysis is consistent with the spectrum of the seeds of forest herbs and bushes unearthed at other excavation areas in the fortified central part of the stronghold (Látková 2017, 121–122).

Current archaeobotanical findings do not indicate any difference in the subsistence strategies at the fortified and the unfortified peripheral areas of the stronghold. Future research must focus on a wider hinterland of the stronghold, namely on discovering and describing so-called production sites – villages in the area. Only a confrontation and comparison of archaeobotanical assemblages from such production sites can prove or disprove the present hypothesis.

9. Rural Economy and Centres in the Context of the Organisational and Functional Principles of Great Moravia

The model we present contains our understanding of the organisation of the hinterland of Great Moravian centres, the economic strategy of the communities that used to live around them, the interaction of the Great Moravian centres with their closest surroundings and the more distant – peripheral – parts of the hinterland as well as the interaction of the studied communities with the landscape. We based this model primarily on the data from Mikulčice and the economic hinterland. In the final part of our work, we discuss the interpretive implications of the model. Our primary goal is to place the study of the relationships between a particular Great Moravia centre and its closest surroundings into a broader context of the research of the principles governing the functioning of Great Moravia. We have divided our interpretations into three parts.

First, we study the character of the landscape and the farming settlements discovered both in the Mikulčice hinterland and the wider Great Moravian territory in relation to the issues of the rural economy in Great Moravia (Chapter 9.1). This first point is primarily intended to direct us toward the foundations of the economic relations – the type of farming, the organisation of primary agricultural production and land ownership in Great Moravia. In addition to land ownership, consideration must also be given to the issue of livestock ownership, which, alongside manpower, was the basic labour force used to support the functioning of the whole society. In this context, we also discuss the degree of specialisation in agriculture and crafts, and in the organisation of craft production.

Second, we address another basic issue concerning the functional principles of Great Moravia – the economic status of the centres (Chapter 9.2). We study two aspects – the position of the centres in relation to their surroundings and the economic relations between the different centres. The degree of the economic dependence of the centres on their surroundings and the interdependence of various centres are directly related to the basic principles of the flow of resources (raw materials, foodstuffs) and craft products through the system. This is linked to the existence and organisation of trade and tribute or other forms of strengthening economic interdependence. These are phenomena decisive for defining the level of the centrality of Great Moravia, or better, its political and economic complexity.

The third branch of our treatise focuses on the Great Moravian society in terms of the distribution of the economic burden, which was crucial to the functioning of the whole system (Chapter 9.3). Central to our considerations is the degree and form of the involvement of the Great Moravian elite and the marginalised (enslaved) social classes in the economic processes, which ensured the functioning of the whole system.

9.1 LANDSCAPE, SETTLEMENTS AND RURAL ECONOMY IN GREAT MORAVIA

Early medieval farming settlements were among the pillars of the entire economic system of early medieval Europe. The research into the centres means we can compile a more comprehensive picture of the organisational and functional principles of Great Moravia. As of today, hundreds of farming settlements have been discovered in the Middle Danube region, more precisely the part that correlates with the territory of Great Moravia. However, this source base is very uneven as it mostly includes only partially excavated or surface-prospected components (for lists, see Milo 2014, 466; Šalkovský 1998, 33). Several more comprehensively researched Great Moravian settlements are in the Morava, Nitra and Váh river regions, which constitutes the core territory of Great Moravia.

Apart from dozens of settlements detected by non-destructive research in the River Morava region, which are still awaiting complex archaeological

research (Hladík 2020; Milo 2014), several settlements in this area have undergone a more complex systematic research. These include the settlements of Mikulčice-Podbřežníky, Mutěnice-Zbrod, Kopčany – Pri kačenárni and the partially excavated settlement of Prušánky-Podsedky.[34] In the hinterland of Pohansko, these include Kostice – Zadní hrúd, Břeclav-Poštorná, Břeclav-Líbivá, Břeclav-Lány and Břeclav – Na včelách (Kavánová/Vitula 1990; Macháček 2001a; Macháček et al. 2013). An unfortified settlement in the hinterland of Staré Město, the Uherské Hradiště – Sady – Dolní Kotvice settlement (Milo 2014, 547; Marešová 1985), was also explored. The large settlements from the wider area of Great Moravia, such as Bajč – Medzi Kanálmi, Čataj, Nitra – Mikov dvor and Šurany – Nitriansky Hrádok, are also an essential source of research into the rural economy (Milo 2014, 466).

9.1.1 Cultural Landscape

Several Slavic farming settlements in Central Europe show a long continuity of inhabitation. For instance, the settlement Bajč – Medzi kanálmi settlement was inhabited from the 7th to the 11th century, Mutěnice-Zbrod from the 6th to the 9th century, Šurany – Nitriansky Hrádok from the 6th to the 10th, and Kostice – Zadní Hrúd as long as 6th–12th century (Bialeková 1959; Klanica 2008; Macháček et al. 2013; Ruttkay 2002). Such long stretches of continuous settlement at a single site show the close ties of the inhabitants to the land they farmed. It also suggests that the agricultural practices must have been sustainable in the long term because they exploited the land around the settlements for long periods, even though this does not hold for all the settlement units. Despite the economical and non "fatal" exploitation of the land, it is clear that the long-term existence of the settlements impacted the environment and transformed the wild nature into a cultural landscape. All the settlements depended on water sources – for instance, the settlements in the hinterland of the Mikulčice agglomeration are never further than 400 m from a water source. Settlements were very often located on the outskirts of floodplains around watercourses, respecting the boundary of the floodplain beyond which there was a risk of floods. At the same time, they were as close to the water source as possible (Hladík/Mazuch/Poláček 2018; Hladík 2020).

The natural environment and the stage of complexity of the studied society are generally considered the most important determinants of an agricultural economy. This is why the development of landscape structure, synergistic with climate changes, largely determined the basic principles of the subsistence strategy – and the rural economy of early medieval populations in Central Europe as its integral part. The early medieval natural environment in the studied area was partially reconstructed through the collaboration between archaeology, dendrochronology, geology, geomorphology, paleopedology, paleobotanics and paleozoology (Büntgen et al. 2021; Doláková et al. 2020; Hladík 2020).

The climate in the second half of the first millennium AD experienced a dry phase with a decline in precipitation. The climate developments in Central and East Europe, and also in Asia, in the first millennium most likely affected the migration of early medieval populations. The period between the 5th and 11th centuries was characterised by warming, which caused long droughts in East Europe and Central Asia. In turn, these forced the pastoral communities to migrate to Central and Western Europe (Gyulai 2010, 169). Using the available climate models, some authors assume that this dry period ended in the 10th century and that there was a significant increase in precipitation in Western and Central Europe around the year 1000 (Macháček et al. 2007, 307). However, the dating of these changes is still the subject of discussion. According to some models, the 10th century was marked by a dry and warm climate (Lamb 1989, 181–191; Wiethold 2002, 32).

Important arguments were brought into this discussion by a study that presented a reconstruction of Central European summer variability over the past 2,110 years (Büntgen et al. 2021). The authors presented 27,080 annually resolved and absolutely dated measurements of tree-ring stable carbon and oxygen ($\delta^{13}C$ and $\delta^{18}O$) isotopes from 21 living and 126 relict oaks (*Quercus spp*.) used to reconstruct Central European summer hydroclimate from 75 BC to 2018 AD. The conclusions confirm that 6th-century Central Europe experienced a Little Ice Age (that is, the LALIA Drought) during the culmination of the Migration Period. In contrast, the Great Moravian period was generally wetter (marked by the Early Medieval Pluvial) (Büntgen et al. 2021, 193–94). A gradual increase in precipitation took place over the 7th and 8th centuries. This process culminated at the turn of the 9th and 10th centuries and was followed by a decrease in precipitation in the 10th century. This dry period (the so-called Medieval Drought) culminated around 1000. A significant increase in rainfall then culminated at the end of the 11th and the early 12th century (the late Medieval Pluvial) (Büntgen et al. 2021, 194, Fig. 4).

The climatic developments in the pre-Great Moravian and Great Moravian periods are among the causes of the economic changes discussed in the following chapters. It is particularly important in this context that, after the unfavourable centuries at the beginning of the Early Middle Ages, the climatic conditions became favourable for the development of agriculture, particularly in the 9th century, which was broadly reflected on the socio-economic level (see below for more detail).

In addition to the climatic factors, the landscape and its economic potential were influenced by cultural factors, especially in the late stages of the

34 Hladík/Mazuch/Poláček 2018; Mazuch 2006; Klanica 2006; 2008; Baxa 2010.

Early Middle Ages. Compared to the preceding Roman Period, pre-Great Moravian pollen charts from the early medieval deposits found in the Carpathian Basin showed a decrease in the pollen of cereals and other cultural crops, such as fruit trees and vine. In contrast, the presence of oak slightly increased. This data indicates a decrease in the economically exploited area, which in turn is linked to a decrease in population density. Conversely, the period after 800 saw an increase in cereal, fruit and grass pollen and decreasing quantities of tree pollen. In the 10th century, oak continued to decline, while there was an increase in the pollen of hornbeam, beech and hazelnut. These plants possibly indicate a short-term cooling (Gyulai 2010, 170). The changes recorded in the final centuries of the Early Middle Ages in the pollen charts clearly indicate the formation of secondary steppes in the area of the Carpathian Basin and the Middle Danube region. The land in the Middle Danube region was intensively agriculturally exploited.

The largest number of paleobotanical and palynological analyses of the historical landscape was conducted around central Great Moravian sites, such as Mikulčice and Pohansko. Earlier paleobotanical studies by E. Opravil as well as palynological analyses have proven that unflooded hardwood (oak, ash, hornbeam, elm, lime) was characteristic of the River Morava floodplain in the Middle and most of the Late Holocene.[35] These conclusions were confirmed by the latest pollen analyses conducted in Pohansko and Mikulčice,[36] which were thus surrounded by mixed oak woods. The pollen spectra prove a certain proportion of local meadow growth. Mixed oak forest was mainly dominant from the 6th to the 8th century. The 9th century, i.e. the Great Moravian period, saw a decrease in the curve of the woody plants, which illustrates deforestation. During that period, the proportion of grasses and cereals increased (Hladík et al. 2014). In general, it is assumed that in the 9th century the studied landscape was intensively exploited in the strip around the rivers in the area with concentrated occupation. There were settlements with adjoining fields and pastures. A cultural steppe was created there by the people farming this land (Unger 1992, 97).

Palynological analyses show that there was a decline in woody plants around the Great Moravian centres, which means significant deforestation caused by human activity.[37] The analysed assemblages contained groups with pollen indicators of cereal fields, wet meadows and pastures, as well as dry pastures, human settlements and roads. Some pollen groups indicated fallow soil. The most important Great Moravian centres, such as Mikulčice, had a more urban character and a large economic hinterland (fields, pastures, and meadows) while anthropogenic indicators prove the movement of the inhabitants in the surrounding area. When combined, the results of the most recent analyses of pollen, plant macroremains and the anthracological analyses of the material from Pohansko and its surroundings correlates with older conclusions regarding the form of the cultural landscape in the wider area of the floodplain – a mosaic of forested and open biotopes. This mosaic was composed of mesophilous oak-hornbeam forests, a riparian forest, shrubs on forest edges and wet and dry meadows (Doláková et al. 2020, 560).

Considering the climatic factors, the finds of field weeds discovered in Mikulčice indicate that the fields were open, not shaded by higher vegetation, such as a forest. It is also highly likely that there were greater distances between the crops and that the fields were relatively large (Látková 2017; 2019, 113). We can thus assume extensive farming, which farmed large areas, using less human labour. The results of the soil nitrogen analysis (see Chapter 12.3) indicate that agrotechnical practices were used to improve or maintain the quality of agricultural land in some of the fields. Therefore, it can be assumed that fields established on lower-quality soils were fertilised or regularly laid fallow. Fallow farming with balks and pastures is evidenced, along with others, by archaeobotanical finds of field weeds typical of these habitats (Hlavatá 2015, 24). Botanical and pollen analyses have proven the existence of vast field systems in the vicinity of the early medieval centres as well as large meadows – pastures. The finds of perennial grass species indicate these biotopes were large, as were the fields. They were by no means small enclaves in the middle of a forest, but vast meadows and pastures with what were probably low herbaceous plants (Látková 2019, 113).

9.1.2 Food Production

The model of the past cultural landscape, which we have briefly presented, shows that the raw material supply in all Great Moravian communities was based on intensive local food production. Considering the intensity of resource exploitation from the landscape, it is obvious that the organisation of agriculture in Great Moravia required organised collaboration at a higher social level than individual farming families or the small communities of "isolated" settlements. Period written sources correspond with the archaeological records. Despite their fragmentariness, they indicate the type of agricultural production in Great Moravia (for more details, see Hladík 2022).

Such fragmentary information about Slavic agriculture can be found in reports by Arab merchants (travellers) dated to the 9th or 10th centuries. At the beginning of the 10th century, Ibn Rustah wrote in his *Book of Precious Things* that Slavs sowed millet in their fields (Pauliny 1999, 98, 99). In his

35 E.g. Jankovská/Kaplan/Poláček 2003, 72; Opravil 1983, 27-33; 2003; Poláček 2001, 320; Svobodová 1990.

36 Doláková et al. 2020, 532-541; Dresler 2011, 83; Hladík et al. 2014; Macháček et al. 2007, 302.

37 Doláková et al. 2020, 560; Dresler 2015, 151; Macháček et al. 2007, 302; Svobodová 1990, 173-178; Unger 1992, 99.

encyclopaedic work, *The Meadows of Gold and Mines of Gems*, Al-Masudi (c. 947) mentions "*many fields*" and "*farmed fields*" when writing about Kievan Rus' and the Duchy of Bohemia. According to Ibrahim ibn Ya'qub, wheat and barley were grown in the Duchy of Bohemia in the mid-10th century (Pauliny 1999, 118–119). These 10th-century reports mention cereals as a good commercial article, which is remarkable, considering the intensity of the agricultural production. The sale of agricultural crops in Prague is evidenced by the 10th-century Raffelstetten Customs Regulations (Ivanič 2011, 89). The yields from the fields in some parts of Central Europe exceeded the needs of the population, at least in the 9th and 10th centuries. Ibrahim ibn Ya'qub referred to the Duchy of Bohemia – and Poland – as granaries (Benková 2015, 48).

The situation observed in Great Moravia naturally followed the previous developments and in many respects, is their functional and organisational completion. As mentioned, the continuity of some of the settlements over a very long period of the Early Middle Ages proves a farming system sustainable over the long term. The variability of the natural environment in the Middle Danube region enabled the application of a wide range of agricultural strategies. This was particularly evident in the pre-Great Moravian period when the pastoral Avars were able to use the steppes around the Danube for extensive breeding of horses and cattle in an area, with its rich river network, that was also suitable for growing cultural crops.

The pre-Great Moravian Middle Danube region saw two basic subsistence principles that determined agricultural production and directly impacted the Great Moravian economy. The first major group were the nomad societies. Agriculture in these societies can generally be described as extensive exploitation of vast land, which resulted in the focus on cattle and horse breeding (Vörös 2000). It is highly likely that although marauding expeditions aimed at the immediate economic exploitation of the communities they attacked were an important component of the nomad economy, the primary subsistence strategy was based on agricultural production that used the local sources of small settlements. Although vast riches were brought to the Carpathian Basin through plunder and tributes, it did little in terms of the survival of the Avar warriors, who depended on the acquisition of both. While prestige goods and materials could be plundered in wars against the Romans, Avar society had to rely on the food and goods produced by their clans and farmers. Although economically, the two forms were to some extent dependent on each other, each form can still be distinguished in the meagre information available (Pohl 2018, 244).

The second dominant group were the settled Slavic tribes. Their agriculture focused on intensive use of local resources. Cyclical cultivation of cereals, the essential component of their diet (Kočár et al. 2010; Látková 2017; Beranová 2000), dominated their subsistence strategies. As with the nomad societies, farm animal husbandry was vital for the Slavic rural economies. Although we do not consider the Slavic societies to be pastoral warriors like the Avars, we assume that the Slavic elite classes secured their position and prestige by the ownership of luxury goods, which mainly came from Rome and later from the Byzantine Empire and the western part of the Frankish Empire (Ungerman 2020). The elite of Slavic society often acquired them as war spoils although they also traded them (Poláček 2007; Macháček 2010). The Slavic elites depended on the internal production of food and goods much more than the Avar elites (Hladík 2022).

Therefore, we consider the boom in organised agricultural production in Great Moravia to be the natural result of the development in the previous centuries. The population growth in the Great Moravian period, supported by archaeological data, required the implementation of farming practices able to systematically secure the energy needs of the whole of Great Moravian society (read more about the reconstruction of agrotechnical processes in the Early Middle Ages in Hladík 2022) The success of the whole farming system in Great Moravia is evidenced by the written sources described above, which mention overproduction and trading of cultivated crops. Further proof that supports the conclusion that agriculture was intensive and included the whole social spectrum is the range of crops. As mentioned earlier (Chapter 7.2.3), the archaeobotanical assemblages from the central Great Moravian sites and the settlements around them contain a complete spectrum of cereals known from the Early Middle Ages. These were supplemented by other foodstuffs (legumes, roots and tubers) as well as luxury delicacies (fruit, wine) (Látková 2017; Doláková et al. 2020, 561).

Chronologically, the botanical finds show changes in the assortment and a growing number of the finds of seeds in the late stages of the Early Middle Ages. Only a very small number of botanical finds dated to the 6th/7th centuries was discovered in the Middle Danube region (Hladík 2022). The finds from this period were dominated by wheat (*Triticum aestivum*) and rye (*Secale cereale*). Oat (*Avena sativa*) and barley (*Hordeum vulgare*) were occasionally found. Charred seeds dated to the 8th and 9th centuries were dominated by barley (*Hordeum vulgare*) with the second most numerous being the finds of wheat (*Triticum aestivum*) followed by fewer finds of rye (*Secale cereale*). These cereals were complemented by millet, 2-row barley and oat (Hlavatá 2015, 13). It is generally assumed that the main crop grown by the Avars inhabiting the Carpathian Basin was millet (*Panicum miliaceum*) (Gyulai 2010, 173). The trend in cultivated cereals changed between the 9th and 10th centuries. While barley (*Hordeum vulgare*) was predominant from the 8th to the 10th century, which was accompanied by wheat (*Triticum aestivum*) in the 8th–9th century, there is an increase in the finds of rye (*Secale cereale*), which began in the 9th century (Hlavatá 2015, 13).

The fact that a wide range of cultivated crops was also found at sites that were not directly in the core territory of Great Moravia supports our assumption

that a highly complex and sophisticated system of agricultural production developed throughout the Middle Danube region in the 9th century.

For instance, one of the most important botanical finds of Hungarian archaeobotanical research was unearthed at the Fonyod-Bélatelep site, dated to the Late Migration Period, by Béla Horváth's excavations in 1964. Based on the ^{14}C tests, the age of the settlement, made up of lake dwellings, can be dated from the second half of the 7th century to the end of the 9th century (Gyulai 2010, 176). The identified assemblage contained 181,000 seeds, 64 plant species (both cultivated and wild). This unique find shows that the Avars, or more accurately, the Avar-Slavic population, did not rely on the cultivation of one dominant crop. While the largest assemblage of botanical finds in Hungary comes from the Fonyod-Bélatelep site, the richest in terms of species composition was collected during systematic, decades-long research of the 9th-century site of Zalavár-Vársziget. A total of 103 plant species, both cultivated and wild, were identified in the former assemblage (Gyulai 2010, 178).

These examples show that production methods and the foodstuff range were innovated regardless of the proximity of an important centre – these innovative agricultural practices were not linked to contacts with centres but were a bottom-up process. As mentioned, this was strongly supported by the development of the climate. The changes favourable for agricultural production occurred during the 8th and 9th centuries.

Information about the agricultural production in Great Moravia is also provided by zooarchaeological data. Several works have been published in recent years, which address the zoological data from the Great Moravian centres as well as the farming settlements in great detail. An overview dealing with the Carpathian Basin was published in 2010 by Z. Miklíková. Her work primarily focuses on the evaluation of zooarchaeological material from the early medieval settlement of Bajč in Slovakia (Miklíková 2010). Miklíková made a basic evaluation of earlier archaeological research carried out in Slovakia along with data from the southern parts of the Carpathian Basin (mostly Hungary). The same methodological approach is employed in the paper by G. Dreslerová. Basic zooarchaeological data comes from the central Great Moravian agglomeration of Pohansko (Dreslerová 2018; Doláková et al. 2020, 552–557). However, it is analysed in the context of osteological analyses of early medieval material from the Czech Republic while the interpretations of livestock farming and hunting for wild animals is set in a wider Central European context (Dreslerová 2018, 19–23, 104–121). Another Great Moravian centre, which was systematically zooarchaeological examined, is Mikulčice and several farming settlements in its economic hinterland (Hladík 2020, 297–302). Thanks to Z. Kratochvíl, there are collective monographs as well as specialised studies dealing with Mikulčice (such as Kratochvíl 1981).

A synthesis of these studies has been presented elsewhere (Hladík 2022). However, only some of the findings are relevant to the issue addressed in this book, i.e. the organisation of primary agricultural production in Great Moravia. The conclusions of these studies essentially correlate with the situation in the Mikulčice hinterland as presented in Chapter 8. The distribution of animal bones within the centres and farming settlements have repeatedly shown patterns that support the conclusions regarding organised agricultural production along with the subsequent processing and redistribution across the whole social spectrum.

The numbers of bones from the dominant species differed between the fortified and unfortified areas of the central Great Moravian agglomerations. The fortified parts contained many more pig bones than cattle, sheep and goat bones with all the species evenly represented in the unfortified areas (Hladík 2020, 298; Macháček 2007, 331–334). The distribution of animal bones described within the areas of the Great Moravian centres might prove the hypothesis that pork, which was considered better quality meat, was taken from the economic hinterland to the centre for the higher classes to consume (Dreslerová/Hajnalová/Macháček 2013).

Other significant differences can be seen when comparing the number of finds of animal bones in the Great Moravian agglomerations and the farming settlements in their hinterland. Perhaps the most striking difference is that cattle bones outnumbered pig bones in the rural settlements. The predominance of cattle bones over pig bones in the open settlements may be further evidence of the above hypothesis – that pork was sent, at least partially, to the centre (Hladík 2020, 300; Miklíková 2010, 160). The large number of cattle bones found in the rural areas proves the assumption that cattle were the main towing animal in the Early Middle Ages. This is also confirmed by later written sources. These indicate that oxen were the main draught animals in Hungary. There are direct references to oxen as draught animals used in tilling implements, referred to *as boves arararatores, boves ad aratrum* (Kučera 1974, 126). Analysing pathological deformations in certain parts of animal skeletons, archaeozoology proved the use of cattle for manual tilling (Ambros et al. 2011, 166).

In this context, the results of the analysis of animal bones from Pohansko and its surroundings are also relevant. In the area of the agglomeration, cattle were slaughtered between the second and third years of age. This means that cattle were not only used as a labour force but were also an important source of meat (Doláková et al. 2020, 563).

The coexistence of pastoral and settled populations led to the adoption of each other's cultural and economic patterns. On the one hand, the nomadic communities gradually transitioned to a settled way of life and, on the other, the Slavs began to apply the nomadic subsistence strategies to their economic systems. There is only indirect archaeological evidence of these processes, which mainly comes from

farming settlements. The Avar settlements are currently less researched than the Slavic ones (Odler 2012). Considering the transition by the pastoral communities to a settled way of life, there are some valid conclusions by M. Szőke who studied the late Avar settlements in the Kőrős region (Szőke 1980). His research shows that the Avars lived in semi-sunken huts and followed a settled lifestyle in the 8th and 9th centuries.

In early medieval Central Europe, cattle breeding was more common than pig farming. Grazing requires less work and is more efficient in terms of meat and milk production than pig farming. In contrast, it is conditioned by quality pasture. Pig farming began to dominate around the Great Moravian Period (9th century), when the population density increased, which was most likely due to a decrease in the area of quality pastures at the expense of growing fields (Unger 1992, 97–98). A predominance of cattle bones in the early Slavic settlements (6th–7th centuries) in Slovakia is mentioned by G. Fusek in his economic evaluation of this period (Fusek 1994, 144). Livestock, mainly pig, farming in the surroundings of the Great Moravian centres is also supported by the pollen charts of forest stands from Mikulčice and Pohansko. They recorded the increased presence of oak pollen and a decrease in the pollen of other woody plants of the mixed oak wood (Svobodová 1990, 202). At some of the central (Pohansko) and farming (Bajč), sites, dietary changes were ascertained based on the age of slaughtered animals from the 9th century. A larger proportion of subadult individuals signals the increased importance of the production of milk and dairy products (Dreslerová 2018, 122; Miklíková 2010, 159).

The species composition in the studied assemblages of animal bones excavated at the settlements in the north of the Carpathian Basin (eastern part of Great Moravia) correlates to a large extent with contemporary Hungarian sites (Miklíková 2010, 160). Zooarchaeological studies from Hungary suggest that the Avar pastoral communities depended on livestock farming (Vörös 2000). In these types of communities, the zooarchaeological assemblages mainly contain the bones of cattle and small ruminants. Still, relatively large numbers of pig bones were found in Avar settlements in the later phases of the Middle Ages. This trend is interpreted as the gradual transition of the pastoral societies into settled ones. In contrast, significant numbers of sheep, goat and horse bones have been discovered in some settlements, mainly in the east of the Great Moravian territory, such as Bajč. Specialised literature associates this phenomenon with the influence of pastoral communities (Miklíková 2010, 160). However, we are currently unable to decide to what extent this phenomenon was shaped by intercultural impacts and to what extent similar geographical and ecological conditions played a role. The assumption that the increased numbers of sheep in the closing phases of the Early Middle Ages were connected to wool production also appears highly likely, especially in the Great Moravia milieu (*cf.* Miklíková 2010, 139, 153). A higher proportion of sheep has also been documented in some settlements in the River Morava region (e.g. Pohansko – Lesní hrúd) (Dreslerová 2018, 121). It is assumed that sheep were bred for wool. This has been indirectly confirmed by the many finds of shepherds' shears (Dresler/Beran 2019, 258–259), and that the remains of significantly older individuals are found in the assemblages of the bones of small ruminants (Dreslerová 2018, 51, 121).

Zooarchaeological analyses from the discussed central sites and farming settlements are consistent with the fact that the most significant changes in diet and farming practices in the Early Middle Ages occurred in the 9th century. This is another argument to support the hypothesis of an intensively organised and complex economy of Great Moravia.

9.1.3 Agricultural Production, Innovation and the Centres

In the previous chapters, we have shown that the zooarchaeological and archaeobotanical data from the farming and central sites indicate that the Great Moravian economy was highly developed, both strategically and organisationally. To discover the roots of the economic and social developments in the Great Moravian period, and the causes of the relatively rapid economic and social upswing in the 9th century, we briefly discussed some aspects of the pre-Great Moravian economy (for more detail, see Hladík 2022). The quality and intensity of food production depended on natural conditions and farming strategies although the development of technology also had an important role.

Historical and archaeological data shows that it was the Great Moravian period when fundamental social, political and economic changes took place in Central Europe. This is also linked to the claim made and supported in what are now classic works about Slavic agriculture (such as Beranová 1980, 192) – that significant technological progress in agriculture was made at this time, which was largely linked to the introduction of the asymmetric ploughshare. The asymmetric share is a rather unique innovation in the development of early medieval agricultural tools. Overall, there were changes in the typological composition of tools in the Early Middle Ages. However, there are almost no changes in the shape and size of the implements (Borzová 2016, 100). This technological innovation might have played a key role in increasing agricultural production. Such a phenomenon – the impact of technological innovation on society – can be observed in the development of historical populations at a general level (Kerig 2013). The introduction of technological changes in agriculture led to more efficient work, which in turn, resulted in releasing the labour force. Further economic diversification of the society may have been a consequence of these events. Therefore, the systematic influence of technological changes may explain the societal and

economic changes. Innovations in agriculture and crafts were the pillars that supported the relatively sudden social and economic boom of Great Moravia.

As we have shown, major innovations in livestock farming also occurred in the Great Moravian period. Zooarchaeological data demonstrates a shift from an animal husbandry system that was not specialised and aimed solely at meeting the sustenance needs of the local community, to more specialised animal breeding, which produced pig meat and wool.

This situation might have several explanations. The changes in agriculture might have been linked with state formation; it is also possible that this represented a bottom-up innovation pioneered at rural estate centres. The only thing that can be stated with certainty is that the centres played a critical role in agricultural innovation in the early medieval period. This is supported by research at both the major centres in the River Morava region – in Pohansko and Mikulčice. As shown by our model presented in Chapter 8, both economic and social innovations occurred in the centres. In the context of the Early Middle Ages, this is currently being confirmed in a broad European framework. Case studies from Western European countries, such as Great Britain and France, show the critical role of the secular centres in the introduction of agricultural innovation. In this milieu, monastic centres sometimes played a key role (Blair 2005; Crabtree 2010; Lebecq 2000). However, there is no unequivocal proof of monasteries in 9th-century Great Moravia. To be more precise, the existence of monasteries in the Great Moravian milieu is still a subject of discussion (Ponfyová 2015, 734–735). The most heated debate is the dating of Zobor Abbey of St Hypolite in what is now Nitra. There are two opposing stances concerning the date of its foundation. One dates the foundation of the Zobor Abbey to the Great Moravian period, while the other links it with the late 10th century or the early 11th century. The main argument for dating it to the 9th century is the legend of Svatopluk who, towards the end of his life, turned to a small community of monks or hermits in an inaccessible forest on Zobor Mountain, where he had previously helped to build a church. This is mentioned by Cosmas (Kosmova kronika česká 2005, 41), as well as the fact that it is dedicated to St Hypolite. It is hypothesised that the monastery adopted this dedication from St Hypolite monastery in Sankt Pölten, which is assumed to have been its mother monastery (Ruttkay/Slivka 1985, 335; Slivka 1991, 5). Another group of arguments is linked to the existence of an episcopal see in Nitra and the position of Wiching as a bishop after 880. It is assumed that Svatopluk founded the monastery under Wiching's influence (Slivka 2000–2001, 29–30; Steinhübel 2004, 137). The dating of Zobor Abbey to the 11th century is based on written sources (Ponfyová 2015, 735).

Given the unquestionable importance of Nitra as a power and religious centre in Great Moravian times, it is perfectly legitimate to assume that historical preconditions existed for establishing a monastery at that time. The evidence available makes us consider this a realistic possibility. However, considering the current level of knowledge, these considerations can hardly go much further than this fragmentary hypothesis compiled from other partial hypotheses (Ponfyová 2015, 735). Unfortunately, even archaeological research has not been able to provide more information regarding the dating of Zobor Abbey because a Baroque Camaldolese monastery was built in the area of the older Benedictine monastery. The research conducted to date has been able to connect the oldest settlement at the site only through pottery fragments dated, among others, to the 9th century (Samuel 2010), which does not allow a functional interpretation of this area as a 9th-century site.

As for the function in the Great Moravian economic system, the interpretations concerning the Sady church complex, which is unequivocally described as a religious centre linked with an episcopal see, are similarly unclear (Galuška 1996; 2020). V. Hrubý's older interpretations contained an assumption that it was a monastery, but later he came to assume that it was an archbishop's see (Hrubý 1975, 14). Therefore, it is now questionable to what extent this church complex played a role as a monastic centre with economic functions that affected economic innovation, as is the case of the monastic centres in Western Europe (Lebecq 2000, 121–148). However, even if churches and church centres were not direct parts of monasteries, they clearly served more purposes. Religious institutions played several important roles – pastoral, status, and also economic (see Kalhous 2016, 176).

Although we do not have unequivocal evidence of the existence of monastic centres in Great Moravia, it is clear that the Christianisation of Moravia was likely part of the wider transformation of the cultural, political, social and economic structures introduced during the Early Middle Ages throughout the whole of Europe. The organisational structure established by the Church in the region formed the backbone of the Mojmirid dynasty, surviving beyond the fall of the Slavic principality (Kalhous 2020). Therefore, it is highly likely that the Christianisation of Great Moravia brought about economic innovation. The question remains of who was the bearer of this innovation – the monastic centres or the religious centres connected with the establishment of episcopal sees?

Given our current knowledge of Great Moravia, we consider the secular centres to be the primary hubs of innovation. Presently, our sources do not allow us to decide to what extent the monastic culture and its advanced and well-organised economy interfered with the economic processes in Great Moravia. Remarkably, the reflection of economic relations, which we have been seeking using archaeological data from both central and farming settlements, is very similar to the reflection found in some parts of Western Europe (Crabtree 2010), where monastic culture and the economy were natural parts of the whole system.

A very similar trend can be observed in animal husbandry in Central Europe, in Anglo-Saxon Britain and animal husbandry in Britain and the early medieval (Merovingian and Carolingian) period in northern France. Zooarchaeological data shows that cattle breeding dominated over sheep, goats and pigs in the early phases of the Early Middle Ages. This pattern of animal husbandry is associated with an economy based on autarky or self-sufficiency, extensive rather than intensive agriculture and the use of cattle for transport and traction. It is possible that cattle played important roles as symbols of status, power and wealth in both Early Anglo-Saxon England and Merovingian France (Crabtree 2010, 126). The same applies to the Central European area.

The zooarchaeological data for all these areas changed significantly in the late stages of the Early Middle Ages. The variety in the proportions of farmed species increased compared to the earlier phases: Early Anglo-Saxon vs Middle Saxon period, Merovingian vs Carolingian period, pre-Great Moravian vs Great Moravian period. The data shows increasing diversity in terms of species ratios, suggesting an increase in the specialisation of animal husbandry practices and a shift from economic self-sufficiency to production for exchange (Crabtree 2010, 126).

We have said that the changes in the economy that took place in the 9th century may have been connected with the processes involved in state formation. As in many similar cases, the causes of innovation were probably of multicausal origin, and vice versa, these innovations may have caused many other processes and events. The specialisation in economic production, which took place in the early phases of the Early Middle Ages across Europe has two particular aspects: 1) the focus on a single animal product, and 2) the production of a surplus. The specialised production of surplus commodities indicates that some settlements were involved in trade, tribute and exchange networks that linked these sites to a broader regional and international economy. The changes in animal husbandry described above appear to be associated with wealthy, high-status sites, whether monastic or secular and the communities that supplied these estates. Whether this is a cause or an effect of specialised agricultural production is a matter of debate. However, specialisation in economic production is very likely to have resulted in a growth in regional trade and population.

This is a key fact for the interpretation of the economic and political principles on which Great Moravia was based. Current literature often emphasises a political-economic model of Great Moravia, which assumes that the entire economic system depended on the redistribution of (particularly prestige) goods, which were in the hands of the elite classes residing in the Great Moravian centres. This model does not assume a developed local market (Macháček 2010, 516) but defines one of the functions of the Great Moravian centres in correlation with the emporia in Western and Northern Europe. Similar to these types of sites, the Great Moravian centres were supposed to be key spots for crafts and international trade,[38] while their basic energy demands were satisfied through intensive exploitation of the economic hinterland (Macháček 2013, 242–244) (see in detail in Chapter 9.2).

However, an analysis of archaeological data from the Middle Danube region has a much more likely model, which defines intensive and highly organised local agricultural production as the primary economic support of the whole system, which in turn, triggered the existence of a complex local market network. In this system, centres were places where wealth produced primarily from local sources was concentrated, which made them the nodes of the rural economy. These economic centres were intensively involved in the primary production of food and other agricultural products. They were not centres in the sense of emporia, whose primary function was to control the long-distance trade and redistribution of prestigious goods (Saunders 2001). The Great Moravian centres would have thus been wealthy, high-status secular sites, which coexisted in a narrow symbiosis with the communities that supplied them.

This model correlates with the situation in Western Europe and the British isles. Based on the most recent analyses, some authors question the key role of emporia in the process of state-building, which was attributed to them in older literature that sometimes suggested a direct link between the rise of the emporia and state formation in early medieval Europe (Hodges 1982). The critical question, be it in Western or Central Europe, is essentially the same: who were the innovators of agricultural practices? When looking for explanations, the fundamental difference between Central and Western Europe is that in the West, both archaeological and written sources provide evidence of a more complex structure of settlements regarding their economic functions (Crabtree 2010, 123; Hamerow 2007, 226–230). Therefore, more interpretation alternatives can be proposed to address this problem.

P. J. Crabtree suggests four alternative answers: 1) the innovations were a consequence of a top-down process that is closely linked to the emergence of a small number of powerful kingdoms. 2) The rise of emporia as centres of international and regional exchange may have had a transformative effect on the rural hinterland. 3) These innovations may be linked to the spread of monasticism and the monasteries' control over high-quality agricultural land and labour. 4) Agricultural innovations may result from a bottom-up process, and the sources for these innovations may be found in the rural estate centres themselves (Crabtree 2010, 131). He further discusses and verifies these options using zooarchaeological data. These analyses conclude that the rise of emporia as centres of regional and international trade is more likely to be a reflection of these economic changes than the cause of them. Current evidence

38 Macháček 2007a, 491–492; Hodges/Hobley eds. 1988.

suggests that the traditional focus on emporia as engines of change may be too simplistic. Monastic sites and rural estate centres, especially those located near trade routes, may instead be the agents of innovation in agriculture and animal husbandry in the Early Middle Ages (Crabtree 2010, 133).

Similar conclusions on the relationship between emporia and farming settlements were also formulated by H. Hamerow (2007, 226–230). Hamerow studied the relationship between agricultural production and emporia and concluded that the reorganisation of food production in mid-Saxon England was closely linked to the development of both secular and monastic centres. The existence of a regional market network is linked to the increase in food and craft production. She further asserts that the intensity and specialisation of agricultural production were rooted not only in the needs of the "consumer community", but also overall population growth and that the economies of the emporia must have been in some way tied to those of rural producers, even if the precise economic mechanism that linked the traders of the emporia with peasant farmers toiling in their hinterlands remains ill-defined (Hamerow 2007, 228–229).

These conclusions are valid for our issue, which is addressed in the context of Central Europe, particularly because they define the primary cause of the social and economic diversification that further led to the emergence of medieval states: not the centres, in the sense of emporia, i.e. nodes that secure the functioning of the society through international trade and subsequent redistribution of goods (top-down process). However, they preferred a bottom-up model in which innovations leading to socio-economic diversification and state-building processes were the result of economic and technological changes and the subsequent development of agriculture and the local market. In this model, the centres are local production nodes, which are strongly interlinked with the rural economy of Great Moravia.

In comparison with Western Europe, several questions remain unanswered regarding Central Europe. First, there is no proof of monastic culture at the time of fundamental social and economic change (see the above discussion on the dating of the earliest monasteries in Great Moravia). The second question is related to the economic status of the Great Moravian centres and their potential development. If we accept the assumption that the emporia were the result and not the cause of economic and social changes, the question arises as to whether the developments in Great Moravia would have moved in the same direction. It is indisputable that some of the Great Moravian centres had the geographical, political and economic potential for developing into emporia (read more on the topic of a Great Moravian centre as an emporium in Macháček 2007a; 2013). The unexpectedly rapid end of Great Moravia caused by turbulent geopolitical events at the end of the 9th century most probably stopped this development (we analyse the economic situation of Great Moravian centres in detail in Chapter 9.2).

From the point of view of long-distance trade contacts and based on the archaeological records discovered to date, the settlement agglomeration in Bratislava Gate appears to be a suitable candidate with great potential to develop in this direction. Its position on the confluence of the Morava and Danube rivers – at the crossroads of the Amber Road and the Danube – and at the same time on the Great Moravian border – predestined it as an international trade node and for the dissemination of social and economic innovations on the territory of Great Moravia (for the most recent overview of Great Moravian finds in Bratislava and its surroundings by a collective of authors, see Šedivý/Štefanovičová ed. 2012, 309–351). Even though the picture of Bratislava in the Great Moravian period is fragmentary due to the poor state of preservation of the Great Moravian finds from the town that was highly urbanised in both the Middle Ages and the modern era, their provenance covers a large area. We can mention examples such as Blučina Pottery Group ceramics, a vessel belonging to the Ancient Pottery Group, an Arabic coin and a large wooden building from the end of the 8th and the early 9th centuries, with an area of up to 90 m^2, which stood near the ford across the River Danube and may have been linked with the transport of goods across the ford.

The above hypotheses can be summarised as follows: in Great Moravia, there was well-developed and centrally organised agriculture able to meet the needs of the society during intensive population growth. At the same time, the economy had the features of specialised food production of foodstuffs and other products, which were intended either for the elite classes or commercial use, both regionally and in a wider geographical area. This raises two questions that are fundamental for the understanding of the economic principles on which Great Moravia was based. First, who owned the essential resources necessary for the production of food and other agricultural products – land and livestock? Second, who owned the agricultural products – what was the mechanism for distributing resources that secured the existence of the whole society?

Unfortunately, archaeological sources offer us very limited possibilities for interpretation in this case. Based on the presented model of basic economic relations, which shows the economic interactions in Great Moravia as a complex network of relationships organised across the social spectrum, we deem it highly likely that at least part of the means ensuring the functioning of the whole society was in the hands of the ruling elite. However, we are unable to quantify how many and what production means were monopolised. This applies to both land and livestock. Nevertheless, the degree of this monopolisation exceeded the property necessary to cover the vital needs of the elites. The elites also owned, or more precisely, claimed a large part of overproduction and likely controlled trade in a more

broader than local context. As with the agricultural innovations discussed above, the centres played a key role in regional and international trade (trade relations are dealt with in Chapter 9.2).

The question of immovable property with a clearly identifiable owner is unclear even in the Carolingian Empire (Kalhous 2016, 178). Both in Central and Western Europe, the problem was that the ruling dynasty, or other elite parts of the society, owned properties in different parts of the country. However, there were no independent power structures that would guarantee this ownership. An important role in defining ownership claims was played by local consensus.

When dealing with issues of ownership and the ownership of production means, written sources are not very helpful either. They contain only scarce mentions of animal husbandry. The Strategikon mentions the huge herds of horses that the Avars took on military campaigns (Pohl 2018, 244). There is a mention by Ibn Rustah from the times of Svatopluk that "*riding animals were only with superb men*". It transpires from the context that he meant the Great Moravian ruler Svatopluk or someone from the directly subordinated elite (MMFH III 346, p. 4). The written sources do not state clearly who claimed the ownership of farming animals, or better, to which extent the ownership of this key part of agriculture was monopolised. We are unable to answer this in the Slavs or in the nomadic societies, such as Avars (for more detail, see Hladík 2022).

The lack of clarity of the available sources has influenced specialised debate for several decades. In the second half of the 20th century, the social structure of Great Moravia was studied from the perspective of Marxist theory (Kalhous 2014b, 40). The main question was whether Great Moravian society had a feudal character. It was mainly older papers that considered Great Moravia to have been a feudal state (Havlík 1980; Ratkoš 1990). The issue of land ownership, as an important production means, was closely linked to this. The concept of Great Moravia as a feudal state a priori assumed that the land was owned by the monarch who allocated it to individual members of the elite (e.g. Havlík 1980, 12–13; Ratkoš 1990, 90–95; Ruttkay 1997, 161). These hypotheses are now generally considered to be largely unfounded (Štefan 2011, 346). Neither written sources nor archaeological records have been able to provide evidence of the existence of a land-based aristocracy in Great Moravia. It is possible to agree with those authors who consider the existence of a stabilised elite depending on extensive land ownership in Great Moravia as unlikely (Třeštík 1997, 287; Klápště 2009, 538).

To understand the economic foundations of Great Moravia, it is also important to answer the question of how the economic burden of ensuring the functioning of the economy was distributed in society. Thus, it is a question of the social structure and how the various social groups were involved in the economy. At this point, archaeological data offers us more interpretation possibilities than in the question of land and livestock ownership. An important source of information on social and economic relations are burial grounds (Poláček/Velemínský 2013; Mazuch et al. 2017). The type and extent of the involvement of the elite, but also marginalised (enslaved) social classes in the subsistence relationships is discussed in detail in Chapter 9.3.

9.1.4 Spatial Distribution of the Settlements in the Mikulčice Hinterland – Dwellings, Farm and Production Buildings, Storage Pits and the Organisation of Craft Production

The historical landscape model that determined the basic economic principles defined the properties of the space in which basic economic interactions took place in Great Moravia. Based on this model, we have also been able to describe the main parameters of the farming methods (for more detail, see Hladík 2022). A further important source of information about the rural economy – the economic principles applied in Great Moravia – is the area where the agricultural settlements used to be. However, the degree of preservation and the low intensity of the archaeological research of these parts of the residential network seriously limit our efforts to learn about the form of the settlements and the attempts to link the parts inside and outside the residential area of the settlements with concrete farming activities. In Chapter 7.2, we applied spatial analysis and presented an interpretation of the various areas of the Mikulčice-Trapíkov settlement. Here, we have interpreted the presence of the road that connected the fortified centre of Mikulčice and the peripheries of the agglomeration and the closest farming hinterland as the key factor that determined the spatial arrangement of dwellings (fig. 40).

We can now demonstrate a broader context of the situation in the Mikulčice hinterland in five settlements, which are at least partially excavated and researched. These include Trapíkov, Kopčany – Pri kačenárni, Mikulčice-Podbřežníky, Prušánky-Podsedky and Mutěnice-Zbrod (Hladík 2020, 145–160). These settlements are at different distances from the Mikulčice stronghold, which is an important starting point for discovering the economic relations in the hinterland. On the outskirts of the agglomeration are the settlements of Mikulčice-Trapíkov and Kopčany – Pri kačenárni. Beyond the border of the agglomeration, in its immediate vicinity, is the Mikulčice-Podbřežníky settlement, while the settlements of Prušánky-Podsedky and Mutěnice-Zbrod are located on the periphery of the agricultural hinterland of Mikulčice, about 10 km from the centre (fig. 79).

Even though the three settlements have not been excavated in their entirety and that the quality of the excavations varied – because they were carried out over several decades from the mid-20th century

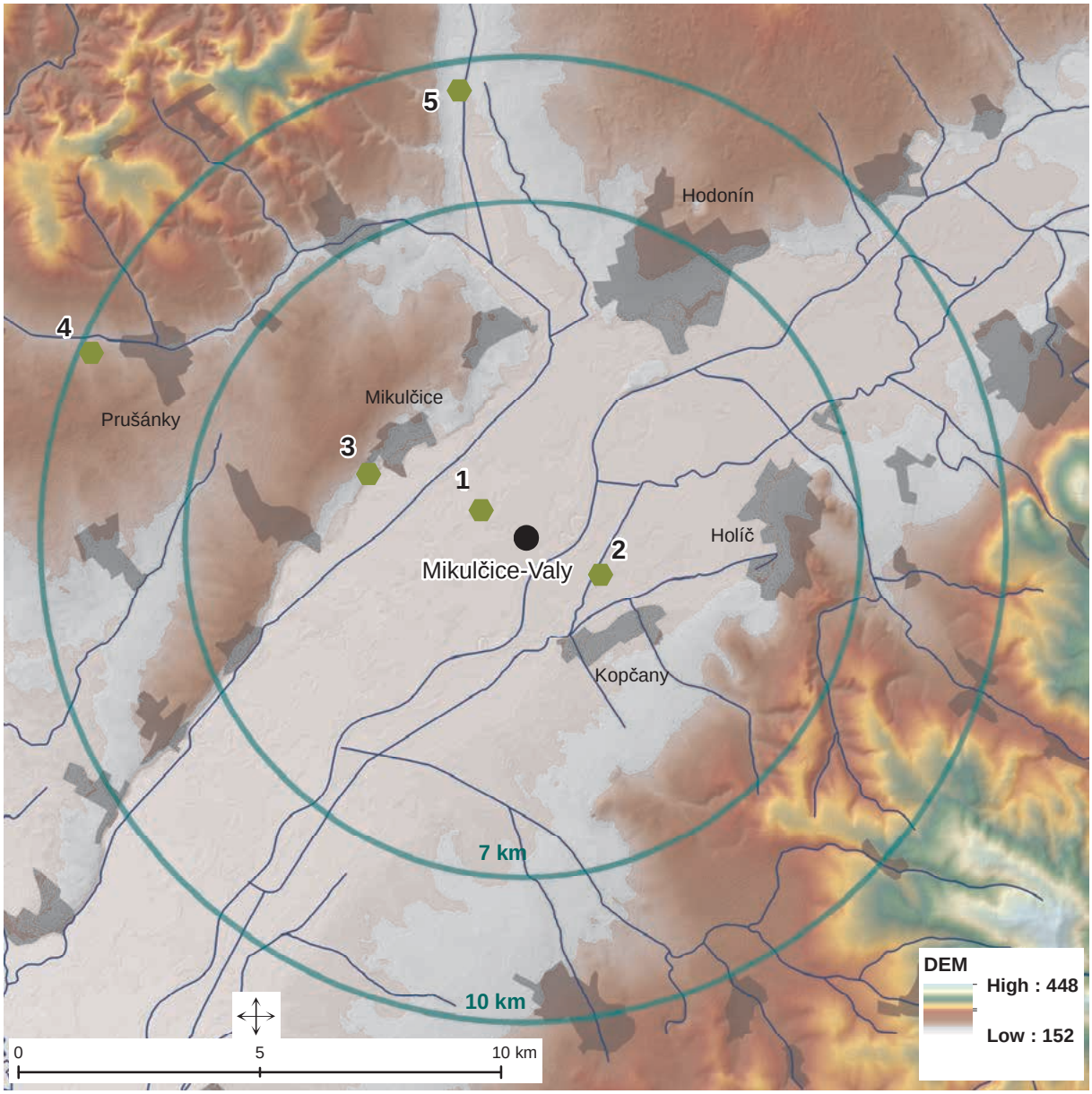

FIG. 79 | Great Moravian settlements excavated in the hinterland of Mikulčice. 1 – Mikulčice-Trapíkov, 2 – Kopčany–Pri Kačenárni, 3 – Mikulčice-Podbrěžníky, 4 – Prušánky-Podsedky, 5 – Mutěnice-Zbrod.

(for an overview, see HLADÍK 2020) – there are certain differences in the disposition (FIG. 80). To a certain extent, these correlate with the distance from the centre of the Mikulčice agglomeration. Trapíkov is addressed in detail in Chapter 7.2. We have published a detailed description of the other sites mentioned above several times (HLADÍK 2014, 96–99; 2020, 145–160; HLADÍK/MAZUCH/POLÁČEK 2018).

We are currently unable to present more comprehensive interpretation models of the spatial relationships at the above-mentioned Great Moravian settlements. In general, we have to say that we have been unable to discern significantly regular structures in the spatial distribution of the dwellings and farm buildings in the Great Moravian settlements in the Mikulčice hinterland. The exception is the interpretation presented above – the relationship between the buildings and the communication running toward the centre of the Trapíkov agglomeration. In most cases, the buildings form irregular accumulations, which primarily reflected the terrain – or, more precisely, the pedological and hydrological conditions. In the above-mentioned settlements, these include one or more groupings of houses, usually irregularly situated in a semi-circle or irregular lines. In this respect, the Great Moravian settlements in the hinterland of Mikulčice that have been excavated to date are by no means different from modern-day settlements in Central Europe. Clusters with irregularly situated buildings are the most common in this geographical area. The concentration of buildings in the settlements varies. Thus, two types of settlements can be mentioned: concentrated and dispersed (DONAT 1980, 137–145; ŠALKOVSKÝ 1998, 29;

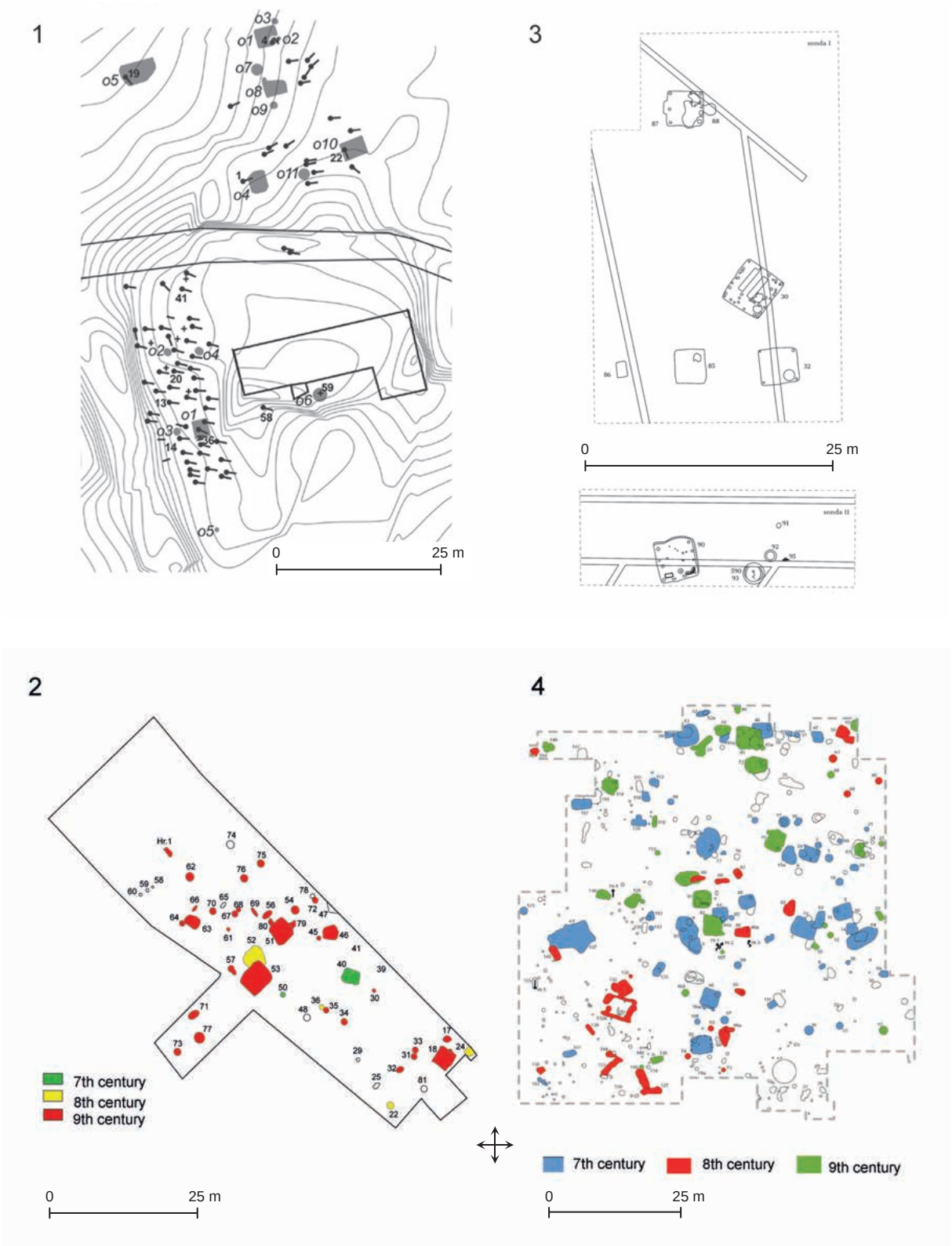

FIG. 80 | Spatial dispositions of the Great Moravian settlements excavated in the hinterland of Mikulčice.
1 – Kopčany-Pri Kačenárni, 2 – Mikulčice-Podbrěžníky, 3 – Prušánky-Podsedky, 4 – Mutěnice-Zbrod.

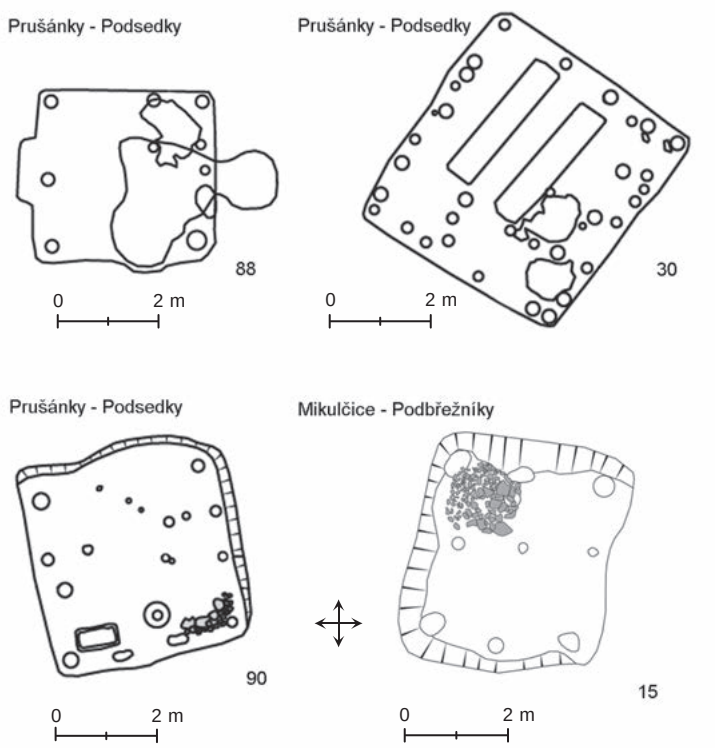

FIG. 81 | Types of dwellings in the Mikulčice hinterland settlements.

Šalkovský 2001). These are the two basic layout types of settlements that are present in Mikulčice. With a degree of uncertainty, we can consider the settlement in Mutěnice-Zbrod to be an example of a village green layout where the Great Moravian dwellings are arranged in a semi-circle around an open space (FIG. 80). As mentioned, differences in the layout correlate to some extent with the distance from the centre of the agglomeration. Two settlements on the outskirts of the agglomeration, Mikulčice-Trapíkov and Kopčany – Pri kačenárni, have spatial planning traits. The layout of Trapíkov suggests it consisted of organised row houses. The layout of these two settlements probably depended on other elements of the settlement network, such as burial grounds and communications. On the other hand, the layout of the settlements in the more remote hinterland was determined by local geomorphological and hydrological conditions and possibly the specific purpose of the settlements. The Mikulčice-Podbřežníky settlement contained five Great Moravian dwellings and over twenty silos, which were irregularly distributed throughout the whole settlement, and four production facilities. Only minimum information about the layout is available for the Prušánky-Podsedky settlement because it has only been studied using trial trenches. The studies conducted to date indicate that this could be a scattered settlement type with traces of separate farmstead buildings.

As with the layouts, there is a certain variability in the house constructions within the settlements in the Mikulčice hinterland (FIG. 81). The greatest variability of house construction within a single settlement was recorded in Prušánky-Podsedky. On the relatively small area of the large trial trench I (FIG. 80), four sunken featured buildings of various constructions with interesting details of interior equipment were found less than 150 metres from cemetery I. Three of the dwellings had a timber post construction and one was probably a log house. Three cottages were equipped with stone ovens (two of the features with as many as two ovens) and one with a hearth. A highly unusual phenomenon is the position of an oven outside the perimeter wall of one of the dwellings. P. Šalkovský hypothesised that such a construction might not be an oven outside an above-ground perimeter wall but an oven seat (Šalkovský 1998, 24). Apart from ceramic fragments, there were only a small number of finds (bone awls, spindle whorls) found in the features, with hardly any iron artefacts. Smaller trial trench II, around 400 metres from cemetery I, another dwelling with a timber post construction was found – it contained a stone oven in the corner and storage pits. A human skeleton was discovered in one that had been deposited unreverentially. The rest of the settlements in the Mikulčice hinterland are dominated by square sunken dwellings with stone corner ovens without a timber post construction. However, one sunken house with a timber post construction was found in Mikulčice-Podbřežníky (FIG. 81). This Great Moravian sunken dwelling with a timber post construction contained a very well-preserved stone oven. A unique discovery was made inside this dwelling: the skeletal remains of four unreverentially deposited children (FIG. 82). Radiocarbon dating placed the remains of one of these children to the late 9th and the early 10th centuries (FIG. 83). Like the skeletal remains above the settlement features at Trapíkov, these children's skeletons could also be proof of the sudden violent demise of the settlement during the fall of Great Moravia.

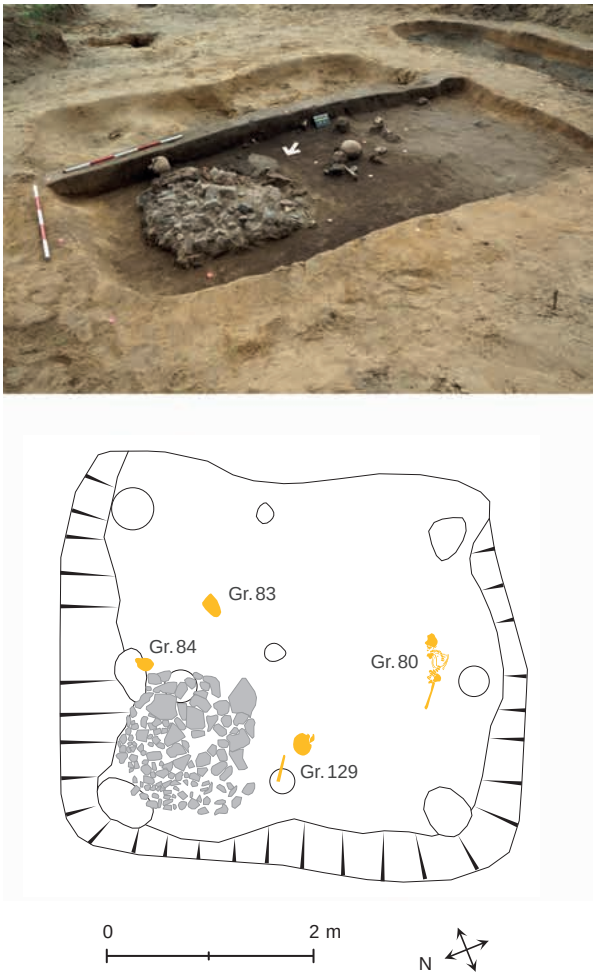

FIG. 82 | Mikulčice-Podbřežníky. Photo documentation and floor plan of the archaeological context in dwelling 15.

The last category of features that we studied at the settlements in the Mikulčice hinterland is farm buildings (production features) and silos. We have very limited information about the form of farming and production buildings in the settlements in the Mikulčice hinterland. Pits of various shapes and sizes were found irregularly throughout these settlements. With a few exceptions, no structural details have been documented, and no interpretively significant portable finds were discovered there, which is why we do not have any further information on the function of these features. The exceptions mentioned above include four production features at the Mikulčice-Podbřežníky settlement. In two cases, these were a smelting furnace, a bread oven and a feature, which probably served for roasting grains (MAZUCH 2008, 171–173, Fig. 15). The relatively numerous finds of iron slag in the settlements of Mikulčice-Trapíkov and Kopčany – Pri kačenárni are possible proof of ironwork or smithery. Textile making can be possibly associated with the context in dwelling 30 in Prušánky-Podsedky (FIG. 81). On the bottom of this dwelling were two parallel grooves, which also ran parallel to the wall. Dwelling 30 had a timber post construction and two ovens. Based on better-preserved analogies, such a context is associated with the presence of a loom (MILO 2014, 77–82; RUTTKAY 2002, Abb. 4). Large amounts of portable finds prove textile making, such as spindle whorls and loom weights, where the interpretation of the context as the remains of a loom is more than probable.

The sparse proof of crafts at the settlements in the Mikulčice hinterland correlate with the model of the movement of goods between the centre and the hinterland, which was presented in Chapter 8. Proof of specialised activities concerning iron processing, which is demanding in terms of raw material and technology, was concentrated in the immediate vicinity of the agglomeration and its outskirts. Excavations in the peripheral parts of the hinterland unearthed proof of homemade production of common products such as bone and wooden artefacts and textiles. This correlates with the hypothesis generally accepted in academic literature, that craft specialisation was improbable in rural Great Moravia (MILO 2014, 81). Crafts were part of the housework in the villages and can be described as domestic workshop production in rural Great Moravia. This type of craft production is characterised by the extent and range of production exceeding the needs of household members; the production was organised by family members and any surplus used for trading, exchanging goods or paying tithes/tributes. It was carried out providing there was free time and did not take up the entire working capacity of an individual (ANDERSSON 2003, 47).

Current research at the central sites, such as Mikulčice-Valy, Břeclav-Pohansko and Staré Město – Uherské Hradiště (BŘEZINOVÁ/PŘICHYSTALOVÁ 2014; GALUŠKA 1989; 1992; MACHÁČEK et al. 2007a; MAREK/KOSTELNÍKOVÁ 1998), suggests that craft production was more intensive in the central agglomerations than in farming settlements (BŘEZINOVÁ/PŘICHYSTALOVÁ 2014, 206). Although this was due to the larger numbers of inhabitants, the presence of the elites also played an important role in the organisation of craft production. For textile production, the needs of the inhabitants of the centres and the farming settlements were saturated by production in domestic workshops. However, the workshops of unfree specialists were likely found, especially in the centres (BŘEZINOVÁ/PŘICHYSTALOVÁ 2014, 206). In Andersson's classification, this is level three of craft production organisation, the so-called attached specialist production (ANDERSSON 2003, 47). The existence of the last level of the organisation of craft production in Great Moravia, so-called workshop production for the market, is particularly evidenced by three groups of craft products. These include artefacts made of iron or precious metals, such as jewellery, armour and weapons as well as the highest quality pottery production, which is represented by the Mikulčice and Blučina ceramic groups. Although the accurate location of metal and pottery workshops is problematic in Mikulčice (KLANICA 1974; KLÍMA 1985; POLÁČEK 2008, 280–284), such finds were discovered on other central

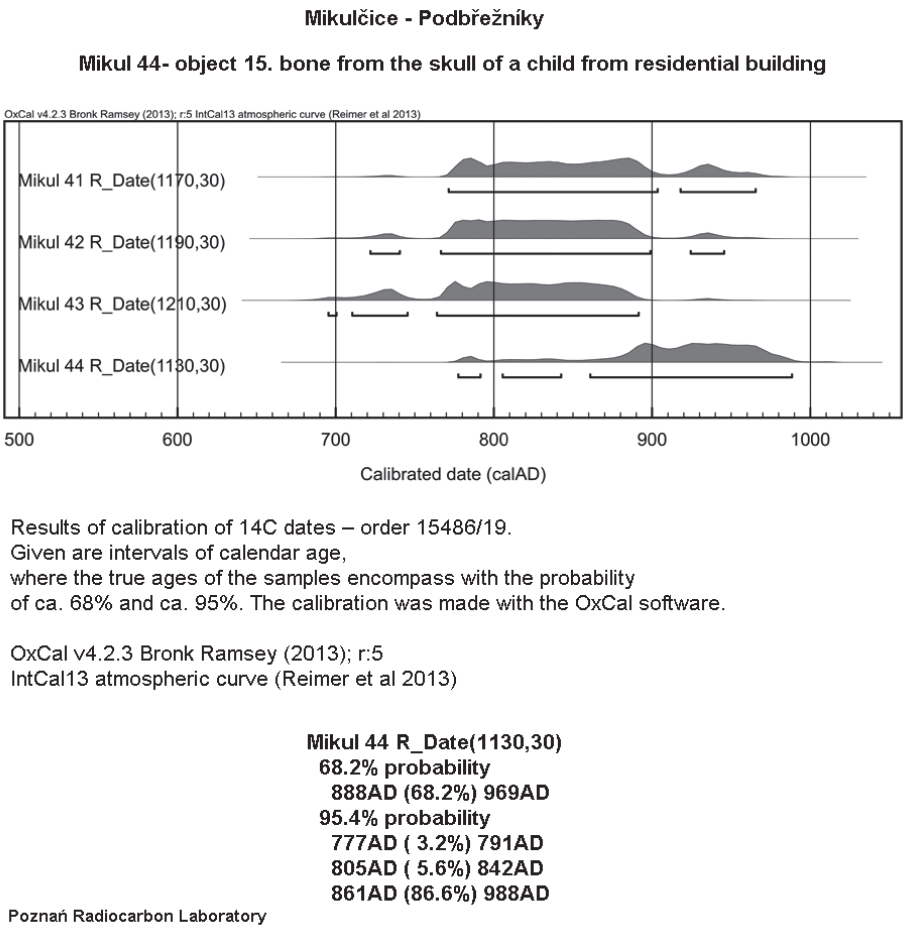

FIG. 83 | Mikulčice-Podbřežníky. Results of radiocarbon dating of child skeleton discovered in the destruction layer of dwelling 15.

sites. Both jewellery and blacksmith workshops were found in Staré Město – Uherské Hradiště (Galuška 1989; 1992). For example, there were several production areas in Pohansko, which included workshops related to the processing of iron and other metals. Based on the situation at the stronghold, it is assumed that the craft production in Pohansko was largely professionalised and centrally managed (Macháček et al. 2007a, 178). Specialised pottery or blacksmith's furnaces were found in the area of the Nitra agglomeration (Chropovský 1959; Staššíková-Štukovská/Plško 2003; Vlkolinska 2002). An earlier interpretation of kilns, which were associated with glass production in Nitra (Chropovský 1974, 159–175), has been rejected based on new analyses of slag from these kilns: the results state that it was not glass slag but iron slag (Staššíková-Štukovská/Dekan/Miglierini 2006, 106). Thus, these were features linked with smithery. A Great Moravian find worth noting are the twelve pottery kilns at Nitra-Lupka (Vlkolinská 2002). They were found outside the stronghold and were interpreted as proof of specialised workshop production. It is assumed that the members of a potter's family were buried at the nearby cemetery. The burial rite suggests that it was a community with a good social status (Vlkolinská 2002, 235–239).

Workshop production intended for the market is, among other things, characterised by the standardised production and that the job required the manufacturer's full workload capacity (for more detail, see Andersson 2003, 47). Production quality, degree of standardisation and the number of products made from coloured and precious metals and the most progressive Great Moravian pottery suggest that there must have been specialised workshops in Great Moravia. These were located in the central agglomerations and were directly supervised by the elite. It follows from the above that the craft production in Great Moravia included the whole development scale. Of course, the highest degree of specialisation – direct production for the market – included only some commodities and was most likely linked with the demand of the social elite; not only did it saturate their primary needs but was also traded in the world around. Thus, another condition of the existence of direct production for the market – sufficient and constant demand for production of specialised workshops – was fulfilled. This conclusion correlates with those presented above concerning a comprehensive, centrally organised agricultural economy in Great Moravia. The development in Great Moravia clearly did not reach a stage where the existence of specialised workshops would constitute the primary form of craft organisation. This was observed in earlier phases of the Middle Ages when female labour was pushed out by male labour and when craft guilds began to be founded alongside the development of towns (Charvát 1990, 81).

Lastly, storage pits (silos) in agricultural settlements were features that offered great information potential in our attempts to put together a picture of the functional principles at work in Great Moravia. Earlier in this book (Chapter 7.2.3.4, Chapter 8), we stressed that no silo was found within the actual agglomeration, as opposed to the agricultural settlements in the centre's hinterland. Storage pits that were the closest to the Mikulčice acropolis were at Mikulčice-Podbřežníky (Mazuch 2008, 165–181) and in Mutěnice-Zbrod (Klanica 2008, 185), 3 and 9 km away from the Mikulčice acropolis, respectively. Based on the most recent archaeobotanical analyses (Látková 2017, 105), we assume that the early medieval storage (grain) pits in Podbřežníky served for the long-term storage of grain intended for consumption. It is also possible that they contained overproduction or export.

Archaeological literature indicates that above-ground granaries and other high-volume forms of above-ground crop storage were used where the conditions did not allow the digging of deep pits (such as unsuitable subsoil, as is the case of the Mikulčice acropolis and its vicinity) or when there was a need to access the crops daily (van der Veen/Jones 2006). It is thus reasonable to assume that cereal grains were stored in special above-ground buildings (granaries), facilities (wattle-and-daub or wooden chests) and vessels.

This conclusion corresponds with our observations at Pohansko, where P. Dresler assumes that cereals might have been stored in above-ground granaries or containers (Dresler 2016, 225). According to Dresler, the inhabitants of Pohansko needed cereals and cereal products for their sustenance, which they prepared themselves when needed. Therefore, they had to have a way of storing cereals and other crops. They might have used portable vessels for crops intended for immediate consumption. Granaries with pillar column/pillar construction and log-house silos with or without stone underpinning cannot be excluded either. Although they have not been detected to date, such buildings can store the part of the harvest intended for sowing. The fortified and populated centre did not primarily require the storage and preservation of production surplus in hidden sunken pits (Dresler 2016, 228).

The increased concentration of storage pits in the settlements in the closest economic hinterland of Mikulčice points to a number of important facts. First, it is clear that long-term storage of excess produce was organised, systematically implemented and took place close to the centre, which supports the assumption of elite-controlled treatment of the foodstuffs produced. There is a question as to what extent these foodstuffs were primarily intended as supplies of the centre, as assumed in earlier works (Hladík 2014; Macháček 2001a, 44), and to what extent they were long-term storage overproduce intended for later consumption, sowing or export. As was the case in the proof of craft production and their location within the landscape exploited in the 9th century, the spatial aspects of cereal storage and its variable volume point to a complex hierarchical system, which is evidence of social relationships that integrated the existence of market exchange and a well-organised economy. There were dozens of silos close to the centre, which outnumbered the dwellings, while in the hinterland, the number of silos correlates with the number of dwellings (for more detail, see Hladík 2020, 294–296). These differences in the number and volume of the storage pits in the hinterland point to the fact that agricultural products were privately owned – the link between silos and individual dwellings in the peripheral areas of the hinterland is significant. Groups of smaller silos were also noted in the settlements in the immediate vicinity of the centres. For example, in Břeclav-Líbivá, small silos were found near dwellings, while larger ones were concentrated in a separate area on the edge of the settlement, around ten metres from the nearest houses (Macháček 2001a, 41). Production for household use was thus separated from the grain that was stored in large storage pits – the use of which was decided by the elite social class.

9.2 ECONOMIC STATUS OF GREAT MORAVIAN CENTRES – MODELLING GREAT MORAVIAN SETTLEMENT HIERARCHY

In Chapter 4, we briefly defined the basic parameters of the discussion concerning social and economic relations in Great Moravia, or more specifically, the relations between the central agglomerations and the surrounding settlements. The main question that should be debated in the discussion that emerged from the excavations carried out to date in Mikulčice and Pohansko is the degree of autarky of these centres and the consequences of this phenomenon. There are three main lines of interpretation. One extreme of the interpretive spectrum is the claim that Pohansko was fully self-sufficient (Dresler 2016). On the other side of this spectrum is the model where Pohansko is significantly dependent on the economic hinterland (Dresler/Macháček 2008). Somewhere in between is the Mikulčice model, which prefers the concept of cooperation between the inhabitants of the centre and those from the hinterland in securing basic energy needs (Hladík 2014; Látková 2017).

These models are based on data from two neighbouring agglomerations and their surroundings. These were central points, most likely with specific functions within the system of agriculture and administration in Great Moravia (see more in Dresler/Mazuch 2019). Therefore, it is possible that the organisation of the relations in their surroundings was also different, but at the same time, it is very likely that on the basic level of primary subsistence relationships, both the agglomerations had to function equally. This opens up broader interpretive possibilities concerning the more global issues: social, economic and environmental interactions within Great Moravia. As we are addressing constituent

phenomena of this complex problem, which are related to the data from Trapíkov, we shall not discuss theoretical concepts concerning Great Moravia here. We are not going to answer the question of the stage of the social development of the Great Moravian society, which draws on categories that are essentially based on purely structuralist research and were defined decades ago (e.g. Hodges 1982). However, we do not intend to demean the importance of such a debate in any way – we made it clear in the introduction to this work that one of the primary objectives of our long-term research is the involvement in this debate. As we have already mentioned and will demonstrate below, our foremost concern is the use of available archaeological data. To date, we have been able to develop a model that primarily defines the basic relations in the central parts of Great Moravia (see Chapter 8). However, our data does not enable us to understand the exact way these processes worked. In other words, we have created a picture of the direction in which energy sources moved and their transformation into products, both on the level of physical artefacts and the level of social relations and structures. Within this model, we also assume the directions of the movement of the workforce, technology and innovation (fig. 76). However, drawing on our data we are unable to decipher the exact way in which all this took place, without merely repeating, supporting or condemning some of the many more or less supported and (of course justifiably) published theories on trade, redistribution or tribute from other works.

At this point, we want to briefly discuss issues covered by our data – or more precisely, phenomena concerning the data obtained from Mikulčice and Pohansko, the consequences of which impact the debate on the nature of Great Moravia, which was mentioned earlier.

The first such issue is the existence of very different models of the relations between the Great Moravian centres and their surroundings, which were based on the very same data. This concerns the excavations at Pohansko. While the first model, created by P. Dresler and J. Macháček, assumes the existence of an economic hinterland background with a complex network of social and economic relations around Pohansko (Dresler/Macháček 2008), the latest work by P. Dresler (2016) concerning the settlements neighbouring Pohansko presents a model of an autarkic centre unsupported by settlements in its hinterland (Dresler 2016). The question is what is Dresler's interpretation based on? The key problem we see in this debate is the state of research into the open settlements around the centres. In the case of Pohansko, there were even fewer at least partially excavated and studied settlements than in the surroundings of Mikulčice. Like our model of Mikulčice, the first model of the complex economic hinterland of Pohansko was mainly based on non-destructive research.

The results of this research were questioned by Dresler who argues that the material obtained from the surface prospection is too fragmented, culturally indeterminable and chronologically not very sensitive (Dresler 2016, 247). Based on the repeated co-existence of the so-called Great Moravian ceramics and the post-Great Moravian graphite ceramics in the material from the surface survey of the settlement network around Pohansko, Dresler presented a hypothesis that this settlement is not contemporary with the Pohansko centre, but proof of a diaspora of the former inhabitants of Pohansko after its demise. He uses this claim together with other arguments (such as that the finds of farming implements discovered directly at the stronghold are not proof of craft production but farming activities, Dresler 2016, 247–248) to support his theory that the area within 5 km from the centre cannot be clearly interpreted as an economic hinterland in a generally assumed form. He claims that the inhabitants of Pohansko were farmers and were able to cover their energy needs. If we put aside the finds of farming tools and the overall situation at the stronghold, it is clear that there are two contradicting theories based on different dating of identical sources. Without research into the open settlements around the centres and their accurate dating, we will not be able to prove or disprove either. Both are based on quality methodology and valid arguments. However, the key issue of the absolute dating of sources has not been resolved.

How can we join this discussion using the data from Trapíkov? First, it is a fact that there is data from two neighbouring Great Moravian centres, or more precisely from their surroundings. These are two important points on the whole network of social and economic relations in Great Moravia. Current research on their status and function has brought complex theoretical models. We can now leave the issue of the dating of the settlement near Pohansko, which we identified as the key problem for the emergence of two different interpretations concerning the basic economic strategy of the Pohansko agglomeration. We will now take the discussion into a wider geographical and economic context. In other words, we can observe a higher level of the relations between the various Great Moravian centres. It results that the key question is whether we can accept the assumption that the organisation of the hinterland of the individual Great Moravian centres (neighbouring ones, in this case) was identical. If we accept such a premise, we can extend the model, which we consider to be the most likely picture of the social and economic interactions between Mikulčice and its hinterland (and which is presented in this work), to the hinterland of Pohansko. More specifically, we would be able to generalise its basic parameters, which would suffice to support one or the other model of the Pohansko economic hinterland.

To confirm the possibility of such generalisation, let us first compare the settlement networks around the two centres, primarily taking into account at least the partially studied sites. In neither case is there an abundance of excavated settlements

dated to the Great Moravian period based on the current state of knowledge – on the other hand, we have at least some archaeological data. The data in our model comes from the settlements of Kopčany–Pri kačenárni, Mikulčice-Trapíkov, Mikulčice-Podbřežníky, Prušánky-Podsedky and Mutěnice-Zbrod that are in the vicinity of Mikulčice. Around Pohansko, the settlements of Kostice–Zadní Hrúd, Břeclav-Poštorná, Břeclav-Líbivá, Břeclav-Lány and Břeclav–Na včelách have been researched. Even this simple quantification (for more details about Pohansko, see Dresler/Macháček 2013; Dresler 2016) shows that unfortified rural settlements existed around both the central places. Based on this, we are inclined to support the view that – analogically to Mikulčice – there was a network of settlements that coexisted and cooperated with the Pohansko centre and functioned as its economic hinterland. We can support this statement with a logical deductive argument. Deductive or logical reasoning is such where truth premisses guarantee a truthful conclusion and where it is impossible to reach a false conclusion if all premisses are true. The truth of the conclusion, arrived at by deduction, is inherent in the truth of the premisses from which it is derived. Therefore we will define our premises at the beginning so that we can consider them to be true, disregarding the ongoing debate.

Premisses:

1) The settlements concentrate around Great Moravian centres.
2) The settlements accumulate around the centres because they benefit from the geographical proximity to the centres.
3) The centres benefit from the increased population density in their vicinity.

What conclusions can be drawn from these premisses that concern the problem we are addressing?

Premisses 2 and 3 are essential for tackling our problem. So how do the settlements benefit from the proximity of the centre and vice versa – how does the centre benefit from the proximity of the settlements? Like the Pohansko models, our models show that the settlements around the centres benefit from the existence of the centre and its production. Quality craft products from the centre get into its surroundings, and at the same time, the centre protects the inhabitants from the outside – both spatial (the agglomeration serves as a refuge), and mental (defined sphere of influence – sense of belonging, identification with the centre). But what can the settlements around the centre provide in return? This value can have two forms. It may be products or services. Based on the current state of research, we do not assume that large numbers of technologically demanding craft products or those made from expensive materials (such as iron and precious metals) were brought to the centres from their surroundings. However, this does not rule out the possibility that the centre was supplied by craft products from more accessible materials (wood, leather, bone and textile). However, the other type of products that went from the surroundings to the centre – crops – were more significant. Thus, the surroundings of the centres provided some of the products necessary for the functioning of the whole network of relations. Apart from that, there were services, which the inhabitants of the villages from around the centres might have provided. Based on archaeological data, we particularly ponder such involvement of these rural communities as the construction of centres (e.g. fortification) or the transport of material necessary for the construction, maintenance and everyday life of the centre (stone, wood, clay).

Based on these conclusions, we assume that there was an economic hinterland, which fulfilled specific functions for the centre, in Mikulčice as well as in Pohansko. The organisation of the relations in the Mikulčice and Pohansko hinterlands may have differed. We have stated that the hinterland provided "countervalue" to the centres, which was transformed into various products and services. However, it is very likely that the proportion of such partial components differed between the hinterlands of the Great Moravian centres and depended on the geographical and functional particularities of the centres and their surroundings. Based on the arguments mentioned above, we also assume that the centres were not merely passive recipients of products (energy from the outside) but were actively involved in the management and economy of the hinterland. Again, this level of involvement may have varied between the centres, depending on geographical, political and functional particularities. Such involvement is also logical from the point of view of the sustainability of the whole system.

If we assume the existence of a developed economic hinterland in the vicinity of at least some of the Great Moravian centres – as the current state of research suggests – it is important to use archaeological data to answer the question of the extent to which the individual centres were economically independent of other centres. It is one of the key phenomena that essentially defines the level of centrality in Great Moravia; the understanding of these relationships would enable us to build a model of settlement hierarchy in Great Moravia. A more detailed analysis of this problem is still problematic, especially because of the uneven state of research at the Great Moravian central places. However, the debate on the status and mutual relations of the Great Moravian centres has been taking place since the second half of the 20th century. The phenomenon discussed here is the functional classification of the Great Moravian centres (Staňa 1985; 1990; 1999; Třeštík 1987; Hulínek 2008). Although this debate reflects the problem of the varying quality and quantity of sources, it is clear that the centres had their specific functions and a specific position within the settlement hierarchy. These conclusions show that there were strong social and economic links between

the Great Moravian centres. This in turn suggests the existence of a strongly hierarchical socio-economic relation network.

The hierarchical relationships of the Great Moravian centres, manifested in economic bonds (different levels of economic dependence between the centres), were complemented by the relations of the settlement units (agricultural settlements) in the vicinity of the centres. Despite the fragmentariness caused by the current state of research, the picture of the layouts and the types of built-up areas (housing and farm buildings) at the agricultural settlements in the Mikulčice hinterland shows that the settlements in the hinterland of the Great Moravian centres had specific functions in the settlement hierarchy. Most probably, these were not indifferent farming settlements, independent from the other settlements for subsistence and would be merely a systematically economically exploited area with regard to the centre. They were settlements integrated into a complex hierarchical network. There was an agglomeration in its centre surrounded by nodes with lesser centrality. However, these nodes with a lower degree of centrality than the agglomeration were interlinks in the economic relations between the agglomeration and the settlement network in its surroundings.

9.3 SOCIAL DIVERSITY, DIET AND WORKLOAD IN THE GREAT MORAVIAN POPULATION (ELITES, FREE PEOPLE AND SLAVES)

The discussion concerning Pohansko and its hinterland shows that a key problem in recreating the picture of social and economic relations in Great Moravia is the dating of individual components of the residential network, which in turn is the basis for interpreting the function of the individual components and the social and economic status of the population. This is what the second issue, which we want to briefly mention, is linked with. In archaeological research, progressive natural science methods are now being put forward that focus on analysing the presence of stable isotopes in both animal and human bones. Such research analyses, among other things, show the relationship between food and social diversity in society (Twiss 2012; Vidal-Ronchas et al. 2018). This trend can also be observed in the research on social structures in Great Moravia (Kaupová et al. 2018) and also forms part of our research (see Chapter 12.3). However, to build meaningful models from this data, it is necessary to have as precise as possible analysis of the ecofacts – the same as in the case of artefacts. This condition is currently very difficult to meet, especially for data coming from open settlements outside the fortified centres. This problem is no smaller in the case of rural burial sites (see Mazuch/Hladík/Skopal 2017, 333–336). In our opinion, it transpired in the work on the nutrition of the Great Moravian population by a team of authors led by S. Kaupová et al. (2018). Undoubtedly, this is a remarkable study, the first to comprehensively examine this issue using a very progressive methodology. However, the principles on which the selection of the sampled components is problematic concerning one of the objectives of the study, namely the comparison of the nutrition of the elite classes of the society from the fortified centre and the nutrition of the lower social strata from the hinterland.

The samples for the analysis of the hinterland came from the cemetery in Josefov. This burial site is anthropologically and archaeologically rather specific (which the authors mention; Kaupová et al. 2018) and we consider its choice as representative of a cemetery of the hinterland population as rather unfortunate. In our opinion, it would be much more appropriate to sample the finds from the burial site in Prušánky, which has a greater information potential, both archaeologically and anthropologically. Based on the archaeological and anthropological research carried out so far, we assume that a wider spectrum of the society was buried there (Havelková et al. 2011; Mazuch/Hladík/Skopal 2017). The paper by S. Kaupová et al. (2018) has results that are worth noting but the archaeological data on which it is based does not allow to develop the model, which the authors sought to present. The conclusions of the study basically correspond with the main assumptions – the archaeological hypothesis about a significant social stratification of the Great Moravian society. This is what the authors primarily prove by statistically significant differences in the consumption of animal proteins between the centre and the hinterland. However, this trend was mainly observed in the male population. It is therefore questionable whether the observed dietary differences in the part of the studied population correlate with the social status of the individuals. Although all the groups may have consumed similar amounts of animal protein from the same species, they were different cuts and proportions to secondary products. These would not have been isotopically visible (O'Connell/Hedges 1999) and neither would the differences when using stable isotope analysis (Vidal-Ronchas et al. 2018).

Using the methodology applied to define the causal relationship is also problematic. The authors use the results of such statistical tests as t-test, ANOVA or Mann-Whitney to decide whether there are differences between the sample groups (the samples are primarily divided into groups from the centre and the groups from the hinterland or divided chronologically into Great Moravian and Late Hillfort). The results are presented rather tersely. They are usually limited to indicating the resulting p-value. This is, by all means, a correct and broadly used way of presenting results. Nevertheless, even by disregarding the fact that some sample groups contain a very small number of specimens to secure a relevant result of a statistical test, we must bear in mind that in case the above tests show a statistically significant difference or, vice versa, a match between two groups of data, they do not have an impact on the

interpretation of causality. Therefore, it would be appropriate to complement the methodology with more comprehensive statistical algorithms or mathematical models, such as modelling using structural equations (see, for example, Mazuch/Hladík/Skopal 2017, 271– 281). These would introduce multidimensional space analysis into statistical reasoning (this might include the exploration of links between all attributes of the funerary rite and stable isotope values), which would enable us to find the causal reasons of the state of the empirical variables and their relationships. The statistical comparison of the dispersions of the measured values of stable carbon and nitrogen isotopes, which is presented in this work, brings very ambiguous conclusions, which can contain much bias. Finally, this is also evident in those parts of the work where the authors discuss the importance of stable isotopes for the interpretation of the diet of the studied population, which show that the measured values are influenced by a large number of factors and that identical values may be the result of very different processes.

Similar conclusions were reached by the authors of other studies focusing on trace elements in buried individuals in early medieval Central Europe (Bodoriková et al. 2013; Vidal-Ronchas et al. 2018). Remarkably, the early medieval Central European population had a mixed diet, where the plant and animal components were almost identical (Bodoriková et al. 2013, 7). This proportion obviously varied depending on the chronological phase of the Early Middle Ages and the geographical location of the analysed samples, which is a significant trend. In the context of the conclusions discussed above, which concern the Mikulčice centre and its hinterland, it is important to mention the results of a study that reconstructed dietary habits by analysing the content of Sr and Zn in the dental tissues of those buried in the early medieval cemetery in Gáň, dated to the 9th/10th century. The results suggest that adult individuals consumed more animal protein than subadults and that the female diet probably contained more protein than the male diet. The results also indicate that there were individuals in the population whose diet was not so varied – it was richer in animal protein, which was probably connected to the state of their health or their social status (Bodoriková et al. 2013, 7).

It also follows that in this case, our attempt to reconstruct a picture of Great Moravian society is hindered by the absence of systematic excavations of the settlement outside the fortified centres as well as a solid interconnection between archaeological and anthropological research – be it on the level of understanding of the epistemological starting points of these disciplines – not only in the presentation of the results of the individual analyses (see also Mazuch/Hladík/Skopal 2017, 14– 25).

Strong economic relations across the social spectrum in Great Moravia are evident. However, the question of the extent to which the social elite was involved in the various basic subsistence processes is highly problematic. The relationship of the elite groups of Great Moravian society, who resided in large fortified agglomerations such as Mikulčice-Valy, Břeclav-Pohansko and Nitra (Hladík/Mazuch/Poláček 2018; Macháček 2010) and the people from the hinterland of these centres has been the subject of systematic research in recent decades (Dresler 2016; Hajnalová/Hajnalová 2008; Hladík 2020; Látková 2017; Štefanovičová 2008). The question of the involvement of the elite members of society in agricultural and craft production was addressed in three case studies.

In the first study, which is the result of comparative archaeological and anthropological research, we focused on the differences in the manifestations of physical strain reflected on the skeletons of the individuals buried in the acropolis of the Mikulčice stronghold and those buried in the peripheral unfortified zones of the agglomeration and its hinterland (Havelková et al. 2011; Havelková/Hladík/Velemínský 2013). The starting point for this research was the hypothesis that the different socio-economic conditions are reflected by changes in the insertions of muscles and ligaments. It is also important that the changes in the muscle and ligament insertions are closely correlated with age – in the case of heavy physical stress, changes even occurred in younger age groups. The analysed groups of skeletal remains came from the cemetery near Church 3 (the basilica) at the Mikulčice acropolis, a cemetery in the unfortified extramural settlement in Mikulčice – Těšický les and two cemeteries in the Mikulčice hinterland: Prušánky-Podsedky and Josefov-Záhumenica (Havelková et al. 2011; Havelková/Hladík/Velemínský 2013).

The changes in the areas of the muscles and ligaments are strongly correlated with age in all the assessed population groups except for the group of males from the hinterland (cemeteries in Prušánky and Josefov). This result confirms the assumption of a higher physical burden in this population group. The least rate of changes was observed in men buried on the acropolis of the stronghold. Based on the changes in the areas of muscle attachments among the men buried in the extramural settlement (the Těšický les cemetery), we can differentiate two groups that belonged to the elite strata of society (Havelková/Hladík/Velemínský 2013). However, the situation was different for women. More significant changes to bones in the area of the ligaments and muscle attachments were observed in females buried at the acropolis rather than in the hinterland. This indicates that even women from higher social classes were exposed to greater physical burdens throughout their lives. It is rather problematic to unambiguously define the physical activity, which led to these changes – and which could help us to define the type of work and socio-economic status of the studied communities. However, it is likely that the men buried in the hinterland were involved in farming-related activities, while the women did work such as skin processing, spinning, weaving, grinding

and food preparation (Havelková et al. 2011). Most probably, these activities were carried out by women across the spectrum of the vertical social hierarchy.

Similar conclusions regarding the heavy physical strain of the elite members of the Slavic society were also reached by R. Beňuš and S. Masnicová who analysed skeleton remains from the Devín stronghold and the unfortified settlement of Devín – Za kostolom in its hinterland. In the first case, it was the 11th/12th-century population and the other was from the 9th century (Beňuš/Masnicová 2015). The purpose of this case study was to reconstruct physical activity based on traces on the bones of the buried individuals with regard to agriculture. After an evaluation of physical stress markers on the skeletal remains, the authors stated that the men who lived on the Devín stronghold in the 11th and 12th centuries mostly did hard manual work – mainly agriculture or craft. Some of the stress deformations suggested the presence of warriors in the population. In the male part of the population from Devín – Za kostolom, there were dominant markers that supported the hypothesis of agriculture as the main activity (Beňuš/Masnicová 2015, 75). As for the females from this population, the authors stated that they engaged in hard manual work, most likely activities related to agriculture and domestic work and crop processing (milling of cereals) (Beňuš/Masnicová 2015, 74).

The last case study is based on an archaeobotanical analysis of botanical macroremains from the Mikulčice-Valy agglomeration and the unfortified farming settlements in its hinterland (Mikulčice-Trapíkov, Kopčany – Pri kačenárni) (Látková 2017). On the one hand, there are striking differences in the species composition of the consumed cereals, which provides a broad basis for socio-economic interpretations. However, the model presented by M. Látková (2017) is important regarding the issue now focused on – the participation of the elite social classes in food production. Based on the results of archaeobotanical analyses, it can be assumed that plant-based foodstuffs for the Mikulčice agglomeration were not produced exclusively by the settlements in its economic hinterland (Látková 2017, 87–96). This type of settlement generally consisted of a small number of households – too few to organise the necessary workforce in the most stressful times of the agricultural year to produce excess crops for the central part of the agglomeration (Látková 2017, 101–106). Therefore, it is highly likely that a certain part of the population of the centre also participated in the production of plant food that saturated the needs of the central part of the agglomeration. To what extent this concerned the elite population or purely its servants cannot be clearly determined. However, in both cases, the result of the above conclusion is that the elite social classes in Great Moravia participated either directly or indirectly in primary economic production. Thus, it was not just the exploitation of the lower social classes.

Just as we assume the direct involvement of the social elite in agriculture and crafts, it is justified to assume that a large part of the workload fell on the shoulders of the lower social classes, whether free or slave. The status and importance of slaves in the early medieval Great Moravian economy and the wider geographical area of Central Europe have been addressed by a number of researchers (Galuška 2003; Henning 1992; 2003; Macháček 2015a; 2021; Sutt 2015; Profantová/Profant 2014; Třeštík 2000).

The position and importance of slaves to Great Moravian society can be studied on two levels. First, it is the question of to what extent was the unfree population involved in primary economic activities. When reconstructing a picture of the functional principles of Great Moravia, the important question is to what extent was the operation of the local economy dependent on slave labour. The second important phenomenon is the slave trade in the wider area of early medieval Europe. In this context, the fundamental question is the impact of the slave trade on the development of early medieval power formations in Central Europe. This issue was given more attention by Czech archaeology and historiography in the past. Key texts on this subject were published by D. Třeštík (1999; 2000). He considered the slave trade to be a driving force in the process of the formation of early medieval Central Europe. He demonstrated his conclusions primarily on the situation in Prague in the 10th century during the rule of Boleslav I and Boleslav II. According to Třeštík, an enslaved person was the only attractive goods that Central Europe was able to offer to the Arab world at that time. Třeštík also posits that the slave trade was one of the primary economic bases in Great Moravia, the same as in the 10th-century Bohemia. Jewish traders and merchants from Venice came to the "market of the Moravians" in the seat of the Mojmirids where slaves were supposed to be the key article. Třeštík hypothesised that the 9th-century "market of the Moravians" played a similar role to the "market of the Slavs" in Prague in the 10th century.

Třeštík's conclusions were contested by several researchers (Galuška 2003; Macháček 2010, 458; 2015a; 2021) who highlighted the problems concerning the Great Moravian period. One of these is the location of the "market of the Moravians" as well as the interpretation of its form and importance to the entire Great Moravian economy (Galuška 2003, 76; Macháček 2010, 457–58; Poláček 2002, 56–57). L. E. Havlík and L. Poláček assume that this term does not denote a single specific market and that the concept was more general because such markets were likely to take place in several places in Moravia (Havlík 1987, 220; Poláček 2002a, 56–57). J. Macháček considers the possibility that the market of the Moravians was located somewhere around Pohansko or that Pohansko was heavily involved in international trade, which would correlate with this possibility (Macháček 2010, 457–460). Written sources prove the importance of slaves as an article within the global economic relations of early medieval Europe. The extent to which the Great Moravian economy was based on

the slave trade is subject to discussion. L. Galuška rejected Třeštík's conclusion that the Great Moravian economy was based on "catching and selling" slaves (Galuška 2003, 79). On the contrary, J. Macháček considers this option likely; he states that the selling of Slavic slaves to the Muslims helped to finance the beginnings of medieval states in central, North and East Europe (Macháček 2021). The provocative words of the Polish historian and former rector of Warsaw University Henryk Samsonowicz, who wrote that "Without Mohammed, there would be no Rurik in Russia, Mieszko in Poland, Gorm in Denmark and no Wenceslaus in Bohemia", is closer to the truth than it might appear at first sight (Adamczyk 2014, 29; Macháček 2015a; 2021).

The extent to which slaves were involved in primary economic activities in Great Moravia itself is also unclear. The inquiry into the causes of economic progress in early medieval Europe is also linked to this issue. Besides the references to the slave trade, scarce written sources prove the existence and use of slaves directly in Great Moravian society (Galuška 2003, 77). L. Galuška assumes that the slaves did not represent a decisive component of the production sphere in Great Moravia and that slave labour was probably not used on a mass basis. Most importantly, he claims – based on B. Dostál's works – that the economy of the Great Moravian courts was largely based on the work of unfree people. However, he adds that the existence of the princely retinue was not entirely dependent on slave labour (Galuška 2003, 79). J. Macháček also assumes the use of slaves for work directly for the needs of the Great Moravian ruler (Macháček 2021). Mass use of slaves cannot be assumed in agriculture and craft production, since free people were the main labour force in these sectors of the economy. The quantity and quality of their production were sufficient to keep the entire Great Moravian economic system running (Galuška 2003, 77–79; Dostál 1990).

The archaeological record offers a very fragmented picture of the extent and way in which slave labour was used in Great Moravia. One of the most significant finds connected with the presence of slaves is iron shackles. These finds from the region settled with Slavs were processed as early as 1992 by J. Henning (1992). His work was updated and critically assessed for the milieu of Great Moravia by L. Galuška (2003). The above-mentioned works show that finds of iron shackles are very rare, and it is clear that enslaved people were much more often tied with ropes from organic materials, which were not archaeologised.

The second group of archaeological records, which might contribute to the debate on the importance of slaves in Great Moravia are burial grounds or some aspects of the funerary rite. Especially in the area of such Great Moravian centres as Pohansko or Mikulčice, some groups of graves in the peripheral settlements were identified as graves of the people with the lowest social status. According to B. Dostál, the excavations at the site Pohansko – Lesní školka had revealed an settlement specialising in craft production and other types of activities. Judging from the grave goods from that area, he believed the inhabitants of the attendant settlements were of low social status – slaves (Dostál 1988, 283–287; 1993, 31–54). The fact that the graves from the craft area in Pohansko – Lesní školka belonged to low-status inhabitants is consistent with the conclusions of R. Přichystalová (Přichystalová/Kalová/Boberová 2019, 30). Based on analyses focusing on textile production at Pohansko, Přichystalová assumes that the unfree inhabitants were used for labour within the so-called workshop production of dependent specialists (Březinová/Přichystalová 2014, 205–206). These craftsmen with limited freedoms might have come from different parts of Europe and, as foreigners with different cultural habits or low social status, were not entitled – or did not want – to be buried near a church (Přichystalová/Kalová/Boberová 2019, 30).

Both written sources and archaeological data show that in Great Moravia, we must expect the presence of slaves and their contribution to the functioning of the entire socio-economic system. It is highly likely that slave labour did not constitute the foundation of economic production, but based on current research, the unfree population was used for specific crafts and possibly for ensuring the basic functioning of the economy and the households of the higher social classes. However, these assumptions need to be further examined. To identify the unfree population and how they were used in the economy, it is necessary to continue with interdisciplinary research – the first results were presented in this chapter. Using a combination of analyses of food quality, migration, strain deformations of the skeleton and all available attributes of the funerary rite while employing complex mathematical models (Mazuch/Hladík/Skopal 2017), we will be able to identify population groups that were marginalised and regularly burdened with labour and which can be, with a certain degree of uncertainty, assessed as people with limited personal freedom.

In a wider European context, the understanding of the importance of slaves in Great Moravian society is linked to the debate on early medieval economic progress; more precisely to the issue of its key driving force. In his 2001 book, *Origins of the European Economy: Communications and Commerce A.D. 300–900*, M. McCormick presented a theory on the key importance of the slave trade for the development of the economy in early medieval Europe following the collapse of the Roman Empire (McCormick 2001). McCormick considers the slave trade of the 8th and 9th centuries to have been "the source of the western wealth" (McCormick 2001, 758) and "the first great impetus to the development of the European commercial economy" (*ibid.*).

The concept of the slave trade as the key driving force of early medieval economic progress was contested by J. Henning (2003), who presented a number of arguments against McCormick's theory. Concerning the archaeological records presented in this

book, his argument on the reasons for the development of the local market in early medieval Europe is significant. Henning writes: "There is good evidence for a visible development of local market relations in the Frankish heartlands in the Carolingian period. The spread of silver currency is among the most obvious. But it seems hard to explain this process as primarily inspired by the importation of luxury goods for a small upper class" (Henning 2003, 273). He also states that the development of economic relations at local markets after the 7th century must be primarily explained by increased production and the local exchange of goods, mainly foodstuffs. He also points out that the post-Roman economy in Europe was not collapsing, but that it was a case of a major reorganisation of the agricultural economy as a primary food production sector (energy base of the entire social system). Many of the so-called inventions of medieval European agriculture, traditionally attributed to the period after the year 1000, turn out to have already been known in Roman times, such as the heavy-wheeled plough in its sophisticated form of a "swivel plough" or the long-handled "authentic" scythe. But they were limited in their diffusion. Immediately after the decline of Rome in the West, some of the most effective methods were selected and became integrated into the newly dominant rural economic structures, which consisted basically of villages, farmsteads and peasants. A key factor for maintaining the new post-Roman system of agricultural economy was a developed technological base and the growing number of relatively autonomous and independent farmers organised in the villages and a higher degree of freedom in the rural world (Henning 2003, 274).

Based on archaeological, archaeobotanical and archaeozoological data from the area of Great Moravia, we formulated a theory that, in the case of Central Europe, or more specifically Great Moravia, local developments in technology and agricultural strategy were the primary source of economic advancement and in turn increased production and local exchange of goods (primarily foodstuffs). Economic advancement was thus a result of bottom-up processes (see Chapters 9.1.2, 9.1.3). Therefore, the archaeological data and analysis conclusions presented there support the arguments put forward by J. Henning. Archaeological data from Central Europe provides further evidence for the theory that after the collapse of the Roman Empire, there was no deep economic collapse taking place in the territory of Western and Central Europe, but a broad reorganisation of the economic structures in the immediate post-Roman centuries. These reformed structures (methods, peoples, etc.) should be seen as the decisive basis, which enabled that fascinating increase of economic activities after the end of the first millennium AD (Henning 2003, 270).

10. Conclusion

Our long-term research aims to build a stable, conceptually consistent and accessible model of social and economic relations in Great Moravia. After publishing several case studies with different perspectives of the stated aim and different degrees of overlap with each other and the main research aim (FIG. 2), we presented a narrative model of causal relations from a particular geographical area and time. For the first time, we used mainly data from the excavations of an open settlement outside the central part of the Mikulčice-Valy agglomeration, which were carried out in the spirit of current methodological trends. This was the shift in research, the importance of which we emphasised in the conclusion of our work on the Mikulčice economic hinterland (HLADÍK 2014; 2020). This book was primarily based on post-excavation analyses of earlier fieldwork and modern, non-destructive archaeological research. By doing so, we laid the foundations for research into the social and economic relations between Mikulčice and its immediate surroundings. However, throughout the research process and during the interpretation phase, we were aware of the limits of the methodology used. One of our conclusions was that if we want to develop or validate the truth of any assumption, hypothesis or model based on systematic archaeological prospection, it is necessary to examine the unfortified settlements around the centres. The absence of such research in the past has seriously distorted the source base on which the interpretation models are built. The absence of excavations of the unfortified settlements is a general problem of Great Moravian archaeology.

The excavations of the Trapíkov settlement, which were the result of the construction of the new Mikulčice workplace of the Institute of Archaeology in Brno, perfectly suited our research concept. This area had already been studied, which is why we were able to begin fieldwork while taking into account specific historical issues. It was clear that we would continue to excavate a Great Moravian settlement and cemeteries. Locating these components was crucial for the excavations and the processing and interpretation of the archaeological material unearthed by it. The components were found in a very specific area on the outskirts of the agglomeration. As a result, we did not obtain data from a typical unfortified settlement in the hinterland of an agglomeration – this is one of the next steps planned. However, we excavated an area between the centre and hinterland, which is of no less importance.

Our main research aims were formulated in three key points. We sought to design a narrative model based on environmental analyses and the analyses of spatial relationships between contexts and archaeological material. The three main issues, which we believe can be solved by analyses of archaeological material from the settlement and cemetery at Trapíkov, are the economic strategy of the communities living in and around the centre, the hierarchy of the settlements and the function of the Great Moravian centres, and the interaction of the Great Moravian population with the landscape in which it lived. Hence, the conception of the model is presented in our work. Obviously, data from a single settlement cannot comprehensively answer the above questions. However, together with the results of extensive prospection in the vicinity of Mikulčice published in 2014 and 2020 (HLADÍK 2014; 2020), they constitute one of the pillars on which our interpretive models are based. This time, it focuses on intensive research into specific components of the residential network.

We primarily sought to answer the question of whether the new data from the Trapíkov settlement confirms our model, which we based on non-destructive research, and which lies at the heart of the discussion about the relations between the Great Moravian centres and their surroundings. This is why we defined the basic parameters of the discussion on social and economic relations in Great Moravia, or more specifically, the relations between the central agglomerations and the settlements around them. In this discussion, the key question, which resulted from the excavations carried out in Mikulčice and Pohansko, is the degree of autarky of these centres and the consequences of this phenomenon. There are three main lines of interpretation. One extreme of the interpretive spectrum is the claim that Pohansko was fully self-sufficient (DRESLER 2016). On the

other side of this spectrum is a model where Pohansko is significantly dependent on its economic hinterland (Dresler/Macháček 2008). Somewhere in between is the Mikulčice model, which prefers the concept of cooperation between the inhabitants from the centre and the hinterland to secure their basic energy needs (Hladík 2014; 2014; Látková 2017).

The research methodology was based on theoretical assumptions consistent with previous case studies (see Mazuch/Hladík/Skopal 2017; Hladík 2019). The main theoretical concepts applied are the concept/vision of renewed modernity by K. Kristiansen, relational archaeology and the theory of network analyses (Kristiansen 2014; Knappett 2013; Watts 2013). They were integrated into the spirit of methodological pragmatism utilizing basic methodological procedures while seeking the widest possible repertoire of applied methodologies (for details, see Hladík 2019). We have dealt with the issues using a combination of multiple algorithms. The first set of analyses was aimed at detecting spatial relationships in the area of the settlement. Intra-site analyses were carried out in the GIS environment using several spatial statistics algorithms. We entered these algorithms as both non-portable (contexts) and portable finds (especially pottery, iron objects, botanical macroremains). The second group of analyses mainly focused on portable finds – artefacts (mainly pottery). In this case, we applied several descriptive statistical methods. The last group of analyses focused on ecofacts, primarily botanical macroremains, but also animal osteological material. In addition to descriptive statistics, we used multi-dimensional survey methods to detect latent variables behind the patterns in this data group.

In the next step of our research, we compared the results of these partial analyses and, based on this comparison, developed a theoretical model on relations between the Mikulčice centre, the peripheral zones of the agglomeration and its surroundings (fig. 76).

The Trapíkov settlement was probably situated on one of the main roads leading to the power centre (fig. 40). This significantly influenced the layout of the settlement, which was a type of buffer zone in which the interests of the centre and its vicinity naturally came together and were communicated. It is where activities related to the distribution (and partly the processing) of foodstuffs from the hinterland to the centre most likely took place, as well as the distribution of craft production from the centre to the hinterland. The centre-hinterland direction was probably accompanied by targeted penetration of power and administrative structures into the vicinity of the agglomeration. In our view, the bearers of this movement were the inhabitants of the centre.

Therefore, we have defined two opposing directions in which services and goods moved within the studied community. The first is the direction in which foodstuffs (and/or other raw materials) were brought from the surroundings to the centre, and the second is the direction in which craft products (pottery, tools, construction fittings or jewellery) were transported from the centre to its vicinity. This model reflects the natural movement of energy in the studied system. The primary source of energy (food) went from the primary production site to the place of the greatest demand – the centre with the most concentrated population – to be transformed by a system of social and economic relations and directed back from the centre to its surroundings.

Based on this model, we made two statements about the organisation of the subsistence strategy in the vicinity of the Mikulčice centre. 1) The source of energy – food – was largely outside the centre (taking into account farming directly in the agglomeration although it could not have been the primary food source). 2) The people from the centre contributed to providing energy for the system – the entire community. The inhabitants of the centre actively participated in securing subsistence for the whole community. However, the available sources do not allow us to define the exact parts of the chain secured by the people from the centre. Clearly, the centre produced craft products (this phenomenon is best proven by pottery production). However, an analysis of archaeobotanical data points to the fact that in the most stressful parts of the agricultural cycle (around the harvest), the inhabitants of the centre were bound to contribute to agricultural labour.

To date, we have been able to develop a model that primarily defines the basic relations in the central parts of Great Moravia. We generalised this model by taking it from the Mikulčice hinterland and applying it to the vicinity of Pohansko. In the debate on the autarky/non-autarky of Great Moravian centres, we support the conclusions that state there was a complex network of economic and social relations between the centres and their hinterlands, which means we consider the model of non-autarkic Great Moravian centres as archaeologically proven. We have created a picture of the direction in which the energy sources moved and were transformed into products, both on the level of physical artefacts and the level of social relations and structures. Within this model, we took into account the directions in which the workforce, technology and innovation moved. To incorporate theories on specific forms of food distribution, products, innovation and technology into the model, we must obtain further data from settlements farther away from the agglomeration. The comparison of this data with the data collected at the centre and the peripheral zone of the agglomeration, which we identified near the Trapíkov settlement, can help us understand the processes and relationships that were a crucial fit to the energetic stability of the studied society.

After presenting an archaeological model of relations between the centre and its economic hinterland, we focused on the interpretive implications of this model. We discussed the rural economy and the importance and function of the Great Moravian centres in the context of the organisational and functional principles of Great Moravia. To describe

the principles of the rural economy and the organisational and functional principles of Great Moravia, we presented a model of the cultural landscape and defined the character of the agricultural settlements in the central part of Great Moravia. These were the foundations for us to consider how craft production and agriculture was organised, along with the food produced (the quality and quantity as well as changes during the Early Middle Ages). This took us directly to the issue of the driving force of early medieval economic development, more precisely the question of the roots of innovation in agriculture, crafts and economy in Great Moravia in general. Central to our line of thought was the innovation process and the function of centres compared to the function of the agricultural settlements in the network of social and economic relations. This is directly related to the extent and manner in which the inhabitants of different types of settlements were involved in the economic processes (from the elite classes to the slaves). On a theoretical level, this discussion is an assessment of the validity of two opposing concepts, and in this case, whether innovation in early medieval Central Europe was the result of top-down or bottom-up processes.

As with any complex system, it is clear that the social and economic development of the Great Moravian society must be seen as a multicausal issue. However, based on the archaeological data currently available, which is also presented in this book, we consider the key driving forces of the Great Moravian economy to be innovation in agriculture, local development of technology and farming strategy; these led to increased production and local exchange of goods – the local market. Therefore, economic advancement was the result of bottom-up processes. In this system, the centres were nodes where the processes of economic innovation came together and were redistributed. Also, it was in the centres where wealth produced primarily from local sources was concentrated, which made them the nodes of the rural economy. These economic centres were intensively involved in the primary production of food and other agricultural products; they were not centres in the sense of emporia, the primary function of which was to control long-distance trade and the redistribution of prestigious goods. The Great Moravian centres were wealthy, high-status secular sites, which coexisted in a narrow symbiosis with the communities that supplied them. At the same time, individual centres likely had specific functions and a particular position within the settlement hierarchy. In turn, their functions determined the form of settlement in their immediate surroundings (the existence or absence of economic hinterland). There were strong social and economic links between the Great Moravian centres (see Chapter 9).

The hierarchical relationships of the Great Moravian centres, expressed by economic ties (different levels of economic dependence), were complemented by the relations of the settlement units (agricultural settlements) in their vicinity. The settlements in the hinterland of the Great Moravian centres had specific functions within the hierarchy. Most probably, these were not indifferent farming settlements independent from the others for subsistence and were systematically economically exploited by the centre. These settlements were the home of farming communities with an ordinary status, which were also engaged in trade and non-agrarian production. This points to a higher degree of economic complexity, integration, and resilience than previously imagined. This is supported by an overall archaeological perspective, which proves that the period between 800 and 950 AD, which is aptly nicknamed "the long ninth century" in Central Europe was a turning-point in terms of settlement structure and the organisation of agriculture, crafts and regional exchange. Western Europe saw very similar changes a few decades earlier, in what is nicknamed "the long eighth century" (c. 680–830 AD, see Hamerow 2002, 191). Great Moravian settlements were integrated into a complex hierarchical network: in the middle was an agglomeration surrounded by nodes with lesser centrality than the agglomeration. These nodes were links in the economic relations between the agglomeration and the settlement network in its surroundings. Such a form of agglomeration hierarchy correlates with other conclusions of our research. In a discussion on the organisation of craft production in Great Moravia, we presented the hypothesis that it is justified to assume that the existence of workshop production intended for the market, which is typically directly produced for market needs, entails standardised processes and work requiring the full capacity of the producer. Therefore, it is characteristic of societies with significant social stratification and hierarchical socio-economic relations. The significant social stratification of the Great Moravian society (corresponding to a society with a high degree of complexity) was also proven by anthropological analyses of skeletal remains from central as well as agricultural cemeteries (among the markers are strain bone deformations in the buried individuals or isotopic analysis of the diet of the Great Moravian population).

The fact that the centres are understood primarily as the nodes of an agricultural economy, and not international trade, does not mean that long-distance trade in prestigious goods or slaves did not play a role in the Great Moravian economy. However, based on archaeological data, we consider it more likely that trade in luxury goods and slaves did not constitute the basis of the whole socio-economic system. Our conclusions largely correlate with Henning's postulations concerning the developments in early medieval Europe following the demise of the Roman Empire. These were the key factors of the new system: a technological base, part of which reached an almost nineteenth-century level of quality (not quantity), and the increasing number of relatively autonomous and self-managing peasants organised mainly in villages, a growing interest by these food producers in their daily work, and finally, a higher

degree of freedom in the rural world. This "sort of freedom" was, in the words of Karl Brunner, "the successful rural concept of the Early Middle Ages". The effects on the agricultural efficiency of labour must not be underestimated (Henning 2003, 274). From this perspective, Great Moravia represents integral proof of the fascinating increase in economic activities throughout Western and Central Europe at the end of the first and the beginning of the second millennium AD, which was the result of a broad reorganisation of economic structures following the disintegration of the Roman Empire.

The archaeological model of the relations between the central agglomeration and its economic hinterland, which we present in this work, as well as the hypotheses concerning the organisational and functional principles of Great Moravia, offer a wide range of possibilities for testing them. Therefore, one of the primary objectives of our further research is to focus on modelling settlement hierarchy and socio-economic relationships in the Great Moravian society. The theoretical and methodological background to our research shows that we conceptualise this issue in a spirit of theoretical pragmatism, which in this particular case means applying methodologies aimed at developing more dynamic models. In the modelling of a settlement hierarchy, this means a shift from the central place theory to network analyses. The basic theoretical starting point for this shift is that while the central place theory mainly works with the concept of the construction of an ideal territory, network models are moving toward the reconstruction of real territory. From the fieldwork point of view, it is essential to continue excavating unfortified Great Moravian settlements; considering the current state of knowledge of the Mikulčice economic hinterland, it is possible to focus on a specific area. We particularly mean the valley of the Prušánka Brook with a concentration of components such as cemeteries and settlements, the size and other attributes of which indicate the existence of a highly hierarchical settlement network in this area in the Great Moravian period.

11. References

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12. Environmental Analyses

12.1 ARCHAEOZOOLOGICAL ANALYSIS OF THE REMAINS OF ANIMAL BONES FROM MIKULČICE-TRAPÍKOV

Gabriela Dreslerová

An assemblage containing 470 fragments of animal bones and teeth with a total weight of 2,929 g was archaeozoologically analysed. The amount and weight of the determined bones (Schmidt 1972) correspond to the standard situation (fig. 84) where the majority are undetermined bones. However, in terms of the bone weight, the greater part were determined by anatomy and species. As for the Trapíkov site, 173 fragments with a total weight of 1,943 g were determined.

The condition in which the remains were preserved can be described as quite poor. Some of the bones were severely damaged by the deposition. Even animal teeth, which are usually quite resilient, have been preserved in a fragmentary form. A total of eight animal species were identified in the assemblage. Two finds were determined on the level of class (birds, fish), without determining the species (fig. 85). Considering the size of the assemblage, I state only the numbers of finds. The determined animal species represent mainly domestic fauna. Exceptions contain a hare tibia and a fragment of vole skull, in which recent dating cannot be excluded.

The number of bones belonging to slaughtered domestic animals suggests a significant predominance of domestic cattle and a minimum proportion of the domestic pig (fig. 86). The remains of this omnivore were even scarcer than those of horse, which was not primarily consumed. I assume this is due to the low number of determined bones: the coincidental presence of the accumulation of horse bones in feature 35 easily increased the number of finds of this unslaughtered species. The frequent finds of human remains are connected with the presence of graves near the studied features. Apart from the find of the remains of a horse – a lower part of a hind leg – a fragment of the skeleton of a lamb/kid up to six months of age was excavated in layer 1. Even this find significantly supported the proportion of the bones of this small ruminant. The age profile of the animals

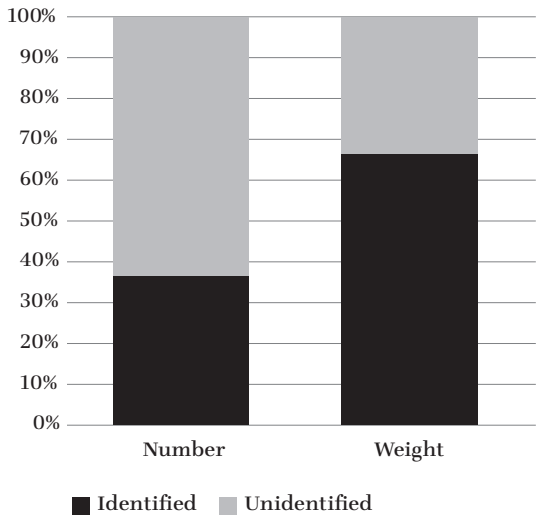

fig. 84 | Percentages of the numbers and weight of the identified and unidentified osteological fragments.

showed a predominance of almost adult individuals, with the singular find of the very young animal from context 1 (Habermehl 1975).

The poor quality of the osteological assemblage from the Trapíkov site might have coincided with the fact that I did not encounter any convincing traces of cutting or sawing. Only the proximal joint area of the horse's metatarsal contained a circular opening. The condition of the bones did not allow to state whether this hole was human-made or was caused during the post-position process (by a root growing through). The black colour of the bones cannot be unequivocally connected with fire. The unfortified village on the outskirts of the Trapíkov agglomeration can be compared with the settlements in the vicinity of the Pohansko stronghold (Břeclav-Lány, Břeclav – Na včelách, Kostice – Zadní hrúd) (Dreslerová 2018). Considering the very low number of finds, the only possible comparison appears reasonable: the percentages of domestic slaughtered species (fig. 87).

The result of this comparison is the significant dominance of cattle in Trapíkov and the Břeclav – Na včelách site. However, in comparison with

Species	Sum	Archaeological features																						
	sum	1	1 (ft48)	3a	4a	7	9a	21	57	58	66	67	68	76	78	79	ft27	ft35	ft48	ft25	ft34	trench 28	9S-4
Bos primigenius f. taurus	94	7		1	1				9		9		24	30		2	5	1		1			4
Ovis ammon f. aries	2								1					1									
Ovis-Capra	27	10		2							6			2			1	6					
Sus scrofa f. domestica	8								3				2	3									
Equus caballus	16																	15				1	
Domestic	**147**	**17**	**0**	**3**	**1**	**0**	**0**	**0**	**13**	**0**	**15**	**0**	**26**	**36**	**0**	**2**	**6**	**22**	**0**	**1**	**0**	**1**	**4**
Lepus europeaus	1	1																					
PISCES	2							2															
Wild	**3**	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AVES	1																		1				
Domestic/wild	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
Microtus	1						1																
recent?	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Homo sapiens sapiens	21	4								17													
Determined in total	**173**	**22**	**0**	**3**	**1**	**0**	**1**	**2**	**13**	**17**	**15**	**0**	**26**	**36**	**0**	**2**	**6**	**22**	**1**	**1**	**0**	**1**	**4**
VMV	5																		5				
SV	106	16		9				2			2	3	31	19	20			3			1		
VV	186	15	1			2			24		20		45	27		6	9	24		13			
Undetermined in total	**297**	**31**	**1**	**9**		**2**		**2**	**24**		**22**	**3**	**76**	**46**	**20**	**6**	**9**	**27**	**5**	**13**	**1**	**0**	**0**
SUM	**470**	**53**	**1**	**12**	**1**	**2**	**1**	**4**	**37**	**17**	**37**	**3**	**102**	**82**	**20**	**8**	**15**	**49**	**6**	**14**	**1**	**1**	**4**

FIG. 85 | Animal species found in the features; abbreviations: VMV – very small animal (such as a mouse), SV – medium-size animal (goat, sheep, domestic pig), VV – large animal (cattle, horse, deer).

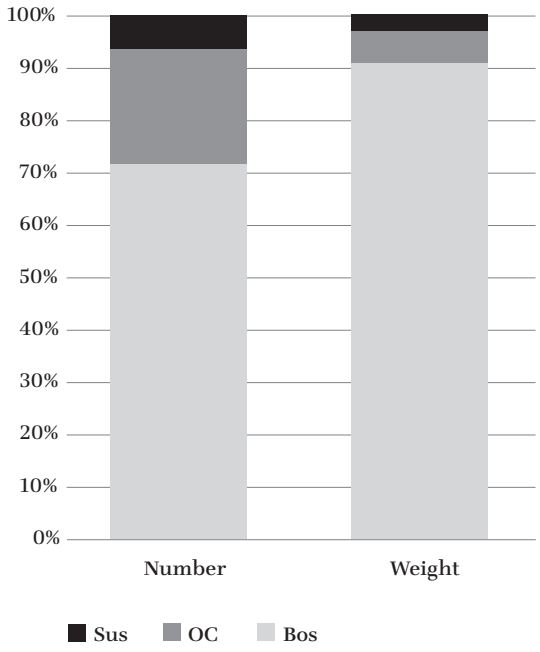

FIG. 86 | Percentages of the remains of cattle, sheep/goat and pig, by the numbers and weight of the finds.

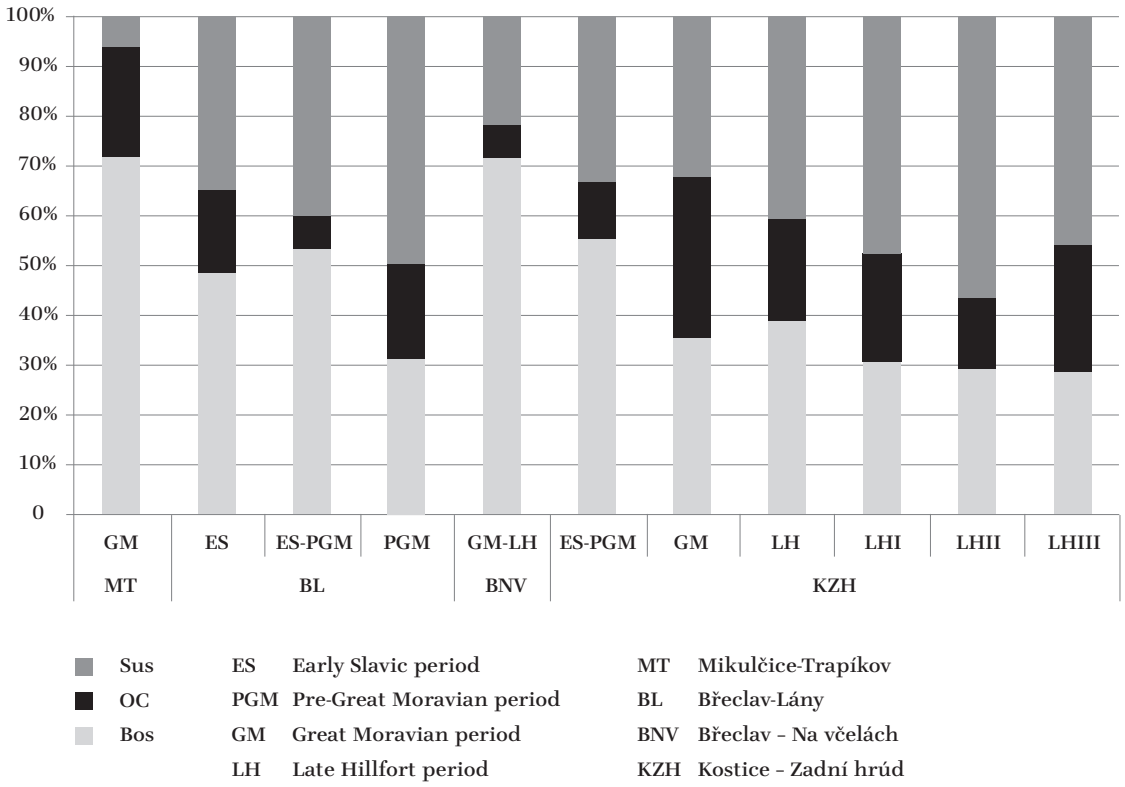

FIG. 87 | Percentages of cattle, sheep/goat and pig, by the numbers of fragments.

the Břeclav – Na včelách site, a small number of pig bones were found at the Trapíkov site, although pig was typically bred in Great Moravian centres and was by no means insignificant in the villages either (Kratochvíl 1968, 1981). Unfortunately, the analysed bones might not have accurately reflected the original proportions of the domestic animals. The condition in which the bones were preserved was significantly marked by the post-deposition processes, which might have led to the destruction of the remains of small and medium-sized animals.

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12.2 ANTHROPOLOGICAL ANALYSIS OF THE SKELETAL REMAINS FROM MIKULČICE-TRAPÍKOV

Petra Brukner Havelková

A total of eight contexts containing skeletal remains, interpreted as human graves (FIG. 14), were excavated during the research into the Mikulčice-Trapíkov site. The remains from grave 58 could not be retrieved from the field as they disintegrated completely during the excavation due to their poor preservation. This is why they are not mentioned in this report. Except for grave 82, which contained only animal bones, all the graves contained human skeletal remains of adult individuals. The skeletons were preserved only fragmentally as they were significantly disrupted by taphonomic processes. Considering the poor preservation, any estimation of demographic characteristics were rather problematic. The estimation of age-at-death was mainly based on the degree of dental wear (LOVEJOY 1985; MILES 1963). However, the morphoscopic evaluation of the structures of pelvic bones especially the auricular surface and acetabulum (CALCE 2012; LOVEJOY et al. 1985; SCHMITT 2005) were also performed where it was possible as well as the evaluation of the inner structure of the proximal part of the femurs and humeri (SZILVÁSSY/KRITSCHER 1990). Another considered feature was degenerative changes of the vertebral column (STLOUKAL/VYHNÁNEK 1976) and the joints of the appendicular skeleton (WALDRON 2009). The estimation of sex based on the morphology and metrics of the pelvic bones could not be performed because all of them were highly damaged. Thus, the descriptive morphological feature of the skull were used (FEREMBACH et al. 1980).

GRAVE 26

State of preservation:
- skull: fragments
- postcranial: fragments

Conclusion:
- sex: unidentified
- age: adultus II – matures (30+)

The skeletal remains of this rather robust individual were very poorly preserved and almost impossible to measure. Only fragments of the cranial vault – the frontal and parietal bones – were preserved. The postcranial skeleton was represented by unidentifiable fragments of the long bones of the extremities with an admixture of animal bones. Estimation of sex and age-at-death could not be done. No pathological alteration were noted on the bone fragments.

GRAVE 31

State of preservation:
- skull: incomplete, partially measurable
- postcranial: fragments

Conclusion:
- sex: unidentified (female?)
- age: adultus (20–35)

A gracile, poorly preserved skeleton with a completely destroyed periosteum were unearthed in Grave 31. The skull was fragmentary. Fragments of the cranial cavity and the upper and lower jaw were present including almost complete dentition. All first premolars in the both lower and upper jaw and the third molars in the upper jaw were lost *ante-mortem*. As for the postcranial skeleton, only the diaphyses of both the humeri, the femurs and a fragment of the clavicle were preserved. Based on the preserved remains, especially cranial fragments, it coud be presumed that the a skeleton belonged to a young individual, rather female, who died between age 25 and 30. The estimated age-at-death was based on the degree of dental wear and the inner architecture of the proximal femur. No pathological alteration was recorded.

GRAVE 32

State of preservation:
- skull: almost complete
- postcranial incomplete, partially measurable

Conclusion:
- sex: unidentified (male?)
- age: adultus (25–35)

The backfill of grave 32 contained a middle-robust skeleton with the heavily damaged periosteum, mainly caused by the roots that had grown through it. However, the overall preservation of the skeleton was good and some of the bones were partially measurable. As for the skull, the cranial cavity was almost completely preserved; the facial skeleton and the right part of the mandible were partially damaged. The dentition was almost complete, unfortunately the enamel was heavily damaged. Among the preserved parts of the postcranial skeleton were the fragments of the scapulae, the diaphyses of both the clavicles and the humeri, with strongly developed areas where the ligaments of the pectoral major muscle used to be attached. The fragments of both the ulnae and radii, almost complete femurs (with damaged epiphyses and periosteum) and the fragments of the diaphyses of the tibiae and fibulae were also preserved. Pelvic bones were preserved only in fragments – the socket of the hip joint (acetabulum) with a fragment of the ischium, a fragment of the auricular surface and a small area of greater sciatic notch on the left side, and a fragment of the right acetabulum. As for the foot bones, the fragments of both the calcanei and left cuboid bone were recorded. The morphological features of the skull is ambiguous; only the chin area is distinctly masculine. The dense spongy bones, the changes on the fragment of the auricular surface as well as the height of the medullary cavity of the humeri and femurs correspond

to a younger individual who died between 25 and 35 years of age. No signs of arthrosis or other degenerative changes were observed on the joints. Neither was found any pathological alteration, except for the dental caries of the first lower premolar.

GRAVE 52

State of preservation
- skull: fragments
- postcranial: fragments

Conclusion
- sex: unidentified
- age: adultus?

The skeleton of the rather robust individual from grave 52 has been preserved only in fragments. As for the skull, only part of the cranial vault was excavated including the fragments of the parietal, occipital and temporal bones. All the bones had a strongly damaged periosteum. The crown of the upper (probably second) premolar with distinct dental caries was only other skull fragment. As for the postcranial skeleton, only the fragments of the middle parts of both the femur diaphyses, with distinct linea aspera (a prominent longitudinal ridge), was preserved. The fragments had a dense spongy bone and narrow medullary cavities, which points to a younger individual. The periosteum of both femurs was strongly disrupted by taphonomic processes – probably gnawing by rodents. It was impossible to estimate the sex and age-at-death due to the state of preservation of the skeletal remains. No pathological changes were observed on the bone fragments, except for the dental caries mentioned above.

GRAVE 80

State of preservation:
- skull: fragments
- postcranial: fragments

Conclusion:
- sex: unidentified
- age: adultus (20–35)

As for the skeletal remains found in grave 80, the bone tissue was overgrown with roots. The skull fragments suggest they belonged to a gracile individual. As for the cranial cavity, the fragments of the frontal bone, both the parietal bones, the occipital bone and the fragments of the temporal bone (*pars petrosa*) were preserved. For the facial skeleton, only two fragments of the lower jaw with the first right molar and the second and third left molars were preserved. Enamel of all the teeth was damaged.

The fragments of the diaphyses of the long bones – the only preserved parts of the postcranial skeleton, were also completely grown through by roots. Based on the shape of the cross-section, these were probably femurs, tibiae and humeri. Apart from the long bones, a small fragment of a scapula was also found. There were no morphological traits in the whole skeleton that would enable the sex estimation. Based on the abrasion of the molars, this individual probably died between age 20 and 35.

GRAVE 81

State of preservation
- skull: incomplete, partially measurable
- postcranial: fragments

Conclusion:
- sex: unidentified
- age: adultus (25–40)

The skeletal remains of the individual buried in grave 81 were strongly damaged by post-deposition processes. Regarding the skull, only a strongly damaged cranial vault was preserved, together with the upper and lower jaws containing an almost complete dentition. However, the teeth were very fragile, with damaged enamel where roots had grown through. On the upper jaw, the first incisors, the second and third molars on both sides and the second right incisor and canine were probably lost *post-mortem*. The lower jaw lacked only the first right premolar, which was probably lost *ante-mortem*. The postcranial skeleton was fragmentary: there were the diaphyses of the long bones (both humeri, an ulna, a femur and both tibiae), all with heavy root growth, which completely replaced the bone tissue in some places. Apart from the long bones, there were also the finds of the left scapula and the right clavicle.

The morphological traits on the skeleton important for the sex estimation were ambiguous and sex could not be estimated even based on the postcranial skeleton. Resulting from the degree of dental wear, the individual probably died between age 25 and 40. Except for caries on the third right lower molar and the second left lower molar, no pathologies or degenerative changes were observed on the preserved bones.

GRAVE 82

only animal bones

Conclusion:
Unfortunately, the studied assemblage of the human skeletal remains of the individuals buried at the Trapíkov site was heavily damaged by post-depositional processes. Most of the skeletal remains were fragmentary where the fragments had a disrupted periosteum, which was caused by different taphonomic processes (root growth and gnawing by small animals).

All the deceased probably died in young or middle adult age, between age 20 and 40 years. The age of the individual found in grave 26 could not be estimated due to the poor state of the preservation of their skeletal remains. Reliable sex estimation

could not be performed on either of the buried individuals. Only in the case of the individual from the grave 31 it can be assumed rather the female sex and the skeleton from the grave 32 belonged rather to a male. Apart from several teeth with dental caries, no pathological alteration were observed at all, which is probably due to the poor state of the preservation of the skeletal remains. Unfortunately, it was not possible to evaluate degenerative changes in the areas of joints and entheseal changes in the areas of muscle and ligament attachment sites, which could tell more about the physical stress and habitual activity of the individuals buried in the Trapíkov site.

ACKNOWLEDGEMENT:

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12.3 ISOTOPIC ANALYSIS OF THE BOTANICAL MACROREMAINS FROM MIKULČICE-TRAPÍKOV

Rastislav Milovský

The carbon and nitrogen isotopes in the charred plant remains from the trapíkov settlement and in modern-day reference samples were tested using the MAt253 mass spectrometer coupled with the Flash2000Ht Plus elemental analyser. The samples were finely ground, weighed (80–100 μg) into tin capsules and combusted in a quartz tube in the helium and oxygen stream at 1800°C; the gas product was purified by chromium oxide, electrolytic copper and cobalt oxide. After chromatographic separation the CO_2 and N_2 were analysed in a mass spectrometer in the continuous flow mode. The isotopic composition was measured against reference gases and calibrated using one international and one working standard – uSGS41 ($\delta^{15}N$ = +47,57‰; $\delta^{13}C$ = +37,76‰) and ureaIVA ($\delta^{15}N$ = -0,73‰; $\delta^{13}C$ = -39,79‰). All the values are in per mil vs PDB (carbon) and AIR (nitrogen). The typical precision of measurement is 0.12‰.

For comparison, samples of related contemporary plants were taken from the identical parts as in archaeological remains – the seeds. As the analogy for the C3 cereals *Triticum aestivum* and *Secale cereale*, a C3 grass *Arrhenatherum elatius* from three excavation areas (the stronghold, its vicinity and outside the stronghold) was used; among C4 plants the only suitable analogy for millet was maize from a recent culture. As with the archaeological sample of hornbeam, the modern one comes directly from the area of the stronghold (FIG. 88, 89).

Compared with the values of the carbon isotopes in the archaeological samples, the values in all the modern samples were systematically lighter (by 2.28‰ in C3 plants and by 2.31‰ in C4 plants), which corresponds with the Suess effect – the enriching of atmospheric CO_2 by the light isotope from burning fossil fuels in modern times (KEELING 1979). According to data from the Greenland and Antarctic ice probes, the pre-industrial values of the atmospheric CO_2 were at least 2‰ heavier than the modern ones.

The difference between the C4 and C3 plants is striking: the carbon in millet and maize (C4 plants) is heavier by 12 %–14 % than in other species, which is in line with a weaker discrimination of ^{13}C in more effective carbon assimilation during the C4 metabolism (O'LEARY 1988).

The variability of nitrogen isotopes is due to a number of significant effects:

The C4 species – both the present and archaeological samples – are the most enriched by the heavy isotope (^{15}N). In maize, this is explained by the sampling point – a field that has long been cultivated and fertilised. However, as for the archaeological sample of millet, we do not suppose a different place of cultivation than in other *Secale cereale* and *Triticum aestivum* cereals. Therefore, the enrichment in ^{15}N mentioned above might be due to a different fractionation of nitrogen in the C4 metabolism.

Nitrogen values measured in the modern samples increase in following order: [forest on the edge of the river terrace] → [floodplain near the stronghold] → [floodplain within the area of the stronghold] → [floodplain within the area of the stronghold, near the church]. We assume that the historical intensity of the exploitation of the soil, landscape, livestock, the population density and, therefore, the enrichment of the soil with organic residues (burial ground near the church?) followed the same trend. Bacterial degradation of organic tissues, as well as maturation of manure preferentially removes light isotope and progressively enriches the residue with heavy nitrogen. Therefore, the samples of grasses with $\delta^{15}N$ close to the atmospheric value (0‰) from the forest on the edge of the floodplain represent a natural environment of a habitat little influenced by farming. Recent experimental work has shown an enrichment in heavy nitrogen of up to 8.8‰ in cereal grains due to fertilising with livestock manure (BOGAARD et al. 2007, FRASER et al. 2011, KANSTRUP 2012).

The significant enrichment of the archaeological samples of cereals with heavy nitrogen compared with the current natural environment (*Secale cereale* by 6.30‰, *Triticum aestivum* by 3.72%, *Panicum miliaceum* by 8.30‰) is most likely due to intensive field fertilisation.

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Sample	$\delta^{13}C$	$\delta^{15}N$
Carpinus betulus – recent sample (meadow): taken near church VI in the stronghold area in the floodplain	–24.93	8.93
Arrhenatherum elatius – recent sample (meadow): from the stronghold area in the floodplain	–23.54	4.27
Arrhenatherum elatius – recent sample (field): taken in the floodplain in the near vicinity of the stronghold	–23.23	3.93
Arrhenatherum elatius – recent sample (fores Doubravy): taken outside of the floodplain on the edge of the riverbed, about 7 km from the stronghold in an oak-pine-hornbeam forest	–25.99	1.59
Zea mays – recent sample (field): taken in the floodplain in the near vicinity of the stronghold	–11.62	10.68
Carpinus betulus – archaeological sample (Trapikov from context 27): destruction of a stone oven in a slightly sunken dwelling (dwelling 3). Dating: late 9th century.	–22.12	9.27
Panicum miliaceum – archaeological sample (Trapikov from context 39): clay layer that constituted the backfill of a slightly sunken dwelling (dwelling 2). Dating: late 9th century.	–9.34	9.89
Triticum aestivum – archaeological sample (Trapikov from context 39): clay layer that constituted the backfill of a slightly sunken dwelling (dwelling 2). Dating: late 9th century.	–21.32	5.31
Secale cereale – archaeological sample (Trapikov from context 39): clay layer that constituted the backfill of a slightly sunken dwelling (dwelling 2). Dating: late 9th century.	–22.91	7.89

FIG. 88 | Overview of the analysed archaeological and recent botanical samples.

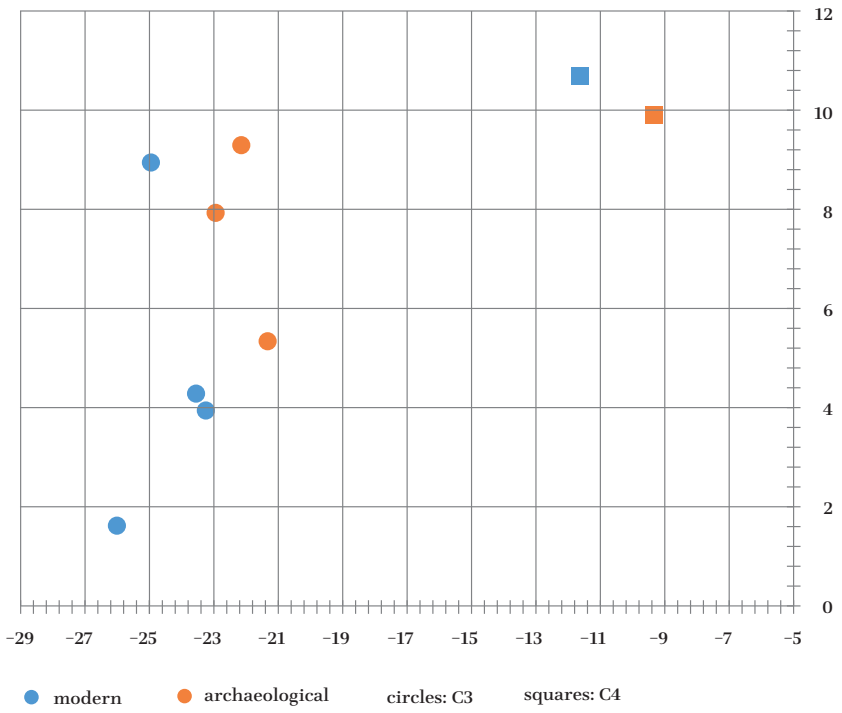

FIG. 89 | 2D chart of the values of the carbon and nitrogen isotopic signal in all analysed samples, both archaeological and recent.

12.4 ANALYSIS OF RADIOCARBON DATES MEASURED ON SAMPLES FROM MIKULČICE-TRAPÍKOV

Peter Barta, Marek Hladík

SAMPLES AND METHODS

Eight radiocarbon samples of charred rye and wheat grains were extracted by water flotation from the infill of various parts of sunken huts 2, 4, 6, 8, and 9. The cereal grains, which *per se* directly date human activity – the cultivation of rye and wheat – are highly mobile parts of the archaeological record. To diminish the risk of dating residual or intrusive material, the samples were retrieved from sediments associated with the habitation of dwellings (FIG. 90). As for the association between the target archaeological event and radiocarbon determination (BARTA 2008), all the samples are viewed as representing the Great Moravian settlement at the Trapíkov site with dominating artefactual evidence from the second half of the 9th and perhaps the early 10th century. Neither earlier nor later settlement activities have been detected on the find-spot.

Pre-treatment and ^{14}C dating were carried out in the AMS Radiocarbon Laboratory of Adam Mickiewicz University in Poznań, Poland. For ^{14}C calibration and simulations, OxCal 4.3 (©Bronk Ramsey 2019; BRONK RAMSEY 2005; 2009) and the atmospheric curve for the northern hemisphere with a five-year resolution were used (IntCal13, REIMER et al. 2013).

RESULTS AND DISCUSSION

The measured conventional ^{14}C ages represent the single-vegetation-season signal of Central Europe. Their vague-prior calibrated date ranges span from the late 7th to early 11th century calAD as shown by 95.4% probability distribution (FIG. 91). Behind this broad time window is the shape of the available ^{14}C calibration curve, the temporal variability of ^{14}C samples, and the statistical nature of ^{14}C determinations.

To be able to comment on the chronological information of the individual ^{14}C determinations, 70 ^{14}C dates for calendar years 700, 725, 750, 775, 800, 825, 850, 875, 900, 925, 950, 975, 1000, and 1025 calAD have been simulated; for each above-given year,

Sample ID	Laboratory code	Conventional ^{14}C age with 1 sigma	Archaeobotanical determination	Feature	Archaeological context
Mikul33	Poz-101999	1220 ±30 BP	*Secale cereale*, charred grains	Dwelling 9	South part of dwelling, infill from a place dug in the substratum of sand, context 2
Mikul34	Poz-102000	1160 ±30 BP	*Triticum aestivum*, charred grains	Dwelling 9	South part of dwelling, infill from a place dug in the substratum of sand, context 2
Mikul35	Poz-101787	1160 ±30 BP	*Triticum aestivum*, charred grains	Dwelling 6	Old excavations, details NA, perhaps from the vicinity of roasting tray, archaeobotanical No. 1–6 /03
Mikul36	Poz-102001	1180 ±30 BP	*Secale cereale*, charred grains	Dwelling 6	Old excavations, details NA, perhaps from the vicinity of roasting tray, archaeobotanical No. 1–6 /03
Mikul37	Poz-101788	1165 ±30 BP	*Secale cereale*, charred grains	Dwelling 4	Infill of the dwelling, intentional concentration of sandy-clayey material in the dwelling, context 39
Mikul38	Poz-102021	1170 ±30 BP	*Triticum aestivum*, charred grains	Dwelling 4	Infill of the dwelling, intentional concentration of sandy-clayey material in the dwelling, context 39
Mikul39	Poz-102022	1045 ±30 BP	*Secale cereale*, charred grains	Dwelling 2	Context 35, bottom of pit, border of contexts 35 and 39
Mikul40	Poz-102023	1115 ±30 BP	*Triticum aestivum*, charred grains	Dwelling 8	Context 84, ash pit of oven FT 83

FIG. 90 | Mikulčice-Trapíkov. Conventional ^{14}C dates, samples and sampled archaeological contexts.

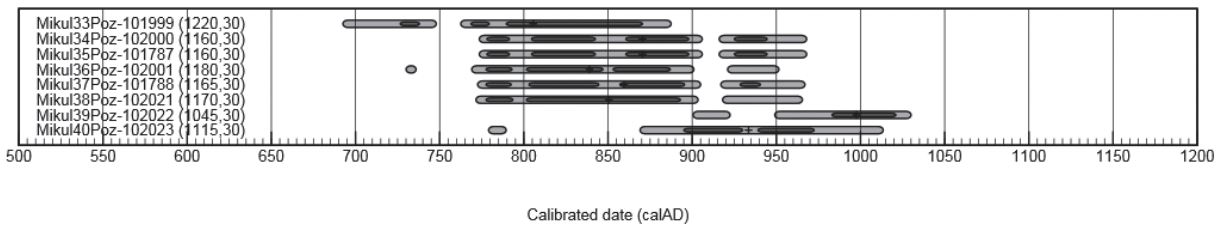

FIG. 91 | Mikulčice-Trapíkov. Radiocarbon dating of charred rye and wheat grains from dwellings 2, 4, 6, 8, and 9. Each conventional ^{14}C age is tagged with both Mikulčice site code (e.g. Mikul33) and ^{14}C laboratory code (e.g. Poz-101999); 68.3% probability (dark grey) and 95.4% probability (light grey) ranges with medians (crosses) are shown.

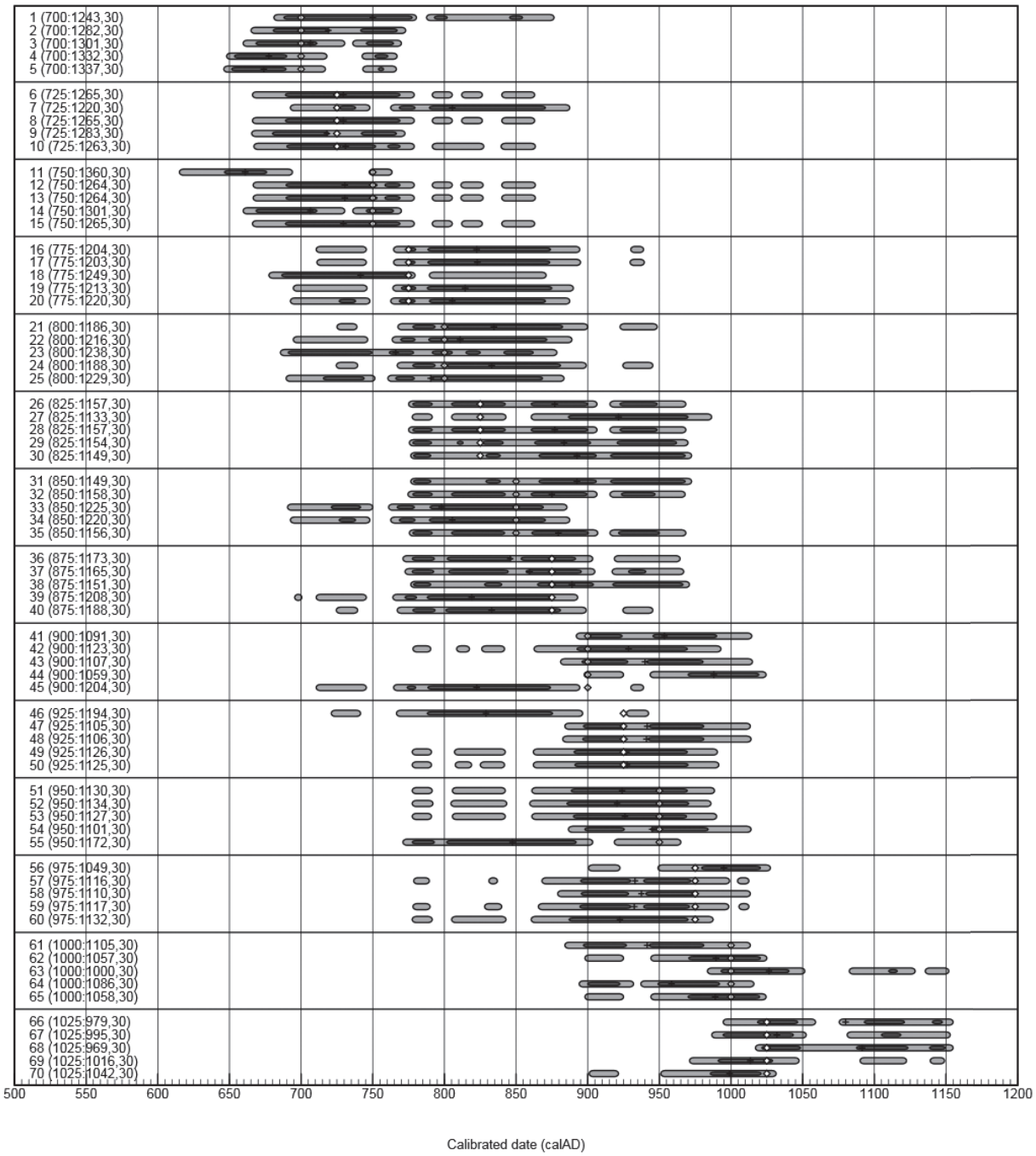

FIG. 92 | Seventy simulated ^{14}C dates with uncertainty (30 BP-yr) identical to that of ^{14}C determinations from Mikulčice-Trapíkov. Open diamonds mark calendar dates for which ^{14}C dates are simulated. Crosses mark medians of calibrated ranges of simulated ^{14}C dates; 68.3% probability (dark grey) and 95.4% probability (light grey) ranges are shown.

five dates with uncertainty 30 BP-yrs (FIG. 92). They demonstrate that the chronological resolution of individual terrestrial ^{14}C determinations from the time-window 700–1000 AD is coarse, with calibrated ranges typically 100–200 years. Based on vague-prior calibration, archaeological events in this interval may remain inseparable. In the simulated data (FIG. 92), this is the case of archaeological events from 700 (No. 1), 725 (No. 7), 775 (No. 18), and 800 (No. 23), or from 825, 850, and 875, or those from 900 (No. 41, 43), 925 (No. 47, 48), 975 (No. 58), and 1000 calAD (No. 61).

Strong informative prior can be of help here. However, due to the lack of stratigraphic relations between sampled dwellings, no priors exist to constrain the ^{14}C determinations, except for considering them a coherent group. As all samples represent the habitation of the Trapíkov settlement, the measured ^{14}C determinations represent a group of archaeological events chronometrically characterising the settlement.

If we assume all archaeological events are equally likely to happen anytime within the existence of the

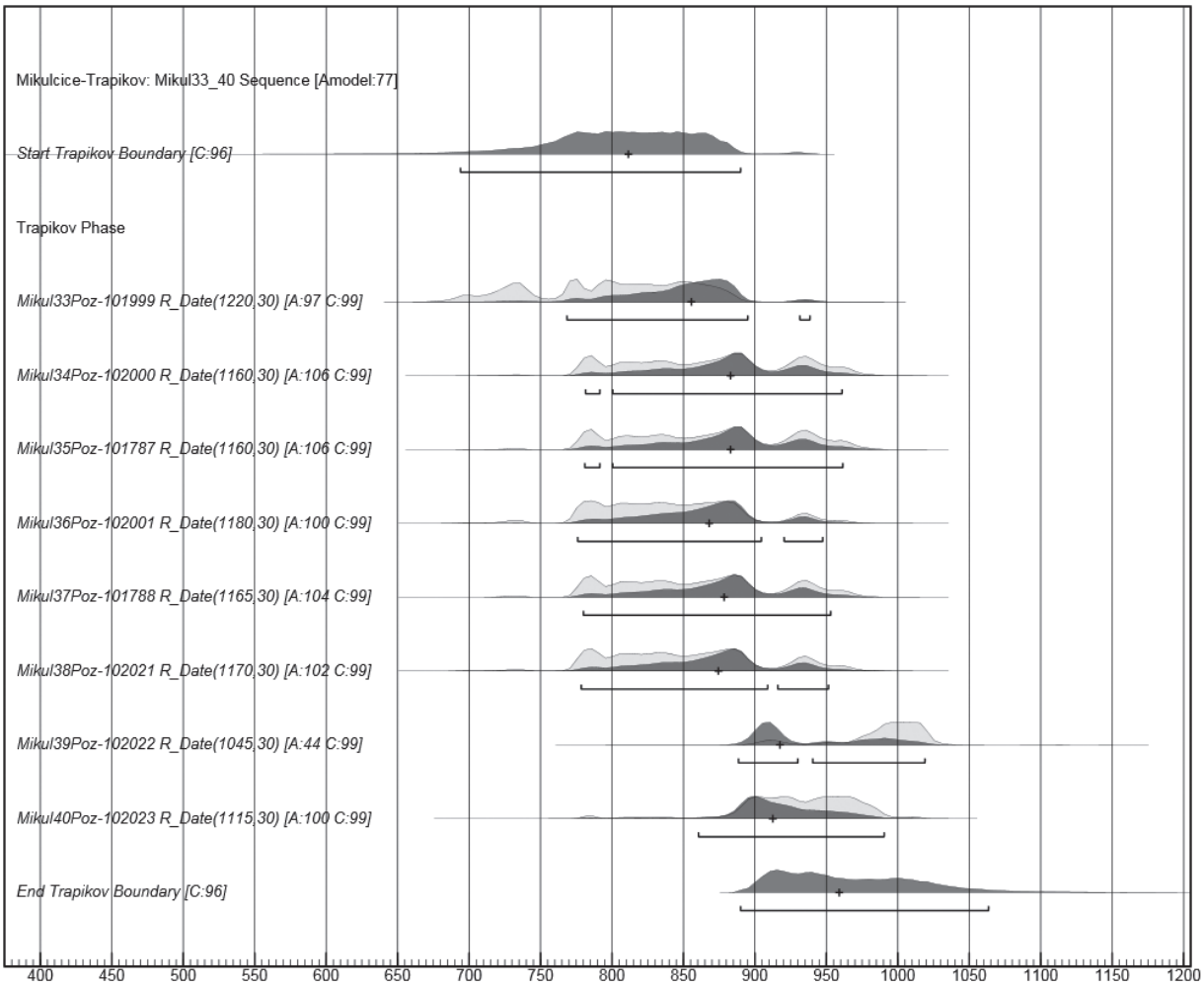

FIG. 93 | Mikulčice-Trapíkov. Radiocarbon dates modelled as uniform phase (calAD).

settlement, we can model the beginning and end of the Trapíkov occupation phase by the boundaries of the uniform phase model (FIG. 93). The agreement index for the model A_{model} is 77% and individual index A for ^{14}C date Mikul39 is 44%, which is well below the threshold (60%). This fact might point to a problem with this particular measurement or with the model itself.

If we assume a slow onset of habitation activity, its clustering around the middle of the habitation phase and its slow decline, we can model the frequency of archaeological events in the phase as normal distribution. In this model, individual agreement index A for Mikul39 ^{14}C date reaches the values just around the threshold of 60% and the index A_{model} also rises (FIG. 94A). This non-uniform phase model appears to better represent the processes beyond the measured ^{14}C dates. As we have no strong prior information in hand and work on a plateau of the calibration curve, we use the medians of the boundaries to describe the beginning and end of the phase. Accordingly, the beginning of the settlement in Trapíkov suggested by this model (FIG. 94A) is 829 and its end is 938 calAD.

As the normal-distribution phase model better suits the data, we have also tested other non-uniform phase models. Based on the overall development of the Great Moravian central site of Mikulčice and the analysis of Trapíkov pottery and iron objects, we assume that after a strong activity during the period of floruit in the second half of the 9th century, the activity at Trapíkov declined. Therefore, we have tested chronological models with frequency distributions of archaeological events declining towards the end of phase: ramped, one-sided normal, and exponential. By using ^{14}C determinations on charred grain, we make an additional assumption that this specific ecofactual part of the archaeological record mirrors the trend of settlement activity.

While the ramped distribution model seems to be less appropriate with individual agreement index for Mikul39 A = 56% (A_{model} = 86%, not illustrated), the one-sided normal distribution model (FIG. 94B), which assumes massive settlement activity clustered at the start of the phase and then a gradual and slow decline, is better (A_{model} = 94%, A for Mikul39 = 71%). However, the highest agreement indices reach the model with exponential distribution of archaeological events assuming the highest activity at the start of the phase and then its exponential decline (A_{model} = 97%, A for Mikul39 = 75.5%). The reason for the high

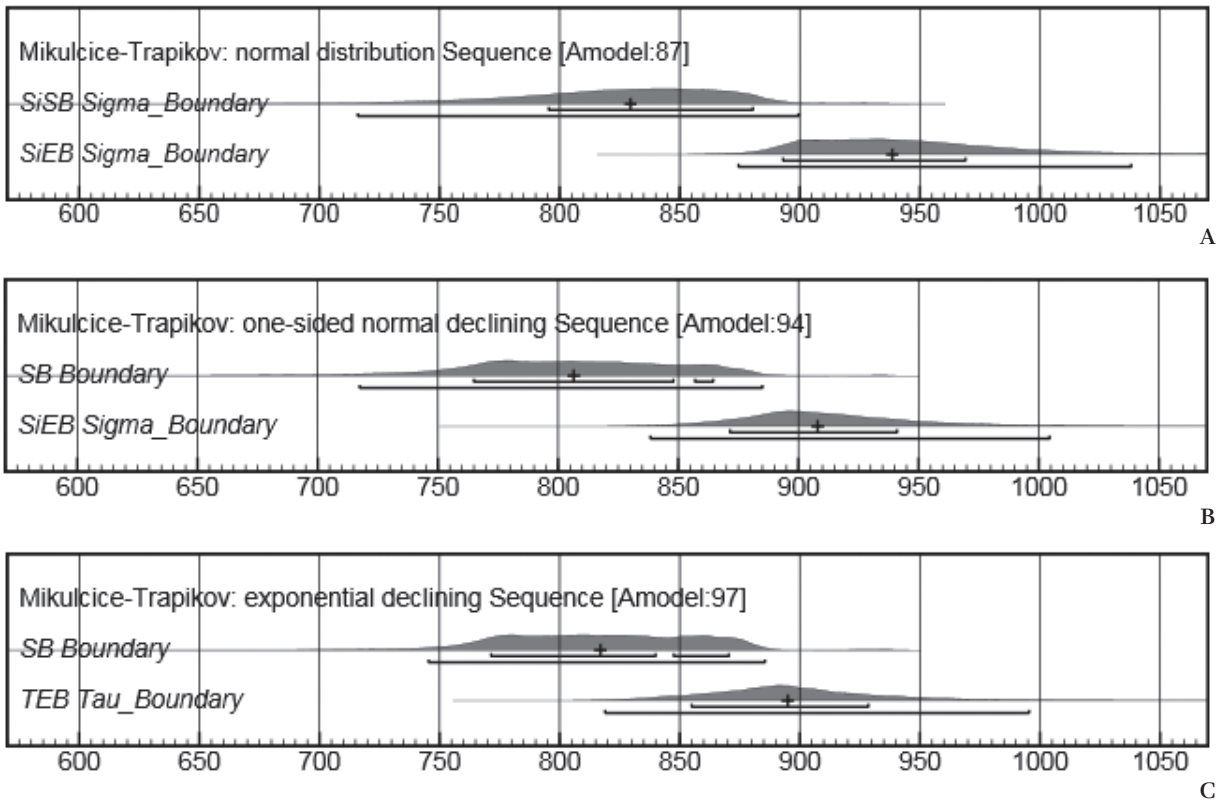

FIG. 94 | Mikulčice-Trapíkov. Outputs of three models with different distributions of archaeological events in single phase: A – normal distribution (medians: 829 and 938 calAD); B – one-sided normal distribution with declining settlement activity toward the end of phase (medians: 806 and 908 calAD); C – exponential distribution with declining activity toward the end of phase (medians 817 and 895 calAD). Posterior probability of start (SiSB and SB) and end (SiEB and TEB) boundaries on the level of 95.4% and 68.3% probability and the medians are shown (calAD).

indices may be that the two latter models investigate processes without definite end events and thus enable to stretch the dates beyond the boundaries (Bronk Ramsey 2009).

CONCLUSION

Artefactual evidence suggests that the Mikulčice-Trapíkov settlement existed during the floruit of the Great Moravian Empire. Taking into account the settlement stability, we have assumed that the habitation at Trapíkov was most intense at the beginning of the settlement phase, very slowly became less intense and then gradually declined. Accordingly, the best approximation of the frequency of archaeological events represented by non-residual and non-intrusive ^{14}C samples is the exponential declining distribution. The chronological model assuming this process put the start and end of agricultural activities mediated by rye and wheat grains to 817 and 895 calAD if we were to use the medians of the start and end boundaries (FIG. 94C). The large ranges of posterior probabilities for boundaries in this model, and also in other models presented here, make the chronological resolution of outputs very coarse in accord with the shape of the respective portion of the ^{14}C calibration curve. Without new chronological information usable as justifiable priors and/or calibration dataset with fine resolution, the presented results cannot be much refined as being locked in the late 8th–early 10th-century plateau of IntCal13 (Reimer et al. 2013).

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13. List of Dwellings, Cultural Layer, Features and Graves

CONTEXT 1
Surface layer, all over the settlement (grey to black sandy-clay layer).
Most of the non-ceramic material (besides the querns) was found in the Context 1 (C. 1) surface layer.
The majority of the iron finds are functionally non-determinable fragments in the shape of sticks or sheets (see TAB. 21–24).

From the determinable finds, we can mention the following (mostly in fragments):

- axe-shaped smaller sized currency bars – find number (fn.) M17/142, length 6.0 cm, TAB. 19:3; fn. M17/85, length 4.8 cm, TAB. 24:2; fn. M17/89, length 7.2 cm, TAB. 24:3
- knives – fn. M17/37, length 4.9 cm, TAB. 19:1; fn. M17/17, length 9.3 cm, TAB. 20:4
- sickle – fn. M17/272, length 16.6 cm (HLADÍK 2014, Tab. 3:2); probable scythe or sickle – fn. M17/36, length 6.7 cm, TAB. 22:2
- tool for cleaning a plough – fn. M17/225, length 8.5 cm, TAB. 20:3
- axe – broken off loop? – fn. M17/104?, length 10.6 cm, TAB. 22:1
- fragments of the door security system – lock fittings – fn. M17/226, length 14.3 cm, TAB. 19:5; a key fragment – fn. M17/103, length 7.9 cm, TAB. 19:2
- spurs – fn. M17/101, length of the arm 12.0 cm, length of the prick 3.5 cm, TAB. 20:6; fn. M17/180, length of the arm 8.9 cm, length of the prick 2.5 cm, TAB. 21:4
- stirrup – fn. M17/187, TAB. 20:5
- horseshoe – fn. M17/103, length 9.0 cm, TAB. 19:4
- construction material – nails – fn. M17/156, length 6.5 cm, TAB. 19:6; fn. M17/155, length 5.5 cm, TAB. 19:7; fn. M17/88, length 6.7 cm, TAB. 19:8; fn. M17/345, length 1.5 cm, TAB. 20:2; a probable nail – fn. M17/143, length 7.0 cm, TAB. 21:6; fn. M17/81, length 6.8 cm, TAB. 21:18; fn. M17/80?, length 6.7 cm, TAB. 21:19
- non-determinable bronze object – fn. M17/187, 3.5 × 3.6 cm, TAB. 21:1
- atypical iron fragments – fn. M17/103, TAB. 19:9, 10; fn. M17/150, TAB. 20:1; fn. M17/136, TAB. 21:5; fn. M17/61, TAB. 21:7; fn. M17/4, TAB. 21:8; fn. M17/143, TAB. 21:9; fn. M17/272, TAB. 21:10; fn. M17/183, TAB. 21:11; fn. M17/46, TAB. 21:12; fn. M17/109, TAB. 21:13; fn. M17/154, TAB. 21:14; fn. M17/2, TAB. 21:15; fn. M17/36, TAB. 21:16, 17; fn. M17/44, TAB. 21:20; fn. M17/274, TAB. 22:3; fn. M17/119, TAB. 22:4; fn. M17/39, TAB. 22:5; fn. M17/89, TAB. 22:6; fn. M17/137, TAB. 22:9; fn. M17/182, TAB. 22:11; fn. M17/90, TAB. 23:1; fn. M17/13, TAB. 23:3; fn. M17/136, TAB. 23:4; fn. M17/108, TAB. 23:5; fn. M17/13, TAB. 23:6; fn. M17/196, TAB. 23:9; fn. M17/108, TAB. 23:10; fn. M17/346, TAB. 23:12; fn. M17/101, TAB. 23:13; fn. M17/177, TAB. 23:14; fn. M17/64, TAB. 23:15, 16; fn. M17/177, TAB. 23:17; fn. M17/40, TAB. 23:18; fn. M17/230, TAB. 24:1; fn. M17/89, TAB. 24:4; fn. M17/40, TAB. 24:5; fn. M17/37, TAB. 24:6, 7

From the non-metal objects, we can mention simple glass beads (TAB. 36:3-4) and a quern fragment (TAB. 32:1).

DWELLING 1 (C. 3, 7, 9, 22)
Rectangular shape, rectangular floorplan, straight and sloping walls, flat and horizontal bottom; dimensions – longer axis 4.7 m, shorter axis 3.2 m, max. depth from the subsoil level 0.3 m (plan in TAB. 38; photo in FIG. 16).
The dwelling contained the remains of a stone oven (C. 3) (FIG. 23).
Finds:

- arrowheads – fn. M17/84, length 3.6 cm (HLADÍK 2014, Tab. 3:11); fn. M17/80, length 7.1 cm (HLADÍK 2014, Tab. 3:9)
- pliers – fn. M17/33, length 6.2 cm (HLADÍK 2014, Tab. 3:7)
- handle fittings of the bucket – fn. M17/33, length 5.1 cm (HLADÍK 2014, Tab. 3:8)

- construction material - nails - fn. M17/43, length 8.0 cm, TAB. 24:9; fn. M17/31, length 5.2 cm, TAB. 24:10
- iron sheet - fn. M17/31, length 11.8 cm, TAB. 24:11
- spindle whorl - fn. M17/152, Ø 3.0 cm, TAB. 36:6
- four larger fragments of querns used secondarily in the oven construction
- pottery - fn. M17/31, 43, 130, 132, 152, 211

DWELLING 2 (C. 34, 35, 39, 49, 56, 57)
Rectangular shape with a niche on the shorter side, rectangular floorplan, straight and sloping walls, flat and horizontal bottom; dimensions - longer axis 5.9 m (including the niche), shorter axis 4.5 m, max. depth from the subsoil level 0.4 m (plan in TAB. 38; photo in FIG. 16).
The dwelling contained the remains of a stone oven (C. 34) (FIG. 23).
Finds:

- lock fittings - fn. M17/243, 4.6 × 4.3 cm, TAB. 27:13
- bucket hoops - fn. M17/243a, length 10.9, TAB. 27:6; fn. M17/243a, length 15.0 cm, TAB. 27:7
- spindle whorl - fn. M17/264, Ø 2.6 cm, TAB. 36:9
- quern fragment used secondarily in the oven construction - fn. M17/250, r = 17.5 cm, TAB. 32:2
- three complete querns at the bottom of the dwelling - M17/248, Ø 48 cm, TAB. 32:3; fn. M17/305, Ø 47.5 cm, TAB. 33:1; fn. M17/248, Ø 51 cm, TAB. 33:2
- pottery - fn. M17/242, 243, 244, 250, 251, 253, 254, 262, 263, 264, 305

DWELLING 3 (C. 27, 59, 60, 61, 62)
Oval shape, oval floorplan, straight and sloping walls, bottom indistinguishable; dimensions - longer axis 4.6 m, shorter axis 3.8 m, max. depth from the subsoil level 0.3 m (plan in TAB. 38; photo in FIG. 16).
The dwelling contained the remains of a stone oven (C. 60) (FIG. 23).
Finds:

- whetstone - fn. M17/348, 6.5 × 5.5 cm, TAB. 36:14
- pottery - fn. M17/203, 204, 261, 297, 342, 347, 348

DWELLING 4 (C. 47, 48, 65)
Shape preserved only partially, the base of the dwelling is in the subsoil, the shape is indistinguishable in the topsoil; overall oval shape, oval floorplan, straight and sloping walls, flat and horizontal bottom; dimensions - longer axis 3.2 m, shorter axis 2.9 m, max. depth from the subsoil level 0.2 m (plan in TAB. 38; photo in FIG. 16).
The dwelling contained the remains of a stone oven (C. 47) (FIG. 23).
Finds:

- key - fn. M17/344, length 15 cm, TAB. 29:2
- scythe - fn. M17/344, length 28 cm, TAB. 30:1
- iron ring (for a scythe?) - fn. M17/344, width 4 cm, height 4.5 cm, TAB. 30:2
- two incomplete querns and three quern fragments used secondarily in the oven construction - fn. M17/350, r = 21 cm, TAB. 34:1; fn. M17/350, r = 21 cm, TAB. 34:2
- three querns at the bottom of the dwelling - fn. M17/300, Ø 47 cm, TAB. 35:1; fn. M17/300, Ø 50 cm, TAB. 35:2; fn. M17/299, Ø 47.5 cm, TAB. 35:3
- pottery - fn. M17/299, 300, 301, 303, 313, 315, 344, 350, 352

DWELLING 5 (C. 5, 10, 16, 1)
Shape preserved only partially, the base of the dwelling is in the subsoil, the shape is indistinguishable in the topsoil; overall oval shape, oval floorplan, walls could not be documented, flat and horizontal bottom; dimensions - longer axis 4.1 m, shorter axis 3.8 m, max. depth from the subsoil level 0.2 m (plan in TAB. 39; photo in FIG. 16).
The dwelling contained the remains of a destroyed stone oven (C. 5).
Finds:

- fragment of a glass bead - length 1.3 cm, TAB. 36:10
- pottery - fn. M17/65, 78, 133, 137

DWELLING 6 (C. 66, 67, 78)
Rectangular shape, rectangular floorplan, straight and sloping walls, flat and horizontal bottom; dimensions - longer axis 4.7 m, shorter axis 4.2 m, max. depth from the subsoil level 0.4 m (plan in TAB. 39; photo in FIG. 17).
The dwelling contained the remains of a stone oven (C. 67) (FIG. 23).
Finds:

- spindle whorl - fn. M17/355, Ø 1.6 cm, TAB. 36:12
- pottery - fn. M17/355, 372, 373

DWELLING 7 (C. 76, 77)
Quadratic shape, quadratic floorplan, straight and sloping walls, flat and horizontal bottom; dimensions - longer axis 3.4 m, shorter axis 3.2 m, max. depth from the subsoil level 0.3 m (plan in TAB. 39; photo in FIG. 17).
The dwelling contained the remains of a stone oven (C. 77).
Finds:

- spindle whorl - fn. M17/368, Ø 2.4 cm, TAB. 36:13
- pottery - fn. M17/368

DWELLING 8 (C. 83, 84, 85, 86)
Rectangular shape, rectangular floorplan, straight and sloping walls, flat and horizontal bottom; dimensions - longer axis 3.6 m, shorter axis 3.0 m, max. depth from the subsoil level 0.4 m (plan in TAB. 39; photo in FIG. 17).
The dwelling contained the remains of a stone oven (C. 83) (FIG. 23).
Finds:

- bronze arrowhead - fn. M17/379, length 4.1 cm, TAB. 31:10
- fragment of a bronze stick - fn. M17/379, length 1.3 cm, TAB. 31:9
- pottery - fn. M17/379, 380

DWELLING 9 (C. 90, 91)
Shape preserved only partially, part of the hut was destroyed by recent digging, overall rectangular shape, rectangular floorplan, straight and sloping walls, flat and horizontal bottom; dimensions – longer axis 4.7 m, shorter axis 3.6 m, max. depth from the subsoil level 0.3 m (plan in FIG. 25; photo in FIG. 17).
Finds:
› without any finds, except the quern fragments (probably from the oven which was destroyed by recent digging)
› pottery – fn. M20/3, 4, 5, 6, 7, 8, 10, 11, 12, 13

At some of the features, it was not possible to clearly distinguish their walls or the bottom, so we only recorded the layout (floorplan) at the highest level of the backfill where it could be recognized.

PIT 11
Circular shape, slightly sloping walls, circular floorplan; dimensions – longer axis 2.0 m, shorter axis 1.9 m (plan in TAB. 40; photo in FIG. 18).
Finds:
› knife – fn. M17/127, length 7.3 cm, TAB. 25:4
› spindle whorl – fn. M17/127, Ø 3.0 cm, TAB. 36:7
› pottery – fn. M17/126, 127, 129

PIT 13
Oval shape, slightly sloping walls, oval floorplan; dimensions – longer axis 2.8 m, shorter axis 2.0 m (plan in TAB. 40; photo in FIG. 18).
Finds:
› nail – fn. M17/35, length of fragments 3.5 and 2.5 cm, TAB. 25:3
› pottery – fn. M17/34, 35

PIT 14
Irregular shape, poorly preserved context, problematic to interpret the walls and bottom; dimensions – longer axis 2.5 m, shorter axis 1.9 m (plan in FIG. 8; photo in FIG. 18).
Finds:
› no finds
› pottery – fn. M17/141

PIT 17
Circular shape, slightly sloping walls, circular floorplan; dimensions – longer axis 0.8 m, shorter axis 0.7 m (plan in FIG. 8).
Finds:
› no finds
› pottery – fn. M17/147

PIT 18
Square shape, straight and sloping walls, flat and horizontal bottom; dimensions – longer axis 0.8 m, shorter axis 0.7 m (plan in FIG. 8).
Finds:
› no finds

PIT 19
Circular shape ?, part of the feature left in situ in the profile; dimensions – r = 0.3 m (plan in FIG. 8).
Finds:
› no finds

PIT 20
Circular shape?, part of the feature left in situ in the profile; dimensions – r = 0.2 m (plan in FIG. 8).
Finds:
› no finds

PIT 23
Irregular shape, part of the feature left in situ in the profile; dimensions – longer axis 1.9 m (plan in TAB. 40; photo in FIG. 18).
Finds:
› no finds
› pottery – fn. M17/158

PIT 24
Irregular shape, poorly preserved context, problematic to interpret the walls and bottom; dimensions – longer axis 2.4 m, shorter axis 1.8 m (plan in FIG. 8; photo in FIG. 18).
Finds:
› stylus? – fn. M17/139, length 6.5 cm, TAB. 25:5
› pottery – fn. M17/139

PIT 25
Oval shape, oval floorplan, straight and sloping walls, convex bottom; dimensions – longer axis 3.2 m, shorter axis 2.7 m (plan in TAB. 40; photo in FIG. 18).
Finds:
› spindle whorl – fn. M17/327, Ø 2.1 cm, TAB. 36:8
› pottery – fn. M17/205, 213, 215, 293, 327, 328

PIT 28
Circular shape, irregular floorplan, sloping concave walls, sloping stepped bottom; dimensions – longer axis 3.3 m, shorter axis 3.2 m (plan in TAB. 41; photo in FIG. 19).
Finds:
› no finds
› pottery – fn. M17/329

PIT 29
Overall kidney shape, kidney-shaped floorplan, stepped and sloping walls, stepped and horizontal bottom; dimensions – longer axis 2.9 m, shorter axis 1.6 m (plan in TAB. 41; photo in FIG. 19).
Finds:
› knife – fn. M17/296, length 17.2 cm, TAB. 25:6
› pottery – fn. M17/219, 296

PIT 45
Oval shape, oval floorplan, straight and sloping walls, flat bottom, which was hardly distinguishable; dimensions – longer axis 2.3 m, shorter axis 1.6 m (plan in TAB. 40; photo in FIG. 19).
Finds:
› no finds
› pottery – fn. M17/292, 302

PIT 50
Rectangular shape, rectangular floorplan, straight

and sloping walls, flat and horizontal bottom; dimensions – longer axis 3.9 m, shorter axis 2.9 m (plan in TAB. 41; photo in FIG. 19).
Finds:
› no finds
› pottery – fn. M17/323, 324, 335, 336

PIT 63
Rectangular shape, convex walls and bottom; dimensions – longer axis 2.0 m, shorter axis 1.0 m (plan in TAB. 41).
Finds:
› no finds
› pottery – fn. M17/351

PIT 68
Oval shape, slightly sloping walls, convex bottom; dimensions – longer axis 3.0 m, shorter axis 2.5 m (plan in TAB. 41; photo in FIG. 19).
Finds:
› no finds
› pottery – fn. M17/356

PIT 72
Oval shape, slightly sloping walls, convex bottom; dimensions – longer axis 2.0 m, shorter axis 1.7 m (plan in FIG. 8).
Finds:
› no finds
› pottery – fn. M17/363

PIT 74
Circular shape, convex bottom, sloping walls; dimensions – longer axis 1.3 m, shorter axis 1.2 m (plan in FIG. 8; photo in FIG. 19).
Finds:
› no finds
› pottery – fn. M17/369

PIT 89
Oval shape (not fully preserved, disturbed by a recent digging), convex bottom, sloping walls; dimensions – longer axis 2.1 m, shorter axis 1.2 m (photo from HLADÍK/ŠKOJEC 2016, 285).
Finds:
› pottery – fn. M20/16, 17, 18, 19

HOARD 41
Concentration of iron objects deposited at the interface of the cultural layer and the subsoil, without traces of sinking (plan in FIG. 8).
FInds:
› axe – fn. M17/289, length 13.5 cm, TAB. 28:2
› chisel – fn. M17/289, length 20.5 cm, TAB. 28:1
› tool/scraper for debarking strains – fn. M17/289, length 14 cm, TAB. 28:7
› bucket fitting – fn. M17/289, length 13 cm, TAB. 28:3; fn. M17/289, length 3.8 cm, TAB. 28:4, fn. M17/289, length 4.8 cm, TAB. 28:5; fn. M17/289, 7.5 × 7.2 cm, TAB. 29:1
› iron ring – fn. M17/289, Ø 4.2 cm, TAB. 28:6

GRAVE 26
Grave pit not recognized (plan in FIG. 8; photo in FIG. 20) skull pate lying at the interface of the topsoil layer and the subsoil.
Finds:
› no finds

GRAVE 31
Grave pit not recognized (plan in FIG. 8, 20; photo in FIG. 20).
Fragments of a skull and long leg bones.
Finds:
› knife – fn. M17/249, length 6.5 cm, TAB. 25:8

GRAVE 32
Grave pit not recognized (plan in FIG. 8, 20; photo in FIG. 20).
Well-preserved skeleton with grave goods.
FInds:
› knife – fn. M17/247, length 11.5 cm, TAB. 26:1
› spur set – fn. M17/247, height 8.5 cm, length of the prick 4 cm, TAB. 26:2–6

GRAVE 52
Grave pit not recognized (plan in FIG. 8; photo in FIG. 20).
Part of the skull and a leg bone, poorly preserved.
Finds:
› no finds

GRAVE 58
Grave pit not recognized (plan in FIG. 8; photo in FIG. 20).
Human teeth and poorly preserved bones.
Finds:
› bronze loop – fn. M17/341, Ø 0.6 cm, TAB. 36:11

GRAVE 80
Grave pit not recognized (plan in FIG. 8, 20; photo in FIG. 20).
Grave slightly dug in the subsoil, fragments of a skull, mandible, long bones preserved; a knife in the loin area, a vessel in the leg area.
FInds:
› knife – fn. M17/374, length 13.5 cm, TAB. 31:6
› vessel – fn. M17/374, height 13.5 cm, TAB. 17:18

GRAVE 81
Grave pit not recognized (plan in FIG. 8, 20; photo in FIG. 20).
Grave slightly dug in the subsoil, fragments of a skull, long bones preserved; a knife in the loin area, a finger-ring above the grave.
Finds:
› knife – fn. M17/376, length 5.5 cm, TAB. 31:7
› bronze finger ring TAB. 31:8

14. Resumé

Vzťahy v ekonomickej a sociálnej rovine sú základnými stavebnými kameňmi akejkoľvek spoločnosti, či v minulosti alebo v súčasnosti. Bez ich existencie by nebolo možné fungovanie komunít a nebol by možný vznik komplexných spoločenských systémov, ktoré sú v našom chápaní archeológie primárnym predmetom výskumu (Hladík 2012; 2020; Mazuch et al. 2017). Z tohto tvrdenia sa odvíja koncepcia tejto knihy. Na žiadne archeologické pramene, ktoré sa stanú prostriedkami nášho výskumu, nie je možné nazerať izolovane. Naším cieľom je vyťažiť čo najviac z informačného potenciálu prameňov v širších časových a priestorových súvislostiach. Priestorová lokalizácia a časové zaradenie prameňov sú základnými determinantmi skúmaných otázok v tom zmysle, že definujú (ohraničujú) komunitu, ktorej vzťahy skúmame v priestore a čase.

Pramene, s ktorými primárne pracujeme v tejto práci, pochádzajú zväčša zo záchranných výskumov z okrajovej zóny mikulčickej aglomerácie (obr. 1), ktoré boli realizované v širšom časovom horizonte cca 15 rokov na prelome 20. a 21. storočia (pozri kap. 5). Tento fakt nám umožnil pristúpiť k terénnemu výskumu dotknutého priestoru v období rokov 2010 – 2015 nie ako k záchrannému výskumu (pred jeho začiatkom je skúmaný priestor *terra incognita*), ale ako k systematickému výskumu prehlbujúcemu poznanie o funkčne interpretovaných komponentoch sídelnej siete na základe predchádzajúcich terénnych výskumov. Vzniknutá situácia nám umožnila predikovať mnohé súvislosti výskumu počas terénnych prác a modifikovať metodiku výskumu so zameraním na konkrétne historické otázky.

Takto bolo možné celý terénny výskum na polohe Trapíkov v katastri Mikulčíc zahrnúť do koncepcie výskumu socioekonomických interakcií a spoločenskej organizácie na Veľkej Morave a interakcií s krajinou, ktorého súčasťou sú už viaceré prípadové štúdie publikované v nedávnej minulosti (obr. 2) (Hladík et al. 2018). Celá táto koncepcia je postavená na princípoch vzťahovej archeológie (Mazuch et al. 2017; Watts 2013) a výrazne čerpá z koncepcie archeológie obnovenej modernity K. Kristiansena (2014). V zhode s týmito teoretickými koncepciami nám ide o skúmanie globálnejších tém s pomocou čo najkomplexnejšie realizovanej štúdie dát na nižšej „lokálnej" úrovni (Hladík 2019). Práve vzťahová archeológia a teória obnovenej modernity predstavujú ideálny teoretický, lingvistický, ako aj metodický rámec takto koncipovaného výskumu. Silnou stránkou oboch týchto koncepcií je prekračovanie hraníc jednotlivých mierok výskumu. Mierka výskumu je pritom vo viacerých smeroch rozhodujúcim faktorom pri tvorbe konečného výstupu výskumu. Má zásadný vplyv na celý proces výskumného procesu od terénneho výskumu cez metodiku deskripcie až po analýzy aj syntézy dát.

V rovine konkrétnych historických otázok je hlavnou ambíciou nášho výskumu zapojiť sa do diskusie o forme, deskripcii a interpretácii sociálnych a ekonomických vzťahov na Veľkej Morave, ktorá prebieha medzi moravskými, českými a slovenskými archeológmi a historikmi v ostatných rokoch.

Rozsiahly terénny výskum, ktorého výsledkom je aj táto monografia, prebiehal od roku 2010, keď začala mikulčická expozitúra Archeologického ústavu AV ČR Brno, v. v. i. realizovať predstihový archeologický výskum na polohe Trapíkov v katastri obce Mikulčice (plocha M17). Potrebu výskumu na uvedenej polohe vyvolal stavebný zámer Archeologického ústavu AV ČR Brno, v. v. i. V dotknutom priestore bola plánovaná výstavba novej budovy mikulčickej expozitúry. Z hľadiska geológie a geomorfológie skúmaného priestoru bola rozhodujúca skutočnosť, že dotknutý priestor sa nachádza na pieskovej dune uprostred údolnej nivy rieky Morava (Poláček et al. 2005). Z hľadiska archeologického priestoru priamo susedil s časťami pieskovej duny, ktoré boli skúmané v rokoch 1998 – 2003. A v konečnom dôsledku išlo z hľadiska historických interpretácií o areál, ktorý predstavoval hranicu medzi najbližším hospodárskym zázemím včasnostredovekej sídliskovej aglomerácie Mikulčice-Valy a jej okrajovými zónami (Hladík 2014; 2020; Poláček 2008).

Nadložná vrstva (hlinito-piesčitý sediment) na skúmanej polohe dosahovala mocnosť od 20 cm vo vrcholovej časti duny do 100 cm na úpätí duny na severovýchodnom okraji preskúmanej plochy. Plocha skúmaná v rokoch 2010 – 2015 sa rozprestierala na severnom okraji duny. V severnej a severozápadnej

časti plochy prechádzali viate piesky pozvoľna do povodňových sedimentov (obr. 13). V povodňových sedimentoch, ktoré sa nachádzali v západnej časti plochy, sme neobjavili žiadne archeologické nálezy v pôvodnom uložení, teda v priamej väzbe na archeologické kontexty. Len výnimočne sme v tomto priestore evidovali sekundárne premiestnené zlomky keramiky. Odkryté archeologické kontexty sa koncentrovali v severovýchodnej časti skúmanej plochy. Hnuteľné nálezy, predovšetkým fragmenty keramiky a zlomky železných predmetov (napr. nože, strelky, kovanie vedra), sa objavovali v nadložnej vrstve v podstate od povrchu (pozri kap. 7). Ich koncentrácia sa zvyšovala na rozhraní nadložnej vrstvy a podložného piesku. V tomto horizonte sme boli schopní identifikovať aj jednotlivé sídliskové objekty. Doklady osídlenia zistené výskumom sa teda koncentrujú na pieskovej dune. Ide o časť otvoreného sídliska, na ktorom sa však podarilo doložiť aj stopy po funerálnej činnosti a ktorého prvé pozostatky sa podarilo odkryť približne 50 m východne a 50 m južne od plochy M17 už v predchádzajúcich výskumoch (obr. 5).

Na preskúmanej ploche sa nám teda okrem časti sídliska podarilo objaviť a zdokumentovať aj časť pohrebiska (obr. 8:A). Celkovo sme pri výskume interpretovali 72 archeologických kontextov (vrstiev, jám, výplní, konštrukcií, prvkov, hrobov a pod.) (obr. 14). Na základe vzájomných priestorových vzťahov a vďaka hnuteľnému archeologickému materiálu interpretujeme preskúmanú situáciu takto: Osídlenie na preskúmanej ploche sa koncentrovalo v priestore piesčitej duny. Väčšinu archeologických kontextov sme rozpoznali až na rozhraní kultúrnej vrstvy a podložia. V rokoch 2010 – 2015 sme objavili 9 obydlí (obr. 8, 15, 16, 17), ktoré datujeme do 9. – 10. storočia (pozri kap. 8).

Okrem týchto obydlí sa v ich bezprostrednom okolí nachádzalo 19 zahĺbených sídliskových jám (obr. 8, 18, 19). Väčšina z nich mala oválny tvar. Dlhšia os mala priemernú dĺžku 2 m. Zahĺbené boli vo väčšine prípadov len niekoľko desiatok centimetrov do podložného piesku. Miera dochovania týchto kontextov ani hnuteľné nálezy nám v tomto prípade neumožňujú ich funkčnú interpretáciu. Väzba týchto objektov k stavebným či hospodárskym činnostiam rôzneho druhu je pravdepodobná.

Špecifickým druhom kontextu, ktorý sa nám vo väčšine prípadov podarilo objaviť na rozhraní nadložnej vrstvy a podložného piesku, boli koncentrácie keramických fragmentov (deštruované nádoby) alebo zlomky žarnovov, ktoré nemali v teréne žiadnu zreteľnú väzbu k iným kontextom (išlo celkovo o 7 takýchto kontextov) (obr. 8). V prípade niektorých nádob by mohlo s veľkou pravdepodobnosťou ísť o inventár z hrobov, ktoré sa v agresívnom podložnom piesku nedochovali. Toto tvrdenie však nie je možné jednoznačne dokázať. Posledným druhom kontextu sídliskového charakteru, ktorý sa podarilo objaviť, je depot železných predmetov (obr. 8, tab. 28, 29:1).

Okrem pozostatkov sídliska sme na preskúmanej ploche objavili 7 hrobov. V 4 prípadoch sa v hroboch nachádzal pohrebný inventár (HR31, HR32, HR80, HR81) (obr. 8, 20, tab. 17:18, 25:8, 26, 31:6–8, 36:11) (Hladík 2014). Zahĺbené sídliskové objekty, ktoré neinterpretujeme ako obydlia, nebolo možné jednoznačne funkčne definovať. Je tiež pozoruhodné a vo vzťahu k interpretácii funkcie sídliska na Trapíkove v celej sieti vzťahov v hospodárskom zázemí mikulčickej aglomerácie veľmi dôležité, že sa v priestore sídliska neobjavil ani jeden objekt, ktorý by mohol byť čo i len v náznakoch považovaný za zásobnú jamu alebo obilnicu.

Celkovo môžeme konštatovať, že na dune Trapíkov je momentálne preskúmaný areál s rozlohou 5381 m². Predpokladaný rozsah duny je na základe geoarcheologických sondáží približne 34000 m². Preskúmali sme doposiaľ len približne 15 % celého areálu. Je veľmi pravdepodobné, že sídlisko a pohrebisko na Trapíkove malo oveľa väčší rozsah a preskúmali sme len jeho malú časť. Aj napriek tejto skutočnosti pochádzajú z výskumu archeologické pramene, ktoré nám umožňujú v mnohých smeroch hlbšie pochopiť systém sociálnych a ekonomických vzťahov v okolí Mikulčíc.

Môžeme konštatovať, že na Trapíkove sa od roku 1993 preskúmalo celkovo 15 obydlí z 9. – 10. storočia a cca 19 sídliskových jám z toho istého obdobia (pre stratu dokumentácie zo starších výskumov na Trapíkove pri požiari v roku 2007 nie je jasný presný počet sídliskových objektov z výskumov spred roku 2010, išlo však asi o ďalších 10 zahĺbených objektov). Ďalej sa na Trapíkove našlo 11 hrobov, z ktorých časť spadá do záveru osídlenia (hroby nad sídliskovými objektmi). Na dune Virgásky vzdialenej cca 300 m od Trapíkova bolo preskúmaných 29 veľkomoravských hrobov (obr. 4, 5, 8). Ani pri jednom výskume v priestore duny Trapíkov sa neobjavila zásobná jama alebo obilnica.

Vybudovať stabilný a koncepčne konzistentný, ako aj navonok zrozumiteľný model sociálnych a ekonomických vzťahov na Veľkej Morave je hlavný cieľ nášho dlhodobého výskumu. Po publikovaní viacerých prípadových štúdií, ktoré z rôznych uhlov pohľadu pristupujú k uvedenému cieľu s väčším či menším prienikom medzi sebou alebo s hlavným cieľom výskumu (obr. 2), sme v tejto práci prezentovali model, pri tvorbe ktorého sme sa prvýkrát opierali predovšetkým o dáta z klasického a v duchu súčasných metodických trendov realizovaného terénneho výskumu otvoreného sídliska mimo centrálnej časti aglomerácie Mikulčice-Valy. Išlo o posun vo výskume, ktorého potrebu sme zdôrazňovali v závere práce o hospodárskom zázemí Mikulčíc v roku 2014 (Hladík 2014; 2020), ktorá bola postavená primárne na post-exkavačných analýzach starších výskumov a na modernom nedeštruktívnom archeologickom výskume. Týmto postupom sa nám podarilo položiť základy výskumu sociálnych a ekonomických vzťahov medzi Mikulčicami a ich najbližším okolím, avšak v celom výskumnom procese, ako aj pri interpretačnej fáze výskumu sme si uvedomovali limity použitej metodiky a jedným z našich záverov bolo, že ak chceme predpoklady, hypotézy či akýkoľvek model

vybudovaný na základe systematickej archeologickej prospekcie precizovať či testovať jeho platnosť, bude nevyhnutné skúmať neopevnené sídliská v okolí centier. Absencia takéhoto výskumu v minulosti fatálne deformuje pramennú základňu, na základe ktorej sú potom budované interpretačné modely. Absencia výskumu neopevnených rurálnych sídlisk je všeobecným problémom veľkomoravskej archeológie.

Výskum sídliska na Trapíkove preto veľmi vhodne zapadol do celej našej výskumnej koncepcie. Pre celý výskum, ako aj jeho následné spracovanie a interpretáciu archeologických prameňov, ktoré z neho pochádzajú, je rozhodujúca lokalizácia týchto komponentov. Nachádzali sa vo veľmi špecifickom priestore na okraji aglomerácie. Výskumom na Trapíkove sme preto nezískali dáta z typickej neopevnenej osady v zázemí aglomerácie. Získanie takýchto dát je jedným z našich najbližších plánovaných krokov. Preskúmali sme však nemenej dôležitý priestor na pomedzí centra a zázemia.

Hlavné ciele, ktoré sme si pri výskume stanovili, sme naformulovali do troch bodov. Išlo nám o tvorbu naratívneho modelu, ktorý vychádza z analýz priestorových vzťahov kontextov, archeologického materiálu, ako aj z environmentálnych analýz. Tri hlavné problémové okruhy, k riešeniu ktorých je možné podľa nášho názoru prispieť pomocou analýz archeologického materiálu zo sídliska a pohrebiska na Trapíkove sú: hospodárska stratégia komunít žijúcich v centre a jeho okolí, hierarchia sídlisk a funkcia veľkomoravských centier, a interakcia veľkomoravskej populácie s krajinou, v ktorej žila. Takto je preto koncipovaný aj model, ktorý sme v práci prezentovali. Samozrejme, dáta z jedného sídliska nedokážu odpovedať na dané otázky komplexne. Po výsledkoch extenzívnej prospekcie v zázemí Mikulčíc publikovaných v roku 2014 (Hladík 2014) však predstavujú ďalší z pilierov, na ktorých budujeme naše interpretačné modely, tentoraz zameraný na intenzívny výskum konkrétnych komponentov sídelnej siete.

Hľadali sme predovšetkým odpoveď na to, či nové dáta zo sídliska na Trapíkove potvrdia model, ktorý sme vybudovali na základe nedeštruktívneho výskumu a ktorý stojí v diskusii o vzťahoch veľkomoravských centier s ich okolím niekde v „strede". Preto sme v práci prezentovali základné parametre diskusie o sociálnych a ekonomických vzťahoch na Veľkej Morave, či špecifickejšie o vzťahoch medzi centrálnymi aglomeráciami a osídlením v ich okolí. Ako primárnu otázku diskusie, ktorá vyplynula z doposiaľ realizovaných výskumov v priestore Mikulčíc a Pohanska, sme identifikovali mieru autarktnosti týchto centier s dôsledkami tohto fenoménu. V súčasnosti existujú tri hlavné interpretačné línie. Na jednom interpretačnom póle sa nachádza tvrdenie o úplnej energetickej sebestačnosti Pohanska (Dresler 2016), ako opozitum stojí model o výraznej závislosti Pohanska od hospodárskeho zázemia (Dresler/Macháček 2008) a niekde medzi týmito dvomi krajnými pólmi sa nachádza model z Mikulčíc, ktorý preferuje koncepciu kooperácie obyvateľov centra aj zázemia pri zabezpečovaní základných energetických potrieb (Hladík 2014; 2020; Látková 2017).

Metodika výskumu bola postavená na teoretických východiskách zhodných s predchádzajúcimi prípadovými štúdiami (podrobne pozri Hladík 2019; Mazuch et al. 2017). Základné metodické postupy ich v sebe integrovali v duchu metodického pragmatizmu, hľadajúceho čo najširší repertoár aplikovaných metodík. Predstavené otázky sme riešili kombináciou viacerých algoritmov. Prvá skupina analýz bola zameraná na detegovanie priestorových vzťahov na ploche sídliska. Intra-site analýzy sme realizovali v prostredí GIS, s využitím viacerých algoritmov priestorovej štatistiky. Tieto algoritmy sme aplikovali na nehnuteľné (kontexty) aj na hnuteľné nálezy (predovšetkým keramika, železné predmety, botanické makrozvyšky). Druhá skupina analýz bola zameraná na hnuteľné nálezy, a to konkrétne artefakty (predovšetkým keramiku). V tomto prípade sme aplikovali viaceré postupy deskriptívnej štatistiky. A posledná skupina analýz bola zameraná na ekofakty a predovšetkým na botanické makrozvyšky, ale aj na zvierací osteologický materiál. Na detegovanie vzorcov v tejto skupine dát sme okrem deskriptívnej štatistiky využívali aj viacrozmerné prieskumné metódy na odhaľovanie latentných, v pozadí stojacich premenných.

Výsledky týchto parciálnych analýz sme v ďalšom kroku výskumu navzájom porovnávali a na základe tohto porovnania sme vytvorili teoretický model o vzťahoch medzi mikulčickým centrom, okrajovými zónami aglomerácie a jej okolím (obr. 76).

Sídlisko na Trapíkove ležalo na jednej z hlavných komunikácií smerujúcich do jadra aglomerácie (obr. 40). Táto skutočnosť mala rozhodujúci vplyv na dispozičné riešenie sídliska, ktoré predstavovalo akúsi nárazníkovú zónu, v ktorej sa prirodzene stretávali a interagovali záujmy centra so záujmami okolia. V tomto priestore sa s najväčšou pravdepodobnosťou realizovali činnosti, ktoré súviseli s distribúciou (ako aj čiastočným spracovaním) potravín zo zázemia do centra a, naopak, v smere z centra do zázemia dochádzalo k distribúcii významnej časti remeselných výrobkov. Tento pohyb smerom z centra bol s najväčšou pravdepodobnosťou sprevádzaný aj cieleným prenikaním mocenských a správnych štruktúr do okolia aglomerácie. Nositeľmi tohto pohybu boli podľa nášho názoru priamo obyvatelia centra.

Vo vzťahoch skúmanej komunity sme teda definovali dva protichodné smery pohybu. Prvým je pohyb potravín (alebo aj iných surovín) z okolia do centra, druhým je pohyb remeselných výrobkov (keramika, náradie, stavebné kovania, výstroj, výzbroj, šperky a pod.) z centra do okolia. V podstate sa v tomto modeli odzrkadľuje prirodzený pohyb energie v skúmanom systéme. Primárny zdroj energie (potraviny) smeruje z miesta primárnej produkcie do miesta najväčšieho dopytu, teda do centra s najväčšou koncentráciou obyvateľov, a táto energia sa následne transformuje v systéme spoločenských a ekonomických vzťahov smerom z centra do okolia. Na základe tohto modelu sme vyslovili dve tvrdenia

o organizácii subsistenčnej stratégie v okolí mikulčického centra.

1) Zdroj energie (pôvod potravín) sa nachádzal z veľkej časti mimo centra (toto však nevylučuje aj využívanie priestoru aglomerácie na poľnohospodárstvo, avšak nemohlo ísť o primárny zdroj potravín).
2) Centrum sa cielene podieľalo na zabezpečení energetických nákladov celého systému – celej skúmanej komunity. Obyvatelia centra sa aktívne podieľali na subsistencii celej komunity.

Pramene nám však v tejto chvíli jednoznačne neumožňujú definovať, ktorej časti celého cyklu sa primárne zúčastňovali obyvatelia z centra. Je zrejmé, že centrum produkovalo remeselné výrobky. Analýza archeobotanických dát však ukazuje, že v najstresujúcejších častiach hospodárskeho roka (napr. pri zbere úrody) sa museli na poľnohospodárskych prácach priamo podieľať aj obyvatelia z centra.

Doposiaľ sme dokázali vytvoriť model, ktorý definuje predovšetkým základné vzťahy v centrálnych častiach Veľkej Moravy. Tento model sme generalizovali z priestoru mikulčického zázemia aj do geografického priestoru okolia Pohanska a v diskusii o autarktnosti či neautarktnosti veľkomoravských centier sme sa priklonili k záverom o existencii komplexnej siete hospodárskych a sociálnych vzťahov medzi centrami a ich zázemím. Z toho vyplýva, že za archeologicky doložený považujeme model o neautarktných veľkomoravských centrách. Vytvorili sme obraz o smeroch prúdenia energetických zdrojov a ich transformáciách na produkty v rovine fyzických výrobkov, ale aj v rovine sociálnych vzťahov a konštrukcií. V rámci tohto modelu tiež predpokladáme smery pohybu pracovnej sily, technológie či inovácií. Na to, aby sme mohli do modelu zapracovať teórie o konkrétnych formách distribúcie potravín, výrobkov, inovácií či technológie, je nevyhnutné, aby sme získali ďalšie dáta aj zo sídlisk ležiacich ďalej od aglomerácie. Komparácia týchto dát s dátami z centra, ako aj z okrajovej zóny aglomerácie, ktorú sme identifikovali na sídlisku Trapíkov, nám môže pomôcť pochopiť procesy a vzťahy, ktoré boli rozhodujúce pre energetickú stabilitu skúmanej spoločnosti.

Po prezentovaní archeologického modelu vzťahov medzi mikulčickým centrom a jeho hospodárskym zázemím sme sa zamerali na interpretačné dôsledky, ktoré predstavený model prináša. V tejto súvislosti sme rozvinuli diskusiu o rurálnej ekonomike a o význame a funkcii veľkomoravských centier v kontexte organizačných a funkčných princípov Veľkej Moravy. Aby sme vedeli opísať princípy rurálnej ekonomiky a organizačné a funkčné princípy Veľkej Moravy, prezentovali sme model kultúrnej krajiny a definovali charakter agrárnych sídlisk v centrálnej časti Veľkej Moravy. Na týchto základoch sme následne mohli rozvinúť diskusiu o spôsoboch organizácie poľnohospodárstva a produkcie potravín (jej kvalitou, ako aj zmenami v priebehu včasného stredoveku) a o spôsoboch organizácie remeselnej výroby. To nás priamo naviedlo na otázku hybnej sily včasnostredovekého ekonomického rozvoja, resp. na otázku príčin inovácií v poľnohospodárstve, remesle či všeobecne v ekonomike na Veľkej Morave. Základom nášho uvažovania bola funkcia centier vo vzťahu k funkciám agrárnych sídlisk v sieti sociálnych a ekonomických vzťahov a v inovačnom procese. S tým priamo súvisí miera a spôsob zapojenia obyvateľov jednotlivých typov sídlisk do ekonomických procesov (od elitných zložiek spoločnosti až po otrokov). V teoretickej rovine je táto diskusia reprezentovaná ako vyvodzovanie platnosti dvoch opozitných koncepcií. Teda či boli inovácie vo včasnostredovekej centrálnej Európe dôsledkom „top-down“ alebo „bottom-up“ procesov.

Podobne ako v prípade akýchkoľvek zložitých systémov je zrejmé, že aj sociálny a ekonomický vývoj veľkomoravskej spoločnosti musíme chápať ako multikauzálnu záležitosť. Na základe archeologických dát, ktoré máme v súčasnosti k dispozícii a ktoré sme prezentovali v tejto knihe, však považujeme za primárny zdroj hybnej sily veľkomoravskej ekonomiky inovácie v hospodárstve, lokálny vývoj v technológii a poľnohospodárskej stratégii, ktorý vyúsťoval do zvýšenej výroby a miestnej výmeny tovarov – existencie lokálneho trhu. Ekonomický pokrok bol teda dôsledkom „bottom-up“ procesov. Centrá v tomto systéme predstavovali uzly, v ktorých sa stretávali a následne rozširovali inovačné procesy v hospodárstve. Ďalej išlo o miesta, na ktorých sa koncentrovalo bohatstvo produkované primárne z miestnych zdrojov a ktoré teda predstavovali uzlové body v agrárnej ekonomike. Išlo o hospodárske centrá intenzívne zapojené do primárnej produkcie potravín a ďalších hospodárskych produktov a nie o centrá v zmysle empórií, ktorých primárna funkcia bola kontrola diaľkového obchodu a redistribúcia prestížneho tovaru. Veľkomoravské centrá teda predstavovali bohaté sekulárne miesta s vysokým statusom, ktoré úzko koexistovali s komunitami, ktoré zásobovali tieto centrá hospodárskymi produktami. Je zároveň veľmi pravdepodobné, že jednotlivé centrá mali špecifické funkcie a mali aj špecifické postavenie v rámci sídelnej hierarchie. Z toho vyplýva, že tieto funkcie determinovali aj podobu osídlenia v ich najbližšom okolí (existenciu či absenciu hospodárskeho zázemia) a že medzi jednotlivými veľkomoravskými centrami existovali silné spoločenské a ekonomické väzby (podrobne pozri kap. 9).

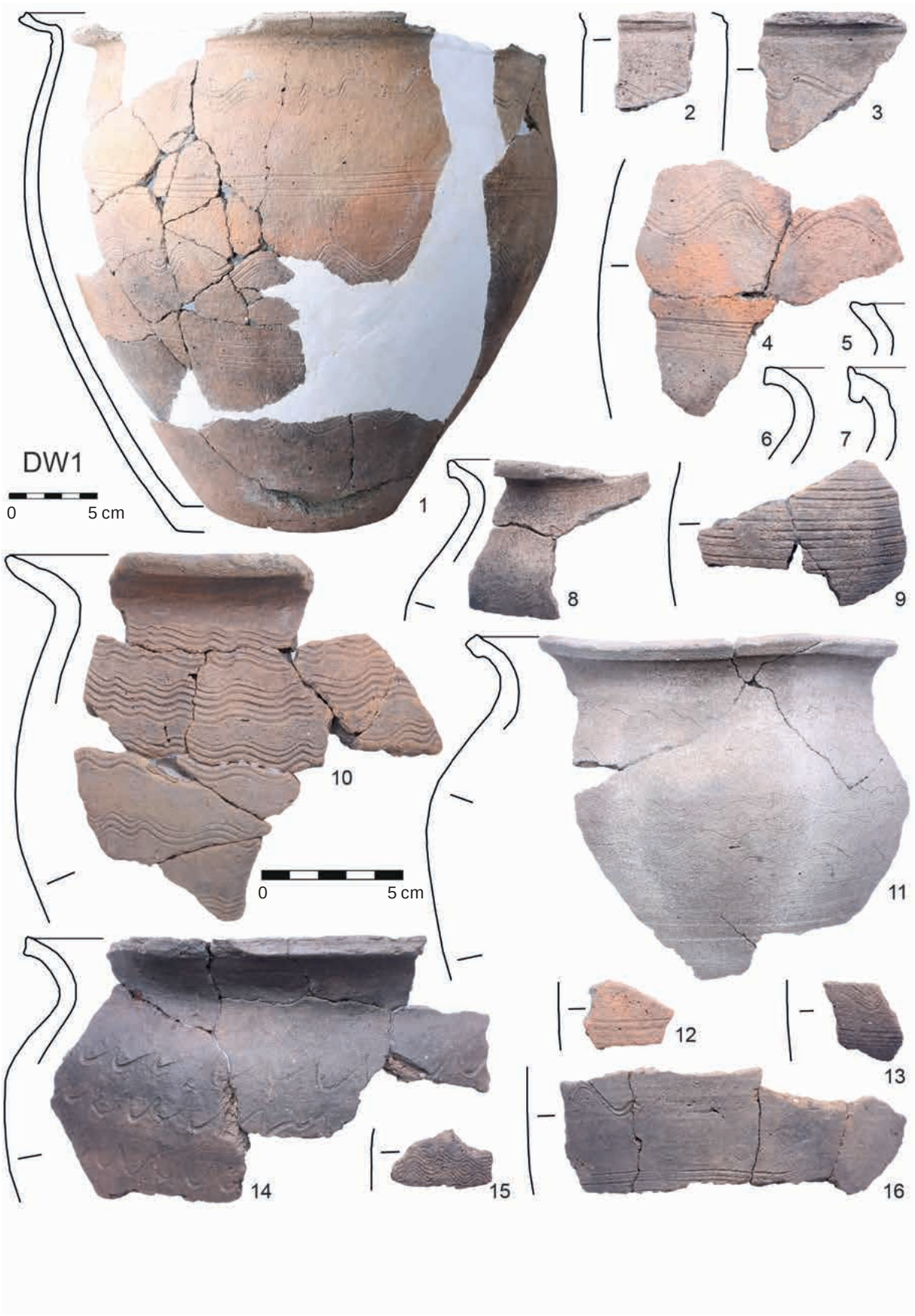
Hierarchické vzťahy veľkomoravských centier prejavujúce sa ekonomickými väzbami (rozličnou mierou ekonomickej závislosti medzi jednotlivými centrami) dopĺňajú vzťahy sídelných jednotiek (neopevnených sídlisk) v okolí centier. Sídliská v zázemí veľkomoravských centier mali špecifické funkcie v sídelnej hierarchii. Nešlo preto s najväčšou pravdepodobnosťou o „indiferentné“ agrárne sídliská, ktoré by z hľadiska subsistencie existovali nezávisle od vzťahov s okolitými sídliskami a vo vzťahu k centru by predstavovali len akýsi systematicky ekonomicky vyťažovaný priestor. Išlo o sídliská integrované

do komplexnej hierarchickej sídelnej siete. V jej centre sa nachádzala aglomerácia obklopovaná uzlovými bodmi s menšou centralitou. Tieto uzly s menšou mierou centrality ako aglomerácia však predstavovali medzičlánky v ekonomických vzťahoch medzi aglomeráciou a sídelnou sieťou v jej okolí. Takto chápaná podoba sídelnej hierarchie koreluje aj s ďalšími závermi nášho výskumu. V diskusii o organizácii remeselnej výroby na Veľkej Morave sme prezentovali hypotézu o tom, že vo veľkomoravskom prostredí je oprávnené predpokladať existenciu dielenskej výroby pre trh, ktorá je charakteristická priamou výrobou pre potreby trhu, ďalej štandardizovanou výrobou a prácou vyžadujúcou si plnú kapacitu výrobcu. Je teda charakteristická pre spoločnosti s výraznou sociálnou stratifikáciou a hierarchickými socioekonomickými vzťahmi. Výraznú sociálnu stratifikáciu veľkomoravskej spoločnosti (zodpovedajúcu spoločnosti s vysokou mierou komplexnosti) tiež dokazujú antropologické analýzy kostrových pozostatkov z centrálnych, ako aj dedinských pohrebísk (či už ide o záťažové deformácie na dochovaných kostrách alebo izotopové analýzy stravy veľkomoravskej populácie).

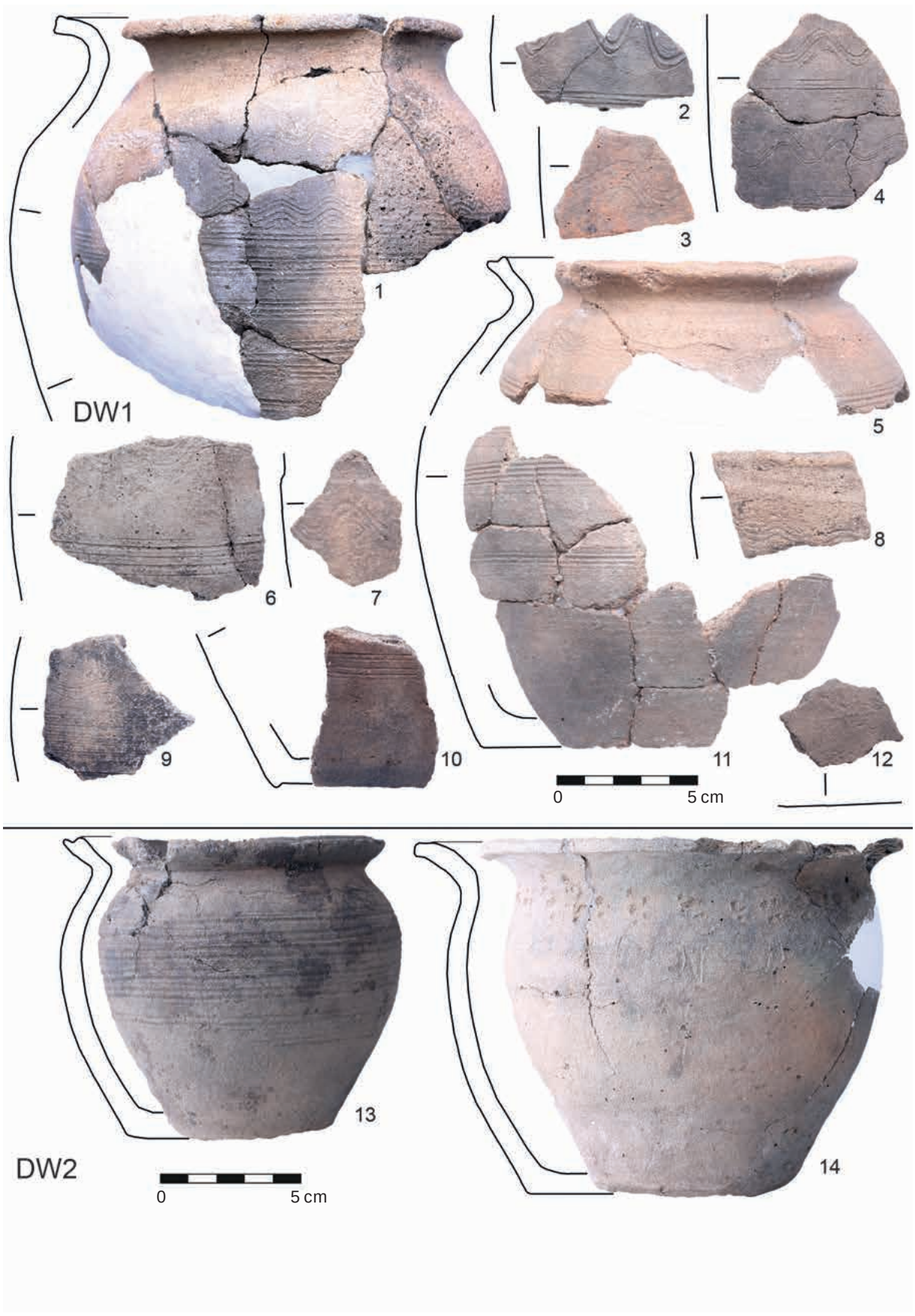
To, že centrá chápeme primárne ako uzlové body agrárnej ekonomiky a nie medzinárodného obchodu, samozrejme, neznamená, že diaľkový obchod s prestížnym tovarom či otrokmi nehral úlohu v ekonomike Veľkej Moravy. Na základe archeologických dát však považujeme za pravdepodobnejšie, že nešlo o základ celého socioekonomického systému. Naše závery do veľkej miery korelujú s tvrdením J. Henninga o ekonomickom vývoji včasnostredovekej Európy po rozpade Rímskej ríše. *„The key factors for the new system were a technological base which in part reached a nearly nineteenth-century level of quality (not of quantity), and the increasing number of relatively autonomous and self-managing peasants organized mainly in villages, a growing interest of these food producers in their own daily work, and finally, a higher degree of freedom in the rural world. This 'sort of freedom' was, in the words of Karl Brunner, 'the successful rural concept of the early Middle Ages'.“* (Henning 2003, 274). V tomto duchu predstavuje Veľká Morava jeden z integrálnych dokladov fascinujúceho nárastu ekonomických aktivít v celej západnej a centrálnej Európe na konci prvého, ale predovšetkým na začiatku druhého tisícročia po Kr., ktorý bol dôsledkom širokej reorganizácie ekonomických štruktúr po rozpade Rímskej ríše.

Archeologický model o vzťahoch medzi centrálnou aglomeráciou s jej hospodárskym zázemím, ktorý sme prezentovali v tejto práci, ako aj vyslovené hypotézy o organizačných a funkčných princípoch Veľkej Moravy ponúkajú širokú škálu možností na ich testovanie. Preto je jedným z primárnych cieľov nášho ďalšieho výskumu zamerať sa na problematiku modelovania sídelnej hierarchie a na problematiku modelovania socioekonomických vzťahov vo veľkomoravskej spoločnosti. Z teoretických a metodologických východísk nášho výskumu vyplýva, že sa túto problematiku snažíme uchopiť v duchu teoretického pragmatizmu, čo v tomto konkrétnom prípade znamená aplikovanie metodík zameraných na tvorbu dynamickejších modelov. Pri modelovaní sídelnej hierarchie ide o posun od teórie centrálneho miesta k sieťovým analýzam. Základným teoretickým východiskom tohto posunu je skutočnosť, že zatiaľ čo teória centrálneho miesta pracuje predovšetkým s koncepciou konštrukcie ideálneho teritória, sieťové modely smerujú k rekonštrukcii obrazu reálneho teritória. Z hľadiska terénneho výskumu je nevyhnutné pokračovať vo výskume neopevnených veľkomoravských sídlisk, pričom tento výskum je za daného stavu poznania hospodárskeho zázemia Mikulčíc možné zamerať cielene na konkrétny priestor. Máme na mysli údolie potoka Prušánka, v ktorom sa už teraz koncentrujú viaceré komponenty (pohrebiská, sídliská), ktorých veľkosť, ale aj ďalšie formálne vlastnosti naznačujú existenciu rozvinutej hierarchizovanej sídelnej siete v tomto regióne v období Veľkej Moravy.

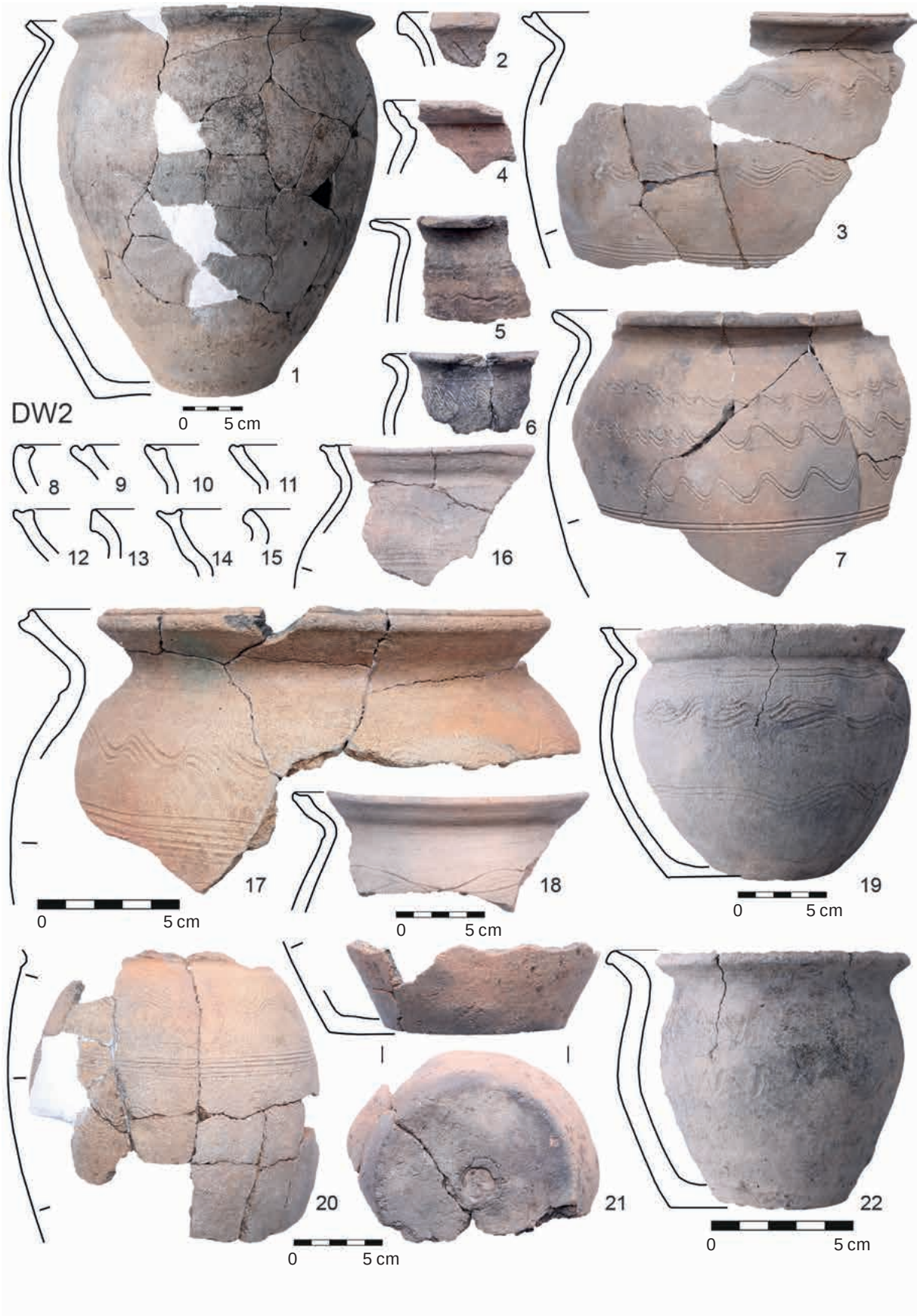
15. Tables



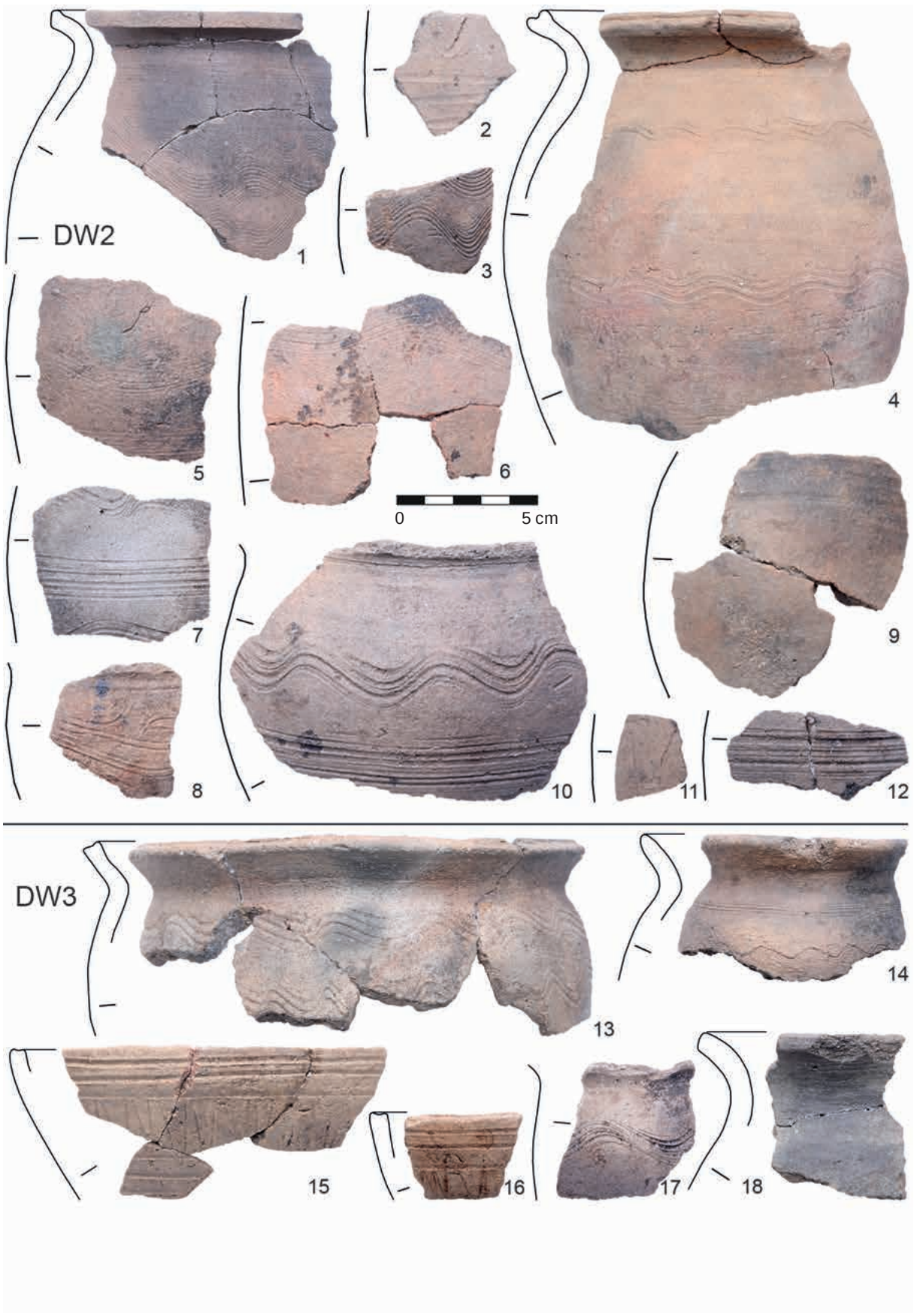
TAB 1 | Selection of pottery from dwelling 1.



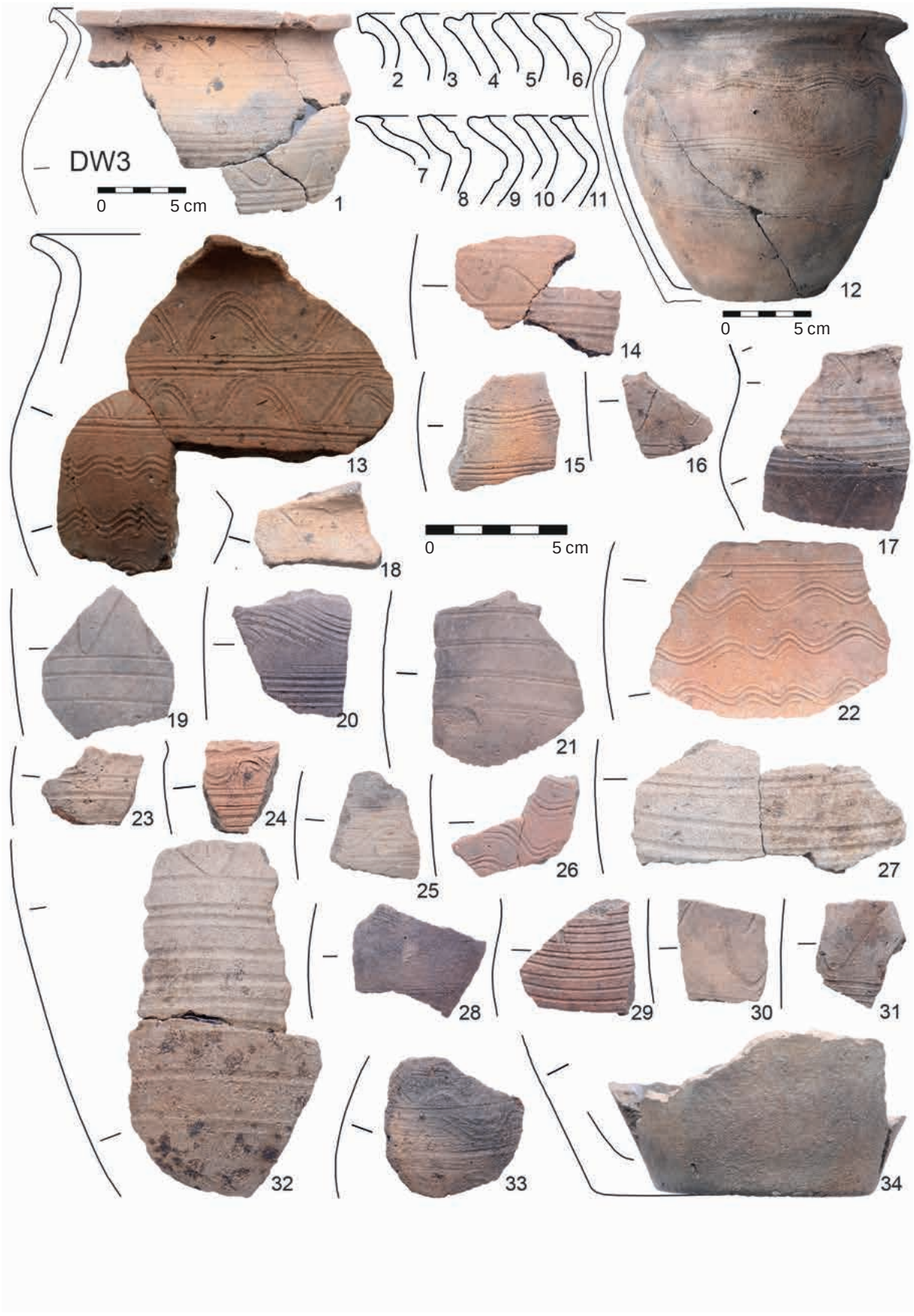
TAB 2 | Selection of pottery from dwelling 1 (continued) and dwelling 2.



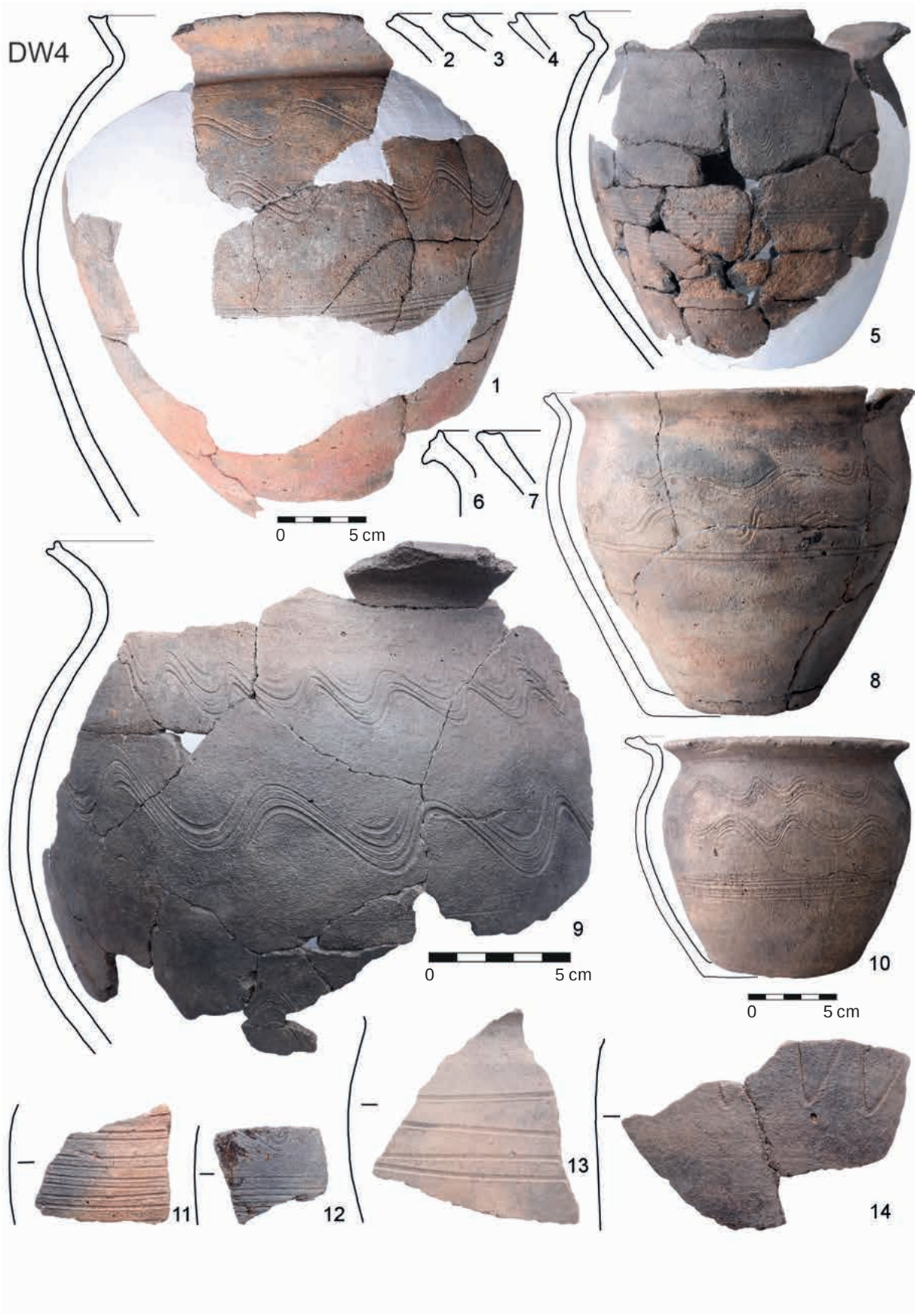
TAB 3 | Selection of pottery from dwelling 2 (continued).



TAB 4 | Selection of pottery from dwelling 2 (continued) and dwelling 3.

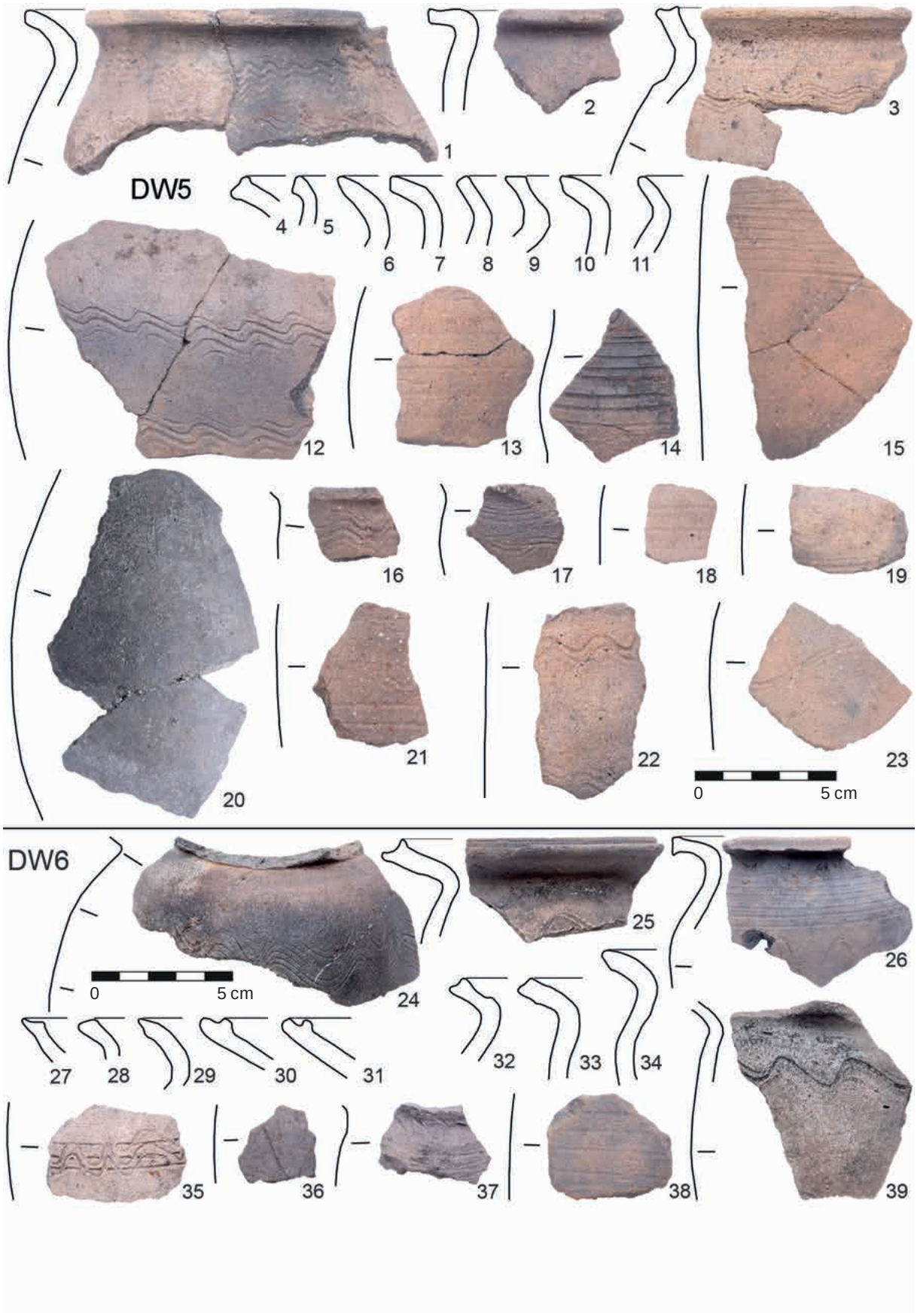


TAB 5 | Selection of pottery from dwelling 3 (continued).

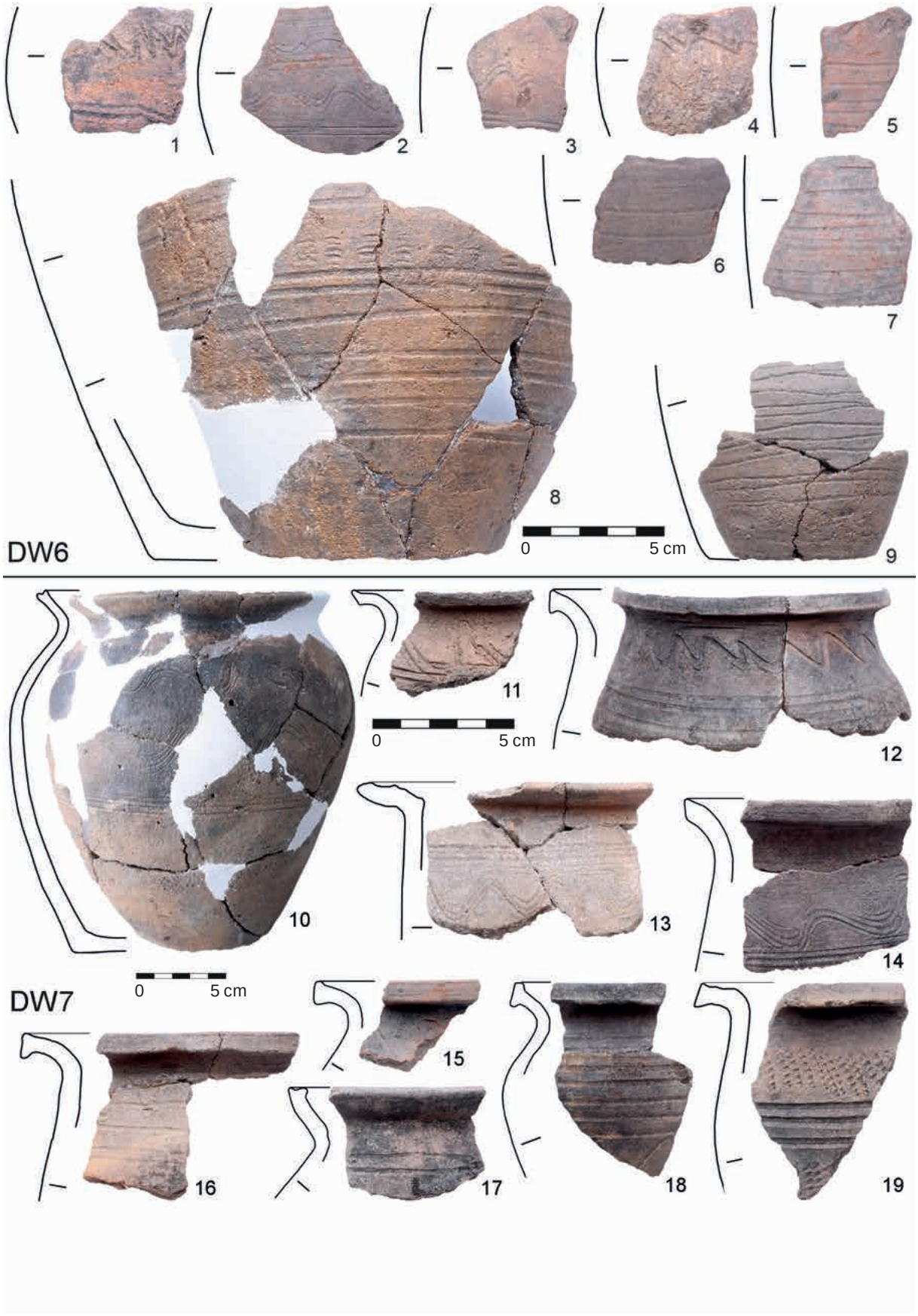


TAB 6 | Selection of pottery from dwelling 4.

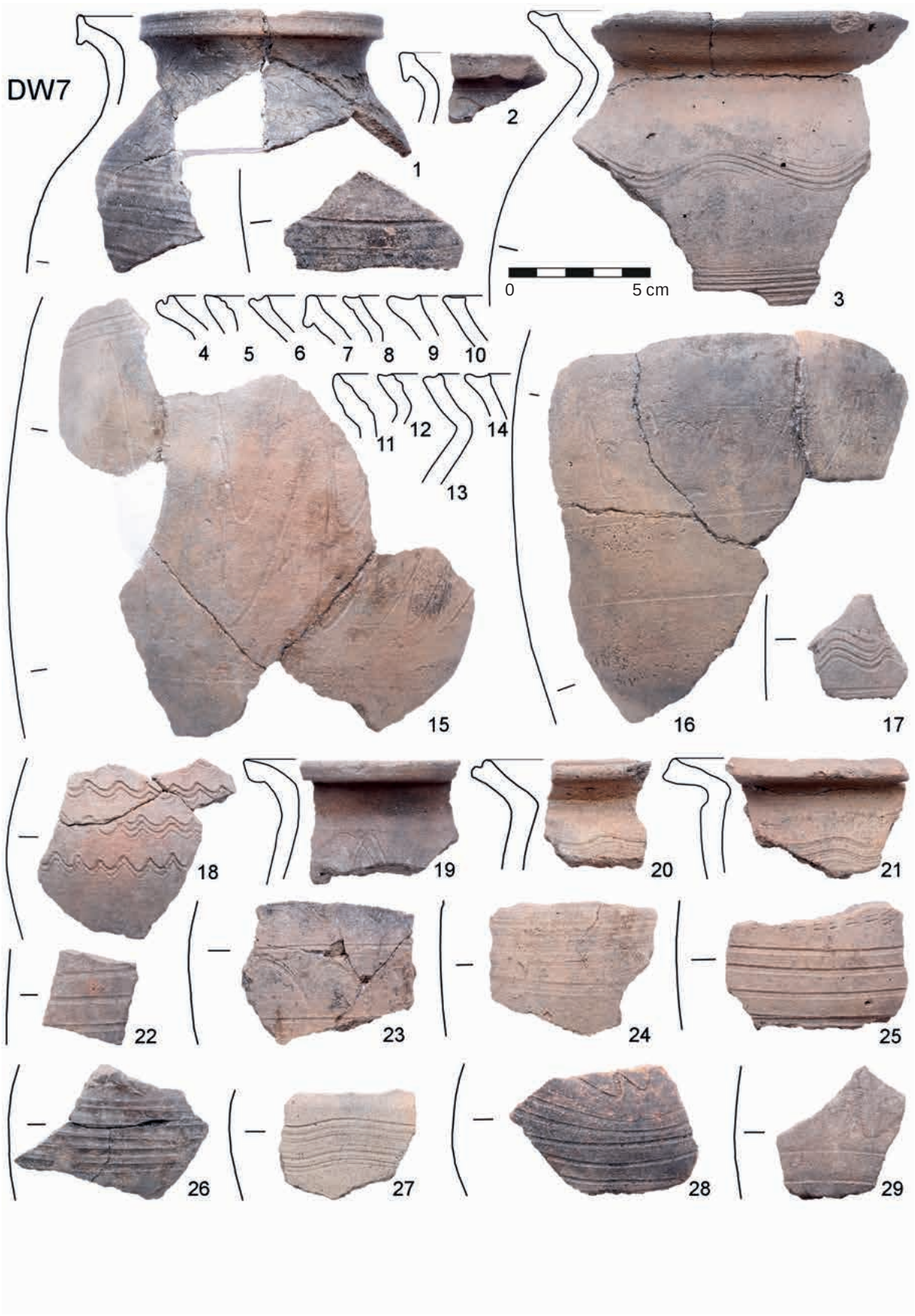
TAB 7 | Selection of pottery from dwelling 4 (continued).



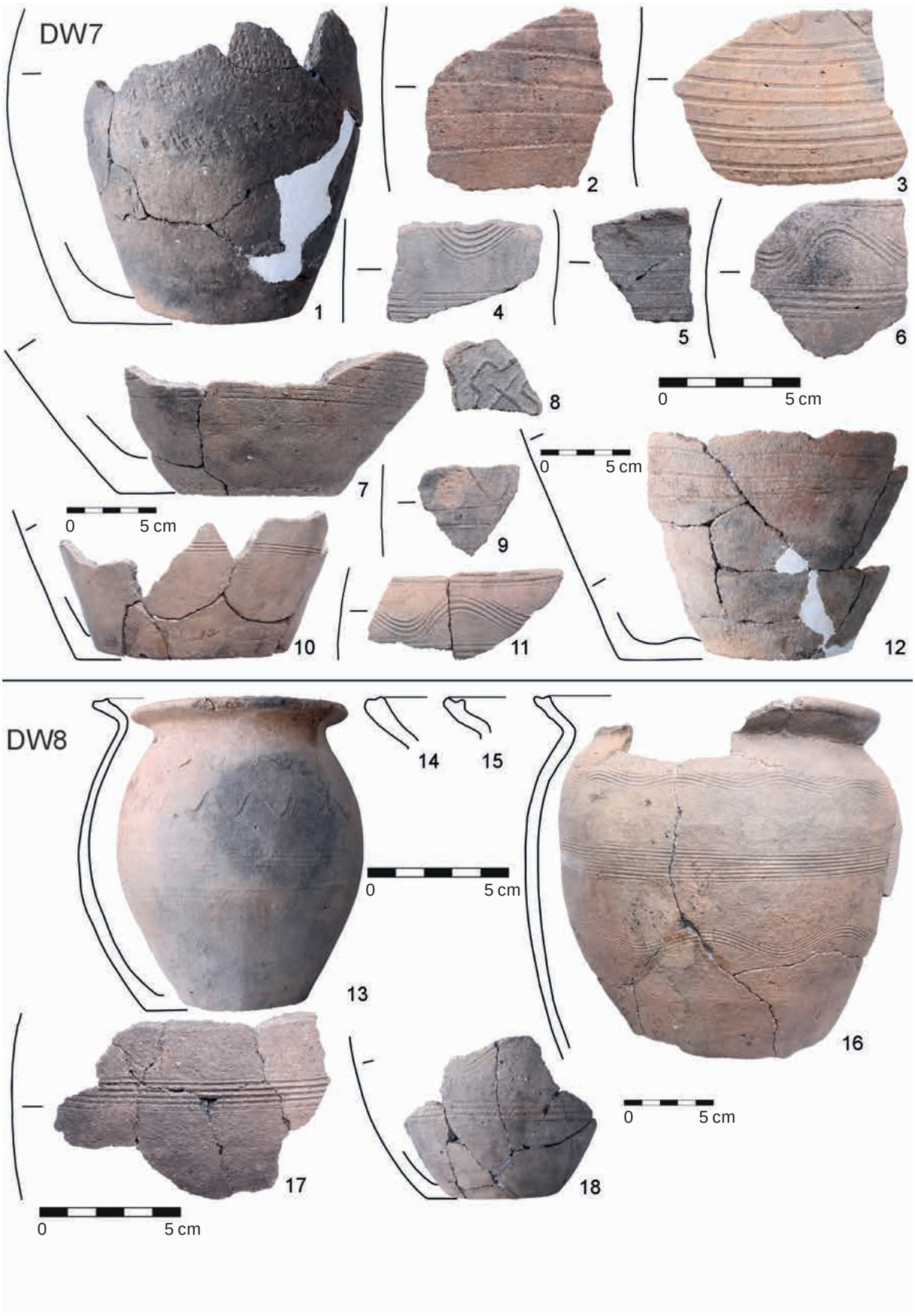
TAB 8 | Selection of pottery from dwellings 5 and 6.



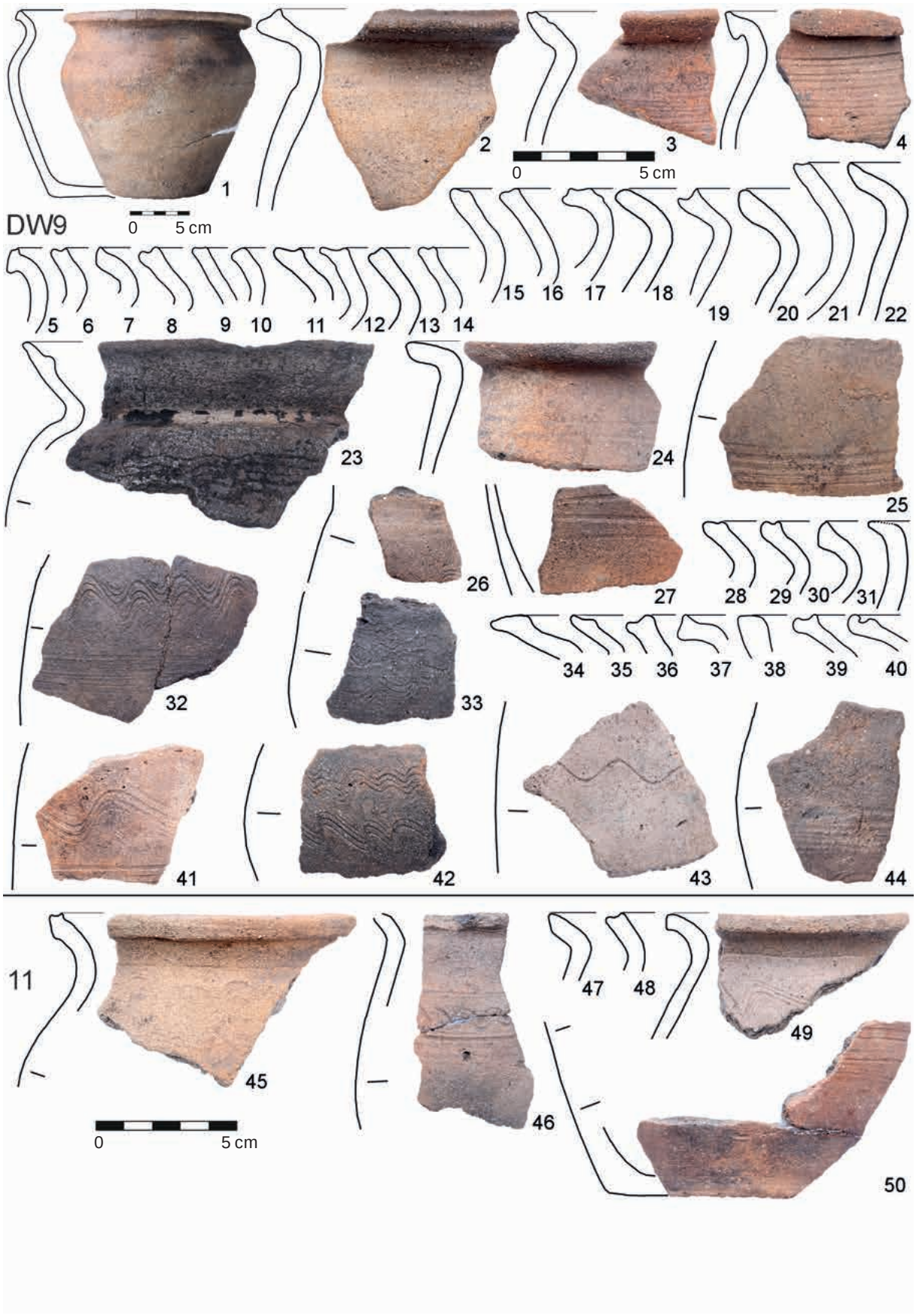
TAB 9 | Selection of pottery from dwelling 6 (continued) and dwelling 7.



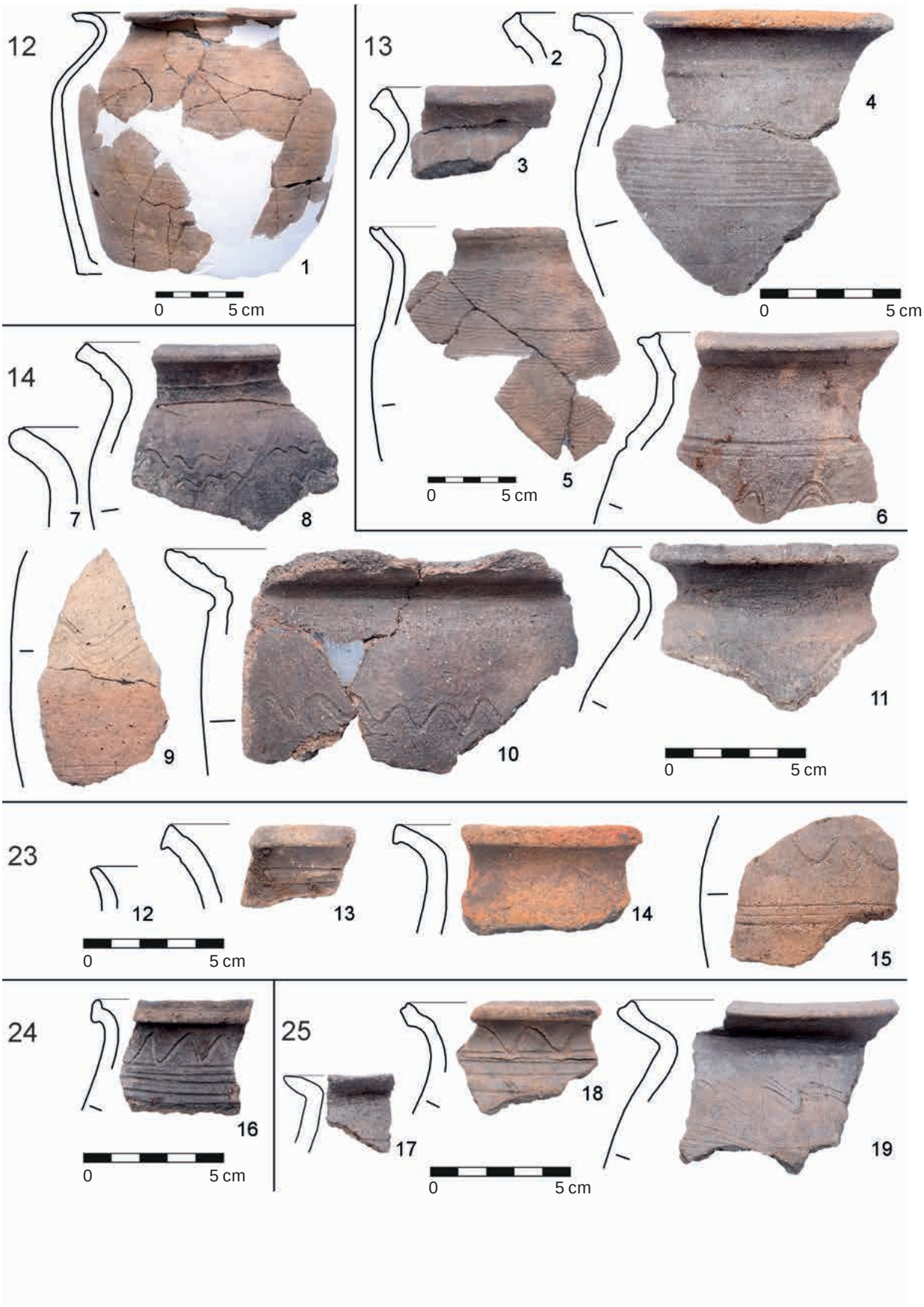
TAB 10 | Selection of pottery from dwelling 7 (continued).



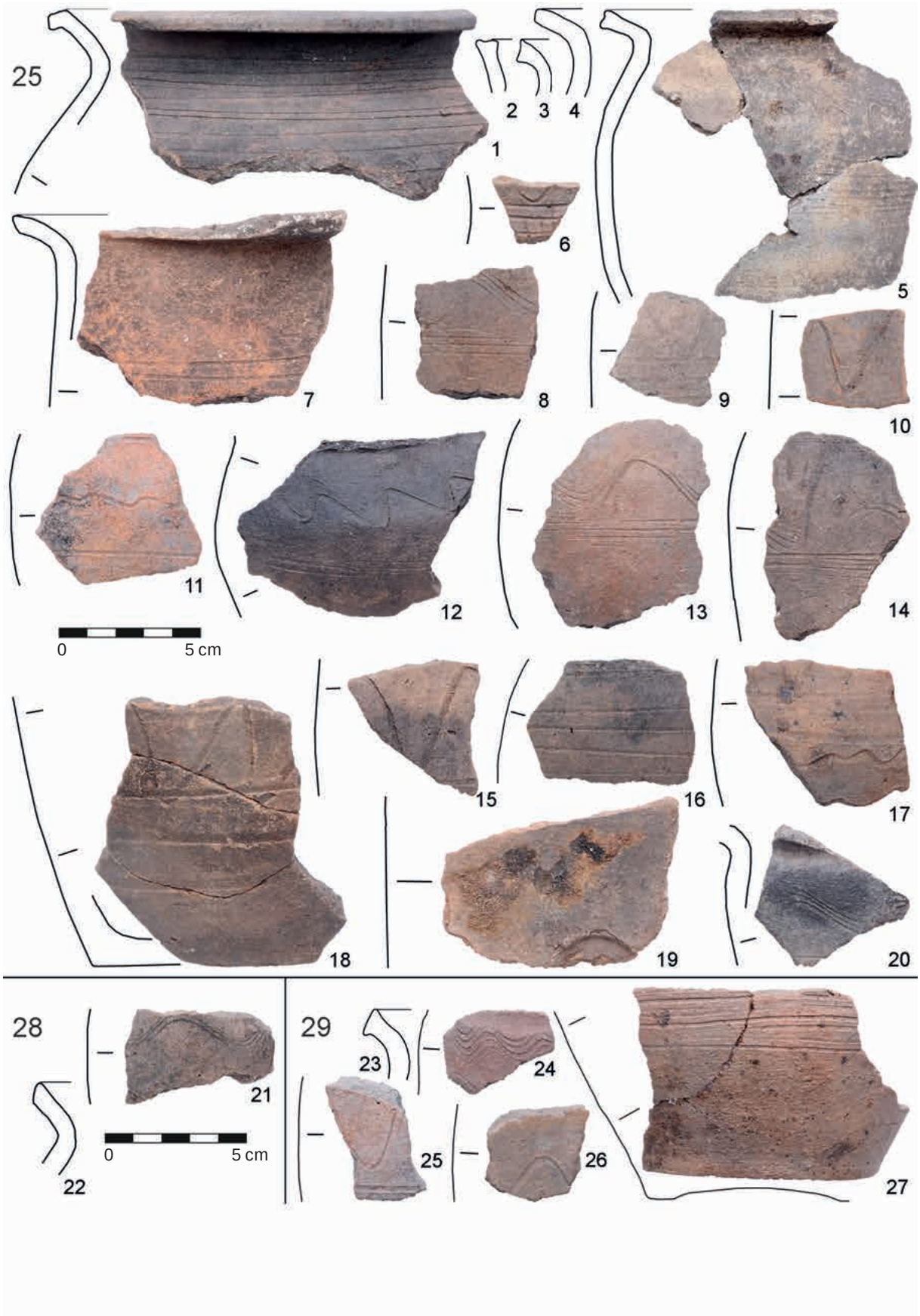
TAB 11 | Selection of pottery from dwelling 7 (continued) and dwelling 8.



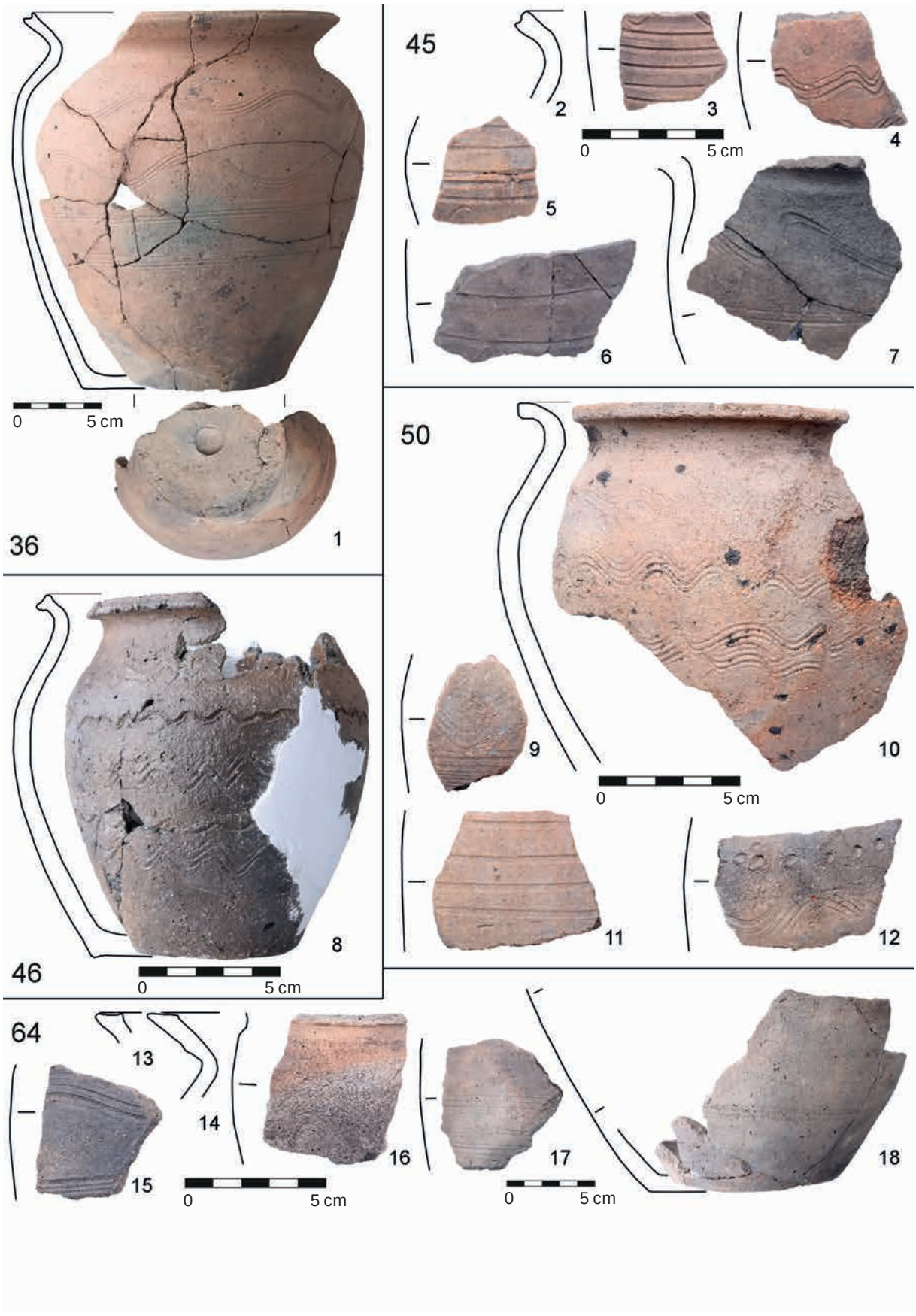
TAB 12 | Selection of pottery from dwelling 9 and context 11.



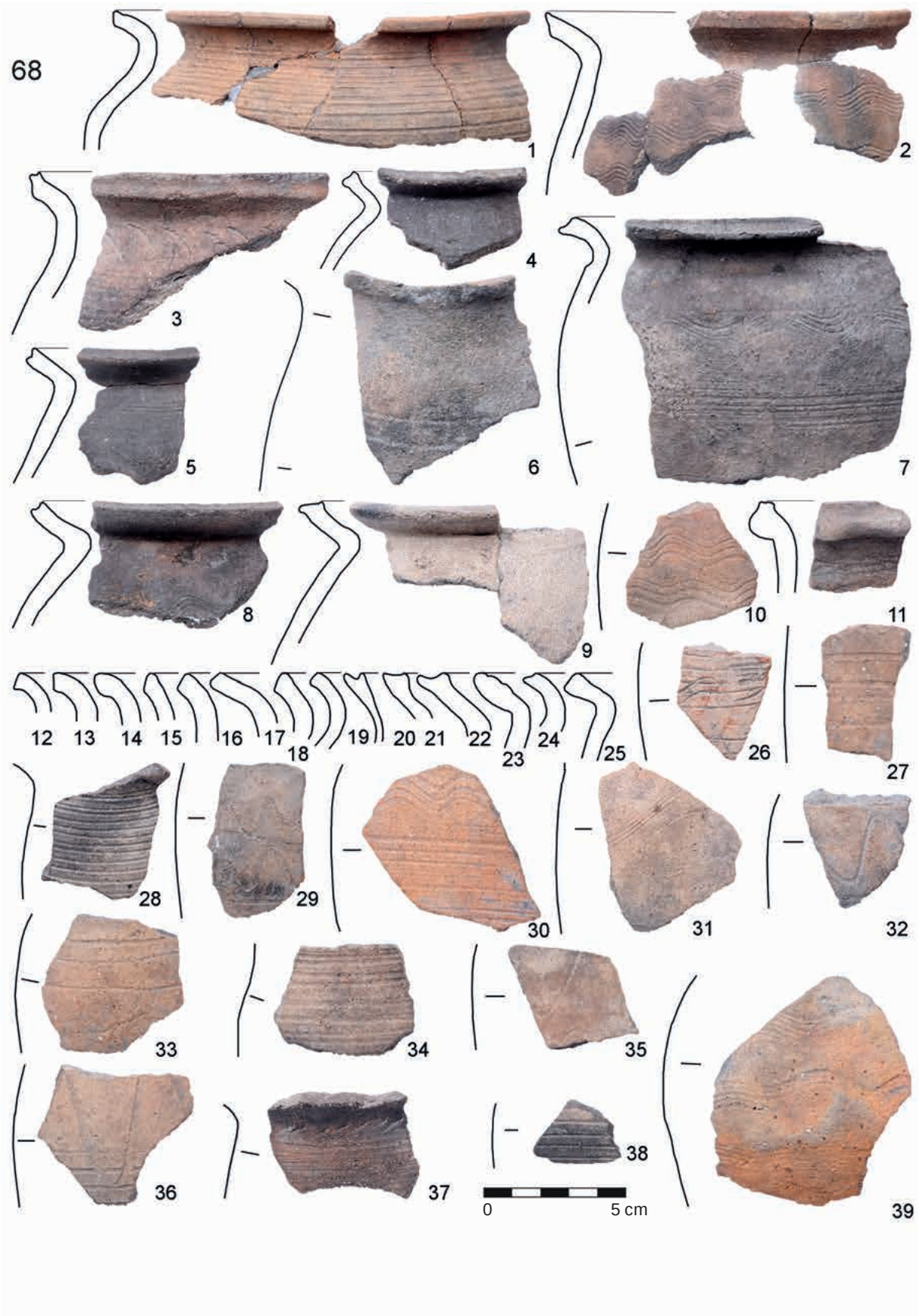
TAB 13 | Selection of pottery from contexts 12, 13, 14, 23, 24 and 25.



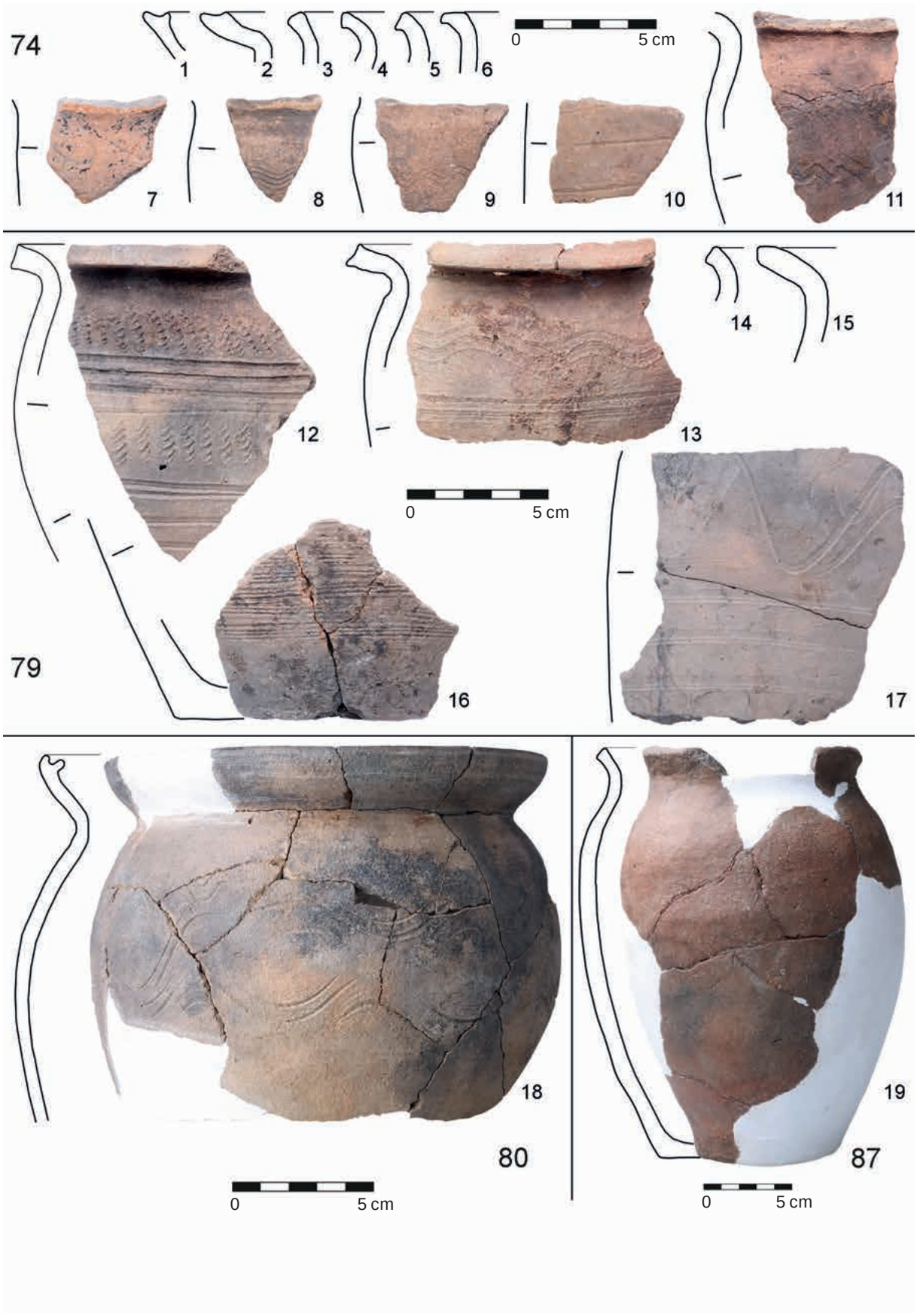
TAB 14 | Selection of pottery from contexts 25 (continued), 28 and 29.



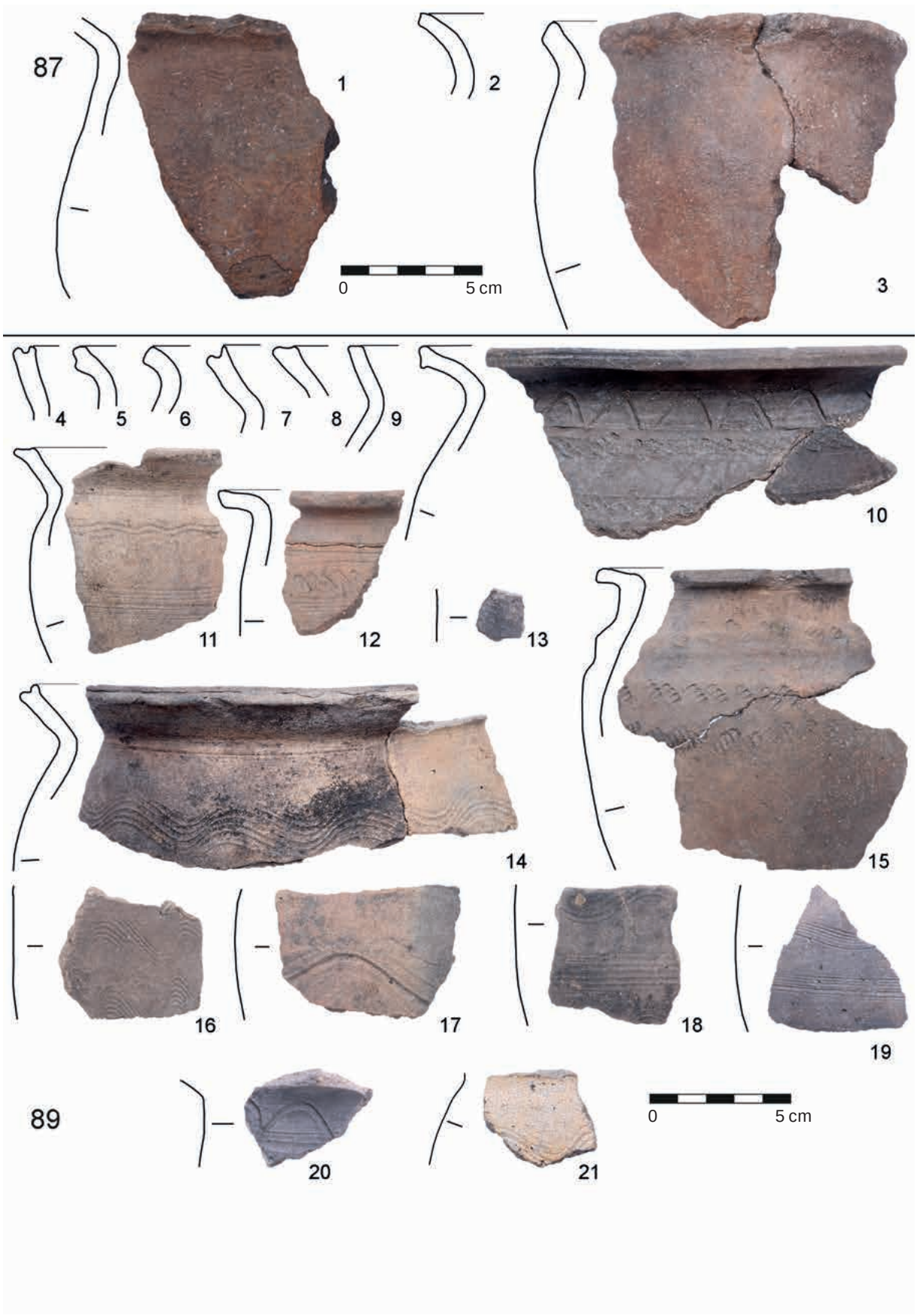
TAB 15 | Selection of pottery from contexts 36, 45, 46, 50 and 64.



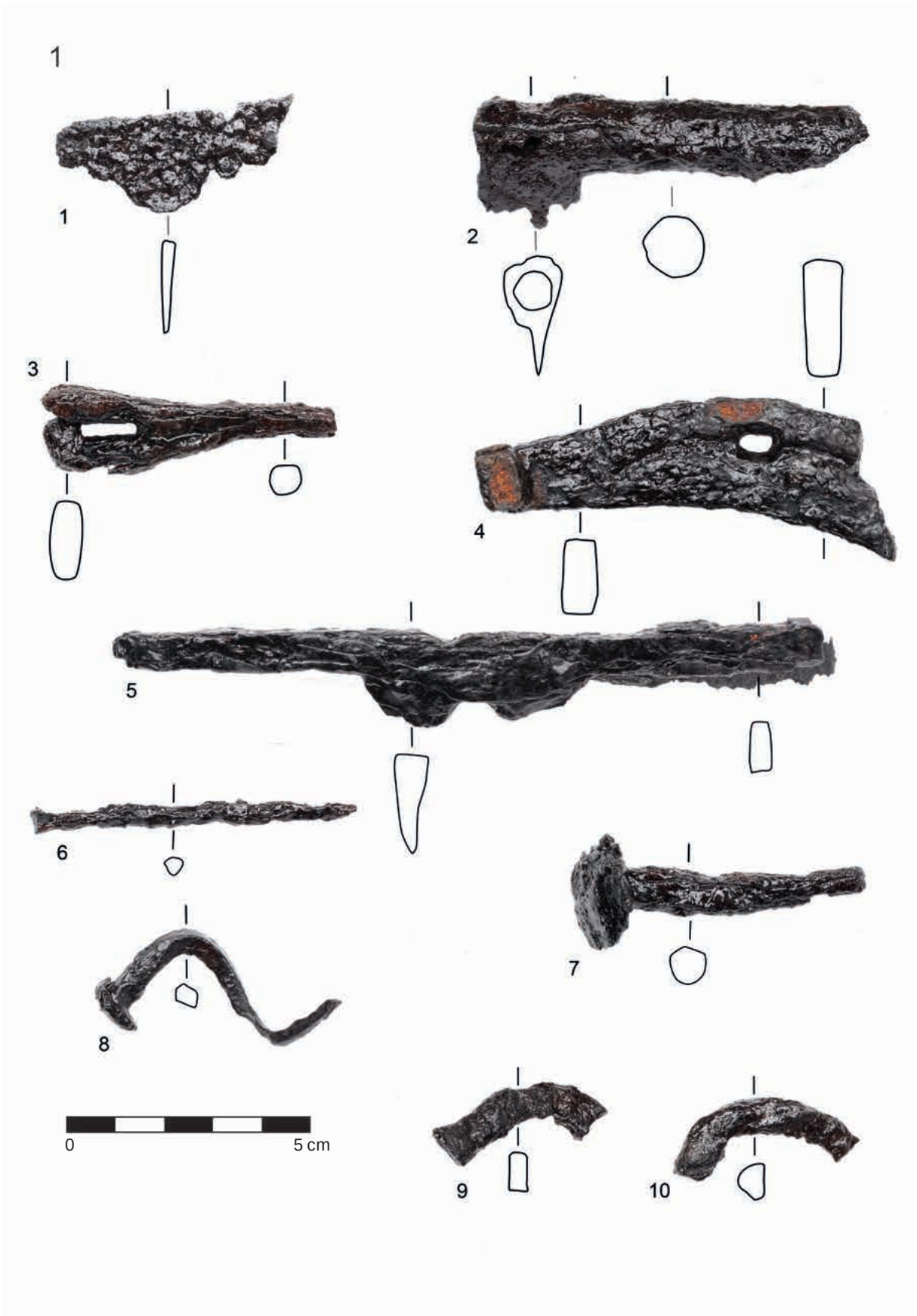
TAB 16 | Selection of pottery from context 68.



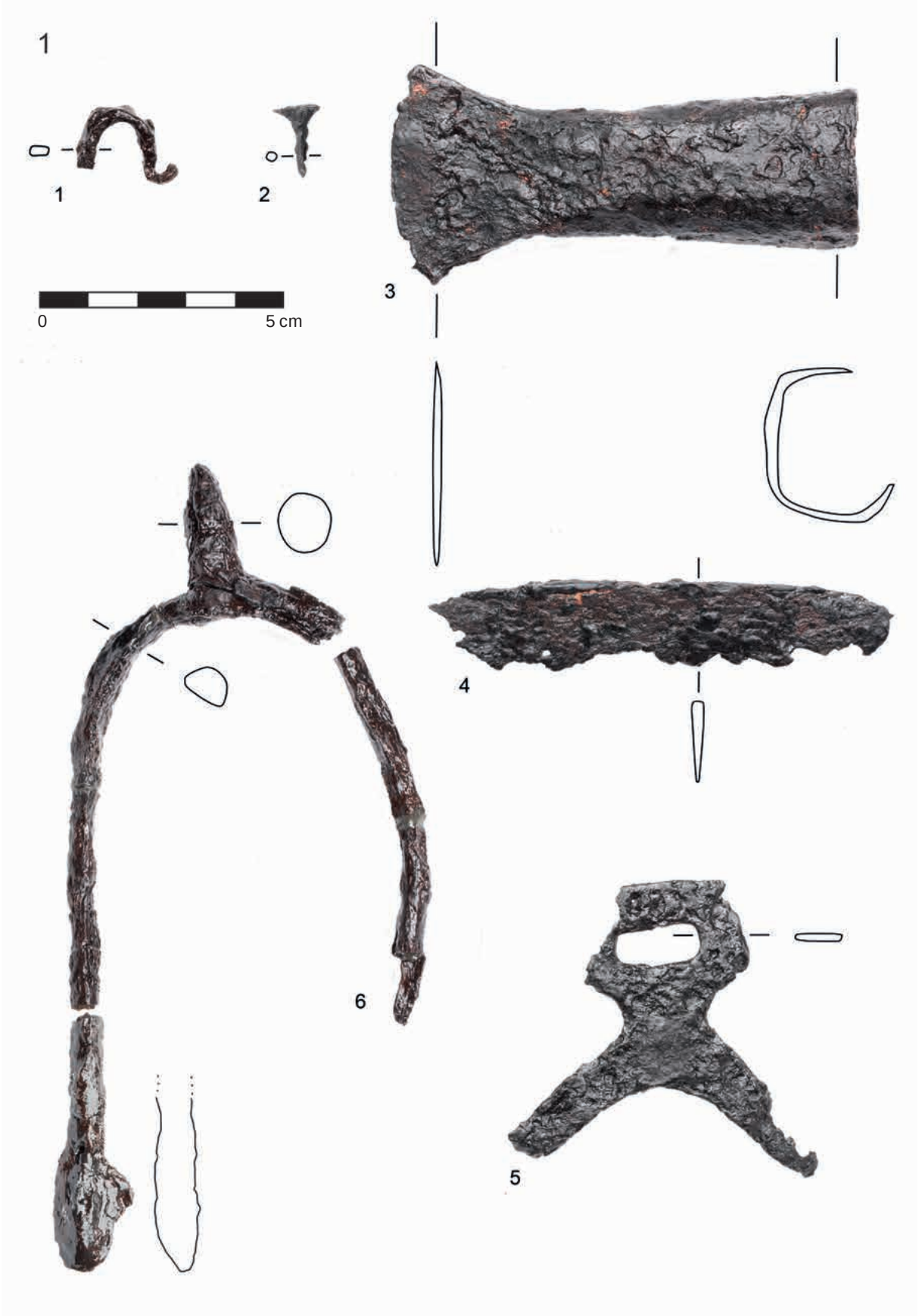
TAB 17 | Selection of pottery from contexts 74, 79, 80 and 87.



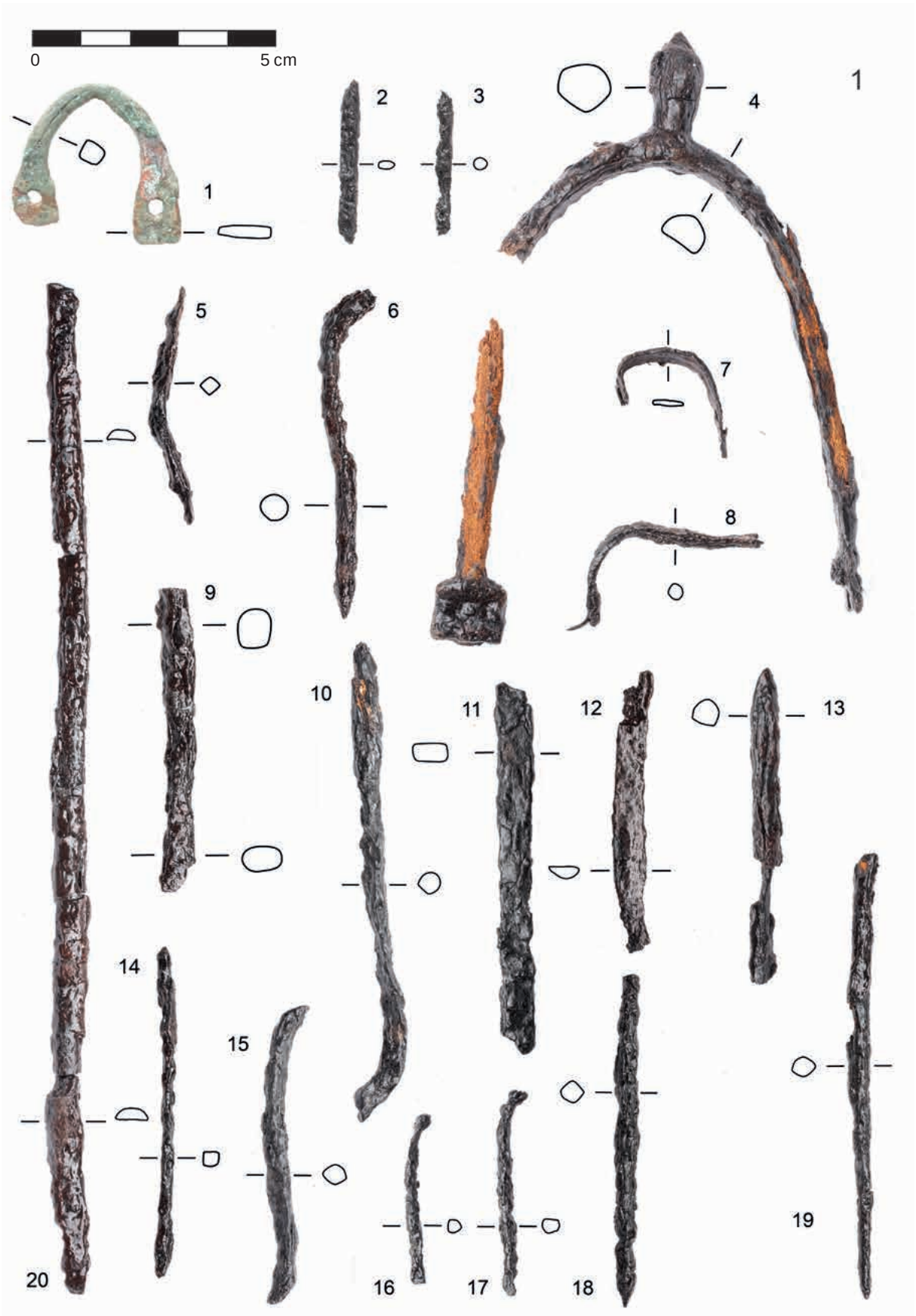
TAB 18 | Selection of pottery from contexts 87 (continued) and 89.



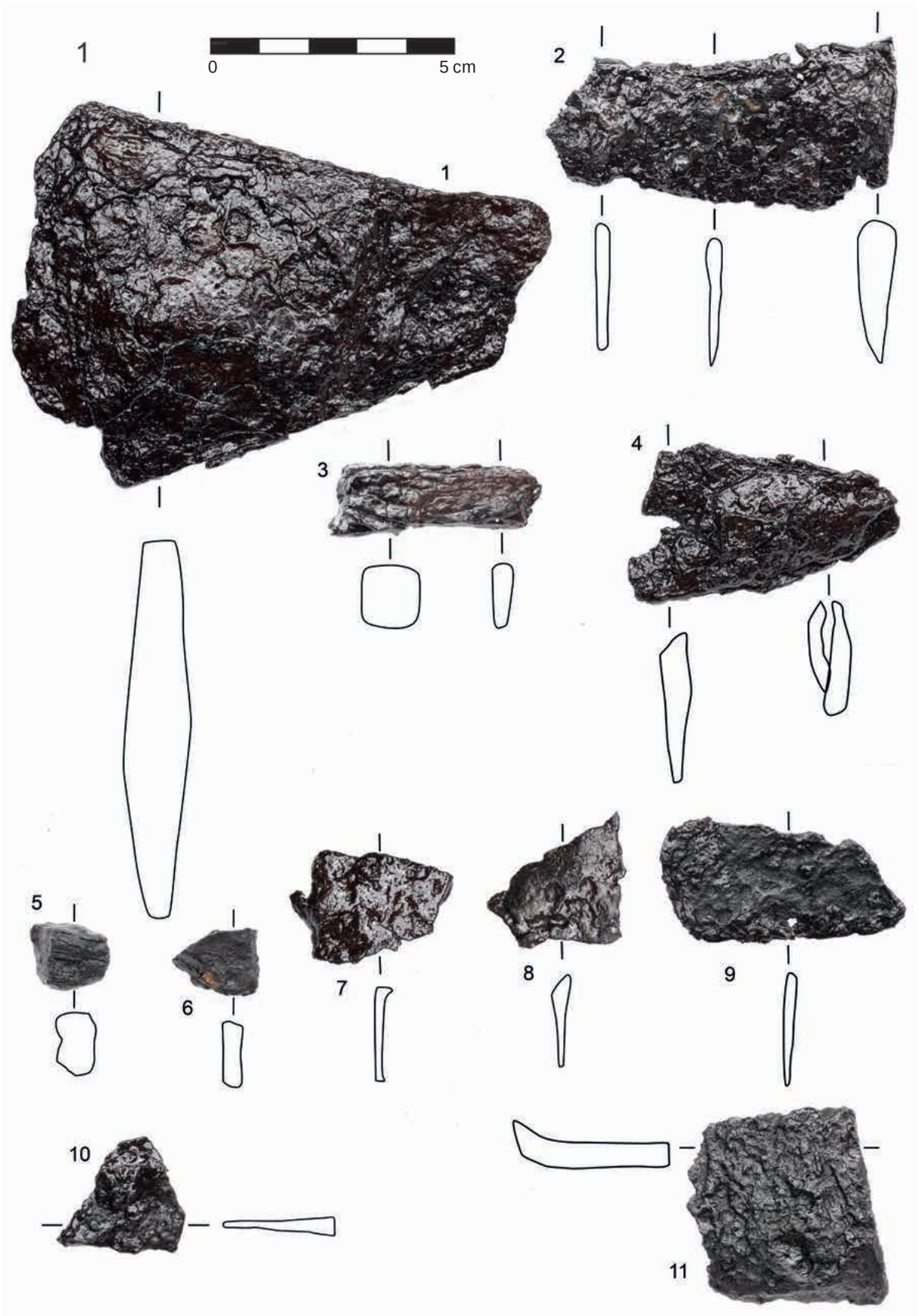
TAB 19 | Selection of metal finds from context 1.



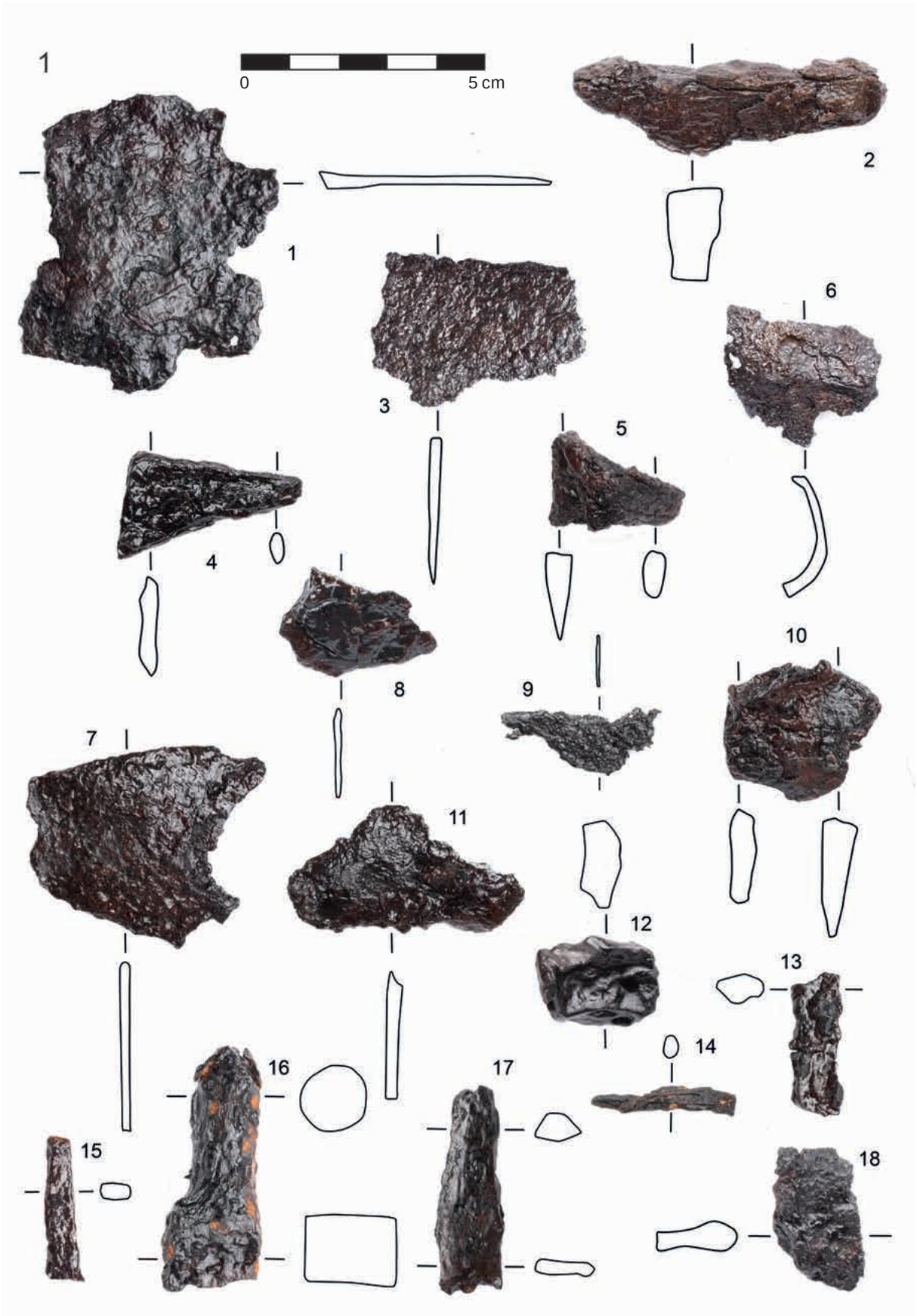
TAB 20 | Selection of metal finds from context 1.



TAB 21 | Selection of metal finds from context 1.

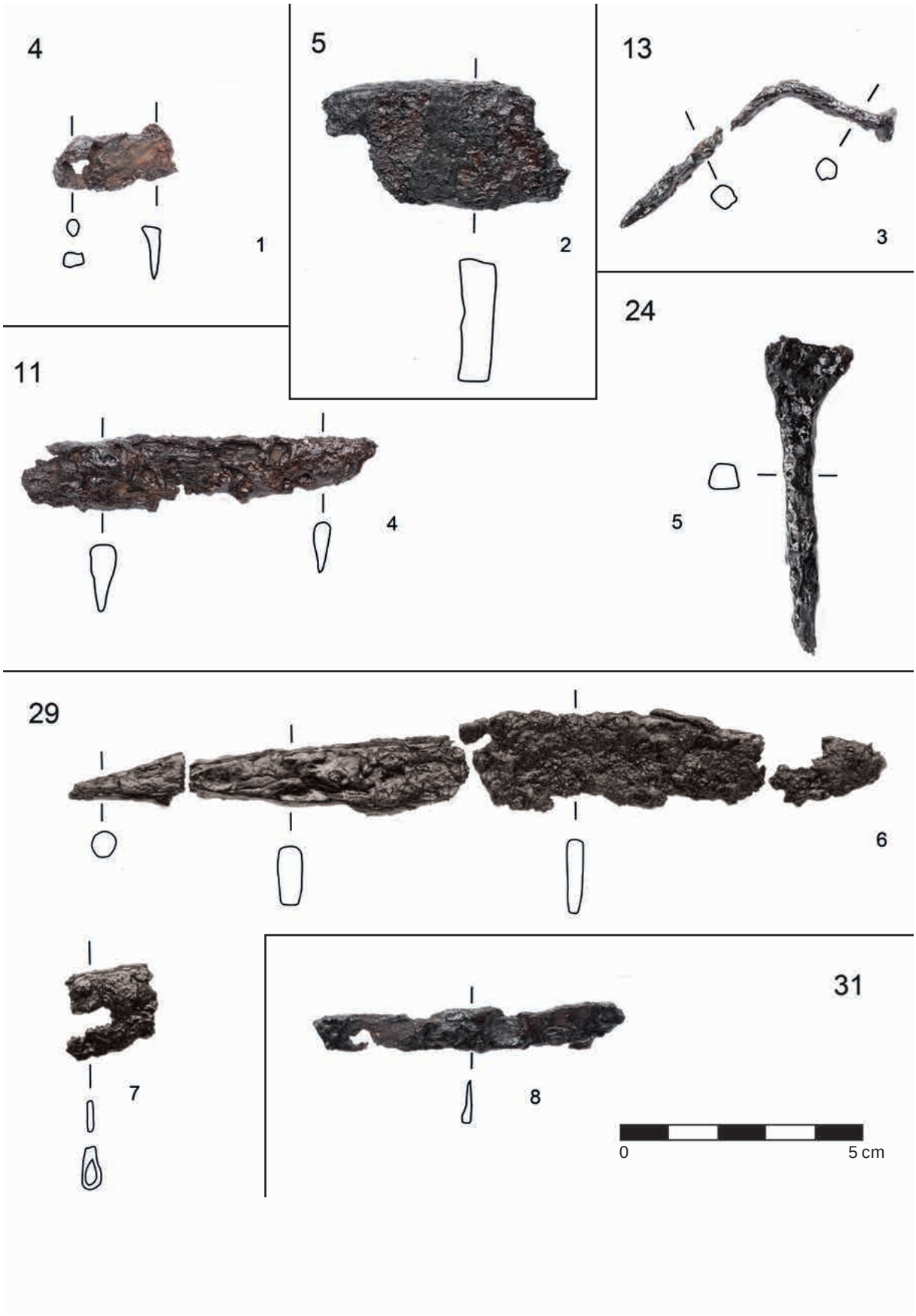


TAB 22 | Selection of metal finds from context 1.



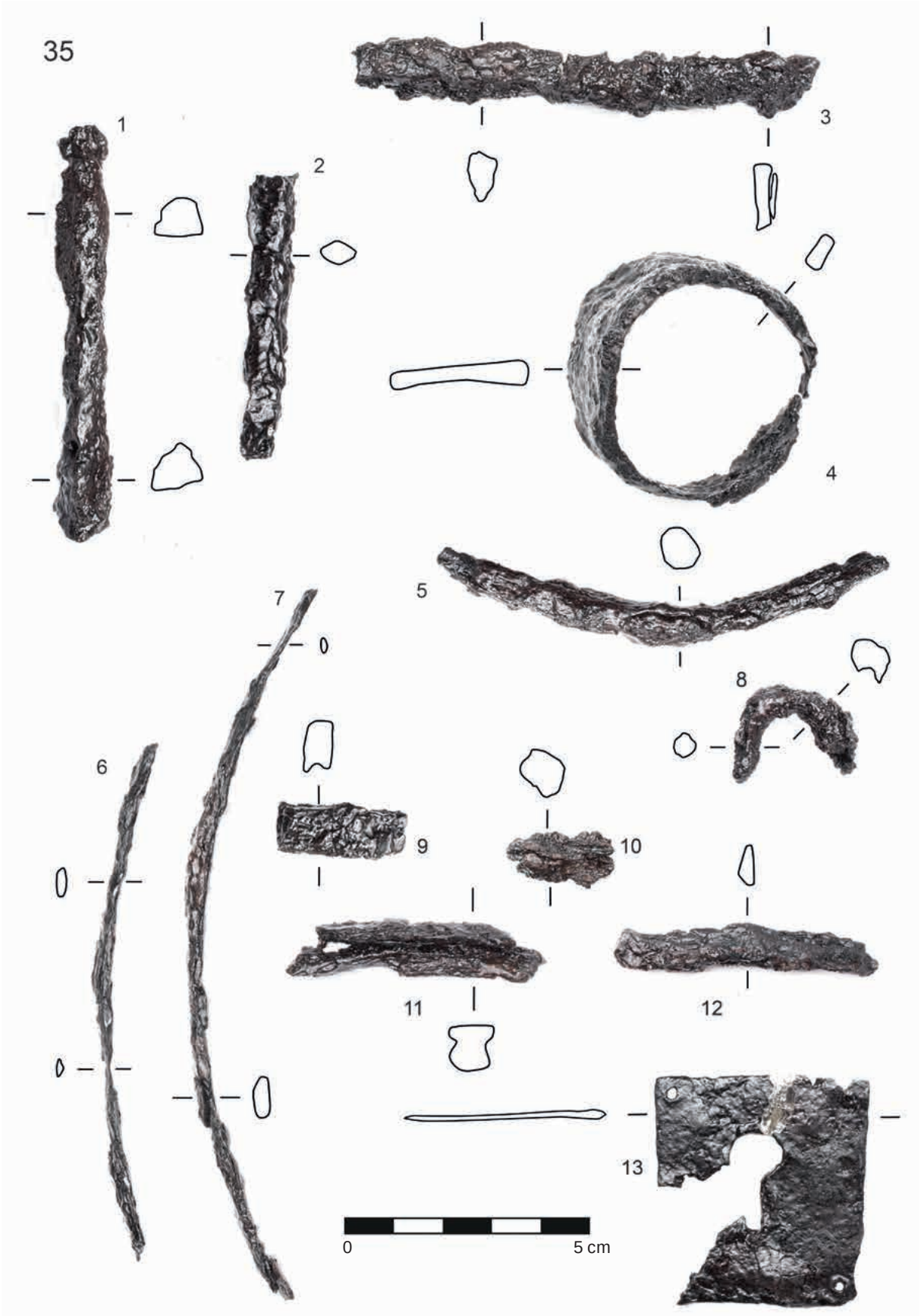
TAB 23 | Selection of metal finds from context 1.

TAB 24 | Selection of metal finds from contexts 1, 2 and 3.

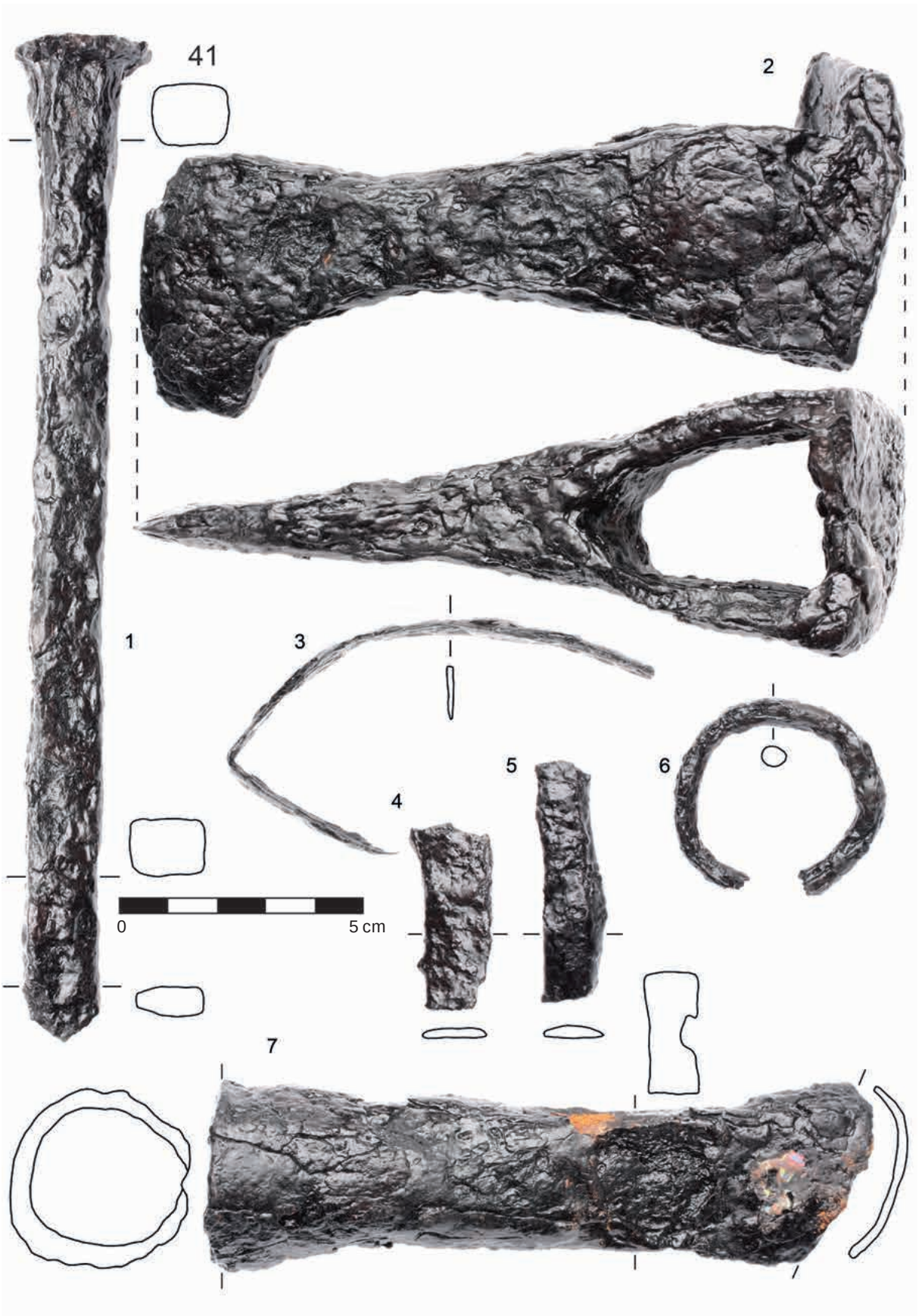


TAB 25 | Selection of metal finds from contexts 4, 5, 11, 13, 24, 29 and 31.

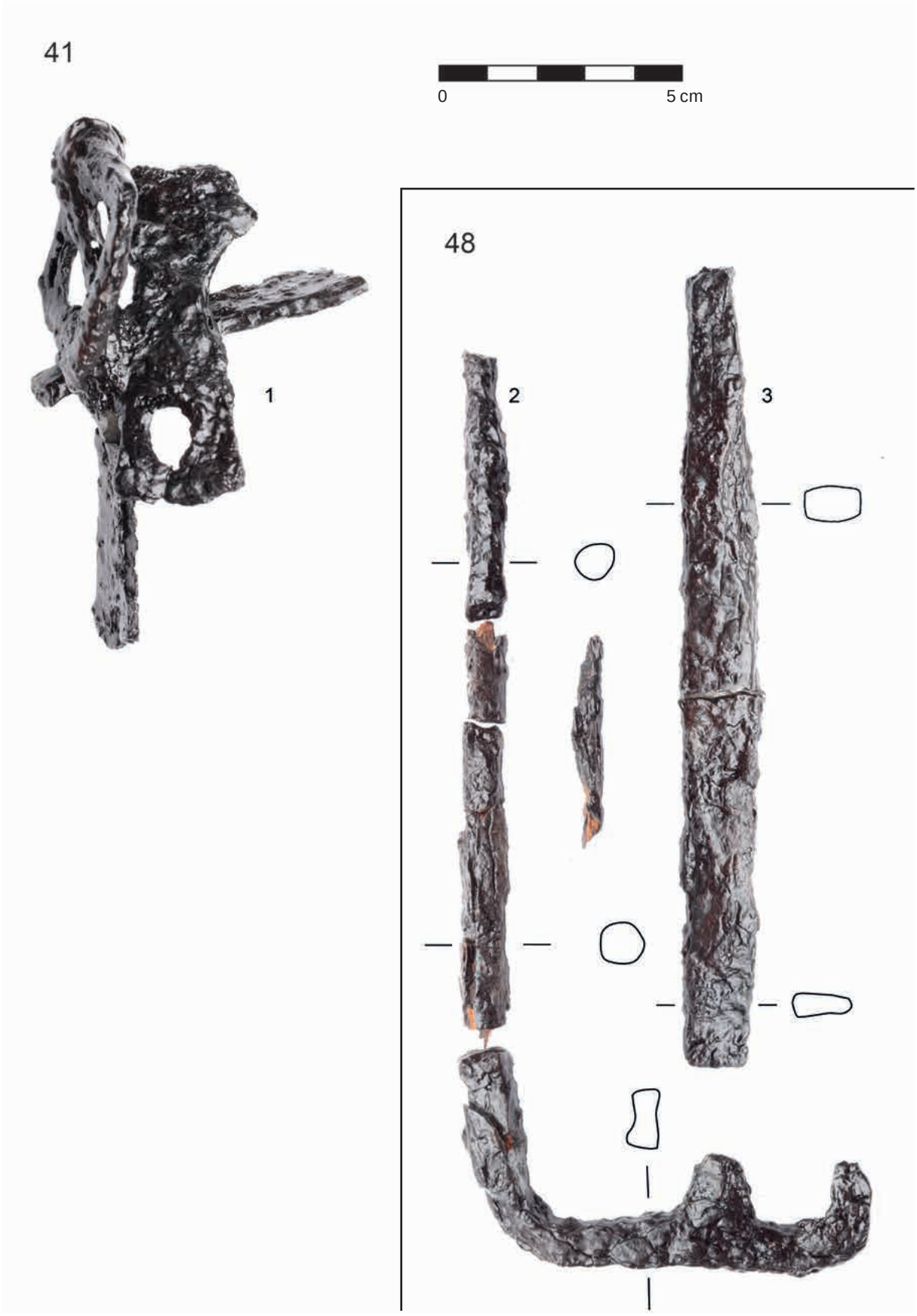
TAB 26 | Selection of metal finds from context 32.



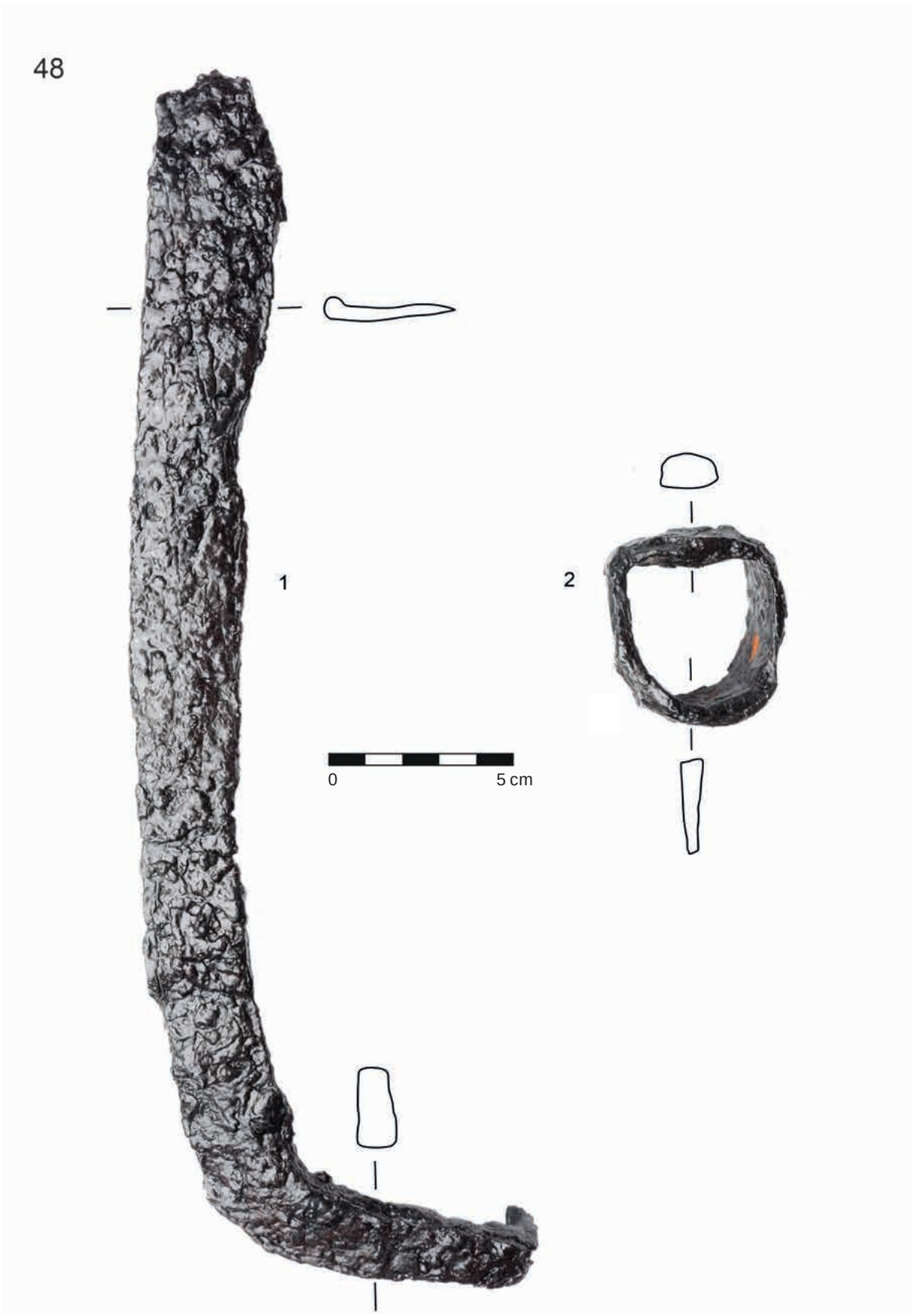
TAB 27 | Selection of metal finds from context 35.



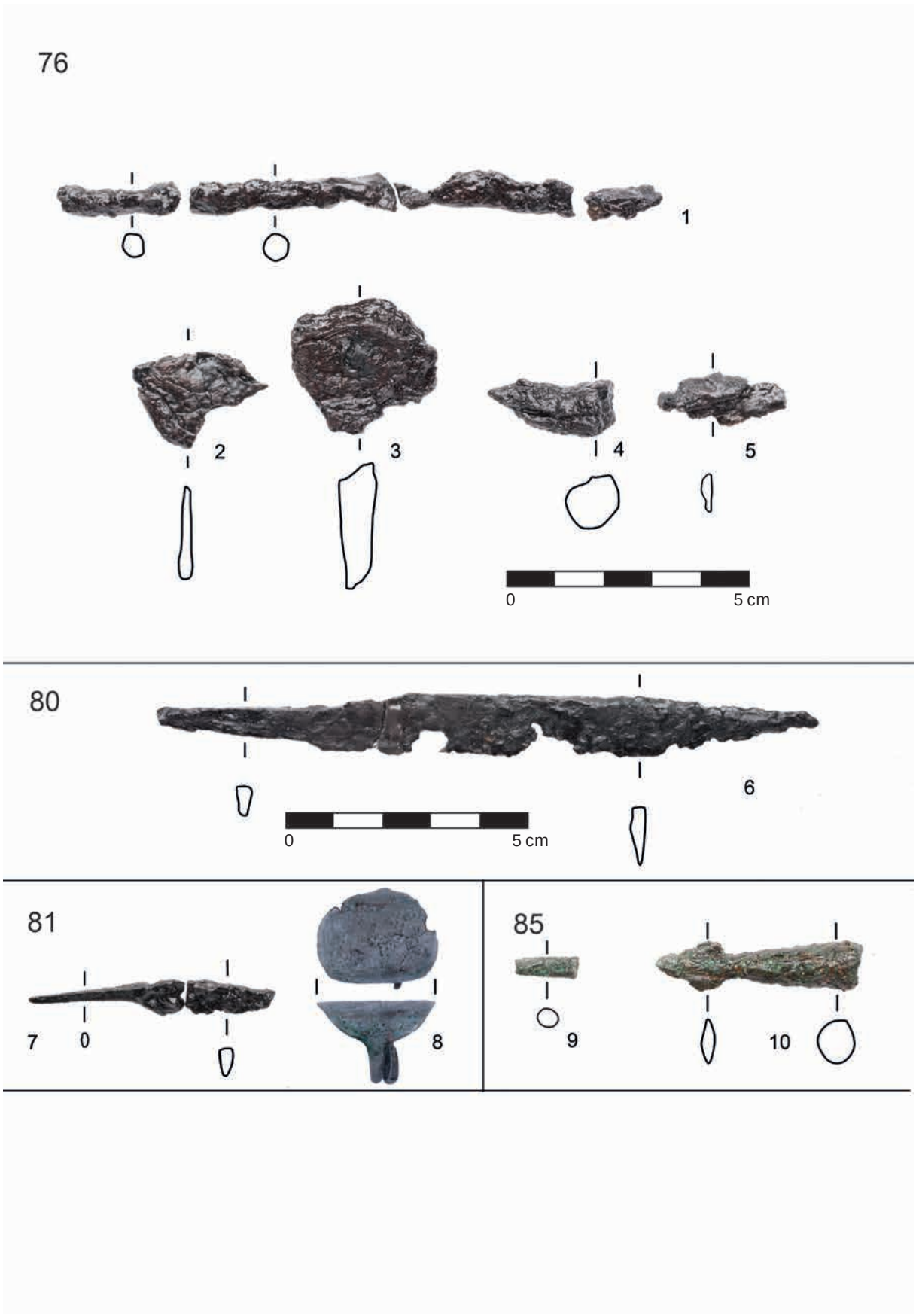
TAB 28 | Selection of metal finds from context 41.



TAB 29 | Selection of metal finds from contexts 41 and 48.



TAB 30 | Selection of metal finds from context 48.



TAB 31 | Selection of metal finds from contexts 76, 80, 81 and 85.

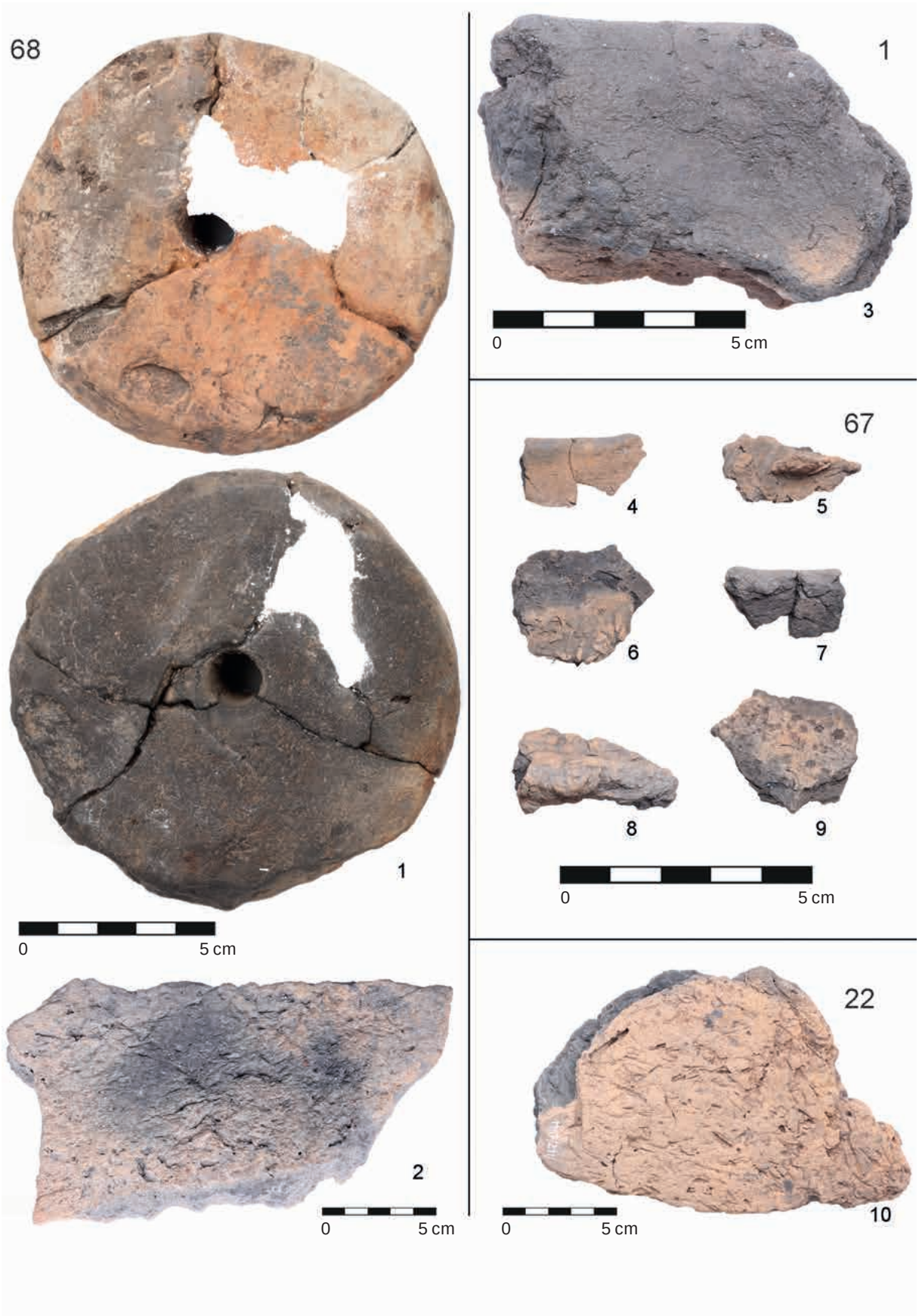
TAB 32 | Quernstones from contexts 1, 34 and 35.

TAB 33 | Quernstones from context 35.

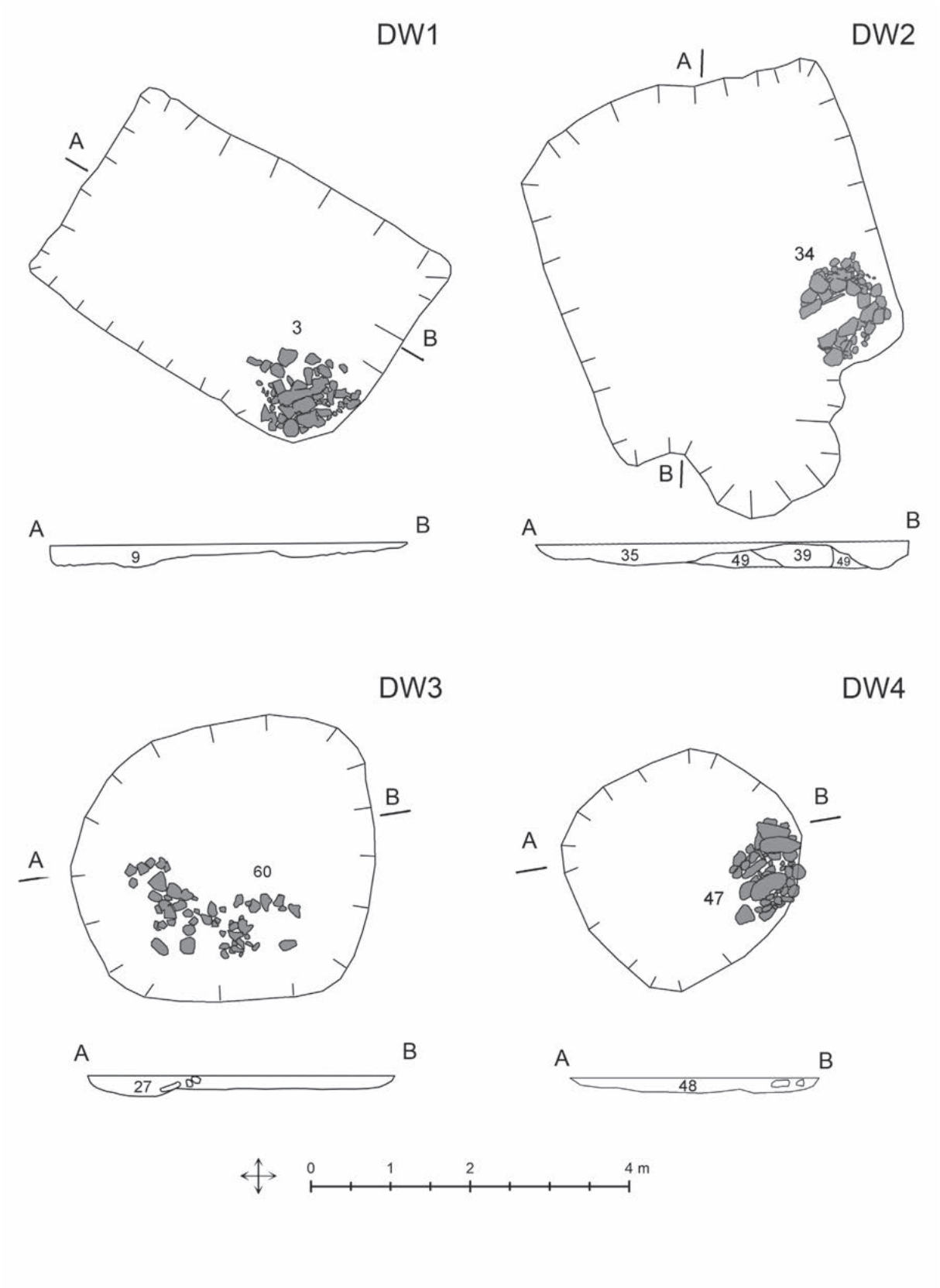
TAB 34 | Quernstones from context 47.

TAB 35 | Quernstones from context 48.

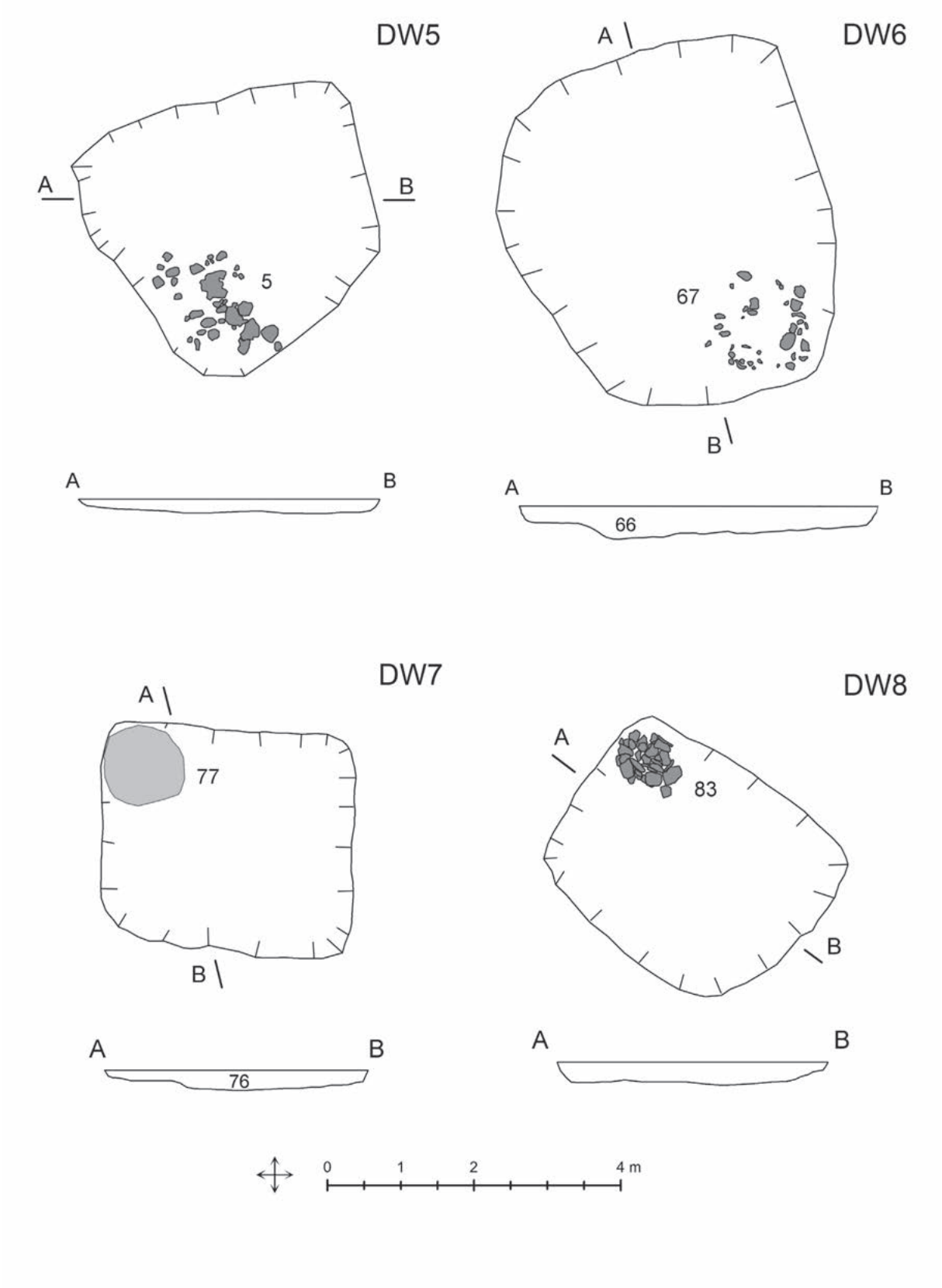
TAB 36 | Small finds from contexts 1, 3, 5, 11, 25, 35, 58, 60, 66 and 76.



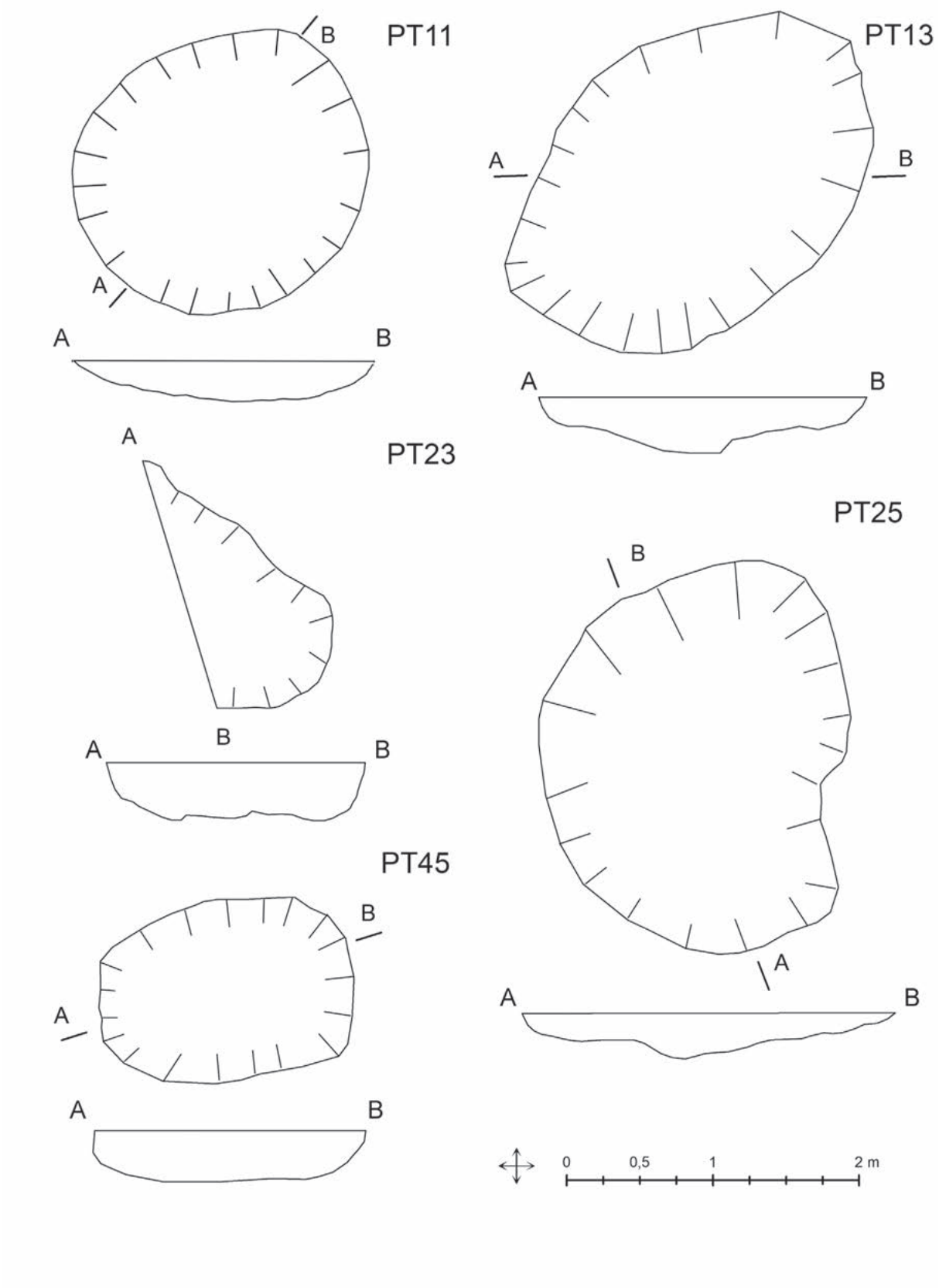
TAB 37 | Clay weight from context 68 and the selection of roasting tray fragments from contexts 1, 22, 67 and 68.



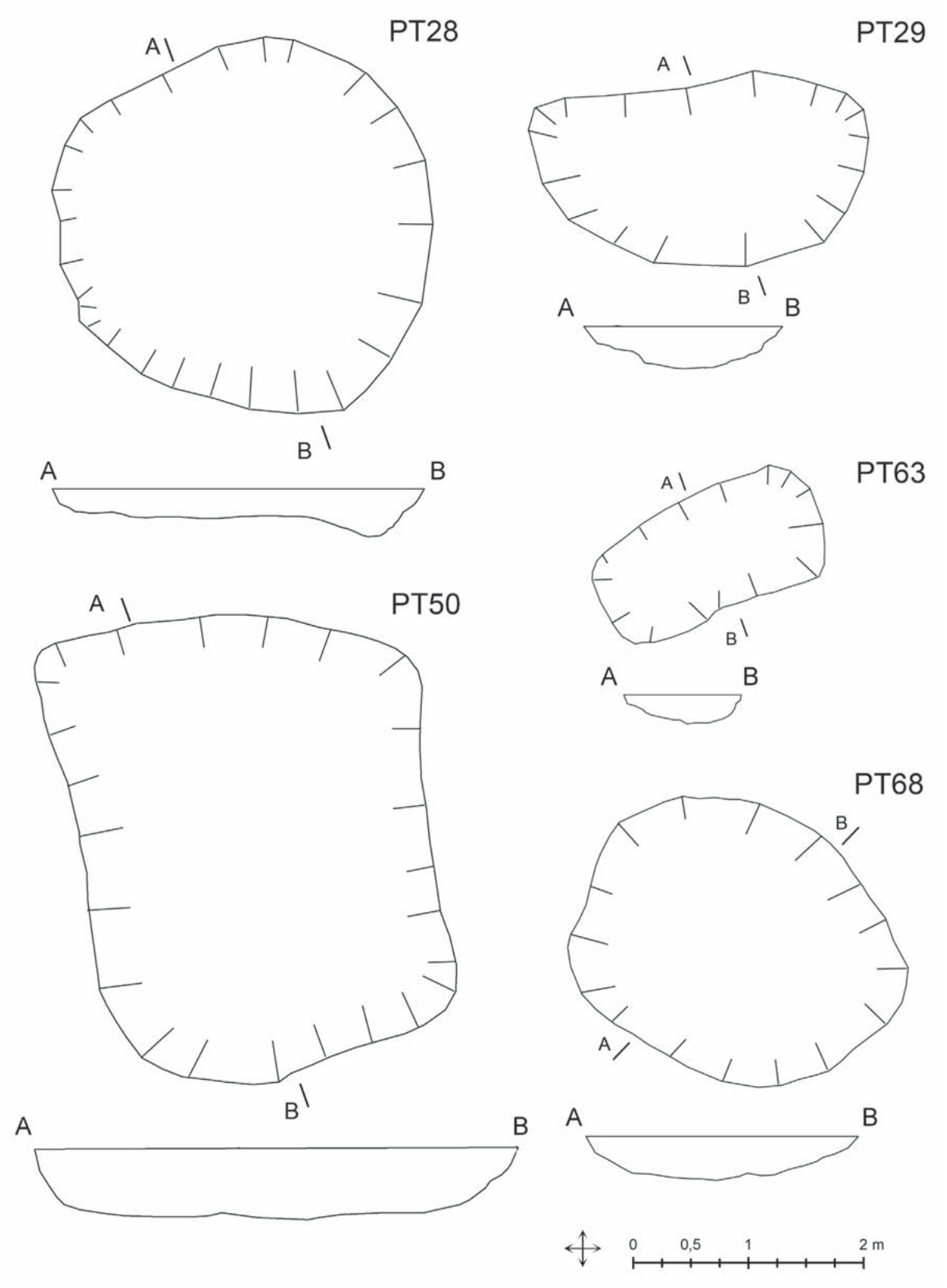
TAB 38 | Plans of dwellings (ground plan, cross-section) from the 2010–2012 Trapíkov excavations.



TAB 39 | Plans of dwellings (ground plan, cross-section) from the 2010–2012 Trapíkov excavations.



TAB 40 | Plans of features (ground plan, cross-section) from the 2010–2012 Trapíkov excavations.



TAB 41 | Plans of features (ground plan, cross-section) from the 2010–2012 Trapíkov excavations.

16. List of Contributors

Peter Barta

Inštitút na výskum kultúrnej krajiny
Cultural Landscape Research Institute
Suchá nad Parnou 92,
SK-919 01 Suchá nad Parnou
peter.barta@invykk.sk

Petra Brukner Havelková

National Museum,
Natural History Museum
Department of Anthropology
Cirkusová 1740,
CZ-193 00 Prague 9
petra.havelkova@nm.cz

Gabriela Dreslerová

Masaryk Museum in Hodonín
Zámecké nám. 27/9,
CZ-695 01 Hodonín
g.dreslerova@masaryk.info

Marek Hladík

Czech Academy of Sciences
Institute of Archaeology, Brno
Research Base Mikulčice-Trapíkov
Mikulčice 736,
CZ-696 19 Mikulčice
hladik@arub.cz

Michaela Látková

Czech Academy of Sciences
Institute of Archaeology, Brno
Research Base Mikulčice-Trapíkov
Mikulčice 736,
CZ-696 19 Mikulčice
latkova@arub.cz

Marian Mazuch

Czech Academy of Sciences
Institute of Archaeology, Brno
Research Base Mikulčice-Trapíkov
Mikulčice 736,
CZ-696 19 Mikulčice
mazuch@arub.cz

Rastislav Milovský

Slovak Academy of Sciences
Earth Science Institute
Ďumbierska 1,
SK-97411 Banská Bystrica
milovsky@savbb.sk

Studien zum Burgwall von Mikulčice
Band XIII

Marek Hladík – Marian Mazuch – Michaela Látková
Great Moravian Settlement in Mikulčice-Trapíkov and Economic Hinterland of the Power Centre
Rural Economy, Centres and Organisational and Functional Principles of Great Moravia

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