RENÉ OHLRAU

MAIDANETS'KE

Development and decline of a Trypillia mega-site in Central Ukraine

SCALES OF TRANSFORMATION IN PREHISTORIC AND ARCHAIC SOCIETIES | 7

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Preface of the editors

With this book series, the Collaborative Research Centre Scales of Transformation: Human-Environmental Interaction in Prehistoric and Archaic Societies (CRC 1266) at Kiel University enables the bundled presentation of current research results of the multiple aspects of socio-environmental transformations in ancient societies. As editors of this publication platform, we are pleased to be able to publish monographs with detailed basic data and comprehensive interpretations from different case studies and landscapes as well as to present the extensive output from numerous scientific meetings and international workshops.

This book series is dedicated to the fundamental research questions of CRC 1266, dealing with transformations on different temporal, spatial and social scales, here defined as processes leading to a substantial and enduring reorganisation of socio-environmental interaction patterns. What are the substantial transformations that describe human development from 15,000 years ago to the beginning of the Common Era? How did interactions between the natural environment and human populations change over time? What role did humans play as cognitive actors trying to deal with changing social and environmental conditions? Which factors triggered the transformations that led to substantial societal and economic inequality?

The understanding of human practices within often intertwined social and environmental contexts is one of the most fundamental aspects of archaeological research. Moreover, in current debates, the dynamics and feedback involved in human-environmental relationships have become a major issue, particularly when looking at the detectable and sometimes devastating consequences of human interference with nature. Archaeology, with its long-term perspective on human societies and landscapes, is in the unique position to be able to trace and link comparable phenomena in the past, to study human involvement with the natural environment, to investigate the impact of humans on nature, and to outline the consequences of environmental change on human societies. Modern interdisciplinary research enables us to reach beyond simplistic monocausal lines of explanation and overcome evolutionary perspectives. Looking at the period from 15,000 to 1 BCE, CRC 1266 takes a diachronic view in order to investigate transformations involved in the development of Late Pleistocene hunter-gatherers, horticulturalists, early agriculturalists, early metallurgists as well as early state societies, thus covering a wide array of societal formations and environmental conditions.

During the past years, Kiel archaeology has conducted intense fieldwork on Ukrainian and Moldovan Tripolye sites, especially mega-sites. Within the Research Centre Scales of Transformation and the Graduate School 'Human Development in Landscapes', the mega-site of Maidanets'ke has been a primary focus of Ukrainian-German research since 2012. The publication on detailed aspects of the development of

Maidanets'ke presented here by René Ohlrau contributes extremely to a fundamental understanding of the extraordinary site and the mega-site phenomenon in general.

We are very thankful to the author René Ohlrau and to the graphic illustrators Susanne Beyer and Janine Cordts for their deep engagement in this publication. We also wish to thank Karsten Wentink, Corné van Woerdekom and Eric van den Bandt from Sidestone Press for their responsive support in realizing this volume and Hermann Gorbahn for organising the whole publication process. Many thanks are also extended to Eileen Küçükaraca who was engaged in the scientific editing of the volume.

Wiebke Kirleis and Johannes Müller

Acknowledgements

'*All cities start in mud.' (Robert Neuwirth (2005, 179)).*

My first encounter with Trypillia sites was in 2011 when I was studying how Iron Age hamlets aggregated into oppida. In an introductory piece, different settlement patterns and the difficulty to define urban development were illustrated with a geomagnetic plot of Maidanets'ke from the 1980s. There were hundreds of black dots combined to a round shape. At first, I thought this was yet another hamlet with hundreds of post holes on a raster of square meters, since there was no scale. But then my lecturer corrected me that every single dot represented a building. For a moment, I thought she was kidding, but this is exactly what these settlements do to an archaeologist at first glance. From a European perspective, they seem unbelievable for the end of the Neolithic. At that time, I never imagined that I would once have the chance to contribute to research on these fascinating settlements.

The following investigation would not have been possible without the support of many people over the years. First, I would like to thank my supervisors, Johannes Müller and Martin Furholt, as well as Mykhailo Videyko for the possibility to work on these fascinating sites and their support over the course of the project. This work was financed by the Graduate School 'Human Development in Landscapes' at Kiel University (DFG Projektnummer 39071778). Additional funding for the 2016 excavations and the radiocarbon dating was provided by the Collaborative Research Centre 1266 'Scales of Transformation' and their subproject D1 'Population agglomerations at Tripolye-Cucuteni mega-sites' (DFG Projektnummer 2901391021). The initial introduction to the geomagnetic of these settlements was made possible by the advice and assistance of Knut Rassmann, Roman-German Commission of the German Archaeological Institute Frankfurt a. M. I am also thankful to the editors, Wiebke Kirleis and Johannes Müller, for the decision to include this work in the 'Scales of Transformations' series.

I am very grateful for shared knowledge and hospitality provided by Mykhailo Videyko and Nataliia Burdo, as well as Maria Videyko, who invited me into their home during the recording of pottery in Kyiv. Pottery recording would not have been possible without the expertise and help of Robert Hofmann, who also provided the database infrastructure for the project. Sara Jagiolla shot most of the pottery photos during our stay in Kyiv and Susanne Beyer assisted in the digitalisation of the pottery drawings and did a tremendous job creating the cover. Susanne Beyer, Janine Cordts, and Carsten Reckweg provided swift help in finalising the figures. Eileen Küçükaraca and Sarah Martini worked on English proofreading. Hermann Gorbahn helped with administrative work and contacts to the publisher. Moreover, I owe a lot to Vitalii Rud, Stanislav Ţerna and Liudmila

Shatilo, who shared their knowledge during their research visit in Kiel. I would also like to thank Aleksandr Diachenko for the many discussions on Trypillia demography and his help with literature that was hard to obtain and Marta Dal Corso for providing suggestions on the reconstruction of wooden structures and the general environment. Furthermore, I would like to thank Florian Bauer and Kay Schmütz for their technical support, in particular with respect to the geomagnetic device and its many quirks. Special thanks go to Nils Eberle for rescuing crucial geodata for trench 110 during the 2016 excavations. The survey campaign of 2016 would not have been possible without the general organisation and hospitality by family Videyko during the rainy days at our arrival, and in the field by Vitalii Rud. For the location of sites and negotiations, Vladyslav Chabanyuk and his team of the Trypillia Museum at Lehedzyne were of invaluable help. Moreover, the survey would not have been possible without the expertise of Heiko Tiede, Vasilisa Filippova (now Tiede) and Stanislav Fedorov and their inexhaustible nature in operating the geomagnetic device. Finally, I would like to thank my friends and family, especially Sara Lilkendey, who endured my absence during the difficult times. This is for you.

René Ohlrau

1 Introduction

Today, around 85 % of the world's population lives in large, agglomerated areas like cities, towns and suburbs (Moreno *et al.* 2016). Clusters of large cities, building urban corridors, have been known since the 1950s (Yeung 2009). Termed 'megalopoleis' (Gottmann 1961) in the West and 'desakota' in Southeast Asia (McGee 1991), they are characterised by the fusion of mega-cities via their hinterland. Current estimates imply a continuous urbanisation in which spatial organisation presents one of humanity's major challenges for the future. Archaeology, with its long-term perspective and diverse evidence concerning human dwelling habits, can provide insights on coping mechanisms for rapid population growth and agglomeration. One of these population trends that we currently observe – although on a much smaller scale – can be found during the Copper Age in modern Central Ukraine. Here, at the turn of the 5th to the 4th millennium BCE, some of the largest settlements of that time in Eurasia emerged. How were these sites structured and what population dynamics led to their development?

While Trypillia 'mega-sites' have been characterised as agro-towns (Kruts 2012), proto-cities (Shmagliy and Videyko 2004) or even low-density and seasonally occupied urban sites (Chapman and Gaydarska 2016a; 2016b), in these studies not enough attention has been paid to fundamental archaeological results. Following the critique of Kohl (2007, 12) for these labelling attempts, this study will

> '[…] *attempt to understand how these sites functioned and, as much as the evidence allows, attempt to reconstruct their social organisation and structure*'.

The question is, therefore, not primarily whether the Trypillia 'mega-site' phenomenon represents cities or not. Instead, their distinct settlement pattern and intra-site development are studied in the following thesis.

To this end, the site near the modern village of Maidanets'ke provides an ideal case study. To date, Maidanets'ke presents the most complex Trypillia 'mega-site' with the largest agglomeration of buildings. It also ranks among the best-investigated sites with over 16 field seasons reaching back to the 1970s. Based on this research and the renewed international investigations, the settlement's history, its structure and regional context will be addressed.

1.1 Aim of study

Several research questions concerning the internal structure and character of features at the site are investigated. First, were most of the features contemporaneous as the minimal overlap of structures suggests? In order to address this question, an extensive radiocarbon sampling strategy was applied in the frame of the CRC 1266 'Scales of Transformations', which includes various dwellings from different parts of Maidanets'ke, but also other features such as pits, the enclosure and a pottery production area.

Second, the inventory of a complete house, its architectural traits and the circumstances of its destruction are analysed. Here, it will be investigated if this building can be characterised as a household, how the potential activities were distributed and if the structure was burnt down intentionally.

Third, a pottery production site, including a multi-phased kiln and several surrounding pits, are investigated. In addition to a rare stratigraphy, these features provide insight about which categories of pottery were produced on site. With them, it is possible to identify clearly which forms and decorations were produced at what time. In result, this will facilitate the development of a typochronology for the settlement.

Fourth, the character of the enclosure and its relation to other features is investigated. For an overall characterisation of the settlement, it is important to define whether the enclosure had a defensive purpose or other potential functions.

With the help of a rigorous evaluation of radiometric dates and their context, a model of the site's development is to be proposed. According to the amount of contemporaneous structures, the palaeodemography will be reconstructed, which will allow further insights on the settlement's resource demands and potentially it's social organisation.

Despite recent advances, working on 'mega-sites' alone will not help to understand how they could develop in the first place. Only by investigating average-sized settlements and the composition of their features are we able to understand what constitutes 'mega-sites' and if their structures are exceptional. Therefore, geophysical surveys on smaller, contemporaneous settlements in the immediate surroundings of Maidanets'ke were carried out to produce high-resolution data comparable to those of 'mega-sites'. By combining the intra-site results with the regional investigation, it should then be possible to develop the principles of Trypillia settlement planning.

2 Trypillia time and space

Considering the chronological and spatial development of the Cucuteni-Trypillia Cultural Complex (CTCC), several aspects on different scales are important. First, a focus is placed on the general periodisation based on typochronological aspects of pottery as well as the radiometric dating of phases. Second, the development of Eastern and Western Trypillia pottery traditions, and third, the development of local variants will be recapitulated. The chronology is traditionally organised on three levels; the general stages, local groups and site types.

2.1 Time

The periodisation of the Trypillia phenomenon begins with its discovery and definition by Vikentiy Viacheslavovych Khvoyka in 1899. Initially, Khvoyka (1901, 736-812) divided the material of his excavations near the village of Trypillia and other sites in the vicinity of Kiev into cultures A and B. Khvoyka's culture A is characterised by the presence of copper axes and incised pottery with pear-shapes, funnel-shaped lids and 'binocular' twin-vessels. The incisements were spiraloid or meandering and painted with white incrustations. Painted pottery was bichromic with reddish or brown paint on a white background. Culture B is characterised by pear-shaped vessels with incised wavy or tree-like motifs and s-shaped vessels with either incised half circles along the rim and shoulder and elongated lines or painting in monochrome fashion. Due to the presence of copper axes in culture A and the elaborate decorations, he proposed a development from the Late Neolithic (B) to the Early Chalcolithic (A). In retrospect, the material he found is ordered the other way around by modern relative chronology. Thus, chronologically wrong and limited to a smaller region, which is now known as a part of the main distribution zone of Eastern Trypillia, Khvoyka's classification is no longer relevant today except for historiographical aspects.

The still relevant foundation for the general chronological division of the Trypillia pottery tradition goes back to the works of Tatiana Passek (1935; 1940; 1949; 1961). Passek (1935, 127ff.) proposed four general stages – A, B, C and γ – for Trypillia. She distinguished her stages based on pottery decorations and techniques. Early pottery was decorated by incisements with and without white incrustation or was fluted. Later vessels of the middle stage were painted bi- or trichromatically, and finally in the latest stage it was mostly painted in monochrome style. Stages B and γ were both divided in an earlier and later phase. During the transition from BI to BII, she recognised two separate lines of development, one for the Bug-Dnieper region (BII to C) and a second one for the southwestern steppe region (γI to γII). However, this periodisation was largely speculative due to missing stratified contexts and was later specified by her. In 1940, Passek and Slavin refined the diverging trajectories of pottery tradition into stages CI and CII,

<table>
<tr><th>Schmidt 1932</th><th colspan="2">Cucuteni (current)</th><th colspan="2">Trypillia (current)</th><th colspan="2">Passek 1949</th></tr>
<tr><td></td><td colspan="2">Horodistea-Foltesti</td><td>CII</td><td>γII</td><td>CII</td><td>γII</td></tr>
<tr><td rowspan="3">B</td><td colspan="2">B3</td><td>CI</td><td>γI</td><td>CI</td><td>γI</td></tr>
<tr><td colspan="2">B2</td><td colspan="2">BIII</td><td colspan="2" rowspan="3">BII</td></tr>
<tr><td colspan="2">B1</td><td colspan="2">BII</td></tr>
<tr><td rowspan="2">A-B</td><td colspan="2">A-B2</td><td colspan="2">BI-II</td></tr>
<tr><td colspan="2">A-B1</td><td colspan="2">BI</td><td colspan="2" rowspan="4">BI</td></tr>
<tr><td rowspan="3">A</td><td>A3a</td><td>A3b</td><td colspan="2" rowspan="3">BI</td></tr>
<tr><td>A2a</td><td>A2b</td></tr>
<tr><td colspan="2">A1</td></tr>
<tr><td rowspan="2"></td><td colspan="2">Precucuteni III</td><td colspan="2">AII</td><td colspan="2" rowspan="2">A</td></tr>
<tr><td colspan="2">Precucuteni II</td><td colspan="2">AI</td></tr>
</table>

Table 1. Initial and current periodisation of the Cucuteni-Trypillia Cultural Complex after Ryzhov (2012a).

which describe the development in the northern part of the Trypillia distribution, and γI and γII in the southern area (Palaguta 2007, 5). In 1949, the detailed periodisation, which was correlated with Cucuteni contexts, was then presented in her widely known study 'The chronology of Tripolye settlements' (Passek 1949).

Since the 1960s, different parts of Passek's periodisation were further elaborated. Early Trypillia was first divided into stages AI and AII by Bibikov (1966) and later by Markevich (1974) into A1-3. This was specified by Zbenovich (1989), who proposes a continuous development of six site types in accordance with the current methodology which correlates sites and not periods. Between Passek's stages BI and BII, a transitional stage BI-II was established by Vinogradova (1983), which corresponds to the Cucuteni stage A-B. The stages BII to CII were refined by Movsha (1972), who recognised some sites of stage CI belonging to a longer development beginning with BI-II, and other sites, which were already related to the decline in stage CII. In this systematic, Passek's stage CI is divided into an earlier phase BII-CI, alternatively labelled as BIII, and a later phase CI-II, which then is relabelled as CI (tab. 1). These additions present the widely accepted current state of the periodisation of Trypillia (Ryzhov 2012a, 80).

In analogy to the advances of Ukrainian and – by that time – Russian scholars, the western part of the Cucuteni-Trypillia-Cultural-Complex in Romania and Moldova was divided comparably into several stages. Various sites of the Cucuteni tradition provided stratified contexts in contrast to the mostly single layered sites in Ukraine. The Cucuteni periodisation and its synchronisation with Trypillia has therefore been essential for refining the development in the East. For the West, Hubert Schmidt (1932), who excavated the eponymous site Cucuteni-Cetăţuia, distinguished between pottery styles A, AB and B. In addition, the Precucuteni pottery tradition, consisting of three stages I-III, was defined to predate the Cucuteni painted pottery (Dumitrescu 1957; Comşa 1974; Marinescu-Bîlcu 1974; Garvăn 2013). A detailed relative chronology for Cucuteni stage A was proposed by Vladimir Dumitrescu (1963). He suggests four phases A1-4 of which the first shows the technological transition from incised and fluted pottery combined with painted light decoration on dark or reddish background. The second is characterised by painted and incised vessels, while for the third phase trichromatic pottery dominates. In the fourth phase, incised pottery disappears, while trichromatic painting and dark decorations on light backgrounds prevail. The various stylistic combinations were further refined by Anton Niţu (1980; 1984), who observed local differences between northeast and central Romanian Moldavia. His division of early Cucuteni A1 and the local variants of A2a-b and A3a-b are now widely accepted (Palaguta 2007, 6). In addition, the later stage Cucuteni B was divided into B1-3 (Niţu 1977, 150). The phases Cucuteni B1 and B2 are synchronised with Trypillia CI and γI, while Cucuteni B3 is associated with Trypillia CII γII. Alternatively, the latest phase B3 is labelled as Cucuteni C or Horodiştea-Folteşti I stage based on the appearance of the corded ware-like pottery tradition (Uhl 2015).

The discussion about a general periodisation of the Trypillia traditions has largely been abandoned in favour of site-by-site comparisons and their development on a regional and interregional level (Ryzhov 2012a). An elaborate chronology correlating the development of the various regions and site types was proposed by Chernysh (1982). He distinguishes six phases for Trypillia A, seven for Trypillia B and eleven phases for Trypillia C (*ibid.*, 171-172, 175). The very first phase is correlated with Precucuteni I, while phases 2-3 correspond to Trypillia A and Precucuteni II. Phases 4-6 are associated with Trypillia AII and Precucuteni III. The early middle stage BI is related to Chernysh's middle phases 1-4 and correspond to Cucuteni A1-4. This period has been further refined by Palaguta (2007), following his methodology. Middle phases 5-7 are correlated then to Trypillia BII and Cucuteni A-B1-2, respectively. For the late stage, Chernysh assigns phases 1-6 to Trypillia CI/γI and Cucuteni B1-3, while late phases 7-11 are related to Trypillia CII/γII and Horodiştea-Folteşti I.

A striking desideratum of the presented periodisation is the lack of formal comparison on an overarching scale. A prominent exception is the seriation of Dergachev (1980) for late Trypillia. Site-by-site comparisons are overwhelmingly carried out by individual analogy or percentages of pottery traits per site, which might be due to the scarcity of stratified contexts. However, hardly any studies considering single contexts were conducted. Nevertheless, this does not affect the general development all too much, but it does, in turn, affect synchronisation on a site level.

2.1.1 Radiometric chronology

Radiometric dating of Cucuteni-Trypillia sites has been applied since the early days of the 'radiocarbon revolution'. It began in Romania with the sites near Hăbăşeşti and Valea Lupului (Vogel and Waterbolk 1963), which were immediately set into a transregional context by Dumitrescu (1963). Soon thereafter, further dates followed for sites located in Moldova and Ukraine (Kohl and Quitta 1970; Vogel and Waterbolk 1972; Dolukhanov *et al.* 1976). Since several early contextualisations of these dates are exclusively based on uncalibrated radiocarbon ages, they are not discussed here in detail. Moreover, for several sites only archaeomagnetic dates are available, which are also not considered here.

First calibrations by Titov (1971) provided an estimated total scope of the Cucuteni-Trypillia phenomenon in the time between the early fifth millennium up to 3300-2900 cal BCE.

Then, a comprehensive overview of calendric dates for the synchronised periodisation of both Cucuteni and Trypillia was provided by Chernysh (1982, 175). He proposed the following thresholds for the respective Cucuteni-Trypillia stages. The early stages 2-6, encompassing Trypillia A, are dated between 4750-4500 BCE, followed by early Trypillia BI between 4500-4370 BCE and later BI between 4370-4250 BCE. The transition from BII to CI remained unclear, so the timeframe for both phases was given between 4250-3750 BCE. Finally, the decline included a gap between 3750-3250 BCE and the transition between Trypillia CII and Globular Amphora societies was narrowed down to the time between 3250-2750 BCE.

Another attempt to specify radiometric phases of the CTCC was presented by Telegin (1986). His five phases were based on uncalibrated dates, which were later corrected for his English monography on Dareivka. They fall into the time between 4500-2900 cal BCE. In his five phases, Telegin summarised the established relative chronological phases into intervals of 200-400 years (*ibid.*, 96). His first phase dates Trypillia A and early BI between 4500-4350 cal BCE, while in his second phase late

Trypillia A to early BI-II were dated in the time between 4350-4000 cal BCE. The third phase of late Trypillia BI-II and all of BII were dated between 4000-3700/3650 cal BCE. The transition from Trypillia B (III) to CI marks his fourth phase and dates in the time between 3700/3650-3350/3150 cal BCE, while the last phase summarised the transition to Trypillia CII and the end of the phenomenon, which was dated between 3350/3150-3100/2900 cal BCE. Telegin recognised severe overlaps between his defined phases, which he explains by referring to the duration of occupation for some sites and the level of uncertainty due to the radiocarbon dating method.

Wechler (1994) then used 51 dates to check the coherence of the chronology presented by Telegin, whereby he also observed a distribution of the CTCC between 4500-2900 cal BCE with several peaks in the summed calibration (*ibid.*, 9). Wechler, however, refutes Telegin's periodisation since the proposed division could not be confirmed with his data. According to him, Trypillia A is dated between 4500-4350 cal BCE (50 %), while stages B and CI showed an incoherent overlap. He observed another inconsistency for phase BI-II, which dated between 3780-3340 cal BCE (50 %) and CI between 3890-3620 cal BCE (50 %). The latest phase CII then is dated between 3150-2880 cal BCE (50 %), which matches the estimations by Telegin. The uneven distribution of dates for the respective phases is given as a possible explanation for these inconsistencies.

Wechler's difficulties to distinguish Trypillia BI-II and CI might be related to a combination of factors. First, the association of dated sites to their respective stages. Second, the cited periodisation, which in part did not reflect the state of research at the time. Third, in connection to the second point, the synchronisation between the Trypillia and Cucuteni systematics. In addition, regional developments can play a major role in the observed radiometric overlap. Another issue is connected to the various laboratories involved, since Wechler mentions the large differences between standard deviations ranging from ± 35 to 600 (*ibid.*). Nevertheless, he proposed a more general timeframe for Trypillia A between 4500-4350 cal BCE and for Trypillia B between 4440-3810 cal BCE. Trypillia CI is located by him between 3890-3620 cal BCE and the decline during Trypillia CII in the time between 3150-2880 cal BCE (*ibid.*, 13).

With a rapid increase in dates, an extended in-depth evaluation of the radiocarbon evidence and its fit to the various relative chronologies were undertaken by Mantu (1998). Later, she updated her study with additional dates and OxCal calibration software (Lazarovici 2010). Based on 83 dates for the Precucuteni, Cucuteni and Horodiştea-Erbiceni/Gordineşti complex and 165 dates for Trypillia, she proposes the following radiometric time spans for the respective phases. Precucuteni, as the foundation of the later Cucuteni-Trypillia Cultural Complex, is dated between 5050-4600 cal BCE, with its initial phases I-II dating between 5050-4750 cal BCE and the later phase III, which corresponds to Trypillia A, dating between 4750-4600 cal BCE (*ibid.*, 74). The final stage of Trypillia AIII is dated between 4600-4170 cal BCE, while Trypillia BI falls in the time between 4350-4150/4050 cal BCE. Trypillia BI-II is located by Lazarovici between 4100-3800 cal BCE and the peak development of the 'mega-sites' with Trypillia CI is dated between 3800-3600 cal BCE, whereas the transition between CI and CII is dated up to 3500 cal BCE. Finally, the decline during Trypillia CII is dated between 3500-3150 cal BCE.

Although dates with a deviation of over 100 radiocarbon years were omitted, there is still a severe overlap observed for certain phases. Therefore, Lazarovici acknowledges the issue of categorising an extensive phenomenon like the CTCC with its various regional developments (*ibid.*).

A further collection of radiocarbon dates was presented by Rassamakin (2012). Unfortunately, he avoided a presentation of boundaries for the respective relative chronological phases. Instead, Rassamakin recognised inconsistencies in the dating of the Kyiv laboratory, which are confirmed by the renewed dating of Bernashivka (Trypillia A). There, the renewed date for house 1 falls in the time between 4700-4550 cal BCE (*ibid.*, 37), in contrast to 5620-5220 cal BCE for earlier dates of the site. A particularly severe shift of 920-670 years is thus to be expected for other dates of the Kyiv laboratory.

cal BCE	Chernysh 1982	Telegin 1986	Wechler 1994	Mantu 1998	Harper 2016
2750					
2800					
2850					
2900					
2950					
3000	CII	V			
3050			CII		
3100					CII
3150					
3200					
3250					
3300				CII	
3350			?		
3400					
3450					
3500	?	IV			
3550					
3600					
3650			CI		
3700				CI	
3750					
3800					CI
3850		III			
3900					
3950				BII	
4000	BII - CI				BII
4050					
4100					
4150		II	B	BI	
4200					
4250					BI
4300	Late BI				
4350					
4400	Early BI				
4450		I	A	AIII	
4500					AIII
4550					
4600					
4650	A			AII	
4700					AII
4750					
4800					
4850					
4900				Precucuteni I-II	
4950					
5000	Precucuteni I				
5050					
5100					
5150					
5200					
5250					

Table 2. The development of radiometric dating for Trypillia phases.

Even if we accept the dates of the Kyiv laboratory, the observed inconsistencies and overlap of phases are hardly surprising when considering the vast distribution of the Cucuteni-Trypillia-Cultural Complex in time and space. Comparable to the trend for the relative chronology, a more regional approach to radiometric dating is expected to provide more promising results.

The state-of-the-art radiometric chronology, which acknowledges the various regional developments of the Trypillia phenomenon, has been developed by Harper (2016, 25). He narrows the Trypillia development down to the time between 4800-2950 cal BCE. He dates Trypillia AII in the time between 4800-4650 cal BCE and AIII between 4650-4350 cal BCE. The following phase BI is divided by him into an early stage dating between 4350-4200/4150 cal BCE and a later stage dating between 4200/4150-3950 cal BCE. With respect to regional developments, he locates the phase BII in the time between 4150-3850 cal BCE. Trypillia CI is dated between 3950-3650/3500 cal BCE and the decline of the 'mega-sites' in CI-II to the time between 3700-3300 cal BCE. Finally, Trypillia CII is dated by Harper between 3650/3500-2950 cal BCE.

Harper notes that, while regional developments were considered, the radiometric dating of regions still remains poor. Nevertheless, his detailed approach is used as a framework for the following contextualisation of Maidanets'ke and the development and decline of the Trypillia 'mega-site' phenomenon (tab. 2).

2.2 Space

2.2.1 The environmental background

The environment is a potential key factor in the development and decline of large Trypillia settlements. Recent results of the renewed investigations present relevant insights for questions of environmental impact and resource management of these sites (Kirleis and Dreibrodt 2016; Müller *et al.* 2017b).

Today, the landscape of the research area is characterised by large fields managed by the successors of former Soviet collective or state farms (kolkhoz/sovkhoz) and it can be characterised as a cultural steppe. In the Uman region in Central Ukraine on an altitude of around 215 m, the average annual temperature is 7.1°C with a mean sum of annual precipitation of 616 mm. The driest month is October with 33 mm and July the wettest with 87 mm precipitation on average. July is also the warmest month on average with 18.9°C, while January is the coldest with an average temperature of -5.6°C (*ibid.*).

The potential natural vegetation of the Northwestern Pontic region is characterised as semi-arid forest steppe with a humid continental climate (Köppen and Geiger 1939). The research area is located at the southeastern distribution limit of the potential natural vegetation of oak-hornbeam forest (fig. 1). Today, the distribution of large Trypillia sites follows the border between steppe and forest-steppe. It has been suggested by Walter and Breckle (Walter and Breckle 1997, 384), however, that the border between forest-steppe and true steppe has shifted during postglacial times, which might be visible in the distribution of large sites.

Forest-steppe is defined as a mosaic-like vegetation type with woodland-sustaining, woodland-tolerant and woodland-hostile areas. These patches of woodland occur on drained soils, elevated areas, and shaded slopes as well as in river valleys and on gorge slopes. Gallery forests along the riverine are located on narrow alluvial soils. The area between these patches is dominated by steppe meadow vegetation. Woodland exploitation of this environment can be of considerable impact, since the root systems of steppe grasses hinder tree growth, making a loss of woodland irreversible in the long run (Kirleis and Dreibrodt 2016, 171).

From a general climatic perspective, the development and decline of large Trypillia settlements coincides with the 5.9 ka event and a period of rapid climate change at the end of the Atlantic (Harper 2017, fig. 1). The reconstructed rapid climate change suggests an increased vulnerability in cereal cultivation at around 3825-3650 cal BC by shorter crop growing seasons (*ibid.*, 7). While the growing seasons in the Sub-Carpathian region and the Moldavian Plateau decreased rapidly, the Central Ukraine remained stable (*ibid.*, fig. 5/6). According to Harper, this implies a critical reduction in carrying capacity for the western distribution of the CTCC and is seen as a trigger for migrations to the east, resulting in the development of large Trypillia settlements (*ibid.*, 9).

For the distribution area of the largest Trypillia settlements in Central Ukraine, palaeoclimate and vegetation archives are scarce. Nevertheless, two pollen archives, which are sufficiently dated from 6800 cal BC onward, are known (Kremenetski 1995). They are representative for the development of both forest-steppe and steppe areas of the Northern Pontic region. The first archive is from the Dovzhok mire in the Dnistro basin, located in the forest-steppe area, ca. 180 km to the west of Maidanets'ke. The second is the Kardashyns'ke mire, located on the western side of the Dnipro Valley in the steppe area, around 300 km to the south-southwest of the research area. Based on these archives, Kremenetski (2003) describes a natural vegetation history of the Northern Pontic region relevant to the Trypillia development and decline.

Before Trypillia times, pine forests grew along the river valleys between 6800-6300 cal BCE, with a climate comparable to today. Then, the climate change from 6300-4800 cal BCE allowed for the expansion of thermophilous trees into

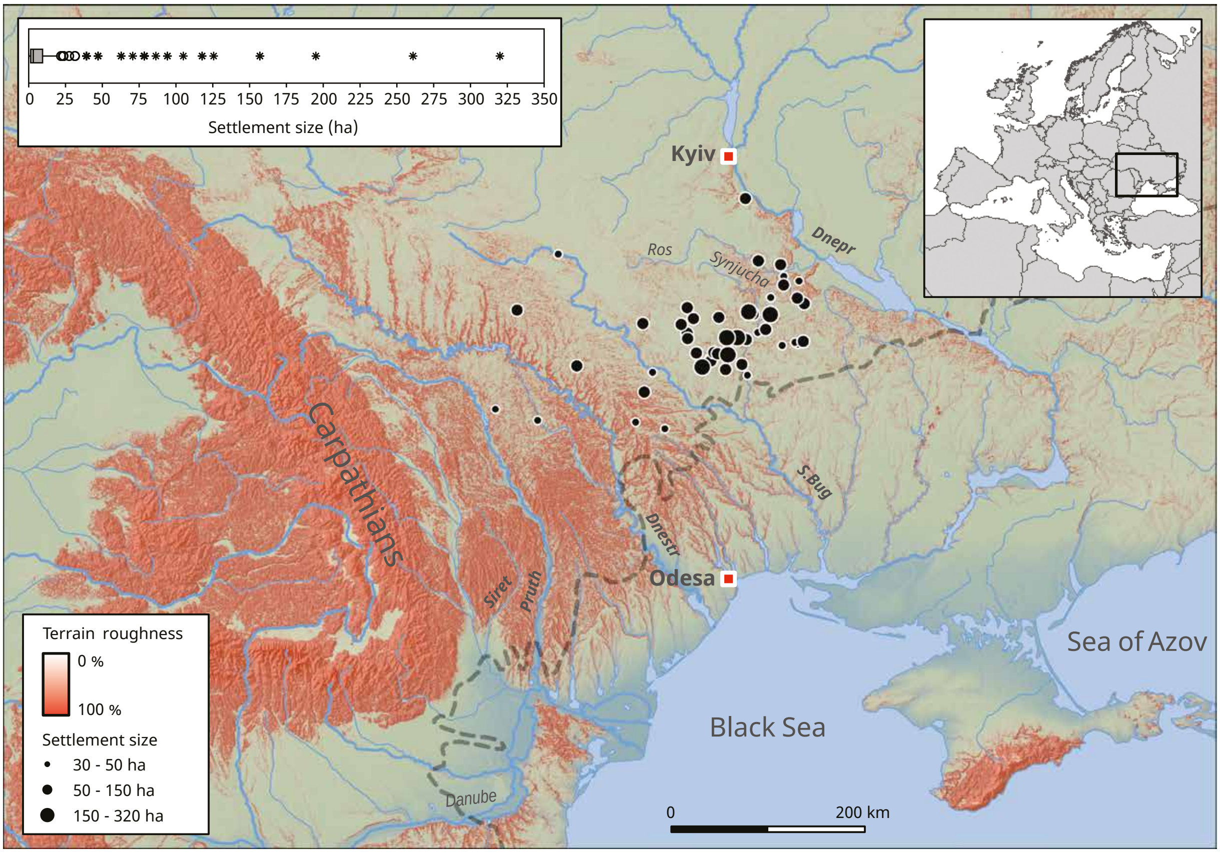


Figure 1. The distribution of Trypillia 'mega-sites' and the location of the potential natural border between forest steppe and steppe after Kirleis and Dreibrodt (2016). The calculated displayed index for terrain heterogeneity after Riley and colleagues (1999). For data see appendix 1.

drier regions. Between 4800 and 2800 BCE, the phase in which the Trypillia development and decline falls, the climate became milder, with steppe temperatures 1°C warmer in January and 2°C colder in July. The annual precipitation for this period was 100 mm higher than today. According to Kremenetski (2003, 15), this led to a maximum spread of broad-leaved forests in the Dnieper and Southern Bug Valleys, and also for the steppe belt. This coincides with the spread of Trypillia settlements to the east. After the Trypillia 'mega-site' phenomenon, at around 3200 cal BCE, the climate became drier and more continental, which led to receding woodland areas in the forest-steppe and an expansion of the steppe belt.

In addition to the main off-site archives, on-site pollen-archives were analysed for the 'mega-sites' near Tal'yanky (Kruts *et al.* 2008, 55) and Maidanets'ke (Kirleis and Dreibrodt 2016; Müller *et al.* 2017b, 72-73). Moreover, a near-site archive derived from alluvial deposits is known for the settlement near Nebelivka (Chapman and Gaydarska 2015, fig. 3).

At Tal'yanky, the pollen evidence from pottery infill hints at woodland habitats along the rivers. It consisted of hazel (*Corylus*), alder (*Alnus*), lime (*Tilia*), common ash (*Fraxinus excelsior*), oak (*Quercus*) and elm (*Ulmus*). The mixture species represents an open environment with steppe vegetation and woodland possibly along the water line (Kruts *et al.* 2008, 55). Kruts and colleagues suggest that the high amount of pioneer species (*Corylus/Alnus*) is an indication of woodland exploitation, namely for timber and fodder (*ibid.*). The presence of pasture in or at the settlement is hinted at by findings of corprophilous fungi spores (*Podospora*, *Sporormiella* and *Coniochaeta*) (*ibid.*). Among the preserved charcoals of building 40 and 41, common ash was detected (*ibid.*, 54).

While the pollen record of 2013 at Maidanets'ke does not allow for environmental reconstruction due to a highly selective intake, several taxa were observed nonetheless (Kirleis and Dreibrodt 2016, 173). Here, pine (*Pinus*) was predominant, but other taxa like oak, lime and hazel were also observed, although as single grains. The charcoal record, on the other hand, shows taxa of the natural forest steppe vegetation. Here, mostly ash (*Fraxinus excelsior*), followed by oak (*Quercus*), elm (*Ulmus*) and willow (*Salix*) were observed. Among the charred remains are also fragments of feathergrass (*Stipa*). They were found throughout the site and hint at an open steppe environment.

The pollen archive near Nebelivka is located 2 km from the archaeological site. Pollen was concentrated from alluvial sediments and show a variety of taxa comparable to the aforementioned archives (Chapman and Gaydarska 2015, 83). What is peculiar about this archive is that several fire events were observed in the charcoal intake. During the assumed synchronization with Nebelivkas occupation, two fire events are visible. The first at the beginning of the occupation and the second during the second half. A peak in the tree pollen coincides with the second fire event. It is unexpected that cereals were mostly observed before and after the assumed occupation, which might be caused by a problematic matching of deposits. Considering that the archive is derived from alluvial sediments, the results must be taken with caution. Nevertheless, this pollen data is the basis for the British team to suggest a seasonal occupation with little environmental impact for Nebelivka (Chapman 2017a; Albert *et al.* 2019).

Besides the evidence from 'mega-sites', the pollen archives of smaller settlements in Northern Moldova clearly show woodland clearing via a sharp fall in broad-leaved species and a simultaneous increase of wind-blown pollen, especially *Pinus* and pioneer species like *Corylus* (Kremenetski 1997).

The development and peak of the Trypillia phenomenon falls into the climatic optimum of the Subatlantic. During these favourable conditions, woodland as a resource became widely abundant in the Northern Pontic. However, the summarised findings of the archaeobotanical and geoarchaeological evidence show that the environment was vulnerable to permanent deforestation. Unsustainable woodland management in Trypillia times, therefore, presents a major factor for short-term occupation and relocation of settlements. Ultimately, it might have played a role in the decline of large population aggregations. Overall, the palaeo-ecological data clearly shows the human environmental impact linked to Trypillia settlement and increasing population agglomerations in the 4th millennium BCE. Kirleis and Dreibrodt (2016, 178) even suggest that the Trypillia occupation might be the origin of today's cultural steppe in Central Ukraine.

2.2.2 Trypillia East and West

From the beginning, Precucuteni and Trypillia A have been part of the Southeastern European Neolithic with parallels to Boian, Hamagia and Vinča traditions (Ryzhov 2012a, 82). The Precucuteni/Trypillia A tradition can be characterised as mostly homogeneous over its distribution from the Carpathian Mountains to the middle Dniester. However, a regionalisation takes place at the end of this early stage.

Considering the entire distribution of the Cucuteni-Trypillia traditions, Tsvek (1980; 1985; 1989; 1999) observed a divide between western and eastern pottery traditions during the transition from Trypillia A to BI. With sites of the Luka-Vrublevetskaya type at the Dniester and Gernivka at the Southern Bug, a distinct Trypillia pottery tradition is established at the end of Trypillia A, which is characterised by a continuation of incised decorations, while losing fluted elements (see Ryzhov 2012a, 82). To the west of the Dniester, the Cucuteni pottery tradition emerged with painted vessels and, especially in the beginning, with decorations spreading over the whole body. This western tradition is characterised by so-called bichromic decoration with white lines on a dark background and sometimes with additional incisements during Cucuteni stage A1, and by so-called polychrome decoration with combinations of reddish, whitish and dark colours from Cucuteni A2 onward (Dumitrescu 1963; Niţu 1984). At the end of Cucuteni A, incisements completely disappear. The emergence of this painted pottery has been related to the Petreşti tradition located in the inner Carpathians (Marinescu-Bîlcu 1981; Ryzhov 2012a, 83).

At the end of Trypillia BI/Cucuteni A, a distinct Western Trypillia tradition emerges between Northern Moldova and the Southern Bug, which differs from previous Cucuteni and Trypillia traditions in pottery, architecture and settlement pattern (Ryzhov 2012a, 84). With the emergence of the Western Trypillia tradition, scholars start to distinguish between several local groups and their development for both eastern and western traditions (see below). From BI onward, the western tradition successively spreads further to the east, up until Eastern Trypillia is only observed at the Middle Dnieper in stage CI (see Ryzhov 2012a, fig. 4.3; 4.4). This spread has been followed by the tracing of so-called syncretic sites at which merged eastern and western traditions appear (tab. 3).

A transformation of traditions can be observed at the end of stage BI-II on the western bank of the Southern Bug. Here, sites of the Klishchevska-Kasanivska type show merged traits of western and eastern Trypillia pottery traditions, where painted and incised decorations appear on western style 'amphora-like' vessels and cups (Zaets and Ryzhov 1992, 94-96). Later, the Western Trypillia tradition reaches the Southern-Bug-Dnieper interfluve at the end of Trypillia BII. Here, the 'mega-site' near Volodymyrivka of the Volodymyrivska-Tomashivska local group line of development marks the transition to western traditions. With the Kanivska local group on the Middle Dnieper, the western tradition reaches its easternmost distribution during Trypillia CI. Painted pottery starts to disappear with the following Lukashivska local group and is only found on a few sherds in the final Sofievska local group (Dergachev 1980; 1991).

2.2.3 Development and decline of Trypillia 'mega-sites'

The extraordinary size of some Trypillia settlements was first recognised by Passek during the excavations at Volodymirivka in Central Ukraine. She (1949, 80) observed around 200 buildings ordered in an oval site plan over an area of around 50 ha. A regular pattern of larger sites, even exceeding Volodymirivka by over 100 ha, was later observed by Shishkin (1973; 1985) via aerial photography in the 1960s. Finally, with the geophysical survey of Tal'yanky, the yet largest settlement was confirmed in size by Dudkin (Kruts 1989). During this period of investigation, size was the major defining characteristic of these sites. Shmagliy and Videyko, for example, define 'mega-sites' as settlements with a threshold of 50-100 ha (Videyko 1996).

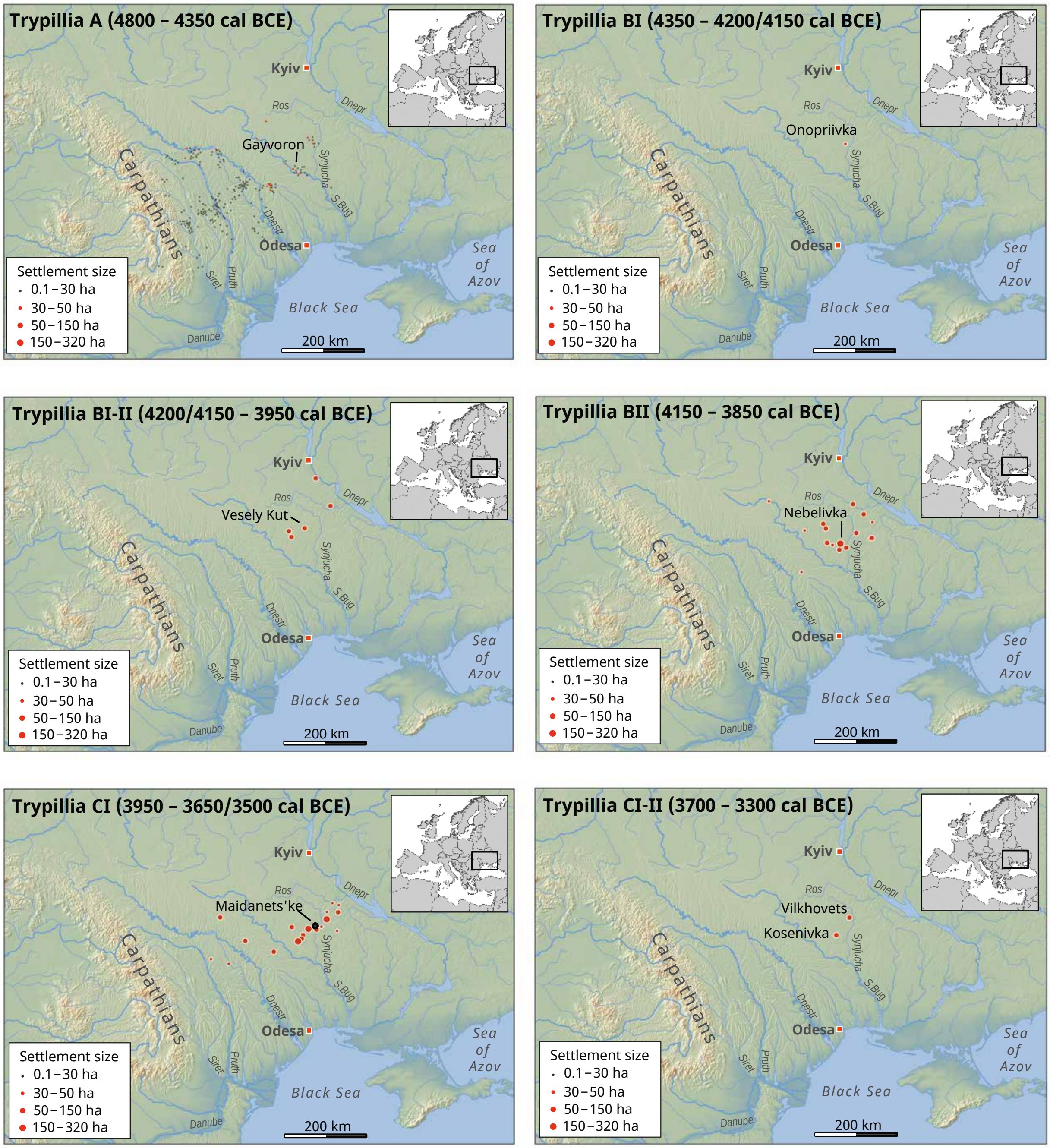
With the renewed international interest in these sites and high-resolution geomagnetic plans, further characteristics were considered. Thus, Müller and Rassmann (2016) define 'mega-sites'

> '[…] *as sites that are larger than c. 150 hectares in size and whose highly structured settlement layout implies some kind of planning (and thus contemporary existence) of most of the involved structures. On the other hand,* […] *as sites which, in comparison to other contemporary sites, are at least 10 times larger than the next smaller ones*'.

Besides a threshold, a ratio to other sites is also given as a general hint towards a defining structure. Another introduced criterion is a large contemporaneous population.

Table 3 (overleaf). Relative development of Western Trypillia and synchronisation of local groups and site types after (Ryzhov 2012a; Videyko 2000; Videyko 2003; Videyko 2005; Videyko 1996). Syncretic sites emphasised in bold. Light grey boxes mark the transition from incised to painted decoration or vice versa. Boxes in dark grey represent painted decoration traits on pottery.

Stage	Prut-Dnistro	Dnistro-Southern Bug	Southern Bug-Dnipro	Middle Dnipro
CII	Gordinesti (Brinzeni) Zhvanetska local group	Vychvatincy local group Usatovo	Serezlievka local group *hiatus*	Sofievka local group Lukashevska local group
CI-II	Koshilovetska local group	Varvarovka 15 type	Kosenivska local group	
CI	Shipinetska local group Petrenska local group	Chechelnytska local group	Tomashivska: T4, T3-2, T3-1, N2-3/ T2 Nebelivska: N2-2/T1	Kanivska local group Kolomyshchinska local group Chapaevka type Kolomyshchina I type
BII	Rakovetska local group Mereshovska - Chetatsuya III type Rakovetska type	Voroshilivska local group	Nebelivska: N2-1, V3/N1 **Volodymirivska**: V2, V1 Grabuzin type Miropyllia type	Kolomyshchina II type
BI-II	Zaleschitska local group Solonchenska local group	**Klishchevska-Kasanivska type** Sabatinovska local group Borisovska local group	Vesely Kut type Onoprievka type Shkarkovka type	Scherbanivska local group Trypillia type Veremye type
BI	Kadievetskiy type	Borisovskiy type	Krasnostavka type Zarubincy type	
A	Lenkovcy **Luka-Vrublevetska type** Okopy type Bernashevka type	Trostianets **Grenivka** Sabatinovka II - Gaivoron type	? Grebenjukiv Yar	Bug-Dnistro



2.2.4 Size development

Figure 2. Development of site sizes per period based on the corrected dataset by Shukurov and Videyko (2017). See appendix 1.

In order to define what constitutes a so-called 'mega-site', we must trace the Trypillia settlement pattern through time. Data used here on settlement size is based on the work of Shukurov and Videyko (2017), who collected over 650 sites ranging from Trypillia A to CII for the territory of modern Ukraine. Their raw data was kindly provided by Mykhailo Videyko. Site dimensions are derived from various methods such as field walking, geomagnetic survey, aerial photography and excavation. Since some exaggerations of size reports are known, the data is corrected by a method proposed by Diachenko (2012). He observed that reported site extensions are often distorted by square estimations of area, whereas most sites are characteristically of circular shape. Thus, the Shukorov and Videyko data is calibrated here by the factor of 0.785 for the relational area of a circle in a square (see appendix 1). Where site sizes are known from GIS data, their respective extension is used. Hence, the most common characteristic of 'mega-sites' can be analysed per period (fig. 2; tab. 4).

In Trypillia A, site sizes range from 0.5-11 ha with a median of 2 ha, whereas sites above 4 ha present statistical outliers. As discussed above, the roots of Trypillia originate from the West and the later core area of the 'mega-site' phenomenon is first colonised in Trypillia A by Maidanets'ke II – Grebenyukiv Yar. During this period, we observe larger settlements along the assumed border between forest steppe and steppe, with Gayvoron as the largest site known to be located close to the Southern Bug.

With the site of Bernashivka, we can trace the typical circo-radial layout of mega-sites back to the beginning of the Trypillia phenomenon (Zbenovich 1996), although new results hint at an even larger extent of the site (Chernovol 2016). Apart from the general layout, with the site of Baia – În Muchie, Ursu and Ţerna (2015) date the origin of exceptionally large buildings like the 'mega-structure' back into Precucuteni / Trypillia A times, and again to the west.

During Trypillia BI, site sizes increase dramatically. While average settlements encompass the whole range of the previous phase with values between 0.02-10 ha, Onopriivka I between the Sinyukha River and the Southern Bug River marks the largest site with around 50 ha. This period marks the shift of largest settlements to the main distribution region of 'mega-sites' for the following development. Moreover, the site shows the typical circo-radial layout.

In Trypillia BI-II, site sizes do increase further and now pass the defined threshold of over 100 ha. Here, average settlements remain at around 0.1-15 ha. The largest site, in this case Vesely Kut with around 120 ha, is again located between the Sinyukha River and the Southern Bug River. Other sites of around 80 ha are also found further to the east in the Middle Dnieper region.

During Trypillia BII, including the transitional phase BIII, the largest sites are still concentrated between the Sinyukha River and the Southern Bug River, with Nebelivka measuring around 260 ha. But similar to the previous phase, sites encompassing around 80 ha appear further east between the Sinyukha River and the Middle Dnieper. Average sites measure between 0.01-35 ha, whereas the upper part of this distribution encompasses settlements comparable in size to Petreni (Uhl *et al.* 2014).

With Trypillia CI, the near exponential growth reaches its peak (fig. 3). In extent, Tal'yanky represents the largest overall 'mega-site' with around 320 ha, while the strongest agglomeration is observed at Maidanets'ke with around 3000 buildings.

Finally, during early Trypillia CII in the core area of the 'mega-site' phenomenon, the last large settlements of Kosenivka and Vilkhovets I mark the end of these giants of the forest steppe with sizes between 95-125 ha.

2.2.5 Towards a new Trypillia 'mega-site' definition

The presented data provides several implications for a wider 'mega-site' definition. Overall, a near exponential growth of site size from Trypillia A to CI is apparent, while site size declines rapidly during CII. Further, the largest settlements are always located near the assumed natural border zone between forest steppe in the North and the Eurasian Steppe belt in the South (fig. 1). In relation to average site sizes, we can observe larger outliers of settlements for every phase. Thus, according to relational definitions of 'mega-sites', they appear from Trypillia A to CII, while by threshold definitions they appear during stage BI-II. In addition, the general circo-radial layout and presence of exceptional buildings can be found in even the earliest and smallest sites of the phenomenon and are therefore no exclusive characteristic for a 'mega-site' definition.

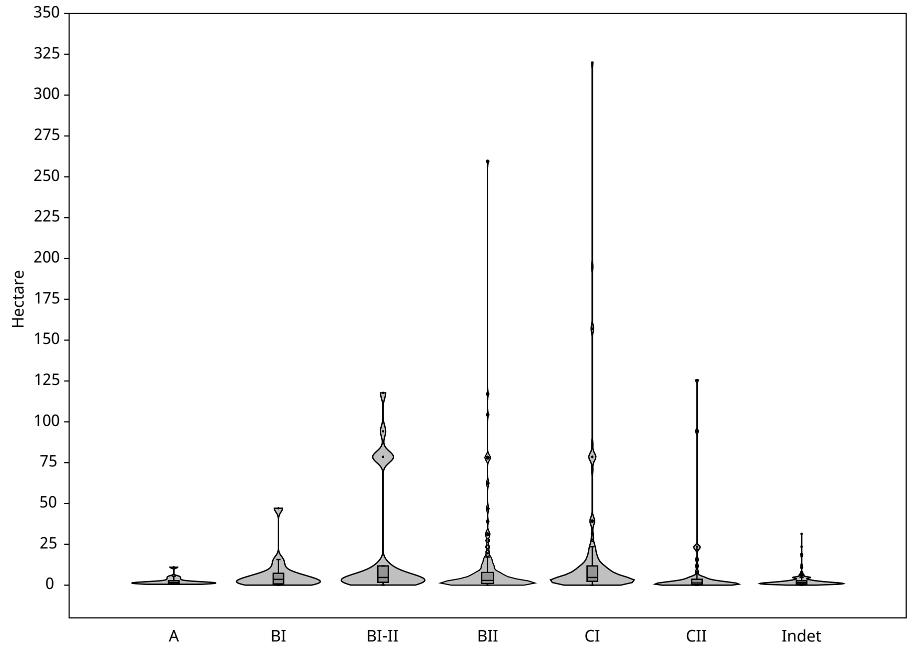


Figure 3. Development of site sizes per period based on the calibrated dataset. See appendix 1.

	A	BI	BI-II	BII	CI	CII
n	21	18	27	169	150	57
Min	0,5495	0,019625	0,07065	0,00785	0,00785	0,00785
Max	10,99	47,1	117,75	204,885	320	125,6
Median	1,57	3,5325	4,71	2,94375	4,71	1,3188
Stand. dev	2,383413	10,94039	36,24724	24,57645	38,00532	20,75702
Coeff. var	99,93743	164,703	160,4133	216,8957	230,0466	297,2404

Table 4. Basic statistics on calibrated site sizes for all Trypillia periods. For data see appendix 1.

What remains as characteristic traits for site size, encompassing all phases, is then a statistically informed threshold, which lies at around 30 ha (Median + 1 Standard deviation), and the distinct location near a natural border to the steppe.

2.3 Local groups of the Southern-Bug-Dnieper interfluve

Inside the main distribution area of the Trypillia 'mega-sites', a typologically connected line of development was observed for several local groups (Kruts and Ryzhov 1985; Ryzhov 1993; 1999; Diachenko 2008; Diachenko and Menotti 2012, fig. 3). While a first detailed relative chronology of the research area concerning middle to late phases BII-CI was established by Kruts and Ryzhov (1985), their phases were only based on pottery from 36 sites. Later, Ryzhov (1999) systematised the analysis of pottery for the core area of the 'mega-site' phenomenon with material from 191 sites. His work remains mostly unpublished, but crucial parts of the results are nevertheless available (Ryzhov 2012b; Diachenko and Menotti 2012).

Ryzhov describes four local groups of which the Volodymyrivska, Nebelivska and Tomashivska groups are seen as one line of development, and the Kosenivska group as part of the general decline during CI-II. The groups are mostly characterised by relative frequencies of technological, morphological and decorative pottery elements. Nevertheless, he also included a qualitative characterisation in his study. For the quantitative part of his study, Ryzhov (1999) used over 1000 ceramic units, *e.g.*, reconstructed vessels and diagnostic sherds. His findings are summarised below.

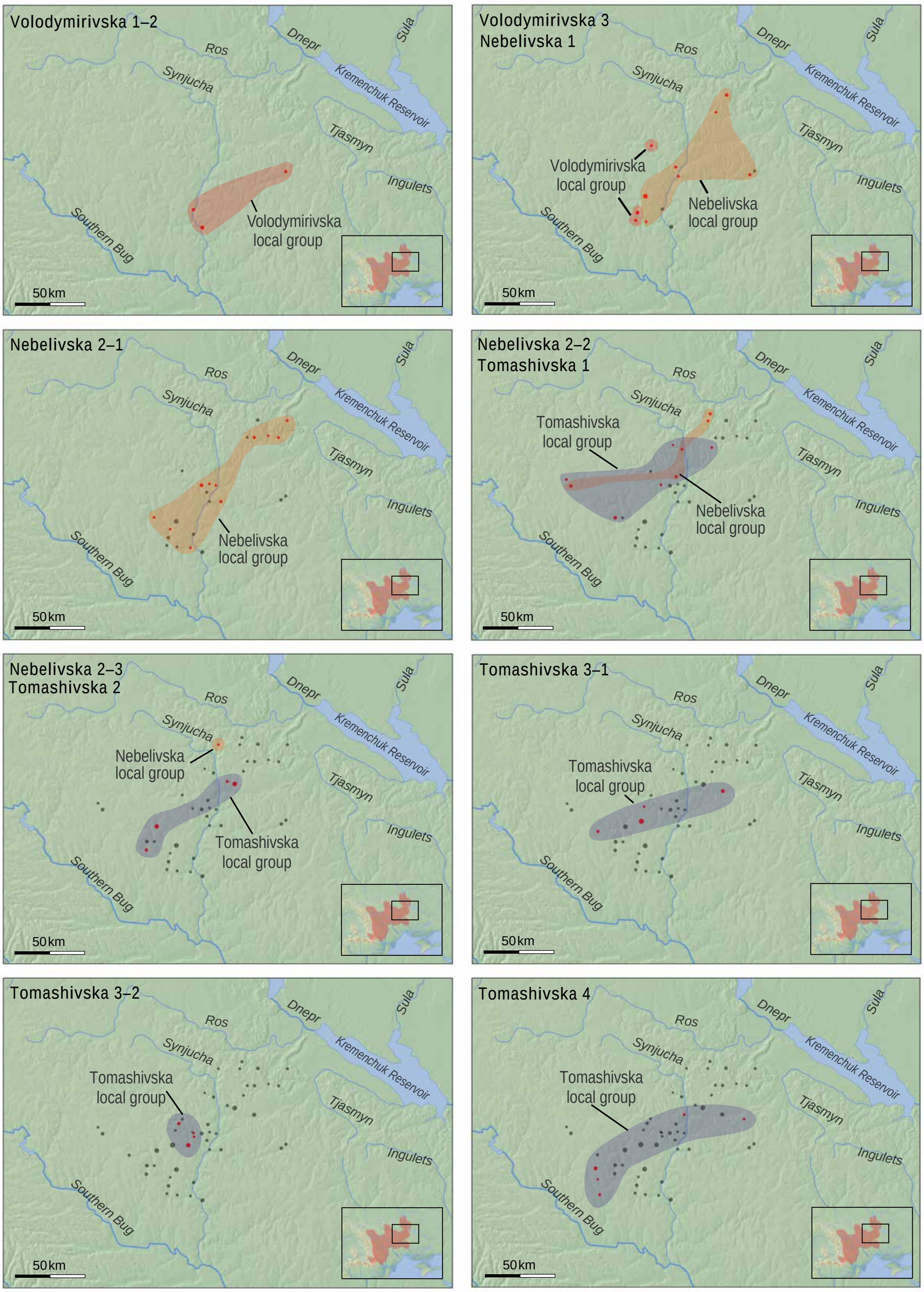


Figure 4. Distribution of the Volodymirivska, Nebelivksa and Tomashivska local groups by relative chronological phases derived from Diachenko and Menotti (2012). Settlements of the previous phase are shown in grey.

2.3.1 Volodymirivska local group

The first group is named after the site excavated by Tatiana Passek, Volodymirivka (Russ. Vladimirovka), which presents the transitional site for the introduction of the western painted pottery tradition into the research area. Settlements of the Volodymirivska group are distributed over an area of around 2800 km² with a median distance between sites of around 36 km (fig. 4). The core territory is located close to the confluence of the Sinyukha River and the Southern Bug. It encompasses around 900 km² with a density of 0.004 sites/km².

From a quantitative point of view, Ryzhov identifies several pottery features, which only appear in this group. These include rectangular (morphological type fwp-1.8) and oval bowls (morphological type fwp-1.9), zoomorphic 'footed' bowls (morphological type fwp-1.7) and incised pear-shaped vessels (morphological types fwp-8.1.1 / 8.2.1). The incised pear-shaped vessels mark the remains of the eastern Trypillia pottery tradition on the site (fig. 5-6).

Morphological traits, which usually only appear in this group, are 'sphero-conical' vessels (morphological type fwp-4), 'funnel-beaker'-like lids (morphological type fwp-9.3) and closed bowls (morphological type fwp-1.4.1). Distinct decorations are the wavy scheme on open (bowls) (decoration type 5) and closed vessels (decoration type 8) as well as radial ornamentation (decoration type 8) on bowls. Furthermore, bowls are sometimes decorated on both the inside and the outside. Probably the most prominent feature of this group is a combination of incised and mono- to polychrome ornamentation. Although the combination of incised and painted ornamentation only makes up 10 % of all material, it is still a distinct feature. The majority (70 %) is a combination of monochrome (black to dark brown) with four to five wide spaced and parallel shallow lines or two to three deeper and narrower lines.

Another characteristic trait of Volodymirivska sites is the high percentage of coarse ware (13 %). It typically has a smooth s-profile and a funnel-shaped rim (morphological type cw-10.2) and is decorated on the shoulder with incised chevrons, scallops or waves (morphological type cw-1.4 / 8.1). A technological trait of the group is the distinct use of clay sources for coarse and fineware. Coarse ware is mostly made of kaolinite clays and tempered with crushed shell. Fineware, however, is mostly made of iron-rich clays. While coarse ware is fired in a reducing atmosphere, fineware is fired in an oxidising atmosphere.

In addition to pottery, there are other features typical for the Volodymirivska group. Anthropomorphic figurines, if the gender is depicted, are usually schematised as female and are mostly in standing position. They are often painted or incised. In contrast, zoomorphic figurines are modelled in naturalistic fashion and only occasionally painted. Finally, houses might already be two-storeyed and a typical interior trait is represented by cross-shaped or round platforms (in Ukrainian research: altars).

2.3.2 Nebelivska local group

The subsequent local group is named after its largest site, Nebelivka, and it mostly preserves the traditions of the Volodymyrivska group. Settlements of this tradition are distributed over an area of around 7750 km² with a median distance between sites of around 10 km (fig. 4). In contrast to the previous group, the Nebelivska sites are more dispersed with several core areas. Two clusters are located in the former core territory of the Volodymirivska group and show an extent of 45-65 km² with a density of 0.02-0.03 sites/km². Two further clusters are located beyond the Sinyukha River, close to the Ros and Dnipro Rivers. Their core territory encompasses around 90-185 km² with a density of 0.02 sites/km². The largest cluster is located between the other agglomerations at the Middle Sinyukha River with a core territory of around 315 km² and a comparable density of 0.02 sites/km².

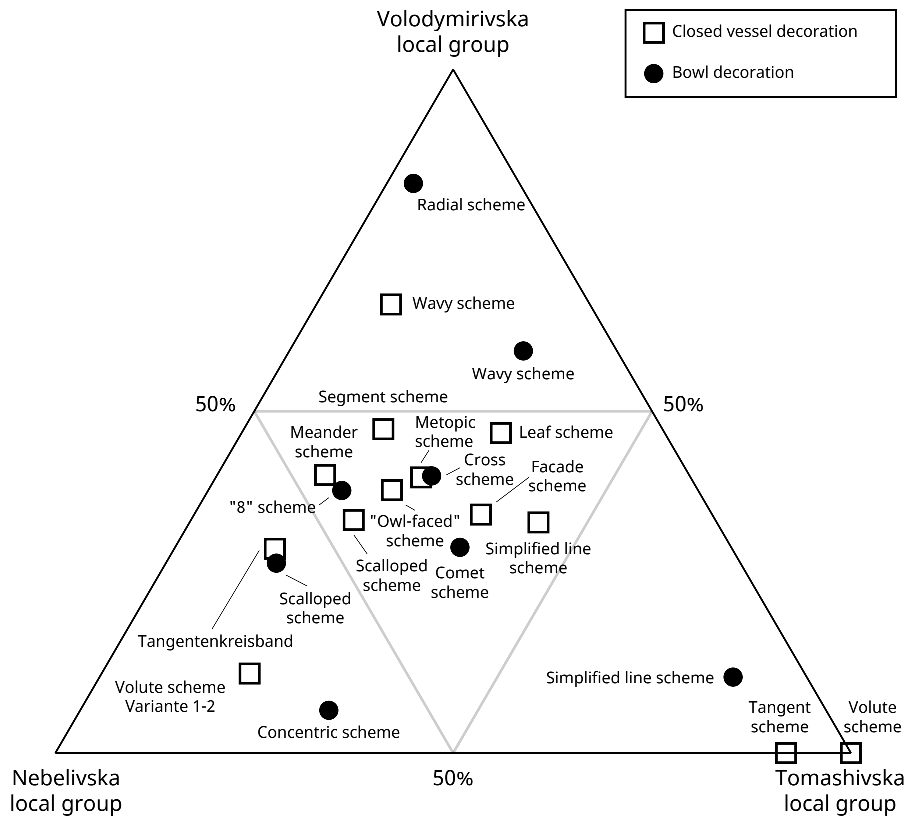


Figure 5. Distribution of decoration characteristics of the Volodymyrivska, Nebelivska and Tomashivska local groups derived from Ryzhov (1999). For the decoration types see fig. 101.

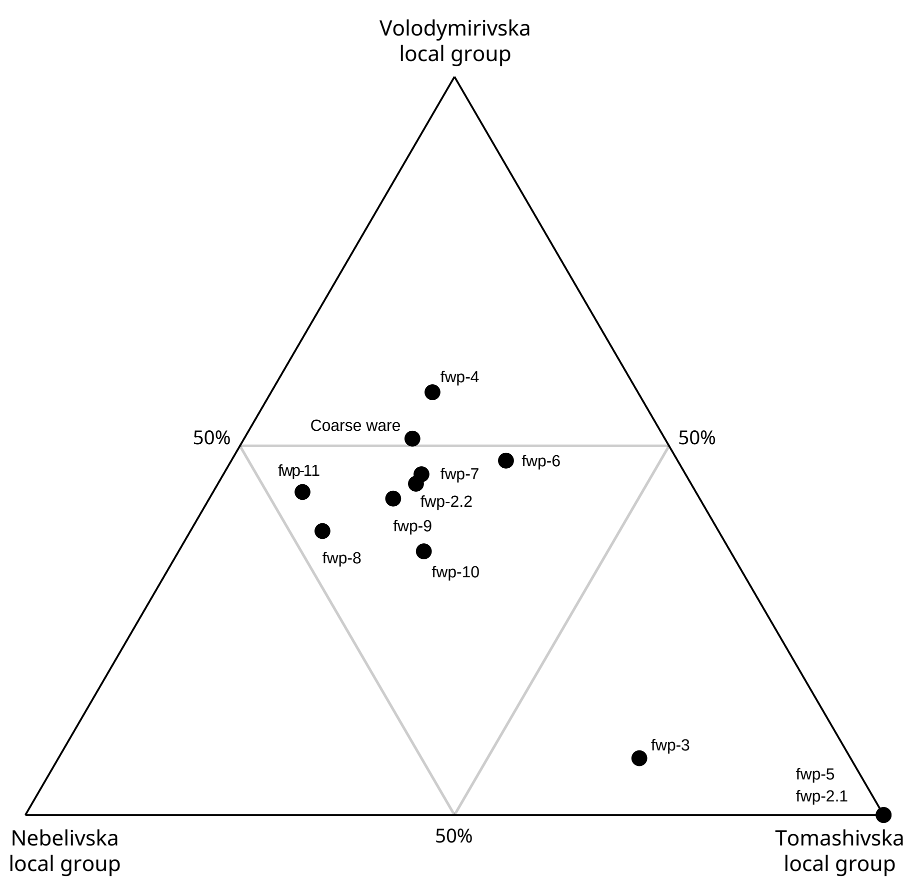


Figure 6. Distribution of vessel morphology of the Volodymirivska, Nebelivska and Tomashivska local groups derived from Ryzhov (1999). For the morphological types see fig. 67-100.

Although no exclusive characteristics are defined, the main difference lies in a shift of ornamentation (fig. 5-6). Prominent features are concentric and scalloped schemes on bowls (decoration type 6), the *Tangentenkreisband* (decoration type 5) and certain types of the volute scheme (decoration type 10.1/2) on closed vessels. The patterns of 'comet'-like and 'figure eight' schemes are combined with wide ribbons from thin parallel lines. Painted pottery is mostly monochrome, but sometimes thin white lines repeat the outlines of the main ornament (bichromic style). For this local group, faunal and floral pictograms start to appear on the decoration. On fineware, incised ornamentation is very rare (0.8-1 %) and combinations with painted decoration are unknown. Formerly complex ornamentation in the shoulder zone of coarse ware is reduced and replaced by zoomorphic applications. Bowls are no longer ornamented on both sides.

Vessel shapes undergo several changes. Coarse ware is mostly represented by tall pots (morphological type cw-10.5) or pots with a straight rim (morphological type cw-10.3). Fineware, on the other hand, shows a tendency towards tall and narrow biconical vessels (morphological type fwp-3.3). In general, fewer vessels appear with funnel-shaped rims and more with accentuated shoulders. The frequency of binocular vessels and ornamented versions rapidly declines and craters with rounded bellies disappear. Funnel shaped lids are replaced by 'helmet' shaped ones (morphological type fwp-9.3.3)

Pottery technology appears to be in transition. Coarse ware is increasingly fired under an oxidising atmosphere and fineware is enriched with larger quantities of temper (mostly sand, sometimes reddish chamotte). The formerly characteristic use of crushed shell as temper is on the decline.

Other clay artefacts exhibit characteristic changes. Figurines appear only in schematic form and are no longer decorated with incised ornamentation. In addition, there are only few zoomorphic figurines and they are no longer painted. Instead, sledge models appear for the first time. This coincides with large sites over 200 ha in extension. The house interiors slightly change, for example, cross-shaped 'altars' are then round or rectangular.

2.3.3 Tomashivska local group

More clearly separated is the local group named after the site of Tomashivka. Settlements of this tradition are distributed over an area of around 4.000 km² with a median distance between sites of around 14 km (fig. 4). The core territory is of elongated shape and is shifted to the northwest from the previous distribution of the Nebelivska group. The territory encompasses around 1.900 km² with a density of 0.01 sites/km². A higher concentration of sites, including Maidanets'ke, is found in the centre of the core territory. Here, within around 300 km² settlements are agglomerated to a density of 0.02 sites/km².

Exclusive characteristics are small cups with sharp profiles (morphological type fwp-2.1), crater-shaped vessels (morphological type fwp-5.1/2) and perforated bowls (morphological type fwp-1.10) as well as large container vessels (morphological type dw-8.1), which also appear as fixed installations (fig. 5-6). Other prominent features are mostly biconical vessels and hyperboloid bowls. Binocular vessels are no longer ornamented and disappear over time.

The low amount of coarse ware (5 %) in assemblages is seen as a distinct chronological marker. Moreover, the shapes of coarse ware show sharper profiles, thus approaching shapes of fineware (craters, pots and bowls). Their ornamentation is simplified to horizontal rows of incisements, plastic applications and fingernail imprints.

Incised ornamentations on fineware disappear completely. Painted pottery is mostly monochrome or occasional bi-chrome (dark and white) on light to reddish engobe. In contrast to the thin white lines of the Nebelivska group, white paint appears as dots in the Tomashivska group. While the painted decoration of other groups is applied on the complete outer surface or in broad friezes on the upper part of the vessels, the Tomashivska pottery is characterised by narrow friezes on its shoulder zone. These friezes are often segmented into four parts and characteristically ornamented with the tangent scheme (decoration type 6). Other prominent decorations are variations of the volute scheme (decoration type 10.2/5). Additionally, an exclusive characteristic is the third variation of the leaf scheme (decoration type 11.3). Prominent features if the decorations are pictograms of animals and trees. In general, the Tomashivska decoration is characterised by a high diversity and combination of elements and schemes.

In contrast to the other groups, Tomashivska coarse ware is fired in an oxidising atmosphere and made from clay with a high amount of iron. Fineware is exclusively fired under oxidising conditions. Painted vessels with temper admixtures close to coarse ware are also a characteristic trait for the Tomashivska local group. On the other hand, 35 % of fineware vessels are made of clay without temper admixture that are sometimes labelled as 'imports'.

Plastic art is dominated by schematic standing figurines and open house models in contrast to mostly closed versions for the previous Nebelivska group. Moreover, the actual houses appear very standardised with a characteristic podium on the long side of the buildings (Chernovol 2012).

2.4 The regional settlement and population development

The traditional research on 'mega-site' development suggests that Trypillia communities moved from place to place after depleting the resources of their immediate surroundings (Diachenko and Menotti 2012, 2811; Kruts 1989; Kohl 2007, 46). This hypothesis is supported by short occupational time spans of settlements, implied by minimal overlap of built space on most site plans. The general tendency of the relative chronology has been proven to be reliable, verified by radiocarbon dating (Brandtstätter 2017; Müller *et al.* 2016a). Partial or complete contemporaneity of sites or their succession is, however, still an open question. Accepting partial overlap, the peak of each settlement's occupation was suggested to lie between 30 and 50 years (Diachenko 2012; Markevich 1981, Kruts *et al.* 2001).

Combining the presented considerations enables us to develop a model of the regional population dynamics in the Southern Bug-Dnieper interfluve at the time of the 'mega-sites' (fig. 7). It incorporates the recent phasing of sites, number of dwellings known from new surveys, a peak occupation of 50 years, and locates them on an absolute timescale, informed by radiocarbon dates.

What becomes apparent is that at the beginning of the 4th millennium an agglomeration of households starts at a relatively low level. But within less than two hundred years, the population increases dramatically. With the transition to the Nebelivska group, the regional population reaches its peak and remains stable until the end of the Tomashivska group. In this phase of demographic stability, a shift in the settlement pattern can be observed. While the Nebelivska group, except for Nebelivka itself, is dominated by many smaller settlements, the Tomashivska group is characterised by fewer but much larger sites. During the time of the Tomashivska group, the regional pattern shows a linear increase of household agglomeration, resulting in a total concentration of around 3000 households at Maidanets'ke. Finally, the 'mega-site' phenomenon declines and the regional population diminishes to values of former times before the phenomenon.

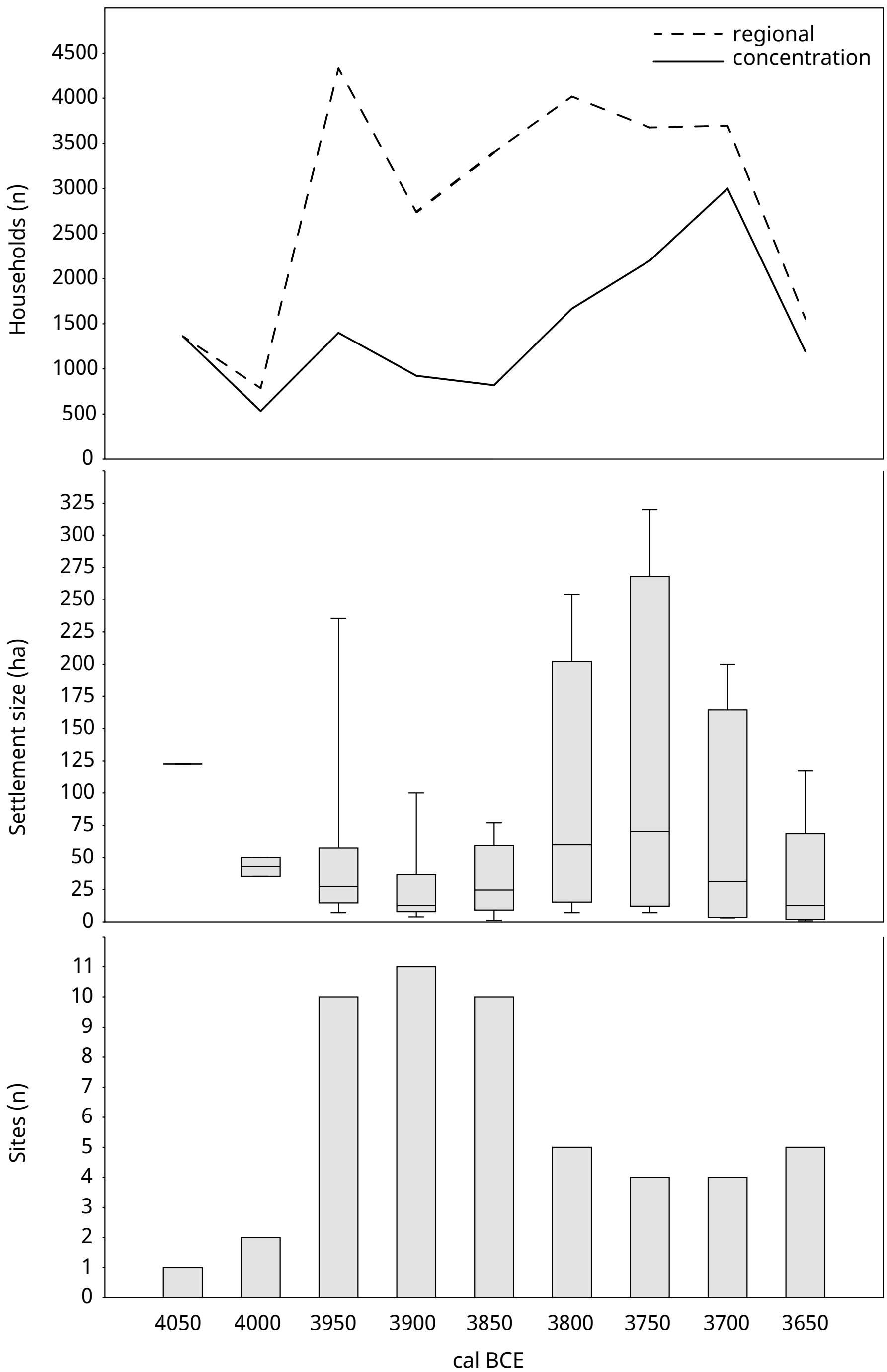


Figure 7. Regional settlement development of the Volodymyrivska, Nebelivska and Tomashivska local groups in Central Ukraine based on the phasing presented in Diachenko and Menotti (2012).

3 The Maidanets'ke site

The site Maidanets'ke I is located to the southeast of the modern village of Maidanets'ke (Tal'nivisky Raion, Cherkas'ka Oblast) on a loess high plateau delimited to the east by the valley of the Tal'yanka River as a right tributary of the Gorny Tikich River, which flows into the Sinyukha River and then into the Southern Bug River. To the southwest, it is delimited by the Shiroka Valley tract (fig. 8).

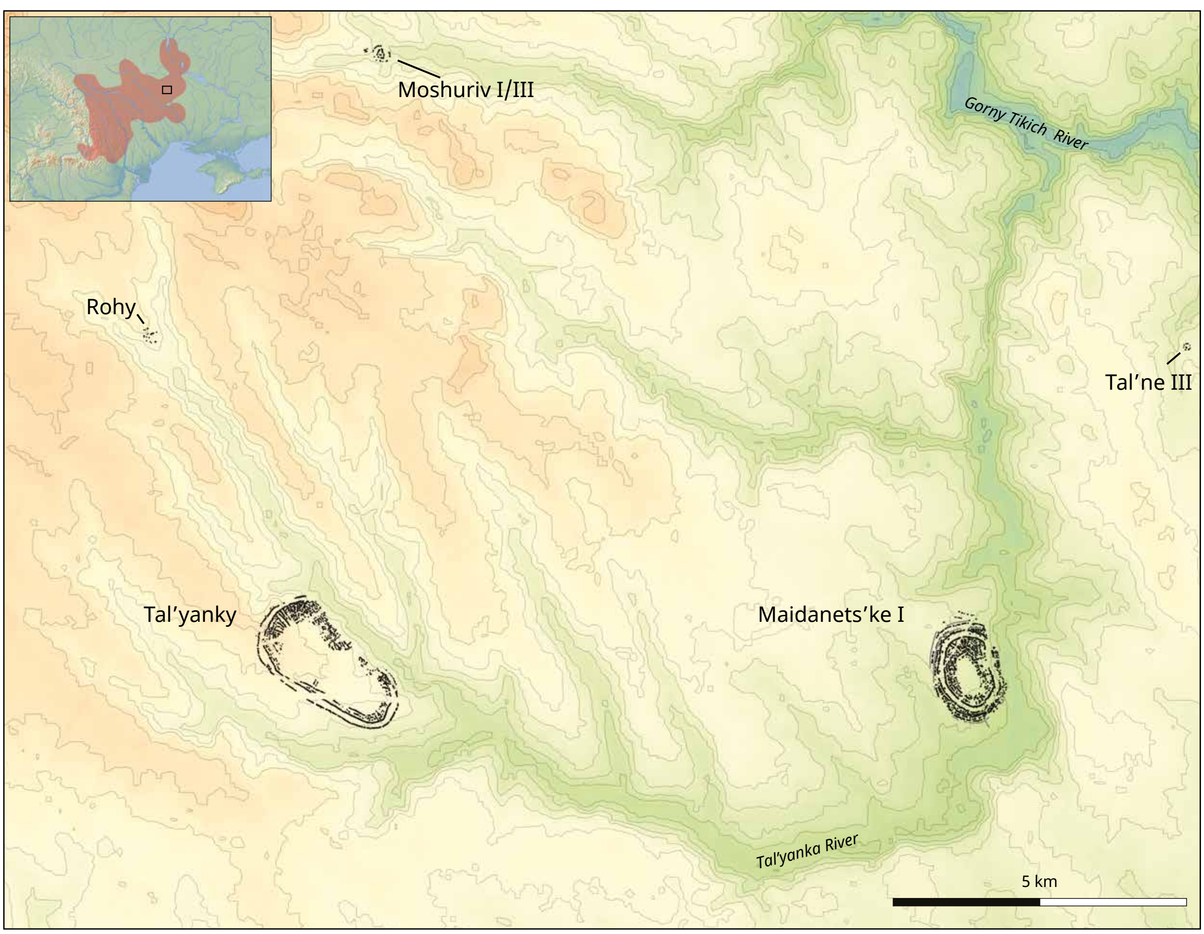


Figure 8. Maidanets'ke I in relation to coeval Trypillia settlements in the Tal'yanka River catchment.

3.1 Previous investigations

In order to contextualise the findings of the international investigations at Maidanets'ke after 2011, previous results are summarised here. After briefly discussing the discovery of the site, the quite extensive excavation activities of the Trypillia Complex Expedition (ТКЭ) with their various findings will be presented. The respective inventories of the excavated dwellings and associated pits are of special interest for socio-economic interpretations. While some material is already published (Shmagliy and Videyko 2004), additional information is derived from archive reports, which were kindly provided by M. Yu. Videyko.

Maidanets'ke was discovered by B. Bezvenglinsky in 1927, but the results of his excavations were lost over the course of the years. Passek (1949, 13), however, considered these results for her studies and placed Maidanets'ke in phase CI. Then, in the 1960s, the site was inspected by G. Yu. Khraban and V. A. Stefanovich (1968), who observed several find concentrations in the area that could mark the site's extension. Between 1964-1966, the aerial photography by Shishkin (1973; 1985) revealed the approximate extent of Maidanets'ke and thus its status as a Trypillia 'mega-site'.

3.1.1 The Trypillia Complex Expedition 1971-1991

At Maidanets'ke, 16 excavation seasons delivered a rich base for analysis and further research under the light of methodological advances (fig. 9). While the first years focused on survey and affirmation of the site's extent, later seasons dealt with various research questions. By field walking on a third of the site's extent, around 400 'ploshchadki' (burnt building debris) were identified. Based on the experimental geophysical survey conducted by V. Dudkin in 1971-1972 (Shmagliy *et al.* 1973), the detected structures were excavated to confirm the method. A complete survey of the settlement was then carried out during the field seasons of 1973-1974 using the M-27 optomechanical magnetometers on a 4 x 4 m grid, with a partitioning of the settlement into plots of 100 x 100 m (Dudkin 1978; Videyko and Rassmann 2016, fig. 7, 23).

During the survey, a kurgan was discovered, which appeared to lie above a row of buildings in the inner main ring of the site. This rare situation was seen as an opportunity to discover well-preserved structures, such as unburnt buildings, which escaped the deep ploughing of modern times. Several campaigns between 1974 and 1980 were dedicated to the Kurgan-house-cluster-complex 'Ж' (fig. 10). Due to the underlying buildings, an alternative excavation strategy than the usual section of kurgans had to be applied, with mixed results, as the excavators report. Nevertheless, it was possible to detect a cluster of houses and several pits as well as an elongated feature, which was interpreted as a 'pit house' (fig. 10).

Between 1981 and 1982, the area around Maidanets'ke was intensely surveyed (Shmagliy and Videyko 1992). Here, in the vicinity of Maidanets'ke, smaller settlements near Tal'ne (1-3) were explored as well as Maidanets'ke II – Grebenyukiv Yar, a Trypillia A site, which marks one of the earliest settlement activities in the area recorded to date.

The work at Maidanets'ke I continued in 1984 with excavations of the trenches 'З' and 'И', and later in 1985 with trenches 'К', 'Л' and 'М' (Shmagliy 1985). These trenches covered several different parts of the site in order to retrieve diverse data for a micro-chronological approach (Shmagliy and Videyko 1990).

In a next step, the dynamics of several house clusters were investigated in the outer main ring located in the southeastern part of the site (Shmagliy and Videyko 1993). From 1986 until 1991, a total of 27 buildings, another kurgan and several pits were partially or completely excavated (fig. 11).

Overall, before the renewed excavations by the Ukrainian-German team, a total of 47 buildings and 15 pits as well as two kurgans were investigated at Maidanets'ke (Shmagliy and Videyko 2004). The main results of the different features are provided below.

Figure 9. The location of the Trypillia Complex Expedition investigations at Maidanets'ke between 1971-1991. Location of the initial geophysical prospection Area I-III and approximate location of test trenches А-Д after Shmagliy and colleagues (1973). All other locations are derived from Shmagliy and Videyko (2004).

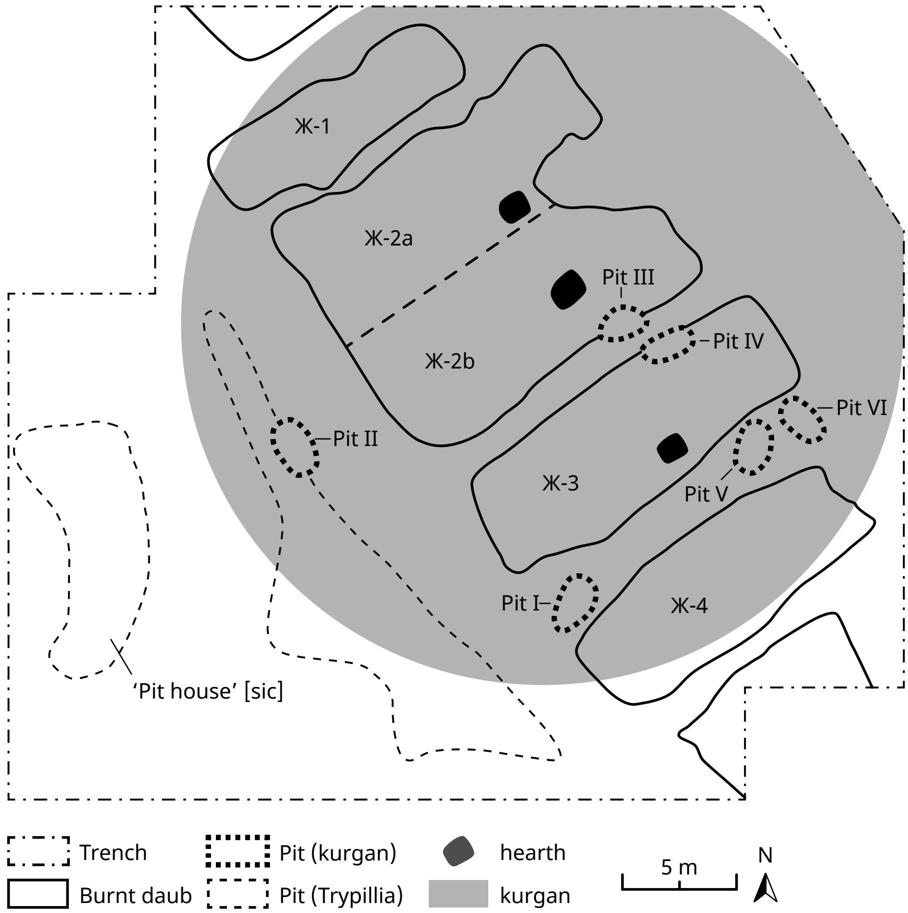


Figure 10. Reconstructed excavation plan of complex 'Ж' and the kurgan on top.

3.1.2 Buildings

This section describes the main results of the architectural remains at Maidanets'ke. After a short introduction of the ТКЭ's excavation approach, various observations are presented. Numerous questions were raised. In general, how were the 'ploshchadki' – the burnt daub debris – preserved in the different parts of the settlement? How many layers were distinguished, and do they show distortions from an assumed former ground plan? Do we see connected buildings, as suggested by the excavators, or overlapping collapsed structures? Can wooden imprints on the burnt daub provide clues about the former construction, especially upper storeys and separate rooms? Further, what interior construction characteristics, installations and inventories could be found in these rooms and how were the structures constructed? Finally, can we observe a pattern of household activities for different parts of the former buildings, or even between buildings in clusters? A summary of these previously investigated aspects will provide a solid foundation for the presentation and discussion of current excavation activities at Maidanets'ke.

In order to reconstruct the former buildings, a documentation strategy focussing on horizontal observations was developed by the ТКЭ, building on Passek's methodology (Zinkovsky 1973; 1974). First, the location of a respective feature was determined by a small-scale geomagnetic survey in the target area by a grid of 1 x 1 m. In this way, it was possible to locate ploshchadki with an accuracy of 0.25 m (Shmagliy *et al.* 1973). After the removal of the topsoil, the uppermost layer of burnt daub was completely uncovered/cleaned and divided into 2 x 2 m alphanumerical quadrants. Only from this stage onward, profile baulks were laid out. During the removing of daub in natural layers, the character and direction of wooden imprints

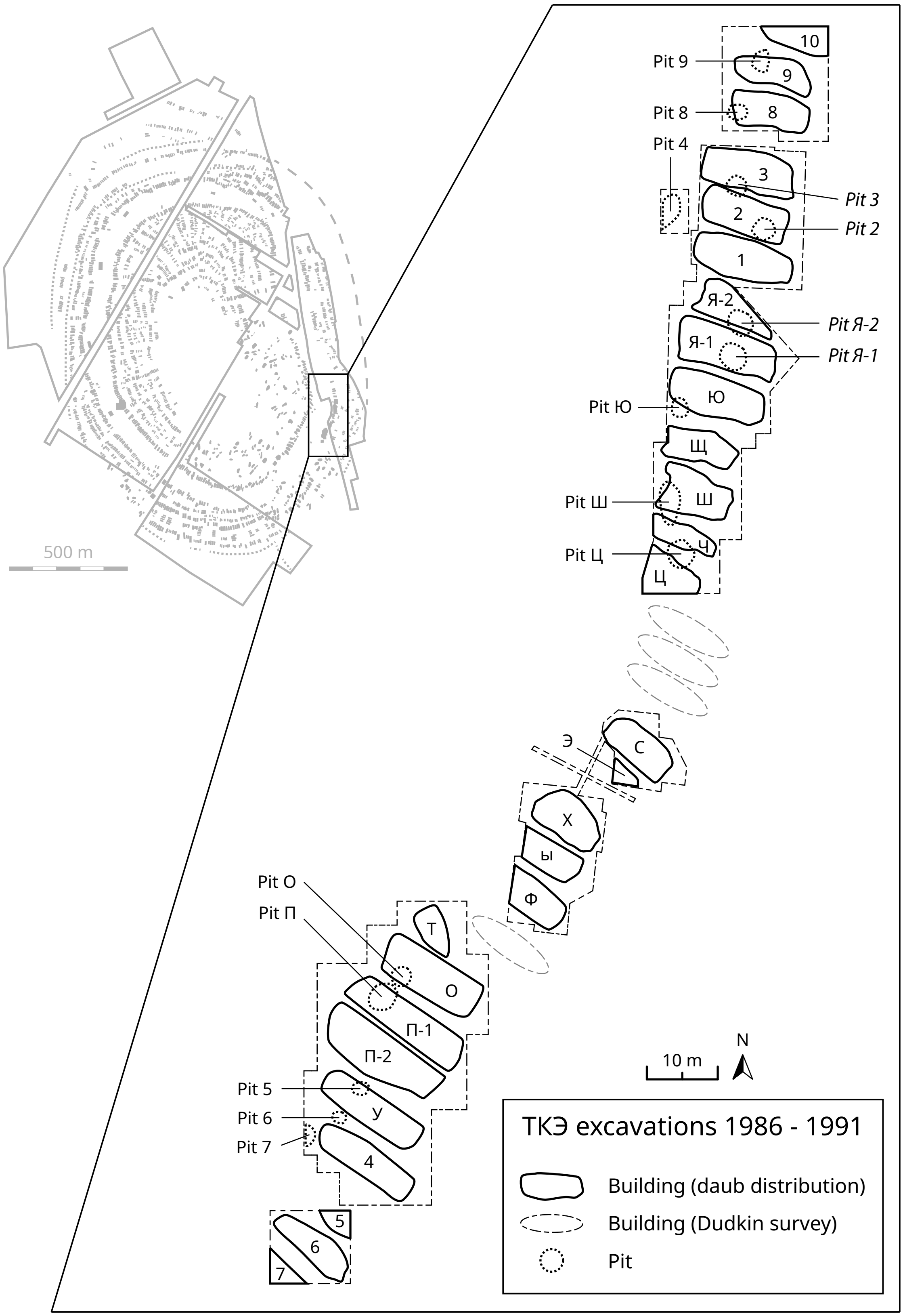


Figure 11. The Trypillia Complex Expedition excavations of several clusters at the southeastern outer main ring of Maidanets'ke between 1986-1991.

House Nr.	Year	Feature	State of excavation	Width (m)	Length (m)	m2	Floors	Living rooms	Imprint direction	Slagged daub	Fired surface
69	1971	A	partial	-	-	-	?	?	?	?	?
1-3	1971-72	Б	complete	6	12	72	2	Yes	?	No	No
70	1971	B	partial	-	-	-	?	?	?	?	?
71	1971	Г	partial	-	-	-	?	?	?	?	?
72	1971	Д	partial	-	-	-	?	?	?	?	?
4	1972-73	E-1	complete	5	11	55	2	Yes	crosswise	Yes	Yes
5	1972-73	E-2	complete	3	10	30	*2*	unclear	?	?	?
6	1974-1980	Ж-1	complete	4,5	11	49,5	2	Economic	crosswise	No	No
7	1974-1980	Ж-2a	complete	5,5	15	82,5	2	Yes	crosswise	Yes	No
7	1974-1980	Ж-2b	complete	5,5	15	82,5	2	Yes	crosswise	Yes	Yes
8	1974-1980	Ж-3	complete	5	16	80	2	Yes	cross/lengthwise	No	No
9	1974-1980	Ж-4	complete	5	14	70	2	Economic	crosswise	No	No
10	1984	З-1	complete	*5*	*14*	70	1	Economic	?	No	Yes
11	1984	З-2	partial	*5*	*14*	70	1	Economic	?	?	Yes
12	1984	И	complete	9	21,5	193,5	2	Yes	cross/lengthwise	Yes	Yes
13	1985	K	partial	4,7	7,9	37,13	1	Yes	crosswise	?	?
14	1985	Л	complete	4,5	10	45	2	Yes	cross/lengthwise	Yes	No
15	1985	M	complete	7	24	168	2	Yes (2)	crosswise (logs)	Yes	No
73	(1987)	H	unexcavated	-	-	600	-	-	-	-	-
16	1986	O	complete	4,3	12,6	54,18	2	Yes (2)	crosswise	Yes	No
17	1986	П-1 (North)	complete	4	15	60	2	Yes	crosswise	No	No
17	1986	П-2 (South)	complete	6	15	90	2	Economic	crosswise	No	No
18	1986	P	complete	1,2	5,6	6,72	2	Yes	lengthwise	No	No
19	1986	C	complete	4,2	10,4	43,68	2	Yes	crosswise (overlap lengthwise)	Yes	No
20	1986	T	partial	4	12	48	2	?	?	?	?
21	1989	У	complete	5	14	70	2	Yes	crosswise	No	Yes
22	1987	Ф	partial	4,6	11,4	52,44	2	Yes	crosswise (planks 15-30cm)	Yes	Yes
24	1987	X	partial	4,2	10,8	45,36	2	Yes	crosswise (planks -25cm)	Yes	?

Table 5. Characteristics of excavated buildings between 1971-1991 derived from field reports and Shmagliy and Videyko (2004).

Renovations	Threshold	Hearth	Podium	"Altars"	Daub "pithoi"	Clay bin	Querns	Looms	Figurines	Token	Silex	Adzes	Imports	Imitations	Human remains	Hoards
?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
No	No	Yes	No	No	No	No	Yes	*Yes*	Yes	No	No	No	No	No	No	No
?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
No	No	Yes	No	No	No	No	Yes	Yes	No	No	No	No	Yes	No	No	No
?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
No	No	No	No	No	No	No	No	No	No	No	No	No	(Yes)	(Yes)	No	No
No	No	Yes	Yes	Yes	Yes (4)	No	Yes	Yes	No	No	No	No	(Yes)	(Yes)	No	Yes
No	No	Yes	Yes	No	Yes (2)	Yes	Yes	Yes	No	No	No	No	(Yes)	(Yes)	No	No
Yes (5)	No	Yes	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes	(Yes)	(Yes)	Yes	No
No	No	No	No	No	No	No	No	No	No	No	No	No	(Yes)	(Yes)	No	No
No	No	No	No	No	No	No	Yes	No	No	No	No	Yes	No	(Yes)	No	No
?	?	?	?	?	?	?	Yes	?	?	?	?	?	?	(Yes)	?	?
No	No	Yes	Yes	No	Yes (3)	Yes (2+querns)	Yes (2)	No	Yes	No	Yes (6)	Yes (2)	No	Yes	No	No
?	?	?	?	?	?	?	Yes	?	?	?	?	?	Yes	?	?	?
Yes (2)	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes (2)	No	No	No	No	No
Yes (seve-ral)	Yes	Yes	Yes	No	No	No	Yes (3)	No	No	Yes (sev-eral)	No	Yes	Yes	No	No	No
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
No	Yes	Yes	No	Yes	No	Yes (quern)	Yes (2)	No	No	No	No	No	No	No	No	No
No	No	Yes	Yes	No	Yes (1)	No	No	No	No	No	No	No	No	No	No	No
No	No	No	No	No	No	No	No	Yes (2)	No	No	No	No	No	No	Yes	No
No	No	Yes	Yes	No	No	No	No	Yes	Yes	No	No	No	Yes	No	No	No
No	No	Yes	No	No	No	No	Yes (2)	Yes	Yes	No	No	No	No	No	No	No
?	?	?	?	?	?	?	Yes	?	?	?	?	?	?	?	?	?
No	No	Yes	No	Yes	No	No	Yes	No	No	No	No	No	No	Yes	No	No
Yes (3)	?	Yes	?	Yes	Yes (1)	Yes (quern)	Yes	Yes	?	?	?	?	?	?	?	?
?	Yes	Yes	Yes	?	?	?	Yes	?	?	?	?	?	?	?	?	?

House Nr.	Year	Feature	State of excavation	Width (m)	Length (m)	m2	Floors	Living rooms	Imprint direction	Slagged daub	Fired surface
26	1987	Ц	partial	4	11	44	2	Yes	crosswise	?	?
27	1987	Ч	complete	3,5	10	35	2	Yes	Platform lengthwise / superstructure crosswise	Yes	No
28	1987	Ш	complete	4,4	10,5	46,2	2	Yes	cross/lengthwise	No	No
29	1987	Щ	complete	3,8	10	38	2	Yes	Platform crosswise / superstructure lengthwise	Yes	No
23	1987	ы	partial	4,5	10	45	2	?	crosswise	?	?
25	1987	Э	partial	4,5	14,5	65,25	2	?	crosswise	?	?
30	1987	Ю	complete	5	13,5	67,5	2	Yes	Platform crosswise / superstructure lengthwise	Yes	No
31	1987	Я-1	complete	4,3	14	60,2	2	Yes	Platform crosswise / superstructure lengthwise	Yes	No
32	1987	Я-2	partial	4	11,4	45,6	2	Yes	Platform crosswise / superstructure lengthwise	?	?
33	1988	1	complete	4,6	14,2	65,32	2	Yes	crosswise	No	Yes
34	1988	2	complete	4,5	10,7	48,15	2	Yes	Platform crosswise / superstructure lengthwise	Yes	Yes
35	1988	3	complete	4,3	10,5	45,15	2	Yes	?	Yes	No
37	1989	4	complete	4,8	15,6	74,88	2	Yes (2)	crosswise	Yes	No
38	1990	5	partial	4	-	-	2	Yes	?	Yes	?
39	1990	6	complete	5	10	50	2	Yes	Platform crosswise / superstructure lengthwise	Yes	Yes
40	1990	7	partial	4	-	-	?	?	lengthwise	Yes	?
41	1991	8	partial	5	-	-	?	?	?	?	?
42	1991	9	complete	5	14	70	2	Yes	crosswise	Yes	No
43	1991	10	partial	-	-	-	?	?	?	?	?
36	1984	Trench 3	partial	-	-	-	?	?	?	?	?

Table 5 continued.

were recorded. Finally, a trench was levelled another 0.5 m below the last cultural layer in order to check for possible postholes (Shmagliy and Videyko 2004).

Over the course of 16 field seasons, a total of 47 buildings were explored (tab. 5). Of these structures, 29 (62 %) were completely excavated. In general, the features show two layers of burnt daub with an overall thickness between 5-40 cm and a former occupational layer underneath with a thickness of around 20 cm. However, due to bioturbation, fragments of burnt daub were observed up to a depth of 1 m below the last daub feature (Shmagliy and Videyko 1987). In most cases, the upper layer was disturbed by ploughing.

The excavators have labelled the burnt remains as 'two-storey' buildings, which might be confused with a three-level building. However, they are meant

Renovations	Threshold	Hearth	Podium	"Altars"	Daub "pithoi"	Clay bin	Querns	Looms	Figurines	Token	Silex	Adzes	Imports	Imitations	Human remains	Hoards
?	?	Yes	?	?	?	?	Yes	?	?	?	?	?	Yes	Yes	?	?
No	No	Yes	No	No	No	No	Yes (non-local)	No	No	No	No	No	No	No	No	No
No	No	Yes	No	No	No	No	Yes	No	No	No	No	No	Yes	No	No	No
No	No	Yes	No	Yes	No	No	Yes (3)	Yes	Yes	No	No	No	Yes	No	No	Yes
?	?	?	?	?	?	?	Yes (2)	?	?	?	?	?	?	?	?	?
?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
No	No	Yes	No	Yes	Yes	No	No	Yes	No	No	No	Yes	No	No	No	No
No	Yes	Yes	Yes	No	No	No	Yes	No	Yes	No	No	No	Yes	No	No	No
?	?	Yes	?	?	?	?	Yes	?	?	?	?	?	?	?	?	?
No	No	Yes	Yes (2)	Yes	No	Yes	Yes	Yes	No	No	No	No	Yes	No	No	No
No	Yes	Yes	No	Yes	Yes	No	Yes	No	No	Yes	No	No	Yes	No	No	No
No	No	Yes	Yes	Yes	No	No	Yes	Yes	No	No	No	No	Yes	Yes	No	No
No	No	Yes (2)	Yes	No	Yes (1)	No	Yes (non-local)	Yes	Yes	No	No	No	Yes	No	No	No
?	?	Yes	?	?	?	?	Yes	?	?	?	?	?	?	?	?	?
No	Yes	Yes	Yes	No	No	No	Yes	No	Yes	No	No	No	No	No	No	No
?	Yes	?	*Yes*	?	?	?	Yes	?	?	?	?	?	?	?	?	?
?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
No	No	Yes	Yes	Yes	No	No	Yes	Yes	No	No	No	No	No	No	No	No
?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?

to be reconstructed as buildings consisting of a ground floor and an elevated platform with a main living room, which is in fact the upper storey (fig. 12). Artefacts and imprints from the uppermost layer on top of the burnt daub are interpreted as the remains of an attic (Shmagliy and Videyko 2004).

Among all excavated buildings, three (6 %) are considered to be ground level buildings and only one of them was completely explored (tab. 5). They show only one layer of burnt daub and a fired surface on the former ground level. It must be noted, however, that the buildings were very poorly preserved and showed wooden imprints on the lower sides of the burnt daub layer, which is generally seen as evidence for an upper storey or attic by the excavators.

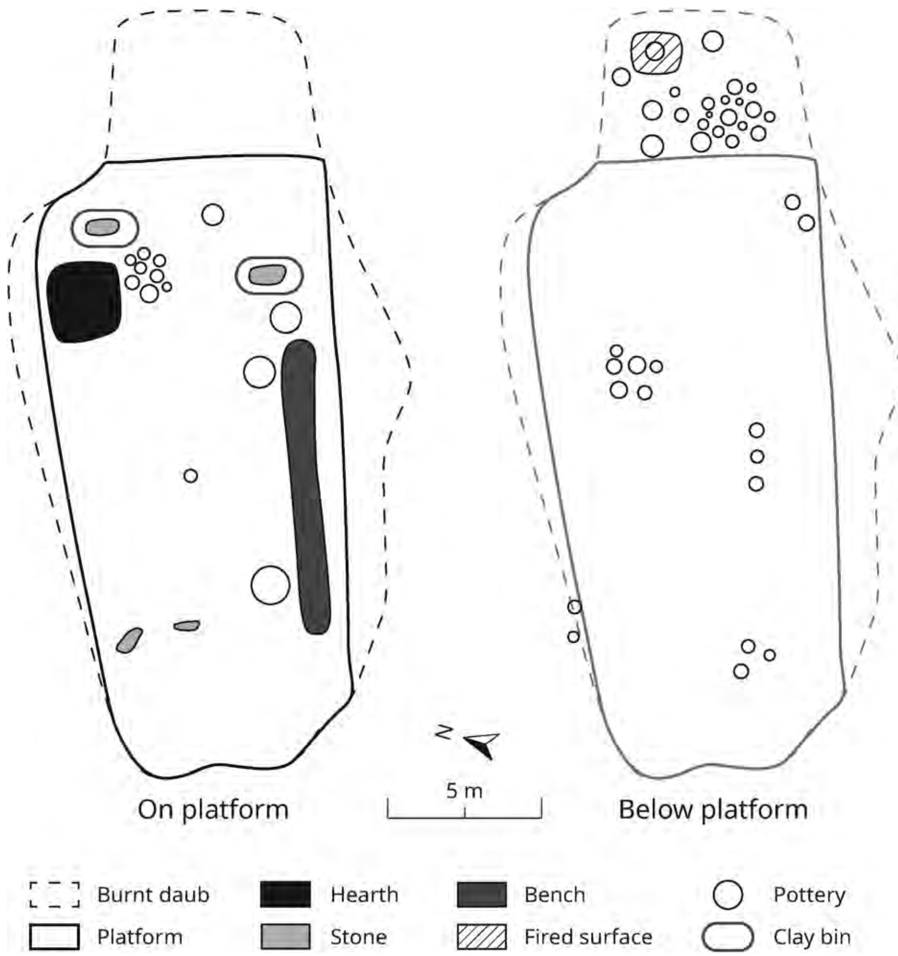


Figure 12. Excavation plan of the two storeys at complex И'.

The burnt remains were generally between 3-6 m wide (median=4.5) and 10-15 m long (median=12.6) (fig. 13). Some larger dwellings, such as complexes 'M' and 'И', were observed, which fall into the category of 'crossroad buildings' (see Ohlrau 2015, fig. 43). This size class was earlier observed to be located at conjunctions between the main concentric and radial pathways. Complex 'И', however, shows major distortions in its ground plan due to wall collapse. Smaller buildings, such as in the case of complex 'P', might present partially burnt structures.

3.1.3 Construction characteristics

Daub

The burnt architectural remains at Maidanets'ke were made of wood and daub. Various structural elements are preserved in fired pieces of daub or as negative imprints on these pieces. At least three types of burnt daub were reportedly distinguished. The most prominent type is burnt daub, which was tempered with chaff. This type was used in a universal manner during the construction of the buildings as can be seen by the various types of wooden imprints. Furthermore, certain parts of the buildings, such as a platform or a fireplace, were reinforced with a type of sand tempered daub. For this type, only few wooden imprints are known. It mostly appears with flattened surfaces. The last type, labelled as vitrified daub, is an indicator for severe temperatures during the burning of the buildings. This type is often found molten together with artefacts and lower layers of the former buildings.

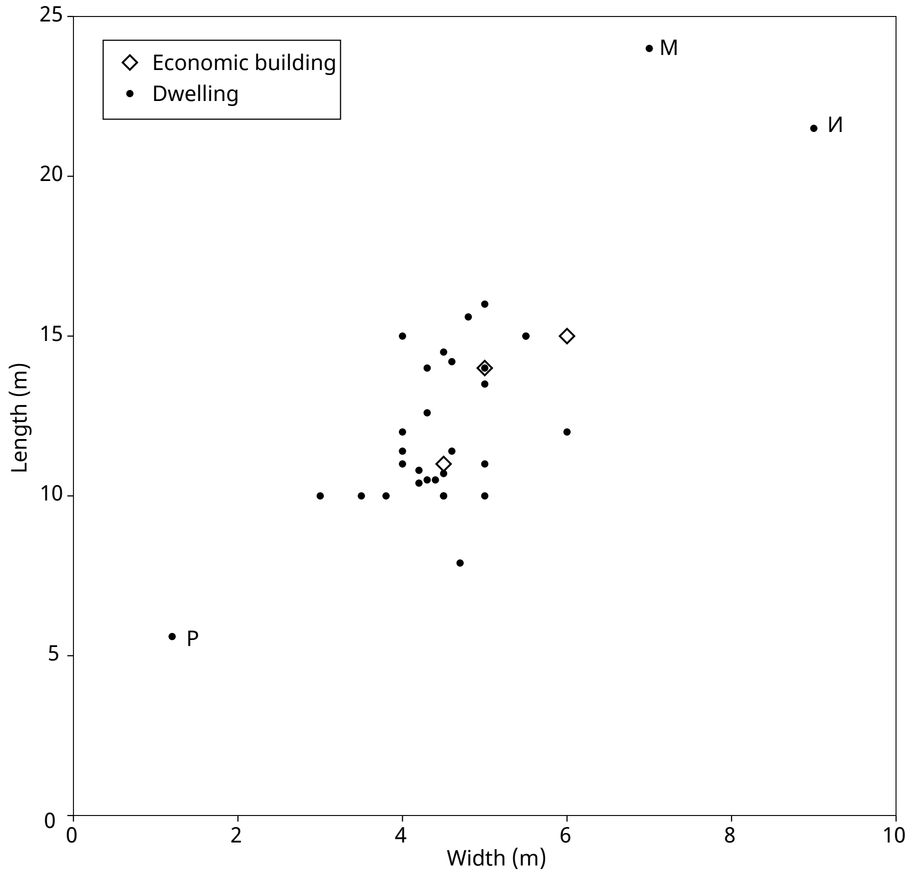


Figure 13. Building dimensions of houses and economic complexes from excavations between 1971-1991. For data see tab. 5.

Vitrified daub was observed in 45 % of all explored features (tab. 5) and could be found covering 30-50 % of the feature's area (Shmagliy and Videyko 2004, 64).

Imprints

For 33 features (70 %), the direction of imprints was recorded (tab. 5). In 90 % of the cases, the imprints below the platform face across the long-axis of the buildings. Lengthwise facing imprints in connection with the main platform were only observed in three cases. Those cases are negligible, since they are either partially excavated (complex '7') or show unusual proportions (complex 'Ч' and 'Р'). A partition between cross- and lengthwise facing imprints was observed in five cases (15 %). These lengthwise facing parts are located at one of the short sides and make up around one third of an overall feature. Whereas there are usually two layers of burnt daub, for the part in discussion only one layer of daub was observed at complex 'И' (*ibid.*, 87). This led to a suggested spatial division between a roofed platform and kind of a front porch, which is in line with Trypillia house models (see Gusev 1995). Although an interpretation as a collapsed wall can be considered, it is unlikely, since this kind of pattern can be widely observed in the renewed geomagnetic plot by lower susceptibility for such parts. Such parts were also recorded during the excavation of trench 92.

When imprints on the upper layer of burnt daub were reported (in 21 % of cases), they mostly face along the long-axis of the former buildings (85 %). However, these upper imprints can be more ambivalent as can be seen in the documentation of complex 'И' (fig. 14). This diverse distribution is likely a mix of roof and wall collapse.

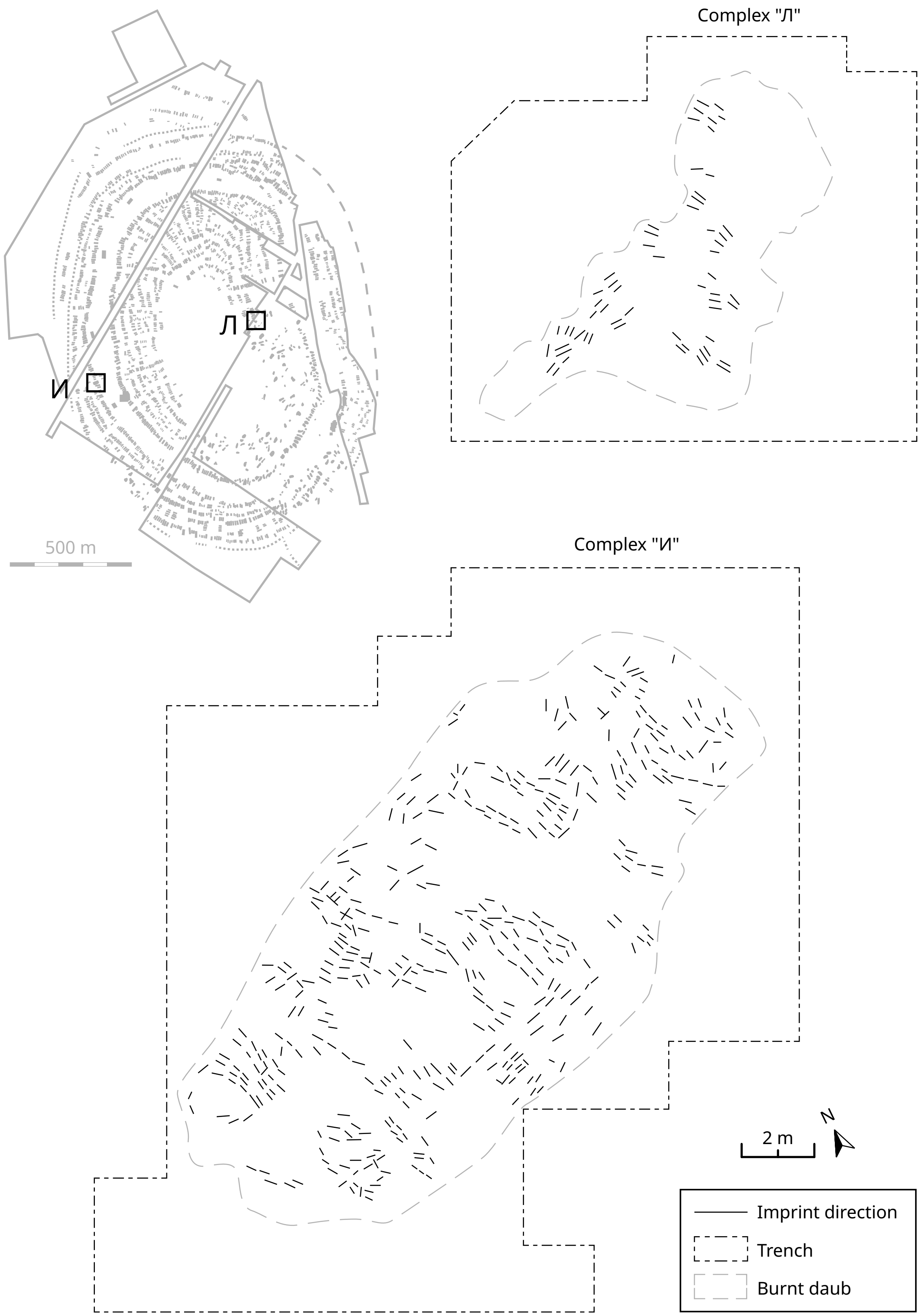


Figure 14. The distribution of wooden imprints on burnt daub at trenches 'И' and 'Л' according to field reports.

Posts

While postholes can hardly be detected due to severe bioturbation, rounded wooden imprints, hinting at the location and character of static support, were observed in two cases.

The first evidence is related to the construction between the roof and the platform. Parts of a post supporting the roof close to a fireplace were found in the upper storey of complex 'Я-1'. The burnt daub remains were rectangular in shape with rounded edges, measuring 20 x 30 cm, and were preserved over 50 cm in length. The imprints show that the plastered wooden pillar must have been 10 cm in diameter. Close by, a cylindrical piece, 30 cm in diameter and 10-12 cm thick, was documented and interpreted as the connection of the post to the ceiling (Shmagliy and Videyko 2004, 82).

The second evidence is related to the support of the elevated platform and the roof. Below the burnt daub layer of complex 'П-1', a vertically collapsed post, indicated by wooden imprints, was recorded on the edge of the pit found below the daub layers (*ibid.*, 75). According to the excavators, this post was dug into the former ground and went through the platform to support the roof (Shmagliy and Videyko 1987). The diameter of this post remains unreported.

Platforms

According to the recorded imprints on pieces of burnt daub, the base for an upper storey was built from wooden planks, arranged across the long-axis of the buildings. Based on the imprints, the planks were reconstructed to have been between 15-30 cm wide and 4-6 m long, taking the width of the former buildings into consideration. For complex 'M', the foundation was constructed from whole logs, 15-20 cm in diameter (Shmagliy and Videyko 2004, 67). These logs were only slightly processed, since remains of bark are visible in the imprints (*ibid.*).

On top of the wooden construction, a daub floor was applied, which is labelled here as the platform. This platform could simply be made from a single layer of chaff-tempered daub or be made of several layers and different kinds of daub. The most elaborate or best-preserved type of platform was observed for complex 'M' (*ibid.*). Here, it was possible to identify three layers of burnt daub in the western part of the feature. The lower layer was tempered with chaff and consisted of pieces with wooden imprints. The middle layer was also made from chaff-tempered daub, but was flattened on both sides. On top, a 3 mm plaster of fine clay was applied and painted with red ochre. The plaster was observed to be refreshed several times (fig. 15).

While at first, the plastered floor of complex 'M' was seen as an elaborate feature of an unusually large building (*ibid.*, 68), it became clear that many of the excavated features were decorated in the same fashion (26 % of all excavated features).

3.1.4 Fixed installations

Fireplaces

There are two types of features interpreted as fireplaces. The first is an installation located on platforms, the second is a fired surface observed on former ground levels. Overall, 68 % of the excavated buildings show remains of fireplaces or fired surfaces (tab. 5). They were found in 90 % of the completely investigated and in 33 % of partially excavated buildings. Among the completely excavated buildings, 24 % exhibited both fireplaces and fired surfaces. Except for the case of complex '4', one fireplace is associated with the main room on the upper storey.

Figure 15. Several renovations of plaster found at complex 'M' (photo by M. Yu. Videyko).

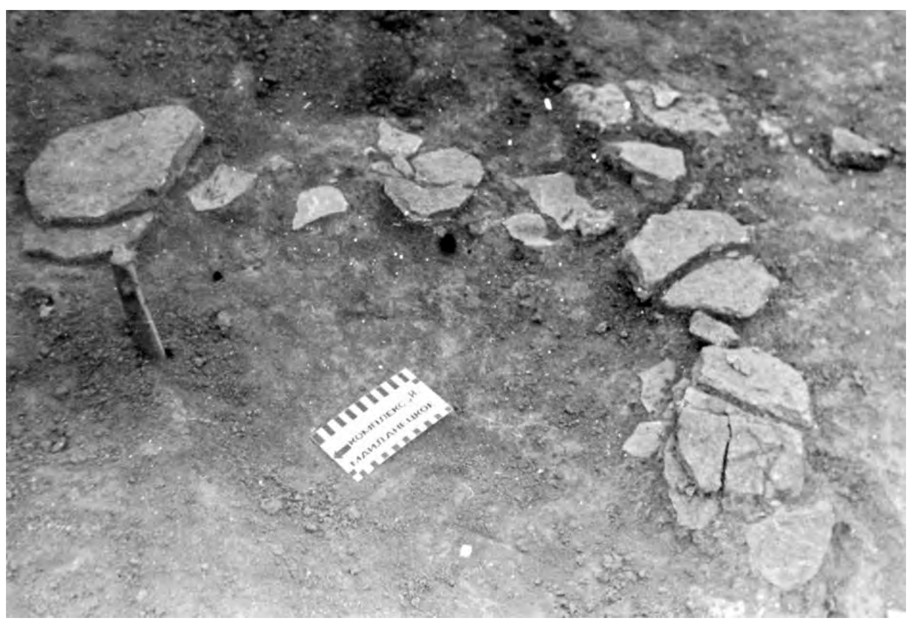


Figure 16. Stone foundation of the hearth found at complex 'И' (photo by M. Yu. Videyko).

The platform installations were found in 83 % of the fully excavated houses and are usually described as rectangular features made of compact and sand tempered daub (tab. 5). They measure between 80 x 90 cm to 260 x 280 cm and show up to five constructive layers.

One of the best-preserved fireplaces was found in complex 'И'. Here, various construction details were observed. To the outer and inner walls, the area was delimited by a unique stone foundation (fig. 16). The fireplace was constructed on 2 x 2 m of the upper storey platform of chaff-tempered daub. On top of this platform, the imprints of crosswise laid out reed were recorded. On the reed, a 1 m² and 15-20 cm thick layer of compact and highly fired daub was applied, which then was finished with a 3-5 cm coating of fine clay.

On other occasions, parts of a delimitation or dome were observed. For complex 'Ж-2b', a rim measuring 7-10 cm high, is mentioned (Shmagliy and

Figure 17. The hearth at complex 'Я-1' with a surrounding threshold (photo by M. Yu. Videyko).

Figure 18. A post or chimney-like clay ring fallen from the ceiling at complex 'Ч' (photo by M. Yu. Videyko).

Videyko 2004, 69). At complex 'Я-1', inward facing edges, 10-15 cm in width, were plastered with fine clay 3-5 cm thick and painted with ochre (fig. 17). Comparable features were observed at complexes '1', '6' and '9'. The highest preserved rim or dome was found at complex 'У', measuring 25 cm.

Chimney-like features were found to be collapsed on top of fireplaces in three cases at complexes 'П', 'Ч' and '9'. At complex 'П', a round construction made from chaff-tempered daub and coated with red painted plaster in the inner and lower part were observed. It measures 45 cm in diameter and had walls up to 6 cm wide and 10 cm high. Since it was found above the remains of a biconical vessel, it must have been related to the walls or the ceiling (*ibid.*, 75). The comparable structure at complex 'Ч' had a diameter of 55 cm (fig. 18). The daub ring was 5-7 cm wide and rectangular in cross-section. It was covered with a layer of fine clay on all sides but the upper part, which was probably connected to the ceiling (*ibid.*, 78). The feature of complex '9' is not further described (*ibid.*, 85).

Fired surfaces were found in 11 cases on the former ground level and are mostly observed beneath platforms. They are amorph in shape and range between 40 x 50 cm to 120 x 150 cm in size.

Podia

Podia are elongated and elevated installations usually found at the long side walls on the opposite side of the fireplace. They are preserved up to 6 m in length, measuring between 40-50 cm wide and 5-20 cm high. The features were made from chaff-tempered daub, which was applied to the platform, and were then finished with an ochre painted plaster of 2-3 cm. The plaster shows up to three renovations. Podia were found in 34 % of all investigated buildings and in 48 % of completely excavated ones (tab. 5). In the case of complex '1', a podium was both observed on the platform and on the former ground level. The lower feature is, however, debatable since it was very poorly preserved over the course of one meter (Shmagliy and Videyko 2004, 83). The presence of podia cannot be excluded for other excavated buildings, where they are not mentioned, but red plaster was found since other features were also decorated in a similar fashion. At complex 'Я-1', both the podium and the floor or wall were plastered and painted with ochre. Questionable cases are complexes 'Щ', 'Ю' and '2', where red plaster was recorded but not further specified. In seven cases at Maidanets'ke, podia were associated with 'pithoi' made of 'the same material as the building', which were probably fixed on the podium. They were made from chaff-tempered daub with incisements around the belly and are reconstructed to have been pear-shaped vessels without a neck (Ryzhov 2012b). Up to four remains of these vessels were observed per building. These 'pithoi' are also depicted in house models (Gusev 1995). At complex 'Ж-3', a closed vessel and a bowl were found, which contained remains of wheat, barley and peas (Shmagliy and Videyko 2004, 69). In general, the podium functioned as a storage area mostly for food in various pottery vessels, but also other items, such as figurines (complex 'Л') or various stone tools (complex 'Ж-3'), were also observed.

'Altars'

Like podia, so-called altars were fixed elevated daub installations found in the central back part of the main room of the upper storey. The features were observed in 12 cases and can be found in 38 % of the completely explored buildings (tab. 5). They were constructed from chaff-tempered daub and a plaster of fine clay or completely made of untempered daub. At complex 'Ж-3', parts of the former decoration were preserved, showing three parallel incisements. In the case of complex 'Ж-2a', the feature was cross-shaped, while at complexes '1' to '3' they were of roundish shape. Their dimensions ranged from 70-150 cm in diameter and 5-25 cm in height. Their function remains unclear.

Clay troughs

Another kind of fixed installation on the level of the platform are so-called clay troughs. They are containers made from chaff-tempered daub, which were directly applied on the platform and occasionally covered with an ochre painted plaster. These installations were observed in 14 % of the completely explored buildings (tab. 5). On one occasion at complex 'И', two clay troughs, both with fixed querns inside, were found.

The installations are mostly rectangular in shape, measuring around 80-100 cm in length and 80-120 cm in width with rims 10-20 cm high and 5-10 cm wide. At complex 'Ф', the container was oval in shape. In four out of six cases, these containers had querns fixed inside. Clay troughs are clearly associated with cereal processing. It can be suggested that the container had the purpose of collecting freshly grounded flour. Interestingly, open house models show comparable features including querns, and in one case a figure during the act of flour production (Palaguta and Starkova 2017).

Figure 19. Several sets of high-quality grinding stones in front of complex '4' (photo by M. Yu. Videyko).

3.1.5 Other installations and inventories

Querns

The presence of querns was reported for 31 cases (tab. 5). Interestingly, fewer were found in economic complexes than in dwellings. Since they are often fragmented due to severe heat during burning or relocated due to the collapse of the buildings, the amount of complete sets, which were in use per complex, cannot be reconstructed for every case. However, in nine cases preservation was sufficient. Querns and hand stones were often associated with clay troughs located in the main rooms on former platforms but were also found in the front porch areas or under the platform (fig. 19).

The stone artefacts of Maidanets'ke were analysed by V. F. Petrun (2005). Most querns and hand stones were made from local sandstone, probably coming from a larger exposure in the southeast of today's Cherkas'ka Oblast. In the cases of complex '4' and 'Ч', however, rare fine-grained grey quartzite sandstones were found, which had an especially good abrasive trait, while preventing polishing of the tool during intensive use (*ibid.*). Their special characteristics and non-local origin suggest an interpretation as prestigious objects.

Other tools

Besides querns, other stone artefacts were found. Among them are various silices, adzes, 'punching stones' and stone plates for pigment processing. Stone plates with the remains of ochre on them were found in two cases at complexes 'И' and 'Ж-3'. They are a vivid reminder not to assume that every piece of grinding stone was used for cereal processing. Another type of stone tool are adzes, which were found in five cases. Usually, a single adze was found per building, with the exception of complex 'И', where two of them are mentioned. Fairly rare are silices, which were only found in three cases at complexes 'Ж-3', 'И' and 'Л'. Among them are pieces from local and distant sources. Interestingly, the highest amount was found at complex 'Ж-3'. The source material of these six pieces came from the current Ternopil's'ka-Rivne region (*ibid.*). Among other finds are a round punching stone and a disk-like polishing stone, which were reported for complex 'Щ'. Antler axes were found in two cases at complexes 'Ч' and 'Щ'.

Figure 20. Loom weights in situ at complex 'Ю' (photo by M. Yu. Videyko).

Loom weights

Loom weights were observed at 17 buildings. Among the fully excavated features, 55 % show remains of vertical looms. They can be found both on and under the platform. The best-preserved remains of such a vertical loom were recorded at complex 'Ю'. Here, 63 weights were documented in over four rows of one meter in length. Among them, four pyramidal pieces were incised and painted with ochre (fig. 20).

While the evidence is usually too scarce to suggest more than one loom per building, two distinct concentrations were observed at complex 'П-2' by the excavators. This is, however, one of the cases where two buildings and their inventories overlap each other, rendering it difficult to separate both inventories. Since for complex 'П-1' no remains of loom weights were mentioned, we can assume that one of the concentrations from complex 'П-2' belongs to 'П-1'.

3.1.6 Pottery and clay plastic

Pottery

Over the course of 16 field seasons, around 2000 vessels from over 100,000 sherds were reconstructed (Shmagliy and Videyko 2004). It is reported that the number of vessels was unevenly distributed between buildings, ranging from 20-130 vessels and 1000-5000 sherds per feature. Pottery was divided into two major groups – kitchenware (coarse ware) and fineware. Kitchenware makes up between 3-20 % of the pottery inventory of a building. An average of 12 % is given for the buildings excavated from 1984-1989. Unfortunately, the pottery inventories of the respective features are still mostly unpublished. Complete accounts of the inventories are only given in the field reports in the cases of complexes 'K', 'Л' and 'M'. They provide but an impression of what to expect for the renewed excavations. Except for selected vessels, such as imports and imitations or examples of types, no pottery drawings have been published.

At the partially excavated complex 'K', one kitchenware pot (16 sherds) and four tableware vessels (93 sherds) were reconstructed. The mentioned vessel types include a biconical, a crater- and a pear-shaped vessel. The fully explored complex 'M' yielded 81 vessels, which were reconstructed from around 2000 sherds. From the inventory of the other fully excavated complex 'Л', 36 vessels were reconstructed from around 750 sherds.

So-called imports and imitations

Imports and imitations were only observed for the category of tableware. Imitations are defined by the excavators as vessels of foreign style made with local technological knowledge. Imports, on the other hand, are defined as being made from a distinct clay – very fine clay with no temper observable by the naked eye in this case – in contrast to local whitish kaolinite clays, which were mixed with quartzite sand. These imports are associated with western groups, mainly Chechelnyk (Ryzhov type 'wavy') and Petreni (Ryzhov type 'Tangentenkreisband').

Imports were found in 13-18 cases. The total amount is unclear, since the finds of complex 'Ж' and 'E' were not reported separately. Therefore, imports are observed for 38-55 % of the fully explored buildings. Most of them were sphero-conical (n=9) or biconical vessels (n=6) followed by conical (n=4) and spherical bowls (n=4). In addition, two cups and 'amphoras' as well as one pear-shaped vessel were labelled as imports by the excavators (Shmagliy and Videyko 2004).

Imitations, on the other hand, were found in six cases. Again, some finds were not reported separately – here from complexes 'Ж' and '3'. Imitations are therefore observed in 17 % of the fully excavated features. They are mostly associated with large biconical vessels and were decorated in the style of the Chechelnyk local group located to the west.

Besides these cases, bichromic vessels painted with additional white lines and dots were found at complexes 'Ж' and 'M'. Their origin remains unreported. It is possible that they are of earlier local group origin (see 2.3 Local groups of the Southern-Bug-Dnieper interfluve).

In two cases at complexes 'Ц' and '3', where a clear assignment is possible, both imports and imitations were observed. The differentiation between both categories is, however, debatable, because at one of the buildings of complex 'Ж' a crater-shaped vessel made from 'foreign' clay was reported to be decorated in local style. In the argumentation of Shmagliy and Videyko, this would then resemble an imported imitation from western groups. This classic approach to contacts between regional style and technique is open to debate but will probably change with the use of geochemical analysis for the vessels in question.

Figurines, sledge models and tokens

Anthropo- and zoomorphic figurines as well as tokens were mostly found in the refill of pits. In the context of buildings, they were only observed at fully excavated structures. Of these, plastic art was found in 28 % of the cases. Tokens were even more rare and were recorded for two cases at complex 'M' and '2'. While the two pieces from complex 'M' were of a plain spherical type, the piece from complex '2' is of rather odd shape. It is even questionable if this artefact should be labelled by the excavators as a token. Another odd artefact is the cylindrical object with seven broken branches found at cluster 'Ж' (*ibid.*, fig. 44, 7) Figurines were found in various places inside and under the buildings. At complex 'И', three anthropomorphic and one zoomorphic figurine, depicting a sheep according the excavators, were found on the former ground level below the platform. The large naturalistic figurine at complex 'C' was also found on ground level, while an anthropomorphic one was found below the collapse between the buildings 'Я-1' and 'Я-2'. At complex 'Л' and '6', they were found close to the fireplace, which is also a depicted location for figurines in house models (Palaguta and Starkova 2017). The anthropomorphic figurine of complex '4' was found baked into the burnt daub remains. It remains unclear if this occurred during the burning of the building or if it was part of the 'temper'. The location of two anthropomorphic figurines for the cases of complex 'Р' and 'Щ' was not reported. Zoomorphic versions depicting a bear were observed for complexes 'В' and 'Р' (Shmagliy and Videyko 2004, fig. 51,2+4). At complexes 'Ж-2' and 'И', fragments of sledge models were found (*ibid.*, fig 46,1).

3.1.7 Pits

Over the course of 16 field seasons, 24 pits were observed of which 19 are clearly related to Trypillia times (tab. 6). The pits I-V in trench 'Ж' reportedly cut through the burnt daub remains and are therefore probably related to the kurgan above it (*ibid.*, 2004, 69-70). In 68 % of the cases, pits were found beneath buildings (see fig. 11). They were unrelated to buildings in only two cases.

Based on the depth, measured from the Trypillia surface, two types of pits can be distinguished. The first type is characterised by shallow pits with a depth of up to 40 cm and the second type includes pits between 60-210 cm in depth lying at an average of 120 cm below the former occupational surface. The deepest pit 'I' is interpreted as a possible granary (*ibid.*, 70).

A relation between pits and buildings is assumed by the excavators based on the presence of burnt daub in the refill and the possible sagging of the house floor into the pit. A high amount of burnt daub in the refill is suggested to be related to the demolishing and clearing of an area for new buildings. If the outline of a pit is visible as a depression of the platform, an open clay extraction or household pit is suggested to be related to the building above it (*ibid.*, 84).

The pits under complexes 'Я-1' and 'Я-2' were interconnected in the upper part. While the refill of pit 'Я-1' hints at a fast deposition of building debris, pit 'Я-2' was observed to be refilled gradually (*ibid.*, 82).

For pit '4', the excavators suggest several intervals of use. Due to the large size of the pit, an initial usage for clay extraction is assumed. The lower layers consisted of dark soil with inclusions of pottery, animal bones and lighter soil, which are interpreted as household waste. Above the lower layers, a refill of burnt daub with wooden imprints is reported and interpreted as the end of the household use-life. The upper layer, then, was filled again with pottery and animal bones, which marks another household's waste (*ibid.*, 85).

For Shmagliy and Videyko, the remains of burnt daub with wooden imprints and plaster on them is a hint for an earlier phase of occupation (*ibid.*, 67). This was also suggested for the findings of the renewed excavations in 2013 (Müller *et al.* 2017b).

Pit VI is of unusual elongated and irregular shape, measuring 9 x 4 m in extent and 1.3 m in depth (see fig. 10). While on the bottom around 3000 sherds of fine and coarse ware, figurines and broken stone tools were found, the upper layer was marked by a kind of sunken floor with unfired daub mixed with chaff. The excavators suggest that this is the remains of a 'half-storey economic building' (Shmagliy and Videyko 2004, 70). In the case of pit VI, we can assume a pit with a preserved so-called unburnt building above it, since pits below buildings have been observed on several occasions. The adobe building was probably saved from ploughing influence by the additional soil of the kurgan above it.

The excavators suggest that pit 1, including finds of vitrified pottery, hints at the remains of pottery production (*ibid.*, 67). There is, however, no simple connection between secondary burnt or vitrified pottery and production waste as will be shown for the case of a kiln and its surrounding pits excavated in 2014.

Around 40 fragments and complete anthropomorphic figurines were found in the pit under complex 'П' (*ibid.*, figs. 48,1-2; 49,6; 50,1-7). The upper part of a naturalistic figurine was refitted with the lower part coming from pit '5' beside

Pit-no.	Pit designation	Context
1	Ж-I	southeast of building 7 (kurgan)
2	Ж-II	between building 8 and 9 (kurgan)
3	Ж-III	cutting building 7 (kurgan)
4	Ж-IV	cutting building 8 (kurgan)
5	Ж-V	between building 8 and 9 (kurgan)
6	Ж-VI	between building 8 and 9 (kurgan)
7	1	unconnected to building
8	2	under building 34
9	3	under building 35
10	4	east of building 34
11	5	beside building 21
12	6	between building 21 and 37
13	7	east of building 37
14	8	under building 41
15	9	under building 42
16	Л	under building 14
17	Е	under buildings 4-5
18	П	under building 17
19	О	under building 16
20	Ц	between building 26 and 27
21	Ш	under building 28
22	Ю	under building 30
23	Я-1	under building 31
24	Я-2	under building 32
25	50	pit to building 12
26	52	pit to building 44
27	60	unconnected to building
28	80-1	south of kiln phase 1
29	80-2	south of kiln phase 1
30	80-3	east of kiln phase 3
31	91	pit to building 54
32	110	pit to building 67
33	111-1	pit under ring-building
34	111-2	pit under ring-building
35	111-3	pit under ring-building
36	111-4	pit under ring-building
37	111-5	pit under ring-building

Table 6. Excavated pits at Maidanets'ke between 1971-2016.

complex 'У'. They were observed in the upper part and at the bottom together with ashy layers. It is assumed that figurines were broken before deposition (*ibid.*, 75). A comparable pit was observed in relation to complex 'E'. Here various amounts of zoo- and anthropomorphic figurines as well as tokens were found. Remains of a sledge model as well as a house model were found in pit '6'. Another sledge model was observed in the filling of the pit under complex 'Я-1'.

Four different types of pits were observed based on their filling. The type with household refuse consists of various amounts of broken pottery, animal bones and tools. The type with burnt daub is related to the demolishing of previous buildings. Pits with various clay plastic pieces are also related to burnt daub but exclusively with ash layers. The last type consists of pits with burnt and vitrified pottery and is possibly related to pottery production.

3.2 Discussion of previous findings

3.2.1 Collapsed walls or connected buildings?

Shmagliy and Videyko (2004, 88) reconstruct clusters of buildings as so-called inhabited walls (жилых стен) based on their interpretation of the overlapping burnt house remains. An evaluation of this interpretation is relevant for two reasons. First, an elaborate defence system is one of their arguments for a (proto)-city interpretation (Shmagliy 1982, 69; Shmagliy and Videyko 2004). Second, interconnected buildings or 'inhabited walls' also imply their relative contemporaneity. However, in Shmagliy and Videyko's extensive study on architectural remains, a possibility of collapsed walls is hardly mentioned at all. This might be due to the rejection of the traditional interpretation of the 'ploshchadka' as ground level buildings (*ibid.*, 63). They follow the idea of a timber-frame and massive daub wall construction as suggested by Zinkovsky (*ibid.*, 65). An operational definition of wall collapse is given in the field report of 1984 as 'pieces of burnt daub found with imprints on their upper side'.

Since the reconstruction of clusters as 'inhabited walls' is essential for a proposed micro-chronology, household divisions and the stage of urbanisation, a closer look at the actual evidence is given below. Here, the archaeological evidence from clusters and freestanding buildings will be compared.

Connections of burnt daub concentrations were observed on many occasions for both the uppermost layer and the level of the platform of buildings. Pieces of burnt daub were found up to 2.5 m between buildings. They can sometimes be distributed over the whole long side of the features or only be 1.5 m wide. The overlap between complex 'C' and 'Э' showed wooden imprints following the long-axis of the former buildings, while the main structures showed imprints facing crosswise (*ibid.*, 78). This was also the case for the overlap between complexes 'Ш' and 'Щ' (*ibid.*, 80), and complexes 'Ю' and 'Я-1' (*ibid.*). Imprints on the upper side found at complex '6' are interpreted, in contrast to the prior definition, as bridges/connections between complexes of a cluster (*ibid.*, 72).

For the overlap between complexes '9' and '10', several rounded imprints with a diameter of 3-5 cm as well as plank imprints were recorded following the long-axis of the former buildings (*ibid.*, 85). These rather small diameters were at best half as wide as the observed post imprints of the main daub distributions, but they are interpreted as posts supporting a connection between both complexes (*ibid.*). Such evidence, especially when following the long-axis, can rather be interpreted as the remains of a collapsed wattle-and-daub wall, than the static support for a bridge.

The excavators argue that, for example, the edges of complex 'И', which show major distortions from a rectangular plan (see fig. 14), measuring 0.9 x 14.5 m and 2.5 x 12 m, are separate rooms of the ground level (Shmagliy and Videyko 2004, 87).

While the central burnt daub was found 0.3 m below ground with imprints facing across the long-axis, the edges were buried at -0.8 m with imprints mainly following the long-axis of the former building (Shmagliy and Videyko 1985). The centre was compact and the edges were unevenly distributed with pieces seemingly displaced, but with artefacts found underneath (*ibid.*).

An interpretation of the edges as collapsed walls was considered, yet rejected, because imprints were only found on the lower sides of the burnt daub and were too compact for fallen debris, which contradicts both the observations and their definition mentioned above. For them, only imprints on the upper side are indicators for collapsed walls (*ibid.*). Considering the displaced distribution of burnt daub, their steep fall-off in the described profile and the direction of imprints in contrast to the platform, all observed evidence hints at wall collapse from the upper storey's superstructure.

It seems as if the distribution of daub is in any case interpreted as constructive space. This is especially prominent in the case of the overlap at complex '6' and the distortion at complex 'И'. In other cases, if not overlap or constructive space, major distortions from a rectangular layout are rather seen as disturbances due to ploughing than a possible wall collapse (see complex 'M'). Thus, we can conclude that the buildings of a cluster were most likely not architecturally connected.

3.2.2 Types of buildings

Based on the large amount of excavated buildings, the excavators were able to distinguish different size classes and functions. Sizes of buildings were doubled, based on their two-storeyed nature, but in the following, their ground plan area is given. Videyko distinguishes between average buildings with a ground plan extent of 30-80 m², making up 82 %, features with an extent of 145-200 m² making up 10 %, and small structures of up to 25 m² found in 8 % of the excavated cases (Videyko 1996, 61). While most of the buildings with an upper floor are interpreted as dwelling and economic complexes, some buildings were probably not inhabited and show an exclusively economic character. Besides these main categories, the excavators interpret large buildings with several rooms on the upper floor as public buildings. Even larger structures of up to 600 m² (complex 'H') were observed during the Dudkin survey, but never excavated. This feature type is known today as an exceptional or ring building with an architecture different from that of dwellings or economic complexes.

After the excavation of several clusters, Shmagliy and Videyko observed a pattern where clusters of smaller buildings alternated with clusters of larger buildings (Shmagliy and Videyko 1993, 56). While smaller buildings are said to show the classic interior of dwellings with podia, hearths, 'altars' as well as grinding stones and looms, the larger buildings show exceptional inventories with rare pottery types, plastic art and hoards including copper items or bone pendants (Videyko 1996, 63). These well-equipped larger buildings are said to occur once per 12-16 regular dwellings.

Whereas two hoards can be confirmed, the reconstructions of larger buildings, such as complexes 'Ж-2' or 'П', are questionable since they were probably not connected at all. The interpretation of overlap as a structural connection in favour of the 'inhabited wall' hypothesis also produces a false perception that larger buildings were comparably well-equipped in relation to regular dwellings. For the above presented size distribution of buildings, the supposedly connected structures were already separated. There it could be shown that in fact only two buildings show larger dimensions.

The inventories provided by Shmagliy and Videyko can be used to describe different types of buildings in more detail. For this analysis, only the completely excavated buildings were considered since they present presumably complete inventories. According to the cluster analysis (Ward's method), there are three larger types of buildings and two rare categories (fig. 21). Several combinations of inventories are observed. First, the quantity of grinding stones appears to be related to the amount of

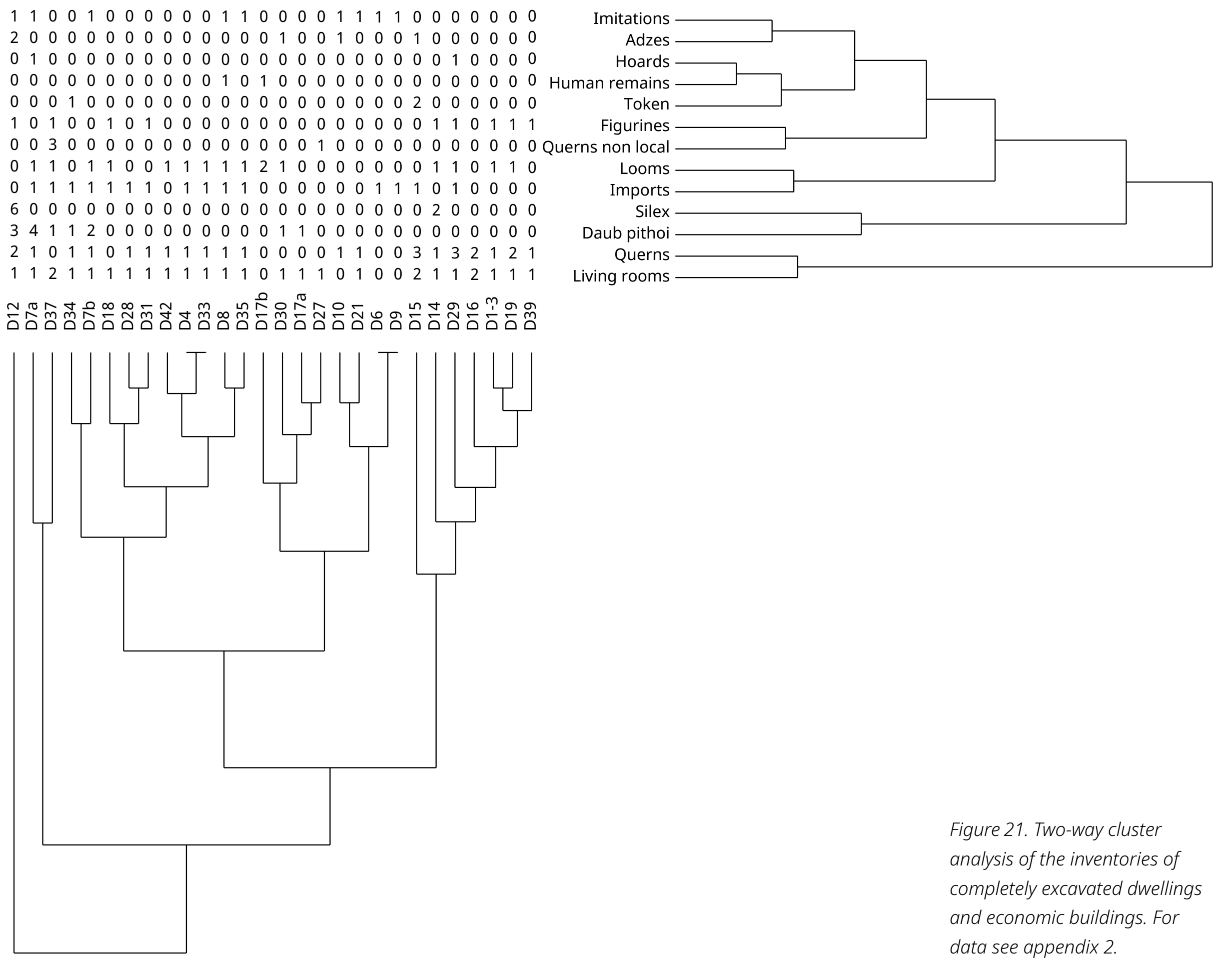


Figure 21. Two-way cluster analysis of the inventories of completely excavated dwellings and economic buildings. For data see appendix 2.

living rooms per building. This is possibly due to the pattern of one clay trough being related to one living room including a hearth, podium and 'altar'. Furthermore, silices and fixed storage vessels also appear to be related to the number of looms and pottery imports. Another result of the analysis is that the number of imported querns seems to be connected to the amount of plastic art found in the building. In addition, the occurrence of hoards, tokens and human remains appears to be related. Finally, pottery imitations of other local groups and stone tools are connected.

The applied correspondence analysis seems to be less conclusive (fig. 22). Here, we observe several outliers such as the categories of non-local querns, findings of human remains and silices. A clear difference can be observed between dwellings and economic buildings. They show, however, no clear connections to certain types of inventories. Dwellings with stone tools, silices and storage vessels appear to be related, as well as dwellings with figurines and more than one living room. Other connections are difficult to observe.

In result, we can conclude that there were notable differences between households, which were of complementary nature. Households with 'rich' inventories, such as hoards, show possible items of trade with the presence of tokens, whereas trade goods, such as pottery imports, are found in other households specialised in textile production. Items for food preparation are found in most dwellings and a higher amount of these items seems to be related to larger families with multiple living rooms.

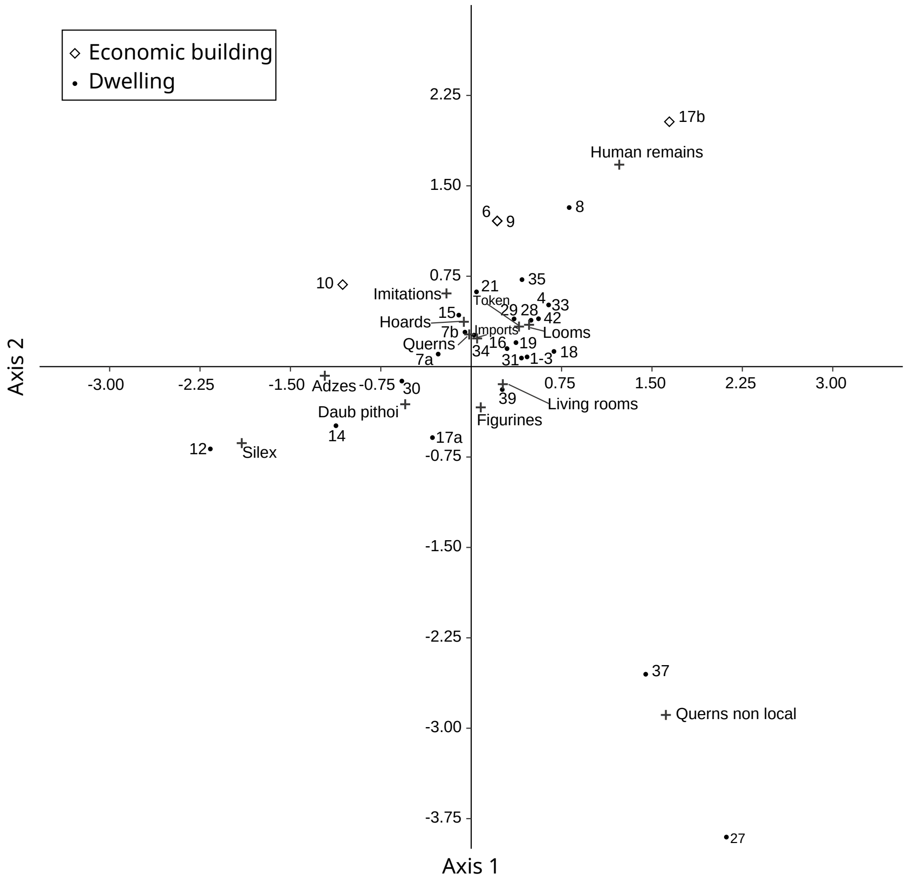


Figure 22. Correspondence analysis of the inventories of completely excavated dwellings and economic buildings. For data see appendix 2.

3.2.3 Site development and micro-chronology

The investigations at Maidanets'ke I led to several conclusions concerning the character of the site, its chronology and development (Videyko 1996). Based on the infill of various pits, it was concluded that the settlement had at least two phases of occupation. The burnt daub debris with wooden imprints and plaster suggested a first occupation with buildings that were demolished and then deposited in pits. These pits were mostly found below dwellings in the southeastern part of the site (see fig. 11).

A micro-chronological approach for the houses *in situ* showed no statistical differences according to the excavators (Shmagliy and Videyko 1990). This is in line with their interpretation of the buildings being interconnected and thus inevitably contemporaneous. They acknowledge, however, that the archaeomagnetic dating shows differences of 50-100 years between buildings in clusters (Videyko 1996, 54). Nevertheless, these results were refuted in favour of the 'inhabited wall' hypothesis (*ibid.*).

The overall development of Maidanets'ke is characterised as gradually growing after an early unplanned occupation spreading over the eastern and central part of the site. This occupation is then interpreted as infill found in several pits. A second stage of occupation is related to the concentric rings. They are suggested to develop from the inside to the outside. This interpretation is based on the excavations at various house rings. A gradual development from the inner to the outer ring is, however, questionable since the abovementioned micro-chronology yielded no observable differences between house inventories. The final stage of development is suggested to be marked by an expansion beyond the usual second concentric ring found at other settlements with the conclusion that, in the end, the whole settlement was burned down.

4 The renewed investigations since 2011

After the collapse of the Soviet Union, the investigations at Maidanets'ke were interrupted until the beginning of international research in 2011. Initiated by Knut Rassmann, Romano-Germanic Commission of the German Archaeological Institute Frankfurt, the renewed geophysical survey at Maidanets'ke showed known features, such as dwellings in larger detail, and revealed new structures, such as pits, pottery kilns, an enclosure, and exceptional buildings, in prominent positions inside the settlement. With the continuation of the geophysical survey in 2012, Kiel University joined the investigations and developed an interdisciplinary research agenda for the following years (Rassmann *et al.* 2014; Müller *et al.* 2017b; Chapman *et al.* 2014a). On the basis of the survey results, the internal chronology of the 'mega-site' is investigated as well as the potential contemporaneity of several 'mega-sites' in the research area around the Uman region. To do so, a radiocarbon dating program was initiated to sample each of the nine house rings at Maidanets'ke (Müller *et al.* 2016a; Müller *et al.* 2017b) and to take a regional sampling of larger and smaller settlements in the wider region of the Trypillia phenomenon (Müller *et al.* forthcoming). Furthermore, the environmental impact of potentially large populations as well as their subsistence economy and the carrying capacity of the past landscape is investigated. The social organisation for the integration of massive agglomerations of 'mega-site' inhabitants is investigated by renewed excavations of regular dwellings and recently discovered exceptional buildings (Hofmann *et al.* 2019).

4.1 Geomagnetic survey

Since 2011, state of the art geomagnetic surveys have been conducted, which successively replace the classic plan of Dudkin (Rassmann *et al.* 2016). Between 2011 and 2012, around 65 % of the site was surveyed, revealing around 1500 clearly burnt and around 400 less burnt or eroded buildings as well as eight exceptional buildings located at prominent places inside the settlement's pathway system. Furthermore, an equivalent number of pits, mostly related to buildings, as well as several potential pottery kilns and a ditch system were recorded (Ohlrau 2015, 50).

In 2016, surveys were continued during the spring and summer campaigns (fig. 23-24). The aim of the spring campaign was to survey the target area of a potential 'mega-structure' in the central eastern part of Maidanets'ke comparable to the neighbouring site of Nebelivka. The projected area was, however, only partially available, so other parcels further to the east were investigated. This eastern part of the settlement is located at a moderate slope bordering the modern reservoir. In the magnetogram, a large geological anomaly distorts the archaeological picture. Still, the bad preservation in this area is apparent. First, several houses are eroded due to the slope. Second, part

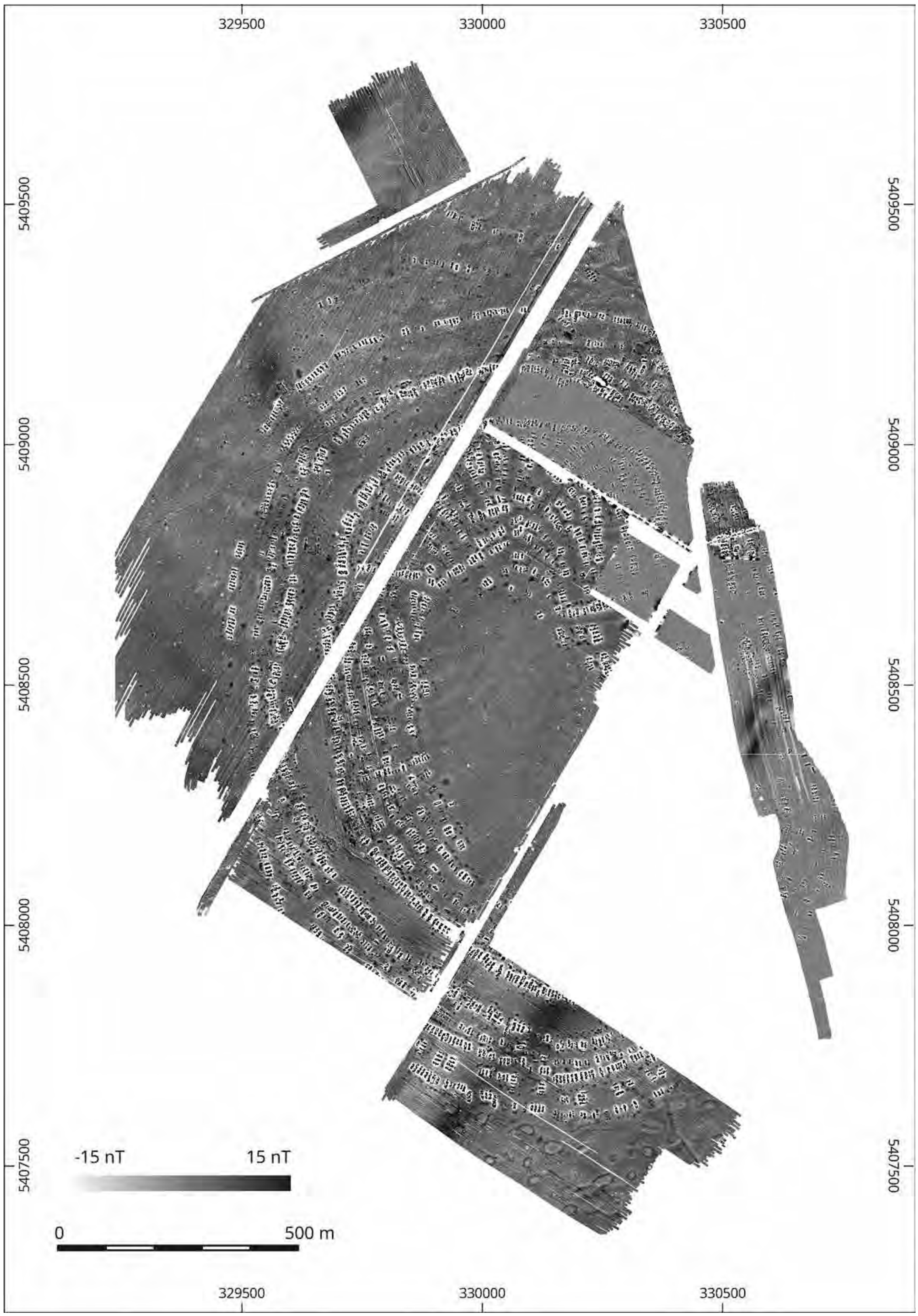


Figure 23. The current geomagnetic plot of Maidanets'ke I.

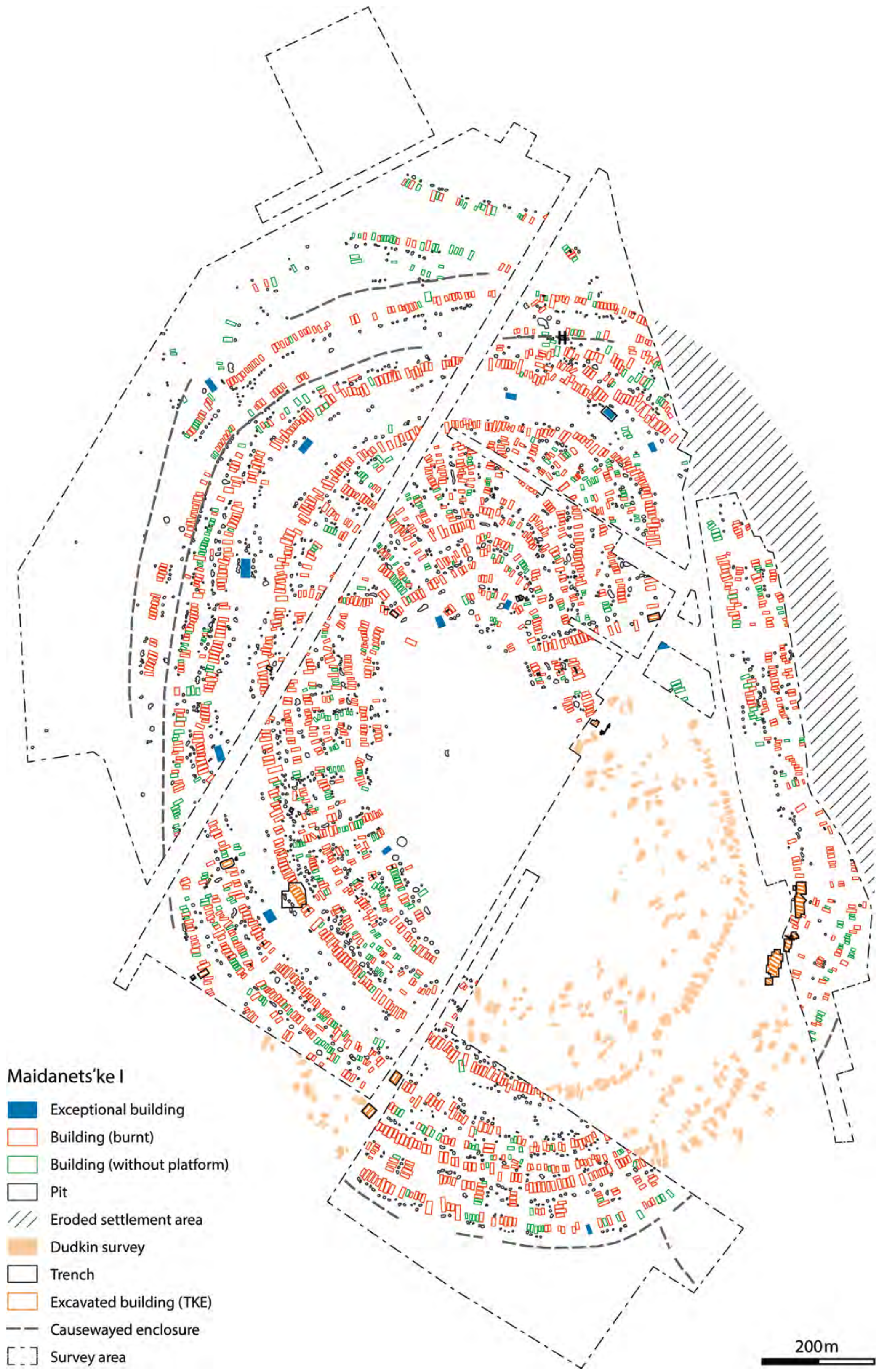


Figure 24. The current interpretative plot of Maidanets'ke I.

Buildings	n
Clearly burnt (surveyed)	1758
Clearly burnt (Dudkin calibrated)	461
Clearly burnt (Eastern erosion estimated)	103
Lesser burnt/eroded (surveyed)	496
Lesser burnt/eroded (Dudkin calibrated)	84
Lesser burnt/eroded (Eastern erosion estimated)	30
Σ	*2932*

Table 7. Observed and estimated buildings for Maidanets'ke according to the current survey.

of the easternmost settlement is lost to the reservoir, hence the former riverbed of the Trypillia times was located at least 90 m to the east. Based on the direction of the buildings in the outer ring, the approximate destroyed area amounts to ca. 10 ha.

The eastern part of the settlement is also important for the expected overall amount of buildings (tab. 7). In the Dudkin survey, most uncertain anomalies were recorded for this area. Now, only 249 secure and 21 potential anomalies of Dudkin's survey remain to be calibrated. The ratio between detected and undetected anomalies for the old and current survey was determined earlier as 1.85:1 and 4.02:1 for secure and potential features of the Dudkin survey (*ibid*., 65). Thus, another 461 clearly burnt and 84 less burnt or eroded buildings are to be expected for the remaining survey area. For the eastern eroded part of the site, another method must be applied. Here, the building density per hectare of the surveyed slope area is applied to the expected missing part of the site. The slope area yielded 124 clearly burnt and 36 lesser burnt or eroded buildings on 12 ha, therefore the building density for this part lies at 10.3 buildings/ha for burnt and 3 buildings/ha for eroded ones. Thus, around 100 clearly burnt and 30 lesser burnt or eroded buildings are expected to have been lost.

During the summer excavations, additional surveys were conducted in the northern part of the main ring and the northeastern inner part. Here, three additional exceptional buildings located inside the main ring were revealed. Furthermore, in the target area of a potential 'mega-structure' parts of a larger building were detected showing comparable architectural traits of exceptional buildings. Its direction is parallel to the long side of the surrounding buildings of the inner main ring. Interestingly, in close proximity to the north, the large and well-equipped dwelling 'M' was excavated. Unfortunately, the dimensions of the potential 'mega-structure' remains unknown. Parts of it are located below the tree line, which was a field street in former times. The building's preservation is therefore questionable.

Another remarkable find is the location of a house cluster inside the northeastern main ring between two exceptional buildings (fig. 25). The cluster of three and two further buildings are in line with the orientation of dwellings in the eastern inner main ring. The orientation of the eastern exceptional building appears to be in line with this cluster. Based on these orientations, it can be suggested that these buildings belong to the displaced house rows north of the main settlement. The site's occupation is thus even more complex than previously assumed.

In sum, around 82 % of Maidanets'ke have been surveyed so far. The overall extent of the site, including the eroded eastern part, lies at around 195 ha. Following the inner ditch, the initially planned extent of the site amounted to around 170 ha. Currently, 1758 clearly burnt and 496 lesser burnt or eroded buildings can be observed. Taking the calibrated Dudkin data and the erosional loss in the eastern part of the site into account, a total of around 2930 buildings are to be expected for Maidanets'ke (tab. 7). Furthermore, seven exceptional buildings are found along the main ring and four others at the inner and outer ends of the pathway system. Additionally, part of a 'mega-structure' is located at the inner eastern main ring.

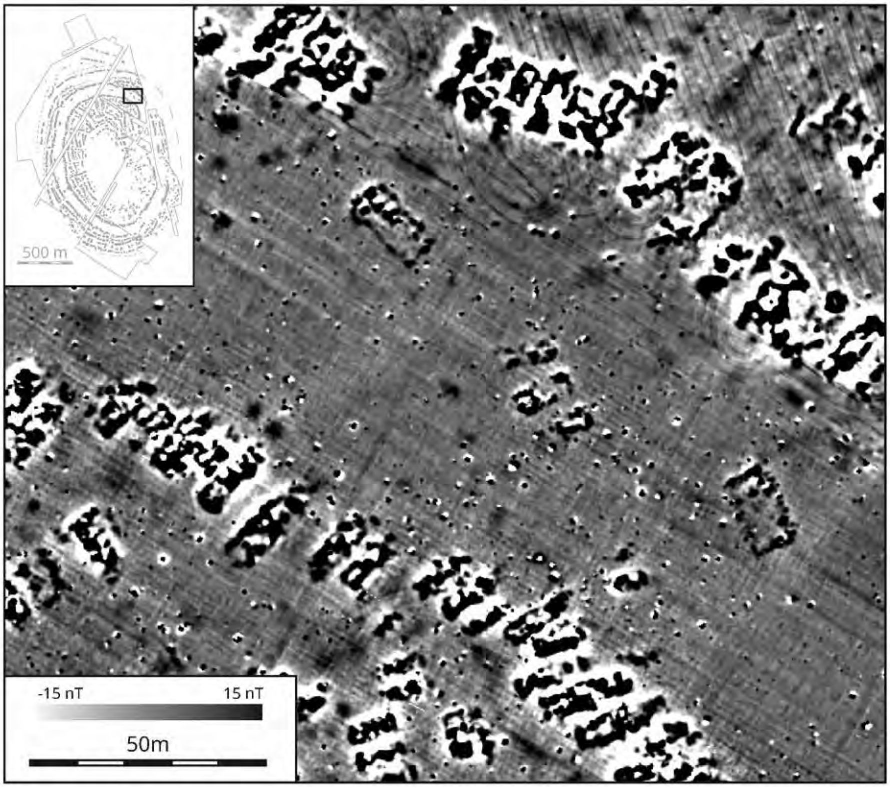


Figure 25. House clusters inside the northeastern part of the main ring and new exceptional buildings.

4.2 The 2013 excavations

In 2013, excavations at Maidanets'ke were resumed to investigate the topics mentioned above (Müller *et al.* 2017b). With the help of the high-resolution survey, target excavations could be conducted on dwellings and pits (fig. 26; tab. 8). Overall, a complete dwelling (no. 44 in trench 51) and its associated pit (trench 52), two other pits of various size and nanotesla intensity (trench 50 and 60) as well as eight test trenches (71-79) on dwellings of each house ring were excavated (*ibid.*, 27).

The excavation of dwelling number 44 in trench 51 revealed a typical Trypillia building with a mineral tempered platform resembling the first floor and a ground floor below (*ibid.*, 34-45). On the first floor, several fixed installations and artefacts were found. In general, the dwelling is divided into a northeastern room, making up one third of the whole building, and a larger southwestern main room making up two thirds of the overall structure (*ibid.*, fig. 13).

In the northeastern part of the building, the anteroom, a clay bin was found which was attached to the northern wall. In the main room, a clay podium was observed along the longitudinal southern wall of the building. Furthermore, an oval platform or 'altar' in traditional Ukrainian research was located in the back of the building's main room. A square platform of heavily burnt daub in the northern corner of the main room is interpreted as the former hearth of the building. No fixed installations were found on the ground floor of the former dwelling. Unfortunately, around one third of the building, mainly the anteroom, was looted by illegal excavations. Thus, the number and distribution of portable artefacts present only a part of the former household inventory. While artefacts from inside the dwelling are interpreted as having been *in situ* locations, artefacts from around the dwelling could also represent relocated objects related to earlier or later activities at the settlement (*ibid.*, 40). At least 50 pottery vessels were reconstructed for the household. Bowls were found in the southeastern corner of the anteroom, on the podium and along the longitudinal walls in the main room, and outside in front of the southeastern wall. Cups were concentrated between the hearth and the 'altar' in the main room, as well as outside the building along the southwestern longitudinal wall. Larger storage vessels were also found to be concentrated between the hearth and the 'altar'. Quern stones were found in fragmented form in the anteroom. In the main room, a complete set of grinding stones was located in the southwestern corner next to the entrance and opposite to the hearth. Further fragments of querns were found in the back of the building near the 'altar'. Outside the dwelling, the fragment of a spindle whorl hints at textile production. Loom weights, however, were not observed for this dwelling. Only one fragment of a flint blade was found outside the dwelling. Among special finds were two fragments of figurines, which were located on the podium in the main room. Two spherical clay tokens were found in the anteroom. The small number of bones was mostly found in the immediate surrounding of the building. On the ground floor, several pots and fragments of quern stones were observed. Overall, dwelling 44 has been interpreted as a household and a typical Trypillia dwelling with an upper floor divided into two rooms as living space, a ground floor as storage space, and activity zones around the building for tool production, characterising it as a 'house place' with a household pit behind the back of the dwelling (*ibid.*, 39).

Around 9 m behind the short side of dwelling 44, a pit with an upper diameter of 4.6 m and a depth of 1.5 m is located (trench 52). In contrast to other settlement pits, the feature yielded only few artefacts, which were mostly located at the bottom and the sides of the pit. Among them are two pottery vessels, a biconical vessel and a bowl. Further finds include animal bones and burnt daub weighing below 1 kg in total. Probably, the pit was initially dug out to produce around 10 m^3 of clay to construct dwelling 44 (*ibid.*, 45).

Two other pits excavated in 2013 produced very different results. The pit in trench 50 was selected for excavation since it probably belongs to dwelling 12 (complex 'И') and hence provides a link between the renewed investigations and the excavations of the Trypillia Complex Expedition. In the upper part, the pit was of rectangular shape with rounded corners, while in the lower part the feature was oval. It measured around 3.9 x 3.0 m in planum view and up to 1.2 m deep. The bottom of the pit showed a burnt surface on which two cattle skulls and several pottery vessels were deposited. Here, a bowl, two biconical vessels, an 'amphora', and a lid were found. A next layer on top was characterised by a massive filling of burnt daub. The density of daub decreased closer to the top of the pit. In this layer two cups, a biconical vessel, and an 'amphora' were retrieved (*ibid.*, 54-55). Furthermore, an antler, an adze fragment, three figurines and three pieces of flint were recovered. Comparable to the pit in trench 52, the pit in trench 50 is interpreted as the result of the building of dwelling 12. The deposition of two cattle skulls and pottery are seen as remains of celebrating the destruction of an earlier dwelling. It is suggested that the demolished earlier dwelling is represented by the layer of daub on top (*ibid.*, 56).

The excavation of the pit in trench 60 again produced different results (*ibid.*, 57-59). It was not directly connected to any building and was filled with a massive amount of burnt daub. The pit was of rectangular shape with rounded corners, measuring 4.0 x 3.5 m in planum, and was 1.5 m deep. Stratigraphically, the feature was recut at least three times and filled with loosely packed burnt daub between ashy sediments. Artefacts were not associated with the different recuttings of the feature. However, among the pottery were several conical bowls, a spherical bowl, a sphero-conical and a pear-shaped fineware vessel as well as coarse ware. Additionally, a loom weight, two quern stone fragments, four whetstones, and a piece of flint were found. Based on the retrieved artefacts and the massive amount of burnt daub, the pit in trench 60 is interpreted as the deposition of demolished houses, whereas the lower fillings could represent remains from the earliest occupation phase at Maidanets'ke (*ibid.*, 59).

Five out of eight test trenches yielded sufficient samples for radiocarbon dating (*ibid.*, tab. 8). Here, five dwellings (47-48, 50, 52, and 53) in four trenches provided *termini ad quos* dates from within buildings. Among the artefacts of dwelling 45 in trench 71 were coarse ware sherds, a fineware bowl and sherds of biconical vessels. Dwelling 46 in trench 72 yielded fineware sherds of cups, bowls, pots as well as biconical and pear-shaped vessels. Dwellings 47 and 48 in trench 73 were divided by a narrow gap of 50 cm between both buildings. The artefacts from both dwellings were not separated. Among them were coarse ware sherds as well as fineware cups and bowls. Unfortunately, no samples or artefacts could be retrieved from dwelling 49 in trench 74. Below dwelling 50 in trench 75, a fineware cup was found. Dwelling 51 in trench 76 only yielded a fineware lid, but unfortunately no samples for radiocarbon dating. Below dwelling 52 in trench 77, a sphero-conical vessel was found. The trench number 78 remained unused. No artefacts were reported for dwelling 53 in trench 79. However, sufficient samples for radiocarbon dating were retrieved from this trench.

In total, 35 samples were dated from the 2013 campaign (*ibid.*, 75-77). Based on the results, it was concluded that most of the dwellings distributed over the nine rings of the settlement existed contemporaneously between 3800-3600 cal BCE and ended collectively after this time. Thus, it was argued that the radiocarbon dating supports a deliberate burning of dwellings at the end of occupation at Maidanets'ke. Furthermore, the results from pits suggest an earlier occupation at the site dating back to 3900 cal BCE, represented by burnt daub and household waste deposited in those pits. For a typo-chronological interpretation of the results, a selection of pottery was classified via the typology developed by Ryzhov (2012b) and interpreted via correspondence analysis, including radiocarbon dates for the different relative chronological stages (Müller *et al.* 2017b, 84-85). In result, dwelling 44 in trench 51 and the pits from trench 50 and 60 fall into the relative phase of Tomashivka 3. The dating of the pits via correspondence analysis clearly contradicts the argument that these features belonged to a previous occupation phase. However, the results from test trenches were omitted in the correspondence analysis, although diagnostic pottery was retrieved during excavations. Thus, it can be concluded that the typo-chronological analysis of the 2013 excavation remains inconclusive.

Nevertheless, the 2013 excavations provided important results to develop further strategies for the investigation of Trypillia 'mega-sites'. It was concluded that further target excavations on various features throughout the settlement would be necessary to clarify the chronological development of Maidanets'ke. The unfortunate partial looting of the otherwise completely excavated dwelling 44 in trench 51 reduced overall knowledge about household inventories documented with state-of-the-art methods. Furthermore, exceptional buildings or 'mega-structures' as well as the ditch system remained to be investigated. With these open questions in mind, research at the 'mega-site' of Maidanets'ke was continued in the following years.

House no.	Year	Feature	State of excavation	Width (m)	Length (m)	m²
69	1971	А	partial	-	-	-
1-3	1971-72	Б	complete	6	12	72
70	1971	В	partial	-	-	-
71	1971	Г	partial	-	-	-
72	1971	Д	partial	-	-	-
4	1972-73	Е-1	complete	5	11	55
5	1972-73	Е-2	complete	3	10	30
6	1974-1980	Ж-1	complete	4,5	11	49,5
7a	1974-1980	Ж-2a	complete	5,5	15	82,5
7b	1974-1980	Ж-2b	complete	5,5	15	82,5
8	1974-1980	Ж-3	complete	5	16	80
9	1974-1980	Ж-4	complete	5	14	70
10	1984	З-1	complete	5	14	70
11	1984	З-2	partial	5	14	70
12	1984	И	complete	9	21,5	193,5
13	1985	К	partial	4,7	7,9	37,13
14	1985	Л	complete	4,5	10	45
15	1985	М	complete	7	24	168
73	*(1987)*	*Н*	unexcavated	-	-	*600*
16	1986	О	complete	4,3	12,6	54,18
17a	1986	П-1 (North)	complete	4	15	60
17b	1986	П-2 (South)	complete	6	15	90
18	1986	Р	complete	1,2	5,6	6,72
19	1986	С	complete	4,2	10,4	43,68
20	1986	Т	partial	4	12	48
21	1989	У	complete	5	14	70
22	1987	Ф	partial	4,6	11,4	52,44
24	1987	Х	partial	4,2	10,8	45,36
26	1987	Ц	partial	4	11	44
27	1987	Ч	complete	3,5	10	35
28	1987	Ш	complete	4,4	10,5	46,2
29	1987	Щ	complete	3,8	10	38
23	1987	ы	partial	4,5	10	45
25	1987	Э	partial	4,5	14,5	65,25
30	1987	Ю	complete	5	13,5	67,5
31	1987	Я-1	complete	4,3	14	60,2
32	1987	Я-2	partial	4	11,4	45,6
33	1988	1	complete	4,6	14,2	65,32
34	1988	2	complete	4,5	10,7	48,15
35	1988	3	complete	4,3	10,5	45,15
37	1989	4	complete	4,8	15,6	74,88
38	1990	5	partial	4	-	-

House no.	Year	Feature	State of excavation	Width (m)	Length (m)	m²
39	1990	6	complete	5	10	50
40	1990	7	partial	4	-	-
41	1991	8	partial	5	-	-
42	1991	9	complete	5	14	70
43	1991	10	partial	-	-	-
36	1984	Trench 3	partial	-	-	-
44	2013	51	complete	4	14,5	58
45	2013	71	partial	3	9	27
46	2013	72	partial	4	12,5	50
47	2013	73	partial	4	12,5	50
48	2013	73	partial	4	15	60
49	2013	74	partial	4	14,5	58
50	2013	75	partial	3	11	33
51	2013	76	partial	3,5	15,5	54,25
52	2013	77	partial	4	12,5	50
53	2013	79	partial	5,5	16,5	82,5
55	2014	91	partial	4,5	12	54
54	2014	92	complete	4	11,5	46
56	2014	92	partial	4	10,5	42
57	2014	93	partial	3	9,5	28,5
58	2014	93	partial	5,5	13,5	75,25
59	2014	94	partial	5	9	45
60	2014	95	partial	5,5	12,5	68,75
61	2014	96	partial	4	14	56
62	2014	96	partial	4,5	11,5	51,75
63	2014	100	partial	5	12,5	62,2
64	2014	101	partial	5	13,5	67,5
65	2014	102	partial	3,5	10	35
66	2014	103	partial	3,6	10,5	37,8
67	2016	110	partial	4	13,5	54
68	2016	111	complete	8	18	144

Table 8. Current number of dwellings explored at Maidanets'ke and their dimensions.

4.3 The 2014 and 2016 investigations

In 2014, international excavations were continued, and preliminary results have already been presented elsewhere (Müller *et al.* 2016c). In the following section, the complete archaeological results of the 2014 campaign are presented (fig. 26). During this campaign, a potential pottery production areal, consisting of a kiln area and several pits (trench 80), a complete dwelling (no. 54 in trench 92), and thirteen dwellings in nine test trenches (91, 93-96, and 100-103), were excavated. The investigations were continued in 2016 with the excavation of the enclosure (trench 110), which is presented here, and the complete excavation of an exceptional ring building (trench 111) in the northern part of Maidanets'ke. The results of this building are currently being analysed by the interdisciplinary team of the D1 subproject of the CRC 1266 'Scales of Transformation' (Hofmann *et al.* 2019).

Figure 26. Renewed excavations at Maidanets'ke. Only archaeological trenches are plotted.

4.3.1 Trench 80 – pottery production area

With the renewed geomagnetic survey, new types of anomalies were discovered. One of these consisted of circular features with a high flux density. Rassmann was the first to identify these anomalies as potential pottery kilns (Kruts *et al.* 2011). In 2013 and 2014, target excavations were carried out at Tal'yanky and Maidanets'ke to verify these potential pottery kilns (Korvin-Piotrovskiy *et al.* 2016). Indeed, most excavated locations revealed various furnace constructions, which can be interpreted as freestanding updraft kilns. The number of channels as well as the superstructures are variable. While known features from Tal'yanky and Nebelivka show a single construction phase, the Maidanets'ke feature is to date the only multi-layered version of this kiln type (*ibid.*).

Besides the confirmation of the geomagnetic anomaly as an actual kiln, the excavation of 2014 in Maidanets'ke followed several other research questions. Trench 80 was laid out over 10 x 11 m in order to catch an entire activity zone connected to pottery production, including potentially associated pits in the proximity of the kiln anomaly (fig. 27).

Concerning the kiln, Korvin-Piotrovskiy and colleagues (*ibid.*, 240) suggest that three phases can be distinguished. Here, a first construction was later followed by another rebuilding event, when its loading zone was turned by 90 degrees to the east.

The earliest phase is characterised by a half-round, three-channel updraft construction with the no longer preserved loading zone to the southeast. The inner partitioning of the furnace channels was rounded, whereas the outer walls were flat, suggesting the remains of a superstructure (*ibid.*, 244). Several parts of large vessels were incorporated into the clay construction. Those inclusions are especially valuable to determine which types of pottery were produced before or at the time of different phases of the kiln.

The separation of the furnace and the firing chamber remains unclear. The reported clay slabs (*ibid.*, 245), which serve to divide pottery from the fuel similar to Nebelivka (Burdo and Videyko 2016, 100), could not be confirmed for the Maidanets'ke case.

The second phase suggested by Korvin-Piotrovskiy and colleagues (2016, 241) is characterised by the refilling of furnace channels and poorly preserved walls constructed on top and in place of the first phase. This phase can rather be interpreted as repairs or laying the foundations for a rebuild, which is labelled as the third phase by Korvin-Piotrovskiy and colleagues (*ibid.*).

A last phase is characterised by a complete rebuild on top of the previous phases turned by 90 degrees (*ibid.*, 242). In order to reconstruct the kiln, the previous phase had to be removed. Only few traces of a former superstructure were observed. The rebuilt kiln is of the same type as the previous ones, characterised by three channels and a half round overall shape. The inner partitioning walls are rounded on top and inclined on the sides, also leaving the channels rounded in contrast to earlier constructions. According to Korvin-Piotrovskiy and colleagues (*ibid.*), these walls showed intense firing marks and partly laminated surfaces, suggesting several repairs. In addition, the rounded upper parts of the partitioning walls showed traces of slagging clay, rendering an interpretation of the channels as combustion chambers even more plausible.

The scatter zone around the kiln and the infill of the last phase channels are yet another question concerning kiln construction. Korvin-Piotrovskiy and colleagues (*ibid.*, 243) suggest that the scattered pottery sherds and pieces of burned daub depict the former and collapsed superstructure. Yet, it is also possible that these remains are waste disposal after the final use of the kiln, as has been interpreted in the case of the Nebelivka furnace (Burdo and Videyko 2016). Müller and Videyko (2016, 86) interpret the scattered pottery and daub as evidence of final activity around the kiln, which remained undisturbed by modern ploughing at 0.6m below the surface. For them, the last cultural layer in connection with the use-life of the kiln was observed way lower. Thus, in their conclusion, the kiln was already not in use some time before the settlement was abandoned (*ibid.*).

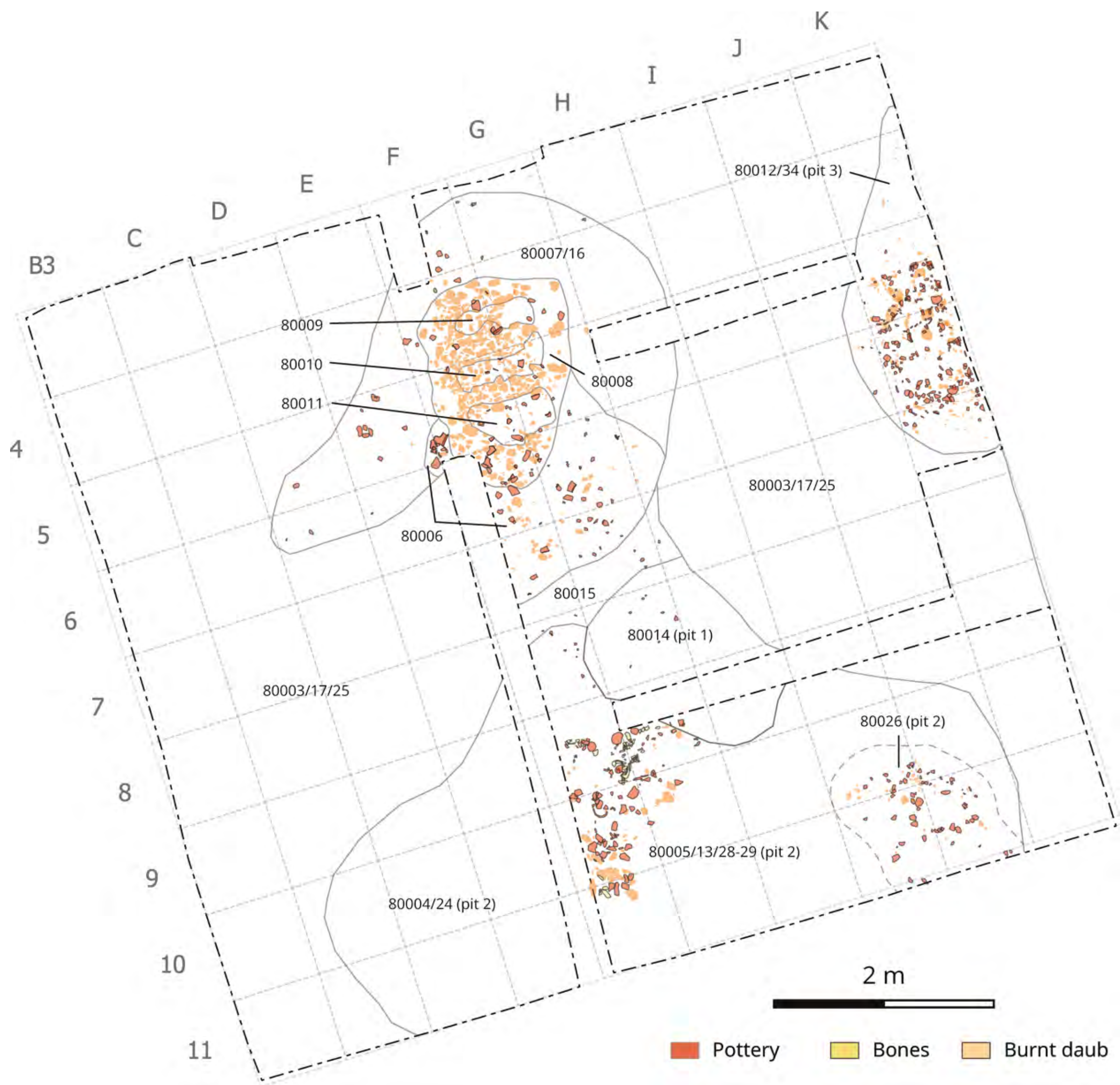


Figure 27. Overview of trench 80 including context signatures.

Müller and Videyko (*ibid*., 90) propose that the two pits to the east and the south are connected to the kiln area, facing the loading zones of different phases. The southern pit with its various layers is interpreted as having been in use over all generations of kilns. However, the last deposition containing bones and an antler axe are seen in a ritual context (*ibid*., 91). Korvin-Piotrovskiy and colleagues (2016, 238) suggest that due to the artefacts in the pit refill, these were, in fact, connected to pottery production. Among other artefacts, the pits contained highly fragmented, vitrified and deformed pottery, which was sometimes baked into clay, which was suggested to have been parts of the kiln (cf. Müller and Videyko 2016, 86). Yet, this is also the case for several other pits with infill of burned down and demolished dwellings previously excavated (Müller *et al.* 2017b). The question in this case is how to distinguish between settlement pits filled with burned house remains and material associated to pottery production?

This chapter provides a detailed analysis of the features excavated in 2014 and discusses the questions raised by the preliminary reports. Propositions of these

Feature group	Context ID	Interpretation
Geo Top	80001	Topsoil 1 (Chernozem)
	80002	Topsoil 2 Transition
Occupational layer	80003	Occupational layer
	80017	
	80025	
Kiln – End	80007	Kiln – scatter zone (spit 3)
	80006	Kiln – clean out zone (south) (spit 3)
	80016	Kiln – scatter zone (spit 4)
	80015	Kiln – clean out zone (south) (spit 4)
	80018	Layer with calcium carbonate fallout above kiln
	80009	Kiln – channel northern infill
	80010	Kiln – channel central infill
	80011	Kiln – channel southern infill
Kiln – Phase 3	80008	general
	80019	Collapsed dome
	80023	
	80031	Kiln – northern furnace channel
	80032	Kiln – central furnace channel
	80033	Kiln – southern furnace channel
	80020	Loading zone (east)
	80021	
	80022	
Kiln – Phase 2	80035	general
	80037	Channel infill west
	80038	Channel infill central
	80039	Channel infill east
	80042	White plaster (renovation)
Kiln – Phase 1	80036	general
	80041	Walls of kiln phase 1
	80030	Eastern wall of kiln phase 1
	80043	Burned daub under kiln phase 1
Pit 2	80004	Western part (spit 3)
	80005	Eastern part (spit 3)
	80013	Eastern part (spit 4-5)
	80024	Western part (spit 4-5)
	80028	Eastern part (spit 5)
	80029	Western part (spit 5)
	80026	Shallow lens south-east
Pit 3	80012	Planum outline
	80044	Second infill
	80045	First infill
	80034	negative
Pit 1	80014	Planum outline
	80046	Fourth infill
	80047	Third infill
	80048	Second infill
	80049	First infill
	80040	negative
Geo	80027	natural

Table 9. Features and contexts of trench 80. For a detailed description see context catalogue.

reports are to be evaluated. This is especially important for the context of the kiln area in order to provide plausible phases for typo-chronological analyses.

The following questions will be addressed: Which features were recognised? How many phases can we distinguish? Are the surrounding pits connected to pottery production, and if so, how?

4.3.2 Features

For trench 80, three main areas are of importance: first, the kiln with its immediate surroundings; second, various overlapping pits to the south; and third, part of a pit to the east (fig. 27; tab. 9).

Kiln

The archaeological remains (tab. 9) around the potential kiln area became apparent at 0.2 m below the surface (fig. 28-29). They were buried beneath a homogeneous and compact black soil (Chernozem) with a high concentration of organic matter (context 80001). Below the topsoil, a circular high concentration of burned daub with two ellipsoid elevated beams appeared (context 80008). The three channels between these beams (contexts 80031/32/33) were filled with brownish silt, including pottery and pieces of burned daub of up to 8 cm (contexts 80009/10/11). Surrounding this concentration, a layer of homogeneous and loosely packed brownish-grey silt with moderate intake of burned daub with sizes between 1-10 cm and a great deal of scattered pottery were found (contexts 80007/16). This layer diffuses to the south with fewer pieces of pottery and burned daub (contexts 80006/15), connecting the kiln area with the southern pit assemblage (context 80005). After removing the infill of the channels, a similar clay construction appeared below, but with channels turned by 90 degrees to the south (context 80036). The channels were filled with loosely packed greyish silt, which included a few artefacts (contexts 80037/38/39). On top of the infill, few traces of a thin whitish plaster (context 80035) were found on the channel walls. After removing the infill of the channels, a further plaster became apparent between the walls (context 80041), marking the original channels of the construction (context 80042). Under the walls and plaster, a 5 cm layer of reddish-burned clay was found, surrounded by the natural soil (context 80027).

Southern pit assemblage (Pits 1 and 2)

For the southern area, three depositions can be identified (tab. 9). A first deposition is characterised by an infill into a funnel-shaped pit (context 80040). The infill of dark brownish-grey silt with a high intake of pottery (contexts 80014/46/47/48/49) is clearly separated from a shallow trough-shaped pit (context 80013) cutting into the aforementioned pit infill (fig. 30). This second deposition is characterised by a high intake of bones, few pieces of burned daub and pottery (contexts 80013/24/28/29). Probably contemporaneous is a third very shallow deposition to the southeast (context 80026). With a depth of around 10 cm, marked mostly by a scatter of pottery, it is more of a filled depression than a pit.

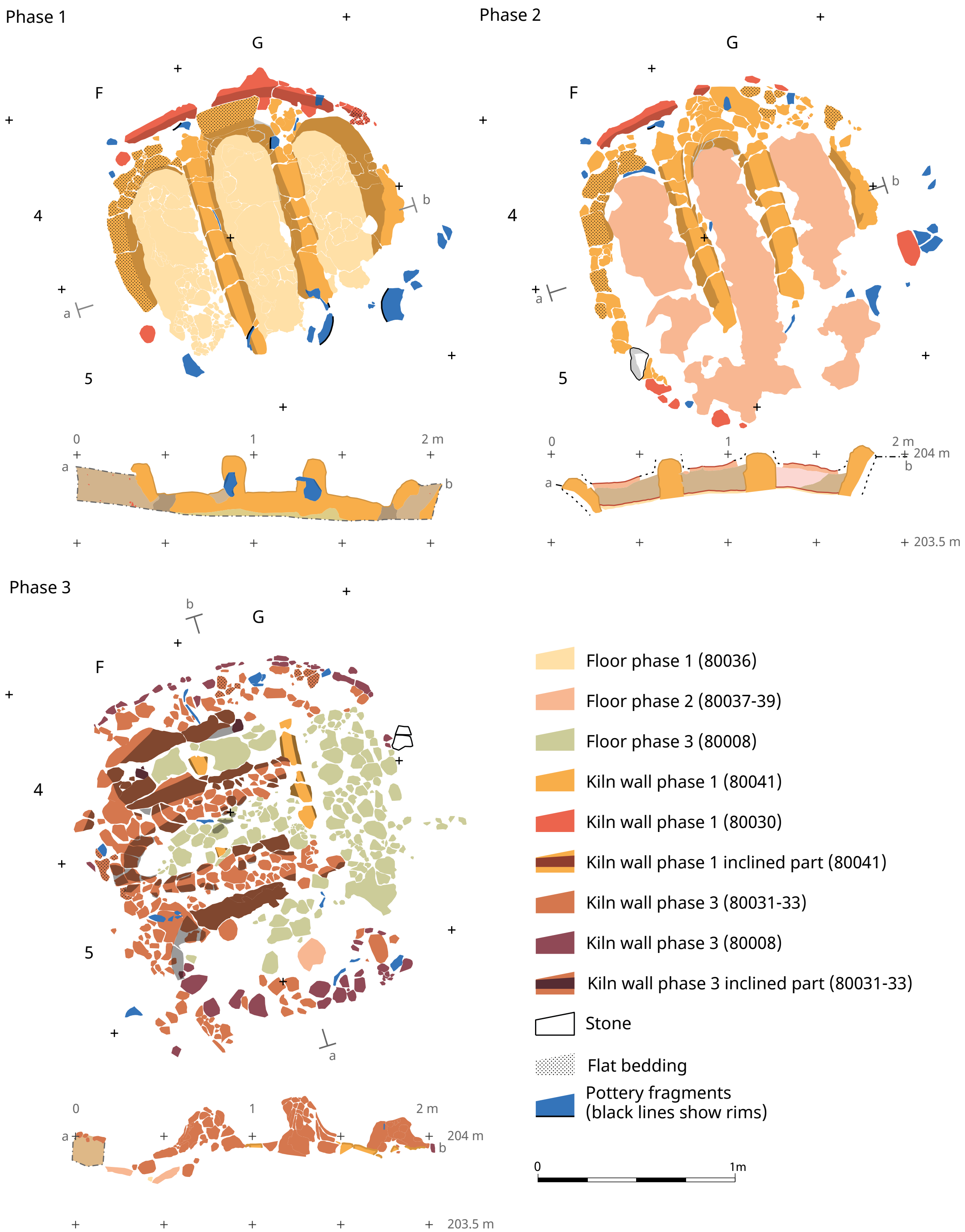


Figure 28. The three construction phases of the pottery kiln at trench 80 (modified after Korvin-Piotrovskiy et al. 2016, fig. 31. Original graphic by R. Hofmann).

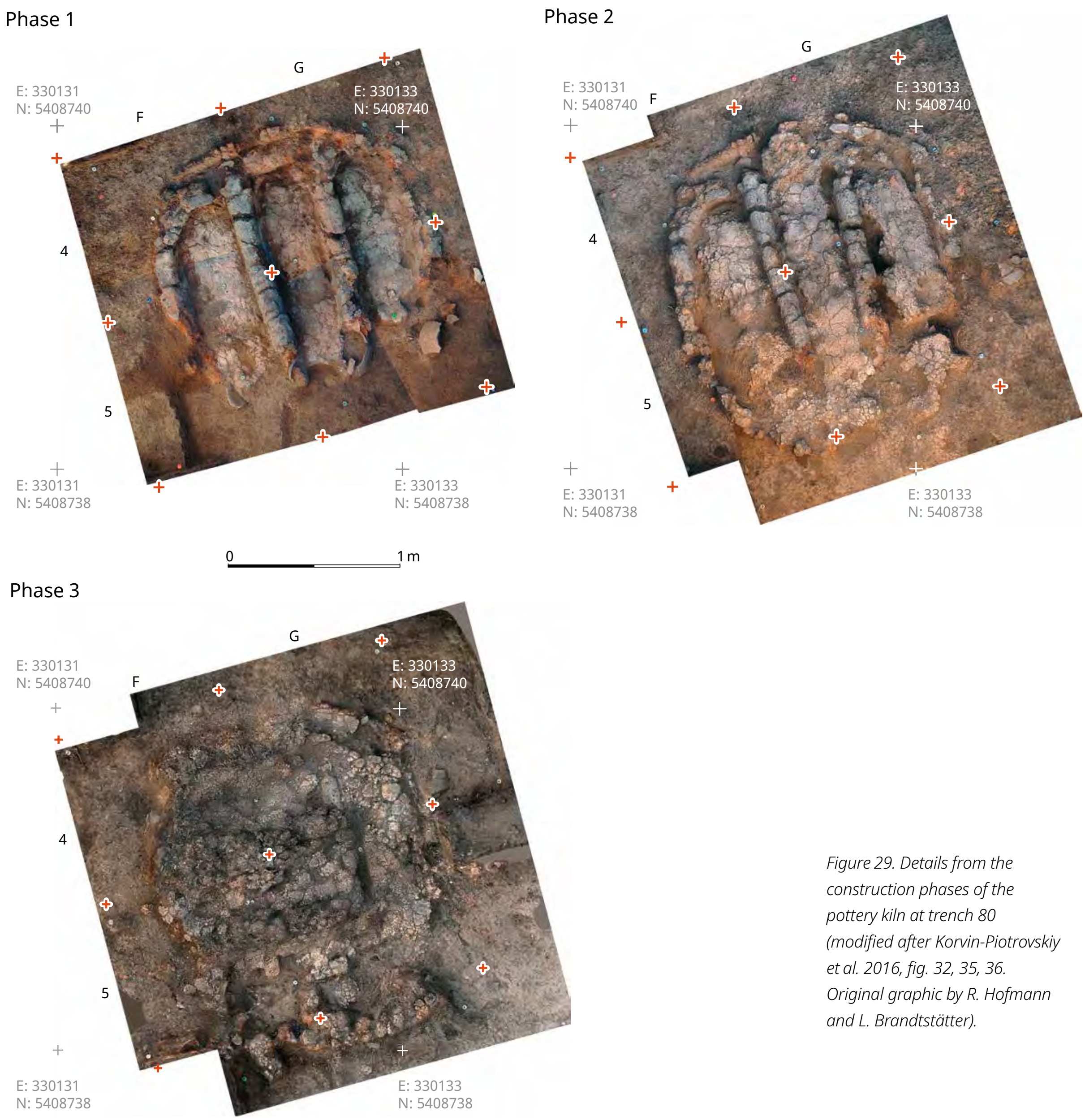


Figure 29. Details from the construction phases of the pottery kiln at trench 80 (modified after Korvin-Piotrovskiy et al. 2016, fig. 32, 35, 36. Original graphic by R. Hofmann and L. Brandtstätter).

Eastern pit (Pit 3)

A last area of interest lies to the east of the kiln area (fig. 30). Here, a high concentration of pottery and particles of burned daub mark the partial infill of a pit previously detected in the geomagnetic survey (context 80012). In profile view, this funnel-shaped pit (context 80034) is characterised by a chaotic infill of pottery and large pieces of burned daub with sizes of over 10 cm (contexts 80012/44/45). In the upper part, several fired granite stones were observed.

4.3.3 The stratigraphic sequence (and other relations)

Based on the observed features, the following sequence of events is proposed (fig. 31). Activities in the area begin with the pit for the first kiln construction and the construction of the first kiln (PH1). The construction of the first kiln is directly

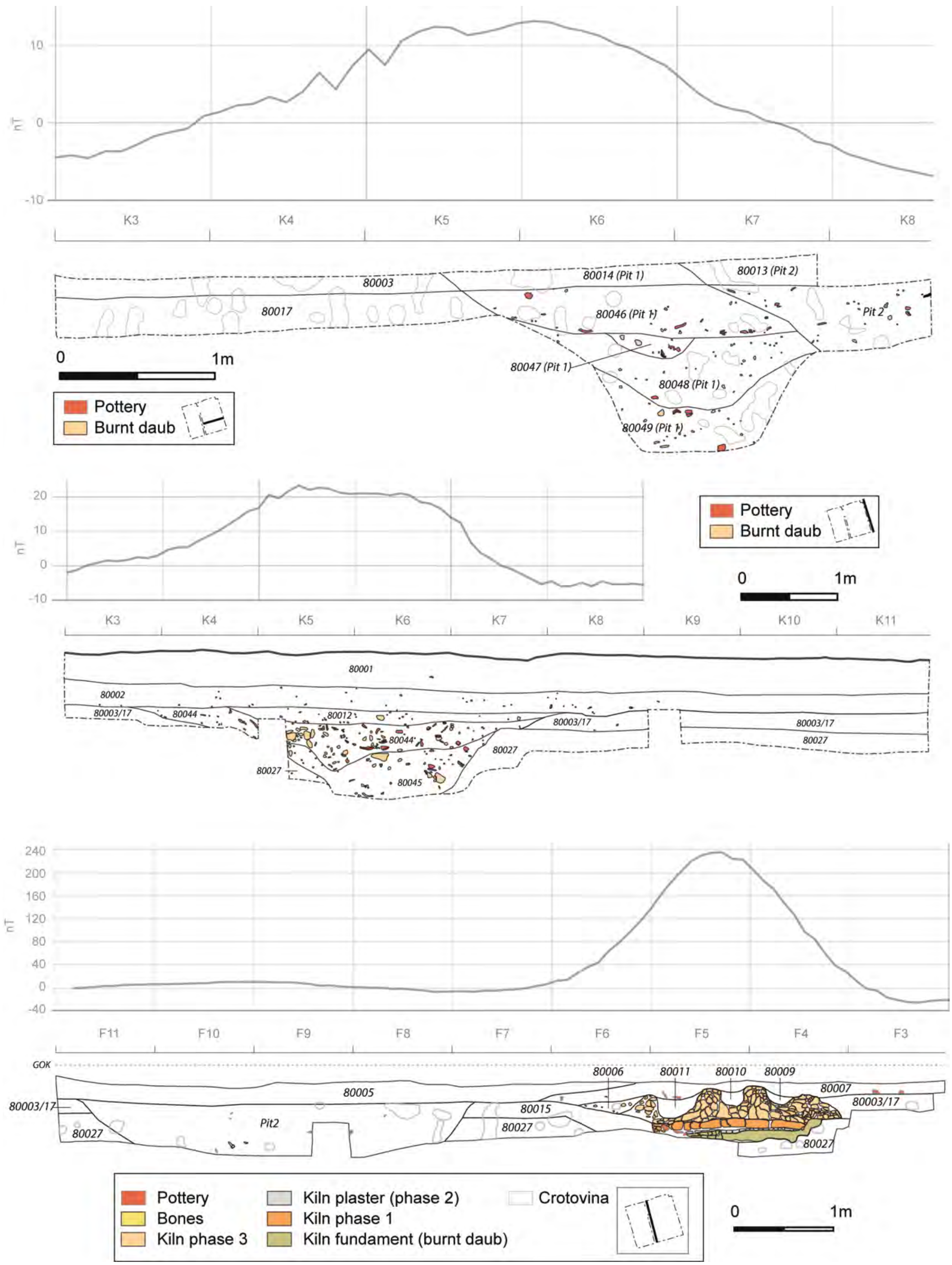


Figure 30. Main profiles at trench 80 showing pits 1-3, a section of the kiln's phases as well as the magnetic susceptibility of the respective features.

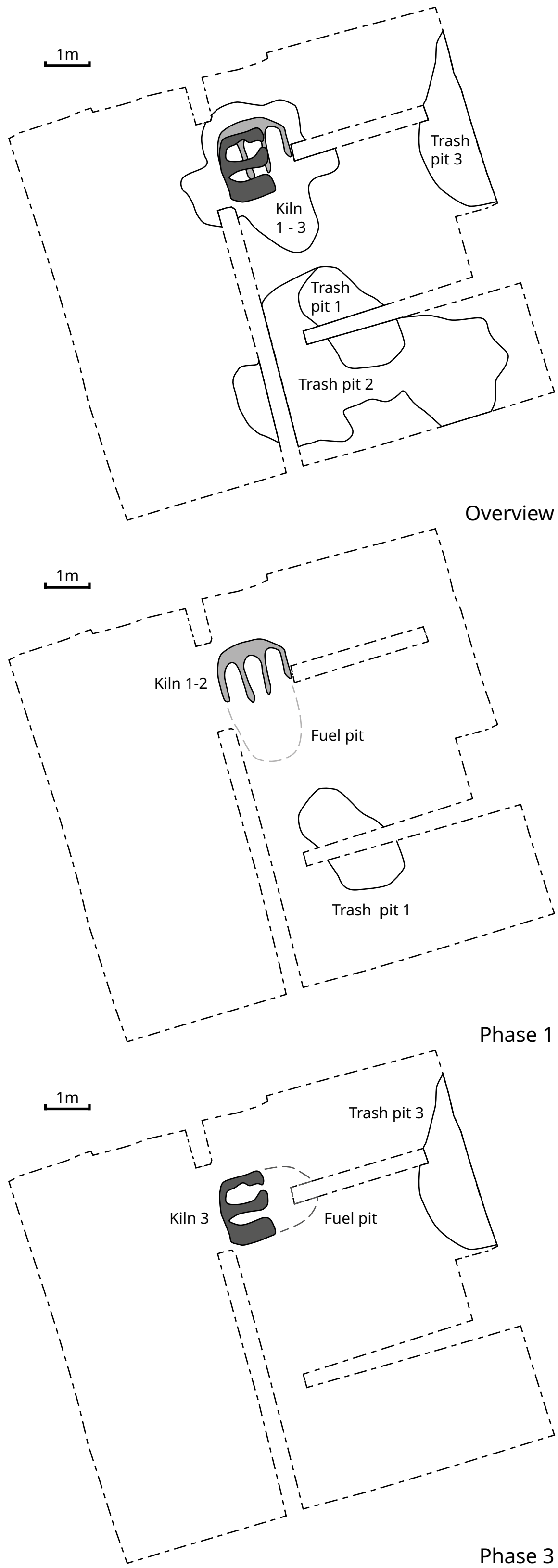


Figure 31. The chronological development of activities at trench 80.

related to the southern pit assemblage by a refitting of one of the large bowls. Based on the artefact distribution, feature characterisation and orientation, the earliest southern pit can be connected to the earliest kiln construction. This is the case because the loading zone of the kiln is faced towards the southern pit, which was filled with pottery with a second firing that is highly fragmented (see fig. 104). This observation confirms the hypothesis of Müller and Videyko (2016, 90).

The second phase is connected to the repairs of the kiln, which is still facing south, and the recutting and filling of the southern pit assemblage. In the third phase, the kiln was redesigned with the previous phases levelled and its channels filled with rubbish. The loading zone of the third kiln points east towards pit three. Like the argumentation for the first phase, the spatial relation is interpreted as relative contemporaneity. Finally, after the third use-phase the kiln is destroyed and then used for trash deposition.

4.3.4 Finds

Kiln – Phase 1

Pottery that was built into the first phase of the kiln makes up 4 % of the material recorded for trench 80 (tab. 10). Here, it was possible to determine the whole assemblage of over 5.2 kg including around 80 sherds of pottery. Fineware makes up 96 % of the material in weight with a low average fragmentation of 90 g/sherd for regular pieces. Weak traces of a second firing were observed for 21 % in weight with an average fragmentation of 45 g/sherd. Severe traces of firing were recorded for 15 % and this material shows a fragmentation of 68 g/sherd on average.

Coarse ware makes up 4 % of the assemblage with an average fragmentation of 25 g/sherd. Severe traces of firing were observed for 12 % with a fragmentation of 12 g/sherd on average.

Several pottery vessels were used as structural support in the construction of the first kiln. Three conical bowls – two of them rather large with rim diameters of 35-36 cm (plate 3, 1; 6, 2) and one of average size (plate 6, 1) – as well as a small biconical vessel with an eyelet below the rim (plate 5, 1) and a rim sherd of a 'crater-shaped' vessel (plate 4, 1) were found built into the channel walls. The construction of the first kiln is directly related to the southern pit 2 by a refitting of one of the large bowls (plate 3, 1).

On the shoulder of the crater-shaped vessel (plate 4, 1), part of a 'leaf' element is preserved, while the biconical vessel (plate 5, 1) shows several details. It shows the 'façade scheme' with two hatched filled half circles enclosing the eyelet. The eyelet itself is painted with lines following its shape and a diagonal line in the centre. The closing line around the sharp-edged belly shows a pattern of recurring triangles. Another triangle is also found on the upper body of the vessel, below a small filled circle. While the decoration scheme is typical for smaller biconical vessels, the triangle and circle elements are uncommon for Maidanets'ke. The average-sized bowl (plate 6, 1) shows a preserved simplified line scheme along the inner rim. Here, a pattern with a combination of a diagonal tapering line and five to six diagonal straight lines is visible. The refitted large bowl (plate 3, 1) also shows a simplified line scheme along the inner rim, but the pattern is exclusively made of diagonal tapering lines. The inner part is decorated with a complex variation of the 'comet' scheme. The wide comet arms are filled with horizontal line groups and the outer ends of the arms show hatched 'eyelash' elements.

	Pit 1		Pit 2		Pit 3		Kiln Ph1		Kiln Ph2		Kiln Ph3		Kiln waste		Occupational Layer		Top soil	
	g	n	g	n	g	n	g	n	g	n	g	n	g	n	g	n	g	n
Fine ware (all)	**9466**	**596**	**31333**	**2710**	**31972**	**2266**	**5041**	**70**	**1926**	**293**	**4604**	**99**	**17149**	**1313**	**18321**	**1588**	**9975**	**662**
secondary fired (weak)	1033	36	2001	242	4016	161	1035	23	521	9	248	3	2532	92	1245	115	1760	113
secondary fired (strong)	4911	312	23417	1095	13755	1588	752	11	1242	274	2284	74	11194	1112	13913	1023	7098	422
Slagged	121	3	937	10	346	25	0	0	0	0	1997	14	2225	21	205	7	99	6
Coarse ware (all)	**210**	**10**	**1249**	**65**	**929**	**110**	**200**	**9**	**216**	**7**	**247**	**5**	**370**	**17**	**789**	**71**	**378**	**22**
secondary fired (strong)	155	9	986	57	632	78	24	2	183	6	247	5	137	10	591	49	322	19
Undetermined	**339**	**160**	**553**	**506**	**1864**	**199**	**0**	**0**	**43**	**1**	**0**	**0**	**259**	**38**	**1206**	**325**	**121**	**38**
Sum	**10015**	**766**	**33135**	**3281**	**34765**	**2575**	**5241**	**79**	**2185**	**301**	**4851**	**104**	**17778**	**1368**	**20316**	**1984**	**10474**	**722**

Table 10. Pottery retrieved from the features of trench 80. Derived from project database.

Kiln – Phase 2

With 2.2 kg of material, including around 2600 sherds of pottery, the channel infill of the kiln's second phase makes up 1.6 % of all material retrieved from trench 80 (tab. 10). Here, 98 % of the pottery in weight was determined. Fineware makes up 88 % of the assemblage in weight and regular sherds show a fragmentation of 16 g/sherd. Traces of weak firing were observed for 27 % of the material in weight with an average fragmentation of 58 g/sherd. With 65 %, most of the fineware sherds show traces of severe firing and a very high fragmentation of only 5 g/sherd on average.

Coarse ware makes up 10 % in weight with an average fragmentation of 33 g/sherd for regular pieces. However, 84 % of the sherds in weight show traces of severe firing and an average fragmentation of 31 g/sherd.

In this assemblage, 2 % of the sherds remain undetermined with an average fragmentation of 43 g/sherd.

In order to provide a stable foundation for the third kiln, the channels of the first kiln were filled with daub and artefacts. Among these, two rim sherds of biconical vessels (plate 7, 6), a rim sherd of a conical bowl and parts of a large fineware pot were recovered (plate 7, 4). Only two small wall sherds show traces of paint (plate 8, 1-2). One can be identified as a simplified line (plate 8, 1), the other is part of a 'leaf' element (plate 8, 2). Besides these diagnostic fineware sherds, the rim of a coarse ware pot was recovered with a characteristic 'trumpet' lug below the rim (plate 7, 5).

A key artefact for the identification of the whole feature as a pottery kiln is the find of a portion of raw fineware clay (plate 8, 3). On the upper side, it shows several fingernail imprints to roughen up the surface. This find is proof for the processing of fineware vessels at the kiln site. This is in line with the find of another portion of raw material in the southern pit assemblage (plate 15, 3).

Kiln – Phase 3

Pottery that was built into the third kiln phase makes up 3.5 % in weight of all the material found at trench 80 (tab. 10). It was possible to determine the whole assemblage of 4.9 kg with around 100 sherds. However, no diagnostic pottery was observed for this construction phase.

Fineware makes up 95 % in weight with a high average fragmentation of 9 g/sherd for regular fineware. Weak traces of a second firing were observed for 5 % in weight and show a low fragmentation of 83 g/sherd on average. Not surprisingly, 50 % of the sherds show severe traces of fire and 43 % show slagging. Their respective fragmentation is 31 g/sherd and 142 g/sherd on average.

All of the coarse ware (5 %) shows severe traces of firing and an average fragmentation of 49 g/sherd.

Kiln – waste disposal

The scatter zone on and around the kiln yielded around 18 kg of material including 1400 sherds of pottery, which make up 13 % in weight of all the retrieved material at trench 80 (tab. 10). Fineware is represented by 97 % of the assemblage in weight with an average fragmentation of 14 g/sherds for regular fineware. Of these, 15 % show weak traces of a second firing and a fragmentation of 28 g/sherd on average. However, with 65 %, most of the fineware shows traces of severe firing and a high fragmentation of 10 g/sherd on average. Vitrified fineware makes up 13 % in weight with an average fragmentation of 106 g/sherd.

Around 2 % of the assemblage is made of coarse ware with an average fragmentation of 33 g/sherd for regular pieces. Severe traces of firing were observed for 37 % in weight with an average fragmentation of 14 g/sherd.

Only 2 % in weight of the assemblage remains undetermined with a fragmentation of 7 g/sherd on average.

A great quantity of pottery was found to be scattered on top and around the third phase of the kiln. Among the diagnostic pieces of the waste disposal at the former loading zone (context 80006) are fragments of a small biconical vessel with eyelets near the belly (plate 8, 5) and the upper part of a large biconical vessel with a severe second firing (plate 8, 7). Other fineware sherds include the broken bottom of a small cup (plate 9, 3), a painted rim fragment of a larger vessel (plate 9, 1) and a painted wall sherd with a large filled circle (plate 9, 2) typical for the 'volute' scheme (Ryzhov decoration type 10). The smaller biconical vessel has parts of a 'segment-shaped' decoration scheme preserved with hatched filled half circles enclosing the eyelet (plate 8, 5).

Among the coarse ware pottery are two rim sherds (plate 8, 4+6), of which one shows vertical brush marks along the neck and diagonal incisements along the rim (plate 8, 4). In the wider range of the scatter zone, another coarse ware vessel fragment was retrieved showing rougher vertical brush marks, a pair of vertical plastic applications and a fingerprint impression on the vessel's shoulder (plate 10, 2).

On top of the destroyed kiln and in the channel infill, two conical bowls (plate 9, 6) and a belly sherd of a large biconical vessel with eyelets near the belly were found (plate 11, 1). The surface of the biconical vessel is mostly eroded. Traces of lines following the shape of the eyelet are preserved, however. One of the conical bowls (plate 9, 6) shows the remains of a simplified line scheme along the inner rim with a pattern of diagonal triangles. Below this on the inner surface, the remains of an inward spiralling line are preserved. According to Ryzhov, this is a hint for either a 'comet' or 'figure eight' scheme.

Besides vessel pottery, a broken spindle whorl was found in the scatter zone (plate 9, 4).

Pit 1

The filling of pit 1 yielded 10 kg of material consisting of around 770 sherds of pottery, which make up 7 % of the pottery retrieved from trench 80 (tab. 10; 11). Overall, 97 % of the pottery in weight was definable. Fineware makes up 95 % of the assemblage with an average fragmentation of 14 g/sherd for regular fineware. Traces of a weak second firing were observed for 11 % in weight with an average fragmentation of 29 g/sherd. Fineware with traces of a severe second firing make up 52 % in weight and show a fragmentation of 16 g/sherd on average. Vitrified pieces were observed for 1.3 % in weight and show a lower fragmentation of 40 g/sherd on average.

Coarse ware makes up 2 % of the retrieved pottery in weight and regular sherds weigh 55 g on average. Traces of severe firing were observed for 74 % of the coarse ware in weight with an average fragmentation of 17 g/sherd.

The 3 % share of undetermined pottery in weight is negligible due to a high average fragmentation of 2 g/sherd.

The diagnostic sherds recovered from pit 1 represent primarily conical bowls of varying size (plate 11, 5-6; 12, 1-3; 15, 2, 4), with a rim diameter ranging from 22 cm to ca. 47 cm. These types are followed in quantity by biconical rims of varying size ranging from 10-26 cm (plate 12, 4; 13, 1-2) and biconical bellies (plate 13, 5, 7-8) reaching up to 40 cm. One of the biconical bellies is roundish (plate 13, 10), in contrast to the sharp breaks of the others. In addition, two belly sherds of cups were found (plate 13, 6) as well as a rim sherd belonging to a large cup or a crater-shaped vessel (plate 13, 4). Bowls show decoration of the simplified line scheme along the inner rim and fragments of the 'comet' or 'figure eight' scheme on the inner part. One well-preserved bowl (plate 12, 1) shows the complex version of the 'comet' scheme with 'eyelashes' on the outer ends (Ryzhov bowl decoration type 2.2.3). On the upper part of one biconical belly sherd (plate 13, 8), fragments of hatches and filled half circles are preserved as part of the 'segment-shaped' scheme (Ryzhov closed vessel

Vessel type	Pit 1	Pit 2	Pit 3
Fwp-1.1.1.1	7	6	3
Fwp-1.1.2.1	0	1	2
Fwp-1.2.1.1	0	0	1
Fwp-1.1.1.5	0	0	0
Fwp-1.7.1.1	0	0	0
Fwp-2.1.1.1b	1	0	0
Fwp-2.1.1.1c	0	1	0
Fwp-2.2.1.1a	1	1	1
Fwp-2.2.4.2	0	0	0
Fwp-3.1.1.1	6	6	3
Fwp-3.1.3.1	0	1	1
Fwp-6.4.1.1	0	0	0
Fwp-3.2.1.1	0	2	0
Fwp-4.1.2.1	1	0	0
Fwp-6.3.1.2a	0	0	1
Fwp-7.2.3.2a	0	1	1
Fwp-5.2.1.1a	0	0	0
Fwp-5.2.1.1b	0	1	0
Fwp-8.2.1.1	0	0	0
Fwp-8.3.x.x	0	0	1
Fwp-9.3.3.1	0	0	0
Fwp-9.3.2.1	0	0	0
Fwp-10.1.1.2	1	2	4
Σ	**17**	**22**	**18**

Table 11. Number of fineware vessel types retrieved from the pits at trench 80 showing the produced spectrum of types produced. For a description of the types see fig. 71-97.

decoration type 4.1.3). One wall sherd (plate 14, 3) shows a fragment of a large filled circle as part of the 'volute' scheme (Ryzhov closed vessel decoration type 10.2-5). Some wall sherds show groups of thin parallel lines enclosed by a broader line (plate 14, 2, 4), which is an uncommon decoration type for Maidanets'ke.

In addition to this fineware, two rim sherds of coarse ware were retrieved (plate 13, 3; 15, 5). Both show incisements on the rim, but only one has the typical vertical brush marks along the neck. One of the key finds for pottery production at trench 80 is the find of burnt raw clay material with a high amount of quartzite temper (plate 15, 3). This is a strong indication for the production of coarse ware for the first two kiln phases.

Pit 2

The filling of pit 2 yielded around 33 kg of material consisting of 3300 sherds of pottery, which makes up 24 % in weight of all pottery retrieved from trench 80 (tab. 10; 11). Overall, 98 % of all pottery in weight was definable. Fineware makes up 95 % of the assemblage with an average fragmentation of 4 g/sherd for regular pieces. Pottery with weak traces of a second firing is observed for 6 % of the material in weight with an average fragmentation of 8 g/sherd. Most of the fineware shows traces of a severe second firing (74 %) with a fragmentation of 21 g/sherd on average. Vitrified fineware makes up 3 % of the assemblage in weight with an average fragmentation of 94 g/sherd.

Coarse ware makes up 4 % of the assemblage in weight and regular sherds show a fragmentation of 33 g/sherd on average. With 79 % in weight, most of the coarse ware, which was found in pit 2, shows traces of a severe second firing. It is fragmented into 17 g/sherd on average.

The 2 % share of undetermined pottery is negligible since it shows a very high fragmentation of only 1 g/sherd on average.

In the filling of pit 2, most of the diagnostic pottery is represented by biconical vessels (plate 15, 7-8; 16-21, 1). Here, the vessel spectrum ranges from very large biconical vessels (plate 18, 6-7) to nearly complete mid-sized versions (plate 21, 1) and smaller ones with eyelets near the belly (plate 18, 5). They are followed by conical bowls with a diameter between 10-40 cm (plate 15, 6-7; 16, 1). Other types include large cups or crater-shaped vessels (plate 20, 3) and the handle of a 'crater' as well as a small cup (plate 20, 2). A well-preserved biconical vessel (plate 21, 1) shows the exact dimensions and 'segment-shaped' / 'tangent' scheme as a vessel in trench 96. Another biconical piece shows fragments of the 'volute' scheme (plate 16, 3). One of the large biconical vessels shows one of usually two rounded lugs near the vessel's neck (plate 18, 6). Bowls show the simplified line scheme along the inner rim. Only in one case is the inner part preserved on a bottom sherd (plate 20, 4). Here, a simple version of the 'figure-eight' scheme is preserved.

Among the coarse ware pottery are two diagnostic pieces of which one shows a line of incisements along the sharp-edged shoulder (plate 16, 6), while another vessel shows an s-shaped profile with horizontal brush marks at the belly and vertical brush marks at the neck (plate 19, 1). At the shoulder, a pair of round lugs is applied.

Some extraordinary finds were retrieved from the upper layers of pit 2. Here, two spherical clay tokens (plate 17, 2-3), a foot fragment of a zoomorphic figurine (plate 17, 4) and a bone bead were found. In addition, a shafted antler axe was found (plate 17, 1).

Pit 3

The infill of pit 3 yielded around 35 kg of material including 2600 sherds of pottery, which makes up 25 % of the overall material retrieved from trench 80 (tab. 10; 11). It was possible to determine 95 % of the material in weight. Here, 92 % is made of regular fineware with an average fragmentation of 28 g/sherd. Around 12 % shows weak traces of a second firing and a fragmentation of 25 g/sherd on average. With 43 %, a larger part of fineware shows traces of severe firing and a high fragmentation of 8 g/sherd on average. Few pieces (1 %) even show traces of slagging with an average fragmentation of 14 g/sherd.

Of the overall assemblage, 3 % is made of coarse ware in weight with a fragmentation of 9 g/sherd for regular pieces. From this share, severely fired pieces make up 68 % with an average fragmentation of 8 g/sherd. Around 5 % of the pottery remains undetermined with a fragmentation of 9 g/sherd on average.

The vessel spectrum of pit 3 includes both conical (plate 22, 1-6) and spherical bowls (plate 26, 4) as well as biconical vessels with (plate 25, 1) and without eyelets (plate 23, 6; 25, 2, 4), crater-shaped vessels of various sizes (plate 23, 1, 3-5) and a rare sphero-conical vessel (plate 23, 2). In addition, a rim sherd of a 'pear-shaped vessel' was retrieved (plate 26, 5). Bowls show various simplified line schemes along the inner rim as well as fragments of simple (plate 22, 1) and complex variations (plate 22, 5) of the 'comet' scheme on the inner surface. Biconical pieces show fragments of the 'volute' (plate 25, 1) and the 'segment-shaped' scheme (plate 25, 2). A cup belly sherd has preserved parts of the 'metopic' scheme (plate 25, 3), which is typical for medium sized cups. Large crater-shaped vessels show fragments of the 'closed leaf' element on the outer rim (plate 23, 1, 3). The sphero-conical vessel (plate 23, 2) with an eyelet below the rim shows a variation of the 'segment-shaped' scheme (Ryzhov closed vessel decoration type 4.1.3), whereby the eyelet is enclosed by half circles with 'eyelashes' on the inner side. Small filled circles are applied below the holes that are below the eyelets. Other wall sherds show fragments of a crop element and of a 'leaf' element. One wall piece shows several parallel thin lines (plate 25, 10), which are uncommon for Maidanets'ke.

Pit 3 shows the largest variety of coarse ware decorations. Here, rows of incisements were applied on or directly below the rim in diagonal or vertical direction (plate 24, 4-8), or in one case on the sharp-edged transition between neck and shoulder of the vessel (plate 24, 1). In addition to the typical vertical brush marks, pairs of vertical lugs are also applied to the vessel shoulders (plate 24, 2).

A key find for the understanding of the pottery production process is a sherd with a strong second firing and a rounded corner (plate 26, 1), which is interpreted as a shaping tool for unfinished vessels.

Occupational layer

Over 20.3 kg of material and 2000 sherds of pottery are assigned to the former occupational layer, making up 15 % of the overall amount of material retrieved from trench 80 (tab. 10). Of the overall material, 94 % in weight was definable. Around 90 % of the pottery in weight is made of fineware, with regular fineware showing a high fragmentation of 7 g/sherd. A small amount of fineware shows only weak traces of secondary fire with 7 % in weight and a fragmentation of 11 g/sherd on average. With 76 % in weight, a large part of fineware shows traces of severe secondary fire with an average fragmentation of 14 g/sherd. Only a small amount of fineware shows traces of slagging (1 %) with a fragmentation of 29 g/sherd on average.

Of the overall material, coarse ware makes up 4 % with an average fragmentation of 9 g/sherd for regular coarse ware. Traces of severe second firing were observed for 75 % of coarse ware in weight with an average fragmentation of 12 g/sherd. Around 6 % of the overall material remains undetermined, but it is negligible with a high fragmentation of 4 g/sherd on average.

Among the unusual finds of the occupational layer is a fragment of a sledge model (plate 1, 8) with traces of secondary firing.

4.3.5 Implications

From a technological point of view, the recently excavated kilns at Maidanets'ke and Tal'yanky confirm the advanced craftsmanship of Trypillia potters, which is known from the quality of the pottery itself. Freestanding updraft kilns provide a controlled atmosphere to maintain high temperatures favourable for the production of the fineware that we observe in the archaeological record. Although pottery can be produced in various ways, the type of kiln found at the 'mega-sites' provides a more controlled amount of firing loss than other types of firing (Rice 2015, 179). A disadvantage of the observed kilns is that with their relatively small size most of the fuel for firing is lost to heating the kiln itself (*ibid.*, 181). Moreover, it has been noted that kilns, in contrast to open firing, demand an increased amount of structural maintenance to assure stable firing conditions (*ibid.*). For both maintenance and the correct use of fuel, an increased expert knowledge is needed to damage neither the pottery nor the kiln. In addition, kiln firings can take several days or even weeks depending on production load, whereas other types of firing only demand several hours of labour (*ibid.*, 176). Hence, with the occurrence of kilns, a certain degree of labour division is to be expected.

At Maidanets'ke, we observe a repairing of the first kiln and later a rebuilding of the entire facility. Besides a careful construction to prevent cracks during thermal stress, attention also has to be paid to the orientation of the loading zone for efficient airflow. Thus, the third phase with its loading zone turned to the east may provide a hint at changing weather conditions during the first half of the occupation at Maidanets'ke.

While simple single-chambered kilns are known from the Early Neolithic onwards between the Carpathian Mountains and the Dniester River, technically more complex pottery kilns with separated combustion chambers and an upper chamber for firing pottery appear with the development of the Cucuteni-Trypillia phenomenon (Ellis 1984, 133; Tsvek 2004; Alaiba 2007). Here, constant innovation is observed over the whole development of the phenomenon (Petrasch 1986, 49; Alaiba 2007, 154).

A technological transition from simple kilns to multi-chambered, up-draught kilns can be observed at Luka-Vrublevetskaya as early as Trypillia phase A (Bibikov 1953, 127). Technologically, the features found at the 'mega-sites' of Maidanets'ke, Tal'yanky, and Nebelivka resemble a hybrid between the kiln reconstructed for Hăbăşeşti (Trypillia phase A) and the well-preserved kilns at Zvanets (Trypillia phase CI) and Kostesty IX (Trypillia phase CII). At Truşeşti and Hăbăşeşti, portable perforated grates were found, which are suggested to be part of multi-chambered up-draught kilns, where the separation between combustion chamber and pottery chamber can be adjusted (Ellis 1984, 147). However, the Hăbăşeşti evidence remains contested (*ibid.*). The kilns at Kostesty IX (Markevich 1981) and Zvanets (Movsha 1971) are characterised by a fixed and perforated separation between the combustion and pottery chambers. A comparable feature with a fixed grate is also reported for Veselyj Kut as early as Trypillia phase BI-BII (Tsvek 2004, 41).

Based on an analysis of black slip on pottery and refiring of sherds, Ellis (1984, 157) observed that Cucuteni-Trypillia kilns reached stable temperatures of up to 1100 °C as early as Trypillia phase A.

In result, this means that although multi-chambered up-drought kilns were found at Trypillia 'mega-sites' for the first time during the current research phase, they are hardly an innovation connected to these large settlements. Rather, it might be assumed that during Trypillia phase A the innovation of more durable pottery due to stable firing processes with higher temperatures later enabled the development of 'mega-sites'. Surely, the complex type of kiln is unrelated to settlement size. In consequence, the labour division implied by operating such a type of kiln would be no different in earlier and smaller settlements than in later 'mega-sites'.

4.3.6 Summary of findings

At trench 80, three successive pottery kilns were found to be built on top of each other. In connection to the surrounding pits, several activity phases could be distinguished. Based on stratigraphic relations and refitted pottery vessels, it could be shown that the initial kiln is connected to pit 1 in the southern part of the trench. In a next phase, the south-faced kiln underwent repairs and pit 2 in the southern area cuts into pit 1. Then, the south-faced kiln was demolished, and a new, east-faced kiln is built on top, while in the eastern area pit 3 was dug out and filled with production refuse. Lastly, the east-faced kiln was abandoned and with the deposition of waste on top of it the activity in the area ended.

In addition to the connection between kilns and pits via refitted pottery, other production waste, such as fine and coarse ware raw material found in the demolished channels of the kiln and the pits, are hard proof for their relation. This raw material is also proof that the furnaces were indeed used as pottery kilns and that both fine and coarse ware were produced in them.

Concerning the social significance of the pottery kilns, it can be concluded that while they were recently discovered in Trypillia 'mega-sites', the innovation of multi-chambered up-draught kilns preceded the emergence of these large sites. Thus, the social consequences regarding labour division, which was related to this technological innovation, already happened during Trypillia phase A and are probably unrelated to the 'mega-site' phenomenon.

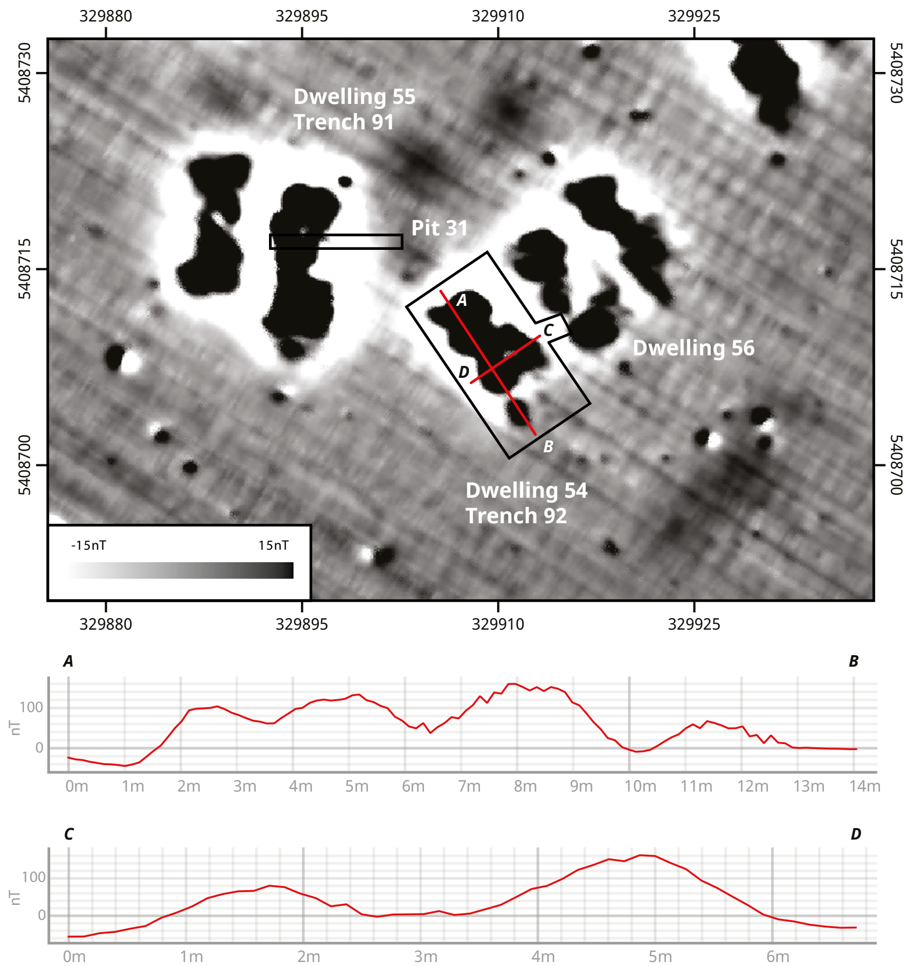


Figure 32. Location of trench 92 and the magnetic susceptibility of dwelling 54.

4.3.7 Trench 92-A complete household

Since the excavated dwelling 44 of the 2013 investigations was partially looted, it was decided to excavate a further building to gain a more complete insight into several architectural and taphonomic aspects of Trypillia dwellings. This includes architectural questions about a potential upper floor, the general construction, *e.g.*, the detection of posts, but also the spatial division of the building and potential activity areas. By recording the character of the burnt daub and the wooden imprints on it as well as the distribution of artefacts within and below, Müller and Videyko (2016, 76) propose a 'two-storey' building reconstruction for dwelling 54. Furthermore, they suggest several activity areas such as "storage of instruments and special resources" for the ground floor, food processing and consumption as well as "house ritual" for the upper floor, and tool production for the surrounding area around the house (*ibid.*). In result, they interpret dwelling 54 as a household.

Dwelling 54 is located at a circular line in the inner northern centre of the settlement as part of a cluster of three buildings (fig. 32). The geomagnetic anomaly measures around 8.5-11.5 x 4 m (34 m² – main room; 46 m² incl. front porch). It shows only minor distortions from the assumed general ground plan in its eastern part, which is later interpreted as a partial wall collapse. To the south, a typical smaller anomaly in front of the short side of the building is located. Sections of the anomalies related to dwelling 54 show values of up to 235 nT in the magnetogram.

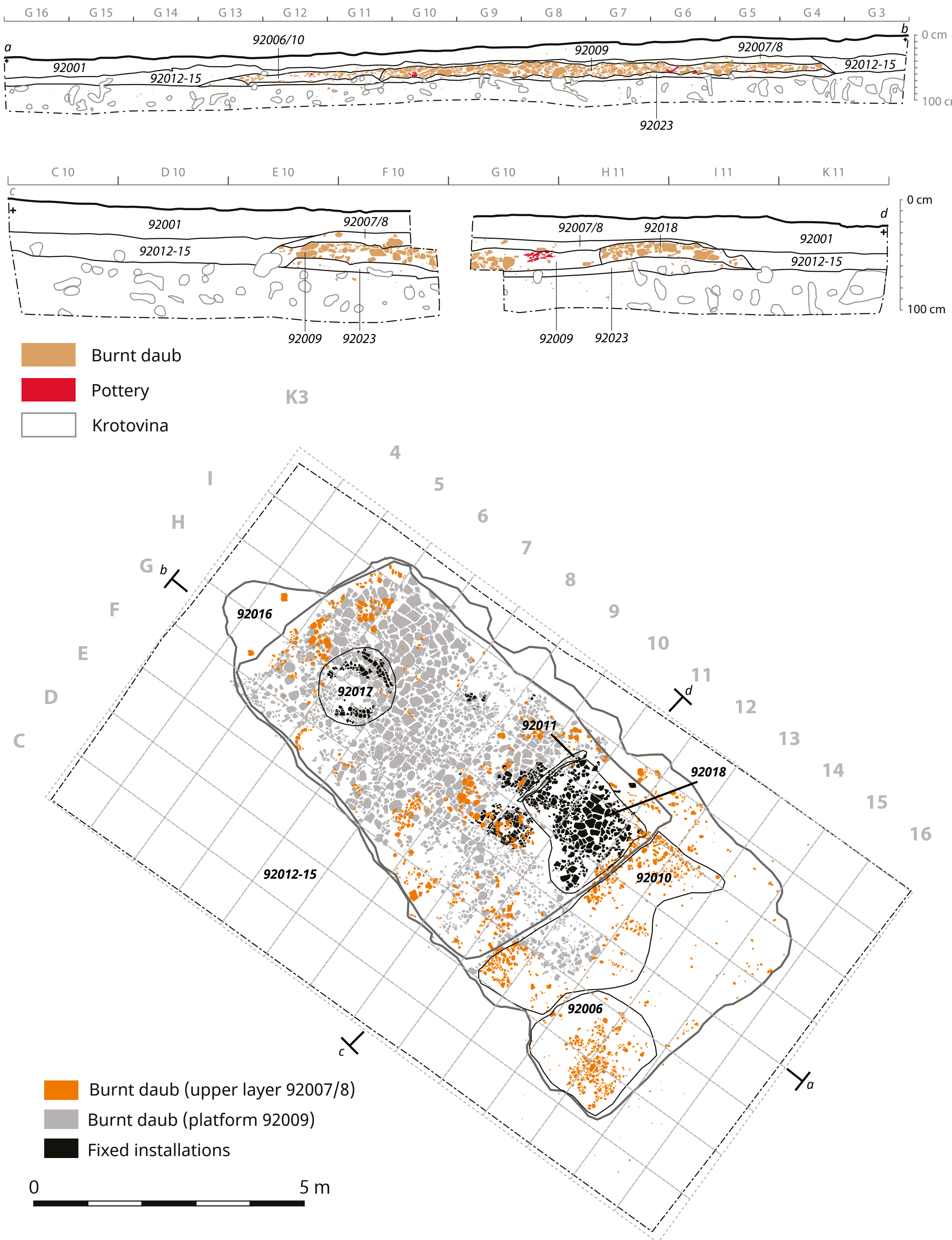


Figure 33. Profiles and planum of dwelling 54 with context signatures at trench 92.

Feature group	Context ID	Interpretation
Geo top	92001	Topsoil (Chernozem)
	92002	Topsoil transition
Dwelling 54 collapse	92003	Soil on / between collapse
	92004	
	92007	Collapse on platform
	92008	
	92006	Pottery concentration / wall collapse / front porch
	92016	Pottery concentration / wall collapse on backside of house
Dwelling 54 interior	92017	"Altar"
	92018	Hearth – general
	92019	Hearth – walls
	92011	Hearth – threshold
	92020	Entrance threshold
Dwelling 54 platform	92010	Front porch
	92009	Floor
Dwelling 54 ground floor	92021	Burnt surface on ground floor
	92022	Other platform remains
	92023	Ground floor under platform
Occupational layer	92012	Eastern quarter
	92013	Southern quarter
	92014	Western quarter
	92015	Northern quarter
Dwelling 56	92005	Soil on / between collapse

Table 12. Features and contexts of trench 92. For a detailed description see context catalogue.

While trench 92 was initially laid out as another test trench reaching over two building remains (dwellings 54 and 56), the L-shaped trench was soon expanded to also cover all of dwelling 54, measuring 14 x 8 m.

4.3.8 Features

At trench 92, the burnt house remains were buried under a layer of Chernozem (context 92001) and a grey layer with high intake of calcium carbonate (context 92002). The building 54 itself can be divided into four major strata (fig. 33; tab. 12). An upper layer is grouped as architectural collapses from the former superstructure built upon the former platform of the building. This collapse consists of the soil directly on top and between the uppermost layer of burnt daub (contexts 92003/4), the burnt daub collapse itself (contexts 92007/8) and two daub and pottery concentrations apart from the main platform remains (contexts 92006/16). Feature 92006 is clearly visible in the magnetogram as one of the regularly observed roundish anomalies located at the frontal short side of buildings. It included several vessels and quern fragments that were buried below a layer of amorphous organic tempered daub. Context 92016, located at the back side of the building is characterised by several vessels, which were probably smashed when the building collapsed. The upper layer of burnt daub is sporadically distributed over the extent of the geomagnetic anomaly. Larger pieces of over 10 cm are found above the main platform, while smaller pieces below 10 cm were mainly found in the southeastern part of the building. The distribution of daub in the eastern part of the building hints at the remains of a collapsed wall, which fell in an eastern direction.

The next major layer groups the fixed installations of which many are also depicted in various house models. Here, context 92017 marks the so-called altar, as attributed by traditional Ukrainian research. This roundish platform, measuring 1.3 m in diameter, is applied on the main platform of the house and is made of mineral-tempered daub. Several parts of the surface were preserved and they show various parallel thin-lined incisements. A red ochre painted surface for this feature, as reported earlier (Müller and Videyko 2016, 76), was, however, not observed for dwelling 54. Another often observed feature is the hearth (context 92018). At dwelling 54, the hearth consists of a threshold (context 92011) and the wall remains of the dome (context 92019). Overall, the hearth measures around 1.8 x 1.6 m. Beside the hearth, a potential entrance to the main room was observed (context 92020). The entrance was probably 1 m wide.

Another major layer includes two features that mark the upper floor of the building. The first is the main platform (context 92009) measuring 8.5 x 4 m. It is made of 5 cm thick daub, which shows a flattened upper surface and wooden imprints on its lower side. Context 92010 marks the remains of a front porch. This is hinted at by a line of burnt daub with wooden imprints facing along the long-axis in the southeastern corner of the building. Such a distribution of imprints contrary to the main platform has been observed for many excavated houses before (see 3.1.3 Construction characteristics). It is in line with the layout depictions in many open and closed types of house models (Gusev 1995). This has previously been interpreted as wall collapse by Müller and Videyko (2016, 79). However, the length of the feature would indicate a wall height of over 3.5 m measured from the platform to the roof, which appears improbable.

Below the main platform, the former ground floor of the building shows several smashed vessels, a large quern, which broke into several pieces by fire, and a fired surface (context 92021). The fired surface was also observed at many other excavated houses before (see 3.1.4 Fixed installations). Here, it can be discussed, if these are the traces of a fireplace on the ground storey, or if the ground was fired during the burning of the building. It is not, however, another so-called altar with "incised decoration and red paint" as stated by Müller and Videyko (*ibid.*, 76).

The occupational layer around dwelling 54 was divided into quadrants (contexts 92012-15). Their approximate level was defined by the occurrence of horizontal pottery sherds.

The burnt daub remains of another dwelling (56) to the east (context 92005) are only partially covered by the original test trench layout.

4.3.9 Construction characteristics

During the excavation of trench 92, over 1.2 t of burnt daub were retrieved. The overwhelming amount of this material comes from the main platform, while only few concentrations are located in the front part of the building or dislocated to the northeast (fig. 33).

In order to understand the former architecture of dwelling 54 and its destruction, several traits of the daub were recorded. For the building and collapse, the morphology of the daub is of major importance. Here, wooden imprints were documented following the concept developed after the 2013 excavations (*ibid.*, 81-85). The documentation distinguishes between plank and rounded plank imprints as well as branches. Further traits, such as flattened surfaces or slag, were also recorded. For these categories their location, direction and location on the upper or lower side were documented.

In addition, temper (mineral or organic), morphology (bloated, layered, amorph or flattened) and imprint diameter of the daub were recorded on the scale of quadrants without their direction.

First, the documentation of dwelling 54 shows typical traits on the upper layer of collapse, which were also observed at previous excavations (fig. 34). At the upper layer, imprints of planks and rounded planks are most common. For the central part, their directions appear random, while for the southeastern third of the building imprints mainly follow the long-axis. In the north and east areas, imprints of branches hint at collapsed parts of wattle-and-daub walls. In the north, the wall collapsed to the inside of the building, while in the east it collapsed to the outside. Few pieces found in the west also fell to the inside. Plank imprints found in the centre following the short-axis are interpreted as a partitioning of the main platform into two rooms. In the central front, south of the hearth, a concentration of vitrified daub is found, with an additional piece in the western central part. Only few pieces show a flattened surface. On the main platform, they were mostly found with the flattened surface on the lower side of the debris, while the few pieces at the southern side show flattened surfaces on both the lower and the upper side.

Figure 34. Distribution of wooden imprints recorded for the upper and lower layer of burnt daub at dwelling 54 in trench 92 (modified after Müller and Videyko 2016, fig. 8 and 10. Original graphic by S. Ţerna).

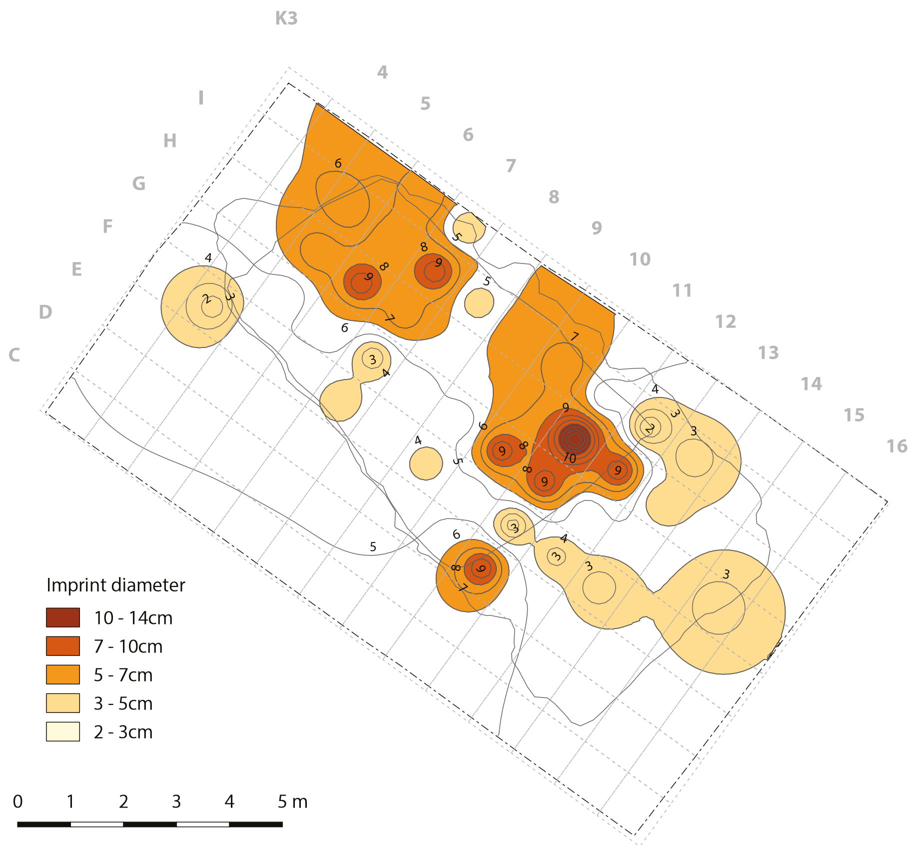


Figure 35. Maximum rounded imprint diameters per quadrant for dwelling 54 at trench 92. For data see appendix 3.

The recorded imprints on the lower layer (*e.g.* the main platform) also show typical traits, which were observed earlier. Here, most impressions below the platform show plank imprints facing across the long-axis of the building. In the eastern and central third of the building, rounded plank imprints are found. In the east, they face along the long-axis, hinting at a supporting construction for the planks.

What is missing in the previously published distribution of imprints are the measurements of the wooden parts visible in the daub. While the width and diameter provide information about the resources (*e.g.* woodland management) used for construction, the distribution of varying diameters also hints at the potential location of posts. In this way, it is possible to get closer to a reconstruction of the architecture, independent of clay models of houses.

At dwelling 54, the width of plank imprints ranges from at least 1 cm to a maximum of 25 cm, with a median of 5 cm. Since the burnt daub remains are often fragmented, the maximal width of observed planks is of importance here. As indicated by the documentation, most of the plank imprints are found facing across the long-axis of the building. In addition to the appearance of the building, the amount of resources used for its construction is of interest. From the maximum width of plank imprints, we can assume that logs with a diameter of around 25 cm were in use. With an area of 27.5 m^2 (7.15 x 3.85 m) for the main platform, we can further assume that around 14 planks with a length of at least 3.85 m were used to construct the foundation of the ploshchadka. As preliminary results show, most of the macro botanical tree remains come from ash (*Fraxinus*) (Dal Corso *et al.* 2019). Based on this, we can calculate the approximate amount of ash trees used. First, the potential length of an ash tree with a diameter of 25 cm must be estimated. The average growth rate of ash has been described by Dobrowolska and colleagues (2011). They observed a "mean radial increment of 4 mm per year" and a height growth of around "0.25 m per year" (*ibid.*, 139-140). For the recorded diameter of planks built into dwelling 54, this results in ash trees of around

62-63 years with a height of around 15-16 m. Based on the width of the building, 3.5 trees and four logs per tree were used to construct the foundation of the platform.

Another important part of investigating Trypillia architecture is the question of storeys and how the often-massive daub platform was elevated from the ground. So far, postholes and remains of posts on the platform are scarce. However, a few traces have been observed earlier at Maidanets'ke (see 3.1.3 Construction characteristics). To identify the potential location of posts at dwelling 54, the distribution of rounded imprints and their diameter were plotted (fig. 35). The observed diameters range from below 1 cm to 15 cm. With a median of 2 cm, most rounded imprints are associated with the remains of wattle-and-daub walls. Larger diameters show a clear pattern, which can be interpreted as the remains of posts. The largest imprints of 10-15 cm are located in the central part of the building near the hearth. This is also the location at which connections between posts and the roof were found during earlier excavations. At the back of the building, near the 'altar', imprints of around 9 cm in diameter were observed. Both imprint concentrations are slightly distributed from west to east, which is in line with the wall collapse outside the main daub distribution. This suggests that the whole building fell partly to the east during its destruction. Further imprints of around 9 cm are located near the front end of the platform and are possibly related to the sub-construction, which supported the platform as well as the entrance facade.

Due to severe bioturbation, postholes on the lower ground are not observable, especially since the krotovina have comparable dimensions as shown by the observed diameter imprints in the daub. However, below the platform near the hearth, a large quern was found, which is located directly below the indicated large central post. This suggests that the post was supported by this quern for a solid static foundation (also suggested by Hofmann during the excavation [pers. comm.]). Another stone found in the northern corner below the platform hints at a comparable situation. Using querns in the construction of Trypillia houses has been observed at earlier excavations, for example, for the foundation of the hearth at house 'И' (see fig. 16). The case of using querns as static support is one explanation for the difficulty to detect postholes in the archaeological record, since they possibly were built directly on the former occupational layer, leaving no traces in the soil. Based on the indicated diameters, the ash tree used for the central post could have had a maximal height between 6-9 m, with the other posts probably measuring ca. 5-6 m in height.

In result, it is suggested that dwelling 54 was constructed on posts, supported by a stone foundation, with posts reaching from the ground through a platform of wooden planks, which were sealed on the upper side with rammed clay.

4.3.10 Finds

During the excavation of trench 92, around 55 kg of material including 1700 sherds of pottery were recovered (fig. 36; tab. 13). Around 75 % of the material counted in weight comes directly from the burnt house remains, while 25 % was retrieved from the surrounding occupational layer. In this review, the material originating from the building debris is separated into the layers: material from within the collapsed superstructure, from the upper floor as well as from the ground floor underneath the building. Another category is material coming from the occupational layer.

Around 41 kg of material including 1300 sherds of pottery were recovered from the dwelling remains (tab. 13). The upper layer of collapse yielded around 13.5 kg of material including over 500 sherds of pottery. Here, 99 % of the material in weight is made of fineware. Regular fineware shows an average fragmentation of 28 g/sherd. Of the general amount of fineware, 10 % shows weak traces of second firing with an average of 23 g/sherd, while severely burnt pottery makes up only 1.7 % of the recovered fineware. The severely burnt pieces show an average fragmentation of 28 g/sherd. Coarse ware makes up only 1 % of the retrieved pottery and shows a

	Dwelling 54 collapse		Dwelling 54 first floor		Dwelling 54 ground floor		Occupational layer	
Trench 92	g	n	g	n	g	n	g	n
Fine ware (all)	**13541**	**499**	**23414**	**637**	**3563**	**96**	**12443**	**375**
secondary fired (weak)	*1358*	*58*	*6509*	*145*	*1285*	*28*	*4742*	*116*
secondary fired (strong)	*223*	*8*	*34*	*9*	*2*	*1*	*144*	*12*
Vitrified	*0*	*0*	*235*	*1*	*0*	*0*	*0*	*0*
Coarse ware (all)	**109**	**11**	**424**	**24**	**45**	**3**	**662**	**30**
secondary fired (strong)	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Undetermined	**25**	**3**	**149**	**13**	**95**	**2**	**147**	**21**
Sum	**13675**	**513**	**23987**	**674**	**3703**	**101**	**13252**	**426**

Table 13. Pottery retrieved from the features of trench 92. Derived from project database.

Figure 36. Distribution of pottery per quadrant at trench 92. For data see appendix 4.

fragmentation of 10 g/sherd. Here, no traces of severe fire were observed. Lastly, 0.2 % of the material remains undetermined with an average weight of 8 g/sherd.

The platform floor below the collapse yielded around 24 kg of material including nearly 700 sherds of pottery. For this feature group, 98 % of the material in weight is made of fineware. Regular fineware shows an average fragmentation of 35 g/sherd. Around 28 % of fineware sherds shows weak traces of second firing with an average fragmentation of 45 g/sherd, while severe firing was only observed for 0.2 % of the material in weight. The severely burnt material is highly fragmented with only 4 g/sherd on average. Vitrified pottery was observed for 1 % of the material in weight and shows an average weight of 235 g/sherd due to the molten daub

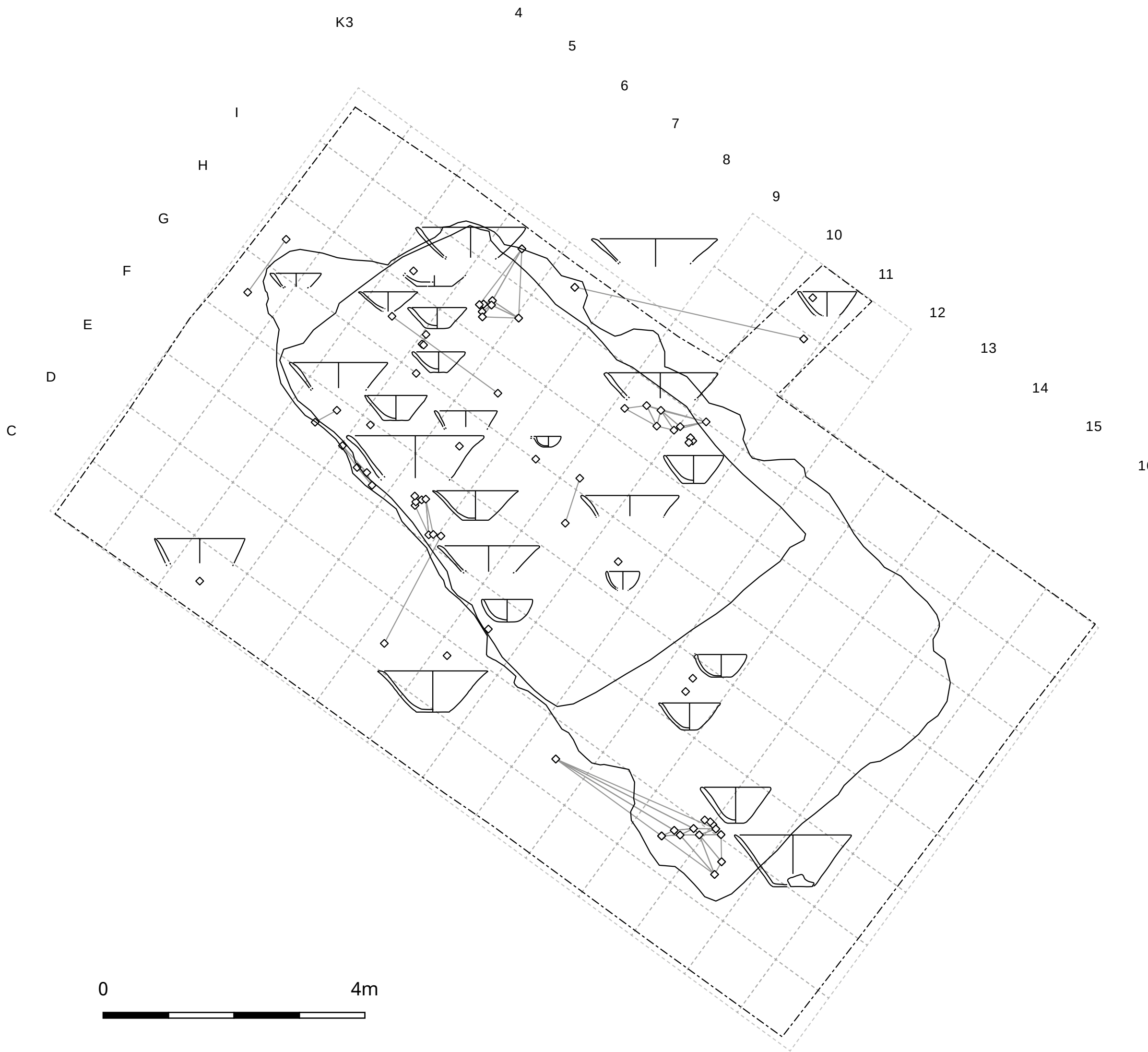


Figure 37. Distribution of refitted bowls at dwelling 54 in trench 92. See plates.

attached to it. Coarse ware makes up 1.8 % of the pottery, with an average weight of 18 g/sherd. None of the coarse ware shows traces of severe heat. A negligible 0.6 % of the material in weight remains undetermined with an average weight of 12 g/sherd.

With 3.7 kg of material including around 100 sherds of pottery, only around 7 % of the overall material in weight comes from the ground floor below the building (tab. 13). Here, 96 % is made of fineware. Regular fineware shows an average weight of 34 g/sherd. Of the fineware material, 36 % shows weak traces of secondary fire with an average weight of 46 g/sherd, while only 0.05 % shows severe traces of burning. Severely burnt fineware is also highly fragmented with only 2 g/sherd on average. No vitrified pottery has been observed. Coarse ware makes up 1.2 % of the overall pottery in weight below the platform and shows a fragmentation of 15 g/sherd on average. No severely burnt material of coarse ware has been found. With 2.5 %, a high amount of pottery in weight remains undetermined. This material shows a low fragmentation of 48 g/sherd.

Lastly, with around 13.3 kg of material including over 400 sherds, 24 % of the overall pottery in weight at trench 92 comes from the former occupational layer around dwelling 54 (tab. 13). Here, 94 % of the material in weight is made of fineware. Regular fineware shows a fragmentation of 31 g/sherd. Around 38 % of the fineware shows weak traces of second firing with an average fragmentation of 41 g/sherd, while severely burnt pottery was only observed for 1 % of the material in weight

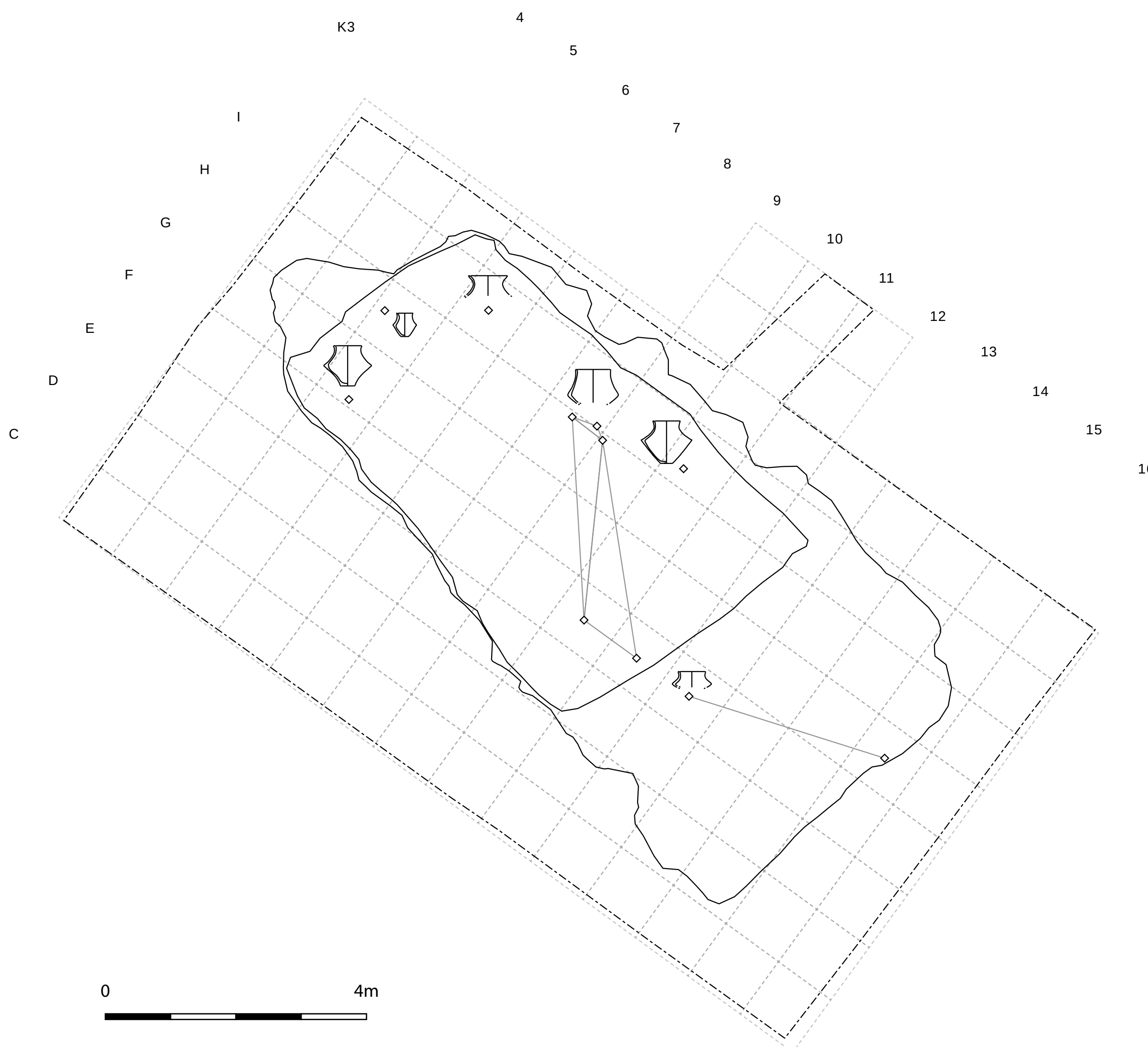


Figure 38. Distribution of refitted cups at dwelling 54 in trench 92. See plates.

with 12 g/sherd on average. No vitrified pottery was observed. Coarse ware makes up around 5 % of pottery in weight and shows a fragmentation of 22 g/sherd. Here, no traces of severe heat were found. With 1 %, a small amount of material in weight remains undetermined. It shows a high fragmentation of 7 g/sherd on average.

4.3.11 Vessel distribution

In order to characterise dwelling 54, the distribution of its inventory must be determined to discuss a potential household. Based on the distribution of various artefact categories, activity areas inside the building can be determined. The distribution of vessel types is given below.

First, the location of 26 bowls of various size and shape could be determined (fig. 37). They are found all over the trench with a concentration on the bench of the dwelling and on the 'altar'. Large conical bowls are found on the bench, while three smaller conical bowls are found on the 'altar'. Below the front porch, two large conical vessels were reconstructed (plate 29, 5). Around the hearth, the remains of two larger and one smaller conical bowl were found. Spherical bowls are rare, however, near the entrance of the building, one spherical bowl with a protruding rim (plate 43, 3) and another with a broken handle or plastic application were found (plate 30, 3). Further spherical bowls were found behind the hearth, a small bowl with a broken handle in the centre of the platform (plate 28, 3), one ‘imported’ spherical bowl (plate 43, 2) on the bench as well as one small bowl below the platform. Outside the building to the west, one larger conical bowl might have been dislocated from the inside of the dwelling during its collapse. Another bowl with a strait rim was found further to the west and might be related to another building. One small spherical bowl (plate 45, 2) found in the eastern test trench section is clearly associated with the collapse of the eastern building (dwelling 56) of the cluster, while a larger conical bowl (plate 45, 3) belonging to the alley between both houses cannot clearly be associated with one of the inventories. Besides bowls, it was possible to refit two so-called lids. One of them was found below the front porch in the pottery and daub concentration in the south (plate 35, 5). The other is an ‘imported’ lid with washed-out clay and no preserved decoration (plate 43, 4).

Overall, it was possible to refit six cups of various size and form (fig. 38). Two ‘classic’ Tomashivska mid-sized cups were found below the platform: one in the eastern back corner of the building (plate 42, 2), the other below the western part of the platform near the hearth (plate 36, 1). On the platform, three different cups were recorded – a small one in the back of the building behind the ‘altar’ (plate 36, 5), the rim sherd of a large cup, and an ‘imported’ cup with a low belly (plate 36, 4) distributed from the entrance area to the western central wall, where it was originally situated. A last small cup was found distributed over the front porch area (plate 42, 4).

Biconical vessels make up the second most common general type at trench 92 with 20 diagnostic vessels (fig. 39). The majority of these vessels – 11 units – were found on the platform. On the platform, they were distributed in special areas. Surprisingly, six mid-sized biconical vessels, five of them with eyelets (plate 37, 2-3; 42, 5), were positioned around the hearth. The sixth is of more sphero-conical shape (plate 38, 1) and the remains show no traces of eyelets. Further mid-sized biconical vessels without eyelets were found on the bench (plate 31, 4) and in the northern corner of the platform (plate 37, 1). Near the entrance in front of the bench, a large pear-shaped vessel (plate 40, 1) could be refitted. Another large biconical vessel (plate 39, 1) could be refitted to the east of the ‘altar’. Most of this vessel was found on the platform. However, some parts situated below the platform illustrate the difficulty in deciding which material was originally deposited on the ground below the building and which fell between the broken platform parts during the collapse. Lastly, the remains of a small biconical vessel were found near the ‘altar’. Below the southeastern corner of the platform, the rim sherd of a mid-sized biconical vessel (plate 43, 5) was recorded. Near the entrance below the front porch, the belly sherd of a small biconical vessel with eyelets near the belly was found (plate 38, 2). To the southeast outside the front porch, rim sherds of three different biconical vessels were documented (plate 44, 1-3). They cannot be clearly associated with the inventory of the building, similar to a sphero-conical vessel (plate 38, 3) on the western occupational layer. The vessel concentration behind the house, on the other hand, is interpreted as part of the assemblage. Here, a mid-sized sphero-conical (plate 32, 5) and a small biconical vessel (plate 32, 6) were reconstructed. While the spherocon has its eyelets placed near the belly, the bicon’s eyelets were placed below the rim.

For trench 92, it was possible to reconstruct nine crater-shaped vessels or s-shaped pots (fig. 40). This category is more elusive, since their rim shapes and diameters are often indistinguishable. Nevertheless, six units were refitted, which are clearly part of the building’s inventory and were found on the platform. Two of the reconstructed units show handles placed on the shoulder of the vessels (plate 36, 3; 39, 3), while another one shows eyelets (plate 39, 2). The majority of these vessel types were found in the back of the building, on the bench and

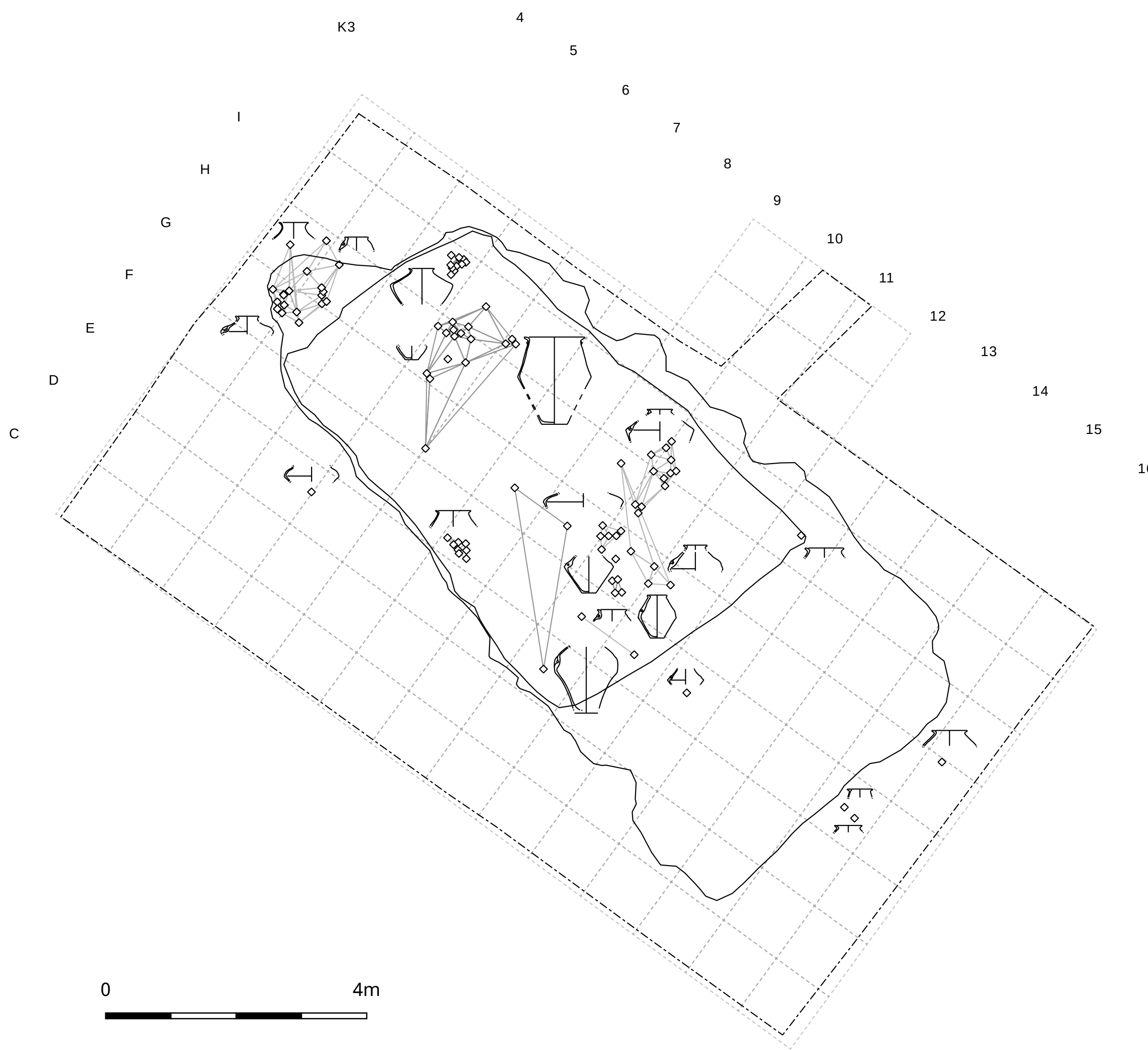


Figure 39. Distribution of refitted biconical and sphero-conical vessels at dwelling 54 in trench 92. See plates.

on the 'altar', in contrast to one crater-shaped vessel with a handle (plate 36, 3), which was retrieved from the hearth area. Two larger rim sherds were found in the front of the building, just outside the front porch, while another well-preserved pot was found on the occupational layer to the west of the building.

Only few sherds of coarse ware were recorded for trench 92, resulting in five reconstructed vessels (fig. 41). They are located in distinct places of the building. Four out of five units were found in front of the hearth and in the entrance area of the house. The last vessels are part of the pottery concentration deposited behind the building (plate 32, 8). One wall sherd was found baked into the burnt house debris (plate 41, 4). Here, it remains unclear if this happed during the conflagration of the building, or if broken pottery was used as temper during the construction.

Overall, 67 fineware vessels and six coarseware vessels were observed for this dwelling (tab. 14).

4.3.12 Other finds

Besides pottery, various other noteworthy artefacts were observed at trench 92. Among them are several stone tools. Directly associated to the house are five fragmented remains of querns and hand stones. Three of them are located below the

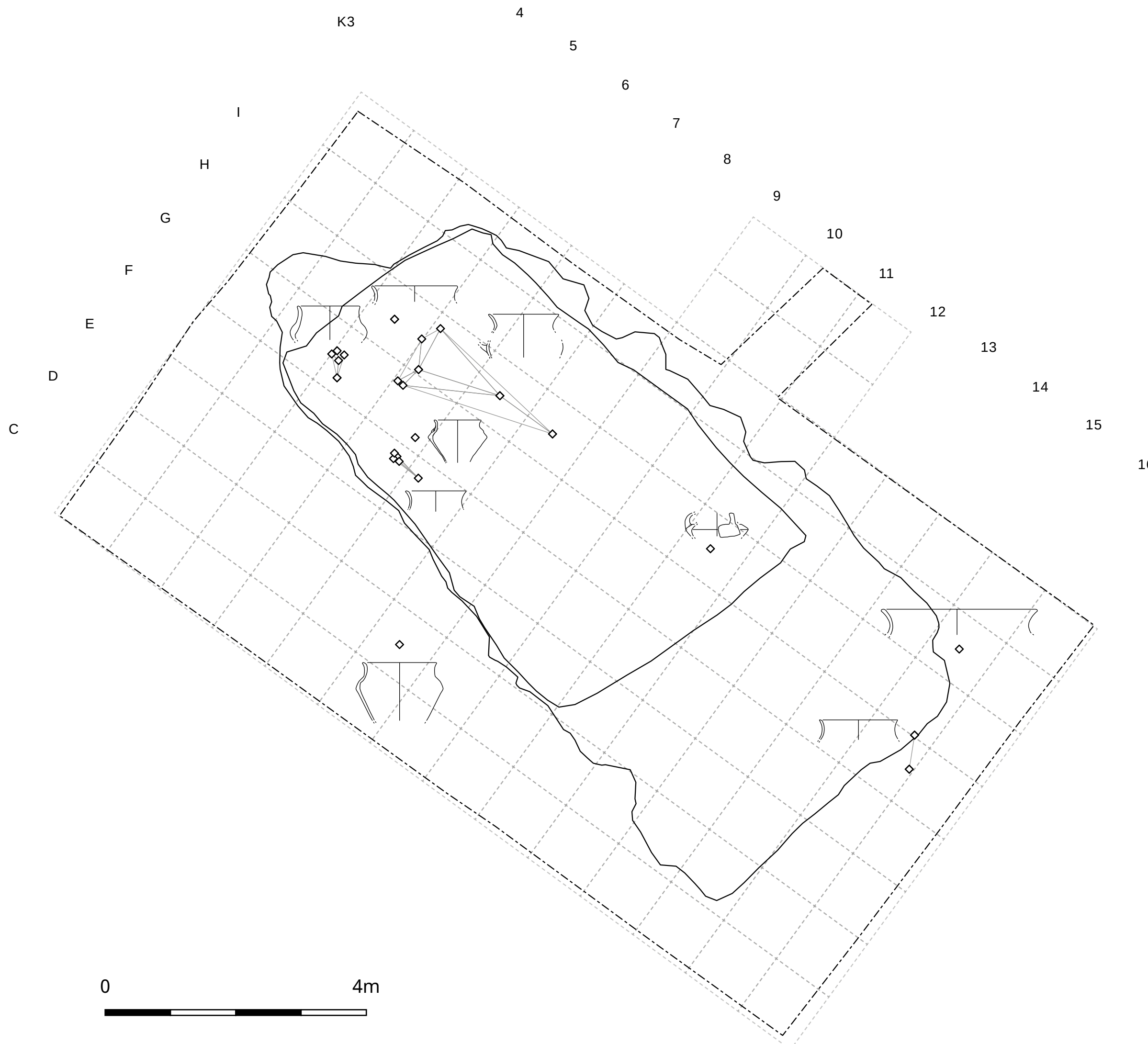


Figure 40. Distribution of refitted crater-shaped vessels and s-shaped pots at dwelling 54 in trench 92. See plates.

front porch, while the largest one was found below the platform and is interpreted as a static foundation for a post (plate 45, 1). The latter quern is located on the platform near the entrance at the end of the bench. This is a typical position known from various house models. In consequence, not all of the retrieved querns mark activity zones. Nevertheless, there are two main observable areas of cereal processing. The first is associated with the quern found near the bench on the platform, the other area is located in the front of the building below the porch.

A broken polishing/punching stone was found on top of the burnt remains of dwelling 54 (plate 29, 1), while a large silex blade was found on the alley between dwelling 54 and dwelling 56. The function of other stone fragments found on the occupational layer to the west and below the platform in the back of the building are not clearly identifiable. A flat stone found on the bench in the back of the building is possibly related to processing of ochre, as it resembles finds from previous excavations with traces of ochre preserved on their surface (see 3.1.5 Other installations and inventories).

Two figurine fragments were found, one near the ‘altar’, the other – a zoomorphic figurine – near the hearth.

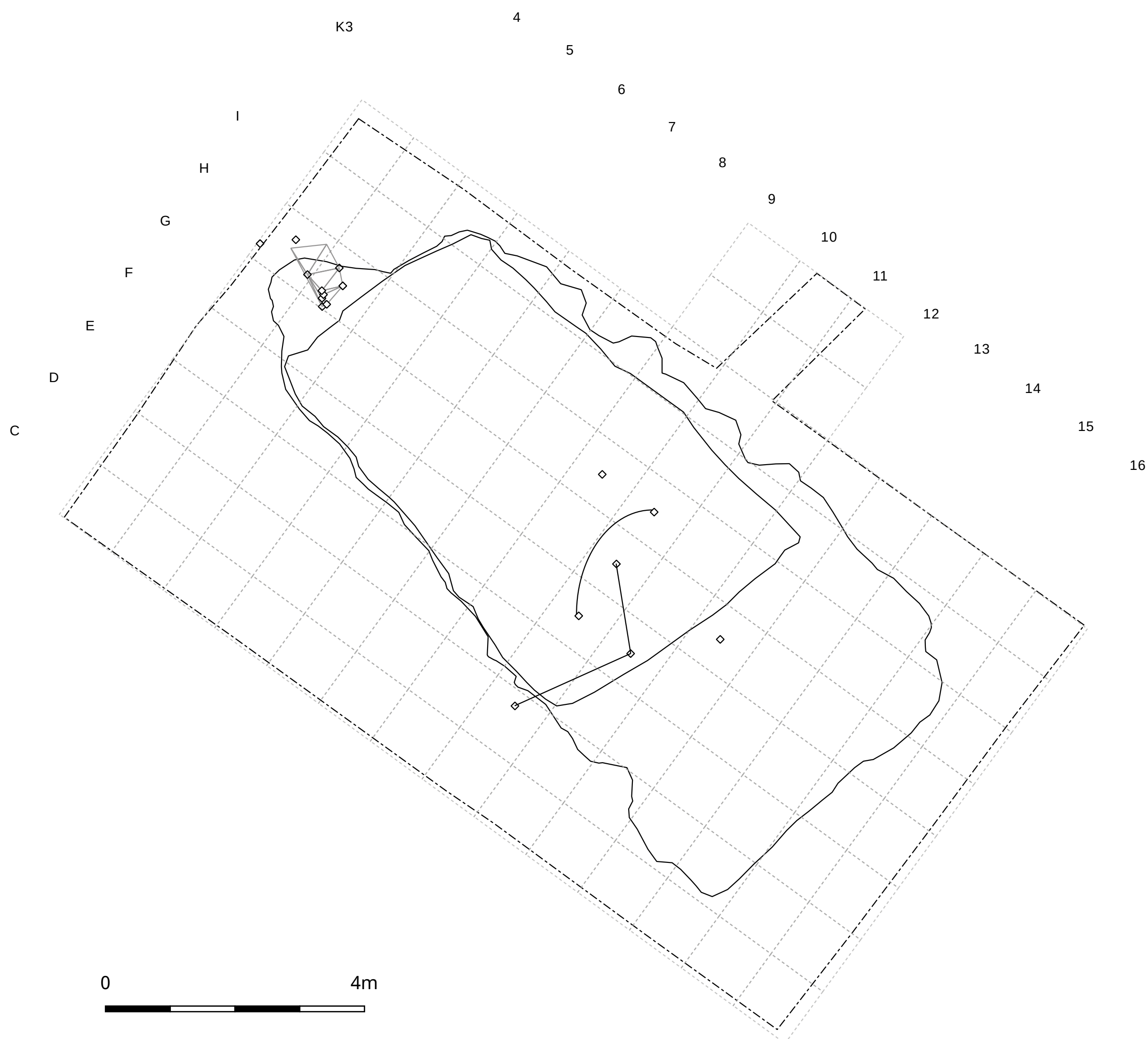


Figure 41. Distribution of refitted coarse ware at dwelling 54 in trench 92. See plates.

4.3.13 Activity areas and household interpretation

The distribution of artefacts can be used to reconstruct the former household activities at dwelling 54 (fig. 42). In comparison to the interpretation of dwelling 44 in trench 51 (Müller *et al.* 2017b, fig. 22), specific artefacts can be associated with certain activities. Coarse ware pots can be related to food processing according to their properties to resist heat. Traditionally, this type of ware is also labelled as kitchenware (Ryzhov 2012b). In dwelling 54, coarse ware pots were concentrated around the hearth and below the platform. The sherds below the platform are still closely related to the hearth, and their deposition below the dwelling is most probably related to taphonomic processes during the collapse of the building. Thus, it can be concluded that food processing took place around the hearth.

Further artefacts related to food production are the quern stone fragments found on the opposite side of the hearth at the southeastern end of the podium. Another quern stone fragment below the front porch was probably in secondary use as a foundation for a wooden post. Other grinding stones outside and on the podium in the back of the dwelling are not clearly related to cereal processing. In result, it can be concluded that cereal processing took place next to the hearth, which is also known from the interior of clay house models (Palaguta and Starkova 2017).

Vessel type	Dwelling 54 (n)
Fwp-1.1.1.1	17
Fwp-1.1.2.1	4
Fwp-1.2.1.1	8
Fwp-1.1.1.5	0
Fwp-1.7.1.1	1
Fwp-2.1.1.1b	1
Fwp-2.1.1.1c	1
Fwp-2.2.1.1a	4
Fwp-2.2.4.2	1
Fwp-3.1.1.1	6
Fwp-3.1.3.1	6
Fwp-6.4.1.1	2
Fwp-3.2.1.1	2
Fwp-4.1.2.1	2
Fwp-6.3.1.2a	0
Fwp-7.2.3.2a	2
Fwp-5.2.1.1a	1
Fwp-5.2.1.1b	1
Fwp-8.2.1.1	1
Fwp-8.3.x.x	0
Fwp-9.3.3.1	1
Fwp-9.3.2.1	1
Fwp-10.1.1.2	5
Σ	**67**

Table 14. Number of fineware vessel types retrieved from dwelling 54 at trench 92. For a description of the types see fig. 71-97.

Vessel types, such as fine ware bowls of various sizes and cups, can be related to food consumption. Bowls are distributed all over the dwelling, but larger ones are concentrated on the podium in the main room. These fineware painted bowls could eventually be related to status display of the household as has been suggested for dwelling 44 (Müller *et al.* 2017b, fig. 22). Further bowls for food consumption were distributed around the 'altar' and outside the dwelling below the front porch. This activity zone below the front porch might be related to the activities of burning the dwelling. Like bowls, cups are also concentrated around the 'altar' in the back of the building. In result, it can be concluded that food consumption took place in the back of the dwelling around the 'altar'. Larger bowls being placed on the podium are probably related to the orderly deposition of the inventory before the burning of the dwelling.

Biconical, sphero-conical, and pear-shaped fineware vessels are probably related to intermediate storage as well as crater-shaped vessels and s-shaped pots. In contrast to dwelling 44 in trench 51, the storage vessels are not concentrated on the podium but around the hearth and next to the 'altar' in the main room. Especially the deposition around the hearth appears unpractical from a contemporary view. This placement could be related to 'over equipment' of the dwelling in connection with its destruction. Interestingly, several storage vessels were found outside, behind the short side of the dwelling, which are probably also related to the activities of house burning.

Evidence of textile production is missing from this dwelling. Maintenance and small-scale production of tools is hinted at by a 'punching stone' found inside

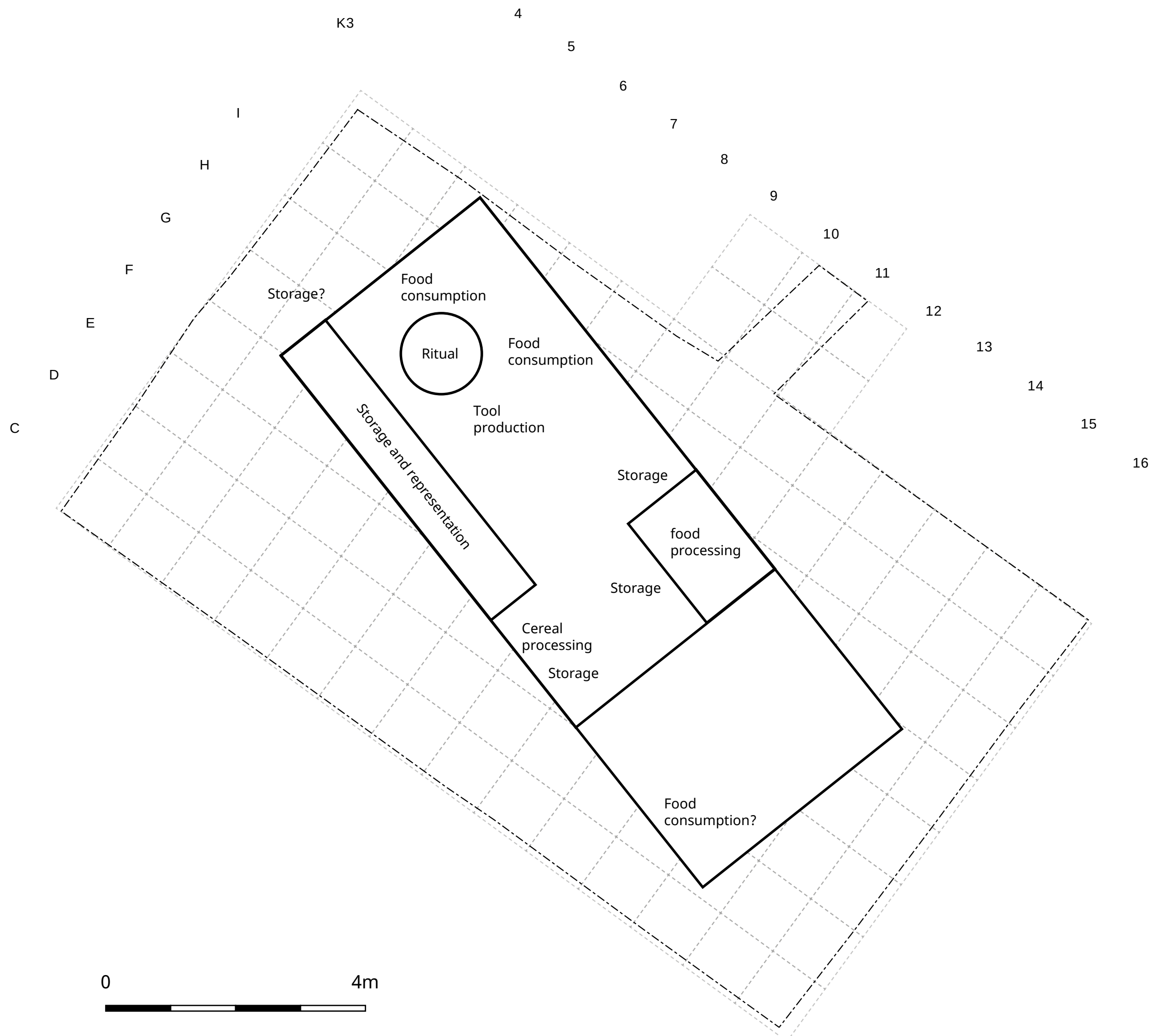


Figure 42. Activity areas at dwelling 54 in trench 92 according to artefact distribution.

the main room. The fragment of a figurine found near the 'altar' supports the ritual interpretation of this feature, and the zoomorphic figurine near the hearth reflects a typical place for such an artefact as they are also displayed in comparable locations in clay house models (Palaguta and Starkova 2017).

Recently, the remains of feathergrass (*Stipa*) found inside the feature were suggested as possible evidence of matting for sleeping (Dal Corso *et al.* 2019).

With the description of these activities it can be concluded that building 54 in trench 92 indeed could have been a dwelling and possibly a household, which was dependent on textile production from other sources, such as the neighbouring dwelling 56, where the fragment of a loom weight was found. The distribution of storage vessels around the hearth as well as further depositions behind the dwelling and below the front porch have to be considered as deliberate depositions related to the burning of the building. This burning is traditionally related to the symbolic 'burial' of the household (Chapman 1999; 2015). Hence, the household inventory and reconstructed activities have to be treated with the same precaution as burial remains if they are used for drawing social inferences to the former inhabitants. Surely, the inventory of Trypillia dwellings do not *per se* reflect the material possessions of the former household, but rather indicate the motives of the society which conducted the burning.

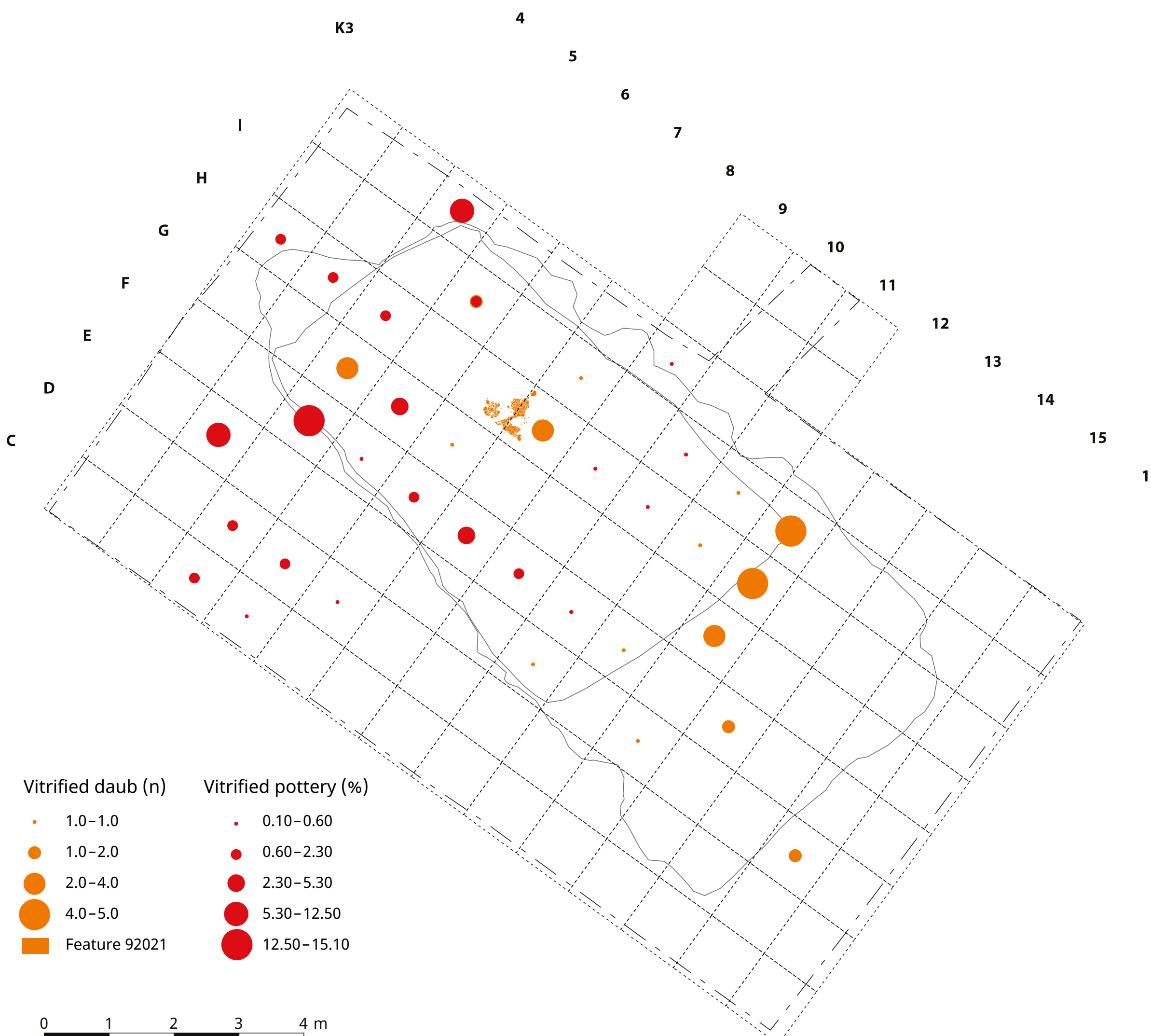


Figure 43. Distribution of vitrified daub and pottery at trench 92. For data see appendix 5.

4.3.14 Implications - The conflagration of dwelling 54

To investigate the sources of fire that led to the destruction of dwelling 54, the distribution of three different proxies were taken into consideration, including vitrified daub, fired surfaces and the ratio in weight between pottery with and without traces of second firing.

For this building, only few traces of vitrified daub were observed (fig. 43). Most of the material is located outside the platform in the front of the building. Other concentrations are found in the back corner of the platform and in its centre. Singular pieces are distributed mostly on the platform along the sides. The weight of the different types of daub were not separately recorded, therefore no further ratios could be calculated to provide a less biased distribution.

A feature category that is regularly observed in relation to buildings are fired surfaces, which are characterised by highly fragmented burned daub with a flat upper side and an amorphous lower side. At dwelling 54, one of these features was recorded in the centre below the main platform (fig. 43. Quadrant H 7-8). Previously, such features have been interpreted as fireplaces. While fire over a period of time is definitely involved in producing such a feature, the surface could both be fired during the use-life of the building as well as during its final destruction.

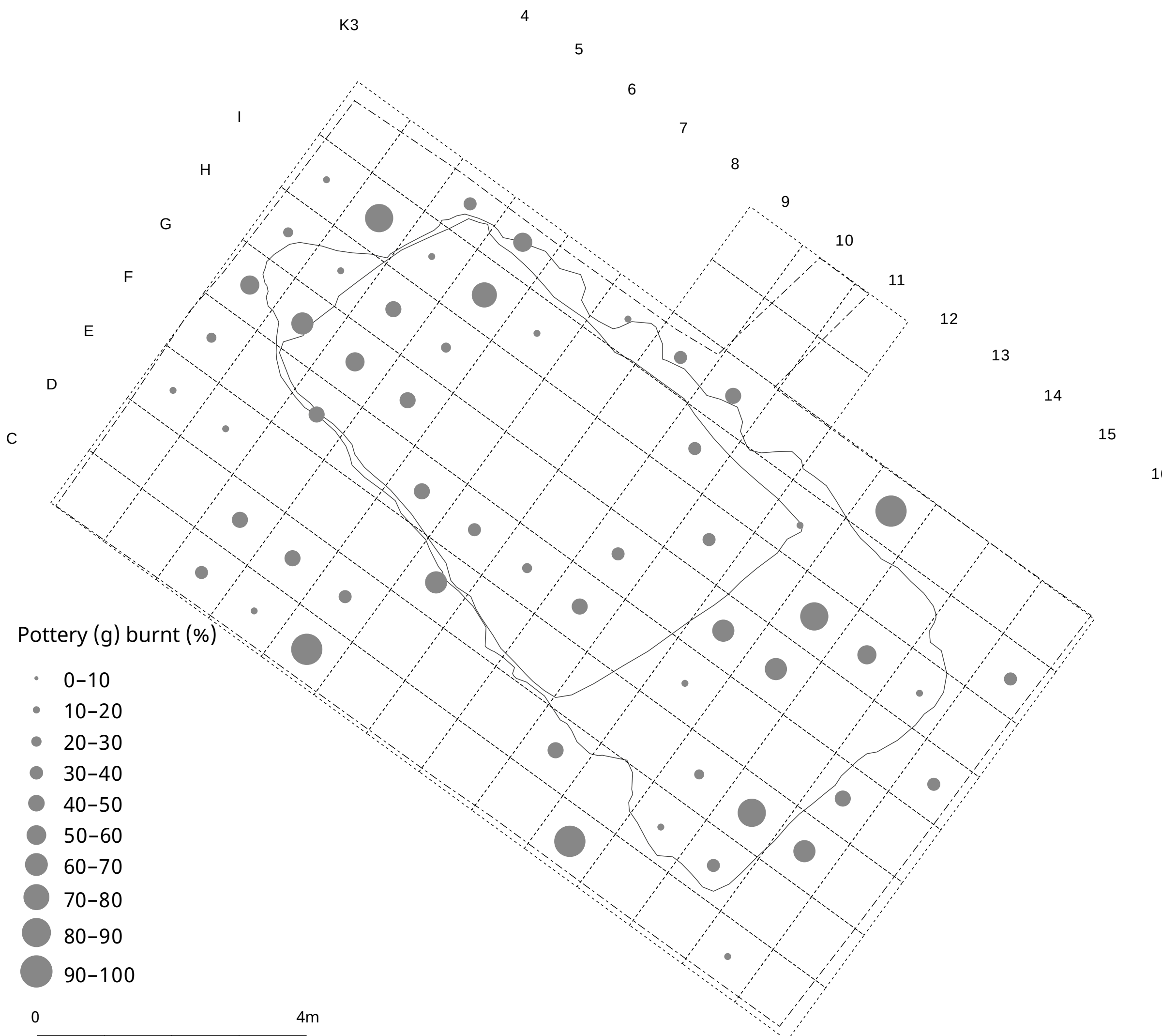


Figure 44. Percentage of burnt pottery per quadrant based on weight at trench 92. For data see appendix 6.

To consider the proportion of pottery with a second firing in weight, one has to distinguish between pieces with weak traces of fire and vitrified material that indicates severe heat over a longer period of time. Pottery showing weak traces of a second firing makes up most of the material retrieved from the front side of the building (80-100 % of the recorded pottery) (fig. 44). However, weak traces of refiring were found all over the general distribution of pottery at trench 92. Therefore, all pottery was somehow affected by the conflagration.

Vitrified pottery, on the other hand, is only found in certain areas of the trench (fig. 43). Here, severe traces of fire are mostly observed on pottery, which was situated on the bench of the building, with up to 15 % of the material in weight. Another concentration is found in the northern corner of the building and the vessels behind the house were also partially affected. A last concentration is documented outside of the house in the western corner.

Combining the presented evidence, it is suggested that there were two main sources of fire. One source of fire was situated below the platform, represented by the fired surface (feature 92021) and the concentration of vitrified daub above it. Another source of fire can be identified in the front part of the building, where the largest concentration of vitrified daub was observed. During earlier excavations at Maidanets'ke, fired surfaces were observed in a similar place comparable to this daub distribution (see 3.1.4 Fixed installations). One can assume

Feature group	Context ID	Interpretation
Geo Top	110001	Topsoil (Chernozem)
	110002	Topsoil transition
Burial	110007	Child burial
Occupational layer	110006	Occupational layer (south-east)
	110014	Occupational layer (central)
	110017	Daub concentration (central)
	110018	
	110015	Occupational layer (West)
	110008	Occupational layer around house
Dwelling 67	110003	Soil on / between collapse
	110004	Collapse
	110012	Floor
	110013	Ground floor under platform
Pit 32	110020	Pit to dwelling 67
Ditch segment (East)	110005	Occupational layer above eastern ditch segment
	110011	Ditch segment (East)
	110016	Ditch segment (central)
Ditch segment (West)	110009	Ditch segment (West)
	110019	Stone setting of millstone fragment and coarse ware pot
Geo	110010	natural

Table 15. Features and contexts of trench 110. For a detailed description see context catalogue.

that a certain amount of fuel was placed on the front facade and below the platform, as has been done during experiments (Korvin-Piotrovskiy *et al.* 2012).

The vitrified pottery remains inconclusive for the identification of a source of fire. However, the severe heat on the bench could have been caused by burning wall parts under the roof, which fell on the bowls below them.

4.3.15 Summary of findings

At trench 92, two dwellings (54 and 56) were observed of which dwelling 54 was completely excavated. Dwelling 54 can be reconstructed as a building divided into a main room on an elevated clay platform and a front porch. Besides a fired surface, no activities were observed on the ground floor. Based on wooden imprints on daub remains and the deposition of stones, it is concluded that the building was constructed on wooden posts with smaller ones along the walls and two larger posts in the back and the front end of the main room.

A fired surface below the building and a concentration of vitrified daub on the outer wall between the main room and the front porch were found as potential sources for the deliberate burning of dwelling 54.

The spatial distribution of various artefact categories was used to identify activities such as food preparation and processing, storage and consumption as well as maintenance and small-scale production of tools. Artefacts related to textile production were not observed. While the interpretation of dwelling 54 as a household is proposed, the spatial distribution of several artefact types suggests a deliberate deposition and arrangement of objects related to the burning of the dwelling. This deliberate deposition has to be considered if the inventory is used for social interpretations.

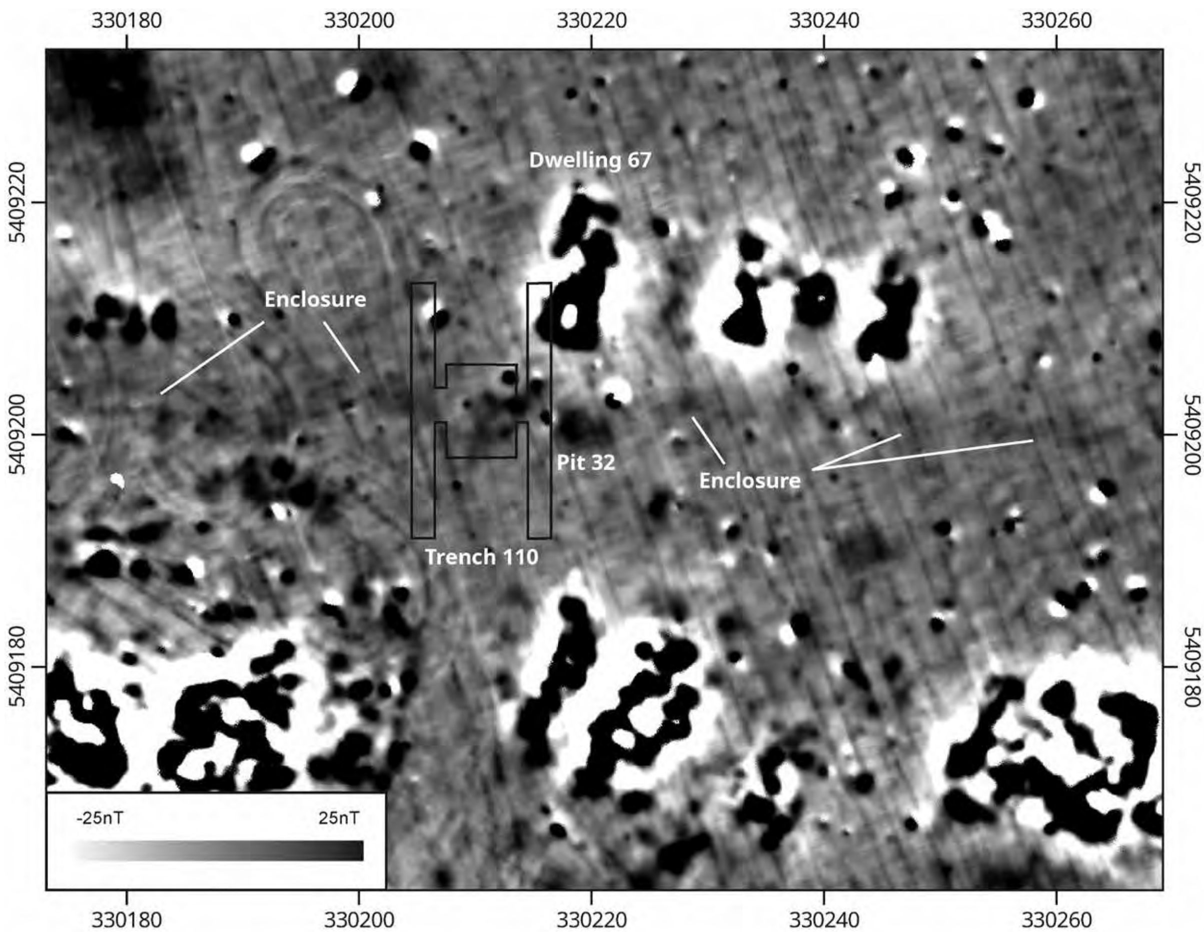


Figure 45. Location of trench 110 plotted on the geomagnetic survey in relation to the enclosure, dwelling 67 and pit 32.

4.3.16 Trench 110 – Ditches, pits and a dwelling

After the discovery of several ditches at Maidanets'ke, their character and relation to other features had to be clarified. Similar anomalies were detected in the nearby site of Nebelivka, suggesting either a symbolic enclosure or a defensive palisade (Burdo and Videyko 2016; Chapman *et al.* 2016). The previously excavated ditches at Nebelivka were cut crosswise in several places of the settlement and revealed shallow, u-shaped features 2 m wide and mostly 1 m (up to 1.5 m) deep (*ibid.*, 119). Other than at Nebelivka, the Maidanets'ke ditches were found partly inside the settlement (Ohlrau 2015). In the magnetogram, overlapping anomalies of one of these ditches and pits were visible in several places (see fig. 23). With sparse stratigraphic relations between features, the intersection of pits, as part of 'house places' (Rassmann *et al.* 2016), and the ditch system hold crucial chronological information about the development of the site. Trench 110 was laid out in order to capture the relation between the presumed ditch, pits and an associated dwelling (fig. 45). The area was first laid out as three separate trenches, two measuring 22 x 2 m to record the ditch in cross section, and a central trench of 10 x 8 m for lengthwise documentation to exclude the possibility of mistakenly recording a pit alignment as a ditch. They were joined later to further clarify the lengthwise connection between features (fig. 46).

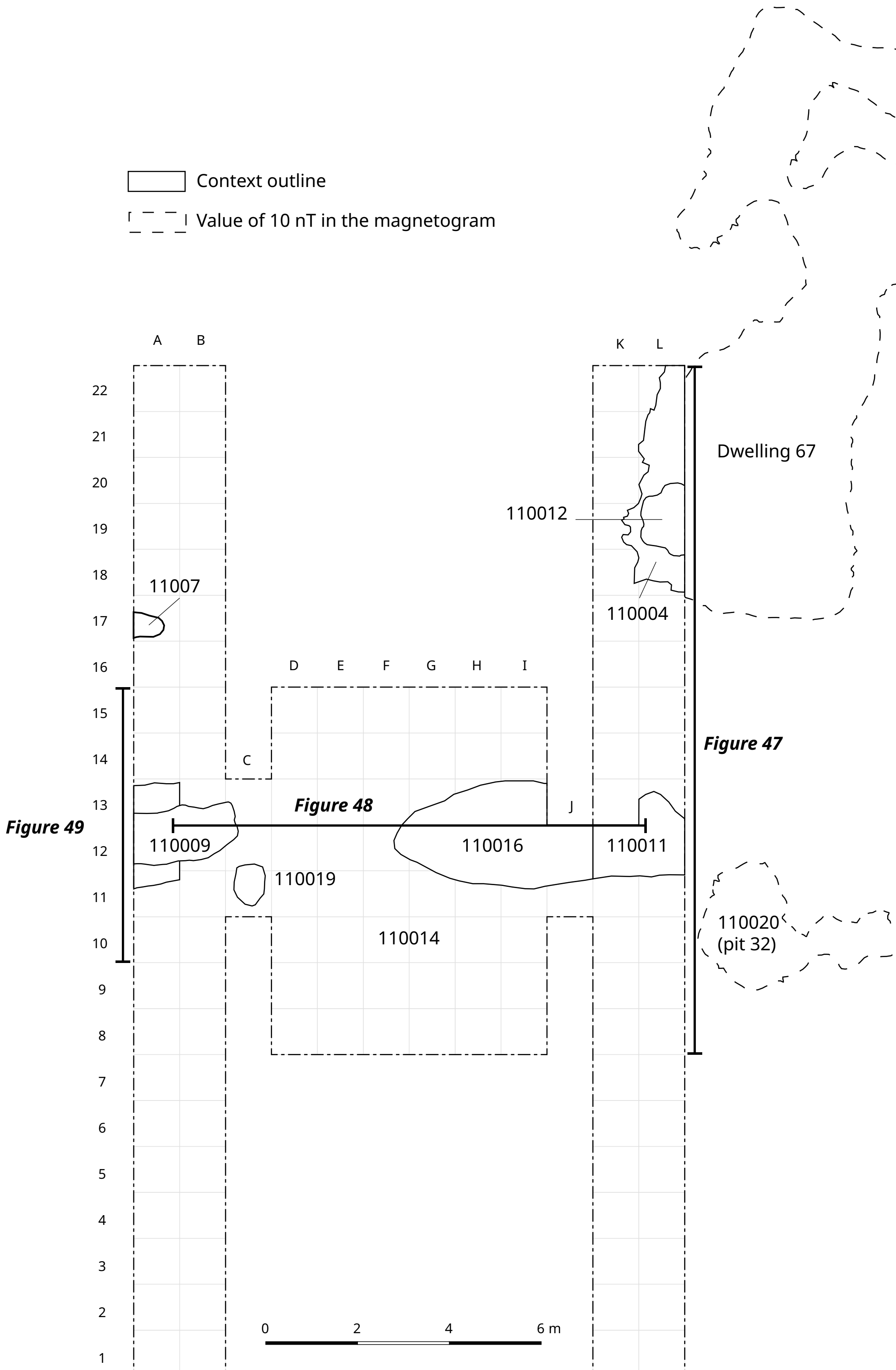


Figure 46. Location of contexts and profiles at trench 110.

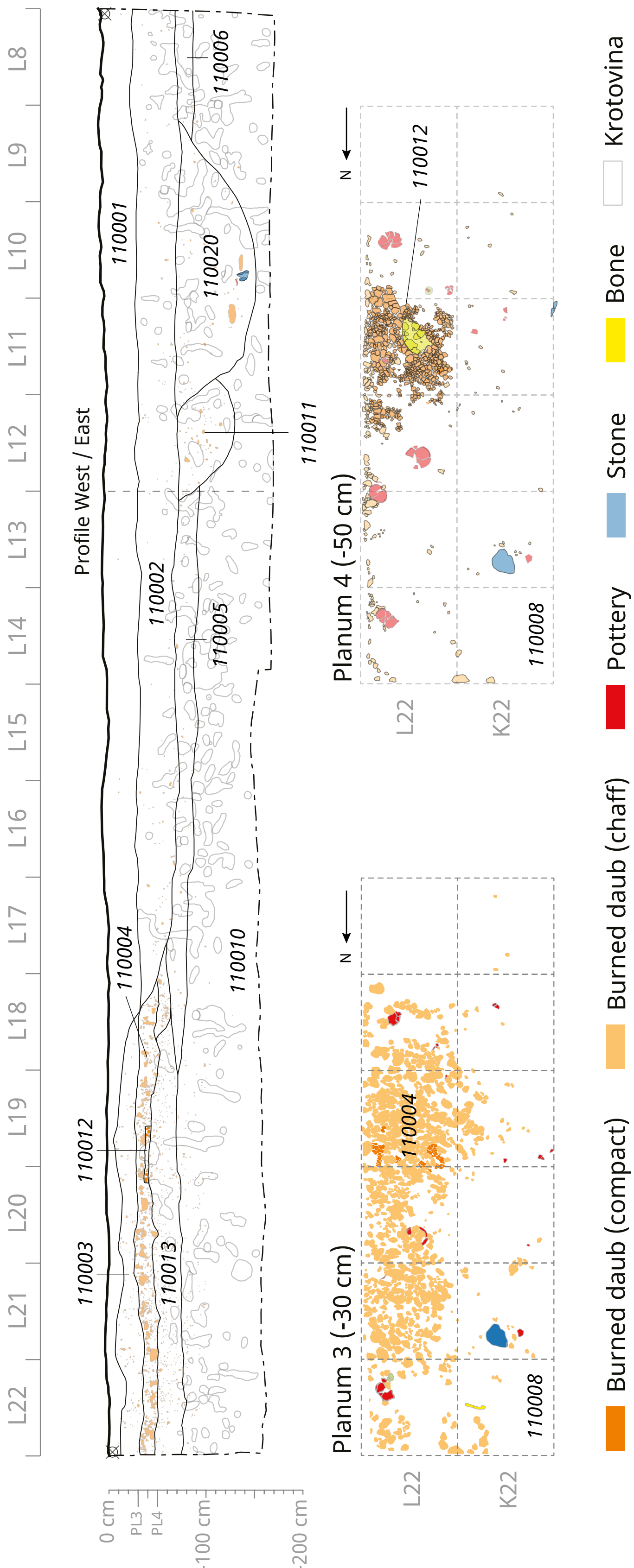


Figure 47. Eastern profile and plana of dwelling 67 at trench 110.

4.3.17 Features

The archaeological features were buried beneath 0.3 m of homogeneous and compact black soil (Chernozem) with high concentration of organic matter (context 110001). In the northeast (fig. 47; tab. 15), a layer with first artefacts became apparent at 0.15 m below the surface. This brownish-grey silt with pieces of burnt daub of up to 5 cm (context 110002) is the product of bioturbation above the burnt house remains. Underneath, the former occupational layer after the burning of the house is located (context 110003). It is characterised by grey silt mixed with particles of charcoal and burnt daub of up to 10 cm.

The package of burnt daub can be divided into several features (fig. 47; tab. 15). At 0.3 m below the surface, a layer of 10 cm with large pieces of burnt daub and pottery (context 110004) marks the beginning of the ploshchadka. The daub shows various wooden imprints and is tempered with chaff. Underneath, a 5 cm thick layer of compact burnt daub without temper but a flattened surface is situated at the southern end of the package (context 110012). On it, parts of a round clay slab with a thickened edge are preserved. Under the package of daub, at 0.6 m below the surface, several vessels were found *in situ* in an upright position on a homogeneous brownish silt layer sprinkled with pieces of burnt daub less than 1 cm thick (context 110013). At the southern edge of the package, buried under the uppermost daub layer (context 110004), a high concentration of small pieces of slightly burnt amorphous daub less than 5 cm thick can be found. An artificial spit of 20 cm further below the building (context 110013) was excavated in order to check for possible postholes. It produced no such findings. Outside the daub package to the west, at 0.4 m below the surface, horizontal sherds of pottery, bone and millstone fragments hint at the former occupational layer (context 110008) contemporaneous to the package of burnt daub (contexts 110004/12/13).

To the south (fig. 47; tab. 15), 5 m from the end of the burnt daub layer, at 0.6 m below the surface, more loosely-packed dark brownish silt with pieces of burnt daub less than 1 cm thick marks the occupational layer above the eastern ditch segment (context 110005). Beginning at 0.7 m below the surface, a u-shaped feature of ca. 2 m wide and 0.6 m deep is located (context 110011). It is refilled with light brown-greyish silt, particles of charcoal, pieces of burnt daub of up to 10 cm, and a few pottery sherds (context 110011a). Context 110011 is cut by another u-shaped feature, 110020, ca. 3.2 m wide and 0.8 m deep. At the bottom, it is refilled with few large pieces of red painted burnt daub, stone, bone and pottery (context 110020a). The upper layer of light greyish-brown silt is more compact than the refill of context 110011 and sprinkled with particles of burnt daub (context 110020b).

In the central area (fig. 48; tab. 15), context 110011 continues as an ellipsoid cut reaching 1.3 m below ground level (context 110016). It is characterised by a first refill of light brown-greyish silt with only few intrusions of burnt daub (context 110016a). The second refill is around 0.3 m thick and consists of large horizontal pieces of burnt daub over 10 cm with various wooden imprints, pottery and bone (context 110016b).

After a gap of 3.5 m to the west (fig. 49; tab. 15), another ellipsoid cut is located, reaching 1 m below the surface (context 110009). Here, the cut is directly refilled with large amounts of burnt daub with various wooden imprints (context 110009a). A second refill extends further to the west, containing pottery mostly placed upside down and part of a bucranium mixed with burnt daub (context 110009b). To the south of its eastern end, a millstone fragment and a coarse ware pot are located (context 110019). They are not clearly related to the other features. The two ellipsoid cuts, on the other hand, are connected by refitted sherds of a 'footed bowl' (plate 67, 5) found in their second refill (contexts 11009b, 110016b).

Around these two mentioned cuts, the former occupational layer is located at a depth of up to 1 m below ground level (context 110014). It is characterised

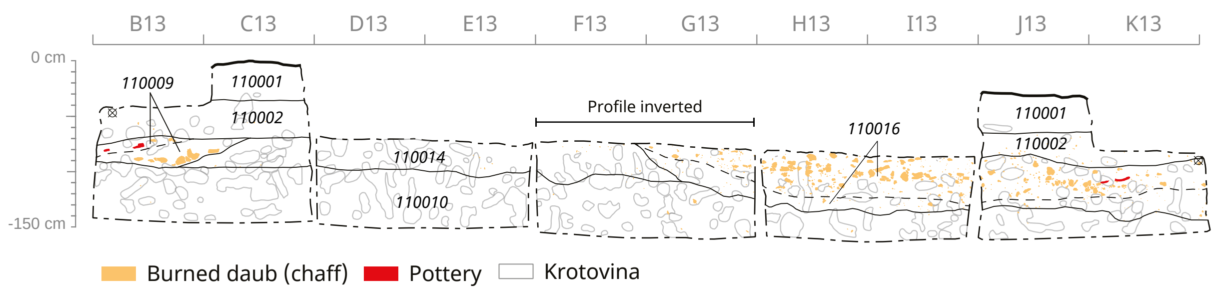


Figure 48. West to east profile of the two ditch segments at trench 110.

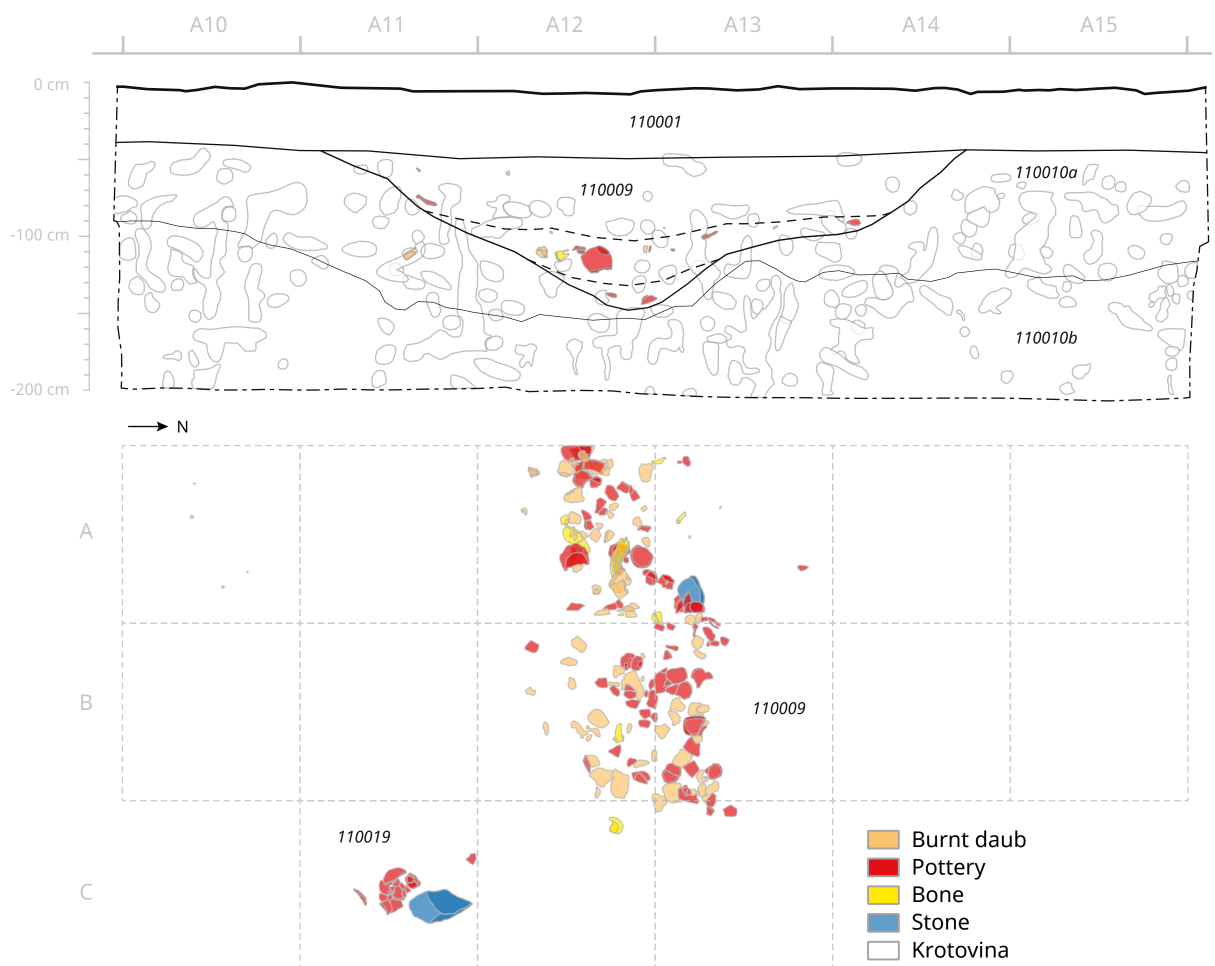


Figure 49. Profile of the western ditch segment and planum at trench 110.

by grey silt, mixed with burnt daub less than 5 cm thick and small occasional fragments of pottery. In the southern part of the trench, two concentrations of burnt daub are located (contexts 110017/18). They are only around 10 cm deep and are situated at the same level as the surrounding context 110014.

Not connected to the Trypillia occupation is an eastward-facing burial of a juvenile individual without any attached artefacts (context 110007). It is placed 0.3 m below the surface in the northwestern part of the trench.

	Ditch West		Ditch East		Pit 32		Dwelling 67		Topsoil	
Trench 110	g	n	g	n	g	n	g	n	g	n
Fine ware (all)	**11665**	**231**	**1606**	**73**	**70**	**1**	**2594**	**80**	**886**	**72**
secondary fired (weak)	*1173*	*37*	*42*	*7*	*70*	*1*	*590*	*17*	*126*	*8*
secondary fired (strong)	*194*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Vitrified	*0*	*0*	*0*	*0*	*0*	*0*	*114*	*4*	*0*	*0*
Coarse ware (all)	**1358**	**48**	**344**	**19**	**0**	**0**	**770**	**32**	**12**	**1**
secondary fired (strong)	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Import	**250**	**7**	**0**	**0**	**0**	**0**	**18**	**2**	**0**	**0**
Sum	**13273**	**286**	**1950**	**92**	**70**	**1**	**3382**	**114**	**898**	**73**

Table 16. Pottery retrieved from features at trench 110. Derived from project database.

4.3.18 Feature interpretation and sequence of events

The findings described above give us a hint about what happened during the Trypillia occupation in this part of Maidanets'ke. First, the ellipsoid cuts can be interpreted as ditch segments for they lie in spatial relation to the elongated geomagnetic anomalies surrounding parts of Maidanets'ke. Since they were cut into the former occupational layer, it seems plausible that the ditch was dug out during and not before the occupation. The first refill of the eastern segment (context 110016a) with only minimal intake of artefacts suggests a slow sedimentation. Thus, this part of the ditch remained dug out for a longer period. Since this kind of refill is missing in the western segment (context 110009), we can conclude that it was dug out later than the eastern part. The refitting of a 'footed bowl' found in the second refill of both segments proves, on the other hand, the contemporaneity of this final refilling. Interestingly, the partial bucranium in the western segment is reflected by the bovine figurine in the eastern segment (plate 62, 7). Another peculiarity is the upside-down placement of pottery in the western segment. A miniature vessel was even placed against its centre of gravity, suggesting a careful and conscious deposition, instead of a simple dumping of waste. Considering the deposited artefacts in the ditch, most of them related to domestic activities, it seems plausible to relate the deposition of a millstone fragment and a coarse ware pot (context 110019) to the final refill of the ditch. Summarising these interrelated features, we can conclude that they show a conscious deposition of one or more former burnt down dwellings.

Sometime after these activities, the eastern ditch segment was cut by a pit (context 110020). The pit lies in spatial relation to the partially excavated ploshchadka (dwelling 67) to the north and can be interpreted as a clay-extraction activity. House and pit assemblages or 'house places' in analogy to the LBK settlement pattern (Rassmann *et al.* 2016) are typical for Trypillia settlements. We can suggest that the pit was dug out in order to retrieve material for the construction of the house to the north. Afterwards, the pit was possibly used for waste disposal, but with only minor depositions of domestic artefacts, as the lower refill shows. A symbolic deposition cannot be excluded, but seems implausible when compared to other cases such as pit 27 at trench 60 (Müller *et al.* 2017b). Instead, the second layer in the pit of trench 110 suggests a slow final refill, leaving artefacts exposed for a longer time period. This and the low number of artefacts are similar to pit 26 at trench 52, which is associated to dwelling 44 at trench 51 (*ibid.*). Like in the case of the ditch segments, a meaningful deposition seems to be related to a rapid refill in connection with burnt daub. A more profane activity is therefore suggested for pit 32 at trench 110.

Consequently, the various layers of burnt daub in the northern part of the trench can be interpreted as a building, which was burnt down after the pit was dug. The associated artefacts of millstone fragments, loom weights, bones and pottery are clearly of domestic function and allow the interpretation of a dwelling (67). The aforementioned agglomeration of small fragments of slightly burnt daub can be characterised as a 'rain gully' formed by water running from the roof. It suggests a taphonomic process of 'slow exterior collapse' (McIntosh 1974; 1977), implying that the building was not burned until the erosion of at least the outer wall set in. Although there are six layers visible for the burnt house, the difficulty remains to relate the artefacts below the house to an earlier time than the finds from the upper layers. The grey layer above the ploshchadka seems to mark the end of the Trypillia activity in this trench.

4.3.19 Finds

During the excavation of trench 110, around 20 kg, including 580 sherds of pottery, were obtained (tab. 16). With over 13 kg of material including around 290 sherds, most of the trench's material was recovered from the western ditch segment with 67 % in weight. Here, 88 % in weight is made of fineware, whereas regular fineware with no traces of refiring also makes up 88 % with a fragmentation of 54 g/sherd on average. Weak traces of second firing are observed in 10 % based on weight, with an average fragmentation of 32 g/sherd. Severe traces of second firing are only visible in 2 % of the material with a low fragmentation of 97 g/sherd. Coarse ware makes up 10 % of the material, whereas no traces of severe refiring is observed. Coarse ware shows an average fragmentation of 28 g/sherd. Besides the local pottery, so-called imports made from washed-out clay without temper makes up 2 % of the material in weight. With 63 %, most of this pottery shows weak traces of second firing with a fragmentation of 32 g/sherd on average.

In contrast, with around 2 kg of material including 90 sherds, only 10 % of the overall pottery of this trench was retrieved from the eastern ditch segment (tab. 16). Here, fineware makes up 82 % of the material in weight. With 97 % in weight, most of the fineware shows no traces of second firing with an average fragmentation of 24 g/sherd. Fineware showing weak traces of second firing make up 3 % and show a high fragmentation of only 6 g/sherd on average. Coarse ware makes up 18 % of the retrieved material and shows no signs of severe refiring. Here, the average fragmentation lies at 18 g/sherd.

The burnt dwelling of this trench was only excavated in part and its pottery yield can be compared to those of test trenches (tab. 16). Here, around 3.4 kg of material including 115 sherds make up 17 % of the overall retrieved material from this trench in weight. Only 77 % of the pottery in weight is made of fineware, with unburnt material making up 73 % in weight with an average fragmentation of 32 g/sherd. Around 23 % in weight shows weak traces of second firing with a comparable fragmentation of 35 g/sherd, while 4 % shows traces of vitrification with a fragmentation of 29 g/sherd on average. With 23 %, a large part of the pottery yield consists of coarse ware, which shows no traces of severe second firing. This material shows an average fragmentation of 24 g/sherd. Few pieces of 'imports' are observed, which make up 0.5 % in weight. Weak traces of second firing are visible in 55 % of this pottery, which shows a fragmentation of 10 g/sherd, while unaltered material shows an average fragmentation of 8 g/sherd.

For the associated pit to the house, only one sherd of secondarily fired fineware was found at the bottom (tab. 16). It shows, thus, a biased fragmentation of 70 g/sherd.

With 331 g of material including 17 sherds of pottery, the occupational layer yielded 1.7 % of the overall material from this trench (tab. 16). All pottery is made of fineware without traces of refiring and shows an average fragmentation of 20 g/sherd. No 'import' pottery is observed for this feature.

Vessel type	Ditch West	Ditch East	Dwelling 67
Fwp-1.1.1.1	19	9	3
Fwp-1.1.2.1	1	0	1
Fwp-1.2.1.1	7	0	1
Fwp-1.1.1.5	2	0	0
Fwp-1.7.1.1	0	0	0
Fwp-2.1.1.1b	0	0	0
Fwp-2.1.1.1c	0	0	0
Fwp-2.2.1.1a	1	0	4
Fwp-2.2.4.2	0	0	0
Fwp-3.1.1.1	6	8	2
Fwp-3.1.3.1	2	2	0
Fwp-6.4.1.1	0	1	0
Fwp-3.2.1.1	0	0	0
Fwp-4.1.2.1	0	1	1
Fwp-6.3.1.2a	0	0	0
Fwp-7.2.3.2a	6	1	0
Fwp-5.2.1.1a	0	0	0
Fwp-5.2.1.1b	0	0	0
Fwp-8.2.1.1	0	0	0
Fwp-8.3.x.x	0	0	0
Fwp-9.3.3.1	1	0	0
Fwp-9.3.2.1	0	0	0
Fwp-10.1.1.2	2	0	2
Σ	**47**	**22**	**14**

Table 17. Number of fineware vessel types retrieved from the enclosure and dwelling 67 at trench 110. For a description of the types see fig. 71-97.

The amount of diagnostic pottery varies between the different features of trench 110 (tab. 17). Most vessels were retrieved from the infill of the western ditch. Here, 47 vessels could be reconstructed. The largest part consists of bowls whereas the amount of diagnostic pottery varies between the different features of trench 110. Most vessels were retrieved from the infill of the western ditch. Here, 47 vessels could be reconstructed. The largest part consists of bowls with a straight and conical wall (plate 59, 1-7; 60, 1-4; 63, 2-3; 64, 2-4, 6-7; 65, 1-6; 66, 1-4; 67, 1, 3; 71, 5-6; 77, 1-2; 78, 1; 82, 1; 83, 2-5) followed by bowls with a spherical wall (plate 64, 1, 5; 66, 5-6; 67, 2, 4) and one hyperboloid specimen (plate 77, 3). Among the rim decorations of bowls are the widely distributed bands of left-skewed hanging triangles (plate 60, 2; 64, 3-4). On spherical bowls, they appear skewed to the right on the outer rim (plate 64, 1). Additionally, dispersed left-skewed triangles were observed (plate 63, 3; 77, 1). Even in this early phase, the decoration arrangement of the 'comet scheme' is found exclusively, although in narrow (plate 77, 1) and wide tail variations (plate 71, 6). The tails are filled either with a single (plate 77, 1) or several parallel narrow lines (plate 71, 6) or rows of strokes opposing the tail direction (plate 71, 5). Among 'comets', only variations of the sickle element are observed. The next most common types of vessels are of biconical shape. Here, vessels without eyelets dominate (plate 60, 11; 61, 1-6; 69, 5; 70, 1, 4-5; 71, 1-3; 76, 2; 80, 3; 82, 4-6). Those with an eyelet are decorated with a filled grain (plate 60, 12; 70, 2) or a rounded filling (plate 70, 3). Among the decoration arrangements is a narrow variant of the 'volute scheme' (plate 70, 3, 5). Other vessels show the sickle element in the upper shoulder part (plate 70, 2). Comparably frequent are crater shaped vessels of various size (plate 68, 2-5; 69, 1-2; 76, 3; 82, 8). They have, however, a completely eroded surface without any hint of the former decoration arrangement. Cups were found in two variations. The first is of classic sharp-edged large Tomashivska type (plate 70, 5; 79, 2-5), and the other is a small and sturdy variant with a stroke group surrounding the shoulder (plate 75, 9). Moreover, a lid with a set-off bottom and a finger imprint on the bottom was found (plate 75, 8). The few recovered pots do not show any diagnostic decorations (plate 69, 3-4).

Far less pottery was found in the infill of the eastern ditch segment. Here, 22 diagnostic vessels were reconstructed. Most of the vessels are of biconical shape with only few pieces showing eyelets near the rim or belly. Among the decoration elements between the eyelets are hatchet-filled grains and filled segments (plate 60, 11-12). A sphero-conical vessel shows a large dot and a segment filled with parallel narrow lines (plate 60, 10). The next frequent vessel type is bowls. At the eastern ditch segment only straight, conical bowls were found. They show the left-skewed hanging triangle band along the rim and 'comet scheme' with a wide tail filled with rows of strokes opposing the tail direction (plate 71, 5).

Since dwelling 67 in trench 110 was only partially excavated, the number of diagnostic vessels is limited. Here, 14 vessels were observed. Among them are mostly bowls with a straight conical wall. One of the better-preserved bowls shows the 'comet scheme' with a narrow tail filled with a single line and a dotted 'comet' at the end (plate 77, 1). The rim shows a band of left-skewed hanging triangles. The 'comet scheme' appears to be mixed with a single element scheme including an additional dot in the middle. Another vessel shows a band of isosceles hanging triangles around the rim (plate 77, 2). Classic Tomashivska cups also appear frequently, but mostly with an eroded surface. One specimen shows a 'metopic' design arrangement with broad diagonal lines and an opposing block with the depiction of a hatchet-filled grain (plate 79, 2). Among the biconical vessels are larger variants without eyelets and bellies of sphero-conical form (plate 80, 4). Their surfaces are, however, burnt or eroded. The few recovered pots do not show any diagnostic decoration arrangements due to burning or surface erosion of the pottery. Coarse ware pots show a set-off straight rim and a rounded belly. The neck is decorated with vertical brush marks. Rows of incisements appear on the outer rim, the transition to the neck or around a set-off cylindrical lug (plate 81, 7). A mostly complete pot shows deformations (plate 81, 1), possibly due to the burning of the house.

Among the special finds of trench 110 is the assemblage of a sledge model fragment with a cross-shaped decoration on the inner surface (plate 63, 1), which was found together with a zoomorphic figurine (plate 62, 7) and a spherical token (plate 62, 6) in the eastern ditch segment. The zoomorphic figurine shows rare punctuations along its back and several rows of punctuations on its head. While the horns are broken off, it can be identified as a cattle figurine. Furthermore, a silex blade fragment (plate 83, 1) was found on the former occupational layer between the two ditch segments.

4.3.20 Implications – A Trypillia causewayed enclosure

The initial inner ditch system at Maidanets'ke is observed in the geomagnetic plot over the course of around 2 km. Overall, it might have been 4.7 km in length, encompassing the whole site. In a second phase, a partial ditch system was laid out over the course of around 1 km to the northwest of the settlement. In contrast to the massive ditch systems of previous Trypillia times, especially in

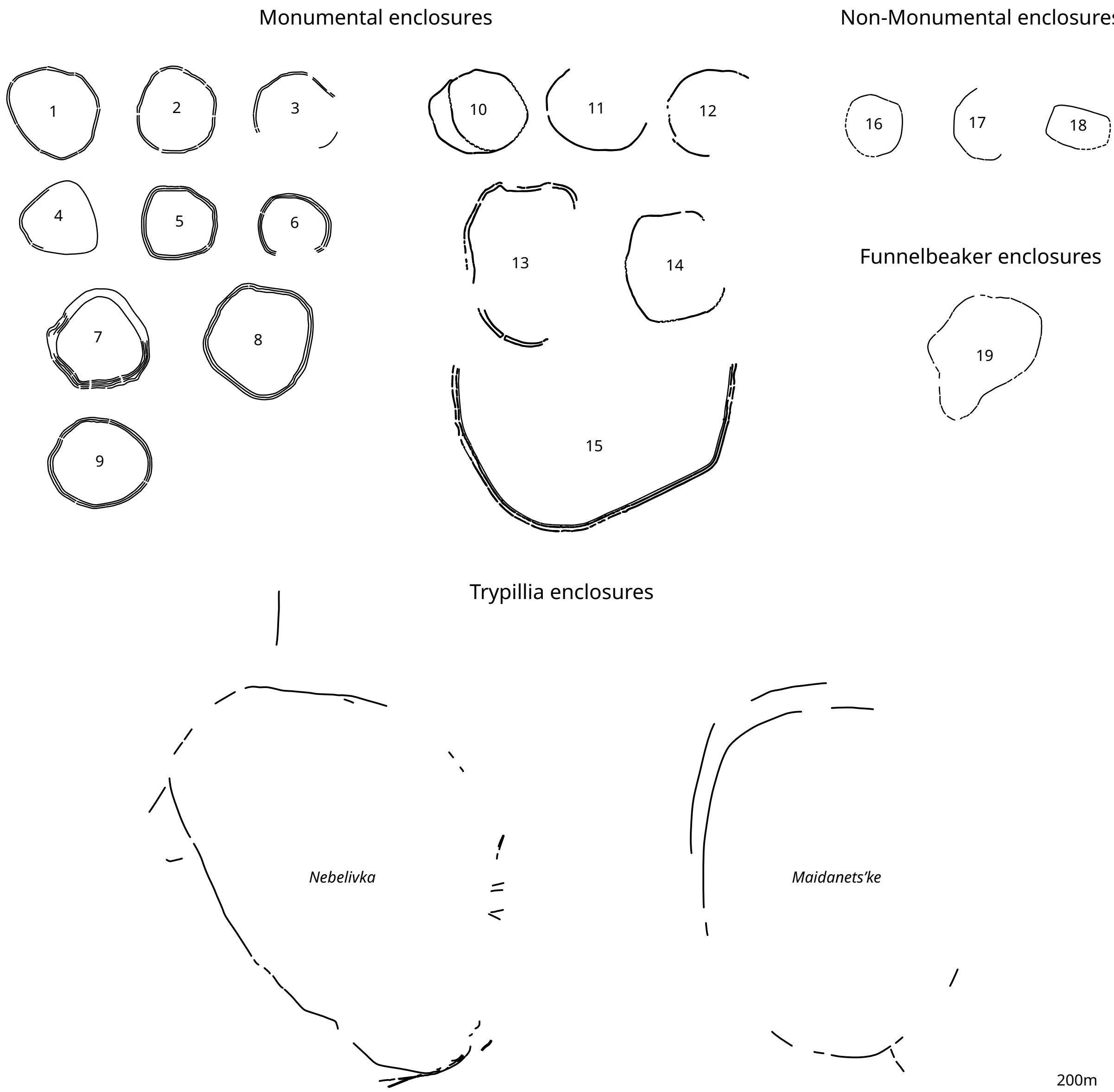


Figure 50. Comparison of Trypillia enclosures and coeval Central European structures. 1 Calden, 2 Wittmar, 3 Ohrum, 4 Rössing, 5 Groß Vahlberg, 6 Hoiersdorf, 7 Oberntudorf, 8 Niedersickte 2, 9 Jerxheim 8, 10 Rimbeck, 11 Wobeck, 12 Werlaburgdorf, 13 Salzmünde, 14 Hornburg 21-5, 15 Urmitz, 16 Börßum, 17 Hornburg 27, 18 Jerxheim 6, 19 Beusterburg. Nebelivka enclosure derived from Chapman and colleagues (2014a). 1-14 and 16-19 derived from Geschwinde and Raetzel-Fabian (2009). Urmitz derived from Andersen (1997).

the west (Lazarovici 1990), the Maidanets'ke ditch appears rather shallow. This is, however, in line with the findings at Nebelivka (Chapman *et al.* 2016).

A defensive character of these 'mega-site' type ditches, as proposed by Videyko and Burdo (2016), appears implausible considering its segmented nature. It is rather comparable to causewayed enclosures known from Central and Western European contexts (Andersen 1997; 2015; Klassen 2014; Mayer and Raetzel-Fabian 2006; Petrasch 2015). There, they are known as a typical trait of the Neolithic period.

For the causewayed enclosure of Maidanets'ke, several areas of origin can be discussed. While enclosures are known since the Early Neolithic and the preceding LBK settlements, Lengyel sites with so-called roundels or circular ditch systems lie closer in time and space to Trypillia settlements. However, the roundels are neither comparable to the size nor the unregular and segmented nature of the

Trypillia enclosures. Moreover, one of the key traits of the roundels are v-shaped ditches, which were not observed in Trypillia contexts (Petrasch 2015, 774).

Another point of origin could be the Balkan and inner Carpathian Mountains. There, the observed massive ditch systems were associated with defensive purposes and the collapse of tell settlements (Lazarovici 1990). Comparable ditches can be observed beyond the Carpathian Mountains up to the Dniester for the middle stage of Cucuteni-Trypillia at Trostianchyk (Rud *et al.* 2016; Rud *et al.* 2018).

Based on their layout, size and timeframe, the Trypillia enclosures can be related best to their Michelsberg counterparts in Central and Western Europe (Mayer and Raetzel-Fabian 2006; Geschwinde and Raetzel-Fabian 2009; Seidel 2008; Seidel *et al.* 2016). The Trypillia enclosures of Maidanets'ke and Nebelivka are, however, even larger than the Urmitz enclosure located at the Rhein River (fig. 50). They fall into the size category Aa (over 90 ha and 4700 m total ditch length) developed by Raetzel-Fabian (1999). Being twice as large as the largest known Michelsberg enclosures, Trypillia enclosures would present the easternmost occurrence of this feature category.

During the excavations, it was not possible to detect remains of palisades or ramparts. As in the case of postholes beneath dwellings, the severe bioturbation at the site hinders the detection of such small features. In general, entrances of enclosures with palisades show a width of up to 2.5 m, entrances of enclosures without palisades range between 1.5 to 4.0 m (Petrasch 2015, 770). Thus, with a width of 3.5 m for the entrance at the Maidanets'ke enclosure, the absence of a palisade seems plausible. Nevertheless, in the western distribution of the 'mega-site' phenomenon a palisade was said to have been observed at Stolniceni (Ţerna pers. comm.).

If the ditch system had no primarily defensive purpose, what purpose could it have had? In general, enclosures have been associated with all sorts of functions such as ritual centres, refuges, marketplaces for animals or stations for cattle herding (Petrasch 2015, 775; Geschwinde and Raetzel-Fabian 2009; Klassen 2014; Andersen 1997). The depositions in the ditch segments, however, represent only the last activity related to the features. Therefore, their initial purpose has to be inferred with care. A working hypothesis for the excavation was that it might have originally been dug to aid circular layout for the initial phase of house construction. Indeed, according to the radiocarbon dating of the ditch's refill, its layout predates the dwelling phase of the site. Thus, its purpose could have been related to site planning. That ditches are, in general, an early feature at Trypillia sites is hinted at when comparing the Maidanets'ke situation with new radiocarbon dates for features at Petreni in Moldova. There it appears that the ditch is also among the earliest structures of the site (Uhl 2017).

4.3.21 Summary of findings

In result, the excavations at trench 110 revealed highly valuable stratigraphic relations between several features. Two ditch segments were observed to be separated by a gap of 3.5 m. The eastern segment was cut by a settlement pit which, based on its location, belongs to a dwelling beyond the enclosure. Both ditch segments are connected by a refitted bowl.

With the partial remains of a bucranium, the artefacts deposited in the western ditch segment can be related to the deposition of two bucrania observed in the pit of trench 50. In the eastern filling, a bovine clay figurine was found to mirror the bucranium in the western segment. Overall, the depositions in the ditch segments resemble demolished remains of burnt dwellings. Besides burnt daub with wooden imprints on them, typical household refuse, such as broken pottery, bones, and quern stone fragments, were found. What has to be considered, though, is that the depositions in these ditch segments only represent the last activity after the use-life of the ditch. Thus, its original purpose has to be inferred with caution. Since the enclosures are of segmented nature and neither palisades nor ramparts are observed, it is concluded that the ditch at the ‘mega-site’ had no defensive purpose. Instead, it is argued that the ditch originally aided the circular building process, among other possibilities.

In a European context, the ditches discovered at the ‘mega-site’ of Maidanets’ke can be characterised as a causewayed enclosure widely known from the Central and Northern European Neolithic and Chalcolithic. Due to their size and shape, the Trypillia enclosures are closely related to the contemporaneous Michelsberg enclosures.

4.4 Test trenches

The aim of the 2014 campaign was to retrieve radiocarbon samples and diagnostic artefacts from various parts of the site. Trenches were laid out for potentially different phases of Maidanets’ke, within the outer rings, which do not fit into the main settlement layout. Other trenches were laid out over several anomalies within clusters as well as at different rows (see fig. 26). This allows for analyses of time depth within clusters and settlement parts.

In order to evaluate the observed features and retrieved artefacts, test trenches were also laid out inside important features. Therefore, the outline of the geomagnetic anomalies in question to be designated as potential sections is also discussed here.

Dimensions of the geomagnetic anomalies were measured at 10 nT of their extent. For the geophysical properties at Maidanets’ke, it has been proven to be a quite accurate measure for the distribution of archaeological features beneath the ground level.

4.4.1 Trench 91

Dwelling 55 is located at a radial line in the northwestern inner part of the settlement and is part of a cluster of two buildings (fig. 51). The geomagnetic anomaly measures around 12 x 4.5 m (54 m²) and appears to show only minor distortions from the assumed former ground plan of the building. Smaller anomalies located at the short sides to the north and south are probably related to the main geomagnetic feature, since it is part of a pattern found throughout the entire site. Cross-sections of the magnetogram show values of up to 240 nT for different parts of the anomaly (fig. 51).

Trench 91 is laid out as a transect of 1 x 8 m through the middle of the geomagnetic feature (fig. 52). Among the relevant archaeological features (tab. 18) are the remains

Feature group	Context ID	Interpretation
Geo Top	91001	Topsoil (Chernozem)
	91002	Topsoil transition (West)
	91005	Topsoil transition (East)
	91006	Topsoil transition (West)
Dwelling 55 collapse	91004	Soil on / between collapse
	91003	Collapse
	91007	Collapse
	91008	Collapse (East)
Dwelling 55 floor	91011	Floor
Dwelling 55 ground floor	91016	Ground floor
	91012	Ground floor (East)
	91017	
Occupational layer	91009	Occupational layer
	91013	
Pit 31	91010	Pit to dwelling 54 (trench 92)
	91014	
Geo	91018	Natural

Table 18. Features and contexts of trench 91. For a detailed description see context catalogue.

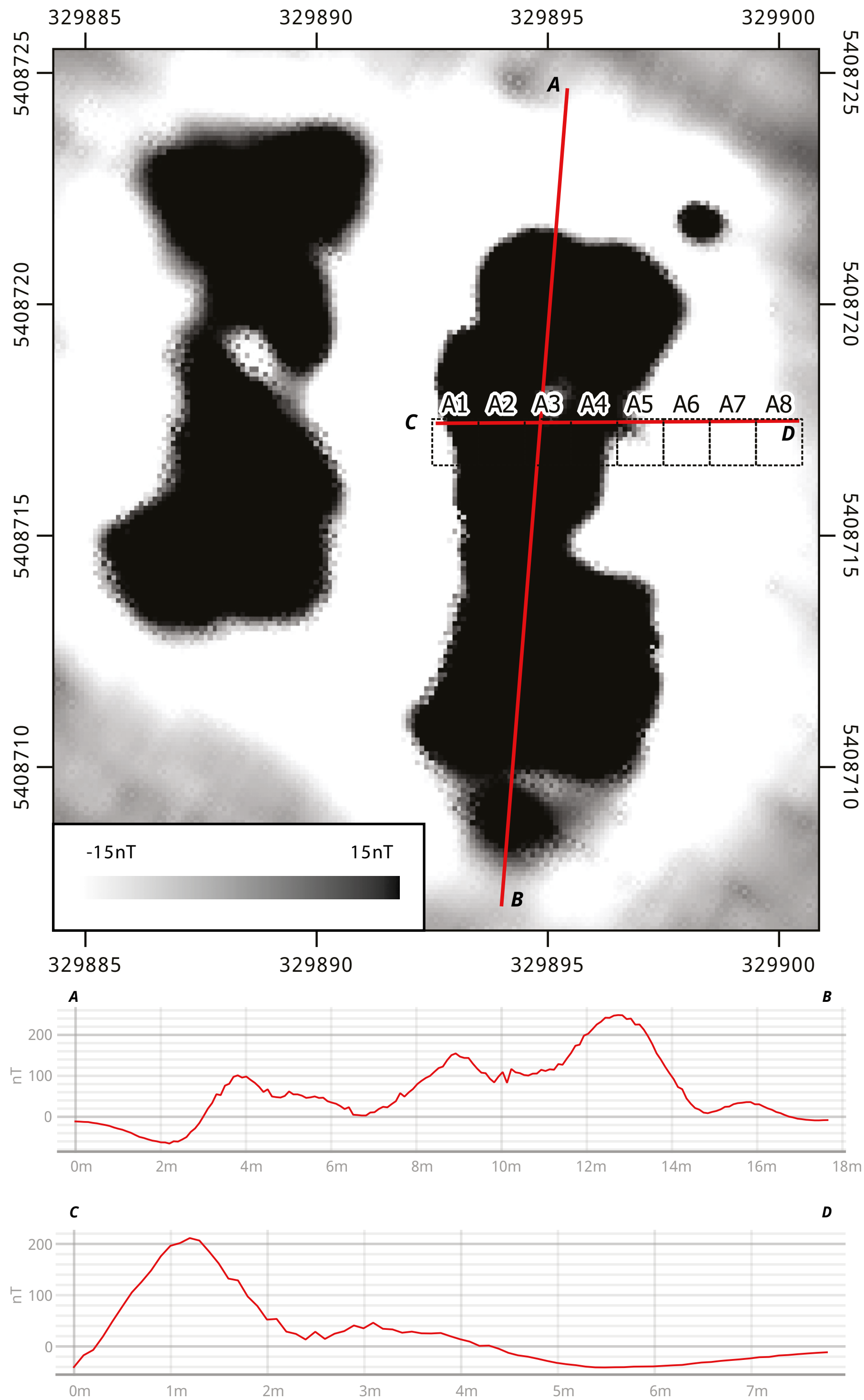


Figure 51. Location of trench 91 and the magnetic susceptibility of dwelling 55.

of dwelling 55 represented by burned daub (contexts 91003/7/8/11/12) with the former ground floor underneath it, identified by brownish silt with a high intake small pieces of burned daub (contexts 91016/17). Outside the house, a compact layer of silt with artefacts was identified as a former occupational surface (contexts 91009/91013). In the eastern part of the trench, parts of a shallow u-shaped pit (31) were documented (contexts 91010/14). This pit was barely recognised by the geomagnetic survey, which goes in line with the low number of artefacts and burned daub coming from this feature. Based on its proximity to the short side of dwelling 54 (trench 92), it can be interpreted as a

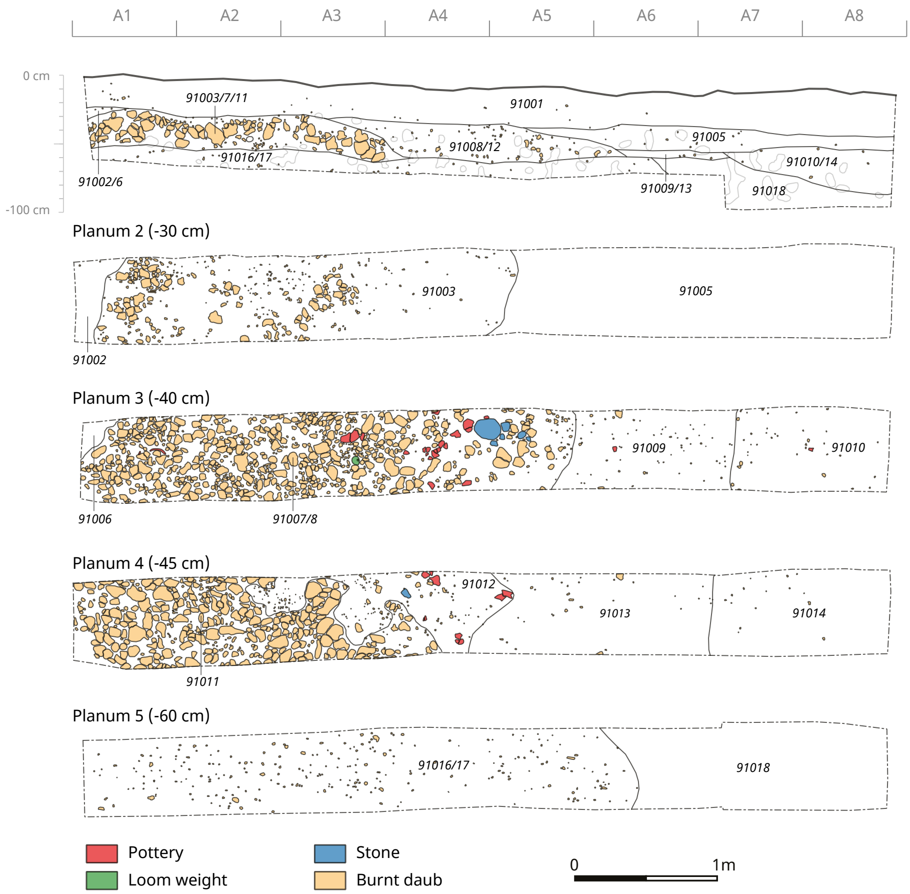


Figure 52. Profile and plana at trench 91.

possible clay-extraction pit of this building. This situation is comparable to the relation between dwelling 44 in trench 51 and pit 26 in trench 52 (see Müller *et al.* 2017b).

4.4.2 Finds

For trench 91, over 6.3 kg of material including 330 sherds of pottery were recovered (tab. 19). Most of the pottery comes from the building debris (84 %), where coarse ware in weight is found predominantly (37 % to 61 %). Here, 99 % of the material could be determined. Around 10 % of the fineware shows traces of weak second firing, originating most probably from the burning of the building. With an average of 18 g/sherd for fineware without traces of second firing and 19 g/sherd for material with traces, there are no relevant visible differences in fragmentation between the two categories. Coarse ware shows no strong second firing differing from cooking induced fire. An average coarse ware sherd weighs 27 g.

Only few pottery sherds were retrieved from the pit (4 %). Here, fineware predominates with over 90 %. No sherds show traces of second firing. For pit 31, fineware weighs 7.8 g/sherd and coarse ware 19 g/sherd on average. The fragmentation of fineware in pit 31 is therefore twice as high as for dwelling 55. The former occupational layer and the a-horizon show ratios between fineware and coarse ware comparable to that of the house. They each make up 6 % of the retrieved pottery from the trench. As can be shown by the refitted import vessel (see below), the pottery of the occupational layer is clearly related to dwelling 55. The comparable ratio between fineware and coarse ware for the topsoil and the building also indicates a connection between the dwelling and the topsoil above it, with pottery displaced by severe bioturbation and ploughing activity. For the topsoil, with 9.6 g/sherd for fineware in

	Dwelling 55		Pit 31 to dwelling 54		Occupational layer		Geo Top	
Trench 91	g	n	g	n	g	n	g	n
Fine ware (all)	**2001**	**110**	**258**	**33**	**145**	**5**	**77**	**8**
secondary fired (weak)	*193*	*10*	*0*	*0*	*0*	*0*	*15*	*1*
secondary fired (strong)	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Vitrified	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Coarse ware (all)	**3233**	**122**	**19**	**1**	**227**	**4**	**156**	**6**
secondary fired (strong)	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Undetermined	**50**	**27**	**0**	**0**	**0**	**0**	**139**	**16**
Sum	**5284**	**259**	**277**	**34**	**372**	**9**	**372**	**30**

Table 19. Pottery retrieved from features at trench 91. Derived from project database.

Feature group	Feature ID	Interpretation
Geo Top	93001	Topsoil (Chernozem)
Dwelling 57	93004	Soil on / between collapse
	93002	Collapse
	93002a	Vitrified daub
	93002b	Floor
Dwelling 58	93005	Collapse
	93005a	Floor
Occupational layer	93003	Alley between dwellings

Table 20. Features and contexts of trench 93. For a detailed description see context catalogue.

general and 26 g/sherd for coarse ware on average, the fragmentation of fineware is higher than most of the features below. Moreover, only 63 % of the ware could be defined. Undetermined sherds weigh 9 g on average. Fragmentation for fineware with second firing (15 g/sherd) and coarse ware in general (26 g/sherd) is, however, comparable to the house. The occupational layer shows the lowest fragmentation for this trench with 29 g/sherd for fineware and 56.8 g/sherds for coarse ware.

The spectrum of diagnostic finds directly related to dwelling 55 includes various vessels. Between the house collapse, two conical fineware bowls, one with a rounded protruding rim (plate 26, 6), the other with a facetted protruding rim (plate 26, 7), were found. Also, a large coarse ware bowl with a rounded straight rim (plate 27, 1), measuring around 40 cm in diameter, and a coarse ware pot with a row of rounded notches on the rim (plate 27, 2), were recorded. The coarse ware pot shows no brushed surface on the neck, which is otherwise a usual trait of kitchenware for the site. Related to the former floor on the platform of the building, a painted fineware fragment from a so-called import vessel was found (plate 27, 3). Together with fragments from the occupational layer, it is refitted as a biconical vessel with eyelets close to the belly. The painted surface shows a pattern of filled half circles hanging from the neck, whereas every second one has three additional lines. One fragment also shows floral decoration (a double-lined twig), and another a small filled circle on the upper body. The pit yielded no decorated sherds, however, a diagnostic rim of a biconical fineware vessel was retrieved (plate 27, 4).

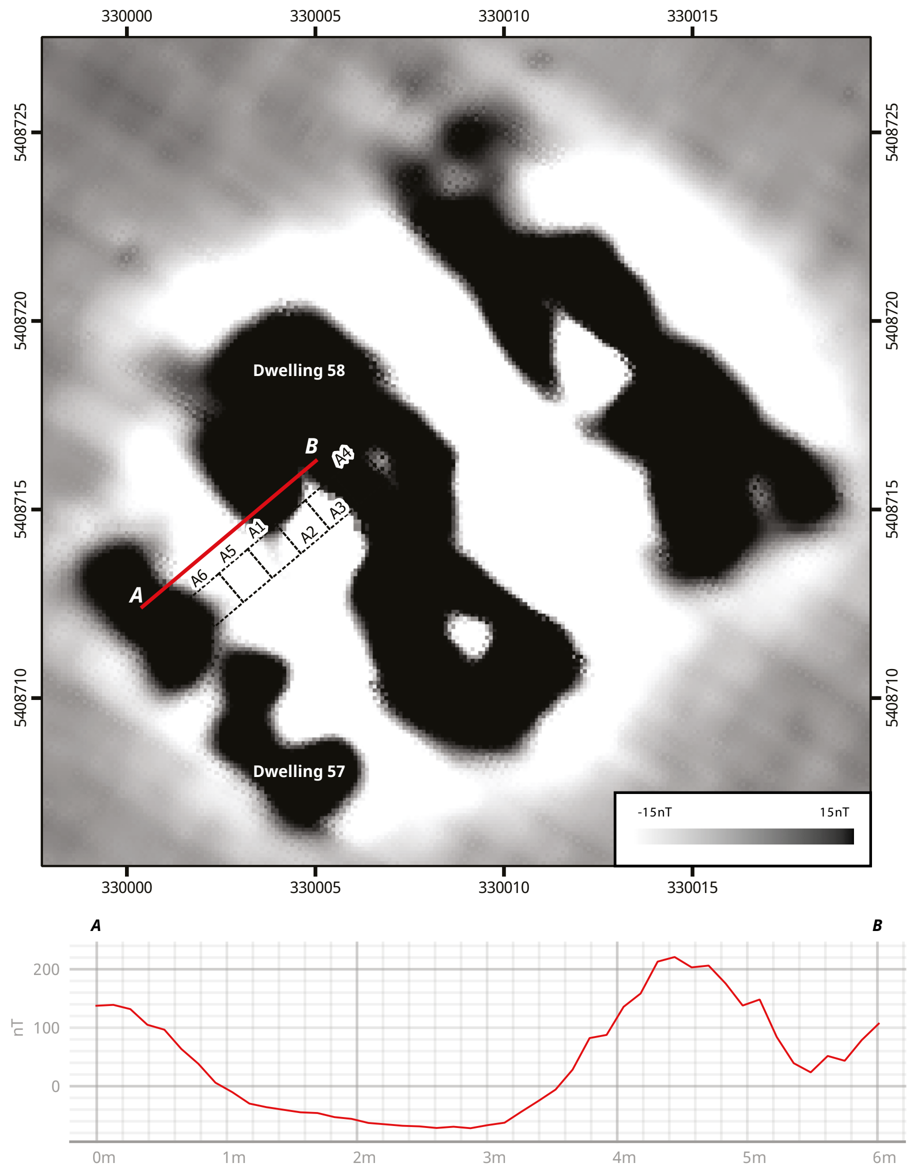


Figure 53. Location of trench 93 and the magnetic susceptibility of dwellings 57 and 58.

Besides pottery, other artefacts include a loom weight (plate 28, 1) and several smaller fragments of a quern (plate 28, 2). While the loom weight and two pieces of a quern were retrieved from the burnt daub collapse, another quern fragment was found on the former platform of the building.

4.4.3 Trench 93

Dwellings 57 and 58 are located at a circular line in the northernmost inner part of the settlement (fig. 53). The cluster lies in the direct vicinity of an exceptional building to the southwest. The geomagnetic features measure 13.5 x 5.5 m (74.25 m²) for the remains of dwelling 58 and 9.5 x 3 m (28.5 m²) for dwelling 57. Both anomalies appear to show only minor distortions from their assumed former ground plan. The section of the magnetogram shows values of up to 220 nT for dwelling 58 and up to 140 nT for dwelling 57 in the area of the 'bloated clay' (fig. 54). Again, the high values do not derive from susceptible material located

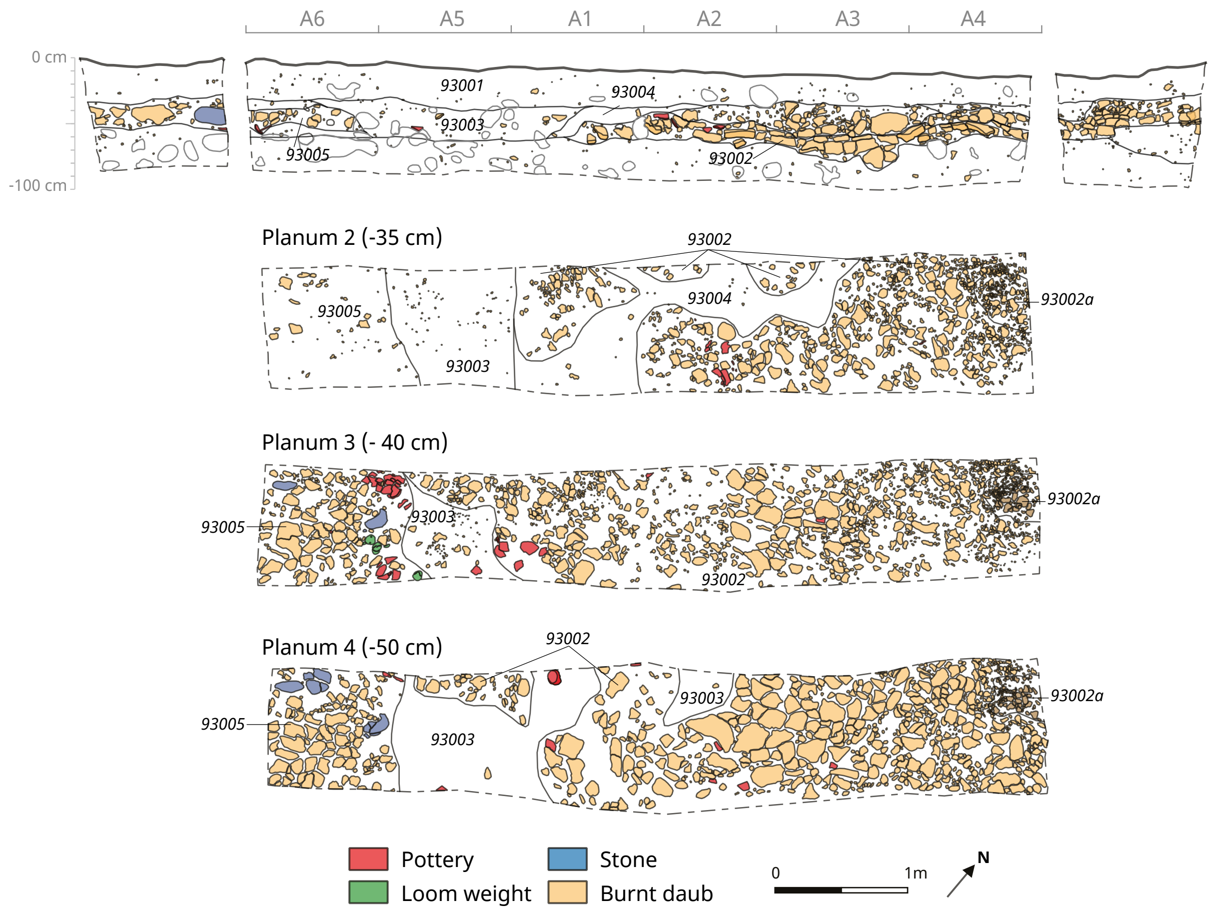


Figure 54. Profile and plana at trench 93.

closer to the surface. This trench was originally planned to probe the central geomagnetic anomaly in a cluster of three. It was soon decided to enlarge it from four to six quadrants in order to reach the anomaly to the southwest (fig. 54). While quadrant A6 in the southwestern corner is associated with dwelling 58 (quadrant A6), the northeastern part is associated with the larger dwelling 57 (quadrants A1-4). Between these two, a small alley of under a meter in width is located (quadrant A5). The relevant archaeological features (tab. 20) are the package of burnt daub interpreted as the collapsed superstructure of dwelling 57 (context 93002) also related to a concentration of vitrified daub (context 93002a) hinting at severe heat in the most northeastern part of the trench. Between the burnt daub of dwelling 57, a layer of grey silt mixed with small daub fragments of under 10 cm is located (context 93004). Beneath it lies a layer of compact and flattened burned daub (context 93002b) representing the former platform of dwelling 57. In the profile of the short side, another layer on top of the collapsed superstructure becomes apparent (fig. 54). Dwellings 57 and 58 are divided by a narrow space of under one meter, characterised by grey silt with little intake of burnt daub (context 93003). The distribution of daub fragments and artefacts in this area marks the former occupational surface. The relevant features of dwelling 58 are the package of burnt daub interpreted as the collapsed superstructure of dwelling 58 (context 93005) and the former platform by a layer of compact and flattened burned daub underneath (context 93005a).

Trench 93	Dwelling 57 g	Dwelling 57 n	Dwelling 58 g	Dwelling 58 n	Occupational layer g	Occupational layer n
Fine ware (all)	**6894**	**233**	**2217**	**47**	**54**	**1**
secondary fired (weak)	*1348*	*28*	*681*	*12*	*0*	*0*
secondary fired (strong)	*244*	*15*	*0*	*0*	*0*	*0*
Vitrified	*45*	*1*	*0*	*0*	*0*	*0*
Coarse ware (all)	**1128**	**19**	**0**	**0**	**0**	**0**
secondary fired (strong)	*0*	*0*	*0*	*0*	*0*	*0*
Undetermined	**0**	**0**	**0**	**0**	**0**	**0**
Sum	**8022**	**252**	**2217**	**47**	**54**	**1**

Table 21. Pottery retrieved from features of trench 93. Derived from project database.

4.4.4 Finds

Trench 93 yielded around 10.3 kg of material including 300 sherds of pottery (tab. 21), whereas the majority of the material comes from dwelling 57 (78 %) followed by dwelling 58 with 22 %. Only 0.5 % belongs to the former occupational layer. For the larger dwelling 57, over 8 kg of material including around 250 sherds of pottery were recorded. Here, fineware predominates in weight with 86 % over coarse ware with 14 %. Overall, around 24 % of fineware shows various traces of second firing, ranging from weak (19 %) to strong (3 %) and one vitrified sherd (0.1 %). While fineware without second firing weighs 28 g/sherd on average, sherds with weak traces of second firing weigh 48 g/sherd. Sherds with strong traces weigh 16 g/sherd and the vitrified pieces 45 g/sherd. Coarse ware shows no traces of extraordinary firing. Sherds weigh 59 g on average.

The smaller dwelling 58 yielded over 2.2 kg of material including 47 sherds of pottery. Only fineware was found from this building. Around 30 % of the material shows weak traces of second firing. While fineware without second firing weighs 44 g/sherd, material with traces weigh 57 g/sherd on average.

The spectrum of diagnostic pottery related to dwelling 57 includes two conical bowls of which the smaller one shows two inward spiralling lines on the inner surface (plate 46, 2). This decoration is a simple version of the so-called 'comet-scheme' following Ryzhovs terminology (2012b). While the larger bowl shows a rounded protruding rim (plate 46, 1), the smaller bowl shows a straight rim with a flattened upper side. In addition, a spherical bowl was documented (plate 46, 4), which also shows a flattened upper side. Further decorated pieces include the rim of a pot or crater-shaped vessel with a closed variation of the 'leaf' element applied between rim and neck (plate 46, 3). In addition, a crude and small biconical vessel was found with roughly painted half-circles filled with horizontal / vertical hatches and an 'eyelash' element applied between the two half-circles (plate 46, 5). Another fragment of a biconical vessel shows parts of a complex decoration, including at least six vertical thin lines in a possible half-circle (plate 47, 3). Besides these fineware pieces, two fragments of coarse ware were recorded. The first is part of a pot with a pronounced ledge between belly and neck (plate 47, 1). The neck shows vertical brush marks. The second piece is a cylindrical lug with a dent on the end part (plate 47, 2).

The remains of dwelling 58 yielded several diagnostic pieces, among them two conical bowls, both painted on the inside with the so-called 'comet scheme' (plate 47, 4-5). The larger bowl shows a more complex version of the scheme with 'eyelashes' at the end of the spiralling lines and at the outer end line (plate 47, 4).

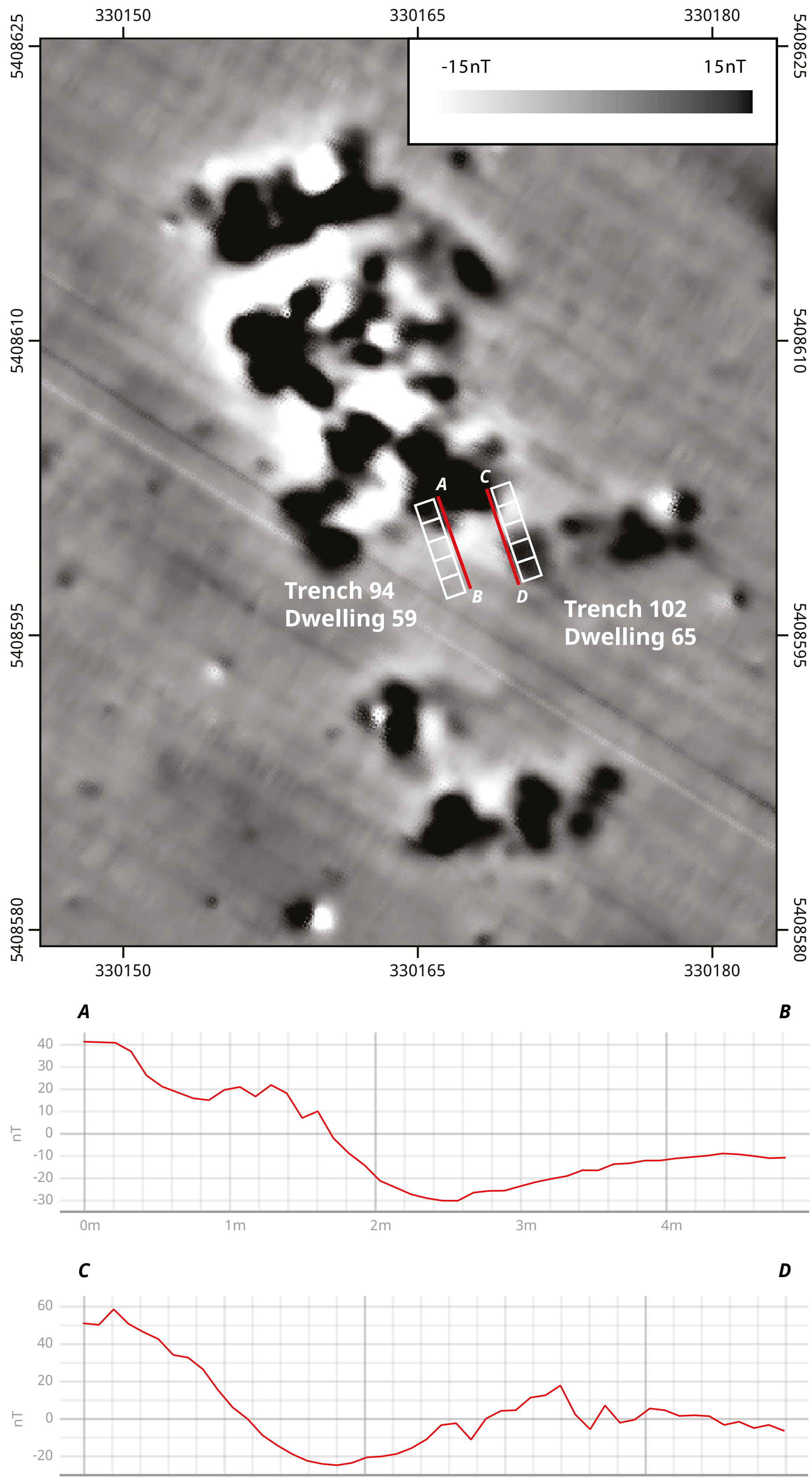


Figure 55. Location of trenches 94/102 and the magnetic susceptibility of dwellings 59 and 65.

Feature group	Feature ID	Interpretation
Geo Top	94001	Topsoil (Chernozem)
Dwelling 59	94002	Collapse
	94003	Lesser burnt collapse
	94006	Ground floor
Occupational layer	94004	Occupational layer
	94005	
Geo	94007	Natural

Table 22. Features and contexts of trench 94. For a detailed description see context catalogue.

Feature group	Feature ID	Interpretation
Geo Top	102001	Topsoil (Chernozem)
Dwelling 59	102002	Collapse (see trench 94)
Dwelling 65	102003	Collapse
Occupational layer	102004	Alley between dwellings
Geo	102005	Natural

Table 23. Features and contexts of trench 102. For a detailed description see context catalogue.

The rim shows remains of a typical surrounding line of triangles. In comparison, the smaller bowl shows a simple double line, which is spiralling inward, and the rim shows a surrounding line of filled half-circles (plate 47, 5). Further pottery includes a complete small cup with a simplified line scheme of bunched five to six diagonal lines (plate 49, 1) and a biconical vessel with a horizontal eyelet in the middle of the upper body (plate 48, 1). The upper part is divided into two mirroring zones of which the first is painted with two half-circles filled with horizontal / vertical hatches enclosing the eyelets and the second showing two hanging lines accompanied by several filled dots in between. Besides these diagnostic pieces of fineware, fragments of a decorated coarse ware pot were recovered (plate 49, 2). The two fragments belong to the upper body and show a surrounding line of incised plastic applications and part of a plastic application on the neck.

In addition to pottery, the two buildings of trench 93 yielded several other notable artefacts. At dwelling 58, several quern fragments and loom weights were recorded (plate 50, 1-6). Judging from the deposition of loom weights, the loom was probably placed in the alley between the two buildings along the wall of dwelling 57. Furthermore, several painted pieces of burnt daub were observed (plate 51, 1). They show a thin red ochre plaster applied on organic tempered daub.

While no loom weights or querns were observed for the sampled area of dwelling 57, a round stone fragment – possibly a polishing stone – was recorded.

4.4.5 Trenches 94 and 102

Dwelling 59 is located at the innermost circular line of dwellings in the eastern centre of the settlement and is part of a cluster consisting of six buildings (fig. 55). The geomagnetic feature measures around 9 x 6.5 m (58.5 m²) and appears to be distorted from the assumed general ground plan of the former building. The central part shows a two-meter-wide positive anomaly outside the main rectangle, which could represent a collapsed wall. Thus, the dwelling could have originally been 4.5 m wide. A similar situation is visible in the eastern part of the anomaly, though not as prominent as the aforementioned distortion. In the east, a positive anomaly of 1.5-2 m in diameter could hint at a diagonal collapse of the front facade. However, the comparably low susceptibility of 40-60 nT for the section of trenches 94 and 102 is in line with the low amount

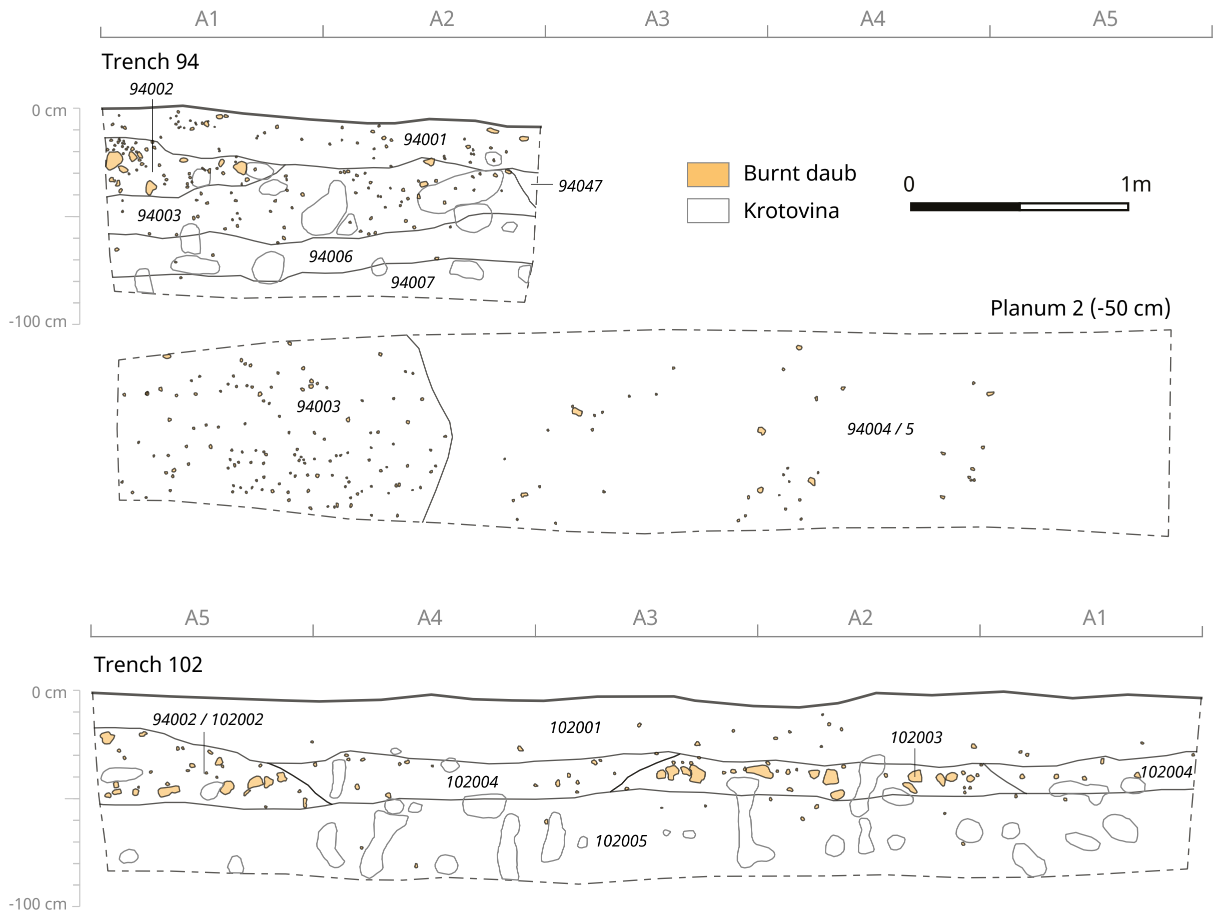


Figure 56 (above). Profiles and planum of trenches 94 and 102.

Table 24. Pottery retrieved from trench 94. Derived from project database.

	Dwelling 59		Topsoil	
Trench 94	g	n	g	n
Fine ware (all)	**276**	**12**	**169**	**17**
secondary fired (weak)	*20*	*3*	*109*	*10*
secondary fired (strong)	*0*	*0*	*0*	*0*
Vitrified	*0*	*0*	*0*	*0*
Coarse ware (all)	**17**	**2**	**0**	**0**
secondary fired (strong)	0	0	0	0
Undetermined	**0**	**0**	**0**	**0**
Sum	**293**	**14**	**169**	**17**

of burnt daub and other artefacts. The building was probed in the southern central part by trench 94 measuring 1 x 5 m and in the southeastern front part by trench 102 (quadrant A5). Trench 94 was laid out in order to capture both the interior of the ploshchadka and the surrounding former occupational layer (fig. 56). Remains of the burnt down building were found in quadrants A1-2, while the former surface is located in quadrants A3-5. The relevant archaeological features are the remains of dwelling 59, represented by layers of burnt daub (contexts 94002/3) and the former occupational surface (contexts 94004/5) identified by small pieces of burnt daub and the artefact distribution (tab. 22). Judging by the small amount and size of burnt daub, it seems that the ploshchadka is poorly preserved in this part. For trench 102 (tab. 23), the profile shows a much better preservation in the northeastern part of the ploshchadka (context 102002). It was, therefore, possible to retrieve a sufficient amount of material for analysis.

A narrow space of about 1.5 m between both houses marks the former occupational surface (context 102004). Dwelling 65 lies, however, off the main line of buildings in the cluster. This spacing therefore provides little general knowledge for distances of buildings in clusters.

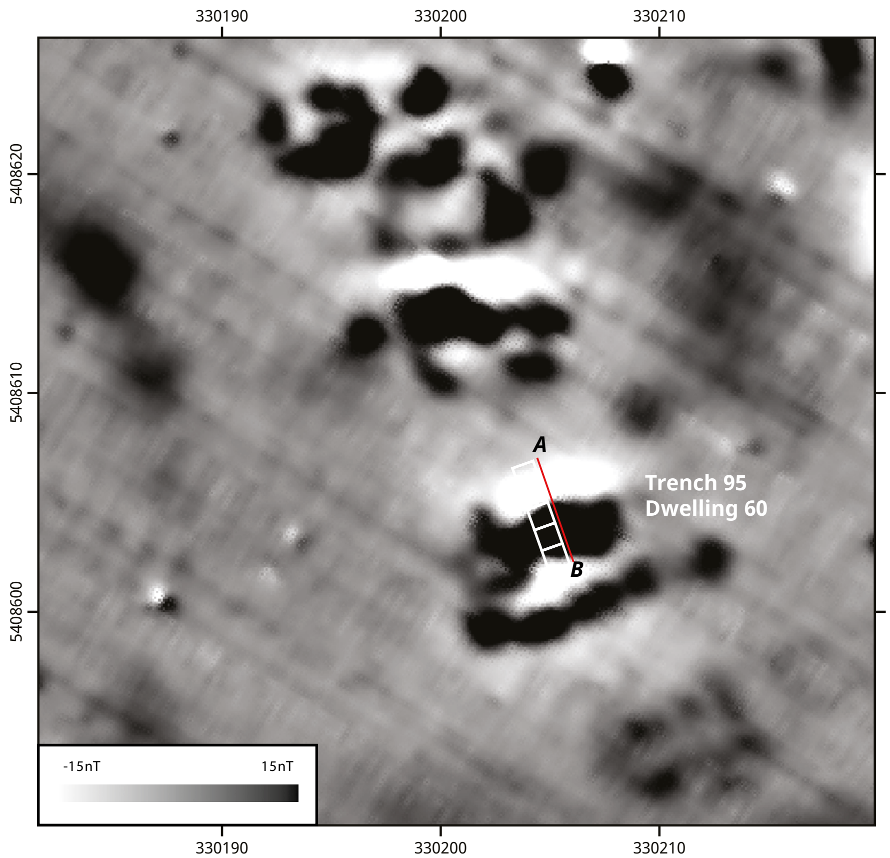
4.4.6 Finds

During the excavation of trench 94, only 462 g of material including 31 sherds of pottery were recovered (tab. 24). While around 63 % of the material originates from the burnt house debris, a high amount of pottery (37 %) was dislocated to the topsoil. From dwelling 65, only around 300 g of pottery were retrieved, while 37 % of the overall pottery was found dislocated in the topsoil. Fineware predominates with 94 % in weight over coarse ware with 6 %. Traces of second firing on fineware was documented for 7 % of the material. Whereas sherds without traces of second firing weigh 28 g, pieces with weak traces weigh only 7 g/sherd on average. Coarse ware shows no traces of severe fire. They weigh 9 g/sherd. In the topsoil, only fineware was found. Most of the material shows weak traces of second firing (65 %). With 11 g/sherd on average, fineware with second firing is slightly less fragmented than pieces without traces, which weigh 9 g/sherd.

Only two pieces of painted pottery could be recovered from trenches 94 and 102. Both belong to dwelling 59, including the fragment of a fineware pot with three hanging half-circle lines along the neck and a surrounding double line along the shoulder of the vessel (plate 52, 4). The other painted fragment of fineware is a wall sherd with the remains of a half-circle filled with horizontal/vertical hatches and a surrounding hatched line above (plate 52, 5). Other fragments include two rim sherds of fineware pots or crater shaped vessels (plate 52, 1-2) and a conical bowl with a protruding rim (plate 52, 3).

Feature group	Feature ID	Interpretation
Geo Top	95001	Topsoil (Chernozem)
	95002	Topsoil transition
Dwelling 60	95003	Unburnt interior
	95007	
	95012	
	95004	Collapse
	95006	Floor
	95009	
	95014	
	95008	Burnt surface
	95013	
	95011	Ground floor
	95015	
Occupational layer	95005	Occupational layer
	95010	
Geo	95016	Natural

Table 25. Features and contexts of trench 95. For a detailed description see context catalogue.



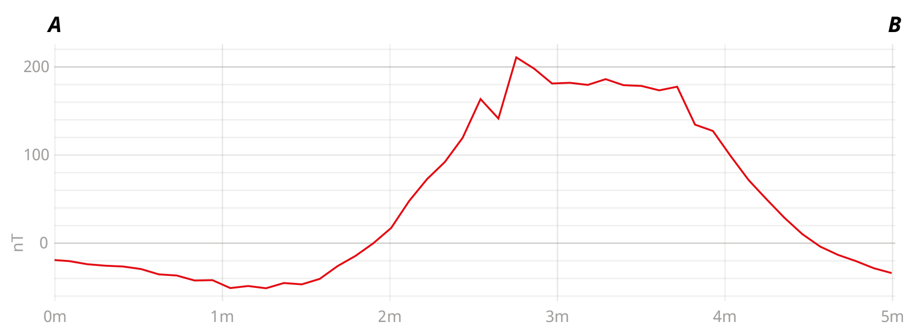


Figure 57. Location of trench 95 and the magnetic susceptibility of dwelling 60.

4.4.7 Trench 95

Dwelling 60 is located just a circular line to the east of trenches 94 and 102 in the central part of the settlement. It is part of a cluster consisting of five buildings of which two overlap to the north (fig. 57). The geomagnetic feature measures around 12.5 x 5.5 m (68.75 m^2) and appears to be distorted from the assumed general ground plan of the former building. While the eastern short side shows a small roundish feature, typical for many geomagnetic anomalies and implying an entrance from that side, the northern central part of the dwelling appears broader than usual. In addition, the inner part of the building shows an unusual polar change, which leads one to expect different archaeological features for this part of the trench. Judging by high magnetic susceptibility values of 180-210 nT visible in the section of the magnetogram and the location of the trench in the idealized layout of the former building, it appears that the trench cuts through the remains of the former fireplace. The geomagnetic feature is probed by a 1 x 4.5 m test trench laid out over the northern central part of the ploshchadka (fig. 58). The main archaeological features (tab. 25) are burnt daub rep-

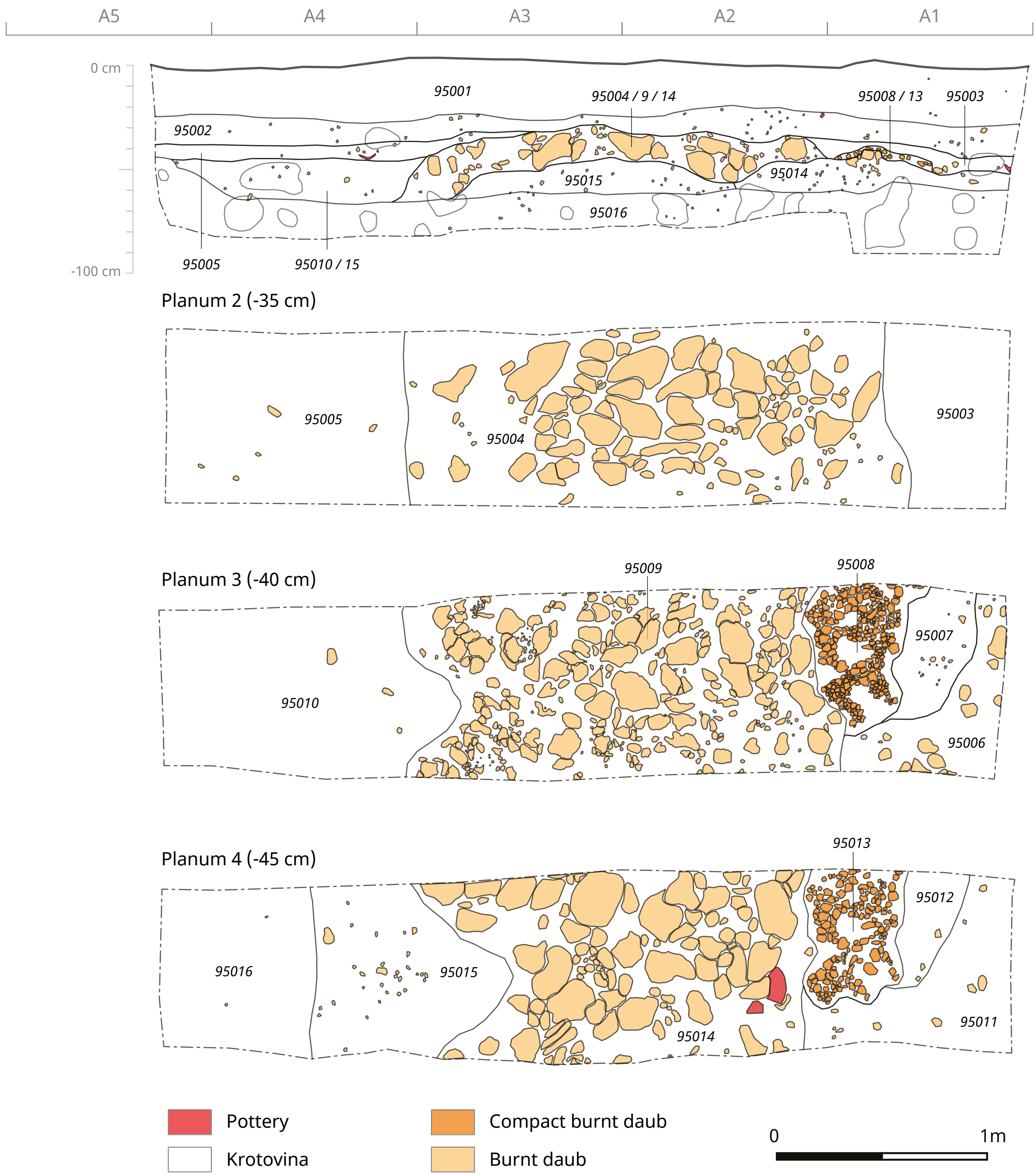


Figure 58. Profile and plana at trench 95.

resenting the former platform and foundation of the fireplace of dwelling 60 (contexts 95004/9/14) as well as the former occupational layer outside the dwelling to the north (contexts 95005/10/15) hinted at by small pieces of burnt daub and the distribution of artefacts. A layer of fired and highly fragmented daub can be interpreted as a fired surface (contexts 95008/13), probably related to the hearth foundation. The inner part of the ploshchadka appears to be empty in the magnetogram, which is the case for a small part visible in the profile (contexts 95007/12). However, small pieces of burnt daub and artefacts depict the former interior surface (contexts 95006).

The high values visible in the magnetogram could not be derived from susceptible material located closer to the surface, as can be shown in the profile for this

	Dwelling 60		Occupational layer		Topsoil	
Trench 95	**g**	**n**	**g**	**n**	**g**	**n**
Fine ware (all)	1535	47	1175	24	67	6
secondary fired (weak)	389	6	0	0	0	0
secondary fired (strong)	0	0	0	0	0	0
Vitrified	0	0	0	0	0	0
Coarse ware (all)	0	0	90	1	0	0
secondary fired (strong)	0	0	0	0	0	0
Undetermined	11	5	0	0	0	0
Sum	**1546**	**52**	**1265**	**25**	**67**	**6**

Table 26. Pottery retrieved from features of trench 95. Derived from project database.

trench (fig. 58). It is therefore plausible to assume an area with burnt daub, which was fired with temperatures comparable to the pottery kiln of trench 80.

4.4.8 Finds

Over 2.8 kg of material including 83 sherds of pottery were recorded for this trench (tab. 26). With 54 %, most pottery in weight comes from the building, followed by the former occupational layer with 43 %. Only 2 % were found dislocated in the topsoil. For dwelling 60, most of the 1.5 kg of material with 52 sherds of pottery were recordable (99 %). Here, all material is made of fineware, of which 25 % shows traces of weak second firing. As indicated by average sherd weight, fineware without traces of second firing is more than twice as fragmented (28 g/sherd) as fineware with traces (65 g/sherd). With only 2 g/sherd, undetermined pottery is highly fragmented.

The occupational layer yielded around 1.3 kg of material including 25 sherds of pottery. With 93 %, fineware predominates, while coarse ware makes up around 7 % of the material. No traces of second firing were recognised. Fineware weighs 49 g/sherd and coarse ware 90 g/sherd on average. The few dislocated pieces found in the topsoil are all made of fineware without traces of second firing and weigh 11 g/sherd on average.

For dwelling 60, only two painted pieces of fineware could be recovered. The first belongs to a cup on which a surrounding double line was applied on the lower body (plate 53, 1). The second is a wall sherd from the neck of a vessel showing a surrounding double line filled with diagonal lines (plate 53, 2). Both decorations are found on many vessel types and do not have a sharp diagnostic character. Other pieces belong to two conical bowls with straight rims (plate 53, 3-4).

Among the artefacts of dwelling 60 were also four loom weights of various sizes coming from inside the building (plate 53, 5-8).

4.4.9 Trench 96

Dwellings 61 and 62 are located at another circular line further to the east of trench 94/102 and 95 in the central part of the settlement. They are part of a cluster consisting of five buildings (fig. 59). The northernmost and central (dwelling 62) anomalies depict a patchwork of susceptible material stretched over the dimensions of a building and can be labelled as 'unburnt or eroded'. The geomagnetic feature of dwelling 61 measures around 14 x 4 m (56 m²) and shows only minor distortion from the assumed general ground plan of the former building. It appears to be two-partite with an anomaly on the northeastern short side of the building, a feature

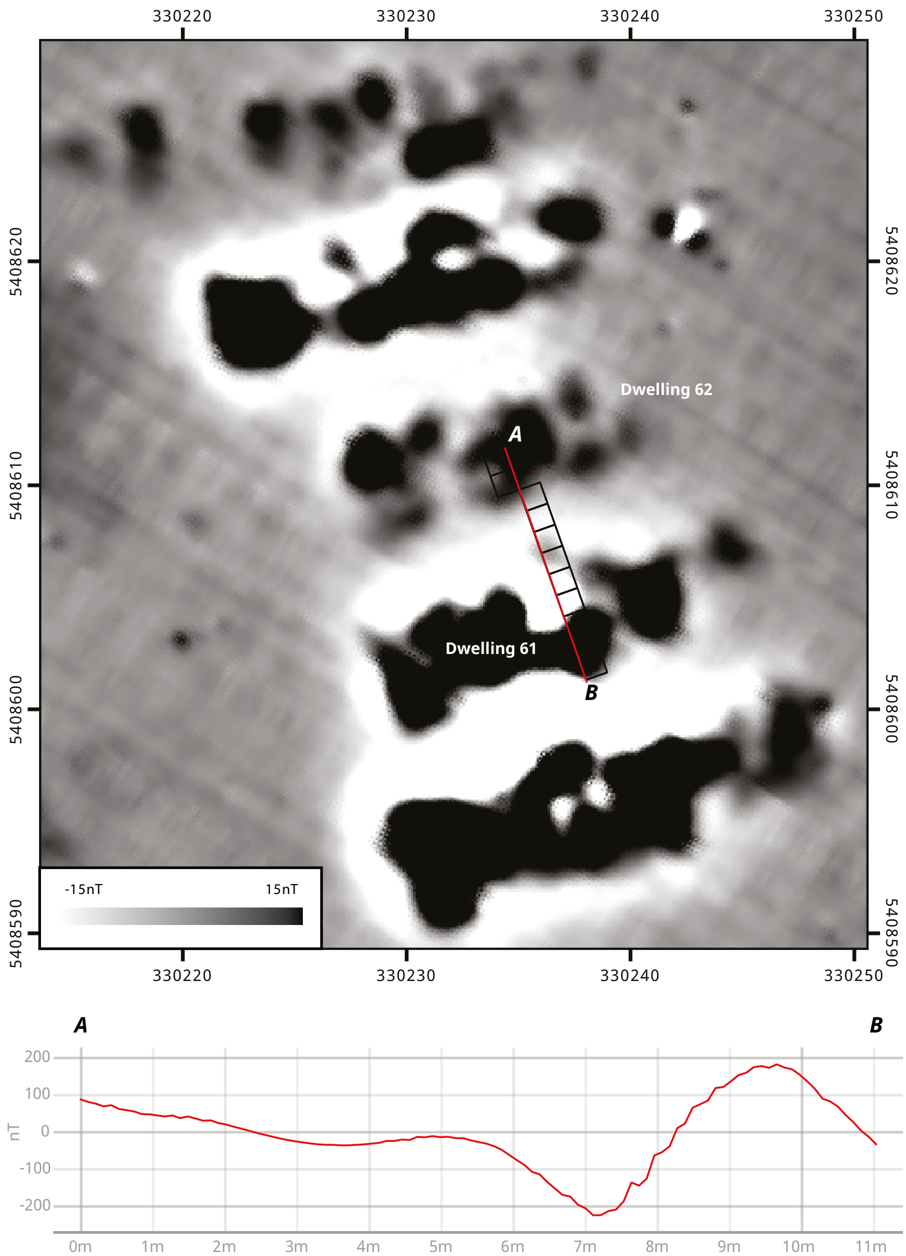
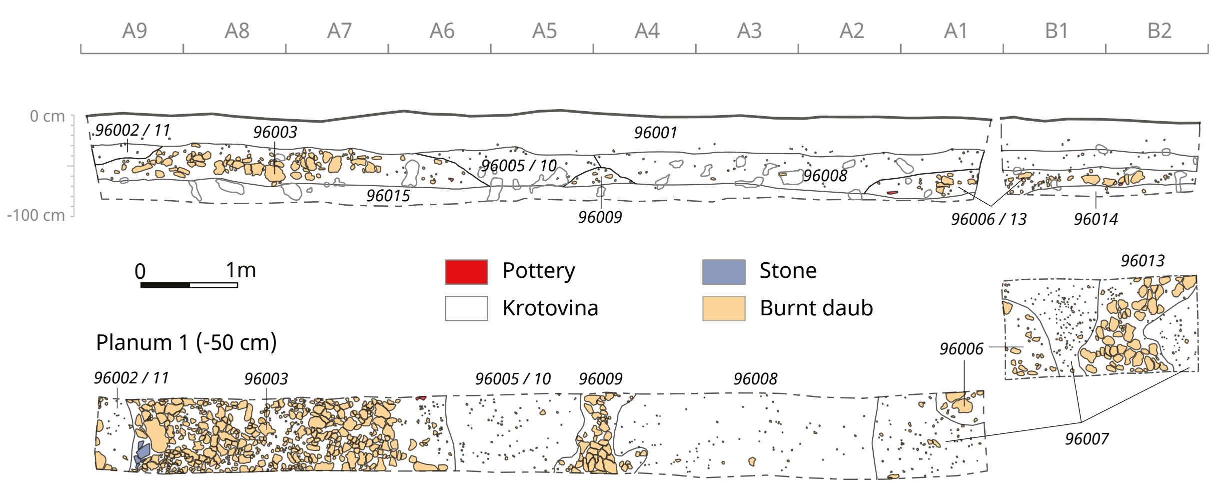


Figure 59. Location of trench 96 and the magnetic susceptibility of dwellings 61 and 62.

Figure 60 (below). Profile and planum at trench 96.



Feature group	Feature ID	Interpretation
Geo	96001	Topsoil (Chernozem)
Dwelling 61	96002	Soil on / between collapse
	96004	
	96005	
	96011	
	96003	Collapse and floor
	96009	Collapse / Wall
	96010	Unburnt interior
Dwelling 62	96015	Ground floor
	96006	Floor
	96013	
	96007	Floor (lesser burnt)
	96014	Ground floor
Occupational layer	96008	Alley between dwellings

Table 27. Features and contexts of trench 96. For a detailed description see context catalogue.

often observed at Maidanets'ke, which is interpreted as workspace after Chernovol (2012). Parts of the anomaly reach up to 200 nT in the magnetogram (fig. 59).

The geomagnetic feature of dwelling 62 measures around 11.5 x 4.5 m (51.75 m²) and shows only minor distortions from the assumed general ground plan of the former building. However, it depicts lower overall values to other building anomalies of up to 100 nT and a general patchiness in the magnetogram (fig. 59). The layout of the anomalies suggests that the entrances of both houses probably faced to the east.

Trench 96 was laid out to cut through two ploshchadki in order to investigate the dynamics of a house cluster comparable to trenches 73 and 93. Both geomagnetic features were probed in their central parts by a section measuring 1 x 11 m. The remains of dwelling 61 were cut in quadrants A4 to A9 and dwelling 62 was detected in quadrants B-2 to A2 (fig. 60). Among the relevant archaeological features (tab. 27) are the remains of dwelling 61 characterised by burnt daub over 10 cm thick (context 96003) interpreted as the collapsed building and an elongated concentration of burnt daub measuring over 10 cm thick (context 96009), marking the northern wall of the building, and several soil infills (contexts 96002/11, -004, –005/010). These infills show a brownish layer of silt with only minor intake of burnt daub measuring under 1 cm and can be interpreted as unburnt parts. An interpretation as pits, judging by horizontals, was not confirmed by the profile. These findings are in line with the dipole visible in the magnetogram. The remains of dwelling 62 are characterised by two concentrations of burnt daub measuring over 10 cm thick (contexts 96006/13) and are surrounded by a layer of brownish silt with minor intake of burnt daub measuring between 1-10 cm (context 96007). Again, the geomagnetic feature is in line with the patchy distribution of daub found in the archaeological record. The two ploshchadki are separated by a 2.5 m wide layer of brownish silt with minor intake of burnt daub measuring under 1 cm, which is interpreted as a former occupational surface (context 96008). In the profile, it becomes apparent that the remains of dwelling 62 lie 20 cm deeper than those of dwelling 61 (fig. 60). This explains both the patchiness visible in the magnetogram and it might depict the general difference in preservation between clearly burnt and less burnt house remains.

4.4.10 Finds

It was possible to recover more than 5 kg of material including 279 sherds of pottery from trench 96 (tab. 28). Most of the material (71 %) comes from dwelling 61, while the other 29 % belongs to dwelling 62. At dwelling 61 with over 3.5 kg of material including

	Dwelling 61		Dwelling 62	
Trench 96	g	n	g	n
Fine ware (all)	**3482**	**180**	**1476**	**82**
secondary fired (weak)	*949*	*32*	*176*	*9*
secondary fired (strong)	*0*	*0*	*0*	*0*
Vitrified	*0*	*0*	*0*	*0*
Coarse ware (all)	**38**	**4**	**0**	**0**
secondary fired (strong)	*0*	*0*	*0*	*0*
Undetermined	**41**	**13**	**0**	**0**
Sum	**3561**	**197**	**1476**	**82**

Table 28. Pottery retrieved from features of trench 96. Derived from project database.

around 200 sherds of pottery, 99 % of the material could be determined. Here, 98 % of sherds are made of fineware, while coarse ware only amounted to 1 %. Around 27 % of fineware shows weak traces of second firing. On average, fineware without traces of second firing weighs 17 g/sherd, while material with traces of second firing weighs 30 g/sherd. Coarse ware, on the other hand, weighs only 10 g/sherd. With 3 g/sherd, undetermined material appears highly fragmented. At dwelling 62 with around 1.5 kg of material including 82 sherds of pottery, only fineware was recognised. Material with weak traces of second firing makes up 12 % with 20 g/sherd on average. Regular fineware weighs 18 g/sherd on average.

Both dwellings 61 and 62 yielded several diagnostic vessels. Among the artefacts retrieved from dwelling 61 was a large conical bowl with a so-called cross-scheme painted on the inner part (plate 54, 1). The cross has a dot in the centre from which a tripartite wave line reaches up to the rim of the bowl. Another conical rim fragment shows a surrounding line of triangles along the inner rim and vertical thin lines towards the inner part of the bowl (plate 54, 2). Moreover, the upper part of a crater with a handle could be reconstructed (plate 55, 1). Here, the remaining painted surface shows a simplified line around the neck of the vessel. Furthermore, a fragment of a biconical vessel shows a larger dot along the upper part enclosed by diagonal hatches (plate 54, 3). The most intriguing find, however, is a larger biconical vessel (plate 55, 2). Its painted surfaces match the larger biconical vessel found at pit 2 of trench 80 (plate 21, 1). This indicates that dwelling 61 received pottery made in the first phase of the kiln excavated at trench 80.

For dwelling 62, the upper part of a crater-shaped vessel was refitted showing a band of ‘closed leaf’ elements below the outer rim with a horizontal ‘crop’ element filled with diagonal hatches on the neck (plate 55, 3). The shoulder of the vessel is divided into two mirroring zones of which the first shows a ‘ladder’ element enclosed by two half-circles filled with horizontal/vertical hatches. The other zones are filled with two larger dots, which are enclosed by forms filled with diagonal hatches. Another vessel, possibly a pot or crater-shaped vessel (plate 56, 1), shows a band of tripartite waves along the neck, while a further rim sherd of a cup shows a surrounding double line along the neck from which three thin lines go down vertically (plate 56, 2). In addition, another smaller cup fragment shows part of a ‘connected leaf’ element along the upper belly part with a surrounding line filled with triangles above (plate 56, 3). The last painted piece belongs to a biconical vessel with an eyelet close to the belly (plate 56, 5). The eyelet is broken but shows an enclosing double line. In addition to the painted pieces, a complete profile of a small conical bowl with a protruding rim (plate, 56, 6) as well as a small cup with a thickened protruding rim (plate 56, 4) were recorded.

Feature group	Feature ID	Interpretation
Geo Top	100001	Topsoil (Chernozem)
	100002	Topsoil (Transition)
Dwelling 63	100003	Lesser burnt interior
	100004	Collapse
	100005	

Table 29. Features and contexts of trench 100. For a detailed description see context catalogue.

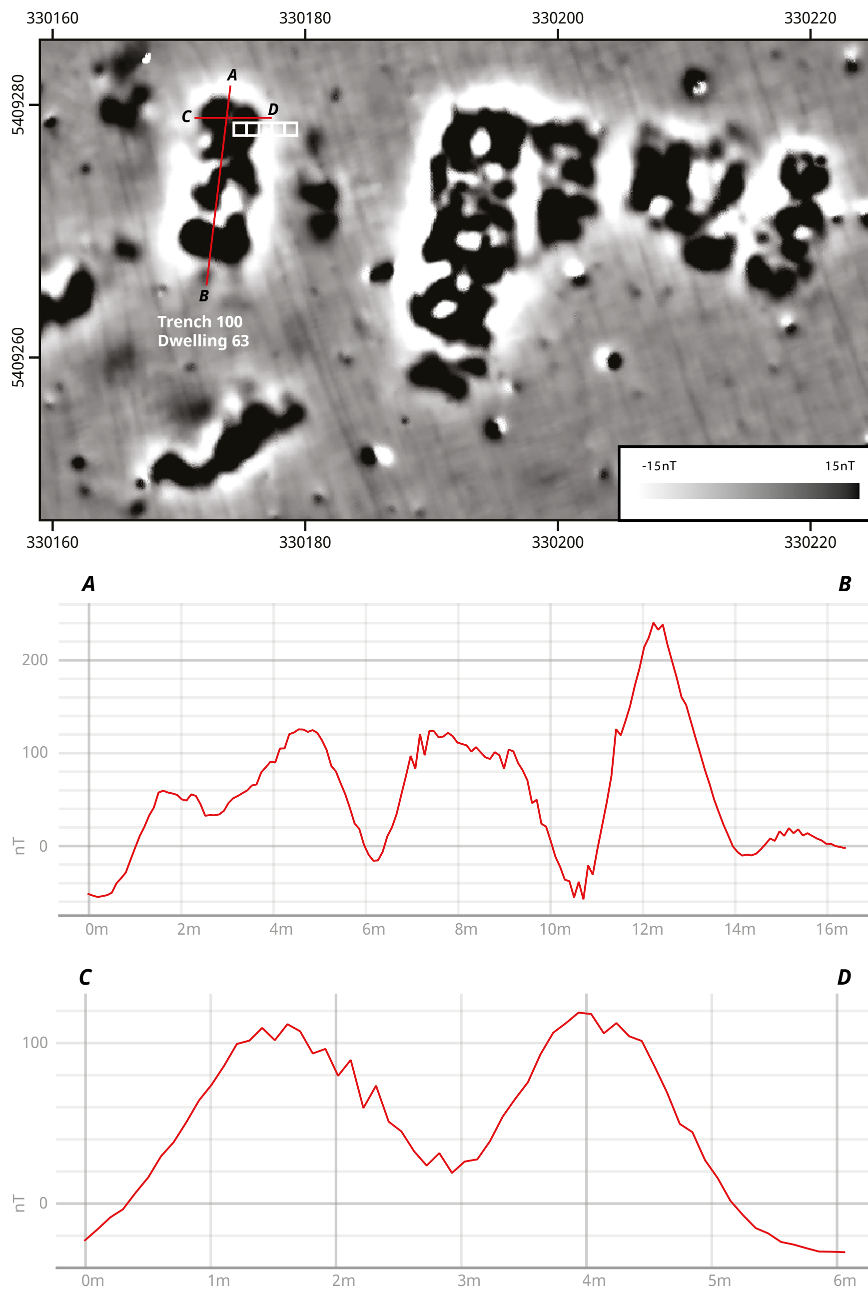


Figure 61. Location of trench 100 and the magnetic susceptibility of dwelling 63.

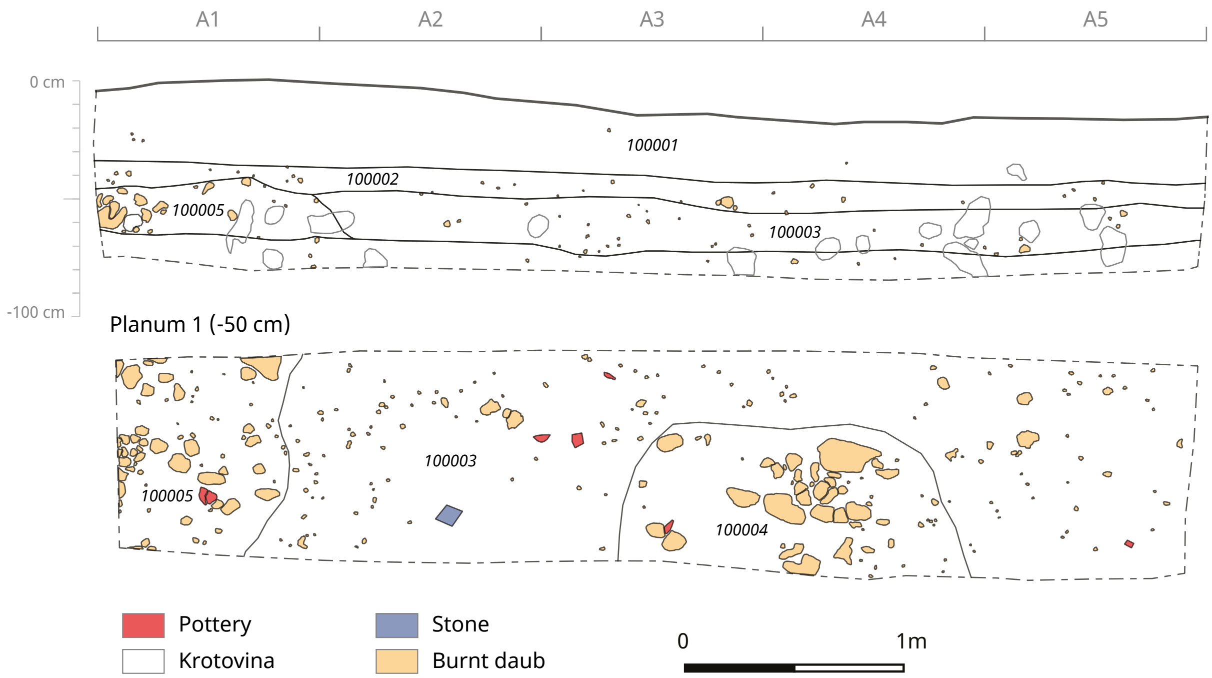


Figure 62. Profile and planum at trench 100.

Besides pottery, a calcinated fragment of a small flint arrow was found between the debris of dwelling 61. Other finds for dwelling 61 include fragments of a quern and a spherical token. At dwelling 62, the fragment of a flint blade was found.

4.4.11 Trench 100

Dwelling 63 is located to the north at the second circular line beyond the inner ditch system and is part of a cluster consisting of three buildings (fig. 61). The probed geomagnetic anomaly is the largest of this cluster, measuring 12.5 x 5 m (62.5 m²), and shows only minor distortions from the assumed general ground plan. This feature also appears to be two-partite with one third to the south set-off from a larger patchwork of positive anomalies to the north. Especially for the southern part, the anomaly reaches up to 250 nT in the magnetogram. The section following the long profile of the trench shows two peaks reaching up to 130 nT (fig. 61).

Trench 100 measures 1 x 5 m and cuts through the northern end of the geomagnetic anomaly (fig. 62). The relevant archaeological features (tab. 29) are the eastern and western concentrations of burnt daub representing the house collapse (contexts 100004/5), and the lesser burnt interior between the daub concentrations (context 100003).

4.4.12 Finds

With 673 g of material including only 16 sherds of pottery, trench 100 yielded very little material compared to the other test trenches (tab. 30). Most pottery was retrieved from dwelling 63. Here, fineware predominates with a 94 % proportion, while 6 % was made of coarse ware. Fineware with traces of second firing make

	Dwelling 63	
Trench 100	g	n
Fine ware (all)	**673**	**15**
secondary fired (weak)	*87*	*2*
secondary fired (strong)	*0*	*0*
Vitrified	*0*	*0*
Coarse ware (all)	**42**	**1**
secondary fired (strong)	*0*	*0*
Undetermined	**0**	**0**
Sum	**715**	**16**

Table 30. Pottery retrieved from features of trench 100. Derived from project database.

Feature group	Feature ID	Interpretation
Geo Top	101001	Topsoil (Chernozem)
	101002	Topsoil (Transition)
Dwelling 64	101004	Soil between / on collapse
	101005	
	101003	Collapse
	101007	Floor
	101008	
	101009	
	101010	Lesser burnt interior
	101011	Ground floor

Table 31. Features and contexts of trench 101. For a detailed description see context catalogue.

up 13 % of the material with an average weight of 44 g. This is comparable to the average of regular fineware with 45 g/sherd and coarse ware with 42 g/sherd.

For trench 100, only two diagnostic pieces of pottery were observed. The first is a coarse ware rim of a pot with a line of triangular incisements along the shoulder (plate 57, 1). The second is a fineware rim sherd from a larger open vessel showing a thickened rim (plate 57, 2).

Besides the few pieces of pottery, three quern fragments were found in the central lesser burnt interior of the building.

4.4.13 Trench 101

Dwelling 64 is located at the northernmost circular line and is part of a cluster consisting of five buildings (fig. 63). The circular line appears to be unconnected to the general layout of Maidanets'ke and potentially belongs to an earlier or later phase of settlement activity. The geomagnetic feature measures 13.5 x 5 m (67.5 m²) and is the largest building of the cluster. Like many other building anomalies, dwelling 64 appears to be two-partite, with a larger northeastern part representing the inner main room, and a smaller southwestern part. The building shows only minor distortions from the assumed general layout to the southwest. This is possibly related to collapsed architecture or a pit in the front part of the building. The geomagnetic anomaly reaches up to 110 nT in the magnetogram (fig. 63).

Trench 101 is laid out over 2 x 4 m and cuts through the central part of the main room in the northeast of the building (fig. 64). Among the relevant archae-

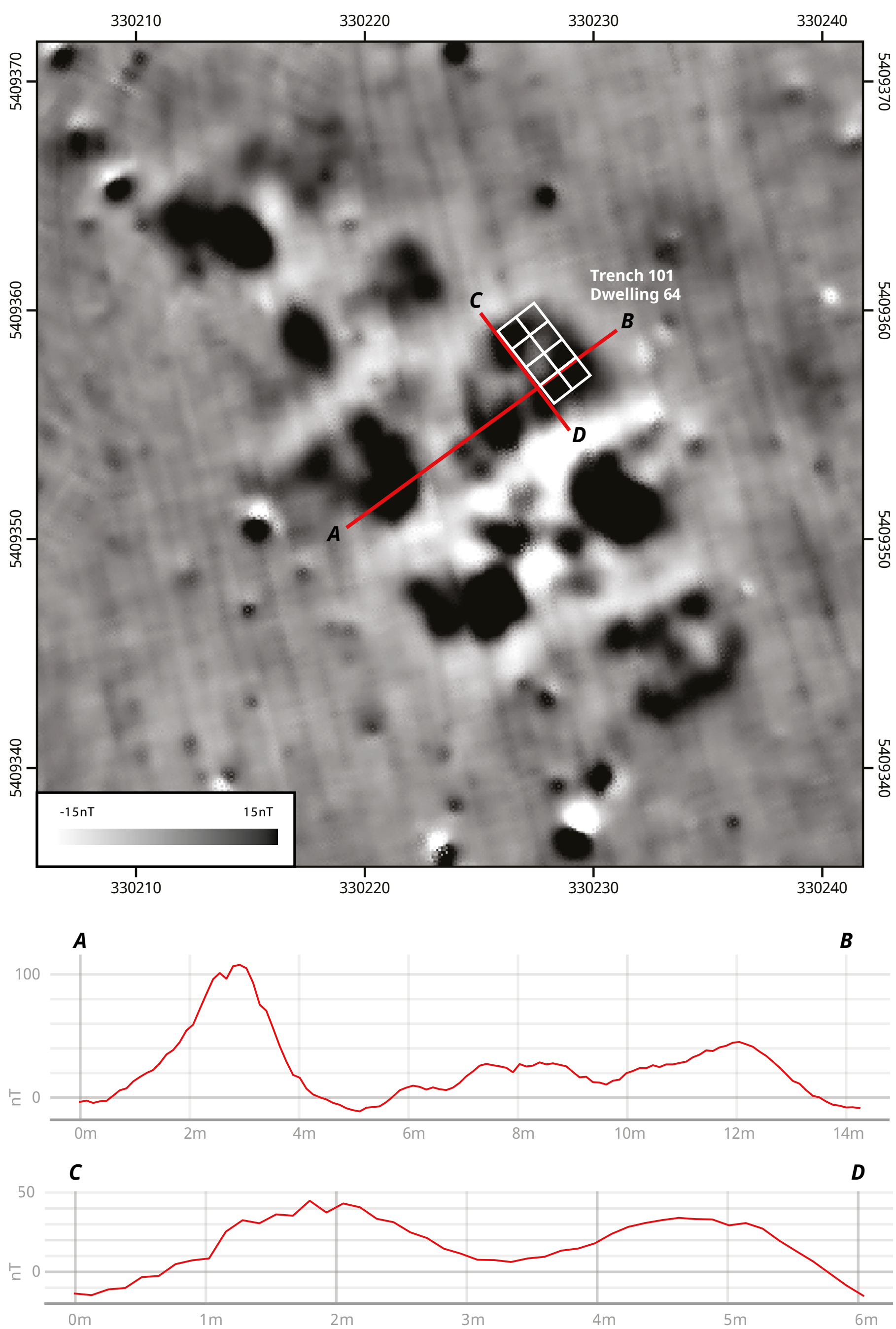


Figure 63. Location of trench 101 and the magnetic susceptibility of dwelling 64.

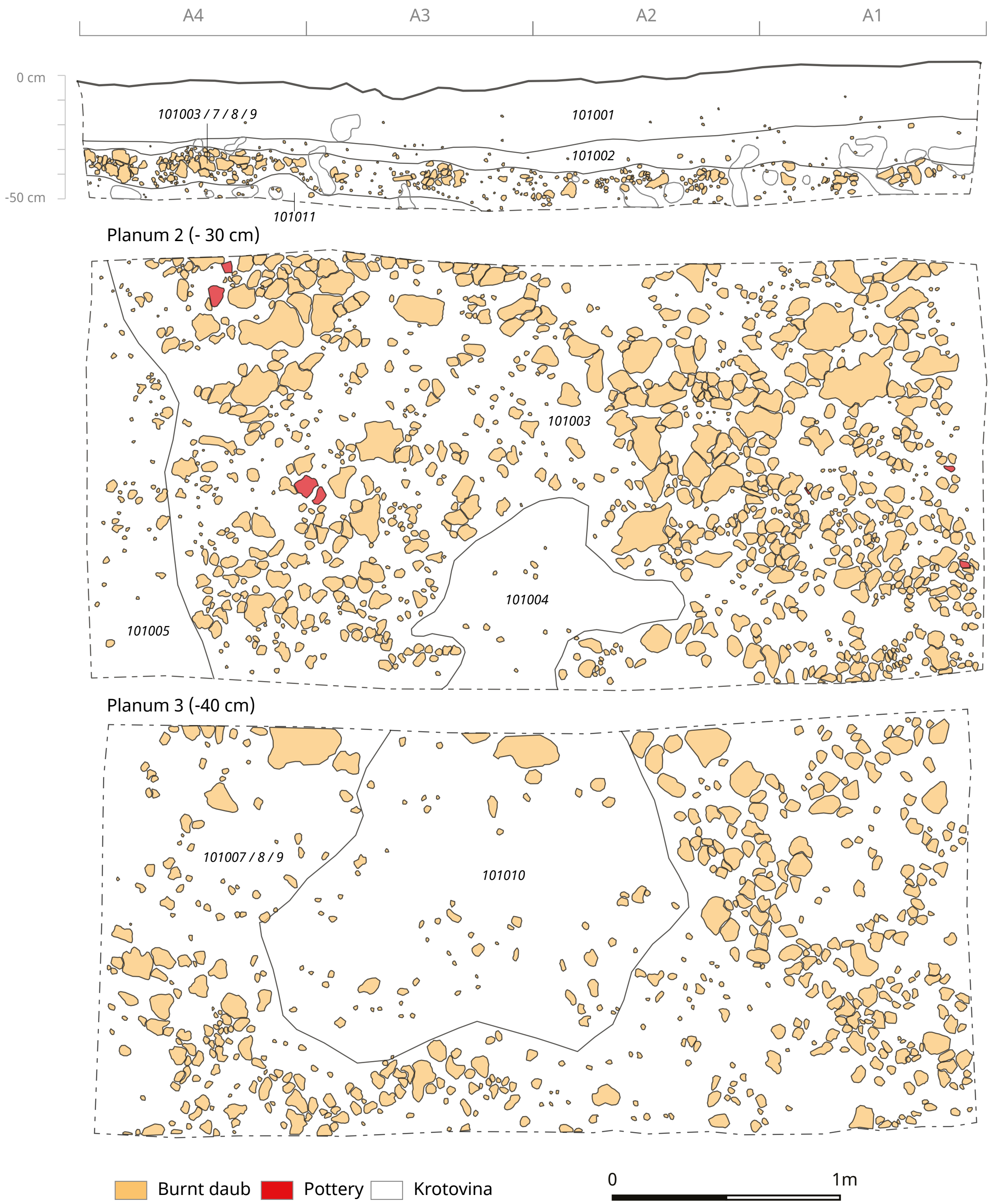


Figure 64. Profile and plana at trench 101.

	Dwelling 64		Topsoil	
Trench 101	g	n	g	n
Fine ware (all)	**459**	**27**	**91**	**8**
secondary fired (weak)	*53*	*1*	*20*	*1*
secondary fired (strong)	*0*	*0*	*0*	*0*
Vitrified	*0*	*0*	*0*	*0*
Coarse ware (all)	**0**	**0**	**0**	**0**
secondary fired (strong)	*0*	*0*	*0*	*0*
Undetermined	**0**	**0**	**0**	**0**
Sum	**459**	**27**	**91**	**8**

Table 32. Pottery retrieved from features of trench 101. Derived from project database.

ological features (tab. 31) are the greyish silt on top and between the upper layer of burnt daub (contexts 101004/5) and the upper layer of burnt daub itself interpreted as structural collapse (context 101003). Below the collapse, another layer of burnt daub represents the upper floor or platform (contexts 101007-9) as well as lesser burnt or destroyed parts of the interior, which are characterised by only a small amount of burnt daub and artefacts (context 101010). The last layer underneath marks the ground floor of the former building and shows only minor intake of burnt daub (context 101011).

4.4.14 Finds

Considering the dimensions and location of trench 101 inside the building, the amount of pottery retrieved from this feature is very low (tab. 32). Only 550 g of material including 35 sherds of pottery were recorded. Of these, 17 % are dislocated to the topsoil. The remaining 83 % belonging to the house are exclusively fineware. Around 12 % of this fineware shows traces of weak second firing with a low fragmentation of 53 g/sherd on average. Regular fineware shows a fragmentation of 17 g/sherd on average. The dislocated sherds retrieved from the topsoil are also exclusively fineware, whereas 22 % shows traces of weak second firing with 20 g/sherd on average, and regular fineware with a fragmentation of 10 g/sherd on average.

Dwelling 64 yielded a nearly complete larger cup with a preserved painted surface (plate 57, 3). Below the outer rim, a band of closed ‘leaf’ was applied. Further down, along the shoulder, a so-called metopic scheme composition with horizontal / vertical hatches and two tapering lines are located. The second painted piece is a thick-walled fineware sherd with second firing showing a tapering line (plate 57, 4). Besides the larger, classic Tomashivska cup, a miniature cup with a completely eroded surface was found (plate 57, 5). Other diagnostic pieces include two conical bowls with a protruding rim (plate 58, 1-2).

4.4.15 Trench 103

Dwelling 66 is located in the northeastern part of the site at the second circular line beyond the inner ditch system like dwelling 63 in trench 100 (fig. 65). It is part of a small cluster consisting of two buildings of which dwelling 66 is the larger one. The geomagnetic feature measures 10.5 x 3.6 m (37.8 m²) and shows only minor distortions from the assumed general layout. In the southwestern part, it reaches up to 230 nT

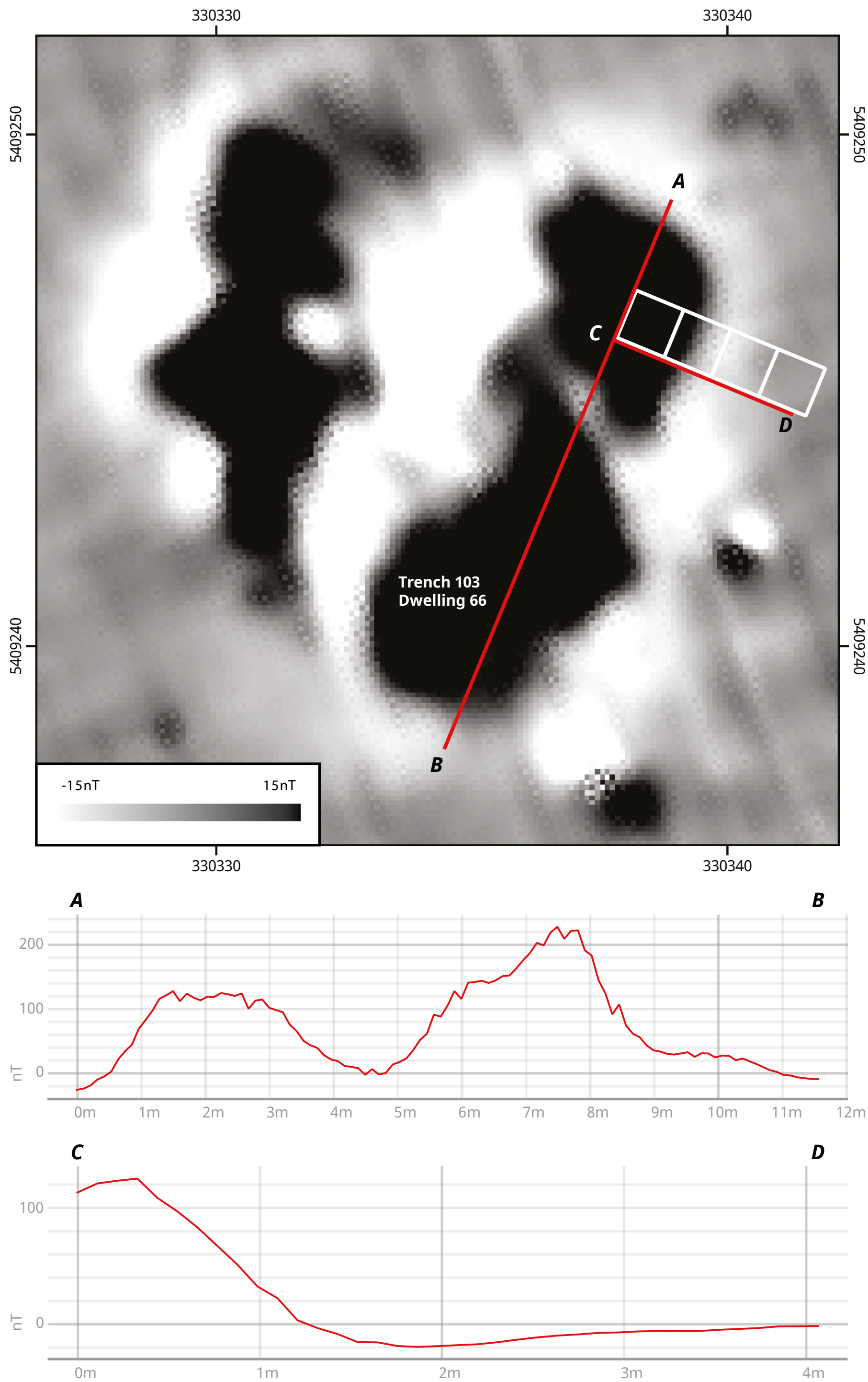


Figure 65. Location of trench 103 and magnetic susceptibility of dwelling 66.

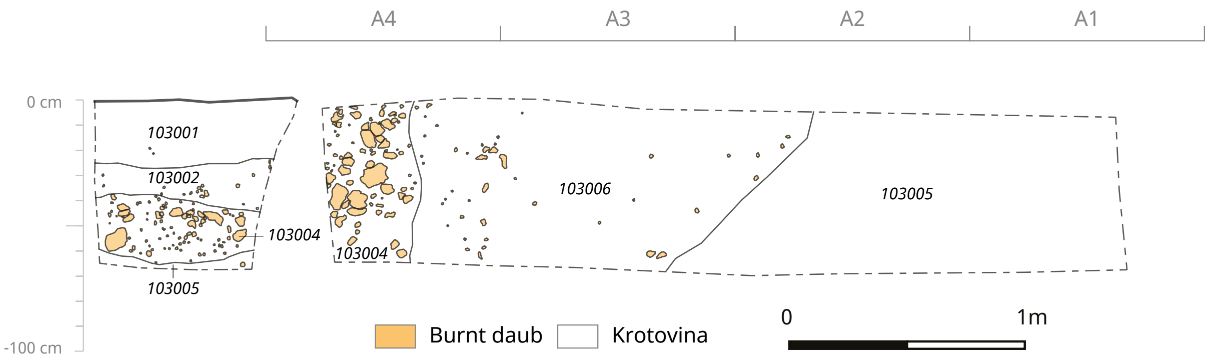


Figure 66. Profile and planum at trench 103.

Feature group	Feature ID	Interpretation
Geo Top	103001	Topsoil (Chernozem)
	103002	Topsoil (Transition)
Dwelling 66	103004	Collapse
	103006	
Geo	103005	Natural

Table 33. Features and contexts of trench 103. For a detailed description see context catalogue.

	Topsoil	
Trench 103	g	n
Fine ware (all)	**225**	**21**
secondary fired (weak)	*21*	*2*
secondary fired (strong)	*0*	*0*
Vitrified	*0*	*0*
Coarse ware (all)	**0**	**0**
secondary fired (strong)	*0*	*0*
Undetermined	**0**	**0**
Sum	**225**	**21**

Table 34. Pottery retrieved from features of trench 103.

in the magnetogram, whereas the larger anomaly possibly represents the fireplace, while the southwestern corner appears comparable to the 'front porch' features observed at trench 92, which are visible at many house anomalies throughout the site.

Trench 103 measures 1 x 4 m and is laid out to cut both the inner part of the main room and the surrounding occupational layer of the building (fig. 66). Here, the relevant archaeological features (tab. 33) are the concentrated burnt daub (context 103004) and a layer with lower intake of burnt daub surrounding the building (context 103006).

4.4.16 Finds

With only 225 g of material including 21 sherds, Trench 103 exhibits the lowest amount of pottery retrieved from all the test trenches (tab. 34). In addition, it is exclusively dislocated material from the topsoil. Both regular fineware and fineware with weak traces of secondary fire (9 %) show a high fragmentation with 11 g/sherd on average.

Only one painted piece was recovered from trench 103. It belongs to a conical bowl with a protruding rim and shows a line of triangles around the inner rim and many thin lines facing towards the inner centre of the bowl (plate 58, 3).

4.4.17 Summary of findings

The main aim of conducting test pits was to obtain further samples for radiocarbon dating from various parts of Maidanets'ke. Overall, eleven buildings and a pit were partially excavated (trenches 91, 93, 94-96, and 100-103). Trench numbers 97 to 99 remained unused. Comparable to the results from the 2013 excavations, the number of artefacts retrieved from the different trenches heavily depended on their location in the respective features. The amount of diagnostic pottery ranges from an occasional sherd to several nearly complete vessels. In several buildings, both quern stone fragments, indicating cereal processing, and loom weights, hinting at textile production, were observed. In addition, other buildings yielded polishing stones, flint, and clay tokens. This indicates that most of the probed buildings were dwellings comparable to the completely excavated buildings in trenches 51 and 92.

5 Pottery analysis

To create a typo-chronological model for the development of Maidanets'ke, the typology of morphological and decoration traits on pottery is addressed in the following section. The typology used here is mainly based on the work of Ryzhov (1999; 2012b). His original typology is expanded with additional descriptions for each of his vessel types. If necessary, a detailed classification of aspects such as rim or belly morphology, or decoration elements is added to account for the fragmented nature of the archaeological record. After a description of various classification efforts, Ryzhov's typology is described. Then, the traditional distinction between fine and coarse ware is evaluated based on detailed pottery recording from trench 110. In a next step, the pottery taphonomy is addressed to analyse potential differences between secondary firing on pottery from burnt dwelling contexts and production waste from the pits connected to the kilns in trench 80. Finally, a typo-chronology based on pottery traits in combination with modelled radiometric dates is proposed.

5.1 Classification of Trypillia pottery in the Southern-Bug-Dnieper interfluve

The following classification is based on the monumental effort of Sergei Ryzhov to systematise Trypillia pottery in the area of the 'mega-sites' and the many years of excavations at Maidanets'ke by Shmagliy and Videyko. An extensive catalogue of vessel shapes and decorations for the Southern-Bug-Dnieper interfluve has been developed by Ryzhov (1999; 2012b), based on over 1000 vessels of the region, while for Maidanets'ke, in particular, a vessel typology has been developed by Shmagliy and Videyko (2004). Other extensive studies concerning the Trypillia painted decor have been carried out by Tkachuk (2005).

Ryzhov (2012b, 140) distinguishes three categories of wares. The first category is so-called kitchenware (coarse ware). Its fabric is made from clays, which are rich in iron or kaolinite, and are mixed with clay marl or 'loess-like loam'. This mixture is tempered with coarse sand, quartz, mica, crushed seashells or chamotte. The second category is so-called tableware (fineware). Its fabric is made from several clays that could also appear to be mixed. For tableware, carbonate and kaolin clays as well as clays with a marly component or high content of iron are used. Characteristically, they are tempered with fine-grained sand and quartz. Sometimes kaolin chamotte or 'crumbled and burnt clay' is added (*ibid.*). Another category of tableware, which is not separately analysed but mentioned, is pottery made of a fine paste with no observable addition of temper. Ryzhov (2012b, 151) describes this paste as typical for previous phases in the region. For Maidanets'ke, however, this category has been described as typical for so-called imports from Trypillia sites further to the west (Shmagliy and Videyko 2004). The last category of 'container vessels' is made from 'loamy and poor clays' which were tempered with cereal chaff. This is a special category since it is fired at low temperatures and is more closely related to the fixed interior of Trypillia buildings than to the other 'wares'.

Western Trypillia pottery is moulded by hand or in models for special shapes, but the use of a slow turning wheel in the finishing process has not been excluded by Ryzhov (2012b, 151). While the 'container ware' is prepared by slabs, kitchenware is built up by a moulding or coiling technique (*ibid.*, 140; 145). Tableware is built up by the coiling technique (sherd breaking of biconical vessels, however, is a hint for the slab technique), although smaller vessels can be formed from one portion of clay (*ibid.*, 151). Biconical vessels were observed to be joined from a lower and upper conical part.

Kitchenware is both fired in reductive and oxidising atmospheres, while tableware is exclusively fired in an oxidising atmosphere (*ibid.*, 145; 152).

For coarse ware, Ryzhov distinguishes between two larger types of bowls (type 1) and pots (type 10). Bowls are divided into seven different variants, while pots show a variety of 20 shapes (fig. 67-70).

Among fineware, Ryzhov distinguishes between eleven morphological types of vessels. With 42 variants, bowls (type 1) show the highest diversity of forms (fig. 71-75), followed by cups (type 2) with 29 variants (fig. 76-80), excluding additional miniature vessels (fig. 98), which were not classified any further. The next highest diversity is apparent in the category of 'pots' (type 10) with 20 variants (fig. 93-95), followed by so-called sphero-conical vessels (type 4) with 15 different shapes (fig. 83-85). Further types distinguished by Ryzhov are biconical vessels (type 3 – 9 variants) (fig. 81-82), so-called craters (type 7 – 9 variants) (fig. 89) and crater-shaped vessels (type 5 – 5 variants) (fig. 86) as well as so-called amphorae (type 6 – 10 variants) (fig. 87-88) and pear-shaped vessels (type 8 – 12 variants) (fig. 90-92). Additionally, so-called lids (type 9 – 11 variants) (fig. 92-93) and 'binocular vessels' (type 11 – 13 variants) (fig. 96-97) are distinguished by Ryzhov.

Independent from Ryzhov, Shmagliy and Videyko (2004) developed a morphological classification of fineware and coarse ware for the material obtained from Maidanets'ke. For the coarse ware they distinguish between five types and nine variants. The first type includes coarse ware bowls, which can be of spherical or conical shape, followed by a variety of pots. Among pots, Shmagliy and Videyko differentiate between vessels with a straight cylindrical neck and rim or pots with an s-shaped profile. Furthermore, they distinguish between s-shaped pots with handles or eyelets, and cylindrical or elongated lugs.

Among fineware, they distinguish between 13 types and 28 variants. The first three types consist of high and low conical bowls as well as spherical and footed bowls. Moreover, they distinguish between cups (type 4) and large cups (type 5). Regular cups are divided into high and thin-walled, thick-walled and squat variants as well as versions with a handle. Large cups are defined by a height of at least 20-25 cm. Shmagliy and Videyko distinguish between large cups with and without handles. Among larger vessels, they differentiate between 'amphorae' (type 6), which are biconical vessels with a pair of eyelets below the rim, 'craters' or crater-shaped vessels (type 7) with or without a handle, and three further types of biconical vessels (type 8). The first two variants of biconical vessels appear with or without a pair of eyelets near the belly, while the third variant is much larger and shows a pair of lugs below the rim. Among so-called sphero-conical vessels (type 9), which show a spherical upper part and a conical lower part, Shmagliy and Videyko distinguish between variants with and without eyelets near the belly. For type 10, they differentiate between regular pots and footed variants. So-called lids (type 11) are separated into variants with a cylindrical and 'helmet-shaped' top. Two variants of pear-shaped vessels (type 12) are differentiated by the appearance or absence of a sharply set-off neck. So-called binocular vessels (type 13) are divided into closed, bowl-like and open variants by Shmagliy and Videyko.

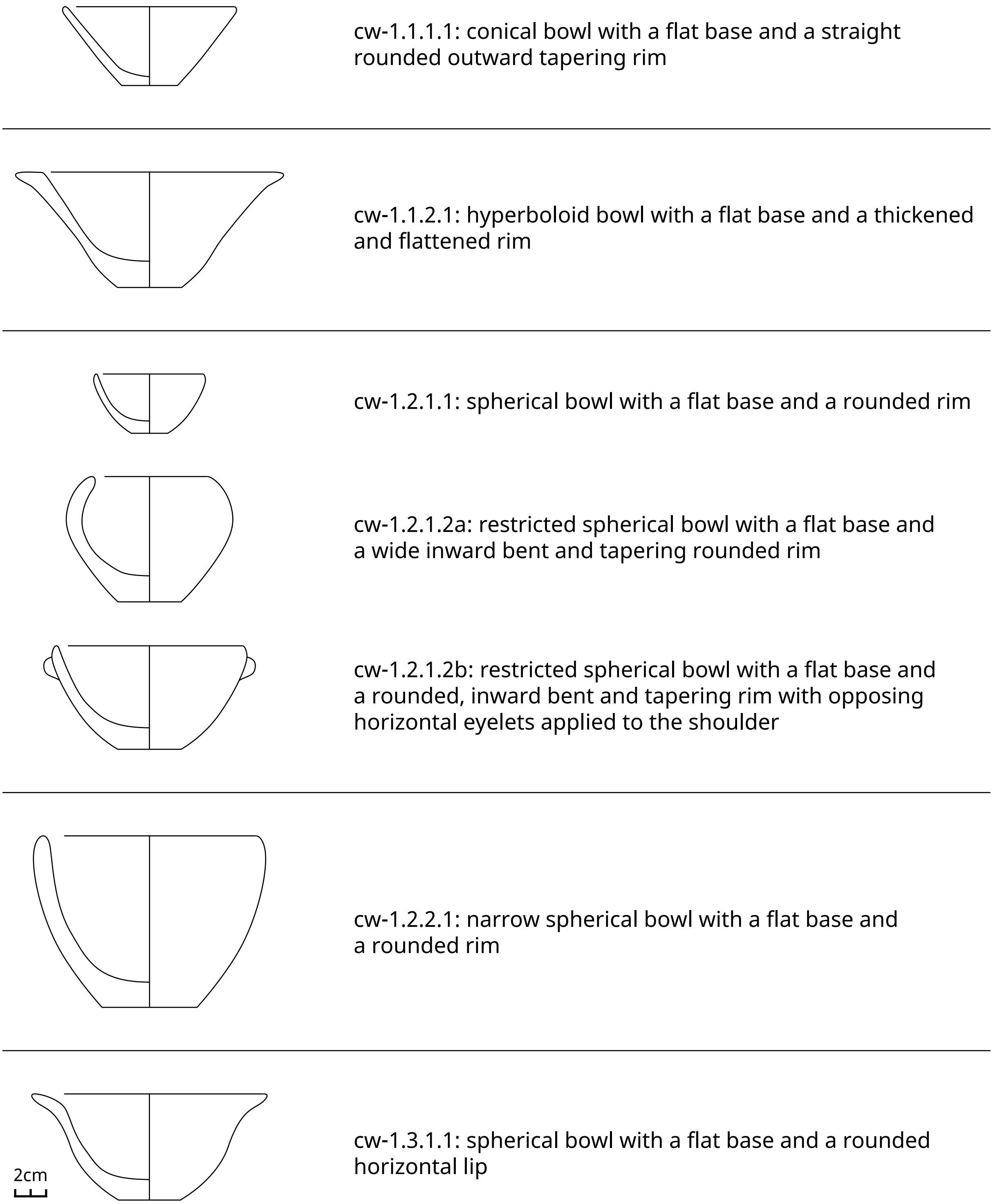
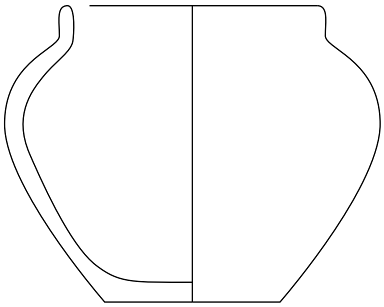
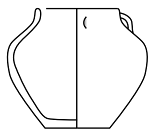


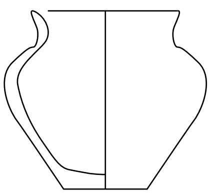
Figure 67. Types of coarse ware vessels of the Southern-Bug-Dnieper-interfluve to scale (derived from Ryzhov 2012b).



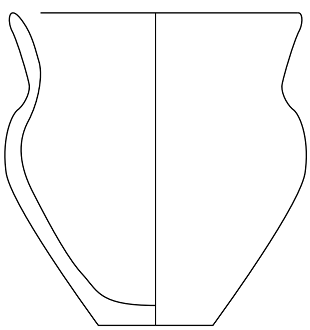
cw-10.1.1.1: restricted vessel with a conical lower body, a convex upper body, and a wide rounded, vertical rim. The belly is located midway between the base and the rim of the vessel.



cw-10.1.1.2: restricted vessel with a conical lower body, a convex upper body, and a wide rounded, vertical rim. The belly is located midway between the base and the rim of the vessel and a handle is applied between the neck and the upper shoulder.

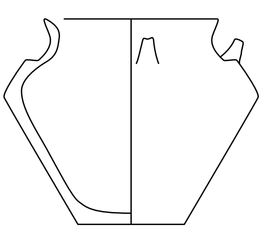


cw-10.1.1.3: restricted vessel with a conical lower body, a convex upper body, and a pronounced break between the shoulder and the wide, rounded outward bent rim

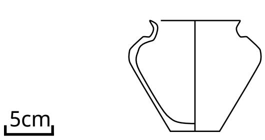


cw-10.1.1.4: restricted vessel with a narrow base, a high conical lower body, a convex upper body, and a wide rounded, straight and elongated funnel-shaped rim

cw-10.1.1.5: small restricted vessel with a conical lower body, a convex upper body, and a rounded outward bent rim. A spout is applied to the shoulder of the vessel.

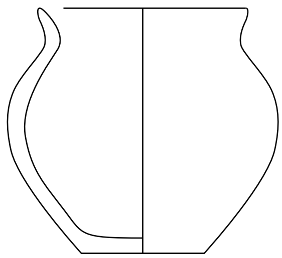


cw-10.1.2.1: restricted biconical vessel with a pronounced break between the shoulder and the wide, rounded outward bent rim. Pairs of elongated lugs are applied to the break between the shoulder and the rim of the vessel.

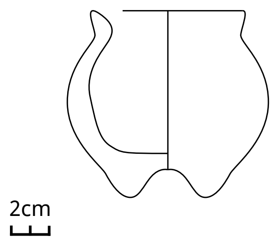


cw-10.1.2.2: restricted biconical vessel with a pronounced break between the shoulder and the wide, rounded outward bent rim

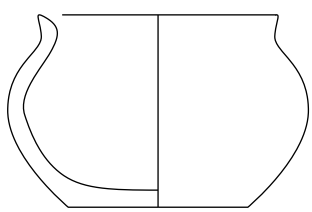
Figure 68. Figure 67 continued.



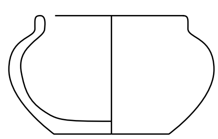
cw-10.2.1.1: restricted vessel with a short conical lower body, a convex upper body and a short rounded outward bent rim. The belly is located midway between the base and the rim of the vessel.



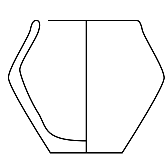
cw-10.2.1.2: footed restricted vessel with a convex lower and upper body and a short rounded outward bent rim



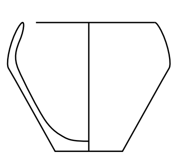
cw-10.3.1.1: restricted wide vessel with a convex lower body and upper body and a short and wide, rounded outward bent rim



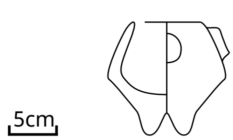
cw-10.3.1.2: restricted wide vessel with a convex lower body and upper body and a very short and wide, rounded vertical rim



cw-10.4.1.1: restricted biconical vessel with a very short and wide, rounded vertical rim. The belly is located in the upper third of the vessel.

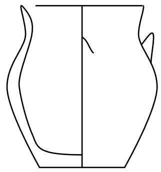


cw-10.4.1.2: restricted biconical vessel with a rounded and straight inward bent rim. The belly is located in the upper third of the vessel.

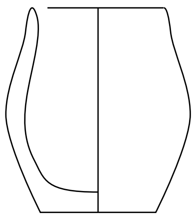


cw-10.4.1.3: small footed and restricted biconical vessel with a rounded and straight inward bent rim. The belly is located in the lower third of the vessel and rounded, concave lugs are applied to the shoulder.

Figure 69. Figure 67 continued.



cw-10.5.1.1: tall and narrow restricted vessel with a high conical lower body, a convex shoulder, and an elongated, outward bent rim. Elongated lugs are applied to the shoulder of the vessel.



cw-10.5.1.2: ellipsoid restricted vessel with a very short and rounded vertical rim

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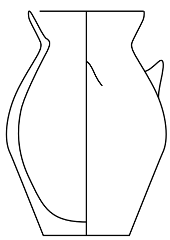
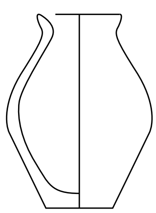


cw-10.6.1.1: tall and narrow restricted vessel with a conical lower body, a convex upper body and an elongated and rounded funnel-shaped rim. Elongated lugs are applied to the shoulder of the vessel.



cw-10.6.1.2: tall and narrow restricted vessel with a conical lower body, a convex upper body and a short and rounded outward bent rim

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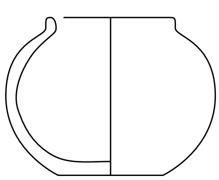
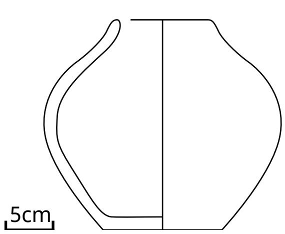
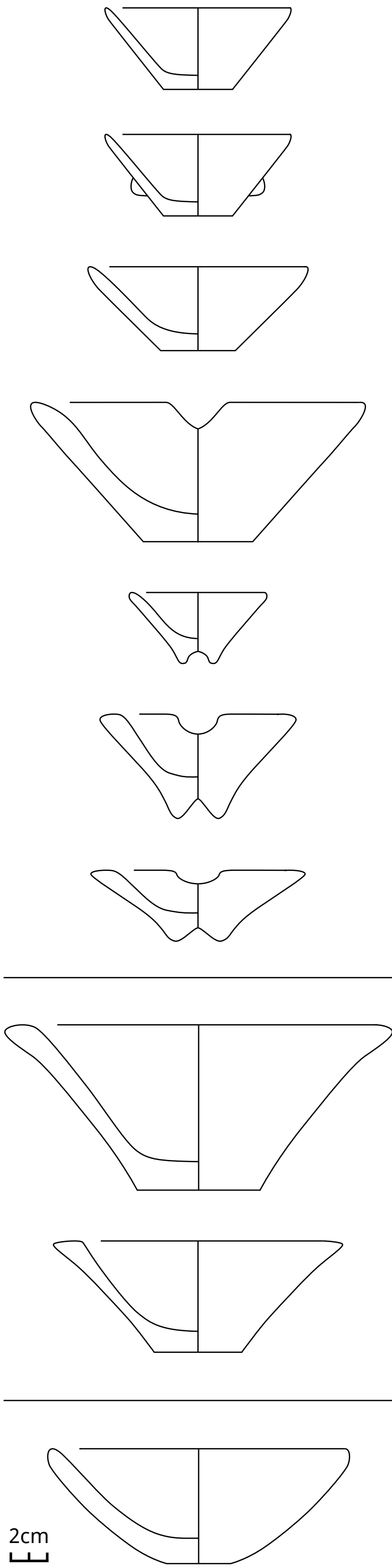


cw-10.7.1.1: wide restricted spherical vessel with a wide base and a very short and rounded vertical rim



cw-10.7.1.2: wide restricted vessel with a wide base, a conical lower body, a convex upper body and a short and rounded inward bent rim

Figure 70. Figure 67 continued.



fwp-1.1.1.1a: conical bowl with a flat base and a straight rounded outward tapering rim

fwp-1.1.1.1b: conical bowl with a flat base, a straight rounded outward tapering rounded rim and eyelets on the outer lower body

fwp-1.1.1.2: wide conical bowl with a flat base and a straight rounded outward tapering rim

fwp-1.1.1.3: conical bowl with a flat base and a straight rounded outward tapering rounded rim with opposing cavities

fwp-1.1.1.4: footed conical bowl with a rounded outward tapering rim

fwp-1.1.1.5a: footed conical bowl with a thickened and flattened rim and opposing cavities

fwp-1.1.1.5b: footed wide conical bowl with a thickened and flattened rim and opposing cavities

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fwp-1.1.2.1: hyperboloid bowl with a flat base and a thickened and rounded rim

fwp-1.1.2.2: hyperboloid bowl with a flat base and a thickened and flattened rim

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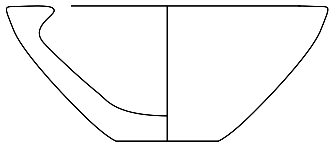
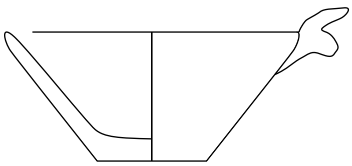
fwp-1.1.3.1: conical bowl with a flat base and a straight rounded rim

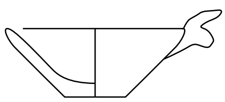
Figure 71. Types of fineware bowls of the Southern-Bug-Dnieper-interfluve to scale (derived from Ryzhov 2012b).



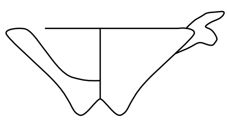
fwp-1.1.3.2: conical bowl with a flat base and a thickened and flattened inward bent rim



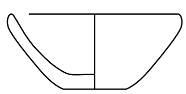
fwp-1.1.4.1a: conical bowl with a flat base and a straight rounded rim with a zoomorphic application



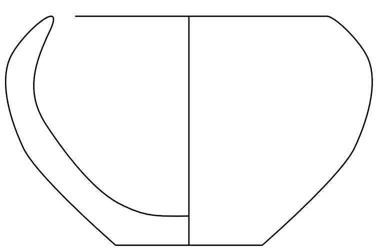
fwp-1.1.4.1b: wide conical bowl with a flat base and a straight rounded rim with a zoomorphic application



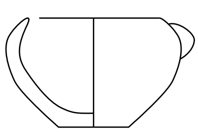
fwp-1.1.4.2: footed hyperboloid bowl with a thickened and rounded rim and a zoomorphic application



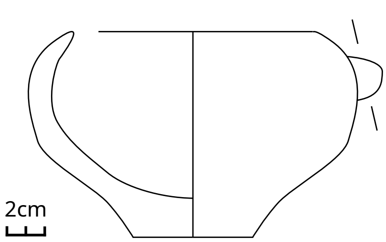
fwp-1.2.1.1: spherical bowl with a flat base and a rounded rim



fwp-1.2.1.2a: restricted spherical bowl with a flat base and a wide inward bent and tapering rounded rim



fwp-1.2.1.2b: restricted spherical bowl with a flat base and a rounded, inward bent and tapering rim with opposing horizontal eyelets applied to the shoulder



fwp-1.2.1.2c: restricted bowl with a narrow flat base, a concave lower body, a convex upper body and a rounded inward bent and tapering rim with opposing vertical eyelets applied to the shoulder

Figure 72. Figure 71 continued.

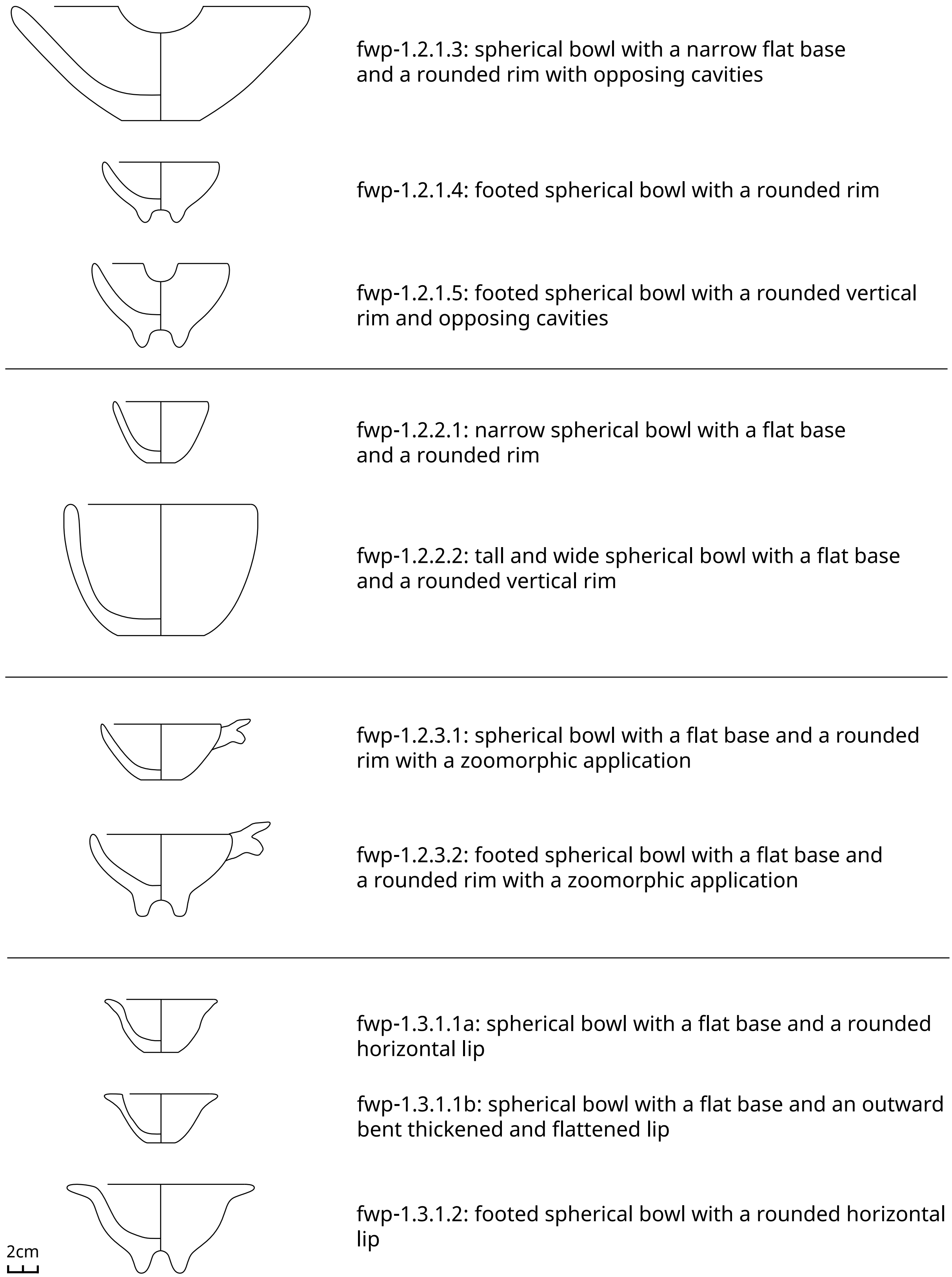
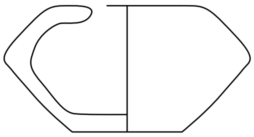
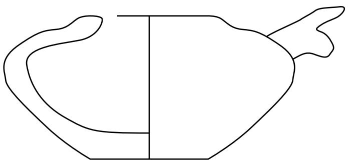


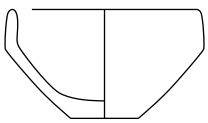
Figure 73. Figure 71 continued.



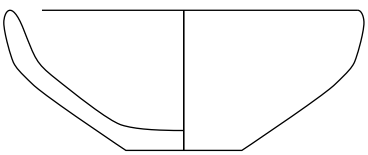
fwp-1.4.1.1: wide and restricted biconical vessel with an inward bent and rounded horizontal rim



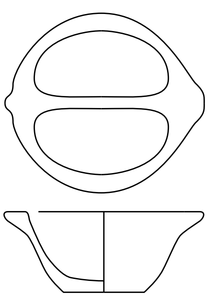
fwp-1.4.1.2: wide and restricted biconical vessel with a set-off, inward bent rim and a zoomorphic application on the lower shoulder (compare with 8.3.2.2)



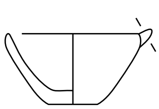
fwp-1.5.1.1: restricted biconical vessel with a narrow flat base, a pronounced biconical belly in the upper quarter of the vessel, and a straight slightly inward bent rim



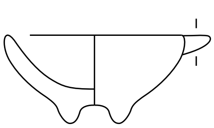
fwp-1.5.1.2: wide and unrestricted conical vessel with a narrow base, a pronounced biconical belly in the upper quarter of the vessel, and a straight slightly outward bent rim



fwp-1.6.1.1: double-chambered spherical bowl with a flat base and outward bent, thickened and flattened rim



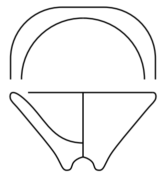
fwp-1.7.1.1: spherical bowl with a flat base, a rounded rim and a diagonally applied vertical eyelet



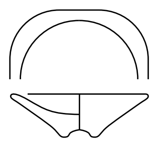
fwp-1.7.1.2: footed spherical bowl with a rounded rim and a vertically applied vertical eyelet

2cm

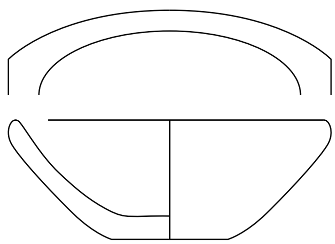
Figure 74. Figure 71 continued.



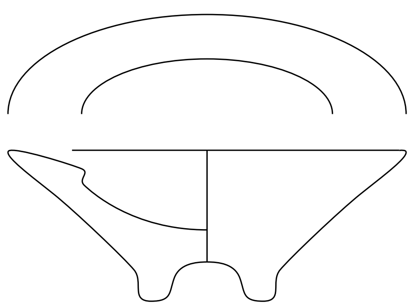
fwp-1.8.1.1: footed conical bowl with a rounded rim. Rectangular in plan view.



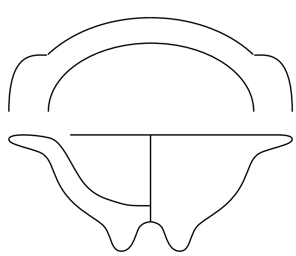
fwp-1.8.1.2: flat footed conical bowl with a rounded rim. Rectangular in plan view.



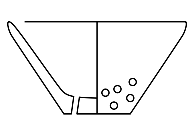
fwp-1.9.1.1: spherical bowl with a flat base and a rounded rim. Ovaloid in plan view with the short sides flattened.



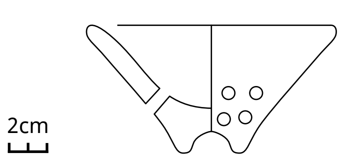
fwp-1.9.1.2a: footed conical bowl with a thickened and flattened rim. Ovaloid in plan view.



fwp-1.9.1.2b: footed spherical bowl with a rounded horizontal lip. Ovaloid in plan view with extended and rounded rectangular short sides.

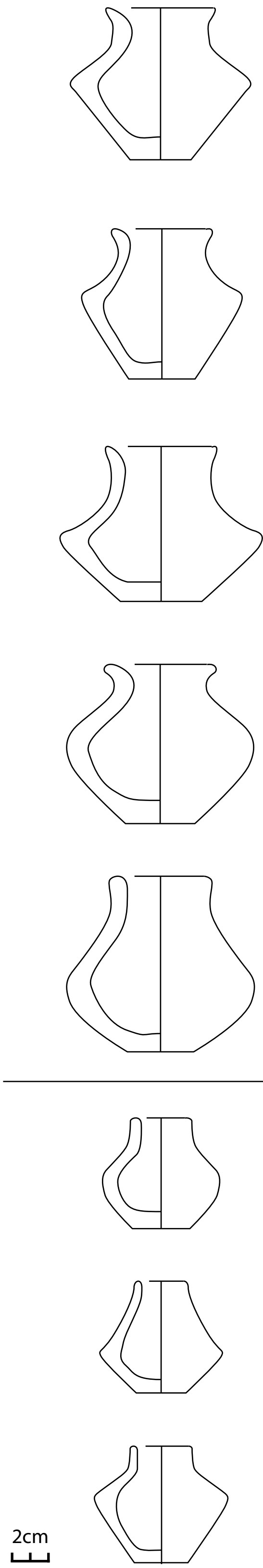


fwp-1.10.1.1: conical bowl with a narrow flat base and a rounded rim. The lower part is punctured (sieve).



fwp-1.10.1.2: footed conical bowl with a rounded rim. The lower part is punctured (sieve).

Figure 75. Figure 71 continued.



fwp-2.1.1.1a: small restricted cup with a narrow flat base, a conical lower body, a concave upper body and a rounded, outward bent rim. The belly is located midway between the base and the rim of the vessel.

fwp-2.1.1.1b: small restricted cup with a narrow flat base, a conical lower body, a concave upper body and a rounded, outward bent rim. The belly is located in the lower third of the vessel.

fwp-2.1.1.1c: small restricted cup with a narrow flat base, a conical lower body, a concave upper body and a rounded, outward bent rim. The belly is located in the upper third of the vessel.

fwp-2.1.1.2a: small restricted cup with a narrow flat base, a convex lower body, a concave upper body and a short, rounded outward bent rim. The rounded belly is located midway between the base and the rim of the vessel.

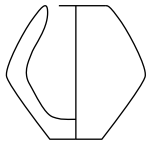
fwp-2.1.1.2b: small restricted cup with a rounded base, a convex lower body, a conical upper body and a rounded vertical rim. The belly is located in the lower third of the vessel.

fwp-2.1.2.1a: small restricted cup with a flat base, a conical lower body, a slightly convex upper body and a rounded vertical rim. The rounded belly is located midway between the base and the rim of the vessel.

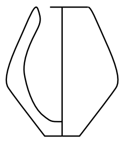
fwp-2.1.2.1b: small restricted cup with a flat base, a conical lower body, a concave upper body and a rounded slighlty inward bent rim. The belly is located in the lower third of the vessel.

fwp-2.1.2.1c: small restricted cup with a narrow flat base, a conical lower body, a concave upper body and a rounded vertical rim. The belly is located in the upper third of the vessel.

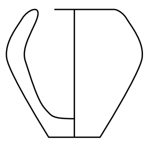
Figure 76. Types of fineware cups of the Southern-Bug-Dnieper-interfluve to scale (derived from Ryzhov 2012b).



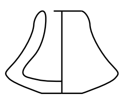
fwp-2.1.3.1a: small biconical cup with a narrow flat base and a rounded, straight inward bent rim. The belly is located midway between the base and the rim of the vessel.



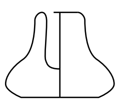
fwp-2.1.3.1b: small and narrow biconical cup with a narrow flat base and a rounded, straight inward bent rim. The belly is located midway between the base and the rim of the vessel.



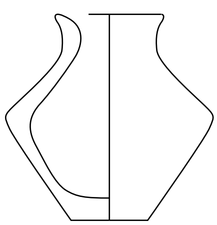
fwp-2.1.3.2: small biconical cup with a narrow flat base and a wide rounded, straight inward bent rim. The belly is located in the upper third of the vessel.



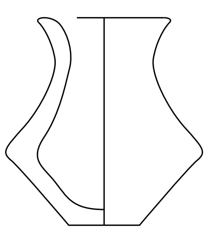
fwp-2.1.4.1: small restricted cup with a very narrow flat base, a convex lower body, a concave upper body and a rounded slightly inward bent rim.The belly is located in the lower quarter of the vessel (cork-like vessel).



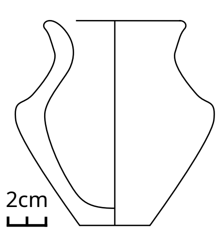
fwp-2.1.4.2: small cup with a very wide flat base, a rounded body and an elongated vertical rim. The belly is located in the lower quarter of the vessel (cork-like vessel).



fwp-2.2.1.1a: restricted cup with a narrow flat base, a conical lower body, a concave upper body and a rounded, outward bent rim. The belly is located midway between the base and the rim of the vessel.

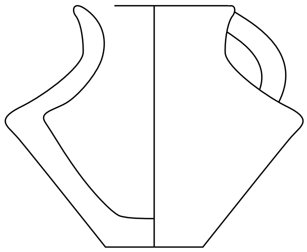


fwp-2.2.1.1b: restricted cup with a narrow flat base, a conical lower body, a concave upper body and a rounded, outward bent rim. The belly is located in the lower third of the vessel.

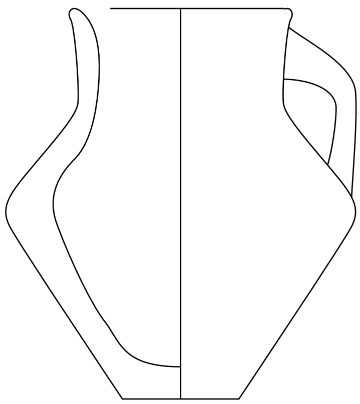


fwp-2.2.1.1c: restricted cup with a narrow flat base, a conical lower body, a concave upper body and a rounded, outward bent rim. The belly is located in the upper third of the vessel.

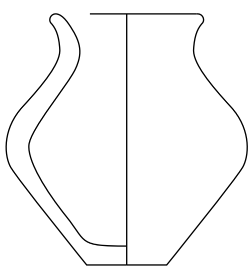
Figure 77. Figure 76 continued.



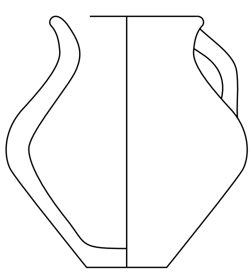
fwp-2.2.1.2a: restricted cup with a narrow flat base, a conical lower body, a concave upper body and a rounded, outward bent rim. The belly is located in the upper third of the vessel and a handle is applied between the neck and the shoulder.



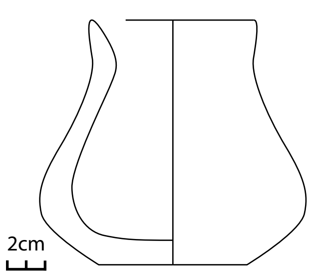
fwp-2.2.1.2b: restricted cup with a narrow flat base, a conical lower body, a concave upper body and a rounded vertical rim. The belly is located in the upper third of the vessel and a handle is located between the neck and the shoulder of the vessel.



fwp-2.2.1.3: tall restricted sphero-conical cup with a flat base, a conical lower body, a convex upper body and a rounded outward bent rim. The belly is located midway between the base and the rim of the vessel.

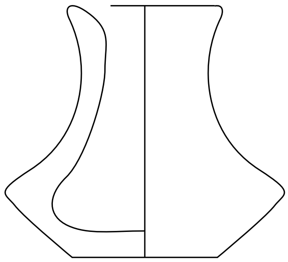


fwp-2.2.1.4: tall restricted sphero-conical cup with a flat base, a conical lower body, a convex upper body and a rounded outward bent rim. The belly is located midway between the base and the rim of the vessel and a handle is applied between the neck and the shoulder.

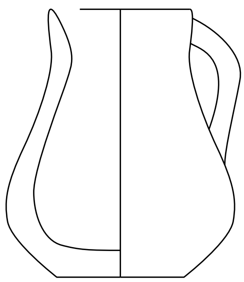


fwp-2.2.2.1a: tall restricted cup with a flat base, an ovaloid body and a rounded outward bent rim. The belly is located in the lower third of the vessel.

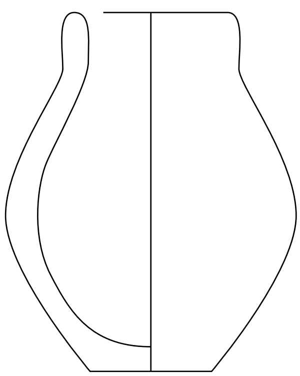
Figure 78. Figure 76 continued.



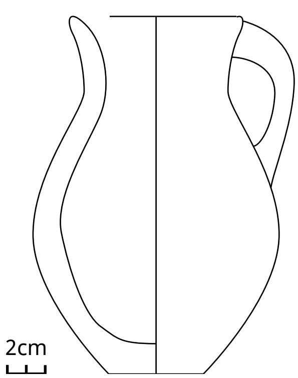
fwp-2.2.2.1b: tall restricted cup with a flat base, a conical lower body, an elongated concave upper body and a rounded outward bent rim. The pointy belly is located in the lower third of the vessel.



fwp-2.2.2.2: tall restricted cup with a flat base, an ovaloid body and a rounded outward bent rim. The belly is located in the lower third of the vessel and a handle is located between the neck and the shoulder.

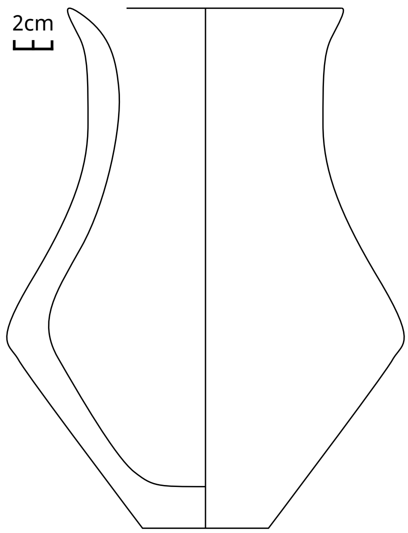


fwp-2.2.3.1: tall restricted cup with a flat base, a conical lower body, a convex upper body and a rounded vertical rim. The rounded belly is located midway between the base and the rim of the vessel.

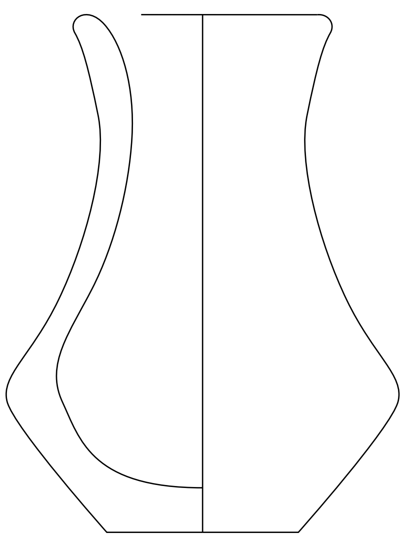


fwp-2.2.3.2: tall restricted cup with a flat base, a conical lower body, a convex upper body, and a rounded outward bent rim. The rounded belly is located midway between the base and the rim of the vessel and a handle is located between the neck and the shoulder.

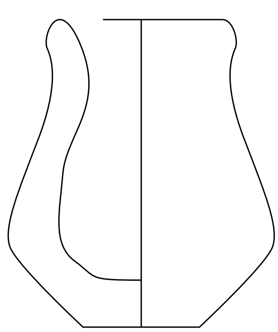
Figure 79. Figure 76 continued.



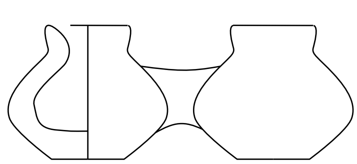
fwp-2.2.4.1a: tall and narrow restricted cup with a narrow flat base, a conical lower body, a concave upper body and a rounded, outward bent rim. The belly is located in the lower third of the vessel.



fwp-2.2.4.1b: tall and narrow restricted cup with a narrow flat base, a conical lower body, a concave upper body and a rounded, outward bent rim. The belly is located in the lower quarter of the vessel.

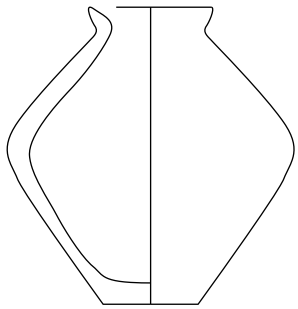


fwp-2.2.4.2: small and narrow cup with a flat base, a conical lower body and a concave upper body. The belly is located in the lower third of the vessel.

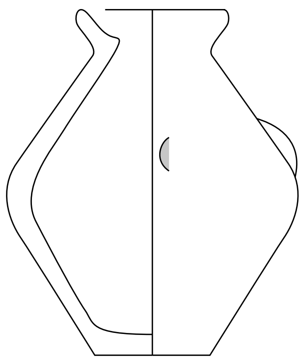


fwp-2.3.1.1: small restricted twin-vessel with a narrow flat base, a convex lower body, a concave upper body and a rounded outward bent rim. The two cups are connected between the belly and the shoulder.

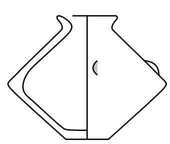
Figure 80. Figure 76 continued.



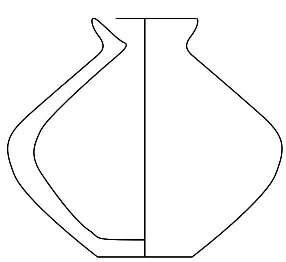
fwp-3.1.1.1: restricted biconical vessel with a flat base and a rounded outward bent rim. The rounded belly is located midway between the base and the rim of the vessel.



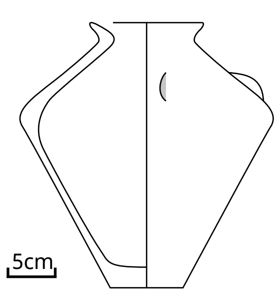
fwp-3.1.1.2: restricted biconical vessel with a flat base, a funnel-shaped rim and a rounded belly located midway between the base and the rim. Opposing horizontal eyelets are applied to the lower shoulder of the vessel.



fwp-3.1.2.1: wide restricted biconical vessel with a narrow flat base, a rounded outward bent rim and a pointy belly located midway between the base and the rim. Opposing horizontal eyelets are applied to the lower shoulder of the vessel.

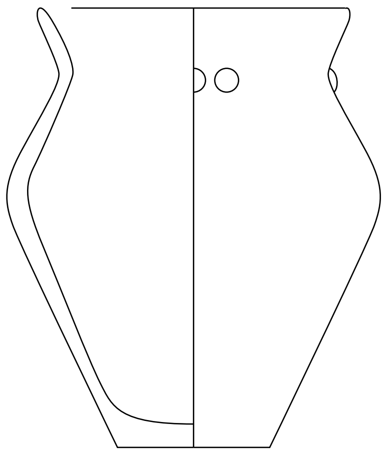


fwp-3.1.2.2: wide restricted vessel with a narrow flat base, a slightly convex lower body, a conical upper body and a funnel-shaped rim. The rounded belly is located midway between the base and the rim of the vessel.

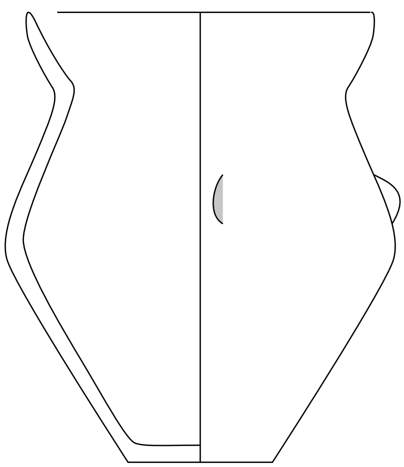


fwp-3.1.3.1: restricted biconical vessel with a narrow flat base, a rounded outward bent rim and a rounded belly located in the upper third of the vessel. Opposing horizontal eyelets are applied to the lower shoulder of the vessel.

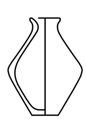
Figure 81. Types of fineware biconical vessels of the Southern-Bug-Dnieper-interfluve to scale (derived from Ryzhov 2012b).



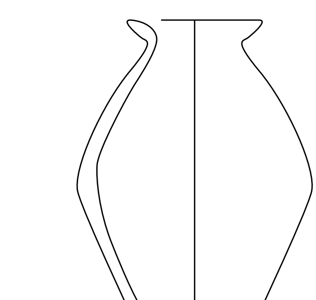
fwp-3.2.1.1: tall restricted biconical vessel with a straight funnel-shaped rim. The throat is wider than the base. The rounded belly is located in the upper third of the vessel and opposing pairs of round lugs are applied to the neck.



fwp-3.2.1.2: tall restricted biconical vessel with a rounded funnel-shaped rim. The throat is wider than the base. The rounded belly is located midway between the base and the rim of the vessel and opposing horizontal eyelets are applied to the shoulder.

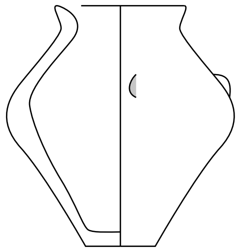


fwp-3.3.1.1a: tall and narrow restricted biconical vessel with a rounded outward bent rim. The rounded belly is located midway between the base and the rim of the vessel.

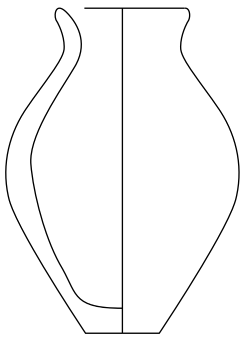


fwp-3.3.1.1b: tall and narrow restricted vessel with a conical lower body, a convex upper body and a rounded outward bent rim. The rounded belly is located midway between the base and the rim of the vessel.

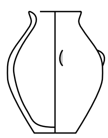
Figure 82. Figure 81 continued.



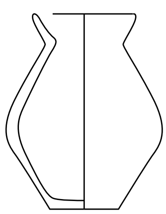
fwp-4.1.1.1: restricted vessel with a concave lower body, a convex upper body and a rounded outward bent rim. Opposing horizontal eyelets are applied to the lower shoulder of the vessel.



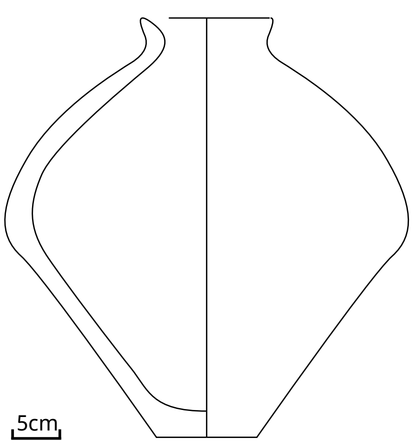
fwp-4.1.1.2: narrow restricted vessel with a conical lower body, a convex upper body and a rounded outward bent rim



fwp-4.1.1.3a: tall and narrow restricted vessel with a conical lower body, a convex upper body and a rounded outward bent rim. Opposing horizontal eyelets are applied to the lower shoulder of the vessel.

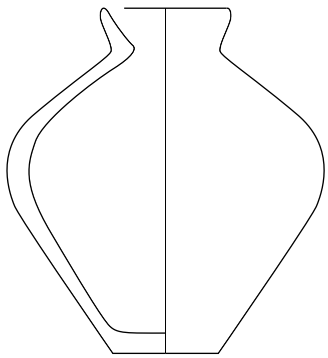


fwp-4.1.1.3b: tall restricted vessel with a concave lower body, a conical upper body and a rounded funnel-shaped rim

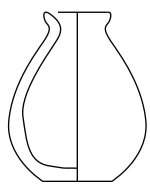


fwp-4.1.2.1: restricted vessel with a concave lower body, a convex upper body and a rounded outward bent rim

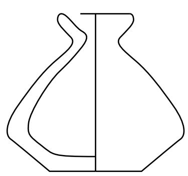
Figure 83. Types of fineware sphero-conical vessels of the Southern-Bug-Dnieper-interfluve to scale (derived from Ryzhov 2012b).



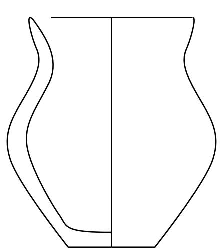
fwp-4.1.2.2: restricted vessel with a concave lower body, a convex upper body and a funnel-shaped rim



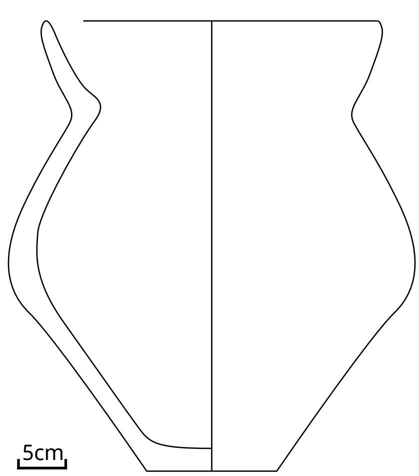
fwp-4.2.1.1a: restricted ovaloid vessel with an outward bent rim



fwp-4.2.1.1b: restricted vessel with a conical lower body, a convex upper body and a funnel-shaped rim. The pointed belly is located in the lower third of the vessel.

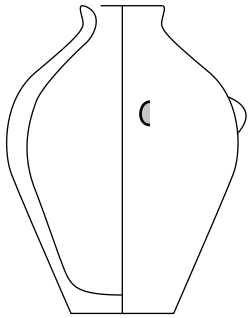


fwp-4.3.1.1: restricted vessel with a conical lower body, a convex upper body and a rounded outward bent rim. The throat is wider than the base.

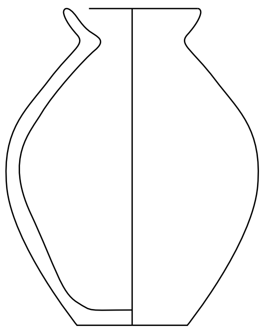


fwp-4.3.1.2: restricted vessel with a concave lower body and a convex upper body. The funnel-shaped rim is wider than the base.

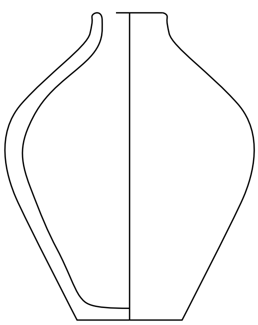
Figure 84. Figure 83 continued.



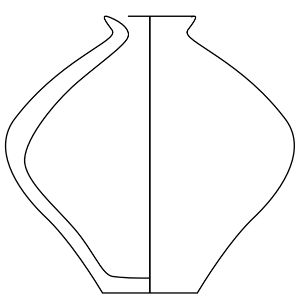
fwp-4.4.1.1a: narrow restricted vessel with a concave lower body, a convex upper body and a rounded outward bent rim. The belly is located in the upper third of the vessel and opposing horizontal eyelets are applied to the shoulder.



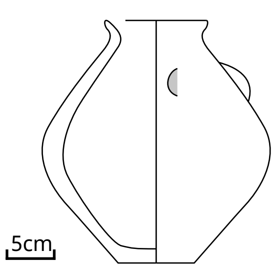
fwp-4.4.1.1b: narrow restricted vessel with a concave lower body, a convex upper body and a rounded outward bent rim. The rounded belly is located in the upper third of the vessel.



fwp-4.4.1.2: narrow restricted vessel with a concave lower body, a convex upper body and a rounded vertical rim. The rounded belly is located in the upper third of the vessel.

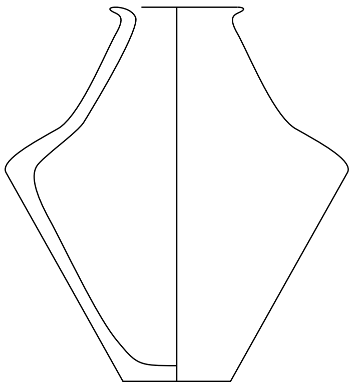


fwp-4.4.2.1: wide restricted vessel with a concave lower body, a convex upper body and a rounded outward bent rim. The rounded belly is located midway between the base and the rim.

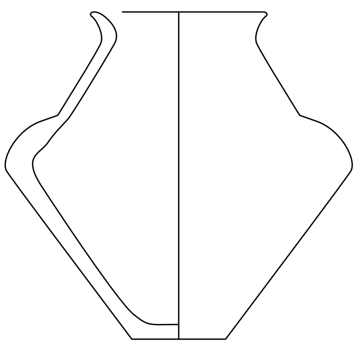


fwp-4.4.2.2: restricted vessel with a concave lower body, a wide convex upper body and a rounded outward bent rim. The rounded belly is located midway between the base and the rim of the vessel and opposing horizontal eyelets are applied to the upper part of the shoulder.

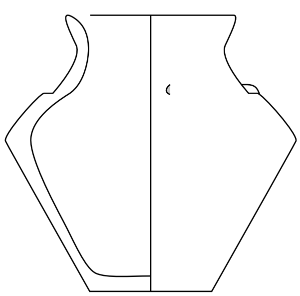
Figure 85. Figure 83 continued.



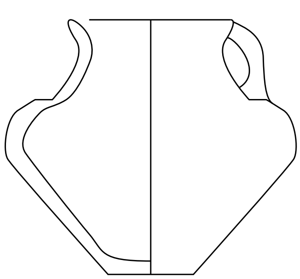
fwp-5.1.1.1a: restricted vessel with conical lower body, a pointed belly, a straight shoulder and a long straight neck with a rounded outward bent rim



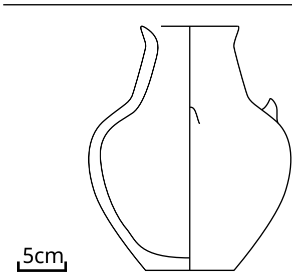
fwp-5.1.1.1b: restricted vessel with a conical lower body, a rounded shoulder and a long straight neck with a rounded outward bent rim



fwp-5.2.1.1a: restricted biconical vessel with a pronounced break between the shoulder and the neck, and a rounded outward bent rim. Small opposing horizontal eyelets are applied at the pronounced break between the shoulder and the neck of the vessel.

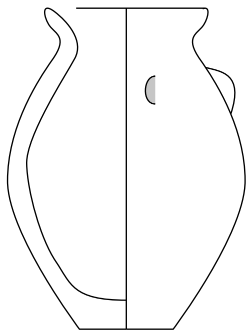


fwp-5.2.1.1b: restricted biconical vessel with a pronounced break between the shoulder and the neck and a roundedd outward bent rim. A handle is applied between the rim and the shoulder of the vessel.

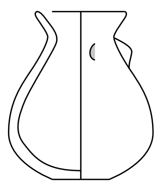


fwp-5.3.1.1: restricted vessel with an ovaloid lower body and a long conical neck with a rounded outward bent rim. Elongated lugs are applied to the shoulder of the vessel.

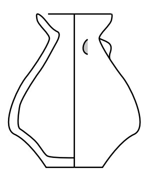
Figure 86. Types of fineware crater-shaped vessels of the Southern-Bug-Dnieper-interfluve to scale (derived from Ryzhov 2012b).



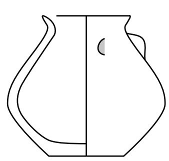
fwp-6.1.1.1: tall and restricted ellipsoid vessel with a rounded outward bent rim and opposing horizontal eyelets applied below the neck



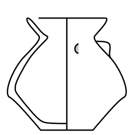
fwp-6.2.1.1a: restricted ovaloid vessel with a rounded outward bent rim and opposing horizontal eyelets applied below the neck (see 4.2.1.1a)



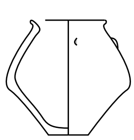
fwp-6.2.1.1b: narrow restricted vessel with a concave lower body, a convex upper body and a funnel-shaped rim. Opposing horizontal eyelets are applied below the neck (see 4.2.1.1b).



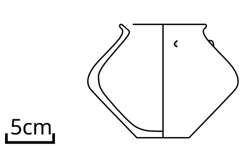
fwp-6.3.1.1a: wide restricted vessel with a concave lower body, a convex upper body and a rounded outward bent rim. The belly is located in the lower third of the vessel and opposing horizontal eyelets are applied below the neck.



fwp-6.3.1.1b: wide restricted vessel with a concave lower body, a convex upper body and a funnel-shaped rim. The belly is located in the lower third of the vessel and opposing horizontal eyelets are applied below the neck.

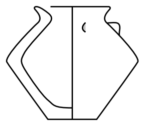


fwp-6.3.1.2a: wide restricted vessel with a concave lower body, a convex upper body and a rounded outward bent rim. The belly is located midway between the base and the rim of the vessel. Opposing horizontal eyelets are applied below the neck.

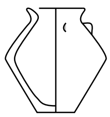


fwp-6.3.1.2b: wide restricted vessel with a conical lower body, a convex upper body and a rounded outward bent rim. The belly is located midway between the base and the rim of the vessel. Opposing horizontal eyelets are applied below the neck.

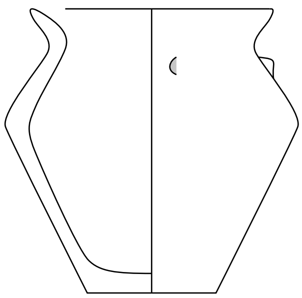
Figure 87. Types of fineware amphorae of the Southern-Bug-Dnieper-interfluve to scale (derived from Ryzhov (2012b).



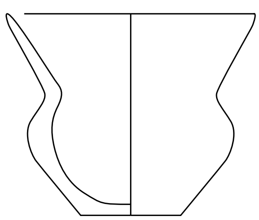
fwp-6.4.1.1: small and wide restricted biconical vessel with a rounded outward bent rim. The belly is located midway between the base and the rim of the vessel and opposing horizontal eyelets are applied below the neck.



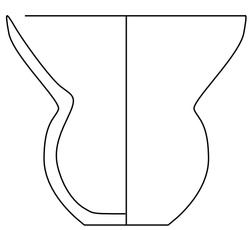
fwp-6.4.1.2a: restricted biconical vessel with a rounded outward bent rim. The belly is located midway between the base and the rim of the vessel and opposing horizontal eyelets are applied below the neck.



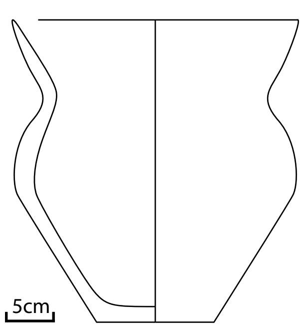
fwp-6.4.1.2b: restricted biconical vessel with a rounded outward bent rim which is wider than the base. The belly is located in the upper third of the vessel and opposing horizontal eyelets are applied below the neck.



fwp-7.1.1.1a: restricted vessel with a wide mouth, a conical lower body, a rounded shoulder and a straight elongated funnel-shaped rim which is wider than the belly (funnel beaker-like)

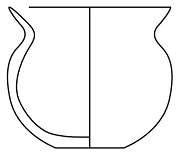


fwp-7.1.1.1b: restricted vessel with a wide mouth, a spherical body and a rounded elongated funnel-shaped rim which is wider than the belly (funnel beaker-like)

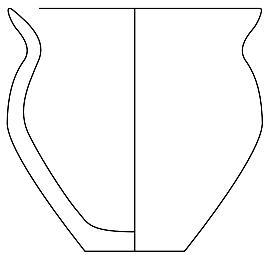


fwp-7.1.2.1: tall restricted vessel with a wide mouth, a high conical lower body, a rounded shoulder and a straight elongated funnel-shaped rim (funnel beaker-like)

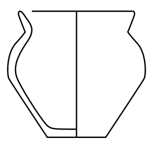
Figure 88. Figure 87 continued.



fwp-7.2.1.1: wide restricted vessel with a wide mouth, a spherical body and a straight elongated funnel-shaped rim (funnel beaker-like)



fwp-7.2.2.1: restricted vessel with a wide mouth, a narrow base, a high conical lower body, a rounded shoulder and a straight funnel-shaped rim (funnel beaker-like)



fwp-7.2.2.2: restricted vessel with a wide mouth, a high concave lower body, a rounded shoulder and a straight funnel-shaped rim

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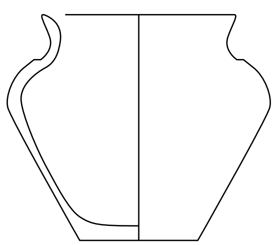
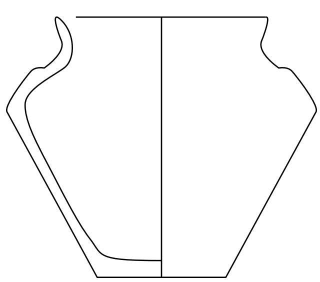
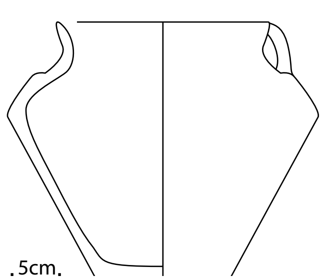


fwp-7.2.3.1: restricted vessel with a wide mouth, a high conical lower body, a rounded shoulder and a pronounced break between the shoulder and the rounded outward bent rim. The belly is located in the upper third of the vessel.

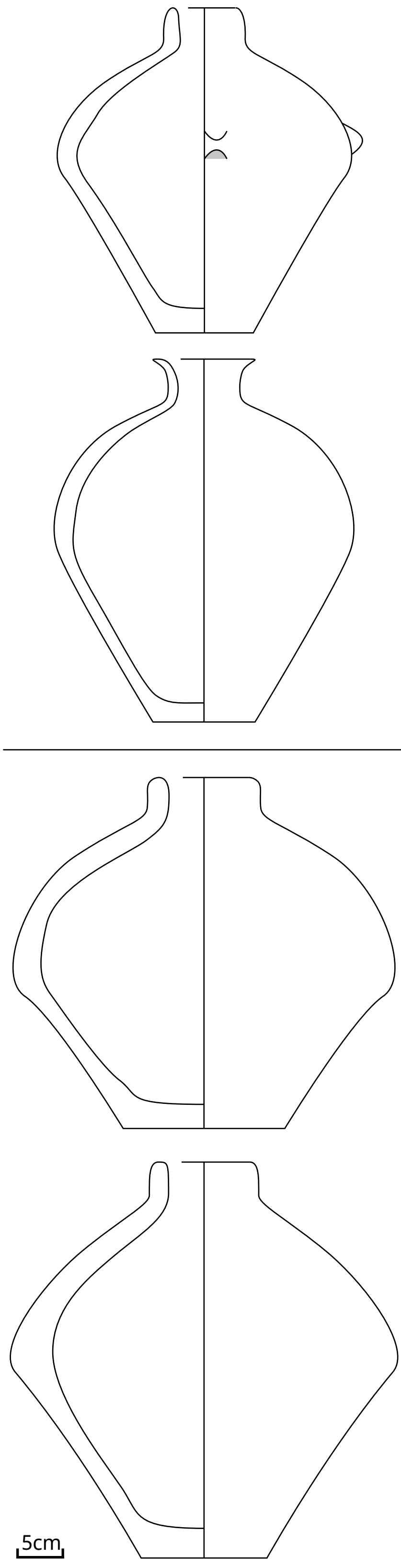


fwp-7.2.3.2a: restricted vessel with a wide mouth, a high conical lower body, a biconical belly and a pronounced break between the shoulder and the rounded outward bent rim. The belly is located in the upper third of the vessel.



fwp-7.2.3.2b: restricted vessel with a wide mouth, a high conical lower body, a biconical belly and a pronounced break between the shoulder and the rounded outward bent rim. The belly is located in the upper third of the vessel and a handle is applied between the rim and the shoulder.

Figure 89. Types of fineware craters of the Southern-Bug-Dnieper-interfluve to scale (derived from Ryzhov 2012b).



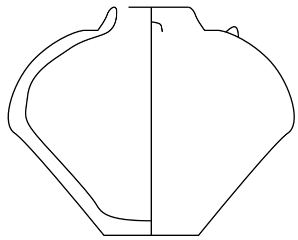
fwp-8.2.1.1: restricted vessel with a high concave lower body, a convex upper body and a rounded vertical rim. The belly is located in the upper third of the vessel and the opposing vertical eyelets are applied to the belly.

fwp-8.2.1.2: restricted vessel with a high concave lower body, a convex upper body, and a narrow, rounded outward bent rim

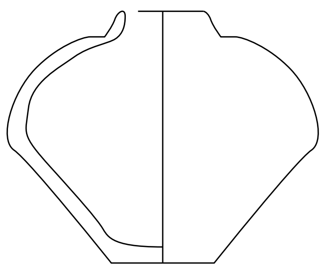
fwp-8.2.2.1: wide restricted vessel with a concave lower body, a convex upper body, and a rounded vertical rim. The belly is located midway between the base and the rim of the vessel.

fwp-8.2.2.2: tall restricted vessel with a concave lower body, a convex upper body, and a rounded vertical rim. The belly is located midway between the base and the rim of the vessel.

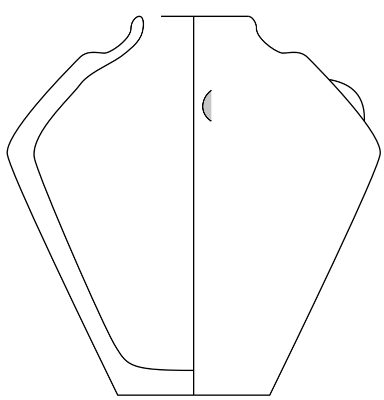
Figure 90. Types of fineware pear-shaped vessels of the Southern-Bug-Dnieper-interfluve to scale (derived from Ryzhov 2012b).



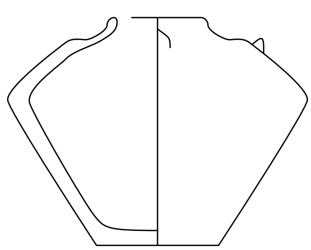
fwp-8.3.1.1: restricted vessel with a concave lower body, a convex upper body and a pronounced break between the shoulder and the rounded, inward bent rim. The belly is located in the upper third of the vessel and elongated lugs are applied to the upper shoulder.



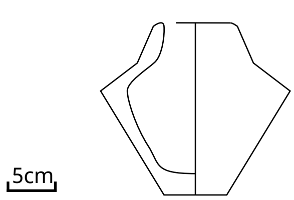
fwp-8.3.1.2: restricted vessel with a concave lower body, a convex upper body and a pronounced break between the shoulder and the rounded, inward bent rim. The belly is located midway between the base and the rim of the vessel.



fwp-8.3.2.1: tall restricted biconical vessel with a pronounced break between the shoulder and the outward bent rim where the tip ends vertically. The belly is located in the upper third of the vessel and opposing horizontal eyelets are applied to the shoulder.

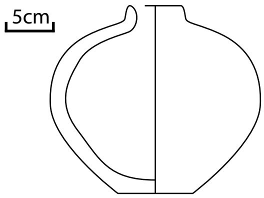


fwp-8.3.2.2: wide restricted biconical vessel with a pronounced break between the shoulder and the outward bent rim where the tip ends vertically. The belly is located in the upper third of the vessel and elongated lugs are applied to the upper shoulder.

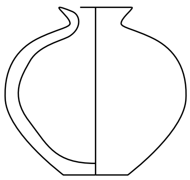


fwp-8.3.2.3: restricted biconical vessel with a sharp break between the shoulder and the inward facing rim. The belly is located in the upper third of the vessel.

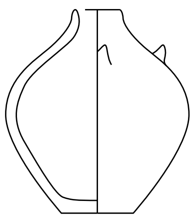
Figure 91. Figure 90 continued.



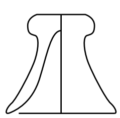
fwp-8.4.1.1a: wide restricted vessel with a conical lower body, a convex upper body and a narrow vertical rim



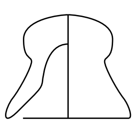
fwp-8.4.1.1b: wide restricted vessel with a conical lower body, a convex upper body and a narrow rounded, outward bent rim



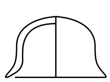
fwp-8.5.1.1: restricted vessel with a conical lower body, a convex upper body and a narrow rounded, inward bent rim. Elongated lugs are applied to the shoulder of the vessel.



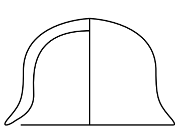
fwp-9.2.1.1: unrestricted hyperboloid vessel with a thickened and set-off base of rounded rectangular shape. The rim tapers outwards.



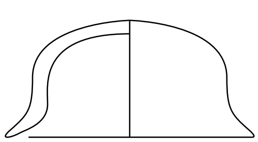
fwp-9.2.1.2: unrestricted hyperboloid vessel with a thickened and set-off rounded ovaloid base. The rim tapers outwards and is wider than the body.



fwp-9.3.1.1a: unrestricted tall spherical vessel with a rounded outward bent rim which is wider than the body

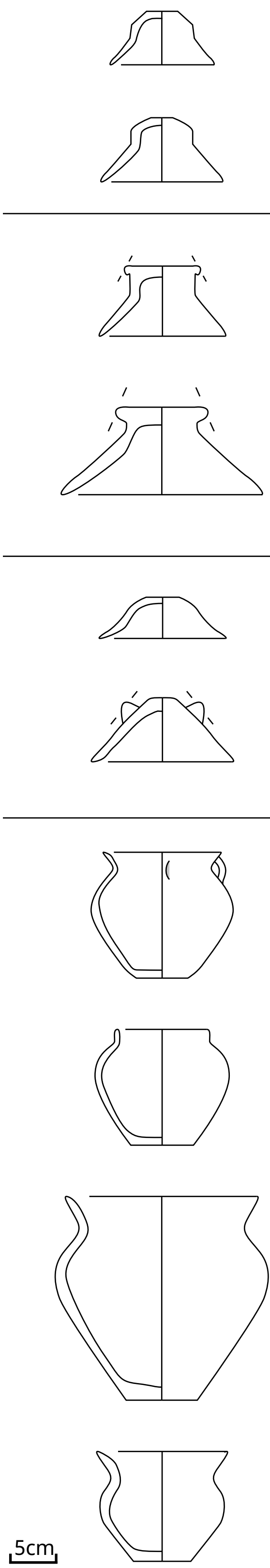


fwp-9.3.1.1b: unrestricted tall spherical vessel with a rounded and only slightly outward bent rim which is wider than the body (defining difference to 9.3.1.1a is unclear)



fwp-9.3.1.2: unrestricted wide vessel with a flat base, a convex body and a rounded outward bent rim which is wider than the body

Figure 92. Types of fineware pear-shaped vessel sand lids of the Southern-Bug-Dnieper-interfluve to scale (derived from Ryzhov 2012b).



fwp-9.3.2.1: unrestricted wide vessel with a flat base, a conical lower body, a vertical wall and a straight, elongated outward bent rim which is wider than the body

fwp-9.3.2.2: unrestricted wide vessel with a flat base, a convex lower body, a vertical wall and a straight, elongated outward bent rim which is wider than the body

fwp-9.3.3.1: unrestricted vessel with a flat base, vertical walls and a straight, elongated outward bent rim which is wider than the body. Opposing vertical eyelets are applied to the transition between the walls and the base of the vessel.

fwp-9.3.3.2: unrestricted flat vessel with a flat and thickened base, narrow vertical walls and a straight, elongated outward bent rim which is wider than the body. Opposing vertical eyelets are applied to the transition between the walls and the base of the vessel.

fwp-9.4.1.1: unrestricted flat vessel with a flat base, a convex body and an elongated outward bent rim which is wider than the body

fwp-9.4.1.2: unrestricted ovaloid vessel with a rounded outward tapering rim and opposing vertical eyelets applied near the base

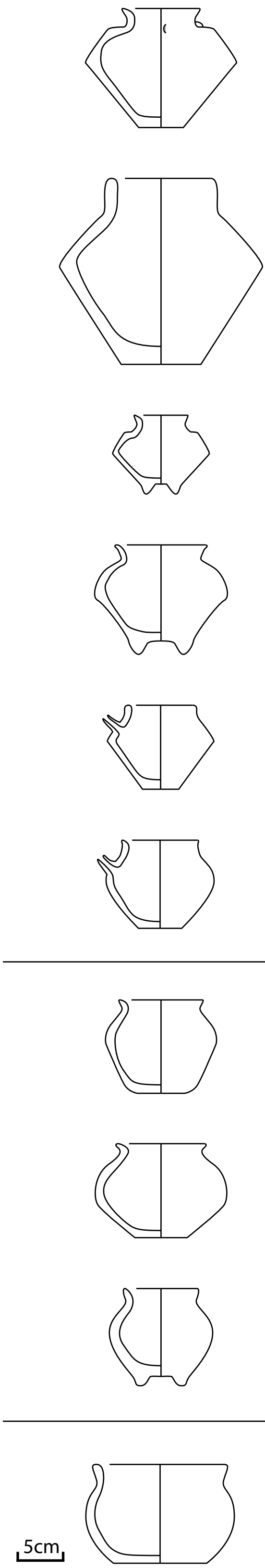
fwp-10.1.1.1: restricted vessel with a conical lower body, a convex upper body and a wide rounded, outward bent rim. The belly is located in the upper third of the vessel and a handle is applied between the rim and the upper shoulder.

fwp-10.1.1.2: restricted vessel with a high conical lower body, a convex upper body and a wide rounded, vertical rim. The belly is located in the upper third of the vessel.

fwp-10.1.1.3a: restricted vessel with a narrow base, a high conical lower body, a convex upper body and a wide rounded, elongated outward bent rim

fwp-10.1.1.3b: small restricted vessel with a narrow base, a high conical lower body, a convex upper body and a wide rounded, elongated outward bent rim

Figure 93. Types of fineware lids and pots of the Southern-Bug-Dnieper-interfluve to scale (derived from Ryzhov 2012b).



fwp-10.1.2.1: small restricted biconical vessel with a pronounced break between the shoulder and the wide, rounded outward bent rim. Small opposing horizontal eyelets are applied to the break between the shoulder and the rim of the vessel.

fwp-10.1.2.2: small restricted biconical vessel with a rounded vertical rim. The belly is located in the upper third of the vessel.

fwp-10.1.2.3a: footed and restricted biconical vessel with a pronounced break between the shoulder and the wide, rounded outward bent rim

fwp-10.1.2.3b: footed restricted vessel with a concave lower body, a convex upper body and a wide rounded outward bent rim

fwp-10.1.2.4a: restricted biconical vessel with a rounded wide and short vertical rim. A spout is applied to the shoulder of the vessel.

fwp-10.1.2.4b: restricted vessel with a conical lower body, a convex upper body and a rounded outward bent rim. A spout is applied to the shoulder of the vessel.

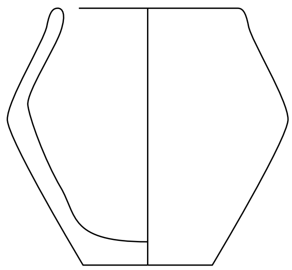
fwp-10.2.1.1a: restricted wide vessel with a high conical lower body, a convex upper body and a short rounded outward bent rim. The belly is located in the upper third of the vessel.

fwp-10.2.1.1b: restricted vessel with a short conical lower body, a convex upper body and a short rounded outward bent rim. The belly is located in the lower third of the vessel.

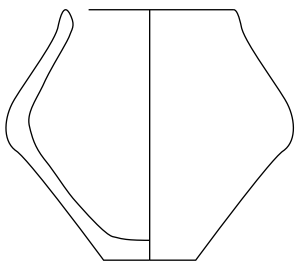
fwp-10.2.1.2: footed restricted vessel with a convex lower and upper body and a short rounded outward bent rim

fwp-10.3.1.1: restricted s-shaped vessel with a wide base and a rounded, outward bent rim

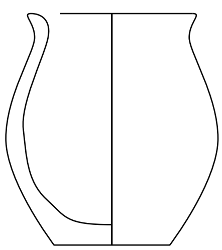
Figure 94. Types of fineware pots of the Southern-Bug-Dnieper-interfluve to scale (derived from Ryzhov 2012b).



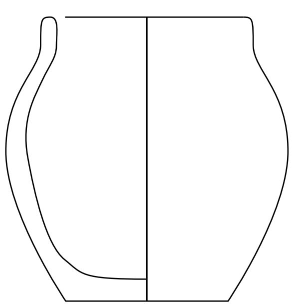
fwp-10.4.1.1a: restricted biconical vessel with a very short and wide, rounded vertical rim



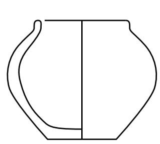
fwp-10.4.1.1b: restricted vessel with a concave lower body, a convex upper body and a very short and wide, rounded vertical rim



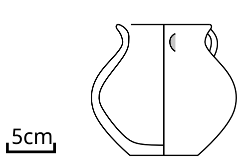
fwp-10.5.1.1: restricted vessel with a flat base, an ellipsoid body and a short and wide, rounded outward bent rim



fwp-10.5.1.2: restricted vessel with a flat base, an ellipsoid body and a short and wide, rounded vertical rim

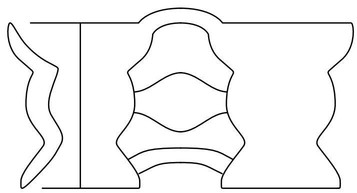


fwp-10.7.2.1a: restricted wide vessel with a conical lower body, a convex upper body and a very short and wide, rounded vertical rim

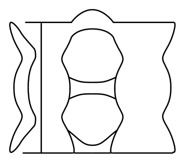


fwp-10.7.2.1b: restricted vessel with a convex lower and upper body and a short rounded outward bent rim. A handle is applied between the rim and the upper shoulder of the vessel.

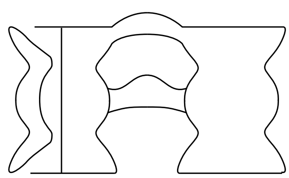
Figure 95. Figure 94 continued.



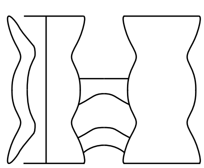
fwp-11.1.1.1: open unrestricted tripartite twin-vessel with a rounded funnel-shaped upper rim, a convex wall and a straight funnel-shaped lower rim. The twin-vessel is connected by an arc on the upper and lower rim and a thickened joint in the centre.



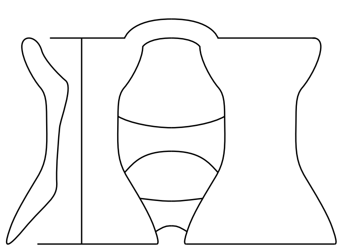
fwp-11.1.1.2: open unrestricted tripartite twin-vessel with rounded funnel-shaped upper and lower rims and a convex wall. The twin-vessel is connected by an arc on the upper rim, a slim joint in the centre and a flattened basal joint on the lower rim.



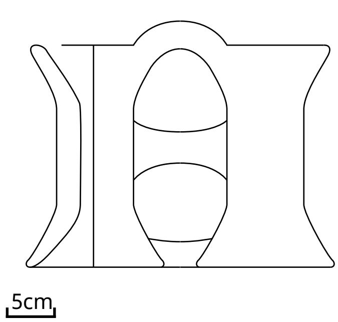
fwp-11.1.2.1: open unrestricted tripartite twin-vessel with rounded funnel-shaped upper and lower rims and a convex wall. The twin-vessel is connected by an arc on the upper rim and a central joint which is thickened on the upper part.



fwp-11.1.3.1: open unrestricted tripartite twin-vessel with rounded funnel-shaped upper and lower rims and a convex wall. The twin-vessel is connected by a central joint, which is thinned on the lower side, and an arc on the lower rim.

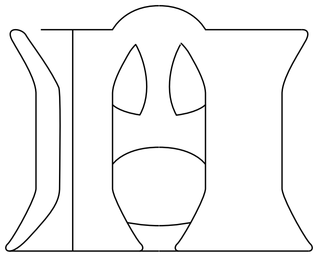


fwp-11.2.1.1: open unrestricted tripartite twin-vessel with a thickened and rounded funnel-shaped upper rim, a straight wall, and a wide straight funnel-shaped lower rim. The twin-vessel is connected by an arc on the upper rim and concave central and lower joints.

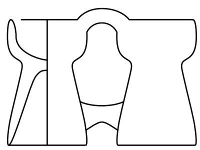


fwp-11.2.1.2: open unrestricted tripartite twin-vessel with straight funnel-shaped upper and lower rims and a straight wall. The twin-vessel is connected by an arc on the upper rim, a concave central joint and a concave basal joint on the lower rim.

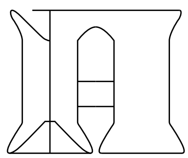
Figure 96. Types of fineware binocular vessels of the Southern-Bug-Dnieper-interfluve to scale (derived from Ryzhov 2012b).



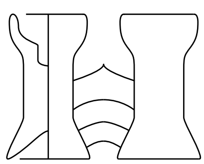
fwp-11.2.1.3: open unrestricted tripartite twin-vessel with straight funnel-shaped upper and lower rims and a straight wall. The twin-vessel is connected by an arc on the upper rim, which is connected to the central joint and a concave basal joint on the lower rim.



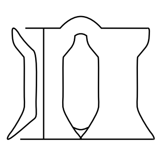
fwp-11.2.2.1: closed unrestricted bipartite twin-vessel with a spherical upper part with a rounded vertical rim and an elongated conical lower part with a straight and rounded funnel-shaped rim. The twin-vessel is connected by an arc on the upper rim and a concave joint on the lower part.



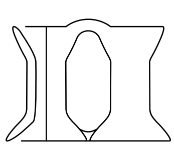
fwp-11.2.2.2: closed unrestricted tripartite twin-vessel with conical upper and lower parts and a massive central part. The twin-vessel is connected by a fusion of the upper rims and a straight central joint.



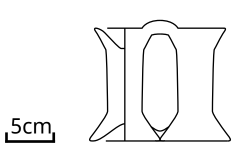
fwp-11.2.3.1: closed unrestricted tripartite twin-vessel with a spherical upper part, a conical lower part and a massive central part. The twin-vessel is connected by arcs on the central and lower parts of the vessel.



fwp-11.2.4.1a: open unrestricted tripartite twin-vessel with a spherical upper part, a conical lower part and a straight wall. The twin-vessel is connected by an arc on the upper rim and a concave basal joint on the lower part.



fwp-11.2.4.1b: open unrestricted tripartite twin-vessel with conical upper and lower parts and a straight wall. The twin-vessel is connected by an arc on the upper rim and a concave basal joint on the lower part.



fwp-11.2.4.2: closed unrestricted tripartite twin-vessel with conical upper and lower parts and a massive central part. The twin-vessel is connected by an arc on the upper rim and a concave basal joint on the lower part.

Figure 97. Figure 96 continued.

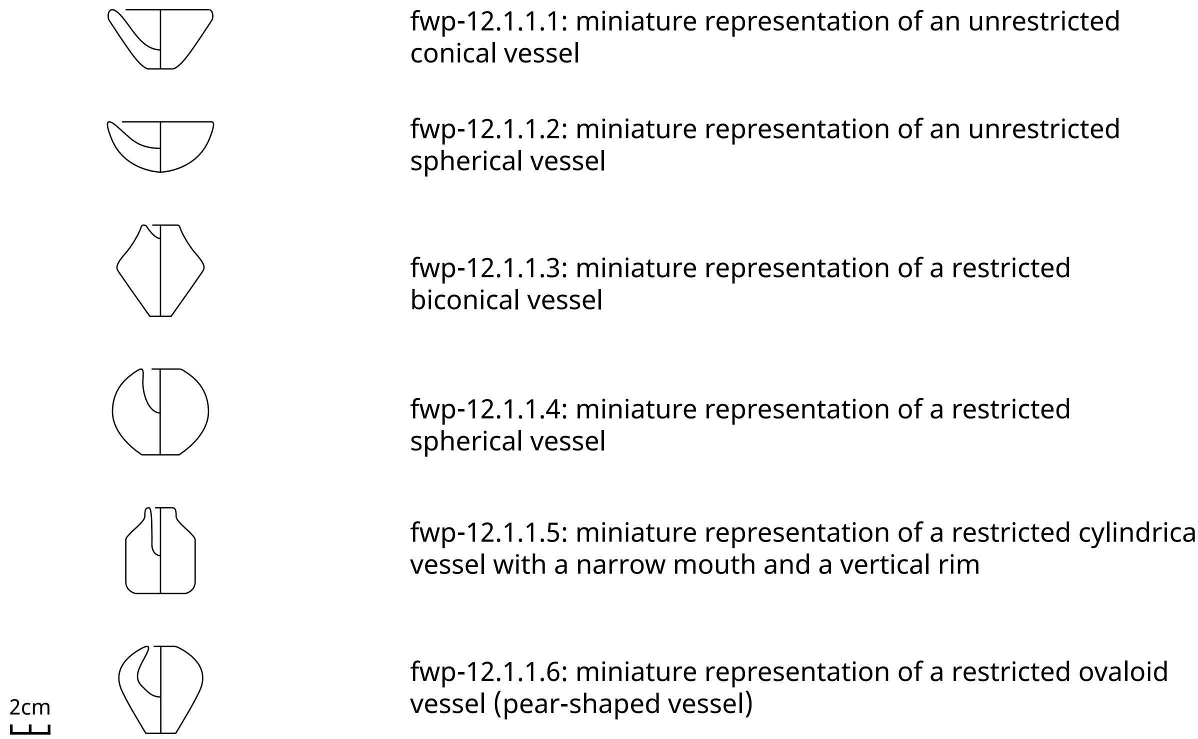
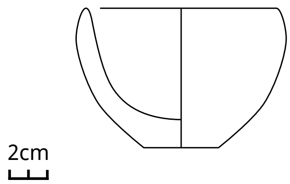


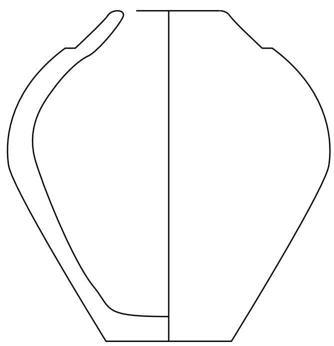
Figure 98. Types of fineware miniature vessels of the Southern-Bug-Dnieper-interfluve to scale (derived from Ryzhov 2012b).

For the classification of the decoration, Ryzhov differentiates between bowls and closed vessels (fig. 101). Among bowls, he distinguishes between eight decoration arrangements with a subdivision between the decoration of the inner and the outer surface of the vessels. With 59 arrangements, the 'simplified line scheme' shows the largest variety. Here, we must distinguish between rim decorations with a variety of 20 patterns on the inner surface and ten patterns on the outer surface, and pictograms with 24 different variants on the inner central surface and five variants on the outer walls of bowls. The type of the 'simplified line scheme' encompasses, therefore, several different kinds and locations of decoration, which are not clearly separated by Ryzhov. The other following types, however, are located on the inner central and outer walls of the vessels and are distinguished from the rim. The so-called 'comet scheme' (type 2) consists of 41 inner and two outer variants, whereas the 'figure-eight-shaped scheme' (type 3) includes 33 inner and 4 outer variants. Furthermore, Ryzhov distinguishes between the so-called cross-shaped scheme (type 4) with 27 inner and four outer variants and the wavy scheme (type 5) with five inner variants. In addition, he differentiates between the scalloped scheme (type 6) with nine inner and four outer variants as well as the concentric ring scheme (type 7) with six inner variants and the radial scheme (type 8) with five inner variants. In several cases, variants of these types show the same structural pattern, especially variants of the cross-shaped, the wavy and the radial scheme. In some cases, a mixture of two or more schemes can be observed on one vessel.

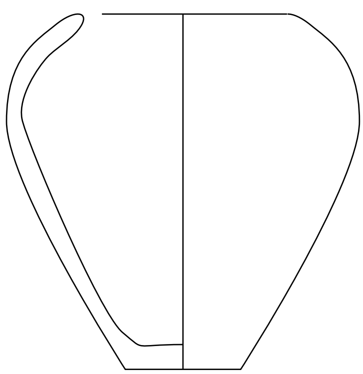
Among the decoration of closed vessel shapes, Ryzhov distinguishes between incised, incised and painted and exclusively painted décor. For fineware, he differentiates between twelve types of decoration arrangements. These include the simplified line scheme (type 1) with 54 variants, the 'metopic' scheme (type 2) with 46 variants, the 'façade' scheme (type 3) with 20 variants, the so-called Tangentenkreisband scheme (type 5) according to a decoration style described by Schmidt for the Cucuteni material with 25 variants and the tangent scheme (type 6) with 23 variants. In addition, decoration arrangements include the 'owl-face' scheme (type 7) with four variants, the wavy scheme (type 8) with nine variants, the 'meander-line' scheme (type 9) with



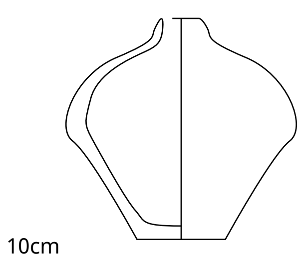
fwi-1.2.2.1: tall and thick-walled spherical bowl with a narrow flat base and a rounded vertical rim



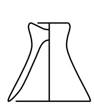
fwi-8.1.1.1a: restricted vessel with a conical lower body, a convex upper body and a pronounced break between the shoulder and the flattened, inward bent rim. The belly is located in the upper third of the vessel.



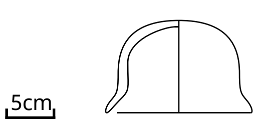
fwi-8.1.1.1b: restricted ovaloid vessel with a narrow flat base and a rounded, inward bent rim. The belly is located in the upper third of the vessel.



fwi-8.2.1.1: wide restricted vessel with a concave lower body, a convex upper body and a rounded vertical rim. The belly is located midway between the base and the rim of the vessel.

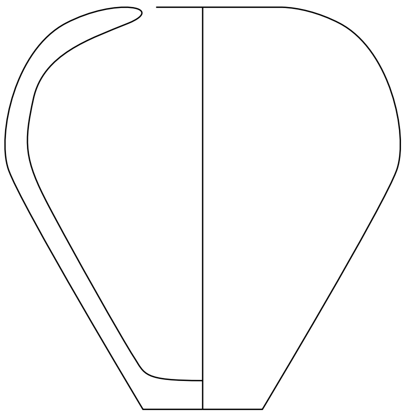


fwi-9.1.1.1: unrestricted conical vessel with a thickened and set-off base and a concave base. The rim tapers outwards.

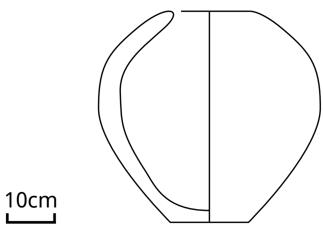


fwi-9.3.1.1: unrestricted spherical vessel with a round base and a pronounced break between the body and a rounded, outward bent rim which is wider than the body

Figure 99. Types of incised fineware vessels of the Southern-Bug-Dnieper-interfluve to scale (derived from Ryzhov 2012b).



dw-8.1.1.1: tall restricted vessel with a narrow flat base, a high conical lower body, a convex upper body and a rounded, inward bent rim. The belly is located in the upper third of the vessel.



dw-8.1.2.1: tall restricted ovaloid vessel with a narrow flat base and a rounded, inward bent rim. The belly is located in the upper third of the vessel.

Figure 100. Types of daub ware vessels of the Southern-Bug-Dnieper-interfluve to scale (derived from Ryzhov 2012b).

16 variants, and the volute scheme (type 10) with 15 variants and the 'leaf-shaped' scheme (type 11) with 12 variants. The last type of decoration arrangement distinguished by Ryzhov is the 'scalloped' scheme (type 12) with 22 variations.

For coarse ware, Ryzhov distinguishes between the simplified line scheme with rows of punctuations (type 1.1), chevrons (type 1.4) and waves (type 8.1) as well as 'scallops' (type 12.1).

Several fineware decoration arrangements appear to be interconnected. Especially the meander, volute and leaf-shaped schemes seem to be variations and developments from one another. In his classification, Ryzhov does not explicitly mark the decoration arrangements, which might be of non-local origin to the Southern-Bug-Dnieper interfluve like the 'Tangentenkreisband', the 'owl-face' and the 'scalloped' schemes. It is also not explicitly mentioned on which morphological type of vessel the various schemes appear or are exclusive to, except for the separated bowls. While it makes sense to separate the two categories of closed and open vessels for the different types of structural arrangements, certain elements like pictograms or 'Zwickel' do appear on both categories.

A more detailed approach to the Trypillia decoration system is provided by Tkachuk (2005). In his semiotic approach, he separates the decoration arrangements into several decoration zones following the classic methodology for Pueblo pottery (Bunzel 1972 (1929)). In this way, he is able to investigate the combinations of element groups per vessel. While his study includes several other local groups, he works extensively with the pottery retrieved from Maidanets'ke. Overall, Tkachuk's catalogue includes 280 decoration traits for Maidanets'ke of which the most only appear once. The advantage of his work is that he does not distinguish between open or closed vessel types. Nevertheless, many of his decoration traits are already combinations of elements and therefore appear only once in the archaeological record. But, discussing elements and element groups realises only half of the potential of the Trypillia decoration system when following the Anglophone approach of hierarchical design structural analysis. According to the ethnographic observations by Friedrich (1970), design elements are easily copied, and their changing frequency possibly represents

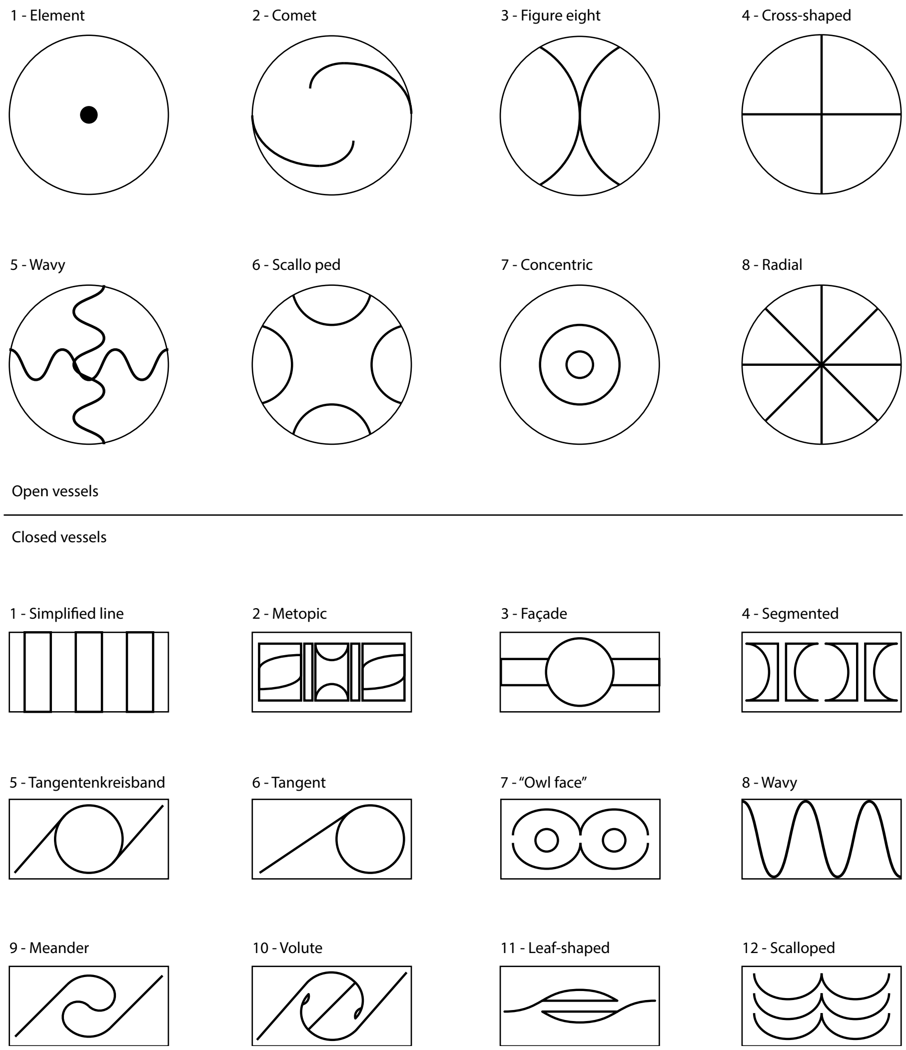


Figure 101. Design arrangements for pottery of the Southern-Bug-Dnieper-interfluve (derived from Ryzhov 2012b).

Temper	Weight(g)	%
Quartz	19390	95,2
Crushed seashell	792	3,9
None	176	0,9
Glimmer	18	0,1
Sum	**20376**	**100,0**
Clay source	**Weight (g)**	**%**
mostly kaolinite rich	11675	62,5
mostly iron rich	5053	27,0
iron-kaolinite mixture	1121	6,0
undetermined	839	4,5
Sum	**18688**	**100,0**
Firing atmosphere	**Weight (g)**	**%**
Oxidizing	17070	91,3
Reducing	826	4,4
Mixed/refired	792	4,2
Sum	**18688**	**100,0**

Table 35. Technological characteristics of pottery retrieved from trench 110. For data see appendix 7.

the factor of time, whereas the design structures – how the different decoration zones are distributed over the vessel – are harder to identify, but are seen as markers to identify production groups. Especially the analysis of design structure in Trypillia pottery and its frequency per feature is missing in Tkachuk's approach.

While the various classifications presented above build the basis for the following classification of the material from the excavations between 2014 and 2016, they do not always fit the needed detail to describe fragmented material or the detailed differentiation of decoration elements for a micro-chronological approach. Therefore, additional traits are mentioned for the respective vessel groups when necessary.

5.2 Definition of wares

In order to evaluate the traditional distinction between tableware (fineware) and kitchenware (coarse ware) as discussed above, the detailed recordings of pottery for trench 110 is analysed below. Since the features of this trench date throughout the entire occupation of Maidanets'ke, it is thus possible to trace potential developments over time. Here, a dataset of 310 pottery units and typologically undiagnostic assemblages (IDs) is used with a total weight of 20376 g. Percentages of characteristics are given based on weight (tab. 35).

Among the used clays are the kaolinite and iron rich ones previously observed by Ryzhov, which also appear as mixtures. With 62.5 %, kaolinite rich whitish clays are most commonly used, followed by iron rich reddish clays with 27 %. Mixtures of theses clays, sometimes banded in profile, appear in 6 % of the material. For 4.5 %, no identification was possible because of severe refiring.

Among the observed temper types are quartz, crushed seashell and glimmer. The most common temper is quartz, which is found in 95.2 % of the material. It makes up 1-7 % of the paste with a median of 2 % and pieces range between 0.5-5 mm in maximal size with a median of 2 mm. Furthermore, crushed seashell is found in 3.9 % of the material, making up 5 % of the paste with a maximal size ranging between 5-7 mm. Glimmer is found in two cases (0.1 %) making up 1-4 % of the paste with a maximal size of 1 mm. Finally, around 0.9 % of the material is made from washed out clay, which shows no traces of intentionally added temper.

Most of the pottery was originally fired in a controlled oxidising atmosphere, which is observed for 91.3 % of the material. A reducing atmosphere is observed for 4.4 % and mixed conditions caused by refiring is found for 4.2 % of the pottery.

By plotting the percentage of added temper against its maximal size, three groups can be determined (fig. 102). The first group – the easiest to define – is pottery without intentionally added temper. The second group is defined by the cluster of quartz temper ranging from 1-3 % and 0.5-3 mm and is used in the following correspondence analysis as category 'Quartz fine'. Third, quartz temper ranging from 5-7 % with a maximal size of 2-5 mm is used in the following correspondence analysis as category 'Quartz coarse'. This third category also includes the occasional appearance of glimmer and crushed seashell.

In the correspondence analysis (fig. 103), a clear clustering of kaolinite rich and kaolinite-iron mixed clays is apparent in combination with the temper category 'quartz fine' and the oxidising fire atmosphere. Furthermore, iron rich clays are connected to the temper category of 'Quartz coarse' as well as to glimmer and crushed shell. Also connected to this cluster are a mixed firing atmosphere and traces of severe refiring up to vitrification. Undetermined clay sources are connected to a reducing fire atmosphere and the lack of temper as well as to traces of weak refiring.

Based on the analysis above, three pottery wares can be defined. Coarse ware, which corresponds to the traditional term of 'kitchenware', is therefore defined by a paste of iron rich clay tempered with 5-7 % of quartz grains of maximal

5 mm in size. It could also contain temper of crushed seashell or glimmer. Coarse ware is found to have been fired in a reducing or mixed atmosphere, which is in line with its assumed use as cooking pottery.

Fineware, which corresponds to the traditional term of 'tableware', is defined by a paste of kaolinite or iron rich clays and sometimes a mixture of both, which is tempered with 1-3 % of quartz grains of 0.5-2 mm in size. Fineware is originally fired under a controlled oxidising atmosphere.

Lastly, washed out clays of 'import' ware is characterised by its lack of temper and exclusive use of iron rich clays. Since most of this material shows traces of secondary fire, a clear characterisation of its original firing atmosphere is not possible.

The presented analysis confirms the traditional categories of wares for late Trypillia pottery in the Southern-Bug-Dnieper interfluve. While a large part of the material appears to be uniform and shows no technological development in pottery production, the few sherds with diverging temper material show the tendency of a transformation. Pottery with crushed shell temper was found in the western ditch segment and date therefore in the early phase of the settlement, whereas sherds tempered with glimmer were obtained from dwelling 67 beyond the ditch system, which dates to the last phase of Maidanets'ke occupation. This trend fits to Ryzhov's findings that pottery of the previous Volodymyrivska local group was characteristically tempered with crushed shell (see 2.3.1 Volodymirivska local group).

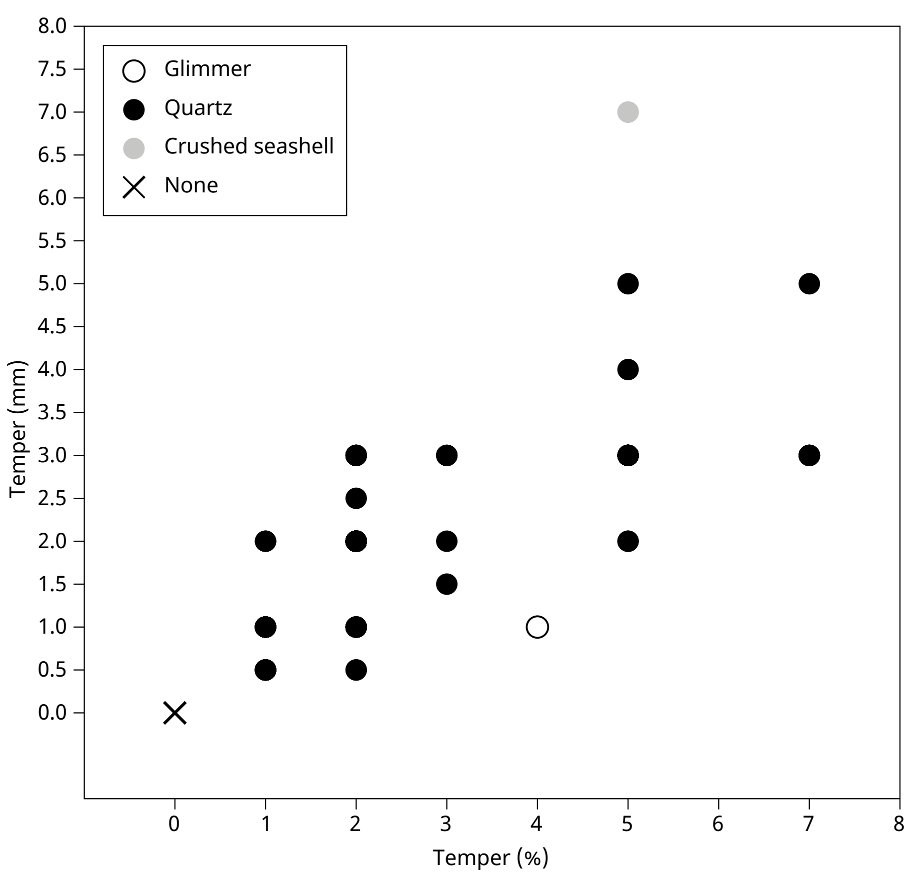


Figure 102. Size and percentage of different kinds of temper found in the pottery at trench 110. For data see appendix 8.

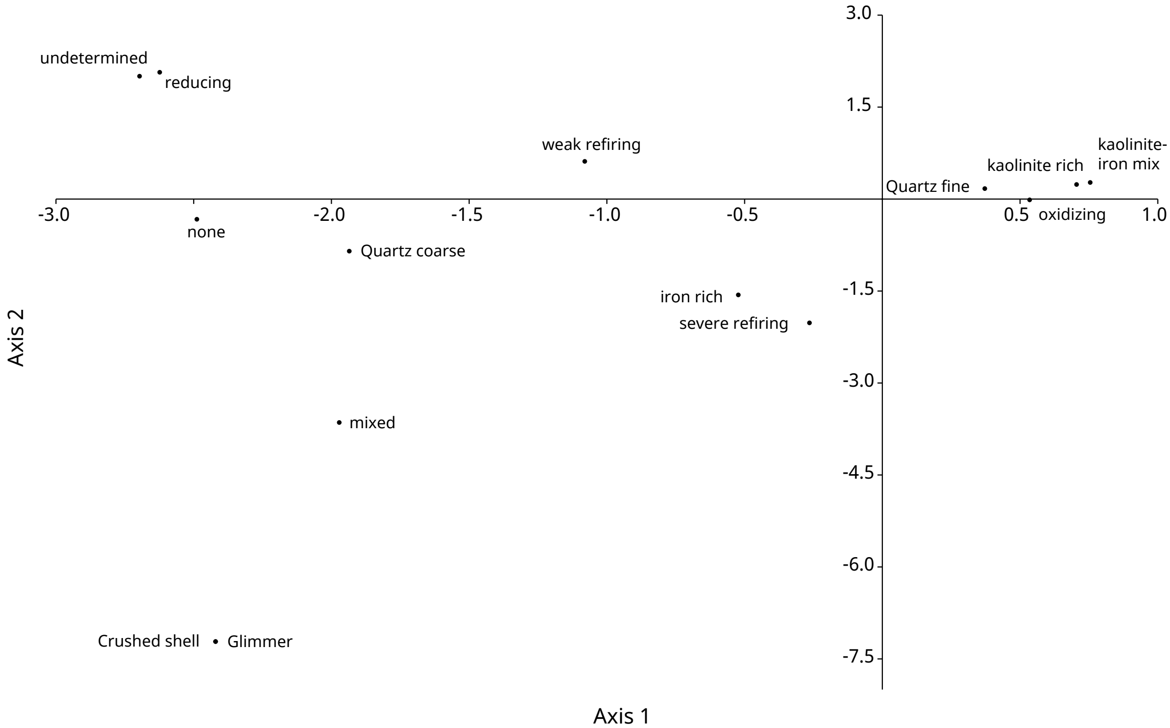


Figure 103. Correspondence analysis of the technological pottery traits at trench 110. For data see appendix 7.

5.3 Pottery taphonomy

One of the research questions concerning the kiln area with its pits is how to determine if the pottery in the refill is indeed related to production or a common pit filled with household trash. Trypillia pottery often shows various intensities of secondary fire due to the burning of domestic buildings. Misfired or reused sherds to separate vessels for their first firing are exposed to the same conditions in kilns as in burning houses up to the point of showing traces of vitrification. Thus, the presence of secondary or misfired pottery alone does not provide a clear characterisation of a pit's infill.

Thus, in order to analyse potential differences, the pottery assemblages of a variety of features were recorded in a quantitative approach. First, the common fineware and coarse ware were recorded separately. Then, different stages of refiring were defined ranging from unaltered to vitrified. Fineware with weak traces of secondary fire is defined by partially refired areas and changes of atmosphere visible in the breakage, while severe traces of secondary fire are defined by sherds with a greyish sintered surface. Last, vitrified pottery is characterised by deformed and molten pottery, sometimes fused with burnt daub. For coarse ware, two categories were recorded. Since coarse ware is considered as cooking pottery, weak traces of secondary fire are to be expected and were not recorded. Here, the category for severe traces of secondary fire is defined by a mostly complete alteration of the firing atmosphere from reducing to oxidising, visible in the strong reddish appearance of the ware. Vitrification was not observed and is left out in the final table. For all categories, the average fragmentation is given as weight in gram per sherd and category percentages are based on weight.

For the analysis below, topsoil and occupational layer contexts are left out. Their statistics are given, however, in the chapters of the respective trenches. Moreover, the recordings of the 2013 campaign had to be left out, since they do not include the categories for refiring. Among the considered feature types are two ditch assemblages, eleven dwelling assemblages, four kiln assemblages and five pit assemblages.

Considering the distribution of the various degrees of secondary fire for the two ware groups, a clear pattern appears (fig. 104). First, severely refired coarse ware is only observed for features of the kiln area and – with around 70-80 % – for the pits 1-3 with assumed association to kilns. Second, for the kiln features, sintered and vitrified fineware make up large parts ranging from 55-90 % of the fineware in weight. For the various dwellings, the ratios between unaltered and refired fineware appear stable with around 70-90 % and 10-30 %, respectively. The two household or construction pits from trenches 91 and 110 produce no clear picture with extrema for both fine and coarse ware.

Considering the average fragmentation of the different wares and taphonomic groups, no clear pattern is visible. However, unaltered fineware appears to be slightly higher fragmented for features of the kiln area than for other features.

Finally, according to the applied correspondence analysis, two larger groups can be identified (fig. 105). The first group includes the three pits related to the kiln, the filling of the initial kiln (phase 2) and its third phase as well as final waste deposition on top. All these features are associated with a high percentage of sintered and vitrified fineware as well as severely fired coarse ware. In addition, a low fragmentation of vitrified fineware is associated with this group. In conclusion, this group describes characteristic pottery production waste in contrast to the second group.

The second group is divided into two parts. The larger part includes various feature types, like ditches, dwellings and a construction pit, but also the pottery built into the initial kiln phase. Here, the percentages of unaltered fineware and coarse ware as well as their fragmentation rates are characteristic. Furthermore, a smaller group includes houses related to fineware with weak traces of refiring and its respective fragmentation. The single sherd from the construction pit in trench 110 depicts a clear outlier, while the complete assemblage from dwelling 54 in trench 92 is located between both main groups described above.

5.4 Coarse ware

5.4.1 Coarse ware morphology

Ryzhov (2012b) distinguished between seven coarse ware vessel types. Including sub-types, 20 shapes are differentiated. He mixes, however, overall shapes and applications like lugs. For example, the type 10.1.2.1 – a pot with a sharp-edged belly, set-off neck and bent out rim – is described as a distinguished sub-type including a pair of cylindrical lugs. But these types of lugs also appear on other vessel shapes and in pairs as well. Therefore, vessel shapes, incised decorations and applications are provided as distinguished categories below.

Among the pot shapes, we can separate six characteristics (fig. 106). First, there are straight or bent out rims. Second, we can distinguish between soft s-shaped upper bodies and a sharp set off between the vessel shoulders and necks. Third, there are rounded or sharp-edged bellies reminiscent of fineware ‘crater-shaped’ vessels.

5.4.2 Coarse ware decorations

The main decoration zones are below the outer rim and the neck as well as on the shoulder. Sometimes, incisions are observed on the rim or the whole body is treated with brush marks or finger impressions. It is questionable, however, if surface treatments can be termed as decoration.

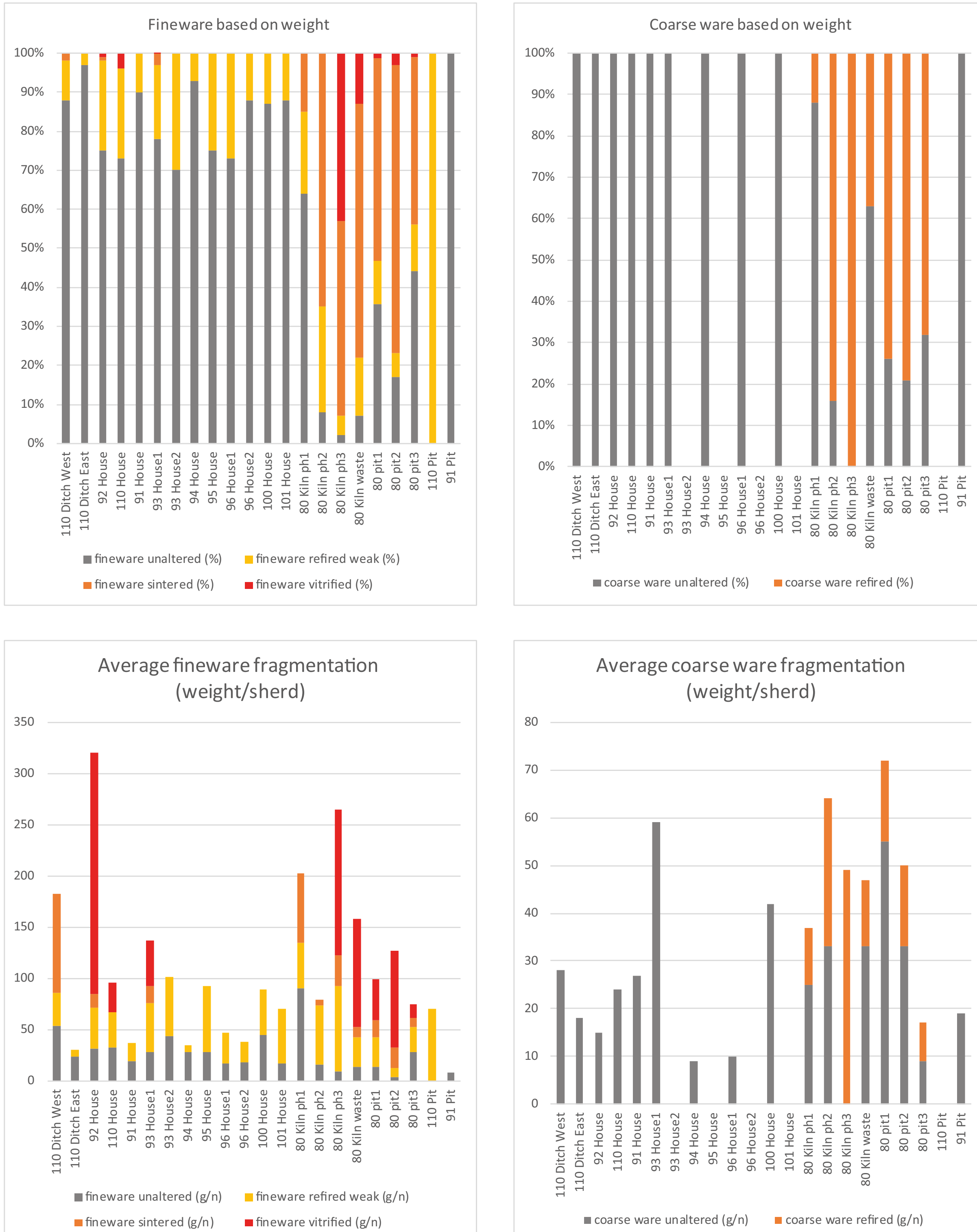
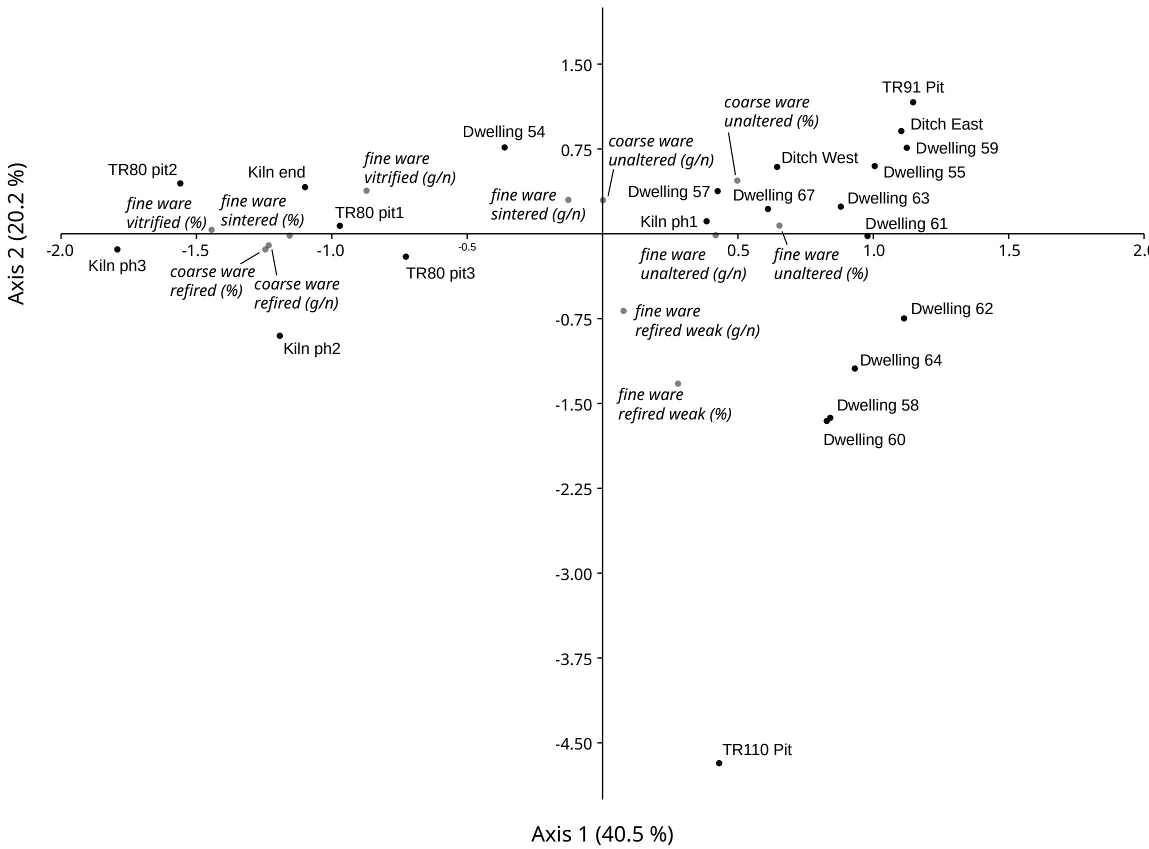


Figure 104. Distribution of wares per feature and their taphonomic aspects from the 2014 and 2016 excavations. For the data see tab. 10, 13, 16, 19, 21, 24, 26, 28, 30, 32, 34.



For the decoration of coarse ware vessels, a variety of techniques were used (fig. 107). Among the used tools for punctuation are round and straight ended or hollow instruments (possibly reed) as well as tools with a round shaft and a rounded tip. In addition, straight ended rectangular and 'splintered' tools (possible split wooden sticks) are used. Furthermore, brushes are used for the most characteristic marks of kitchenware. Decoration techniques without tools include fingertip and nail impressions as well as fingertip pinches.

There are at least four different impressions produced by rounded tools. First, the shaft of a rounded tool is used for rows of impressions on top of rims. Second, tools with a rounded tip are used for rows of rounded tip punctures, while third, solid tools with a rounded shaft and a flat tip are used for row punctures, mostly piercing the clay diagonally with the edge, producing 'sickle'-like impressions. Likewise, the fourth type is produced by the diagonal impression with the flat tip of a hollow tool. Moreover, another type is produced by diagonal impressions of a rectangular tool with at least one 'splintered' side of the shaft and a flat tip.

Brushes are used for three different kinds of impressions. They are applied in a horizontal or vertical manner.

Besides these impression techniques, various plastic applications are observed for coarse ware. Here, we can distinguish between spherical lugs, elongated lugs, set-off lugs as well as a set of cylindrical lugs, which can also be fused to the rim of the vessel (fig. 108).

Figure 105. Correspondence analysis of ware percentages and fragmentation per feature from the 2014 and 2016 excavations. For the dataset see appendix 9.

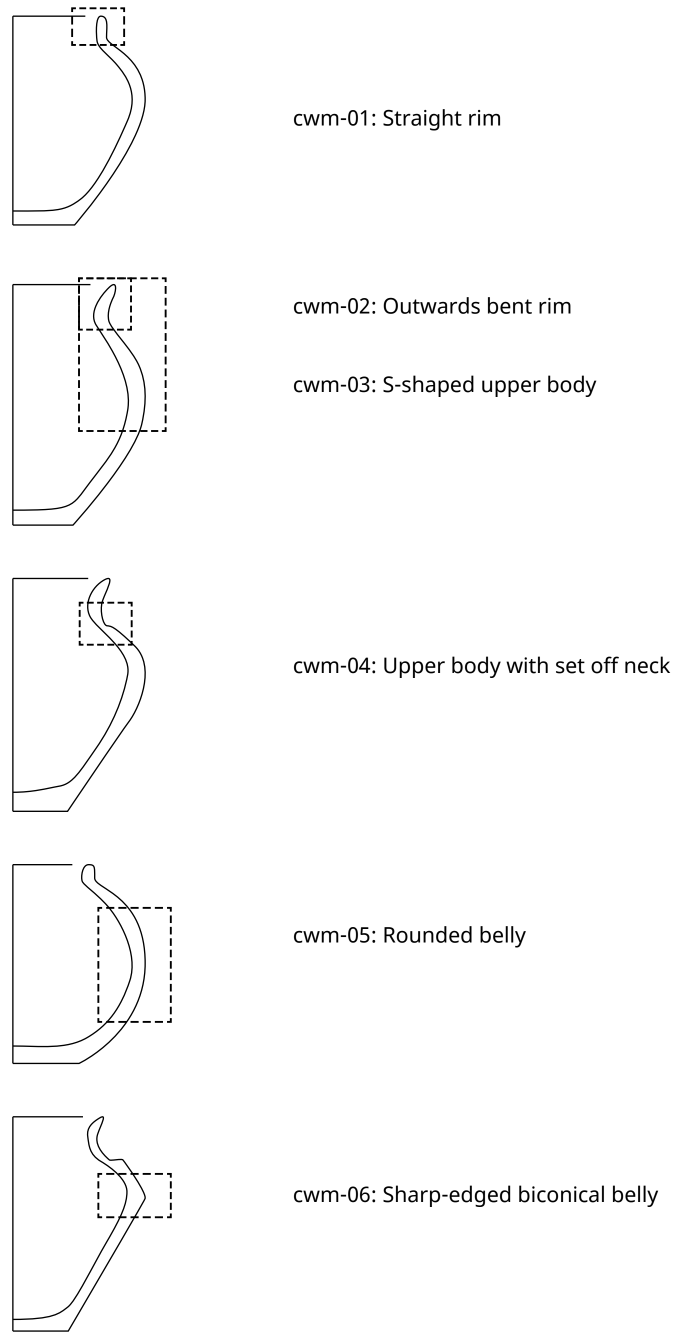


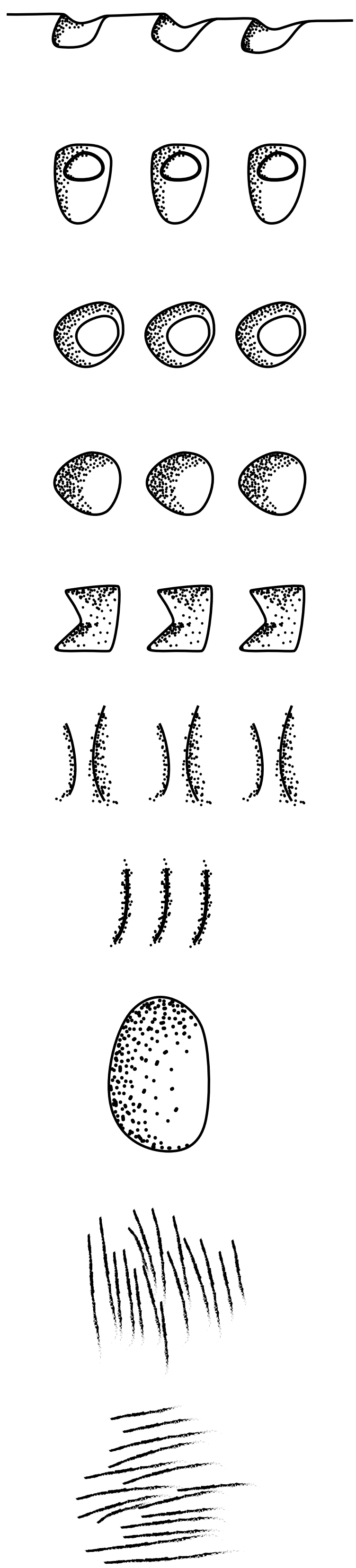
Figure 106. Detailed traits of the coarse ware closed vessel morphology.

5.5 Fineware

5.5.1 Fineware morphology

Out of the large variety of fineware vessel shapes defined by Ryzhov, only certain types appear at Maidanets'ke. For the obtained material from the 2014-2016 excavations, 23 types are differentiated (see tab. 11; 14; 17).

For the overall shape of bowls, we can distinguish between straight conical, hyperboloid and spherical walls. Furthermore, bowls appear as 'footed' variants or as 'spoons' with a flat application on one side of the vessel. Bowls are among the most common vessel category at Maidanets'ke. A desideratum of Ryzhov's classification



cwi-01: Rounded shaft impression

cwi-02: Tubular impression

cwi-03: Rounded tool with flat end

cwi-04: Rounded tool with rounded end

cwi-05: Splintered tool (wood?)

cwi-06: Finger pinch

cwi-07: Fingernail impression

cwi-08: Fingertip impression

cwi-09: Brush - vertical

cwi-10: Brush - horizontal

Figure 107. Coarse ware types of impressions.

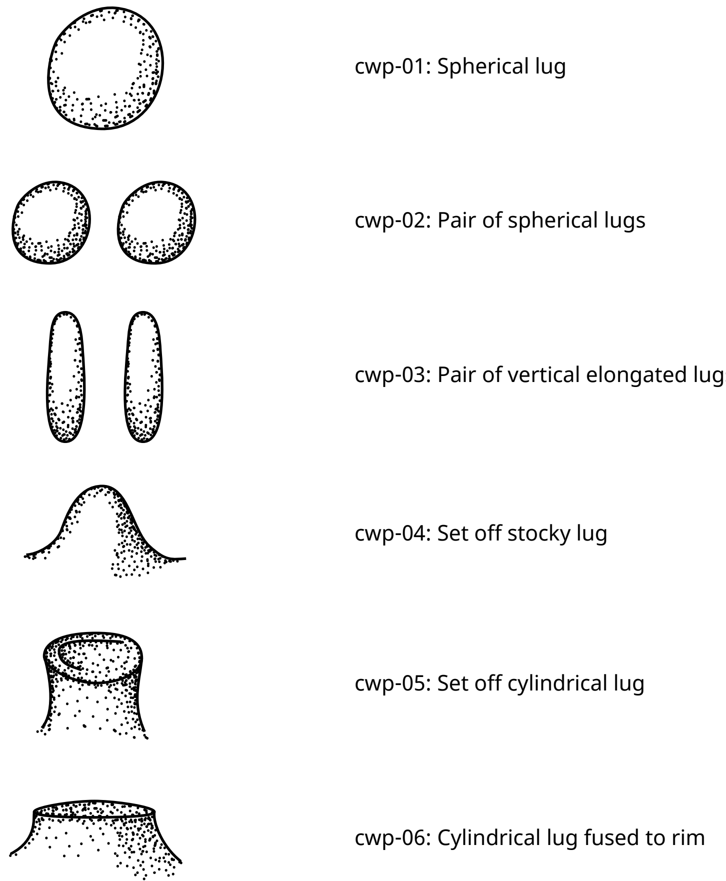


Figure 108. Coarse ware types of plastic applications.

are rim types, which, although mentioned by him, are mixed with overall shapes and applications. Thus, in order to operationalise his classification for the archaeological reality of fragmented pottery units, a classification of rim types is developed (fig. 109).

Among cups, we can distinguish between small, thick walled variants, larger variants of characteristic Tomashivska shape and 'import' shapes with a low waist.

The category of biconical vessels is simplified to general biconical vessels without eyelets, with the eyelets near the rim or the belly, and large biconical vessels. Likewise, sphero-conical vessels are divided into variants with and without eyelets. In addition, a detailed classification of belly types is developed for biconical and sphero-conical vessels since they are like bowl rims among the most common type of pottery fragment in the archaeological record (fig. 110).

Ryzhov's category of crater and crater-shaped vessels is simplified to vessels with a handle or eyelet and variants without both of these traits.

Pear-shaped vessels are rare in the obtained material, but variants with an eyelet near the belly and variants with a sharp-edged, inwards facing rim were observed.

Among so-called lids, variants with a set-off bottom and a straight bottom were observed. The variation with a straight bottom belongs, however, to the category of 'import' vessels. Lastly, pots with a conical lower body, rounded shoulders and set-off, straight rims were recorded.

5.5.2 Fineware painted decorations

During the recording of the obtained material from the 2014-2016 excavations, every piece of pottery with a preserved painted decoration was documented (see plates). Although a lot of pottery shows traces of painting, only in few cases was it possible to reconstruct the structuring decoration arrangement.

Fineware bowls at Maidanets'ke are commonly painted dark on reddish slip. Vessel decoration structures are usually divided between the inner and outer rim with the main motif on the inner surface. Occasionally, the outer body shows rough cross-shaped incisions.

Main decoration arrangements include the 'comet tail' scheme, the 'figure 8'-shaped arrangements as well as the cross-shaped scheme in a wavy variation. These more general ways to structure the vessel decorations can also be combined. In this case, multiple motifs are recorded.

Among the rim decorations, we can distinguish between simple lines setting off the rim area, continuous repetitions of a certain element (band), which can be closed by a line or not, and the intercepted repetition of an element (row). Furthermore, complex bands as a combination of bands and complex rows as intercepted repetitions of element combinations do appear in the archaeological record.

For the rim decoration elements (fig. 111), we can distinguish between parallel double lines, left- and right-skewed hanging triangles, wide and narrow hanging isosceles triangles as well as vertical strokes and half circles. Occasionally, closed horizontal barbed wires appear. Complex row combinations of left-skewed hanging triangles and vertical strokes as well as wide hanging isosceles triangles were observed.

Since the so-called 'comet' scheme is among the most common structuring arrangement for the material of the 2014-2016 excavations, its characteristics are given in more detail below for the sake of a typo-chronological approach. In addition, it is proven to be 'indigenous' for Maidanets'ke, as several vessels from the kiln waste pits show.

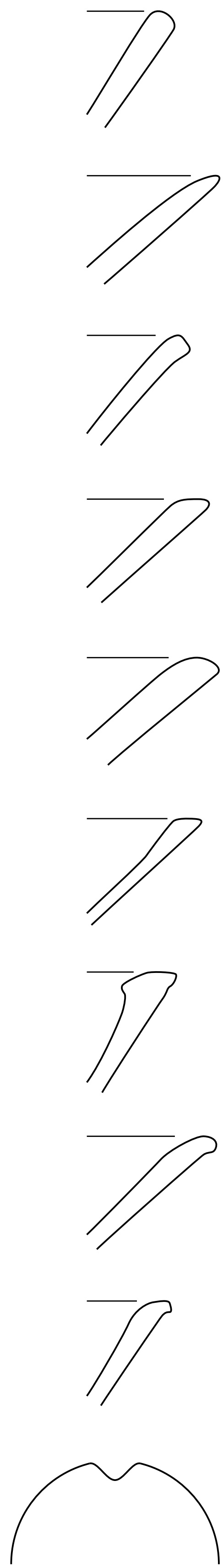
First, the scheme commonly depicts two inwards spiralling 'comets', but sometimes more than two appear as a triplet or are shifted as two pairs. Second, besides the number of 'comets', several traits can be distinguished (fig. 112). Among them is the shape of the 'comet's' tail. Here, two variations appear. The tail can be either of parallel narrow shape or of a wide and narrowing shape. Third, the tails can show only fillings or borders of thick lines, which sometimes show fringes on the outside. Fourth, these tails show varying types of fillings. Here, we can distinguish between empty tails, one to many lines following the tails spin, a diagonal hatching infill, and groups of two or three lines opposing the tail's direction. Furthermore, opposed rows of vertical strokes appear.

Sometimes, the outer part of the tail is connected to the rim by a 'Zwickel', which otherwise commonly appears on design arrangements of biconical vessels. Here, several variations of the 'Zwickel' with either a triple stroke, a stroke group, diagonal hatching or a hanging half circle are observed. Furthermore, non-triangular variants of hanging half circle shape, sometimes filled and with an attached stroke group, are observed (fig. 113).

Finally, we can distinguish different types of 'comets'. Here, two major categories of large filled dots and wide 'sickles' appear, but in some cases, there are no end pieces. Among the sickle variant, we observe plain versions, but also versions filled with triple strokes or stroke groups in the centre. To the sides there are either no attachments, triple strokes or hatching (fig. 112).

Besides the prominent 'comet scheme', simple singular-lined 'figure 8' schemes with a triangular 'Zwickel' filled with a stroke group, and the cross-wise scheme with wavy lines and a central dot were observed. Furthermore, a cross-shaped incision on the outer body was recognised in one case. In addition, a simple 'figure 8' scheme appeared in combination with the wavy type of the cross-wise scheme.

For closed vessel types, several elements and element arrangements are distinguished, since the overall scheme is oftentimes not possible to reconstruct. Among the observed schemes are wide volute variations, spreading over the entire upper part of biconical vessels (type 10.1-2), or narrow versions close to the belly (type 10.4-5). For biconical vessels with eyelets near the rim, the façade scheme in a hanging (type 3.3) or straight (type 3.2) variant is observed. Other schemes include the leaf-shaped type appearing on a variety of vessels from pots to cups and crater-shaped vessels, the metopic scheme on cups, and parts of the tangent scheme.



fwr-01: Blunt rim

fwr-02: Pointy rim

fwr-03: Flat rim

fwr-04: Diagonal rim

fwr-05: Rounded diagonal rim

fwr-06: Thickened diagonal rim

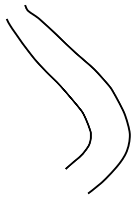
fwr-07: Set off and thickened diagonal rim

fwr-08: Rounded lip on rim

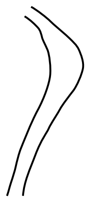
fwr-09: Flattened lip on rim

fwr-10: Cavity on rim

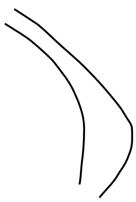
Figure 109. Detailed traits of bowl rim morphology.



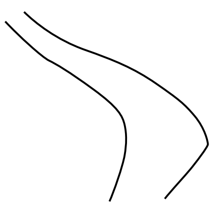
fwb-01: Sphero-conical (upper body bent inwards)



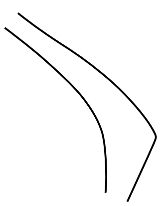
fwb-02: Sphero-conical (lower body bent inwards)



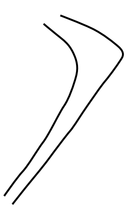
fwb-03: Sphero-conical (upper body bent outwards)



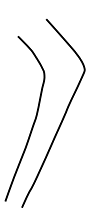
fwb-04: Biconical (upper body bent inwards)



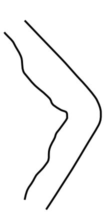
fwb-05: Biconical (upper body bent outwards, high angle)



fwb-06: Biconical (upper body bent outwards, low angle)



fwb-07: Biconical (pointy)



fwb-08: Biconical (rounded)

Figure 110. Detailed traits of the biconical and sphero-conical vessel belly morphology.

Due to the high fragmentation of the material, the different parts of schemes are recorded in a category of elements and segments (fig. 114).

Belly fragments of biconical vessels with eyelets are frequently observed due to their sturdiness. Here, oftentimes the eyelet is framed by a decoration and the handle of the eyelet itself is painted. Since a framing of the eyelet is common for several decoration schemes, it was decided to characterise the kind of framing and painting of the handle independently (fig. 115). There are even occasions of frames without the presence of eyelets.

Besides these geometric elements, there are also several pictograms, which can appear independently from other decoration patterns. Among them, there are floral depictions of grains and crops, but also more abstract forms resembling the form of a sickle or 'eyelashes' (fig. 116).

The category of bands is divided into horizontal and vertical boundaries structuring the design arrangements into several zones. Even when it is impossible to observe the arrangement itself, various types of boundaries can be recorded. For the material of 2014 and 2016, eleven different bands can be distinguished (fig. 117).

5.6 Pottery ordination – relative chronology?

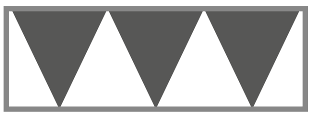
Earlier investigations of the relative micro-chronology at Maidanets'ke concluded that most structures were contemporaneous (Müller *et al.* 2016a; 2017b). However, the actual data to support this suggestion remains unpublished. Thus, the aforementioned 142 pottery traits are used here to explore differences in the various assemblages of the 2014-2016 excavations. Overall, 275 diagnostic pottery units and 20 contexts are investigated here (appendices 10-11). The contexts are, however, problematic since some, such as the infill of pits or ditch segments, can present an intake of material over a larger timespan. Therefore, they only partly present secure contexts. Other contexts, like the various house inventories, may contain non-local vessels, whereas their style might distort the picture of the assumed 'time dimension' in the ordination of the material. With these possible limitations in mind, the results of the correspondence analyses are given below.

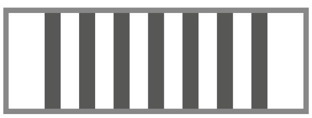
Concerning the possible development of vessel morphology at Maidanets'ke, the correspondence analysis of shapes per context shows no clear picture (fig. 118). The first and second axis explain 26 % of the material's variation, whereas no 'horseshoe' is visible. Sphero-conical shapes are found together with sharply pronounced forms and early as well as later contexts, according to the radiometric dating, are found in close relation to each other. Thus, for the vessel morphology at Maidanets'ke we can exclude characteristic differences. Shmagliy and Videyko only considered morphological traits for their temporal evaluation of the pottery. Thus, their previous result that most dwellings were contemporaneous according to pottery style is in line with the current evaluation of the material.

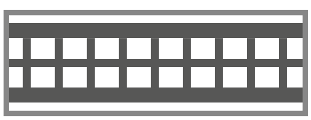
When investigating the decoration system, however, differences become apparent, which are partly in line with the radiometric dating of features (fig. 119). While the plots of the first and the second axis show a major distortion along the second axis, the plots of the second and the third axis present a classic 'horseshoe' of the variables and contexts. This projection explains 18.23 % of the material's variation. The relative succession of dwellings is of special interest for those cases, where no sufficient radiocarbon material could be retrieved. Here, the second axis of the CA of the decoration traits is considered to show the 'dimension of time' (fig. 119b). In general, we can observe a trend from earlier features on the positive part of the third axis towards younger features on the negative part of the third axis (fig. 119b). The earliest dated features at Maidanets'ke, such as the western ditch of the inner enclosure located on the

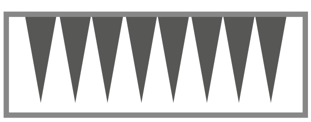

ovrd-01: Closed band - empty


ovrd-02: Closed band - left skewed hanging triangles


ovrd-03: Closed band - hanging wide triangles


ovrd-04: Closed band - vertical strokes

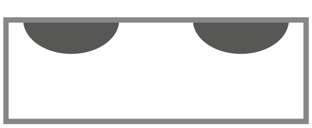

ovrd-05: Closed band - vertical hatching

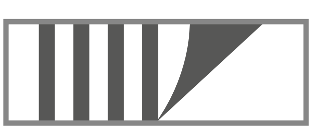

ovrd-06: Open band - hanging narrow triangles


ovrd-07: Open band - right skewed hanging triangles


ovrd-08: Open band - vertical strokes


ovrd-09: Open band - dispersed left skewed hanging triangles


ovrd-10: Open band - hanging half circles


ovrd-11: Complex band - vertical strokes and left skewed hanging triangles

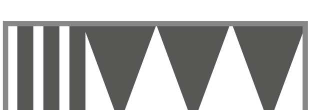

ovrd-12: Complex band - vertical strokes and hanging wide triangles

Figure 111. Rim decoration types of bowls.

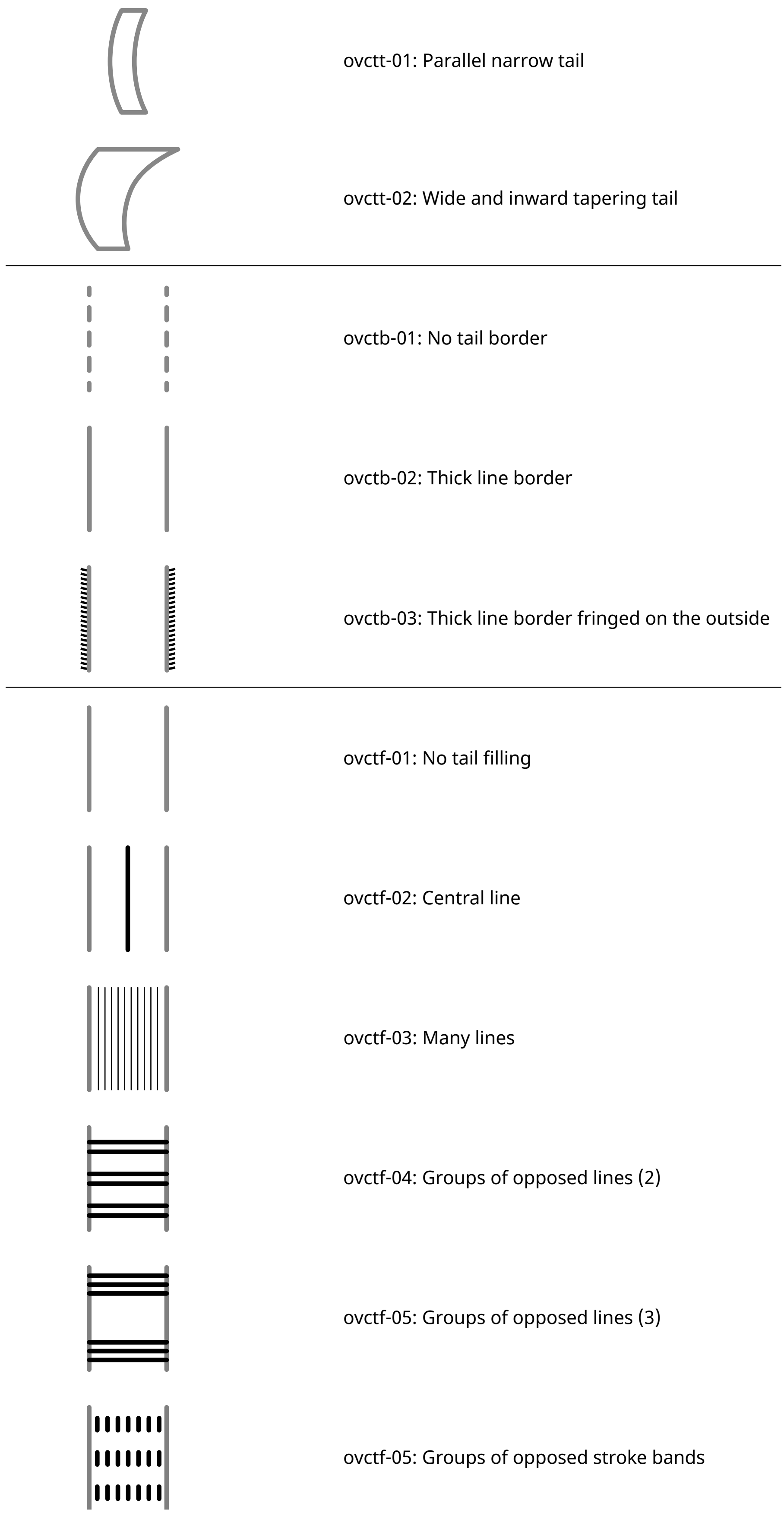
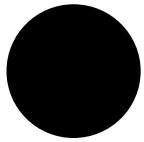
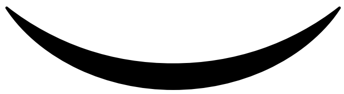


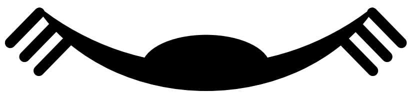
Figure 112. 'Comet' scheme decoration types in detail.



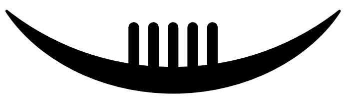
ovcc-01: Filled dot



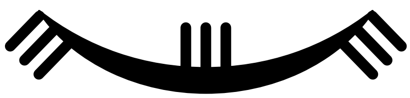
ovcc-02: Sickle



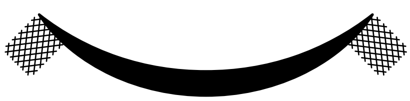
ovcc-03: Sickle with central filled halfcircle



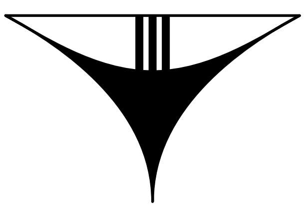
ovcc-04: Sickle with central stroke group



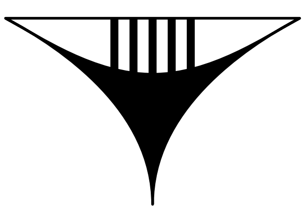
ovcc-05: Sickle with triple stroke group on the ends and center



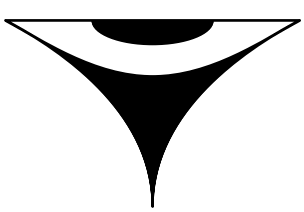
ovcc-06: Sickle with open hatching on the ends



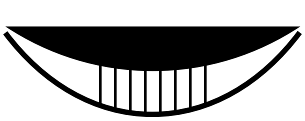
ovcz-01: Triangular filled with a triple stroke



ovcz-02: Triangular filled with a stroke group

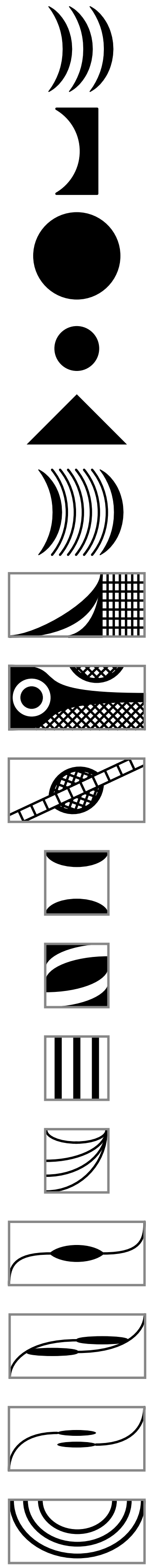


ovcz-03: Triangular filled with a half circle



ovcz-04: Rounded filled with a stroke group and a half circle

Figure 113. 'Comet' scheme 'Zwickel' in detail.



cves-01: Segment - sickles

cves-02: Segment - concave block

cves-03: Segment - large filled circle

cves-04: Segment - small filled circle

cves-05: Segment - filled standing triangle

cves-06: Segment - swung enclosed strokes

cves-07: Segment - swung filled diagonal lines and horizontal-vertical hatching

cves-08: Segment - enclosed filled circle with a half circle filled with diagonal hatching in the upper part and diagonal hatching in the lower part

cves-09: Tangent - diagonal stroke filled line and half circles filled with diagonal hatching

cves-10: Metopic - block of half circles enclosing central element

cves-11: Metopic - block of wide diagonal elements

cves-12: Metopic - block of wide triple strokes

cves-12: Metopic - block of swung diagonal lines

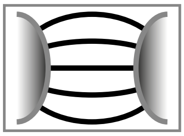
cves-13: Leaf - closed and filled

cves-14: Leaf - filled and connected

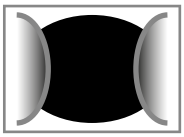
cves-15: Leaf - filled and open

cves-16: Scalloped - empty hanging half circles

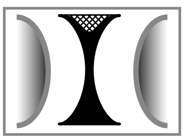
Figure 114. Closed vessel decoration types: elements and segments in detail.



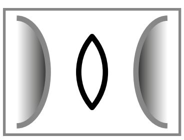
cvef-01: Horizontal strokes on eyelet



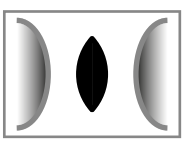
cvef-02: Eyelet completely painted



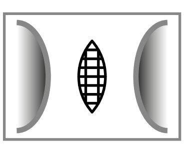
cvef-03: Concave segment on eyelet with diagonal hatching on the upper part



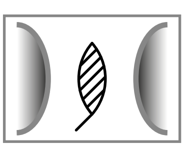
cvef-04: Empty grain on eyelet



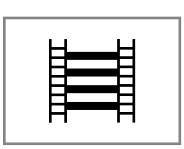
cvef-05: Filled grain on eyelet



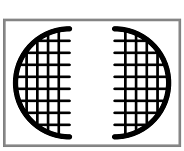
cvef-06: grain with horizontal and vertical hatching on eyelet



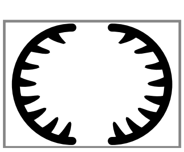
cvef-07: grain with a stem and filled with diagonal strokes on eyelet



cvef-08: "Ladder" element found as central element between frames (independent from eyelets)

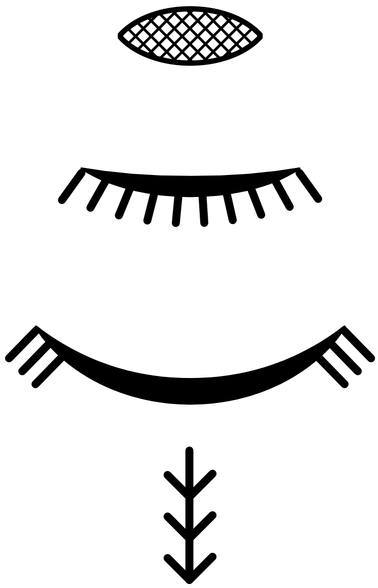


cvef-09: Half circle frame filled with horizontal and vertical hatching



cvef-10: Half circle frame, fringed on the inner side

Figure 115. Closed vessel decoration types: eyelet fillings and frames in detail.



cve-01: Element - horizontal grain filled with diagonal hatching

cve-01: Element - "Eyelash"

cve-01: Element - sickle with stroke group on the outer ends

cve-01: Element - crop

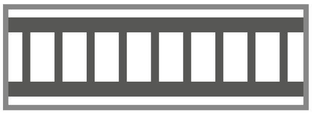
Figure 116. Closed vessel decoration types: elements in detail.

positive part of the second axis, and the initial and renovated pottery kiln (ph1 and ph2) in trench 80, located on the negative part of the second axis, represent a first occupation phase observable in the CA. The final occupation, mainly represented by dwelling 67 beyond the inner enclosure, is located in largest distance in this correspondence analysis to features of the initial occupation such as the western ditch segment of the inner enclosure and the initial and renovated pottery kiln.

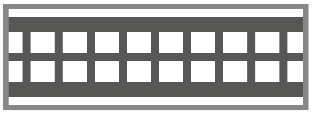
In many cases, however, the relation of dated features does not fit in detail to the radiometric data (see fig. 144). This is, for example, apparent for the secured sequence of the kiln area in trench 80, where in the CA the dating of the production refuse pits (1-3) does not fit to the ending of the activity in the area (kiln waste). This can possibly be explained by the use-life of decoration elements produced in the different pottery kilns. If certain styles were in use for a longer period of time than the pottery kilns, their typological relation to other features, such as dwellings, could shift easily.

Most dwellings are located in the centre of the CA, on the positive part of the third axis (fig. 119b). Dwellings 59 and 61 show identical radiometric *termini ad quos* dates and are also closely related in the projection of the CA. Many dwellings from test trenches are grouped around the completely excavated dwelling 54 which can possibly be explained by the larger variety of forms retrieved from a complete context in contrast to sampling from test trenches. Only dwellings 62 and 64 appear disconnected from this cluster. They are located on the negative part of the third axis and are closely related to the pottery waste pits of the kiln areal. This is due to the fact that a biconical vessel from dwelling 62 (plate 55, 2) matches the exact morphological and decoration elements from a vessel found in the refuse of a pottery waste pit from the kiln (plate 21, 1). According the radiometric dating, dwelling 62 fits into the timeframe of pottery production at the kiln areal between 3960-3790 cal BCE.

Concerning dwellings without radiometric dates, no clear picture is apparent in the correspondence analysis. From a spatial point of view, for example, dwelling 66 in trench 103 should belong to the latest phase of Maidanets'ke since the building is located beyond the inner ditch system comparable to dwelling 67. On the second axis, dwelling 66 is, however, related to the earliest contexts of the site such as the western ditch segment of the inner causewayed enclosure. This might be because only one diagnostic vessel was retrieved from trench 103 and that bowls are a common vessel type throughout the whole occupation of the site. The test pit strategy is therefore better suited for a sole radiometric

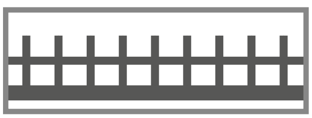


cvdb-01: Horizontal band - enclosed vertical strokes

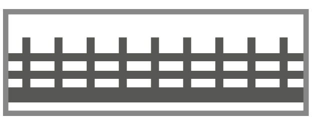


cvdb-02: Horizontal band - enclosed vertical strokes with central horizontal line

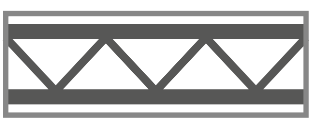
cvdb-03: Horizontal band - fringed line



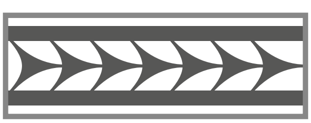
cvdb-04: Horizontal band - fringed line with horizontal central line



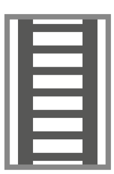
cvdb-05: Horizontal band - fringed line with two central horizontal lines



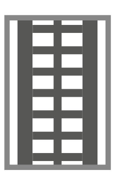
cvdb-06: Horizontal band - enclosed zig-zag



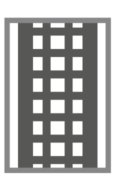
cvdb-07: Horizontal band - enclosed inward bent triangles



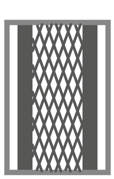
cvdb-08: Vertical band - enclosed horizontal strokes



cvdb-09: Vertical band - enclosed horizontal strokes with central vertical line



cvdb-10: Vertical band - enclosed horizontal strokes with two central vertical lines



cvdb-11: Vertical band - enclosed diagonal hatching

Figure 117. Closed vessel decoration types: delimiting bands in detail.

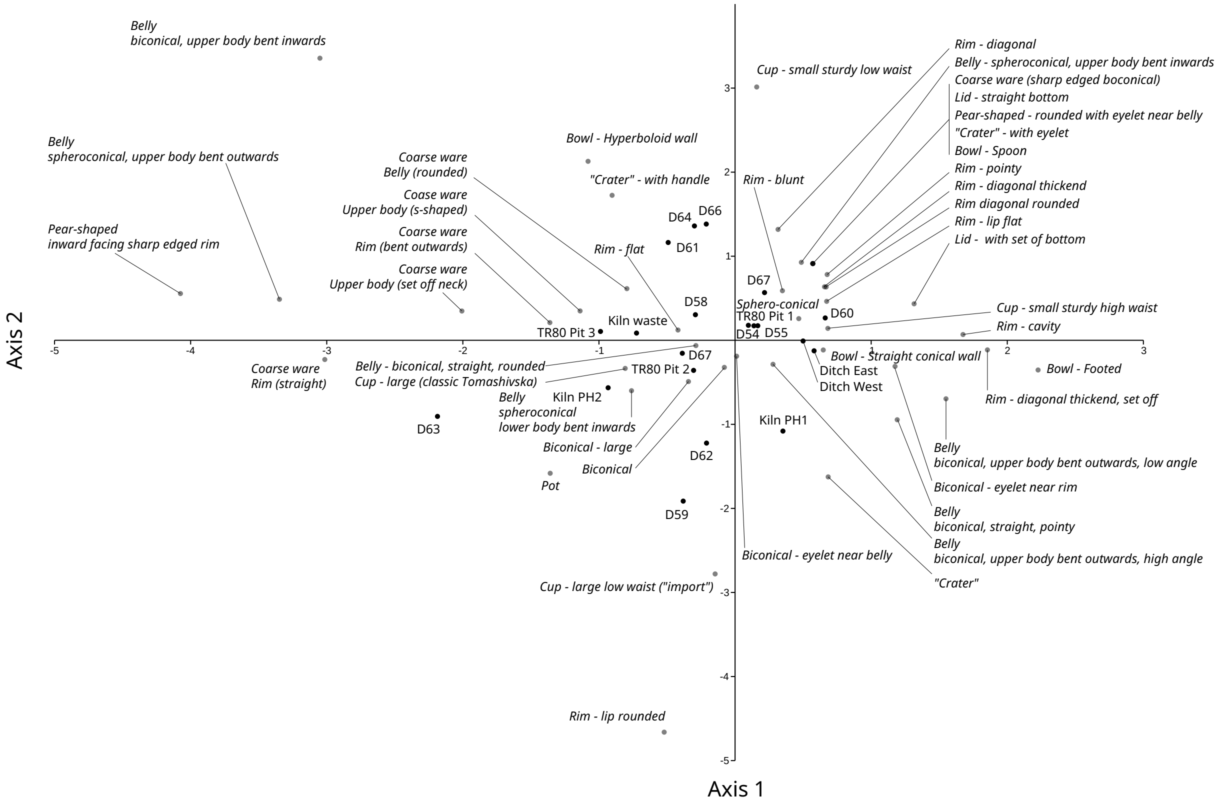


Figure 118. Correspondence analysis of morphological pottery traits from the 2014 and 2016 excavations. For data see appendix 10.

approach to dating 'mega-sites' rather than typological ordination approaches. Nevertheless, the general tendency of the chronological development from the inner causewayed enclosure and the kiln area towards structures beyond the enclosure (*e.g.* dwelling 67) known from radiometric dating (see 2.2.3 Development and decline of a Trypillia 'mega-site') are apparent in the presented plot.

Concerning the stylistic development (fig. 119a), a development of the 'comet' scheme on bowls can be observed (see fig. 112-113). During the initial occupation, wide 'comet tail' endings, such as sickles with central filled half circles (ovcc-03) and sickles with a central stroke group (ovcc-04), occur. Sickles with triple stroke groups on the ends and in the centre of the sickle (ovcc-05) and sickles with hatching on the ends (ovcc-06) as well as filled dots as 'comets' (ovcc-01) appear during the main occupation phase. In the final phase, no sickle elements were observed. The tails of the 'comet' scheme develop from no tail borders (ovctb-01), thin line fillings (ovctf-03), fillings of opposed stroke bands (ovctf-05), and groups of opposed triple lines (ovctf-05) in the initial occupation phase towards tails with thick borders (ovctb-02) and groups of opposed double lines (ovctf-04) as fillings during the main occupation phase. During the main occupation, both parallel narrow tails (ovctt-01) as well as wide and inwards tapering tails (ovctt-02) appear. In the final stage of development, 'comet' tails without fillings (ovctf-01), fillings of a central line following the tail direction (ovctf-02), and tails with fringed border (ovctb-03) are observed. While no 'Zwickel' elements were found during the initial occupation, triangular (ovcz-01 and ovcz-02) and rounded types (ovcz-04) appear during the main occupation of the site. In the final phase triangular 'Zwickel' filled with a half circle (ovcz-04) are observed.

Among bands (see fig. 111 and 117), closed variants without fillings (ovrd-01), variants with inwards bent triangles (cvbd-07), and open bands with a row of right skewed hanging triangles (ovrd-07) are observed for the initial occupation. Moreover, horizontal bands with a fringed line (cvbd-03) were found during this phase. The remaining decoration band types are observed for the main occu-

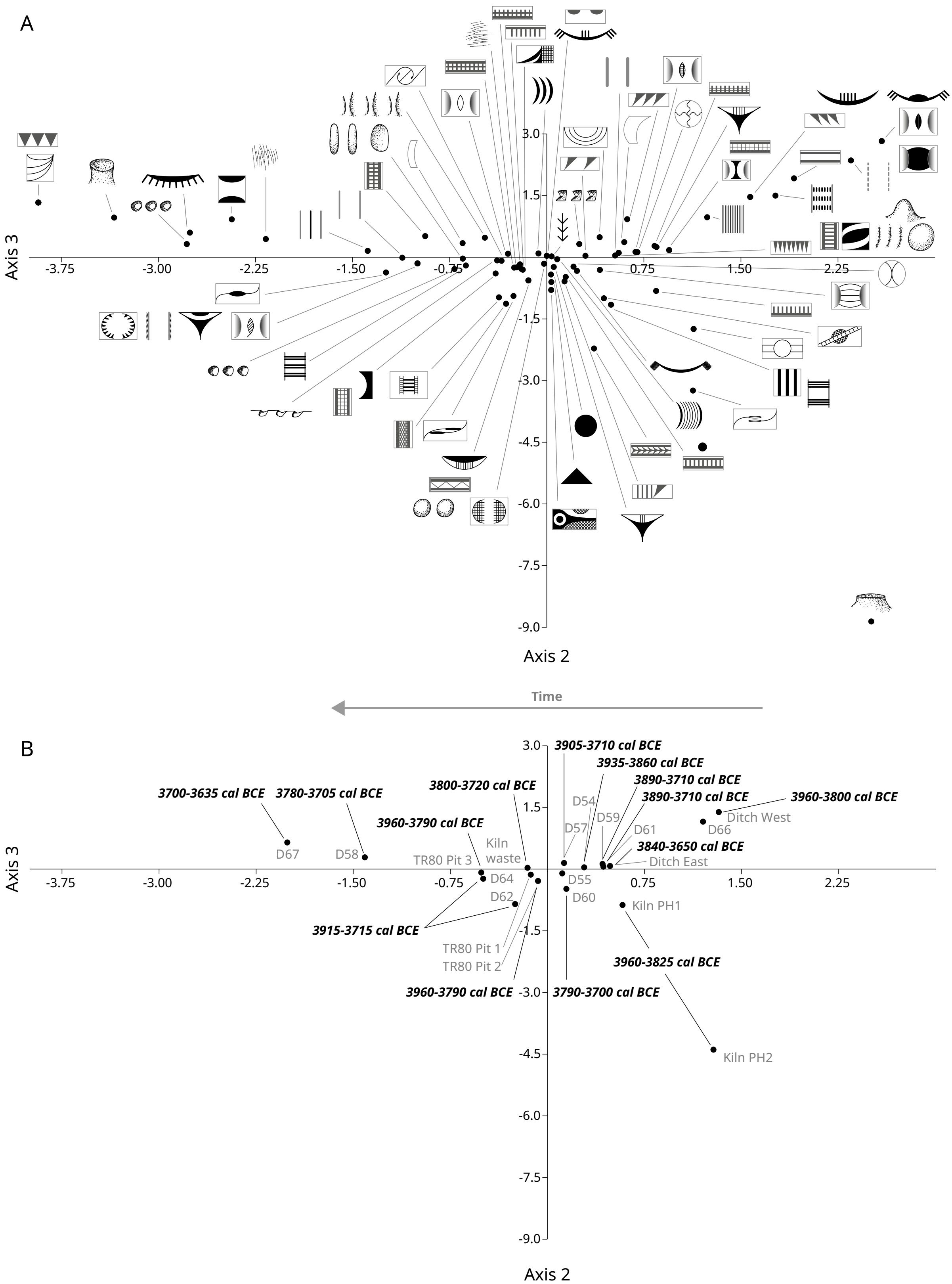


Figure 119. Correspondence analysis of decoration traits on pottery from the 2014 and 2016 excavations (A) and typochronological tendency (B). For data see appendix 11.

pation phase with the exception of vertical bands with horizontal strokes and a central vertical line (cvbd-08) and closed bands with wide hanging triangles (ovrd-03), which are more closely related to contexts of the final occupation according to the correspondence analysis (fig. 119a).

Eyelet decorations on restricted vessels (see fig. 115) develop from completely painted eyelets (cvef-02) and pictograms of filled grains on eyelets (cvef-05) in the initial phase, towards horizontal strokes on eyelets (cvef-011), pictograms of grains filled with horizontal and vertical hatching (cvef-06) and empty grains (cvef-04) as well as concave segments on eyelets (cvef-03) in the main occupation phase. Further decorations of the main phase include ladder elements (cvef-08) and half circles filled with horizontal and vertical hatching (cvef-09) framing eyelets. In the final phase, pictograms of grains with a stem and filled with diagonal strokes (cvef-07) and fringed frames around eyelets (cvef-10) appear.

Other painted decoration elements (see fig. 114) show a development from diagonal tangent elements (cves-09) in the initial phase towards segmented elements (cves-07 and cves-08) in the main phase. Leaf-shaped decorations develop from unconnected leaves (cves-15) in the initial phase via connected leaves (cves-14) in the main phase, towards a single leaf (cves-13) in the final phase.

Among decoration arrangements (see fig. 101), façades (closed vessel decoration type 3) are related to contexts of the initial occupation, while wavy (open vessel decoration type 5) and 'figure-eight' arrangements (open vessel decoration type 3) for bowls, and volute arrangements (closed vessel decoration type 10) are observed for the main occupation.

Cup decorations (see fig. 114) develop from metopic arrangements with blocks of wide strokes (cves-12) in the initial phase towards metopic arrangements with wide diagonal elements (cves-11) in the main occupation phase, to metopic arrangements with half circles enclosing central elements (cves-10) and metopic arrangements of swung diagonal lines (cves-12) in the final phase.

Ultimately, coarse ware decorations (see fig. 107-108) develop from cylindrical lugs, which are fused to the rim of vessels (cwp-06) in the initial phase towards set-off cylindrical lugs (cwp-05) in the final phase. Singular and pairs of spherical lugs are found during the main phase, as well as set-off stocky lugs (cwp-04). Pairs of elongated lugs (cwp-03) start to appear during the final occupation. Incising decorations on coarse ware develop from rounded shaft impressions on rims (cwi-01), splintered tools (cwi-05), and impressions of rounded tools with a rounded end (cwi-04) in the main phase towards impressions of rounded tools with a flat end (cwi-03) in the final occupation phase. Fingernail (cwi-07) and fingertip impressions (cwi-08) and finger pinches (cwi-06) are only observed for the main occupation. Horizontal brush marks appear during the main phase, while vertical brush marks start to appear in the final phase.

In conclusion, a typo-chronological trend can be observed for decoration elements from Maidanets'ke, which is partly in line with the radiometric dating of the settlement. In the temporal trend of the correspondence analysis, three phases can be distinguished, whereas the main occupation, divided into two parts in the analysis of the radiometric dating, cannot be differentiated here. This might be due to several factors ranging from the circulation of styles encompassing a longer timespan than the radiometric dating of activities in the pottery production areal, to depositions of pottery during the deliberate burning of dwellings. Another factor could be the differences between assemblages from completely excavated dwellings and samples from test trenches. Nevertheless, the general trend of the stylistic development could be presented here. This trend supports the phases developed from radiometric dating.

6 Formal chronological modelling

One of the key questions regarding Trypillia 'mega-sites' concerns their internal chronological development (Müller *et al.* 2016a). To discuss the contemporaneity of features and to estimate the number of coeval residents, formal chronological modelling using the Bayesian approach (Bayliss *et al.* 2007; Bayliss *et al.* 2011; Ramsey 2009; Ramsey *et al.* 2010) for samples from the 2013-2016 campaigns at Maidanets'ke is conducted here.

During the 2013 campaign, three different pits (trenches 50, 52, 60), a complete dwelling (trench 51) and several test trenches on dwellings were sampled. The contexts and stratigraphic relations were studied by Lennart Brandtstätter (2017) in his yet unpublished Master's thesis, but the general context information, except for trenches 77 and 79, and 14C dates are published in Müller and colleagues (2017b).

During the 2014 campaign, the excavation strategy to obtain dates from different parts of the settlement by test trenches was continued. Furthermore, with trench 80, a pottery kiln and its associated production waste pits were excavated to obtain radiometric dates for the production of pottery types and decorations. Finally, another dwelling (no. 54 in trench 92) was completely excavated, since the contexts of dwelling 44 from 2013 was partially destroyed by looters.

Overall, 67 radiocarbon samples from the 2013 to 2016 investigations are used in this study, while further samples retrieved from the ring-building (trench 111) excavated in 2016 will be discussed in a separate study (Hofmann *et al.* 2019). All samples were handed to the Poznan Radiocarbon Laboratory for pre-treatment and then dated in the AMS Laboratory at Poznan University. Details on the process were kindly provided by Nils Müller-Scheeßel (see also Meadows *et al.* 2019).

The samples were chemically pre-treated following standard acid-base-acid processing to isolate the desired organic components and to remove eventual contaminations. Filtered collagen was then ultra-filtered to remove degraded collagen fragments. The collagen was dried and weighed to calculate the starting weight for the measurement. Finally, the sample was combusted to CO2 and then reduced to graphite. For the actual radiocarbon measurement, the Poznan Laboratory uses two AMS machines (NEC 1.5 MV Pelletron AMS) which measure the 12C, 13C and 14C ion currents from each sample. The ratio between 13C and 14C was used to calculate the conventional radiocarbon age per sample. The reported standard error includes uncertainties in sample measurement, standard normalisation, instrumental background, blank correction, and uncertainty from sample pre-treatment, based on long-term experience with laboratory standard and known-age samples of similar materials.

In the following section the context of the samples and the respective Bayesian models are presented.

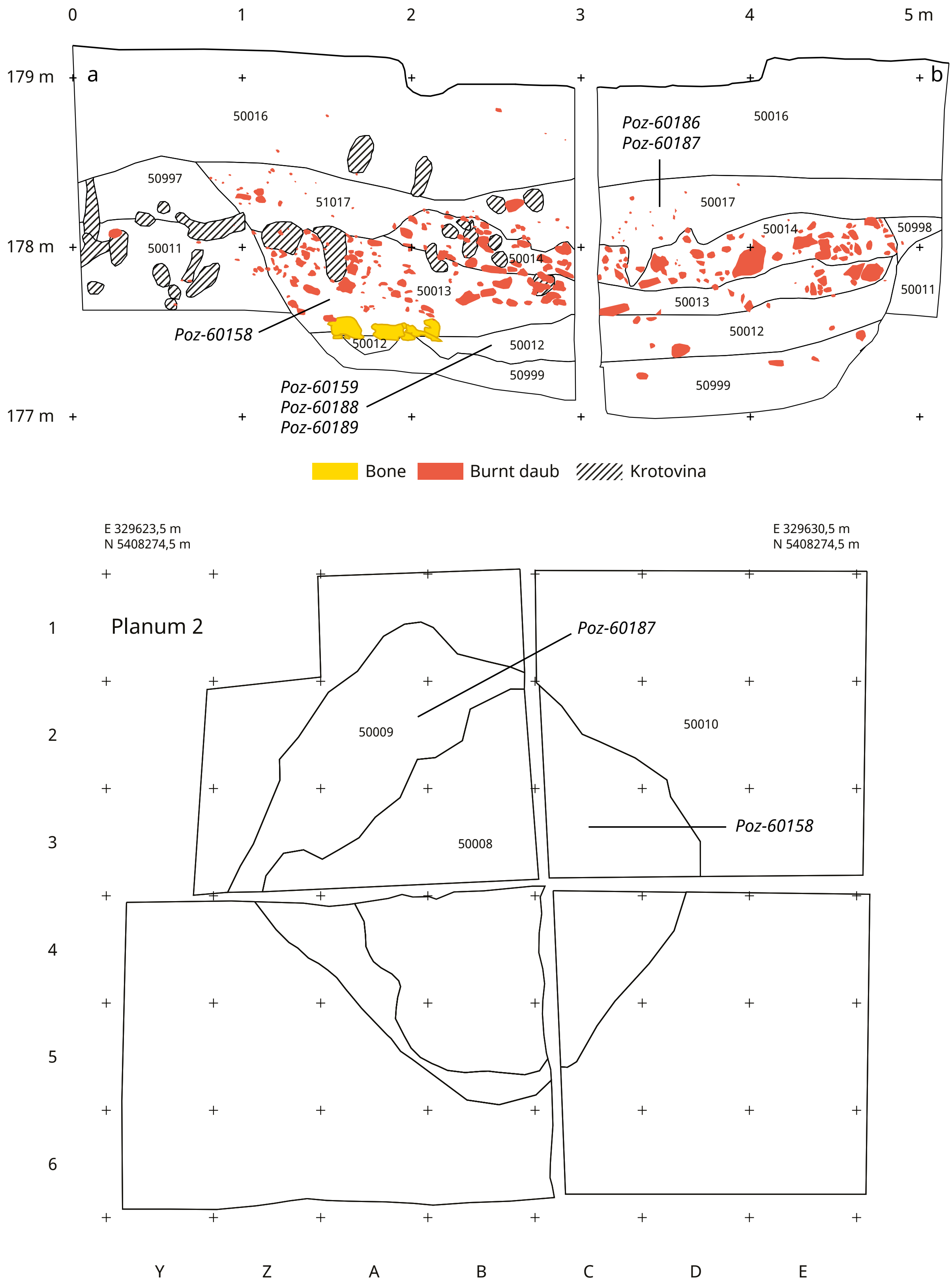


Figure 120. Trench 50 sample context (after Müller et al. 2017b, fig. 32 and 34).

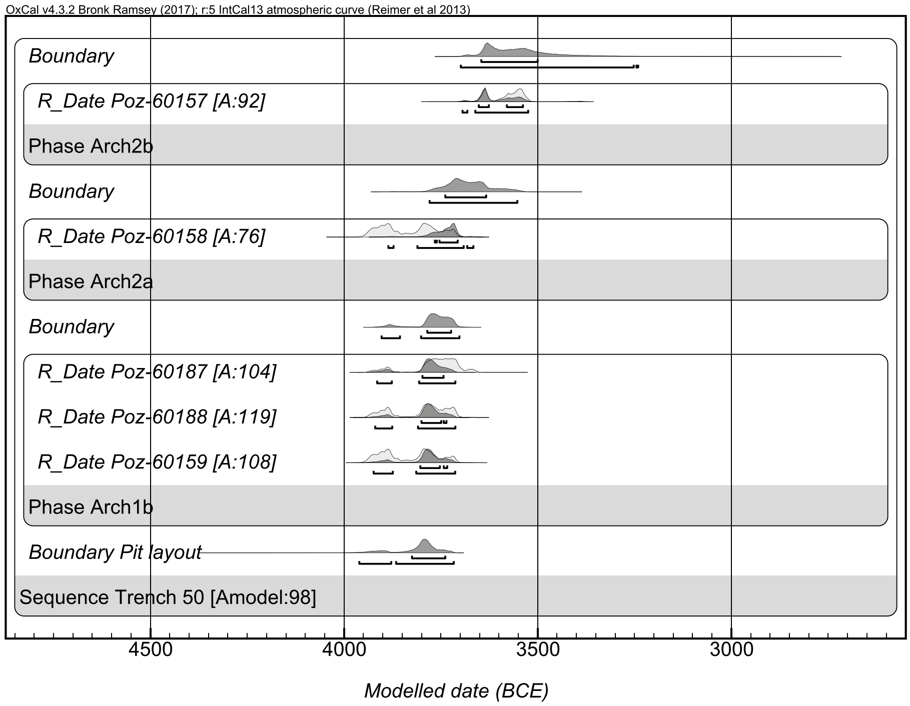


Figure 121. Formal chronological model for trench 50. For code see appendix 12.

6.1 Dating of contexts

6.1.1 Trench 50

For trench 50, Brandtstätter distinguishes four phases for the refilling of pit 25 (50-Arch 1a-b and 50-Arch 2a-b) (fig. 120). The upper part of the lower infill (Arch 1b) is dated by four samples (tab. 36). Three samples were recovered from the bottom of the pit (context 50012). While samples 'Poz-60189' and 'Poz-60188' are derived from *Corylus* and *Fraxinus* charcoal, sample 'Poz-60159' is derived from disarticulated cattle bone. By comparing the differences between the uncalibrated dates of the bone and charcoal samples, an 'old-wood' effect for sample 'Poz-60189' is observed. This sample is therefore left out of the model. As part of the lower infill Arch 1 b, context 50009 lies above context 50012. This context yielded sample 'Poz-60187', which is derived from *Quercus* charcoal.

For the lower part of the upper refill (Arch 2a), sample 'Poz-60158' is derived from disarticulated sheep bone, while for the uppermost refill (Arch 2b) two samples were retrieved. Both samples 'Poz-60186' and 'Poz-60187' are derived from *Quercus* charcoal. Here, the date for 'Poz-60186' is interpreted as 'old-wood', since oak is a long-living species and the date appears too old for the youngest refill of the pit, especially in comparison to the other *Quercus* date of the same context.

Based on this stratigraphic prior information, a robust Bayesian model is calculated with plausible results (A-model=97.7). An alternative model, including the presumed 'old-wood' samples, resulted in an implausible output way below the threshold of 60 % (A-model=36.4).

According to the model used here (fig. 121), pit 25 in trench 50 was refilled in the time between 3800-3540 (68.2 %) or 3920-3525 modelled cal BCE (95.4 %), respectively. The lower part of the pit, including the deposition of two bucrania (50-Arch 1b), was refilled in the time between 3800-3745 (68.2 %) or 3920-3715 modelled cal BCE (95.4 %), while Arch 2a was refilled between 3765-3710 (68.2 %) or 3885-3665 modelled cal BCE (95.4 %), respectively. The top layer of the pit dates in the time between 3655-3540 (68.2 %) or 3695-3525 modelled cal BCE (95.4 %), respectively.

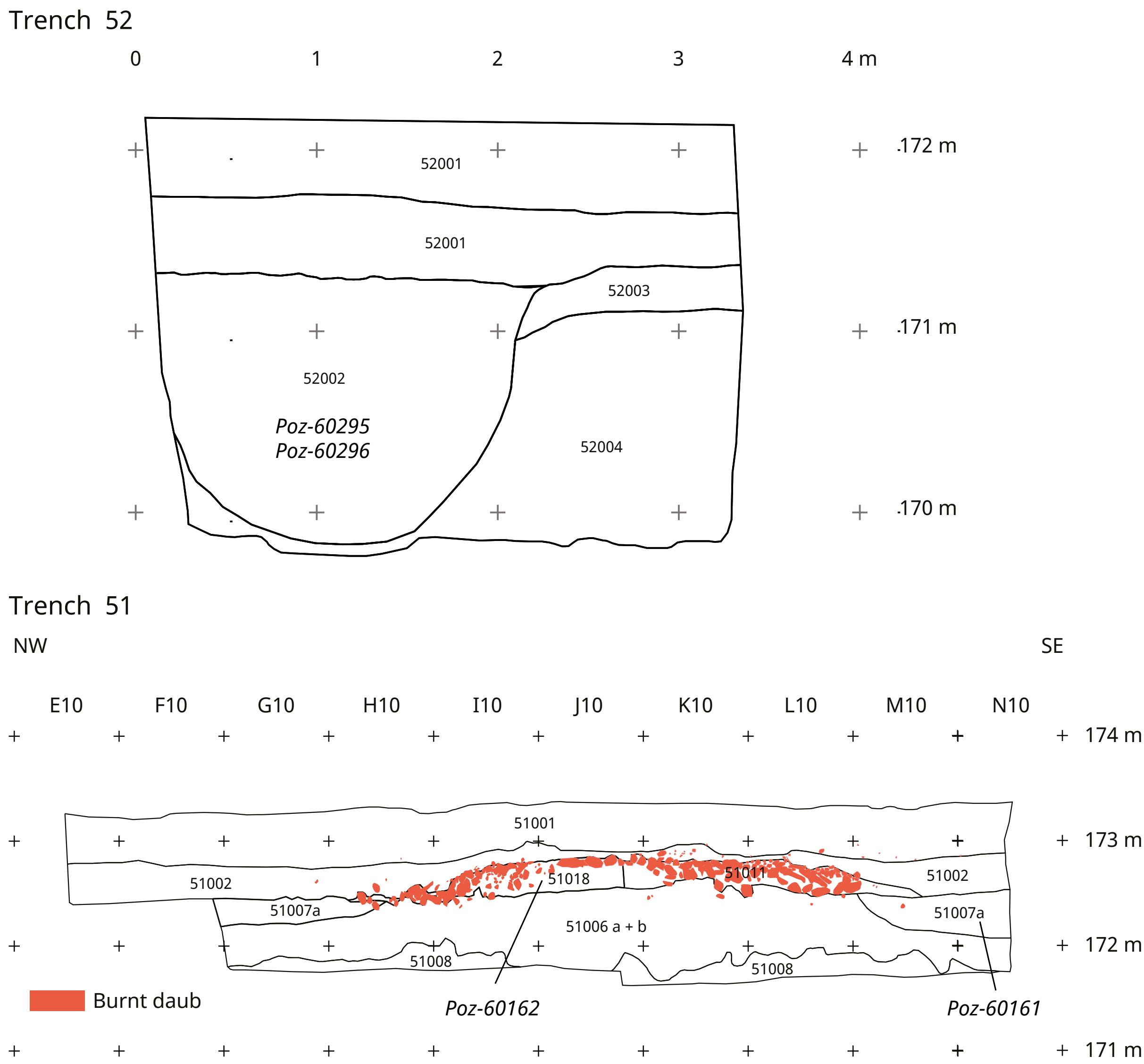


Figure 122. Trench 51 and 52 sample contexts (after Müller et al. 2017b, fig. 15 and 26).

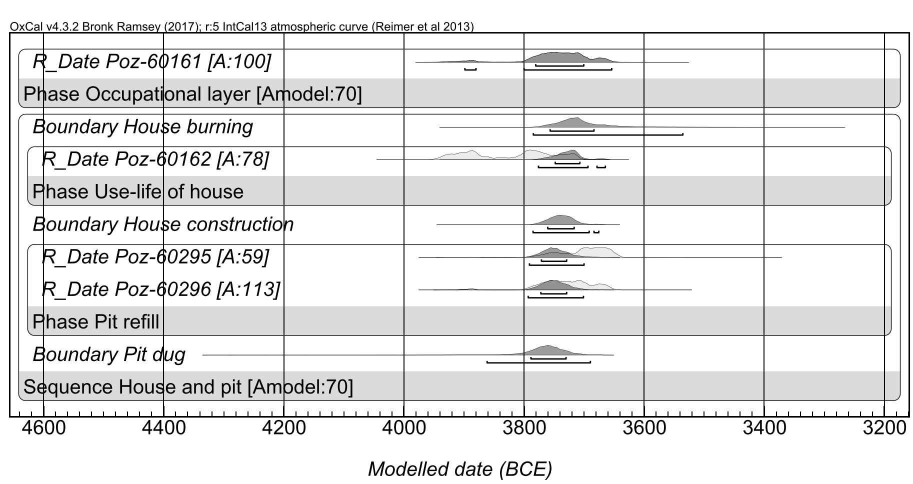


Figure 123. Formal chronological model for trenches 51 and 52. For code see appendix 12.

6.1.2 Trenches 51 and 52

The pit 26 in trench 52 is located behind the back side of dwelling 44 in trench 51 (fig. 122). It is interpreted as the loam extraction pit for dwelling 44 nearby. Only few artefacts are obtained from the bottom of this pit, which suggests that it was not intentionally used for waste disposal.

While samples 'Poz-60190' and 'Poz-60347' are derived from *Quercus* charcoal, sample 'Poz-60295' is derived from disarticulated cattle bone and sample 'Poz-60296' is derived from the disarticulated bone of a large mammal (tab. 36). When comparing both sample types, an 'old-wood' effect is observed for both oak samples, which are therefore left out of the considered dating. Since the deposited material at the bottom of pit 26 is possibly related to the digging event of the pit, the obtained samples are considered here as *termini post quos* for the construction of dwelling 44 in trench 51.

At trench 51, two samples are obtained (tab. 36), one from the burnt dwelling 44 and another from the former occupational layer (fig. 122). Both samples are derived from disarticulated pig bone. While sample 'Poz-60162' was retrieved from the burnt daub on the platform and is considered as a *terminus ad quem* for the use-life of the house, sample 'Poz-60161' was recovered from the former occupational layer and is in no definite relation to the use-life of the dwelling.

Based on this prior information, a plausible Bayesian model is calculated (A-model=70.4). According to this model (fig. 123), the construction pit was dug prior to 3775-3730 (68.2 %) or 3795-3700 modelled cal BCE (95.4 %), respectively, while the house was in use in the time between 3750-3710 (68.2 %) or 3780-3665 modelled cal BCE (95.4 %), respectively. The occupational layer shows general activity in the area between 3780-3700 (68.2 %) or 3905-3655 cal BCE (95.4 %), respectively.

6.1.3 Trench 60

For trench 60 (fig. 124), Brandtstätter distinguishes between two geological layers below the pit (60-GEO 1-2), four archaeological phases (60-Arch 1-4) and the topsoil (60-GEO 3). Brandtstätter (2017, 27) identified several recuttings of pit 27. A sterile layer on the bottom of the pit indicates that it lay open for some time, where the dugout soil was probably used for house construction. The refill on top of the sterile layer includes large pieces of burnt daub that get smaller and less dense in the upper part of the refill, which probably also lay open for some time. This first refill event is labelled as 60-ARCH 1 and is recut by 60-ARCH 2. The refill of the first recut is characterised by the chaotic deposition of large pieces of burnt daub. This deposition is recut by the next phase 60-ARCH 3 and is filled with similar material of large pieces of burnt daub. On top, another layer of burnt house debris is deposited without recutting of the pit. The chaotic refillings of the phases 60-ARCH 2 and 60-ARCH 3 are interpreted by Brandtstätter (*ibid*., 29) as short time and intentional deposition events of demolished dwellings.

Unfortunately, it was only possible to retrieve sufficient radiocarbon samples for 60-ARCH 2 and 60-ARCH 3 as well as for the occupational layer surrounding the pit (tab. 36). Sample 'Poz-60348' is derived from disarticulated bone of a large mammal. The bone was recovered from the assumed former occupational layer outside the pit and is in no relevant stratigraphic relation to the pit. The second archaeological layer (60-ARCH 2) is dated by three samples. While samples 'Poz-60350' and 'Poz-60349' are derived from two different disarticulated cattle bones, sample 'Poz-60192' is derived from *Fraxinus* charcoal. No indications for an 'old-wood' effect are visible between the two sample categories. The infill of the second recut (60-ARCH 3) is dated by sample 'Poz-60191', which is derived from *Quercus* charcoal.

For this pit, it is important to realize what exactly has been dated and what the character of the refill is. In the case of trench 60, two different dwellings are dated that

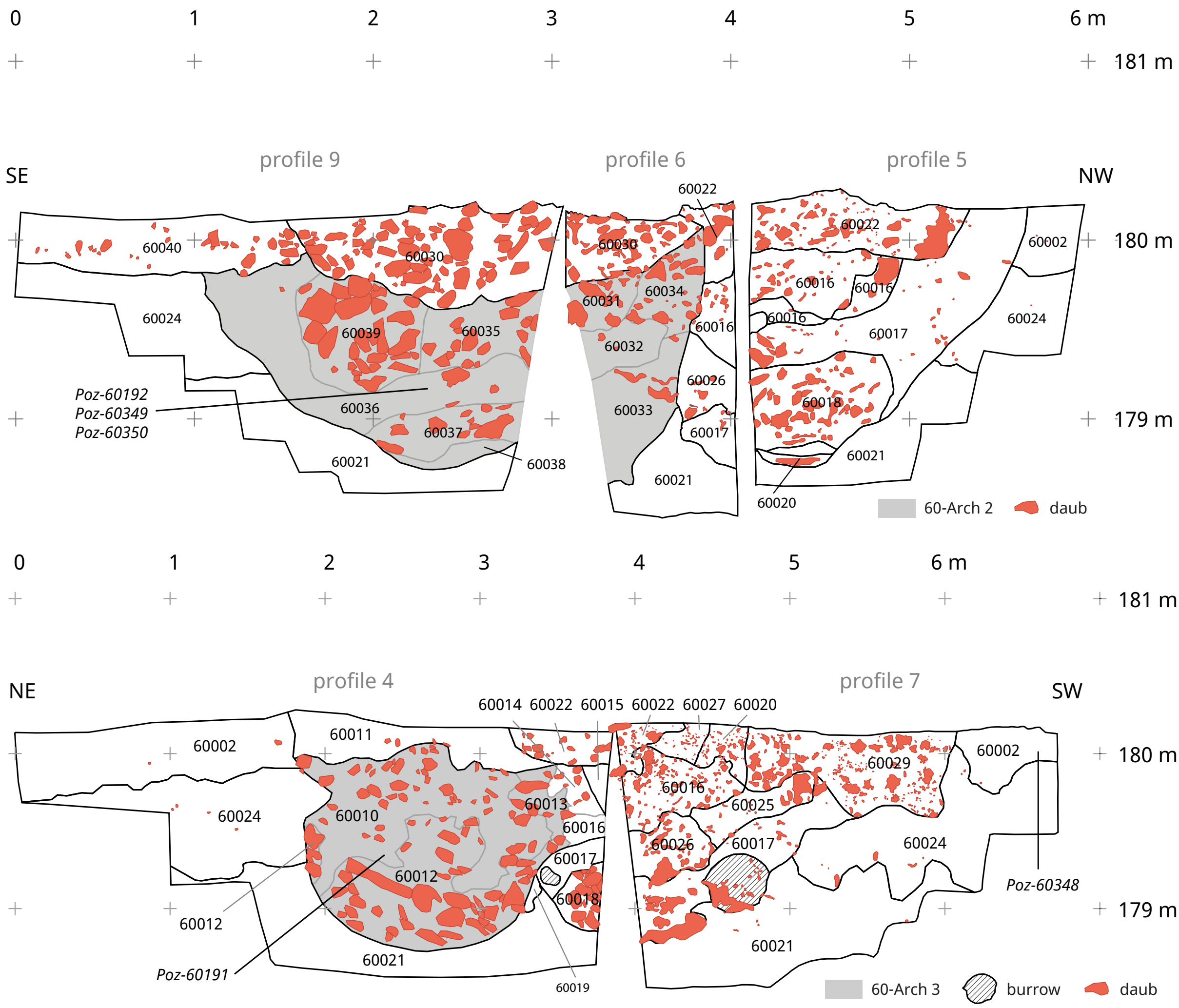


Figure 124. Trench 60 sample context (after Müller et al. 2017b, fig. 41-42).

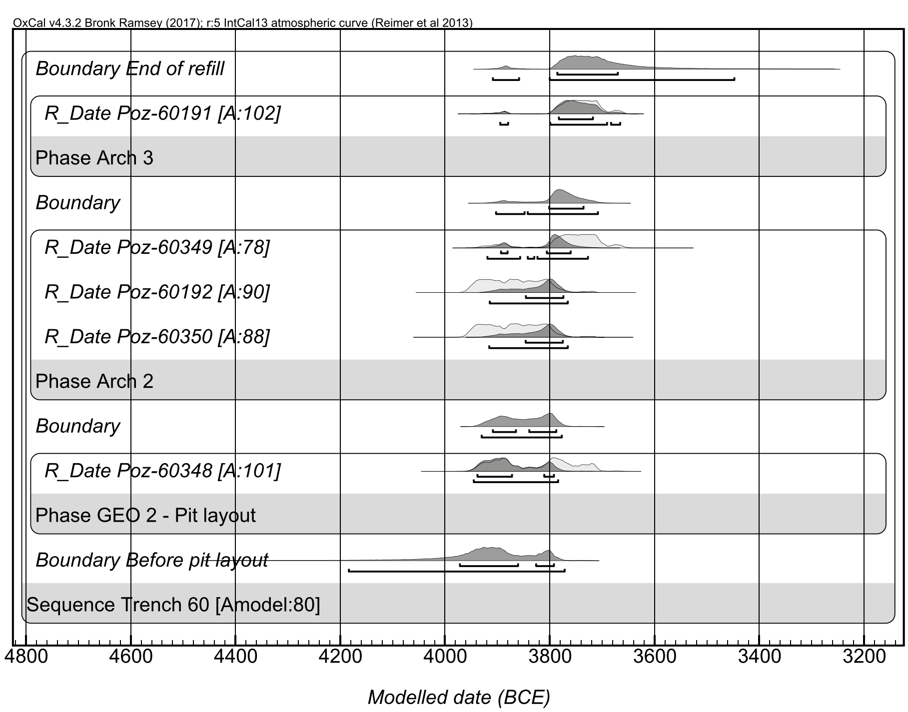


Figure 125. Formal chronological model for pit 27 in trench 60. For code see appendix 12.

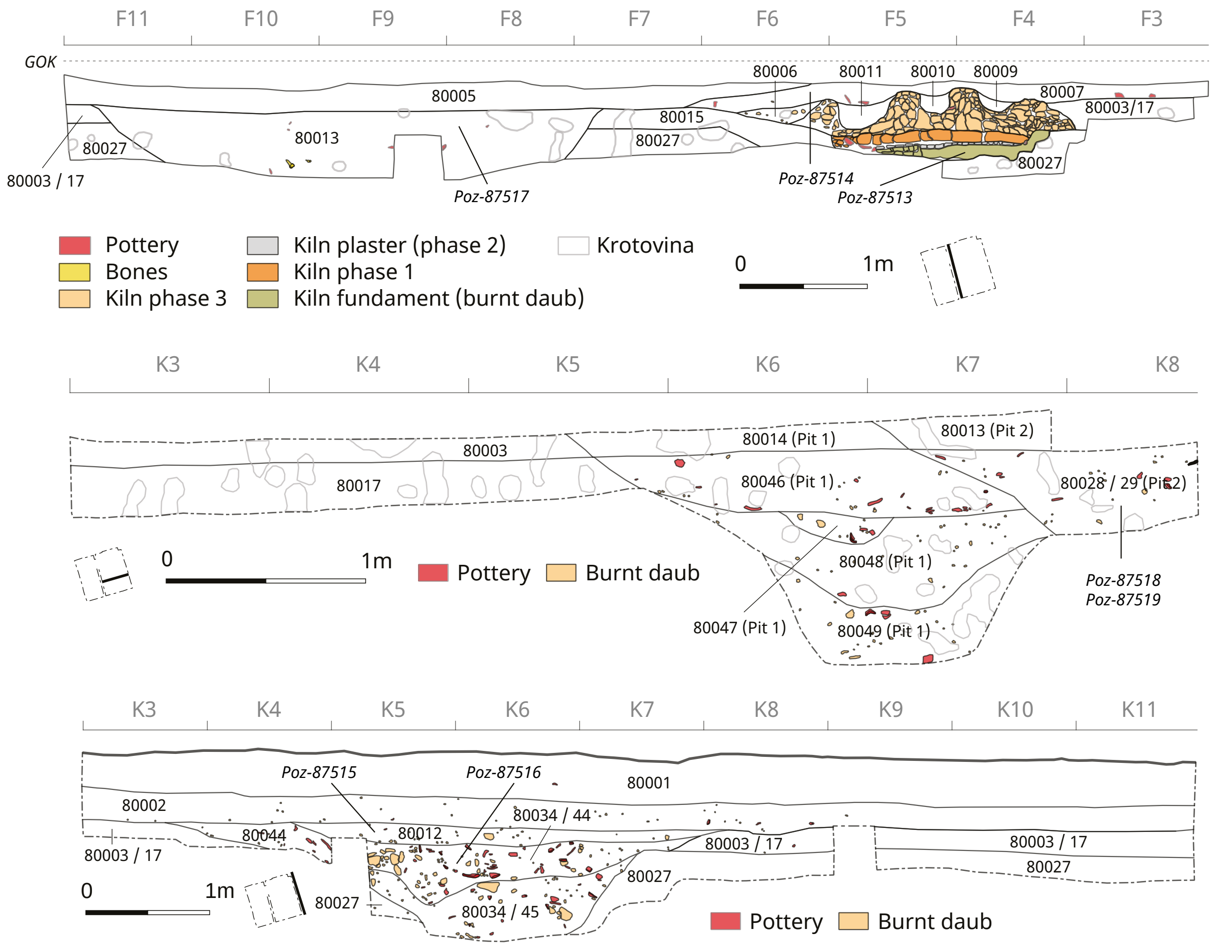


Figure 126. Trench 80 sample context.

were later demolished and deposited in the excavated pit. The bones found in the burnt debris could also represent waste that is unrelated to the original dwelling assemblage, which was deposited in the pit. However, since they do not diverge from the charcoal samples, it is suggested that the dated bones are part of the original assemblage of the deposited buildings. Thus, the dates obtained for 60-ARCH 2 and 60-ARCH 3 are treated as *termini ad quos* for the two demolished dwelling remains found in pit 27.

Based on the stratigraphic prior information, a plausible Bayesian model is calculated (A-model=83). According to this model (fig. 125), the dwelling in the 60-ARCH 2 deposit was in use some time between 3910-3760 (68.2 %) or 3940-3730 (95.4 %) modelled cal BCE, respectively, while the dwelling in the debris of 60-ARCH 3 dates between 3775-3710 (68.2 %) or 3800-3665 modelled cal BCE (95.4 %), respectively. Apart from the modelled dates, the occupational layer around the pit dates between 3935-3715 (68.2 %) or 3945-3710 cal BCE (95.4 %), respectively.

6.1.4 Trench 80

For this trench (fig. 126), eight radiocarbon samples are dated (tab. 36). Sample 'Poz-87513' was retrieved from inside the daub construction of the first kiln phase (context 80036). This sample, therefore, dates the construction of the first kiln prior to its use. The use of the first kiln can be related to pit 2. Here, two samples 'Poz-87518' and 'Poz-87519' were dated coming from the lower infill of the pit (context 80028) and sample 'Poz-87517' dates the upper infill (context 80013). After the repairs of the first kiln, the construction is filled up and another kiln is built on top. This third kiln phase has its loading zone turned 90 degrees to the east, where pit 3 is located. Like

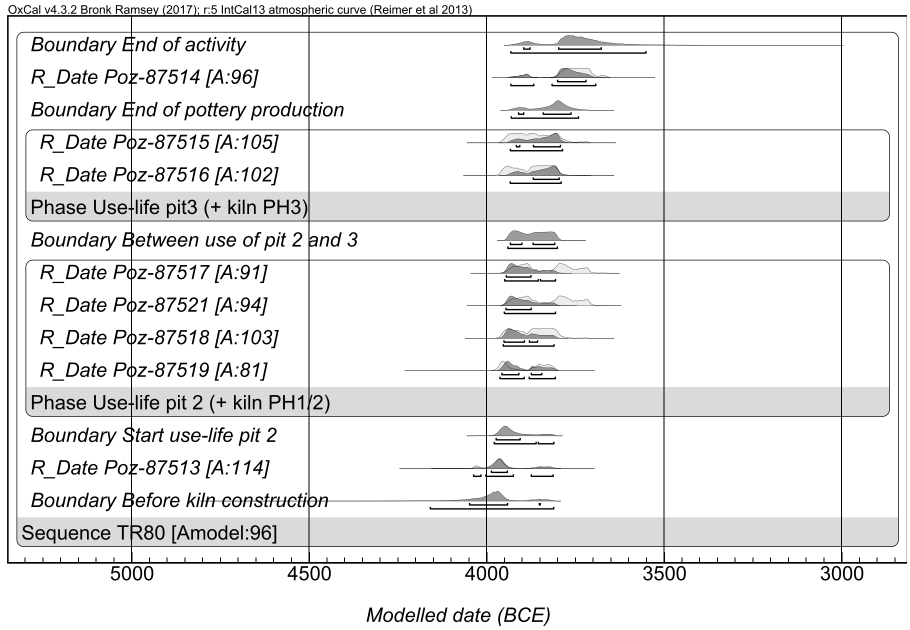


Figure 127. Formal chronological model for trench 80. For code see appendix 12.

the suggested relation between the first and second kiln phase and pit 2, it is suggested that pit 3 is related to the third kiln phase. This is supported by the infill of pit 3, which is clearly related to pottery production. Therefore, pit 3 is suggested to be related to the use-life of the third kiln phase. Samples were dated for the lower (Poz-87516) and the upper (Poz-87515) infill of pit 3. Lastly, the waste zone above the kiln (context 80007) is dated by sample 'Poz-87514', marking the end of pottery production at trench 80.

Based on the stratigraphic and spatial-relational prior information, a robust Bayesian model is calculated (A-model=95.9). According to this model (fig. 127), the initial kiln construction is dated to the time between 3990-3940 (68.2 %) or 4040-3815 modelled cal BCE (95.4 %), respectively. The use-life of the initial kiln including its repair is dated via the refill of the southern pit 2. Thus, the initial and second phase of the kiln was in use some time between 3960-3845 (68.2 %) or 3965-3810 modelled cal BCE (95.4 %), respectively. The use-life of the kiln's third phase is dated via the refill of the eastern pit 3. This phase is therefore dated in the time between 3920-3795 (68.2 %) or 3935-3790 modelled cal BCE (95.4 %), respectively. Finally, the waste deposition on top of the last kiln phase is dated between 3800-3720 (68.2 %) or 3930-3695 modelled cal BCE (95.4 %), respectively. Based on these results, pottery production in this area took place in the time between 3960-3795 (68.2 %) or 3965-3790 modelled cal BCE (95.4 %), respectively.

6.1.5 Trench 92

For this trench (fig. 128), it was possible to date five radiocarbon samples coming from the storage bench of the platform, from the platform itself as well as from the pottery concentration behind and in front of the building, and from below the front porch (tab. 36).

Sample 'Poz-87523' is derived from a disarticulated cattle bone, which was recovered from the burnt house collapse (context 92007) that fell on the bench in the back of the building. This sample originates from the storage area of the main room on the platform. Sample 'Poz-87526' is derived from a disarticulated sheep or goat bone, which was recovered from the central surface of the platform. It is considered here as a *terminus ad quem* for the use-life of the house. From below the building, under the front porch, sample 'Poz-87528' is derived from a disarticulated roe deer

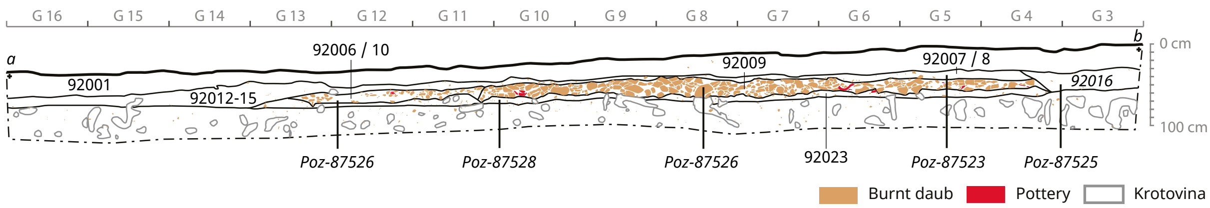


Figure 128. Trench 92 sample context.

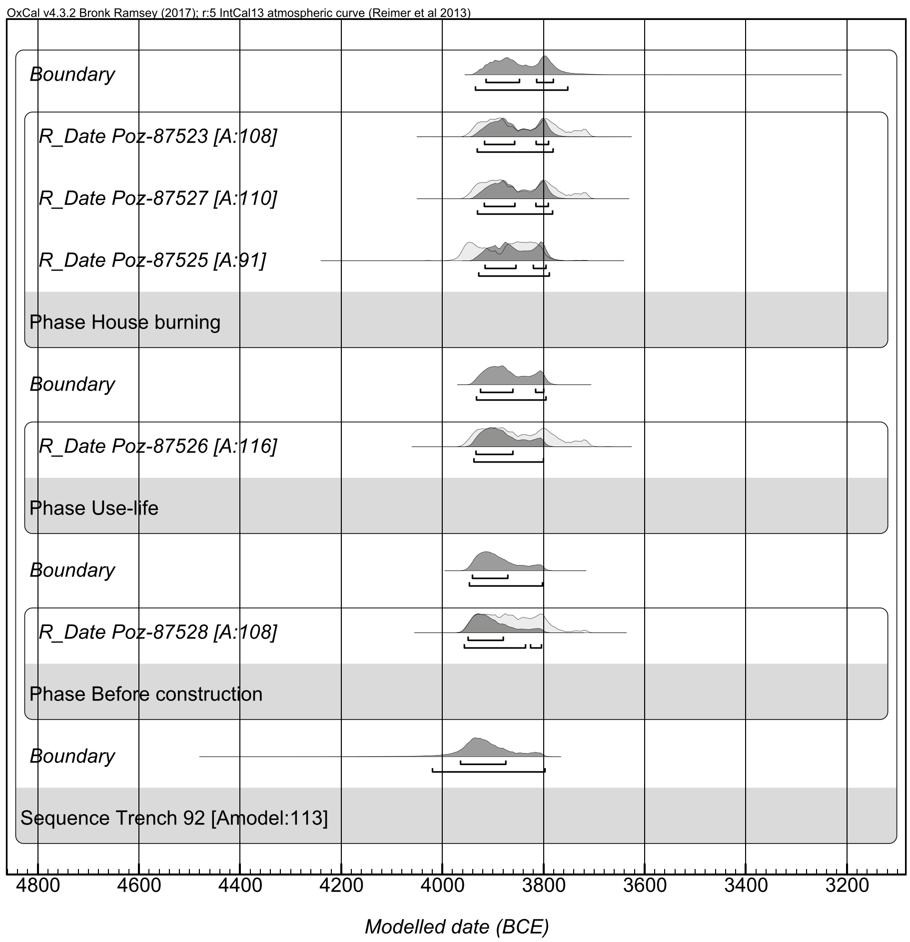


Figure 129. Formal chronological model for dwelling 54 in trench 92. For code see appendix 12.

bone. Two samples are associated with the pottery concentrations in front and behind the building. Sample 'Poz-87527' is derived from a disarticulated bone, which was recovered from the pottery concentration below the burnt remains of the front porch (context 92006). Sample 'Poz-87525' is derived from a disarticulated sheep or goat bone, which was retrieved from the pottery concentration behind the house (context 92016). Both samples are assumed to belong to the content of the deposited vessels.

The sample locations allow for several prior assumptions. For the model used here, it is suggested that the sample from below dwelling 54 was deposited before its construction. Furthermore, it is assumed that the use-life of the house is dated by the sample obtained from the floor in the centre of the platform. While this sample is treated as household waste unrelated to any activity area, the sample from the storage area on the bench as well as the sample from the pottery deposits in front and behind the building are suggested as part of the intentional depositions connected to the house burning.

Based on these prior suggestions, a robust Bayesian model is calculated (A-model=112.6). According to this model (fig. 129), dwelling 54 was constructed in the time between 3950-3880 (68.2 %) or 3960-3805 modelled cal BCE (95.4 %), respectively. Its use-life is narrowed down to the time between 3935-3860 (68.2 %) or

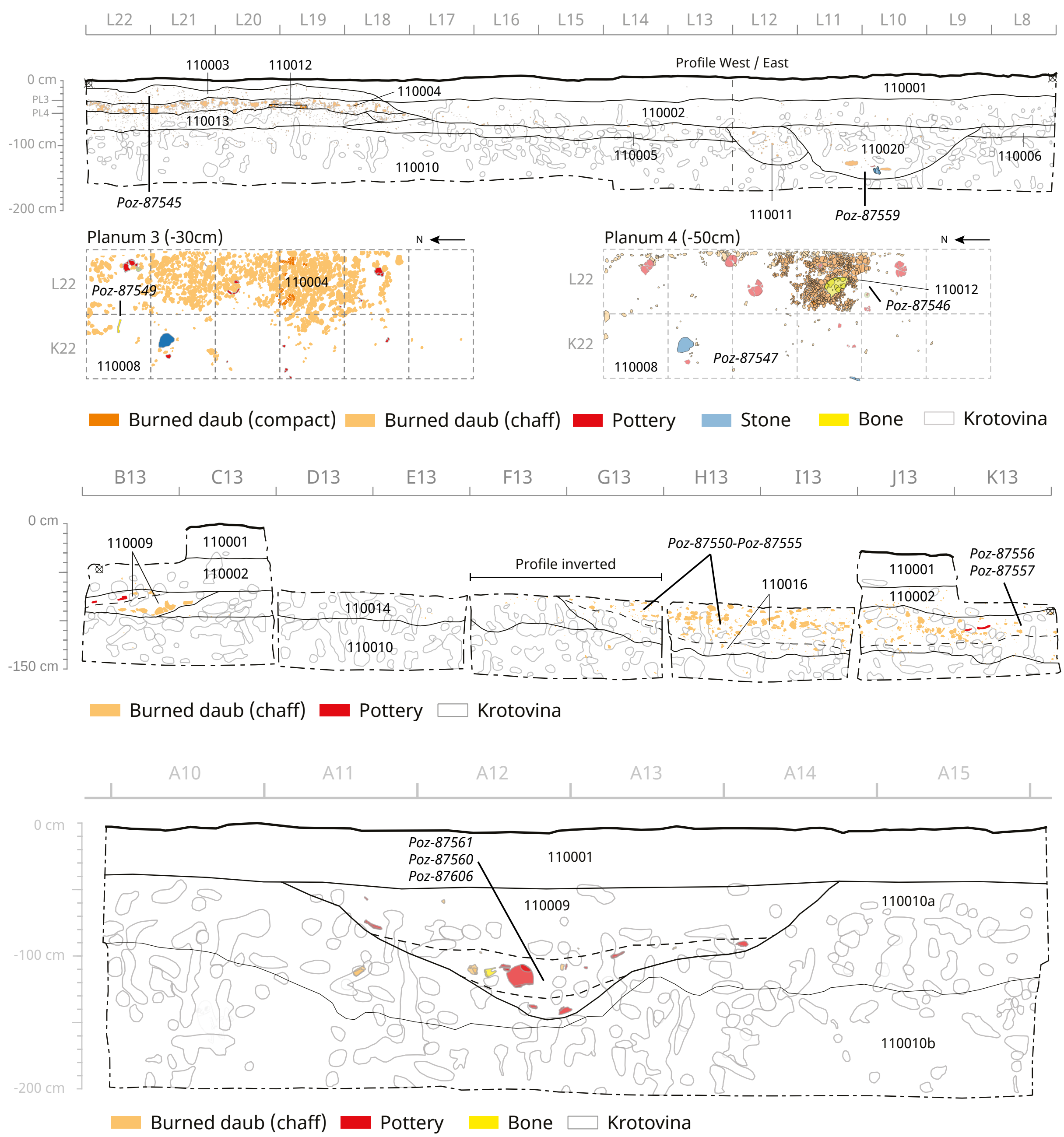


Figure 130. Trench 110 sample context.

3940-3800 modelled cal BCE (95.4 %), respectively, while the burning event is dated between 3920-3790 (68.2 %) or 3930-3780 modelled cal BCE (95.4 %), respectively.

Alternative models considering all samples as *termini ad quos*, for example, yield comparably plausible results. However, with the model used here, it is possible to plausibly narrow down certain events, which is favourable for a chronology of dense events at a Trypillia 'mega-site'.

6.1.6 Trench 110

For this trench, it was possible to date 17 radiocarbon samples (tab. 36). They were retrieved from the two ditch segments, the pit (no. 32) related to dwelling 67 as well as from the occupational layer around the dwelling and the dwelling itself (fig. 130).

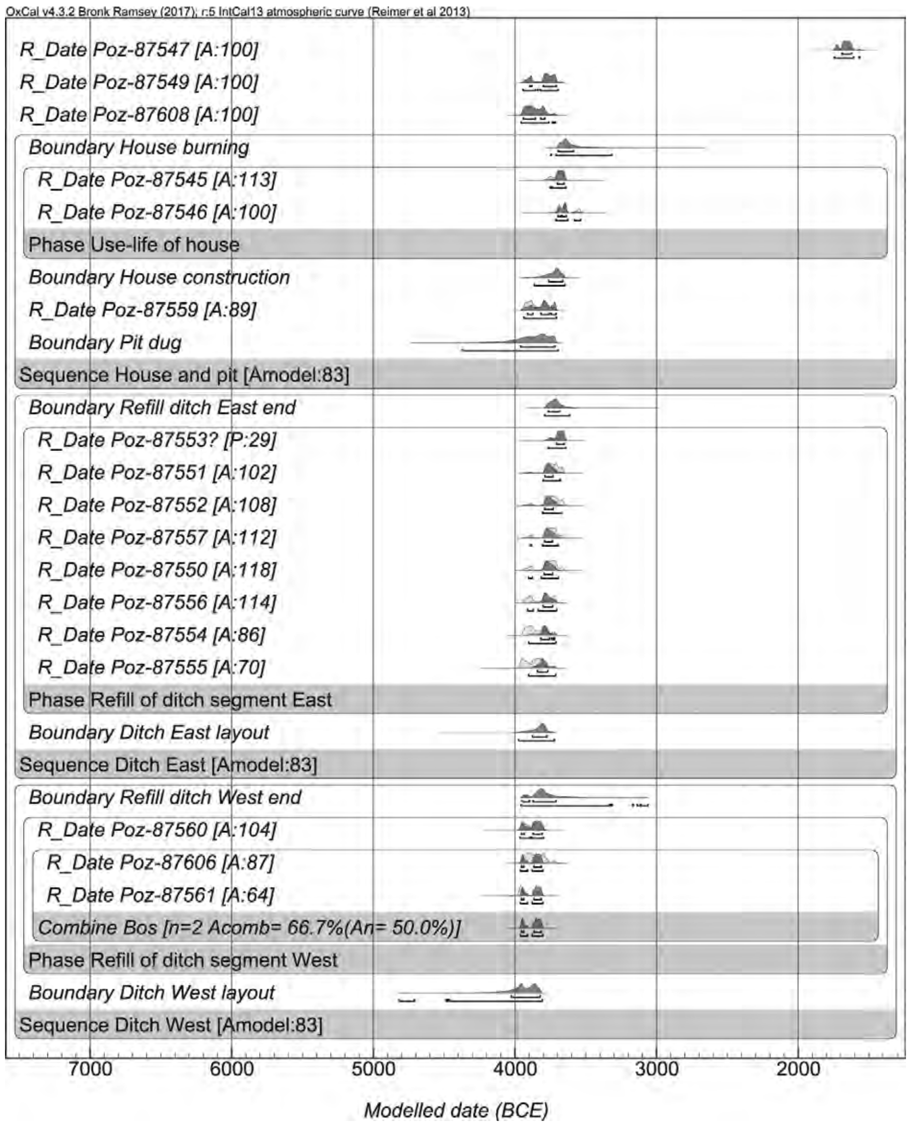


Figure 131. Formal chronological model for trench 110. For code see appendix 12.

Samples 'Poz-87561', 'Poz-87560' and 'Poz-87606' were recovered from the western segment of the ditch. While samples 'Poz-87561' and 'Poz-87606' are derived from articulated cattle bone, sample 'Poz-87560' is derived from a disarticulated pig bone.

A total of eight radiocarbon samples were retrieved from the eastern ditch segment. Samples 'Poz-87550' and 'Poz-87551' are derived from disarticulated pig bones, while samples 'Poz-87552', 'Poz-87553' and 'Poz-87555' are derived from disarticulated cattle bones. Samples 'Poz-87554' and 'Poz-87556' come from disarticulated bones of wild boar. Finally, sample 'Poz-87557' is derived from the disarticulated bone of a large mammal.

Sample 'Poz-87559' is derived from disarticulated pig bone, which was retrieved from the bottom of the pit's infill that is assumed to be associated to dwelling 67.

Two samples are associated with dwelling 67 beyond the eastern ditch segment. Sample 'Poz-87545' is derived from disarticulated cattle bone, which was retrieved from the destruction layer of the building and presents a *terminus ad quem*. Sample 'Poz-87546' is also derived from disarticulated cattle bone, which was retrieved from the southern edge of the platform. Its close relation to the building justifies that the sample is also to be regarded as a *terminus ad quem*. Two other samples were obtained from around the dwelling. Both samples 'Poz-87547' and 'Poz-87549' were recovered from the former occupational layer. They were both disarticulated, with 'Poz-87547' being derived from cattle bone and 'Poz-87549' being derived from sheep or goat bone. Since they were recovered from the occupational layer, their stratigraphic relation to the building is ambiguous and they are treated independently from the dwelling.

Based on the various contexts and stratigraphic relations, it is possible to calculate a plausible Bayesian model (A-model=82.6). According to this model (fig. 131), the western ditch segment was refilled in the time between 3955-3810 (68.2 %) or 3965-3800 modelled cal BCE (95.4 %), respectively. The eastern ditch segment was refilled in the time between 3840-3650 (68.2 %) or 3905-3640 modelled cal BCE (95.4 %), respectively. Since the eastern ditch segment shows a sterile layer at the bottom, and was therefore exposed for some time, the layout of this segment probably falls in the same time as the western part. Thus, the inner enclosure was laid out prior to 3965-3955 cal BCE.

The eastern ditch was then cut by a construction pit (no. 32). Its refill from the bottom dates in the time between 3910-3710 (68.2 %) or 3935-3705 modelled cal BCE (95.4 %), respectively. Comparable to the relation between pit 26 and dwelling 44 in trenches 51 and 52, the dated deposition at the bottom of pit 32 (context 11020) is used here as a *terminus post quem* for the construction of dwelling 67. Therefore, the dwelling was in use some time between 3700-3635 (68.2 %) or 3750-3535 modelled cal BCE (95.4 %), respectively.

The artefact intake of the former occupational layer shows a wide range between 3940-1625 (68.2 %) or 3955-1565 cal BCE (95.4 %), respectively, reaching from the time of the Trypillia occupation, prior to the building's construction, up to later periods.

6.2 Test trenches

6.2.1 Trench 73

This trench was laid out to cut two dwellings of a cluster (fig. 132). During the excavation of the test trench, it was possible to obtain two radiocarbon samples (tab. 36). Both samples 'Poz-60199' and 'Poz-60351' were retrieved, however, from the alley in between dwelling 47 and 48. Thus, the occupational layer, and therefore the general activity in the surroundings is dated (fig. 142). While 'Poz-60199' is derived from the bone of a medium sized mammal, 'Poz-60351' is derived from sheep or goat bone.

The activity in this area is dated in the time between 3700-3380 (68.2 %) or 3760-3375 cal BCE (95.4 %), whereas the date for sample 'Poz-60199' fits into the last dwelling phase at Maidanets'ke with a timeframe of 3700-3650 (68.2 %) or 3760-3640 cal BCE (95.4 %), respectively. This timeframe dates the use-life of one or both dwellings related to the trench (Müller *et al.* 2017b, 48).

6.2.2 Trench 75

For this trench, the only suitable radiocarbon sample (tab. 36) was obtained from the transitional greyish layer above the burnt daub and below the modern topsoil (fig. 133). This was, therefore, deposited sometime after the burning of dwelling 50, but still provided a timeframe for the general activity at the site comparable to the dates for occupational layers in other parts of the settlement. Sample 'Poz-60352' is derived from disarticulated cattle bone and dates in the time between 3650-3535 (68.2 %) or 3655-3525 cal BCE (95.4 %), respectively (fig. 142). Therefore, dwelling 50 in trench 75 dates prior to 3655-3650 cal BCE (Müller *et al.* 2017b, 49) and probably belongs in the last dwelling phase of the settlement.

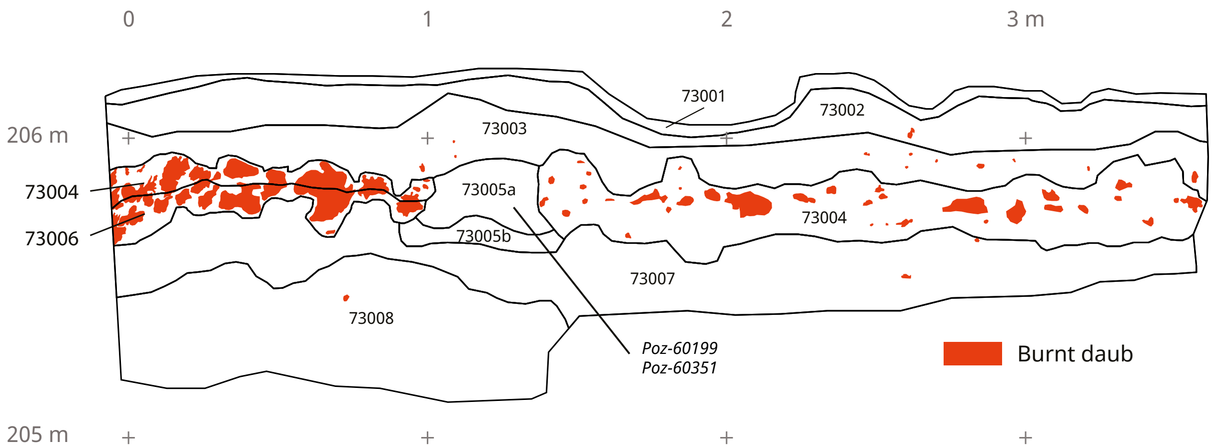


Figure 132. Trench 73 sample context (after Müller et al. 2017b, fig. 28).

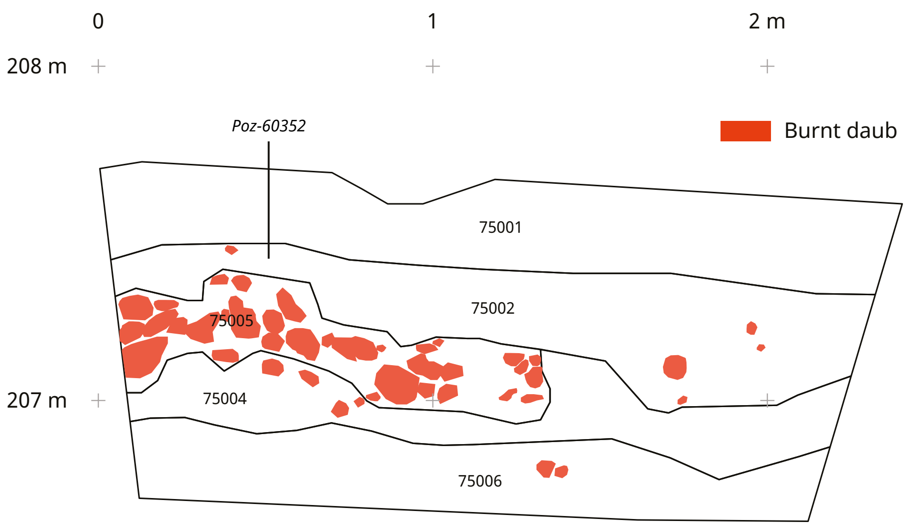


Figure 133. Trench 75 sample context (after Müller et al. 2017b, fig. 29).

6.2.3 Trench 77

Only one radiocarbon sample could be recovered from this trench (fig. 134). Sample 'Poz-60194' is derived from disarticulated sheep or goat bone, which was obtained from within the burnt daub on the platform of dwelling 52 (tab. 36). Thus, it is considered as a *terminus ad quem*. Consequently, the use-life of the building is dated in the time between 3785-3705 (68.2 %) or 3910-3660 cal BCE (95.4 %), respectively (fig. 142).

6.2.4 Trench 79

At this trench (fig. 135), it was possible to date three radiocarbon samples (tab. 36) of which one was obtained from within the burnt dwelling debris, while the other two samples were recovered from the soil above the debris (Brandtstätter 2017). Sample 'Poz-60195' is derived from disarticulated pig bone and was obtained from within the burnt daub on the platform of dwelling 53. It is, therefore, considered as a *terminus ad quem*, while the other samples are treated as *termini ante quos*. In the greyish layer above the debris and below the topsoil, sample 'Poz-60200' is derived from disarticulated sheep or goat bone, while sample 'Poz-60201' is derived from the disarticulated bone of a medium-sized mammal.

Based on the stratigraphic relation of the samples, a robust Bayesian model is calculated (A-model=96.6). According to this model (fig. 136), the use-life of the building is

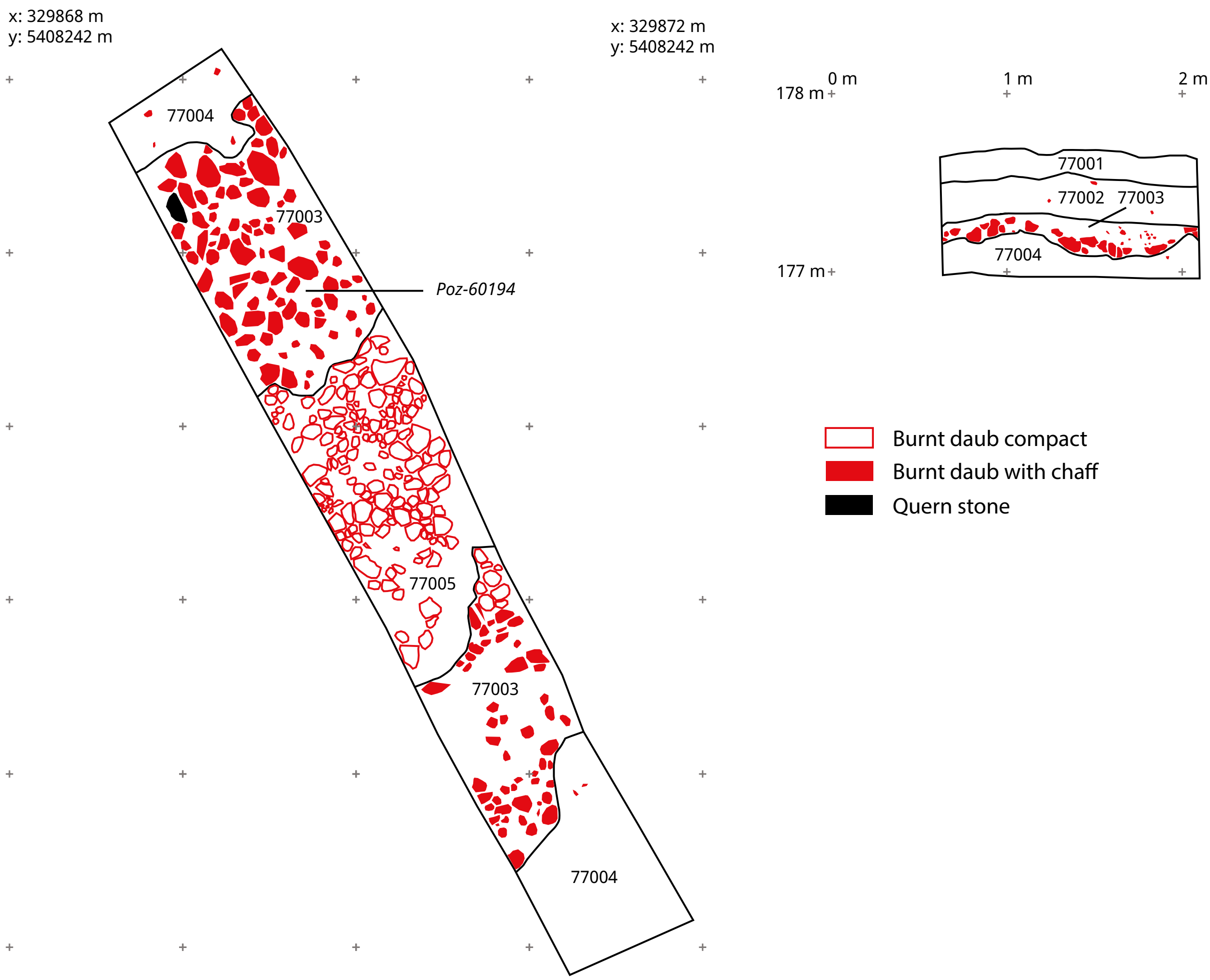


Figure 134. Trench 77 sample context (after Brandtstätter 2017, fig. 8.22 and 8.41).

dated in the time between 3770-3695 (68.2 %) or 3785-3660 modelled cal BCE (95.4 %), respectively. The dwelling was then destroyed between 3725-3655 (68.2 %) or 3775-3600 modelled cal BCE (95.4 %), respectively. After the dwelling's conflagration, material was deposited during the last phase of the settlement between 3680-3640 (68.2 %) or 3705-3535 modelled cal BCE (95.4 %), respectively, and during Early Yamnaya in the time between 3335-3090 (68.2 %) or 3340-3020 modelled cal BCE (95.4 %), respectively.

6.2.5 Trench 93

It was possible to retrieve sufficient radiocarbon material from both dwellings 57 and 58 in trench 93 (tab. 36). Sample 'Poz-87529' is derived from a disarticulated pig bone, which was recovered from the alley between both buildings (fig. 137). Dwelling 57 is dated by sample 'Poz-87531', which is derived from disarticulated sheep/goat bone coming from the sediment between the collapsed house debris. Dwelling 58 is dated by sample 'Poz-87532', which is derived from a disarticulated medium-sized mammal bone coming from in between the burnt daub collapse. The samples from both dwellings, therefore, present *termini ad quos* dates.

Thus, the use-life of dwelling 57 dates in the time between 3905-3710 (68.2 %) or 3945-3695 cal BCE (95.4 %), respectively, while for dwelling 58 the use-life falls in the time between 3780-3705 (68.2 %) or 3910-3660 cal BCE (95.4 %), respectively. The former occupational layer is dated to a comparable timeframe between 3785-3695 (68.2 %) or 3910-3650 cal BCE (95.4 %), respectively (fig. 142).

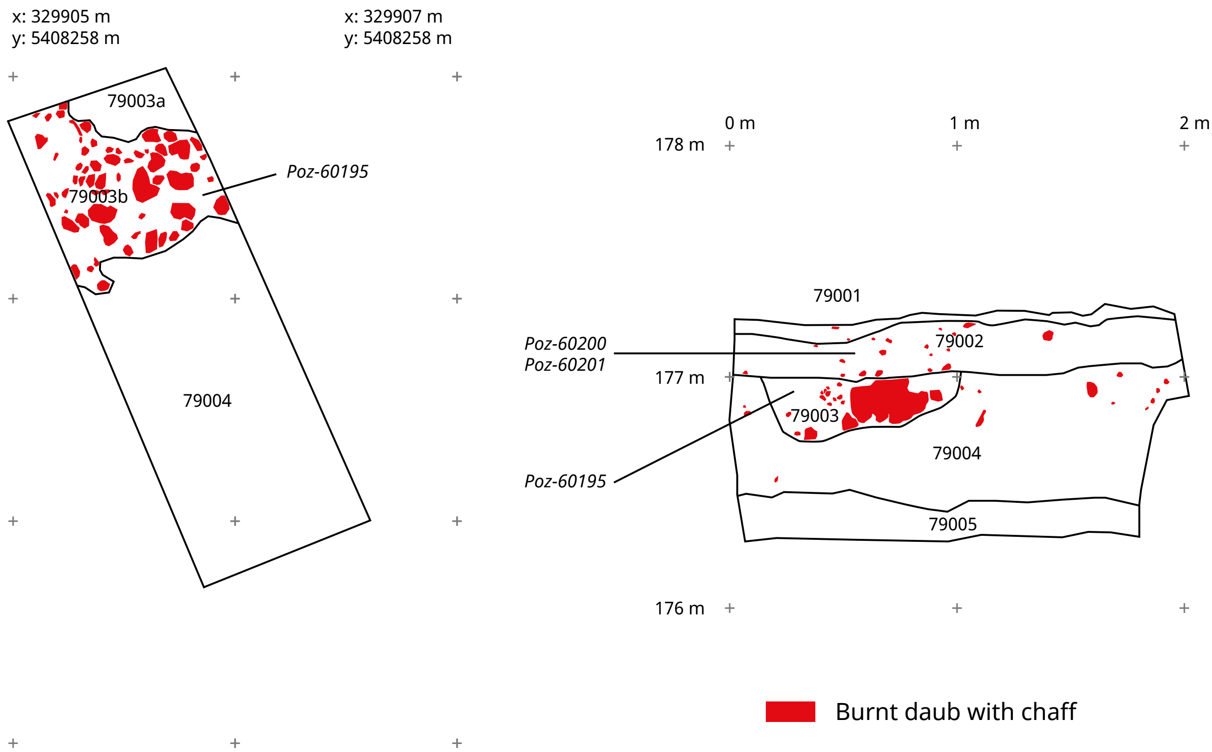


Figure 135. Trench 79 sample context (after Brandtstätter 2017, fig. 8.23 and 8.41).

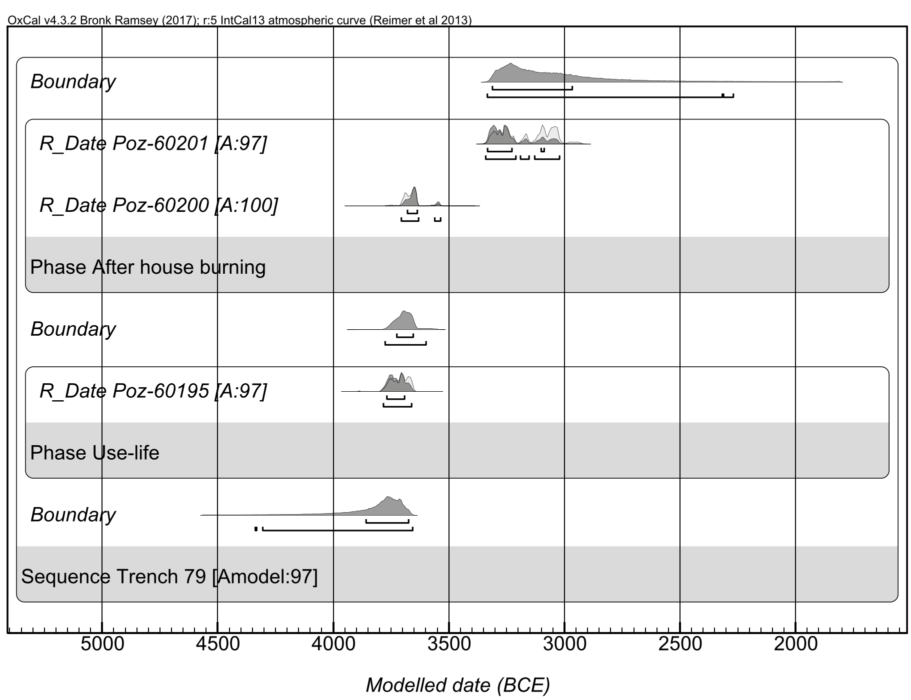


Figure 136. Formal chronological model of dwelling 53 at trench 79. For code see appendix 12.

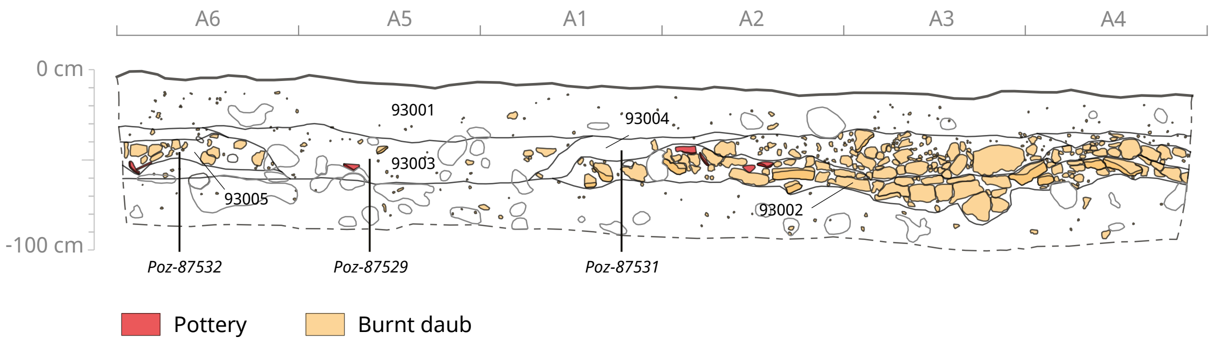


Figure 137. Trench 93 sample context.

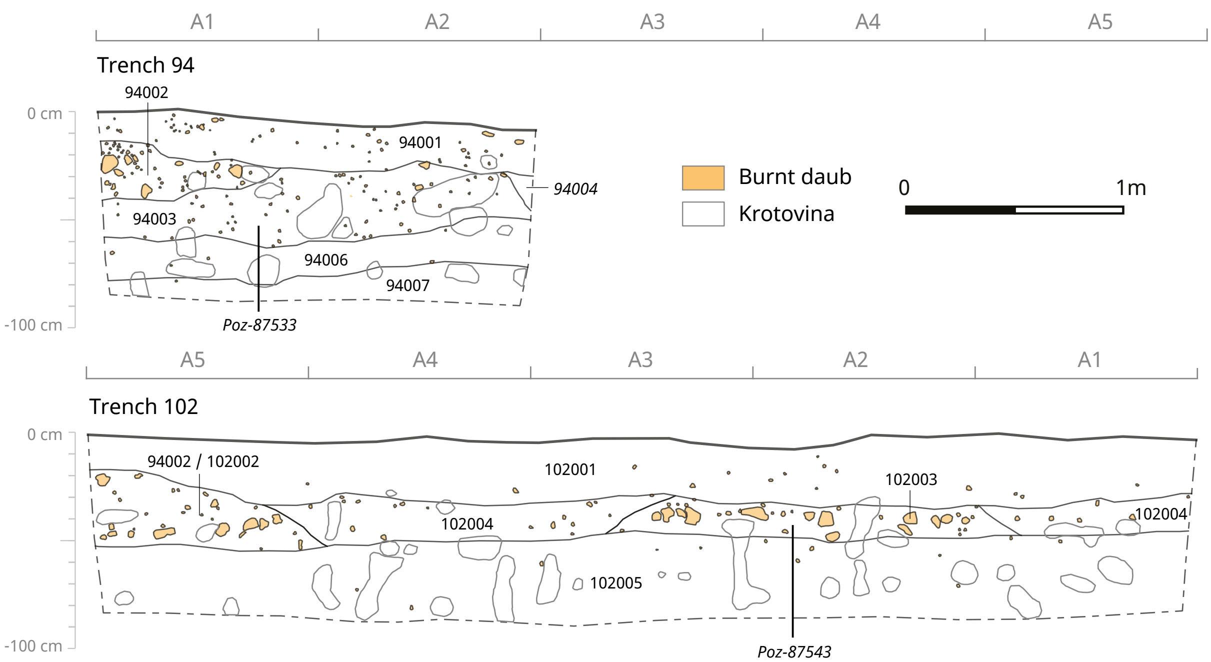


Figure 138. Trench 94 and 102 sample contexts.

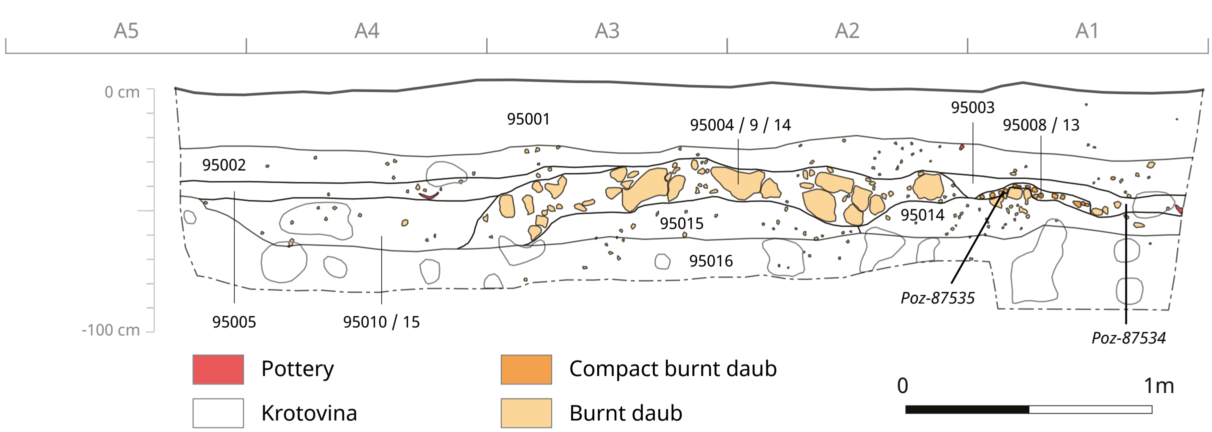


Figure 139. Trench 95 sample context.

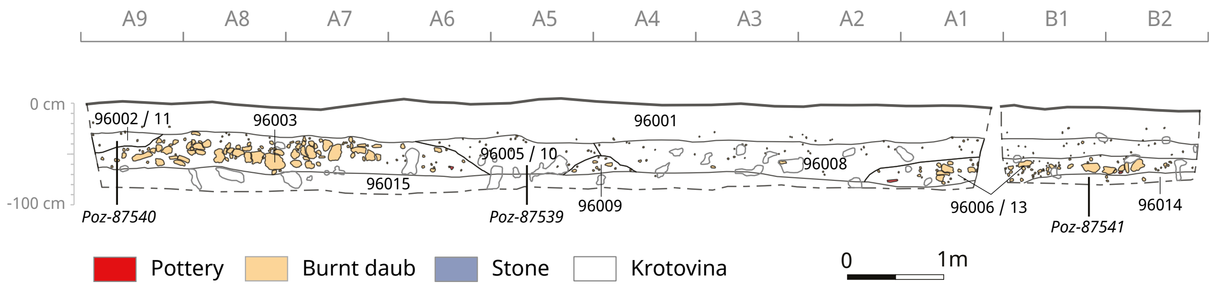


Figure 140. Trench 96 sample context.

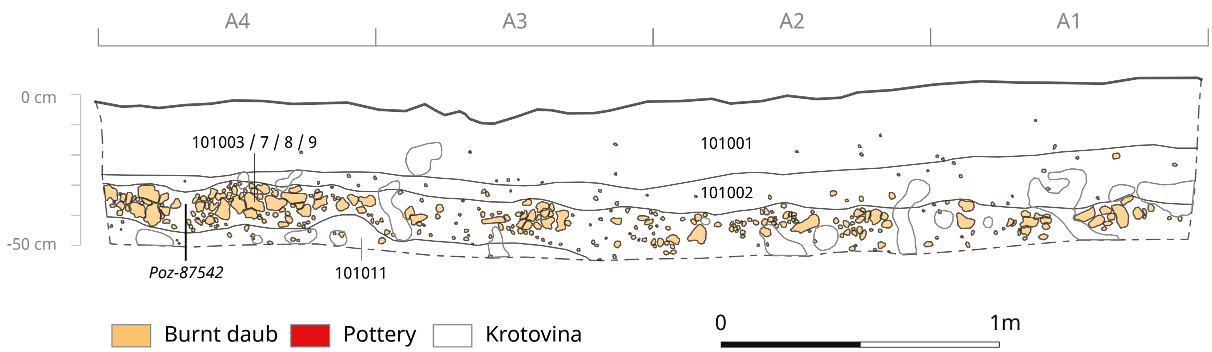


Figure 141. Trench 101 sample context.

6.2.6 Trenches 94 and 102

It was possible to recover sufficient material for radiocarbon dating from both buildings in trenches 94 and 102 (tab. 36). Sample 'Poz-87533' is derived from disarticulated sheep/goat bone, which was retrieved from between the burnt daub of dwelling 59 (fig. 138). The date of this sample, therefore, is considered as a *terminus ad quem* date for the use-life of the building. For dwelling 65, the only suitable material recovered from the burnt daub debris was an undetermined bone fragment (sample 'Poz-87543'), which is also considered as a *terminus ad quem* for this building.

Thus, the use-life of dwelling 59 is dated in the time between 3790-3705 (68.2 %) or 3925-3660 cal BCE (95.4 %), respectively, while for dwelling 65 the use-life falls in the time between 3700-3645 (68.2 %) or 3770-3635 cal BCE (95.4 %), respectively (fig. 142).

6.2.7 Trench 95

It was possible to retrieve sufficient radiocarbon material for both dwelling 60 and the occupational layer observed at trench 95 (tab. 36). Sample 'Poz-87534' was derived from a disarticulated large mammal bone and comes from the former occupational layer (fig. 139). It is, therefore, not directly related to the potential use-life of the building. Sample 'Poz-87535', which is derived from a disarticulated pig bone, was retrieved from the burnt surface/fireplace inside dwelling 60 and, therefore, presents a *terminus ad quem* date.

Thus, the use-life of the dwelling is dated in the time between 3790-3700 (68.2 %) or 3930-3655 cal BCE (95.4 %), respectively. The occupational layer dates between 3940-3770 (68.2 %) or 3950-3710 cal BCE (95.4 %), respectively (fig. 142).

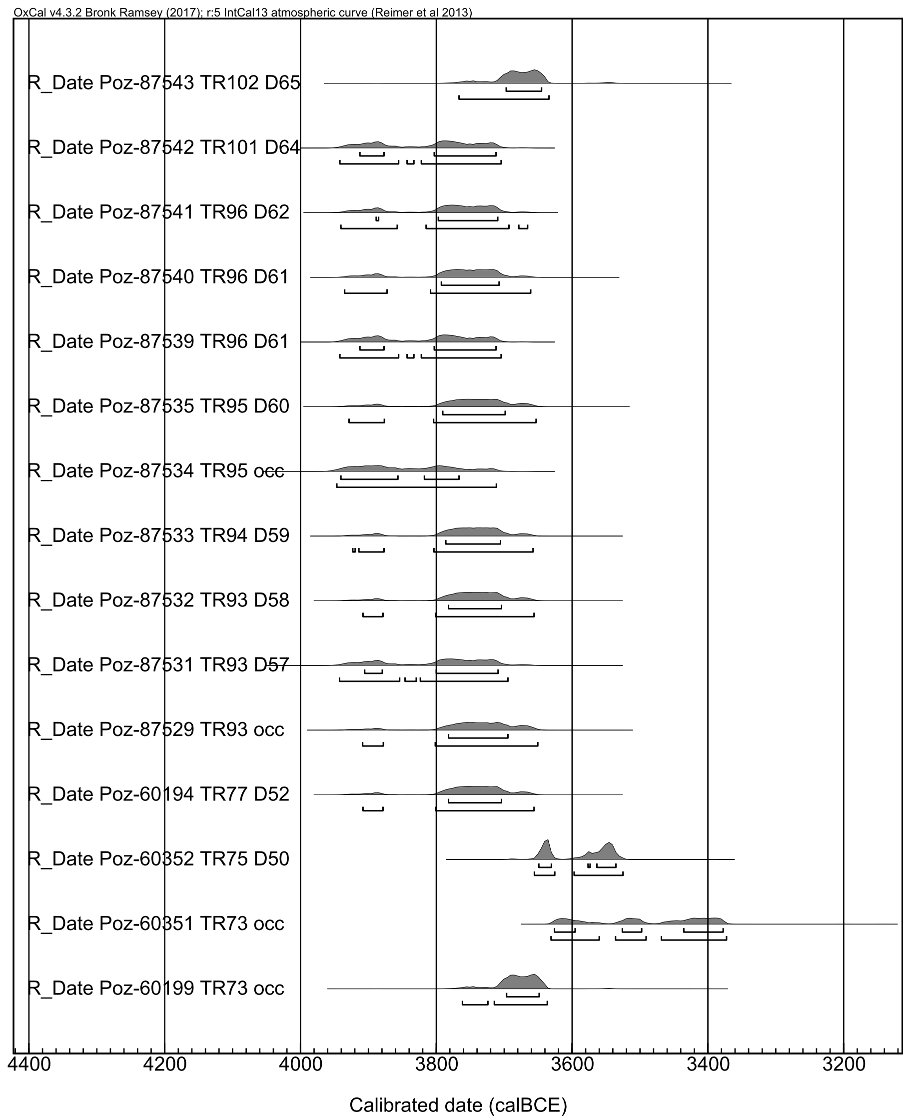


Figure 142. Calibrated radiocarbon dates for test trenches 73, 75, 77, 93, 94, 95, 96, 101, and 102. For data see tab. 36.

6.2.8 Trench 96

It was possible to retrieve sufficient radiocarbon material for both ploshchadki (tab. 36). For dwelling 61, two samples were retrieved. Sample 'Poz-87540' was derived from disarticulated cattle bone and comes from the soil between the upper, burnt daub collapse. A second sample 'Poz-87539' was derived from an unidentified and disarticulated bone and comes from the unburnt interior of dwelling 61. The sample of dwelling 62 (Poz-87541) was derived from an unidentified and disarticulated bone coming from the former ground floor beneath the building.

The two samples from dwelling 61 are considered as *termini ad quos* dates. The building's use-life dates, therefore, in the time between 3890-3710 (68.2 %) or 3940-3660 cal BCE (95.4 %), respectively. Since the sample of dwelling 62 is found beneath the building, it can be either considered as a *terminus post quem*, dating prior to the construction, or as part of the house's assemblage and, therefore, as a *terminus ad quem*. Thus, dwelling 62 dates either in the time between 3915-3715 (68.2 %) or 3945-3705 cal BCE (95.4 %), respectively, or thereafter (fig. 142).

6.2.9 Trench 101

The radiocarbon sample 'Poz-87542' is derived from a charred *Corylus avellana* seed, which was obtained directly from the platform floor of dwelling 64 (tab. 36). This short-lived sample is considered as a *terminus ad quem* date. Therefore, the use-life of the building dates in the time between 3915-3715 (68.2 %) or 3945-3705 cal BCE (95.4 %), respectively (fig. 142).

6.3 Summary of findings

Summing up the results of the modelled and calibrated radiocarbon dates, we can conclude that pit 25 in trench 50 was refilled in the time between 3800-3540 (68.2 %) or 3920-3525 modelled cal BCE (95.4 %), respectively. The lower part of the pit was refilled in the time between 3800-3745 (68.2 %) or 3920-3715 modelled cal BCE (95.4 %), while the upper part was refilled between 3765-3710 (68.2 %) or 3885-3665 modelled cal BCE (95.4 %), respectively. The top layer of the pit dates in the time between 3655-3540 (68.2 %) or 3695-3525 modelled cal BCE (95.4 %), respectively.

Furthermore, the construction pit 26 in trench 52 was dug prior to 3775-3730 (68.2 %) or 3795-3700 modelled cal BCE (95.4 %), respectively, while the dwelling 44 was in use in the time between 3750-3710 (68.2 %) or 3780-3665 modelled cal BCE (95.4 %), respectively.

Pit 27 in trench 60 consists of two layers with demolished dwelling remains. The dwelling in the lower deposit was in use some time between 3910-3760 (68.2 %) or 3940-3730 (95.4 %) modelled cal BCE, respectively, while the dwelling in the upper layer dates between 3775-3710 (68.2 %) or 3800-3665 modelled cal BCE (95.4 %), respectively.

For the pottery production areal, several phases could be distinguished. The initial kiln construction is dated to the time between 3990-3940 (68.2 %) or 4040-3815 modelled cal BCE (95.4 %), respectively. The use-life of the initial kiln, including its repair, is dated via the refill of the southern pit 2. Thus, the initial and second phase of the kiln was in use some time between 3960-3845 (68.2 %) or 3965-3810 modelled cal BCE (95.4 %), respectively. The use-life of the kiln's third phase is dated via the refill of the eastern pit 3. This phase is therefore dated in the time between 3920-3795 (68.2 %) or 3935-3790 modelled cal BCE (95.4 %), respectively. Finally, the waste deposition on top of the last kiln phase is dated between 3800-3720 (68.2 %) or 3930-3695 modelled cal BCE (95.4 %), respectively. Based on these results, pottery production in this area took place in the time between 3960-3795 (68.2 %) or 3965-3790 modelled cal BCE (95.4 %), respectively.

The completely excavated dwelling 54 in trench 92 was constructed in the time between 3950-3880 (68.2 %) or 3960-3805 modelled cal BCE (95.4 %), respectively. Its use-life is narrowed down to the time between 3935-3860 (68.2 %) or 3940-3800 modelled cal BCE (95.4 %), respectively, while the burning event is dated between 3920-3790 (68.2 %) or 3930-3780 modelled cal BCE (95.4 %), respectively.

The areal of the inner causewayed enclosure yielded dates for the whole occupation span at Maidanets'ke. The western ditch segment was refilled in the time between 3955-3810 (68.2 %) or 3965-3800 modelled cal BCE (95.4 %), respectively. The eastern ditch segment was refilled in the time between 3840-3650 (68.2 %) or 3905-3640 modelled cal BCE (95.4 %), respectively. Since the eastern ditch segment shows a sterile layer at the bottom, and was therefore exposed for some time, the layout of this segment probably falls in the same time as the western part. Thus, it is concluded that the inner enclosure was laid out prior to 3965-3955 cal BCE. The eastern ditch was then cut by a construction pit (no. 32) which dates in the time between 3910-3710 (68.2 %) or 3935-3705 modelled cal BCE (95.4 %), respectively. Comparable to the relation between pit 26 and dwelling 44 in trenches 51 and 52, the dated deposition at the bottom of pit 32 is used here as a *terminus post quem* for the construction of dwelling 67. Thus, dwelling 67 was in use some time between 3700-3635 (68.2 %) or 3750-3535 modelled cal BCE (95.4 %), respectively.

Lab ID	Material	Taxon	Radiocarbon age (BP)		age (BP)	N (%)	C (%)	C:N	col (%)	Find ID
Poz-60157	Animal bone	Bos (disarticulated)	4810	±	35	2	4,5	2,3	1	50033
Poz-60186	Charcoal	Quercus ("old-wood")	5050	±	35	-	-	-	-	50038
Poz-60187	Charcoal	Quercus	4980	±	35	-	-	-	-	50073
Poz-60158	Animal bone	Ovis (disarticulated)	5020	±	35	2	4,9	2,5	1,8	50130
Poz-60188	Charcoal	Fraxinus	5005	±	30	-	-	-	-	50140
Poz-60189	Charcoal	Corylus ("old-wood")	5125	±	35	-	-	-	-	50140
Poz-60159	Animal bone	Bos (semi-articulated?)	5020	±	30	0,8	2,4	3	0,1	50197
Poz-60161	Animal bone	Sus (disarticulated)	4965	±	35	2,6	4,3	1,7	1,3	51498
Poz-60162	Animal bone	Sus (disarticulated)	5015	±	35	2,2	5,8	2,6	3	51606
Poz-60190	Charcoal	Quercus ("old-wood")	5165	±	35	-	-	-	-	52029
Poz-60295	Animal bone	Bos (disarticulated)	4920	±	40	0,5	1,9	3,8	0,1	52039
Poz-60347	Charcoal	Quercus ("old-wood")	5125	±	35	-	-	-	-	52042
Poz-60296	Animal bone	Large mammal (disarticulated)	4955	±	35	0,6	2,2	3,7	0,3	52048
Poz-60348	Animal bone	Large mammal (disarticulated)	5020	±	35	1,7	3	1,8	2,3	60113
Poz-60191	Charcoal	Quercus	4970	±	30	-	-	-	-	60132
Poz-60192	Charcoal	Fraxinus	5060	±	35	-	-	-	-	60145
Poz-60349	Animal bone	Bos (disarticulated)	4980	±	35	1,1	3,4	3,1	1,4	60167
Poz-60350	Animal bone	Bos (disarticulated)	5065	±	35	2,5	6	2,4	6,2	60189
Poz-60351	Animal bone	Ovis/Capra (disarticulated)	4710	±	35	0,7	3,2	4,6	1,2	73008
Poz-60199	Animal bone	Medium mammal (disarticulated)	4895	±	35	2,4	9	3,8	3,4	73041
Poz-60352	Animal bone	Bos (disarticulated)	4820	±	30	0,7	2,7	3,9	3,2	75013
Poz-60194	Animal bone	Ovis/Capra (disarticulated)	4970	±	35	1,9	5,7	3	3,4	77012
Poz-60195	Animal bone	Sus (disarticulated)	4940	±	30	1,9	3,7	1,9	2,3	79001
Poz-60200	Animal bone	Ovis/Capra (disarticulated)	4875	±	35	1,1	6,7	6,1	-	79005
Poz-60201	Animal bone	Medium mammal (disarticulated)	4450	±	30	2,5	10,1	4	-	79005
Poz-87513	Animal bone	Medium mammal (disarticulated)	5150	±	35	2,6	9,1	3,5	5,3	80947
Poz-87514	Animal bone	Bos (disarticulated)	4980	±	35	2,9	9,7	3,3	4,1	80071
Poz-87515	Animal bone	not identified (disarticulated)	5055	±	35	1,4	6,4	4,6	1,6	80541
Poz-87516	Animal bone	Medium mammal (disarticulated)	5080	±	35	3,3	10,2	3,1	7	80893
Poz-87517	Animal bone	Ovis (disarticulated)	5020	±	35	2,7	8,7	3,2	8,5	80323
Poz-87518	Cereal grain	Triticum spec.	5075	±	35	-	-	-	-	80487
Poz-87519	Animal bone	Ovis (disarticulated)	5115	±	30	0,8	4,6	5,8	3,8	80649
Poz-87521	Animal bone	Sus (disarticulated)	5020	±	40	0,9	4,8	5,3	2,4	80909
Poz-87523	Animal bone	Bos (disarticulated)	5030	±	35	0,9	5	5,6	1,6	92440

Table 36. List of used 14C data. Samples Poz-60157 to Poz-60352 (after Müller et al. 2017b).

Context ID	Context description	Calibrated BC (68.2 % probability)	Calibrated BC (95.4 % probability)	Modelled date BC (68.2 % probability)	Modelled date BC (95.4 % probability)
50004	From the upper part of the upper infill of the pit (Arch2b). Waste of house “И”.	3645-3534	3656-3521	3653-3539	3695-3525
50004	From the upper part of the upper infill of the pit (Arch2b). Waste of house “И”.	3942-3794	3957-3766	-	-
50009	From the lower infill of the pit (Arch1b). Deposition of two bucrania.	3790-3707	3930-3661	3798-3745	3913-3713
50008	From the lower part of the upper infill of the pit (Arch2a). Waste of house “И”.	3936-3715	3943-3710	3766-3707	3885-3666
50012	From the lower infill of the pit (Arch1b). Deposition of two bucrania.	3905-3712	3940-3704	3801-3738	3917-3713
50012	From the lower infill of the pit (Arch1b). Deposition of two bucrania.	3975-3813	3991-3800	-	-
50012	From the lower infill of the pit (Arch1b). Deposition of two bucrania.	3933-3766	3943-3710	3803-3734	3921-3713
51007	From the platform floor of the building.	3782-3702	3905-3655	3781-3701	3899-3655
51018	From the occupational layer around the house.	3929-3715	3943-3707	3749-3708	3777-3665
52001	Waste from the bottom of the pit. Construction pit for building in trench 51.	4036-3954	4045-3817	-	-
52001	Waste from the bottom of the pit. Construction pit for building in trench 51.	3713-3651	3779-3642	*3772-3730**	*3792-3701**
52001	Waste from the bottom of the pit. Construction pit for building in trench 51.	3975-3813	3991-3800	-	-
52001	Waste from the bottom of the pit. Construction pit for building in trench 51.	3775-3695	3798-3652	3773-3730	3794-3702
60002	From the occupational layer around the pit.	3936-3715	3943-3710	3939-3793	3946-3785
60006	From the third infill of the pit (Arch3). A demolished building.	3777-3707	3893-3661	3783-3718	3895-3666
60009	From the second infill of the pit (Arch2). A demolished building.	3942-3800	3958-3780	3846-3775	3915-3766
60009	From the second infill of the pit (Arch2). A demolished building.	3790-3707	3930-3661	3894-3761	3920-3728
60009	From the second infill of the pit (Arch2). A demolished building.	3944-3801	3959-3785	3847-3776	3916-3766
73005	From the occupational layer between houses.	3627-3378	3632-3373	-	-
73005	From the occupational layer between houses.	3697-3649	3762-3637	-	-
75002	From the greyish layer above the burnt daub remains of the building.	3650-3536	3656-3526	-	-
77003	From within the burnt daub of the building.	3783-3705	3909-3657	-	-
79003	From within the burnt daub of the building.	3761-3661	3777-3654	3769-3692	3784-3662
79002	From the greyish layer above the burnt daub remains of the building.	3695-3640	3748-3538	3680-3637	3706-3536
79002	From the greyish layer above the burnt daub remains of the building.	3320-3025	3336-2945	3333-3088	3341-3022
80036	From inside the daub construction of the first kiln phase.	4036-3825	4041-3808	3987-3942	4037-3813
80007	From the waste deposited on the third kiln phase.	3790-3707	3930-3661	3801-3722	3932-3693
80012	From the upper infill of eastern pit 3. In spatial relation to the third kiln phases loading zone.	3942-3798	3958-3773	3917-3793	3934-3787
80034	From the lower infill of eastern pit 3. In spatial relation to the third kiln phases loading zone.	3952-3805	3961-3796	3869-3796	3934-3791
80013	From the upper infill of pit 2. The first recut of the southern pit assemblage. In spatial relation the first kiln phases loading zone.	3936-3715	3943-3710	3945-3876	3950-3807
80028	From the lower infill of pit 2. The first recut of the southern pit assemblage. In spatial relation the first kiln phases loading zone.	3948-3804	3961-3792	3952-3857	3954-3811
80028	From the lower infill of pit 2. The first recut of the southern pit assemblage. In spatial relation the first kiln phases loading zone.	3967-3815	3978-3801	3958-3845	3963-3807
80013	From the upper infill of pit 2. The first recut of the southern pit assemblage. In spatial relation the first kiln phases loading zone.	3936-3715	3944-3709	3946-3875	3951-3807
92007	From the burnt daub collapse on the podest of the building. Storage area of the main room on the platform.	3939-3772	3946-3713	3917-3791	3932-3782

Lab ID	Material	Taxon	Radiocarbon age (BP)	age (BP)		N (%)	C (%)	C:N	col (%)	Find ID
Poz-87525	Animal bone	Ovis/Capra (disarticulated)	5090	±	40	2,8	9,2	3,3	5	92861
Poz-87526	Animal bone	Ovis/Capra (disarticulated)	5040	±	40	1,5	7,8	5,2	3,5	92561
Poz-87527	Animal bone	not identified (disarticulated)	5035	±	35	3,4	10,9	3,2	7	92710
Poz-87528	Animal bone	Capreolus capreolus (disarticulated)	5055	±	35	3,9	10,7	2,7	2	92711
Poz-87529	Animal bone	Sus (disarticulated)	4960	±	40	1,9	8,5	4,5	4,2	93063
Poz-87531	Animal bone	Ovis/Capra (disarticulated)	5000	±	40	1,1	5,7	5,2	1	93082
Poz-87532	Animal bone	Medium mammal (disarticulated)	4970	±	35	2,5	8,9	3,6	3	93139
Poz-87533	Animal bone	Ovis/Capra (disarticulated)	4975	±	35	1,3	5,4	4,2	1,6	94019
Poz-87534	Animal bone	Large mammal (disarticulated)	5030	±	40	3,3	10,1	3,1	7,6	95020
Poz-87535	Animal bone	Sus (disarticulated)	4970	±	40	1,4	7,8	5,6	6,3	95069
Poz-87539	Animal bone	Bos (disarticulated)	5010	±	35	0,8	6,2	7,8	0,7	96139
Poz-87540	Animal bone	not identified (disarticulated)	4985	±	35	1,1	5,6	5,1	5,5	96143
Poz-87541	Animal bone	not identified (disarticulated)	4995	±	35	2,7	9,1	3,4	7,8	96087
Poz-87542	Seed	Corylus avallana	5010	±	35	-	-	-	-	101031
Poz-87543	Animal bone	not identified (disarticulated)	4890	±	40	2,6	9,7	3,7	4,7	102008
Poz-87545	Animal bone	Bos (disarticulated)	4910	±	40	1,4	7,3	5,2	1,9	110080
Poz-87546	Animal bone	Bos (disarticulated)	4850	±	40	0,7	4,8	6,9	2,3	110176
Poz-87547	Animal bone	Bos (disarticulated)	3370	±	30	2,3	8,4	3,7	3	110332
Poz-87549	Animal bone	Ovis/Capra (disarticulated)	5000	±	35	1,8	7,5	4,2	5,3	110339
Poz-87550	Animal bone	Sus (disarticulated)	4980	±	40	1,2	6,1	5,1	1,8	110417
Poz-87551	Animal bone	Sus (disarticulated)	4955	±	35	2,2	8,7	4	3,4	110306
Poz-87552	Animal bone	Bos (disarticulated)	4960	±	40	1,2	6,3	5,3	2	110358
Poz-87553	Animal bone	Bos (disarticulated)	4910	±	35	2,4	9,8	4,1	3,3	110436
Poz-87554	Animal bone	Sus scrofa (disarticulated)	5035	±	35	2	8,1	4,1	1,9	110484
Poz-87555	Animal bone	Bos (disarticulated)	5090	±	40	1,8	7,6	4,2	2,7	110439
Poz-87556	Animal bone	Sus scrofa (disarticulated)	5010	±	35	1,6	6,8	4,3	1,9	110518
Poz-87557	Animal bone	Large mammal (disarticulated)	4975	±	35	3,9	12,1	3,1	4,7	110250
Poz-87559	Animal bone	Sus (disarticulated)	5030	±	35	2,5	9,9	4	2,3	110560
Poz-87560	Animal bone	Sus (disarticulated)	5090	±	35	3,4	9,9	2,9	1,7	110385
Poz-87561	Animal bone	Bos (semi-articulated)	5130	±	30	1,5	7,6	5,1	2,3	110452
Poz-87606	Animal bone	Bos (semi-articulated)	5045	±	35	3	10,8	3,6	1,3	110363
Poz-87608	Animal bone	Bos (disarticulated)	5045	±	35	1,9	9	4,7	1,8	110172

Table 36 (continued). List of used 14C data. Samples Poz-60157 to Poz-60352 (after Müller et al. 2017b).

Context ID	Context description	Calibrated BC (68.2 % probability)	Calibrated BC (95.4 % probability)	Modelled date BC (68.2 % probability)	Modelled date BC (95.4 % probability)
92016	From the pottery concentration behind the building.	3958-3805	3969-3794	3916-3796	3929-3789
92009	From the central floor of the platform.	3942-3781	3953-3714	3934-3861	3938-3801
92006	From the pottery concentration below the burnt remains of the front porch.	3940-3776	3949-3714	3918-3791	3931-3783
92023	From below the building, under the front porch.	3942-3798	3958-3773	3950-3880	3957-3805
93003	From the occupational layer between both buildings.	3783-3695	3909-3651	-	-
93004	From within the burnt daub of the building.	3906-3710	3943-3695	-	-
93005	From within the burnt daub of the building.	3783-3705	3909-3657	-	-
94003	From within the burnt daub of the building.	3787-3706	3924-3658	-	-
95003	From the occupational layer around the house.	3941-3767	3947-3712	-	-
95013	From the burnt surface/fireplace inside the building.	3791-3699	3929-3654	-	-
96010	From the unburnt interior of the building.	3913-3713	3943-3705	-	-
96011	From within the burnt daub of the building.	3793-3708	3936-3662	-	-
96014	From the former ground floor beneath the building.	3889-3710	3941-3666	-	-
101009	From the platform floor of the building.	3913-3713	3943-3705	-	-
102003	From within the burnt daub of the building.	3698-3646	3767-3635	-	-
110003	From within the burnt daub of the building.	3710-3647	3770-3640	3701-3652	3751-3638
110004	From the southern edge of the platform.	3695-3539	3709-3527	3697-3637	3713-3537
110013	From the occupational layer around the house.	1691-1625	1745-1566	1691-1625	1745-1566
110013	From the occupational layer around the house.	3895-3710	3943-3697	3896-3710	3943-3697
110016	From the refill of the eastern ditch segment.	3797-3702	3937-3656	3794-3733	3901-3692
110016	From the refill of the eastern ditch segment.	3775-3695	3798-3652	3788-3732	3801-3677
110016	From the refill of the eastern ditch segment.	3783-3695	3909-3651	3791-3730	3806-3673
110016	From the refill of the eastern ditch segment.	3706-3652	3766-3641	*3706-3652***	*3766-3641***
110016	From the refill of the eastern ditch segment.	3940-3776	3949-3714	3818-3719	3904-3711
110016	From the refill of the eastern ditch segment.	3958-3805	3969-3794	3841-3770	3903-3712
110011	From the refill of the eastern ditch segment.	3913-3713	3943-3705	3802-3733	3910-3705
110011	From the refill of the eastern ditch segment.	3787-3706	3924-3658	3791-3736	3892-3696
110020	Waste from the bottom of the pit cutting the eastern ditch segment. Construction pit for building in same trench.	3939-3772	3946-3713	3910-3710	3936-3707
110009	From the refill of the western ditch segment.	3957-3806	3966-3797	3955-3808	3964-3799
110009	From the refill of the western ditch segment.	3976-3819	3990-3804	3954-3813	3961-3803
110009	From the refill of the western ditch segment.	3941-3789	3956-3715	3954-3815	3961-3803
110014	From the occupational layer around the ditch.	3941-3789	3956-3715	3941-3789	3956-3715

Further dates were obtained for various test trenches. The occupational layer around dwelling 47 and 48 in trench 73 is dated in the time between 3700-3380 (68.2 %) or 3760-3375 cal BCE (95.4 %) and 3700-3650 (68.2 %) or 3760-3640 cal BCE (95.4 %), respectively.

Therefore, dwelling 50 in trench 75 dates prior to 3655-3650 cal BCE (Müller *et al.* 2017b, 49) and probably belongs in the last dwelling phase of the settlement. The use-life of dwelling 52 in trench 77 is dated in the time between 3785-3705 (68.2 %) or 3910-3660 cal BCE (95.4 %), respectively (fig. 142). For trench 79, the use-life of dwelling 53 is dated in the time between 3770-3695 (68.2 %) or 3785-3660 modelled cal BCE (95.4 %), respectively. At trench 93, the use-life of dwelling 57 dates in the time between 3905-3710 (68.2 %) or 3945-3695 cal BCE (95.4 %), respectively, while for dwelling 58 the use-life falls in the time between 3780-3705 (68.2 %) or 3910-3660 cal BCE (95.4 %), respectively. At trenches 94 and 102, differences between dwellings in a cluster could be observed. The use-life of dwelling 59 is dated in the time between 3790-3705 (68.2 %) or 3925-3660 cal BCE (95.4 %), respectively, while for dwelling 65 the use-life falls in the time between 3700-3645 (68.2 %) or 3770-3635 cal BCE (95.4 %), respectively. The use-life of dwelling 60 at trench 95 is dated in the time between 3790-3700 (68.2 %) or 3930-3655 cal BCE (95.4 %), respectively. At trench 96, the use-life of dwelling 61 dates, therefore, in the time between 3890-3710 (68.2 %) or 3940-3660 cal BCE (95.4 %), respectively. The sample of dwelling 62 is found beneath the building and can be either considered dating prior to the construction, or as part of the dwelling's assemblage. Thus, dwelling 62 dates either in the time between 3915-3715 (68.2 %) or 3945-3705 cal BCE (95.4 %), respectively, or thereafter. Finally, the use-life of dwelling 64 dates in the time between 3915-3715 (68.2 %) or 3945-3705 cal BCE (95.4 %), respectively.

Based on these calibrated *termini ad quos* and modelled dates, the settlement history of the Maidanets'ke 'mega-site' can be described in the following section. This allows us for the first time to analyse the development and decline of such an extraordinary site.

6.4 Development and decline of a Trypillia 'mega-site'

Based on the modelled radiocarbon probability distributions it is possible for the first time to present the detailed chronological development of a Trypillia 'mega-site' (fig. 143). Several conventions are considered to describe the different kinds of activities at Maidanets'ke.

First, dates from the various occupational layers are considered as indicators for general activity on site, since they are almost exclusively derived from domestic species. However, these dates do not necessarily describe Trypillia settlement activity. Thus, second, only *ad quos* dates obtained from burnt house remains are considered as definite indicators of dwelling activity at the site. Third, since numerous events and intervals are dated into a short period of time, at least for the method of radiocarbon dating, only the modelled and unmodelled dates for 68.2 % of the probability density are used here to describe the development. Based on these conventions, the development is described below.

In contrast to previous assumptions (Müller *et al.* 2016a; 2017b), Trypillia activity at Maidanets'ke spans over ca. 350 years ranging from 3990-3640 cal BCE (fig. 144). This is, however, hardly surprising considering the 'overgrown' appearance of the settlement plan in comparison to other renewed plans of 'mega-sites'. Based on the *termini ad quos* dates for burnt buildings, the dwelling activity at the site ranges from 3935-3640 cal BCE, with a probable peak occupation in the time between 3765-3710 cal BCE. While the general activity at the site ranges from

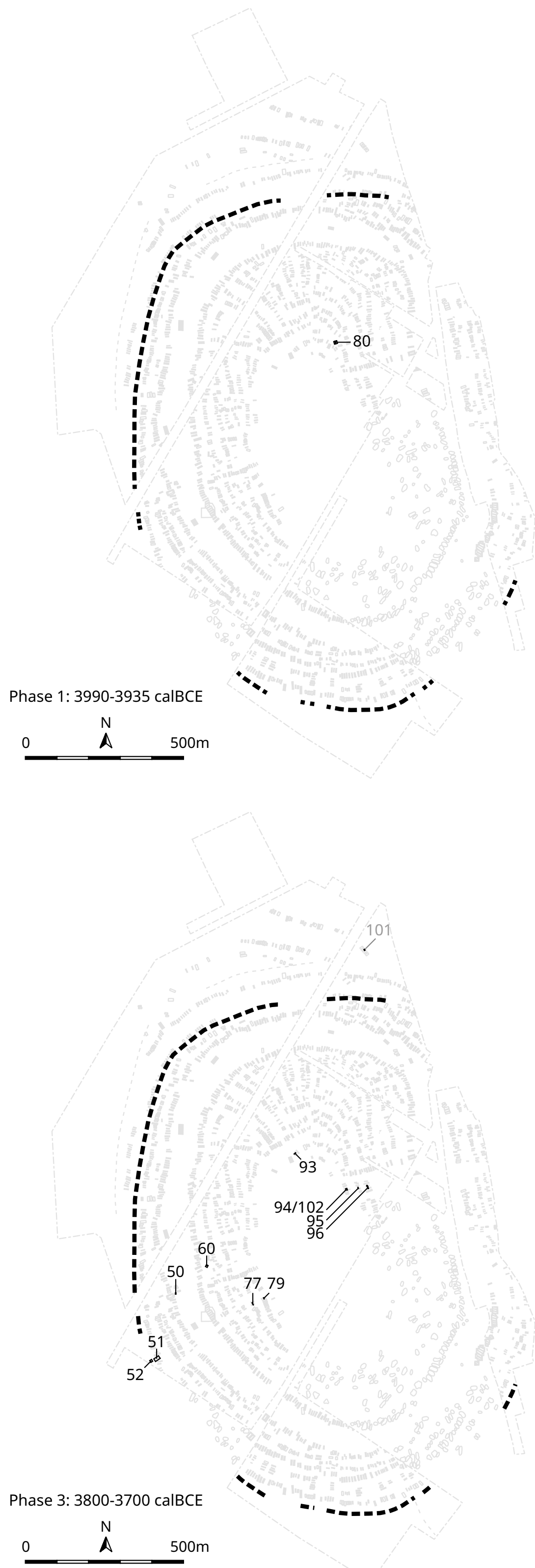


Figure 143. Spatio-temporal development of Maidanets'ke I.

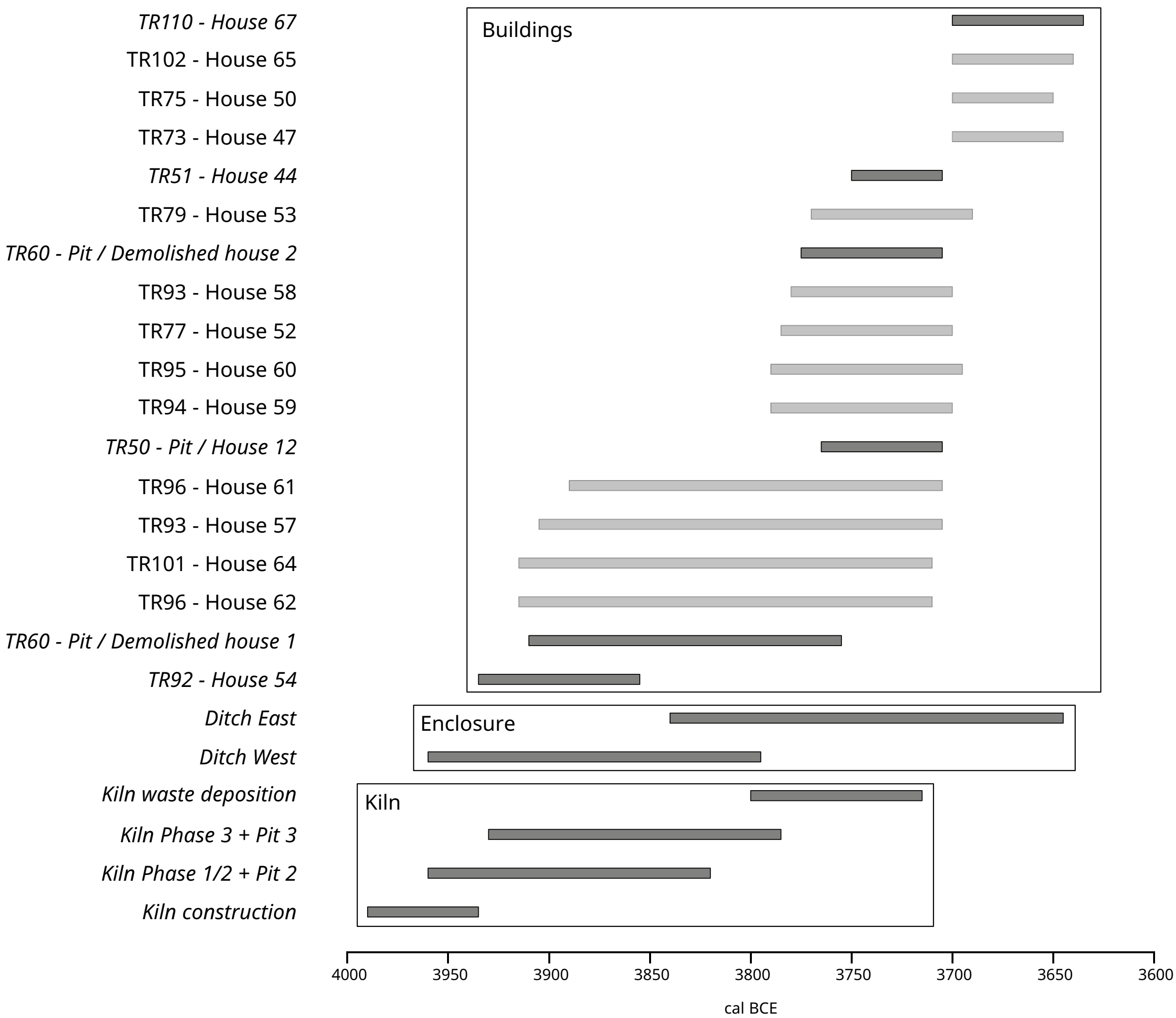


Figure 144. Calibrated and modelled radiocarbon ranges (68.2 %) for dwellings and other features at Maidanets'ke. Modelled dates in dark grey and italic. See tab. 36.

3990-3535 cal BCE, other dates from the former occupational layers date to the end of Trypillia CII (3335-3090 cal BCE) or even the later times (1690-1625 cal BCE).

The earliest phase of Maidanets'ke between 3990-3935 cal BCE (phase 1) is characterised by the establishment of an infrastructure (fig. 144). Here, the earliest activity is marked by the construction of the kiln in the centre of the site as well as the layout of the inner western ditch, and probably its eastern part. This phase strongly suggests that Maidanets'ke was planned as a large site from its very beginning. Interestingly, the claim of land (causewayed enclosure) and the supply of goods (pottery kiln) so far predate the actual dwelling activities. This behaviour indicates a colonisation pattern for these sites in the forest steppe region.

The second phase between 3935-3800 cal BCE is characterised by the first dwelling activity and is observed in two parts of the site (fig. 144). First, most activities are found in the built area inside the inner main ring of dwellings. Here, with dwelling 54 in trench 92, the earliest building is found until now at the innermost radial line in the northwestern centre of the site. However, with the house in trench 101, the outer rings that do not fit into the general layout of the main site are additionally dated in this phase (fig. 144). This indicates that while there might have been a wider effort among the communities to establish the site, as can be seen in the initial phase, not all inhabitants felt obliged to this plan. Furthermore, the lower deposit of the demolished house remains in trench

60 also date into this period. One could speculate that deviating from the traditional layout was a taboo, which was punished by the demolition of one's house or cluster, and thus robbing the insurgents of their ancestry or lineage.

In the third phase between 3800-3700 cal BCE, Maidanets'ke reaches its peak occupation with the highest potential of contemporaneous dwellings (fig. 144). From a chorological perspective, it is characterised by a massive expansion of built space inside the inner enclosure. Here, the inner innermost eastern, northern and southwestern parts are settled as well as the inner and outer main ring up until the outer ring of dwellings right behind the inner enclosure. Interestingly, the time interval for this peak occupation is – with ca. 55 years between 3765-3710 cal BCE – in line with traditional assumptions of 'mega-site' occupations (see 2.4 The regional settlement and population development).

During the last phase between 3700-3640 cal BCE (phase 4), additional dwellings were built in existing clusters of mostly destroyed dwellings, as can be observed in trenches 94 and 102 (fig. 144). In the case of trenches 94 and 102, dwelling 65 was slightly set-off from the main orientation of the cluster (see fig. 55). This lack of building space is general evidence of the 'overgrown' character of the phase. However, while earlier dwellings were evidently demolished and deposited into pits in the previous phase, this effort is not taken during the latest stage. Instead, the inhabitants expanded beyond the original layout, as can be observed at trench 110 (fig. 143). Here, dwelling 67 beyond the inner enclosure dates into the final phase as well as the latest dates for the eastern ditch segment. From a chorological perspective, it is therefore a strong indicator that other features outside the original delimitation belong within the final phase too, while the inner enclosure is levelled.

7 Modelling population development for Maidanets'ke

Since their discovery, the question on the potential urban character of large Trypillia sites has been raised. One of the key factors to answer this question, besides settlement functions and absolute size, is the probable number of coeval inhabitants (Müller *et al.* 2016a). Robust population estimates help us to understand past economic systems and social organisations. Subsistence evidence, carrying capacities, and the environmental impact can be cross-checked to evaluate population estimates and identify potential factors for settlement abandonment (Ohlrau 2015; Ohlrau *et al.* 2016; Dal Corso *et al.* 2019). Certain population sizes seem to imply different levels of social institutions (Feinman 2011), whereas aggregations of people are also seen as main drivers for innovation (Smith 2019). Hence, robust population estimates are essential for the characterisation of the Trypillia 'mega-site' phenomenon. One challenge in dealing with Trypillia population dynamics is the scarcity of burial evidence. Only for special contexts, such as the Verteba cave (Kadrow 2013; Kadrow and Pokutta 2016) or smaller settlements after the decline of large sites, do we have sufficient data (Diachenko 2016). Thus, for the time of the 'mega-sites' we must rely on indices related to built-up space (Kolb *et al.* 1985; Porčić 2012).

In addition to calculating the range of coeval inhabitants at Maidanets'ke, the following section is also concerned with the question, whether a 'mega-site' could grow intrinsically by natural population development or if Trypillia societies were as mobile as traditionally assumed (Diachenko and Menotti 2012; Diachenko and Zubrow 2015), abandoning and founding new sites in the Southern Bug Dnieper interfluve mainly by residential mobility.

7.1 Previous estimations

Population estimates for Trypillia 'mega-sites' have a long tradition since the beginning of the second research phase in the 1970s (tab. 37). After the initial geophysical survey at Maidanets'ke, Shmagliy and colleagues (1975, 69) calculated between 10,000-15,000 inhabitants based on the number of reconstructed buildings. Later, Shmagliy (1982, 202) estimated between 20,000-24,000 coeval inhabitants based on initial excavation results. Further excavations led to the observation that there were at least two occupation phases at Maidanets'ke and that not all buildings were dwellings of nuclear families (Shmagliy and Videyko 1987). Buildings, such as complex 'M', could have housed extended families, and other buildings had economic functions. Thus, the number of coeval inhabitants was recalculated to lie between 6000-9000 residents (*ibid.*). In his regional study on the economic impact of Trypillia

Authors	Estimate
Shamgliy, Dudkin and Zinkovsky 1975	10.000-15.000 p
Shmagliy 1980	20.000-24.000 p
Shmagliy and Videiko 1987	6.000-9.000 p
Kruts 1989	8.267 p
Shmagliy and Videiko 2004	7.220-10.108 p
Rassmann *et al.* 2014	12.000-46.000 p
Chapman *et al.* 2014a	5.000-8.000 p
Ohlrau 2015 (AVRAT)	22.300-23.800 p
Ohlrau 2015 (nuclear families per household)	10.350-16.100 p
Ohlrau 2015 (roofed livingspace)	7.400-7.900 p
Ohlrau *et al.* 2016	6.600-23.800 p
Müller *et al.* 2016a	6.000-23.000 p

Table 37. Previous population estimates for Maidanets'ke.

settlements, Kruts (1989) calculated 8267 coeval inhabitants for Maidanets'ke based on the number of dwellings inferred from the geomagnetic survey. Summing up the excavation results of the Trypillia Complex Expedition at Maidanets'ke, Shmagliy and Videyko (2004, 113-114) re-estimated the population and made their methodology explicit. Instead of counting the geomagnetic anomalies of the Dudkin survey, they calculated the density of dwellings per hectare (8.75) over the settlement area of Maidanets'ke (200 ha), resulting in 1750 dwellings in contrast to the 1550 dwellings of the geomagnetic survey. Furthermore, they estimated that only 75 % of all buildings were residential, and that 90 % of these dwellings were inhabited by nuclear families consisting of 5-7 people, while the remaining 10 % were inhabited by extended families of 10-14 people. In result, Shmagliy and Videyko (*ibid.*, 114) estimate between 7220-10,108 coeval inhabitants.

With the renewed investigations at Maidanets'ke, population estimates underwent further revisions (Rassmann *et al.* 2014). Based on the high-precision survey, the number and type as well as the floor area of buildings became observable. According to the preliminary interpretation of the radiocarbon dating, it was concluded that either all burnt buildings or both burnt and presumably unburnt buildings were inhabited contemporaneously. With an average building size of 77 m² and a floor area demand of 5-15 m² per person, Rassmann and colleagues (*ibid.*, 132) estimated between 12,000 to 46,000 coeval inhabitants for Maidanets'ke (tab. 37).

Chapman and colleagues (2014, 393) estimated between 5000-8000 inhabitants for Maidanets'ke based on a misreading of Rassmann and colleagues (2014) in which they assume 1960 instead of 2960 dwellings estimated from the renewed geophysical survey (tab. 37).

In a detailed approach, the ratio between burnt and presumably unburnt buildings (78 %) was used to determine the maximum coeval population at Maidanets'ke considering various indices (Ohlrau 2015). To keep the estimated populations comparable to settlements of other phenomena, the traditional approach by Cook (1972) of calculating 4.5-7 inhabitants per household was given as a reference. For Maidanets'ke, this resulted in a coeval population of 10,350-16,100 persons with an average of 11,500 inhabitants. Based on the high-precision geomagnetic survey, the built-up area and an extrapolation for areas yet to be measured were used to estimate the population (tab. 37).

According to floor area demands per person for sedentary and agricultural subsistence-based societies (Porčić 2012), a coeval population between 22,300-23,800 inhabitants was estimated (Ohlrau 2015, 66). However, according to the architectural reconstructions of Trypillia buildings by Chernovol (2012), only around one third of the buildings were classified as living space. Thus, in accordance to LeBlanc's (1971) methodology to calculate the floor-area demand for roofed living-space, a coeval population between 6900 to 8300 with an average of 7400 to 7900 inhabitants was estimated (Ohlrau 2015, 67). The ranges of these various calculations were later combined and used for land-use estimations (Ohlrau *et al.* 2016). Overall, the plausible population range of Maidanets'ke was given as 6600-23,800 coeval inhabitants (tab. 37).

Later, Müller and colleagues (2016a, 164) calculated a peak population between 6000-23,000 with an average of 14,500 coeval inhabitants for Maidanets'ke. This was based on the premise that only half of all buildings were inhabited between 3800-3700 cal BCE and calculations using the same methodology as presented in Rassmann and colleagues (2014).

7.2 Methodology

The high-precision survey of Maidanets'ke allows for the application of various indices. Since Trypillia societies did not bury their dead in an observable manner, the range of estimates is limited to family sizes per dwelling and floor area demand constants per person. Kolb (1985) provided a thorough overview of classic approaches to this issue and its pitfalls. For both the area-per-person and the family or household size approach, there are culturally specific and cross-cultural solutions to consider. A general limitation of both approaches is the range of the ethnographic record. Dwelling area demands per person vary with the environmental setting, since vernacular architecture is usually adapted to climate conditions (Rapoport 1969). In addition, floor area demand reportedly changes with the mode of subsistence and family type (Porčić 2010; 2012). Likewise, the universal assumption of a dwelling being equal to a household and nuclear family must be evaluated for specific cases.

For the family or household size approach, various estimates were proposed, which are mostly specific to certain regions (Kolb *et al.* 1985, 585). The cross-cultural estimates by Cook (1972) are reported here, since they are widely used and thus ensure a comparability to population sizes of other case studies. In his definition, a household was defined as the total number of persons sharing a dwelling in which they eat, sleep, reproduce and care for the young. In result, the size of a nuclear family sharing a household was estimated to lie between 4.5-7 members (*ibid.*, 13). Specifically for the Trypillia case, Diachenko (2016) reconstructed the average family size based on mortuary remains from the Vykhvatyntsi cemetery (Trypillia CII). According to the sex-age-profiles, he estimated an annual growth rate of 0.3 % for this community. The average nuclear family size was then reconstructed to lie between 3.9-4.7 members (*ibid.*, tab. 1).

The area per person approach goes back to Naroll (1962), who observed a linear relationship between household members and dwelling size. As a result, he postulated a constant floor area demand of 10 m² per person to infer the size of past populations from architectural remains. Besides approaches trying to specify the floor area demand for certain cases, such as extended households or marital residence patterns (Casselberry 1974; Porčić 2010), Brown (1987) assembled the largest cross-cultural sample size to test the relationship between the average number of household members (AHS) and the average dwelling area (AHFA). While he observed a complex relationship between the two variables, the cross-cultural average was given as a floor area demand of 6 m² per person (AVRAT). The current state of research is represented by Porčić's (2012) refinement of the AVRAT constant. He recoded Brown's (1987) dataset to distinguish between the floor area demand for sedentary, agriculturally based societies, on the one hand, and mobile societies on the other hand. In result, a difference between the area demand for mobile and sedentary societies was observed. Here, the refined AVRAT constant for sedentary societies is used. It is given as a median area demand of 6 m² per person, a mean of 6.97 m² per person, and a standard deviation of 4.82 m² per

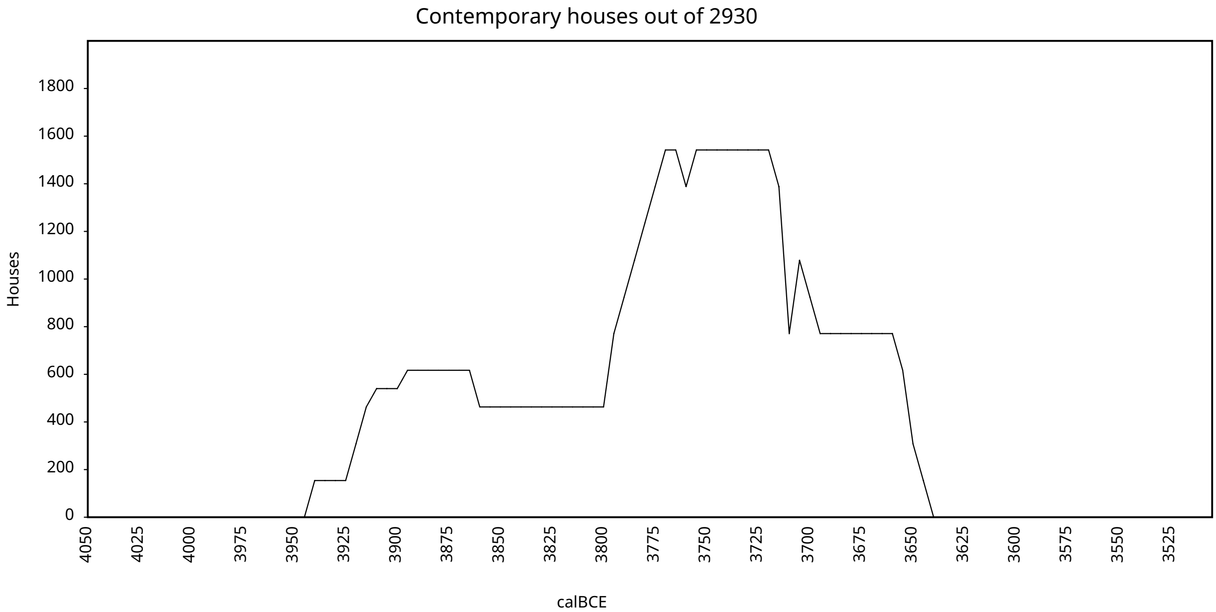


Figure 145. Potential amount of contemporary buildings per time interval based on the 68.2 % probability distribution ranges of calibrated or modelled termini ad quos dates for a total of 19 houses at Maidanets'ke I. For data see appendix 13.

person (Porčić 2012, 79). In addition, LeBlanc's (1971) methodology to only account for roofed living-space is used. For Trypillia dwellings, this results in one third of the total dwelling area (Ohlrau 2015).

Based on the current state of the geomagnetic survey, a total number of 2930 dwellings is estimated for Maidanets'ke (see 4.1 Geomagnetic survey). For the number of clearly burnt buildings, the floor area can directly be derived from the geomagnetic plan (124,091 m²). The dimensions of lesser burnt, eroded, and expected buildings from the Dudkin survey must be estimated from the average building area known from clearly burnt structures (77 m²). Thus, for the remaining 1171 buildings further 90,167 m² are to be expected. Applying LeBlanc's (1971) methodology on Trypillia dwellings, one third of the estimated floor area can be calculated as actual living-floor space (71,419 m²). But how many dwellings were occupied at the same time?

To calculate the total number of coeval dwellings at Maidanets'ke, the ranges of radiocarbon dated dwellings are summed up as a simplified method of summed up probability distributions, used otherwise for large scale demographic studies (Shennan and Edinborough 2007; Shennan 2009; Shennan *et al.* 2013; Brown 2015; Zahid *et al.* 2016). Overall, the remains of 19 houses were dated within the renewed body of research at Maidanets'ke. Here, only the 68.2 % probability range, and not the probability distribution of the calibrated dates is used (fig. 145). The range of each dwelling is counted as 1 in five-year steps except for four dwellings, which fall into a plateau of the calibration curve between 3900-3800 cal BCE (fig. 144). To compensate for the uncertainty of these contexts, they were counted as 0.5 and fall both in the second and third occupation phase of Maidanets'ke. By doing so, the total number of dated dwellings remains the same and an equal probability for the dwellings' occurrences in the second or third phase is provided. Finally, the number of contemporaneous dwellings out of 19 is extrapolated to the total number of estimated dwellings at Maidanets'ke.

Method	Range	Phase 1	Phase 2	Phase 3	Phase 4
Floor area (Method: Porcic 2012; LeBlanc 1971)	Minimum	303	1272	3150	1575
	Median	595	2500	6190	3095
	Maximum	1688	7091	17559	8780
Household (Method: Diachenko 2016)	Minimum	571	2400	5942	2971
	Maximum	689	2892	7161	3580
Household (Method: Cook 1972)	Minimum	659	2769	6856	3428
	Maximum	1026	4307	10665	5333

Table 38 (above). Current population estimates for Maidanets'ke.

7.3 Population development of a 'mega-site'

In result, the occupation at Maidanets'ke starts relatively modest with around 5 % of the buildings being coeval, which makes up around 145 households (3571 m²) during the initial phase of occupation. Based on floor area demands, this makes up an initial population of 300-1690 coeval inhabitants with a median of 600 (tab. 38). Alternatively, based on the range of late Trypillia family sizes, the initial population is estimated between 570-690 coeval inhabitants (tab. 38). This is followed by a first peak of the accumulated probability ranges between 3900-3850 cal BCE during the second phase of occupation. With around 21 %, around 615 households (15,000 m²) probably existed at the same time. According to floor area demands, the coeval population during the second phase ranges between 1270-7090 inhabitants with a median of 2500 people (tab. 38). Based on family size, the range lies between 2400-2890 coeval residents (tab. 38). The occupation at Maidanets'ke reaches its peak with a rapid boom in the third phase between 3800-3725 cal BCE, where possibly around 52 % of all buildings were in use, which makes up around 1520 households (37,140 m²). During this peak, the potential coeval population, based on floor area, ranges between 3150-17,560 inhabitants with a median of 6190 (tab. 38). Taking average family sizes into account, the peak population can be narrowed down to 5940-7160 residents (tab. 38). During the decline of Maidanets'ke, around 26 % of the dwellings remain occupied, which makes up around 760 households (18,570 m²). In this last phase, a floor area based coeval population can be estimated between 1575-8780 inhabitants with a median of 3100 residents (tab. 38). According to family size estimates, the declining population can be narrowed down to 2970-3580 coeval residents (tab. 38).

Thus, the detailed chronological results suggest a lower peak occupation, which, however, still lies within the lower third of the previously estimated contemporary population at Maidanets'ke (Ohlrau 2015, 67). Regarding the assumption that Trypillia 'mega-sites' could represent low-density urban settlements (Chapman and Gaydarska 2016a), which are defined by population densities below 10 inhabitants per hectare (Fletcher 1995), one finds indeed a drop below this threshold at certain times during the occupation of Maidanets'ke (tab. 39). However, it is questionable if the initial and final occupation phases should be considered to define the overall character of the site. On average, the population density for the second up to the final occupation phase at Maidanets'ke range between 14.7 to 36.4 inhabitants per hectare (tab. 39). This population density is calculated according to respective population estimates per phase and the interior of the inner enclosure (170 ha).

Method	Range	Phase 1	Phase 2	Phase 3	Phase 4
Floor area (Method: Porcic 2012; LeBlanc 1971)	Minimum	1.8	7.5	18.5	9.3
	Median	3.5	14.7	36.4	18.2
	Maximum	9.9	41.7	103.3	51.6
Household (Method: Diachenko 2016)	Minimum	3.4	14.1	35.0	17.5
	Maximum	4.1	17.0	42.1	21.1
Household (Method: Cook 1972)	Minimum	3.9	16.3	40.3	20.2
	Maximum	6.0	25.3	62.7	31.4

Table 39. Current population density estimates for Maidanets'ke based on a settlement size of 170 ha for the interior of the inner enclosure and the renewed population estimates.

7.4 Intrinsic growth or aggregation?

One of the key questions regarding Trypillia 'mega-sites' concerns which factors drove their development. Traditional research suggests that these sites were occupied successively with migration from one place to another after resource depletion (Diachenko and Menotti 2012). To test this assumption, the above estimated initial and peak populations at Maidanets'ke, based on floor area demand, as well as intrinsic growth rates are considered in standard exponential and logistic population models (Porčić 2012). While with an exponential model no limitations to population growth are assumed, a logistic model takes a potential limitation such as carrying capacity of the environment into account. If the settlement grew to its peak population size by natural population increase, the duration to grow to its peak would fit Maidanets'kes radiocarbon dating between the first and the third occupation phase of around 200 years. If this were not the case, residential mobility could have played a major role in the development of 'mega-sites'.

Current approaches in modelling former population developments in Europe combine a juvenility index of Neolithic cemeteries with summed calibrated date probability distributions of radiocarbon dates (Downey *et al.* 2014, 6). After a large shift during the Neolithic demographic transition (Bocquet-Appel 2002; 2008), the intrinsic growth rate was determined to lie around 0.172 % *per annum* for the European Neolithic (Downey *et al.* 2014, 6). Nevertheless, having the regional population dynamics at hand (see fig. 5), the specific intrinsic growth rate of populations in the research area can be determined. Calculating a log-log transformed linear model of the regional number of dwellings per phase results in a growth rate of 0.417 % *per annum* (r^2=0.241). As cited above, Diachenko (2016) reconstructed an annual growth rate of 0.3 % based on mortuary remains.

Applying both the regional and the reconstructed intrinsic growth rate to an exponential and logistic population model result in time spans vastly exceeding the expected 200 years of development (fig. 146). With developments of over 2500 years needed for the logistic model and over 700 years for the exponential model to reach the estimated peak occupation at Maidanets'ke, solely intrinsic demographic developments appear highly improbable. Thus, the results strengthen the traditional view on large Trypillia settlements, which assumes that they were rather a product of moving communities.

7.5 Summary of findings

The modelling of population developments at Maidanets'ke is based on the new internal chronology of the site. During the peak occupation between 3800-3700 cal BCE, around 52 % of the observed dwellings existed contemporaeously. This makes up around 1520 households with a potential coeval population of 3150 to 17,560 inhabitants and with a median of 6190 people based on estimates for floor

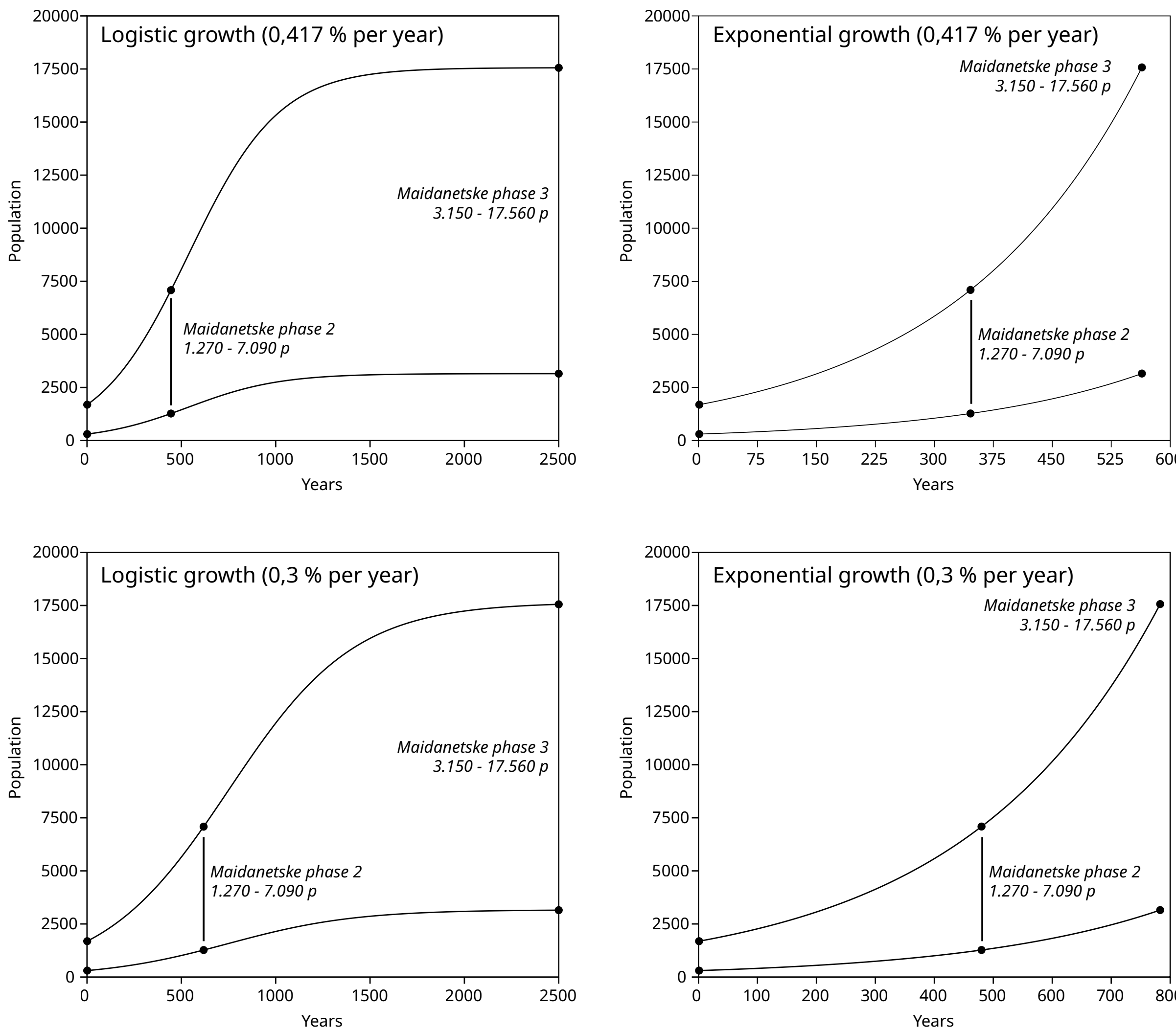


Figure 146. Exponential and logistic model of the population development at Maidanets'ke I. Estimates based on floor area demand were used.

area demand. The population density for the second up to the final occupation phase at Maidanets'ke ranges on average between 14.7 to 36.4 inhabitants per hectare, calculated according to respective population estimates per phase and the interior of the inner enclosure of around 170 ha. Only in the initial occupation phase do the density estimates drop below 10 inhabitants per hectare, which represents the threshold for the characterisation of low-density settlements. Thus, in contrast to British interpretations, it is argued here that Trypillia 'mega-sites' do not qualify as low-density urban sites. Finally, the question was addressed whether 'mega-sites' could develop via internal population growth, or if residential mobility might have played a role in their development. In result, the applied exponential and logistic models, which were informed by regional and natural growth rate estimates, show that it would have taken between 700 to 2500 years for Maidanets'kes initial population to grow to its peak population. Since this massively exceeds the actual range of development, it is concluded here that residential mobility most probably played an important role in the development of Trypillia 'mega-sites' such as Maidanets'ke.

8 Maidanets’ke in regional context

With the internal development of a ‘mega-site’ described above, a next step is needed to understand the wider dynamics of the Trypillia settlement system. To do so, a regional geomagnetic survey in the vicinity of Maidanets’ke I was conducted in 2016. In the following part, the methodology to identify aspects of the settlement pattern as well as the results and further implications for the question of urbanism are presented.

8.1 The regional geomagnetic survey 2016

Within the new body of research, the neighbouring site of Nebelivka plays a special role as the only site completely surveyed until now. Here, we can observe the entire layout of a CTCC ‘mega-site’ to compare it with the partial plans of the other sites. As Chapman and Gaydarska (2016a, 293) noted, there is variability between each settlement. Near absence and changing orientation of exceptional buildings and, in the case of Dobrovody and Tal’yanky, missing ditches were interpreted as different constitutions of society (Chapman *et al.* 2016, 129). Although the observed differences between settlements are acknowledged here, the focus lies on the general settlement pattern. For this sake, as a hypothesis, the differences are treated as various stages of development. Each site and its particularities are recognised, but they are contextualised with respect to the overarching question of development and decline. By doing so, we can describe Maidanets’ke as overgrown and Tal’yanky as unfinished in comparison to Nebelivka. In a diachronic perspective, this holds a lot of potential to describe their decline. However, working on ‘mega-sites’ without deeper knowledge of smaller sites will not help us to understand how they could develop in the first place. Thus, the spring campaign of 2016 had two main aims:

First, to survey smaller sites in the perimeter of the ‘mega-sites’ to check which layout principles they followed, if they show the same features observable for the larger settlements by the new means of geomagnetic prospection and if so, how many of these features are detectable. This contributes to a discussion of their possible function as a starting point of a ‘mega-site’ or as a satellite settlement when relatively contemporaneous to a larger site.

Second, to verify the assumed general settlement pattern deduced from the complete plan of Nebelivka. During the interpretation of the Maidanets’ke plan, larger buildings in the main settlement ring were labelled as ‘mega-structures’ in analogy to the feature excavated in Nebelivka. But it soon became clear that one had to differentiate between the ring buildings often only detected by their burnt walls also present in Nebelivka, and the building B5, which is at least two times larger and consists of both burnt walls and ploshchadka parts. This ‘mega-structure’ is located

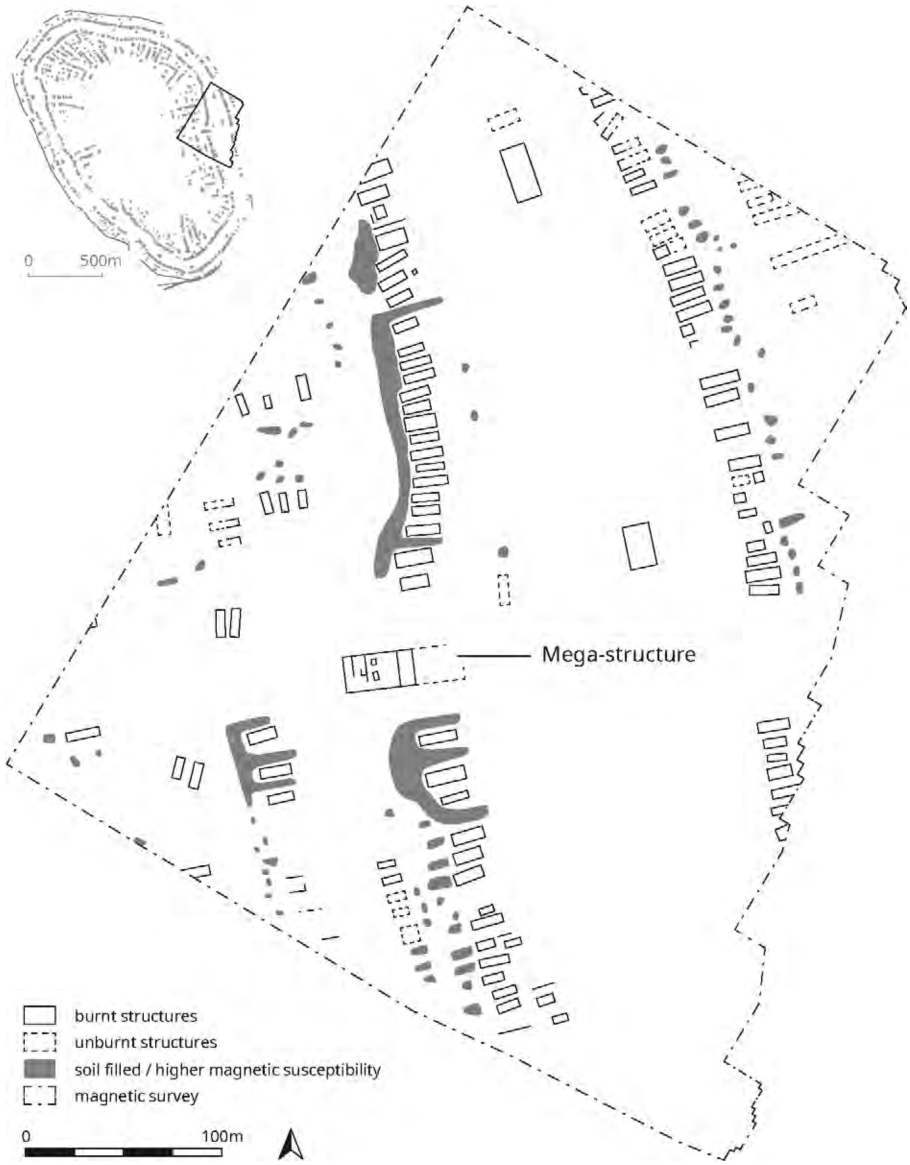


Figure 147. The location of the 'mega-structure' at Nebelivka (modified after Chapman et al. 2014a).

in the eastern part of the inner ring of buildings and is set apart in an entrance area to the free space in the centre of Nebelivka (fig. 147). Similar patterns were observable in the eastern central part of Maidanets'ke and Hlybochok based on the previous survey by Dudkin. Thus, the task was to efficiently survey specific expected locations at other sites to check if the 'mega-structure' was a singularity or part of a larger pattern.

8.1.1 Survey method

To measure the large-area, the magnetometer survey system (Sensys MAGNETO® MX V3) with 8 Fluxgate gradiometers of the Graduate School 'Human Development in Landscapes' was used. The probes (FGM650/3) have a sensitivity of 0.6 V/µT and a measuring range of ± 8000 nT. Measurements were recorded at a fixed distance of 50 cm between the probes and 20 cm above ground level. Records were geolocated with a system of two interlinked GPS (RTK DGPS Leika GNSS): one stationary and one on the carrier. This allows a position accuracy of ± 1 cm per recorded measurement. With an average walking speed of 3.6 km/h in the pushing variant and a 20 Hz recording frequency of the DGPS, we end up with a geolocated record every 5 cm, resulting in a high-resolution grid

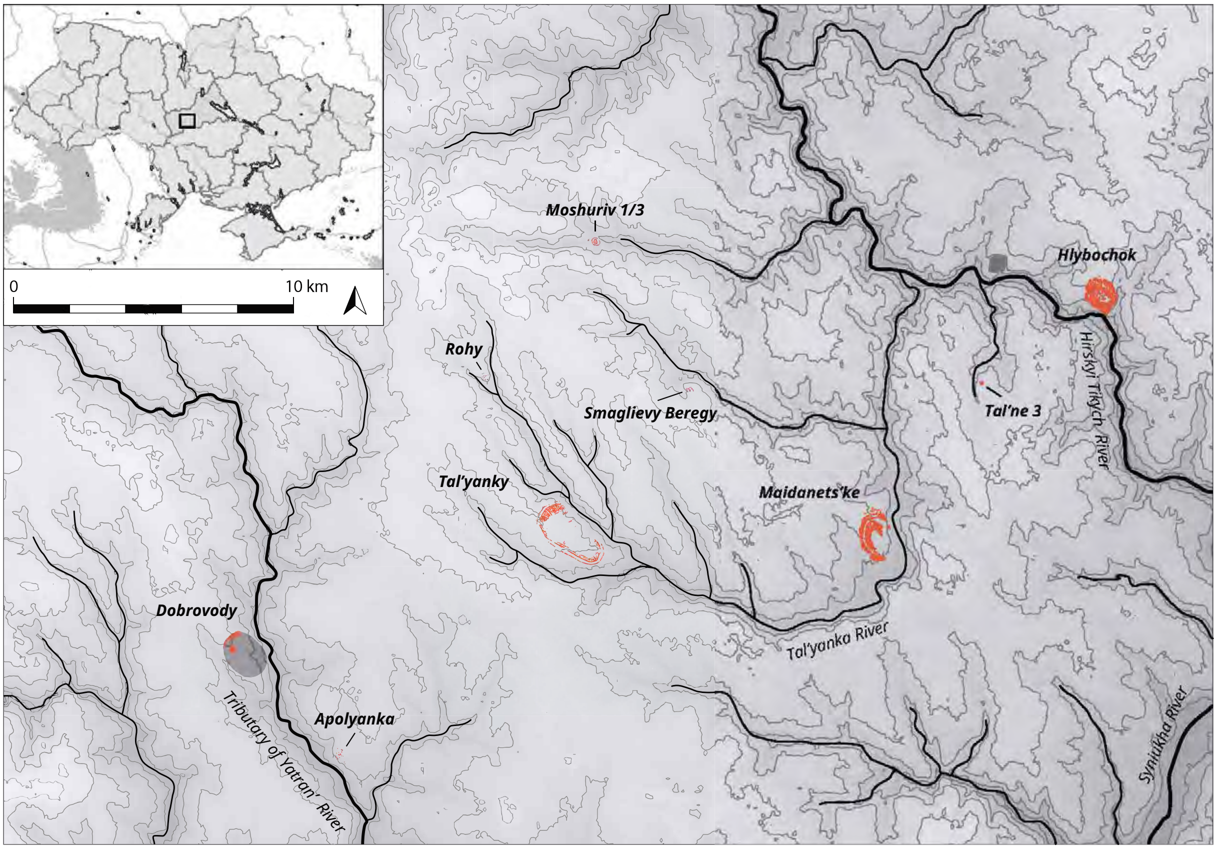


Figure 148. Location of surveyed sites by the Ukrainian-German team in the Uman region.

of 50 x 5 cm. In a first step, the recorded sensor data were linked to GPS coordinates to convert them as an interpolated raster in a global coordinate system (here: UTM 35/36 North) with the software DLMGPS®. In a second step, the raster data were imported into the software MAGNETO ARCH® to generate a grey-scale map of the survey, which can be exported to various GIS programs for interpretation. The results are displayed with varying flux density in the respective plans.

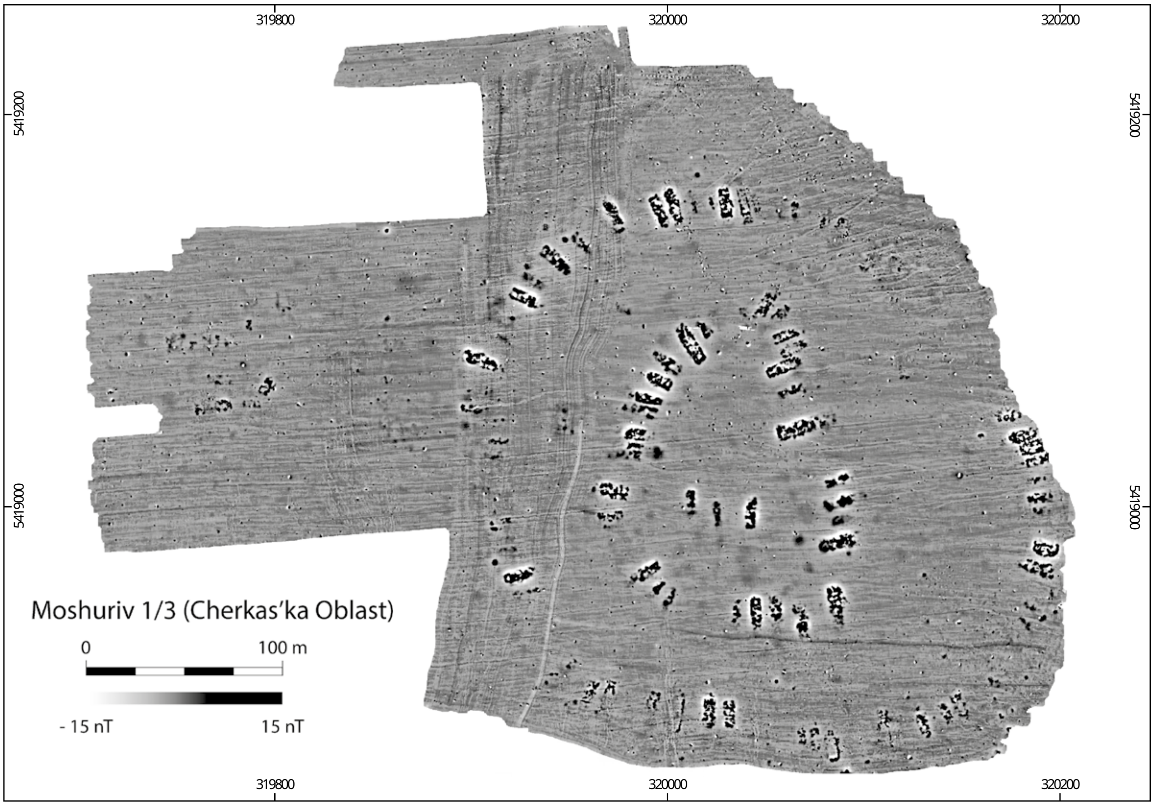
8.2 Smaller sites

During the spring campaign of 2016, it was possible to survey four smaller settlements in relation to the 'mega-sites' of Cherkas'ka Oblast (fig. 148). Previously researched and dated sites in the vicinity of the Ukrainian-German research focus around Maidanets'ke were of main priority. For the relationship of Maidanets'ke to its surrounding sites, the results for Moshuriv 1/3 and Tal'ne 3 are of importance since they belong to the same local group and relative timeframe of Tomashivska 3 (after Diachenko and Menotti 2012).

8.2.1 Moshuriv 1/3

The site is located on a slope to the west of today's Moshuriv (Tal'nivs'kyi Raion in Cherkas'ka Oblast) (48°53'52.88"N / 30°32'39.20"E) at 185 m a.s.l. It is relatively dated to CTCC phase CI, Tomashivska local group stage III/I (after Diachenko and Menotti 2012).

First investigations started in 1981 with a geomagnetic survey of 9 ha by V.P. Dudkin, capturing half of the settlement and several anomalies outside of the assumed double ring layout, and excavations by V.A. Kruts and S.M. Ryzhov revealing buildings dated to phase CI. Further investigations in 1994 by S.M. Ryzhov revealed



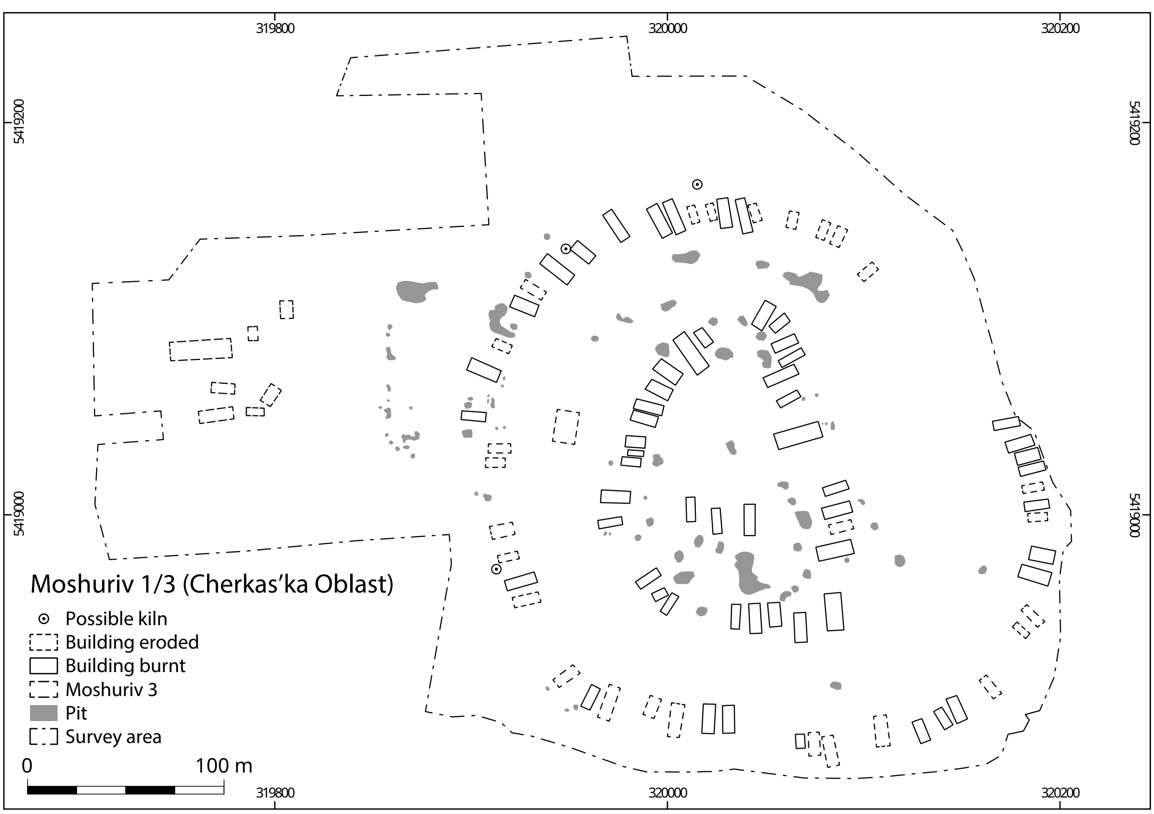


Figure 149. Magnetogram and interpretation of Moshuriv 1/3 (Projection: UTM 36 North).

more houses, dating however to stage CII. This led to the conclusion of a rare multi-layered site (Koshelev 2004, 282), which can be refuted by the new results.

In 2016, the site was revisited by a Ukrainian-German team with a high-resolution gradiometer with which 12.4 ha were surveyed, revealing two different sites which did not overlap (fig. 149). In sum, 57 clearly burned dwellings, 27 eroded or unburned dwellings and 84 pits as well as one ring-building and three possible pottery kilns were detected for the bigger site (Moshuriv 1). The settlement was completely surveyed, extending over 7 ha. Interestingly, the site follows the same layout principles as the 'mega-sites'.

The second site, Moshuriv 3, consists of 7 eroded or unburned buildings presumed to date later (CII – Kosenivka local group) than Moshuriv 1, based on excavations by S.M. Ryzhov in 1994. Its layout does not seem to follow the circo-radial principle.

The renewed survey in Moshuriv 1 revealed a settlement layout comparable to the 'mega-sites', only on a much smaller scale. Besides the prominent double ring structure and clustering of buildings, an analysis of floor size distribution shows the location of the largest 'mega-structure' building found in the same area as in larger sites (fig. 160). The geomagnetic anomaly, however, is not different to anomalies of usual ploshchadki. Another intriguing discovery is the ring building comparable to the ones usually found in larger sites. Like in Maidanets'ke, Dobrovody or Hlybochok, the anomaly depicts mostly the rectangular remains of walls with only minimal interior disturbances, in contrast to strong anomalies of ploshchadki.

The inner ring and centre with its singular cluster of buildings matches the layout found in Tal'ne 3 and also in Kolomyshchina I, which represent classic examples of smaller Trypillia settlements (Passek 1949, 132). It is debatable, however, if Kolomyshchina I was completely excavated. At least building 37 points to the possibility of an outer ring, which would make it comparable in size and structure to Moshuriv, but in another regional context without 'mega-sites'. Little can be said about the second settlement to the west, only that it was already detected by the Dudkin survey. Other than in Tal'yanky or Maidanets'ke, it is not possible to identify trenches of older excavations due to erosion processes diminishing building substance on the slope.

8.2.2 Tal'ne 3

The Trypillia settlement is located at 188 m a.s.l. on a plateau east of a tributary of the Hirskyi Tikych River and southeast of today's city Tal'ne (Tal'nivs'kyi Raion in Cherkas'ka Oblast) (48°51'37.36"N / 30°44'13.61"E). An excavation of a burnt dwelling was carried out in 1990 by M. Yu. Videyko and V.A. Kruts, resulting in a relative dating of the site to CTCC phase CI, Tomashivs'ka local group III/II (after Diachenko and Menotti 2012).

On this first plan of the settlement, 5.5 ha were surveyed (fig. 150). In sum, six clearly burned dwellings, 13 eroded or unburned dwellings and 31 pits were detected. Tal'ne 2 was located only 500 m to the west on the other side of the river, where a cucumber farm currently operates. It was partly surveyed by Dudkin and was later part of a rescue excavation by M. Yu. Videyko and V.A. Kruts. There, a double ring layout comparable to Moshuriv 1 was visible. To make sure that no external ring of dwellings remained undetected in Tal'ne 3, the survey was enlarged over 50 m around the main ring. Furthermore, the settlement was completely surveyed, extending over 1.2 ha. There is minimal disturbance in the western part by a gas line cutting through the circle of dwellings. Despite its size, Tal'ne 3 follows the circular layout principle of 'mega-sites'. With only one ring of buildings, but an organisation in clusters in the centre, it resembles a key site in understanding the overall settlement pattern of the area. Reflecting the inner part of Moshuriv 1 and Kolomyshchina 1, Tal'ne 3 allows us to envision the short-termed development of different parts of sites, which otherwise are hard

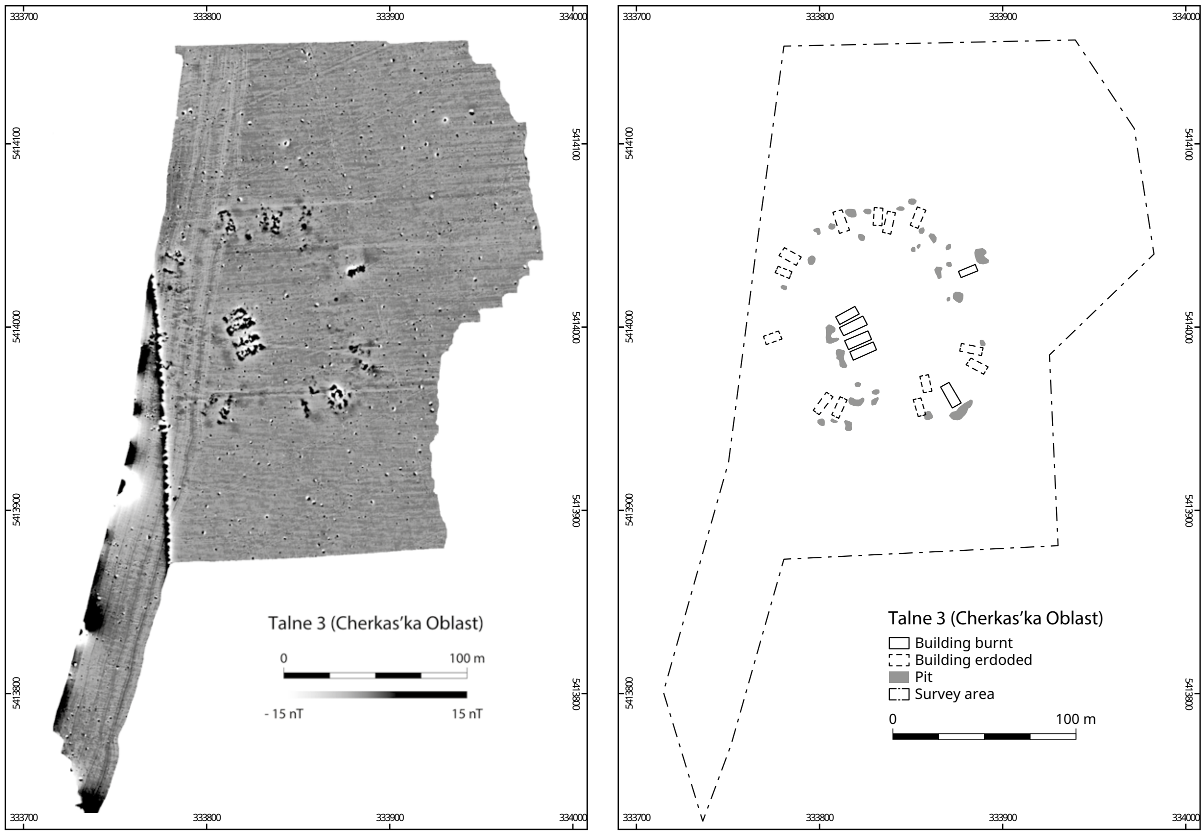


Figure 150. Magnetogram and interpretation of Tal'ne 3 (Projection: UTM 36 North).

to grasp by radiocarbon or relative dating. Another interesting fact is the absence of anomalies hinting at possible kilns. This can be interpreted as a dependency of smallest sites in a cluster of smaller settlements or even 'mega-sites'.

8.2.3 Rohy

The Trypillia settlement is located on a spore at 209 m a.s.l. between tributaries of the Tal'yanka River, southeast of today's Rohy (Man'kis'kyi Raion in Cherkas'ka Oblast) (48°51'7.96"N / 30°29'37.33"E). Its relative dating remains unclear, but possibly falls into the time of the 'mega-sites' between CTCC phases BII and CI.

The site was surveyed for the first time on 9.2 ha, revealing a unique stage of development with new features. In sum, 17 clearly burned dwellings, five eroded or unburned dwellings as well as 34 pits and a circular posthole alignment of unknown function were detected (fig. 151). The site was probably surveyed completely, extending over 5.3 ha. There seems to be a partial outer and inner ring of buildings, which were not completed in eastern direction. Unlike Tal'ne 3 or Moshuriv 1, there is no cluster of burnt buildings in the centre of the site. Instead, numerous postholes between dwellings of the inner ring form a 'kraal-like' enclosure never detected before.

8.2.4 Smaglievy Berehy

The Trypillia settlement, also known as Moshuriv 2, is located on a slope at 207 m a.s.l. next to a western tributary of the Tal'yanka River south of today's Moshuriv (Tal'nivs'kyi Raion in Cherkas'ka Oblast) (48°51'17.88"N / 30°35'1.91"E). Its relative dating remains unclear, but certain buildings with annexes known from later settlements hint at a probable dating to CTCC phase CII.

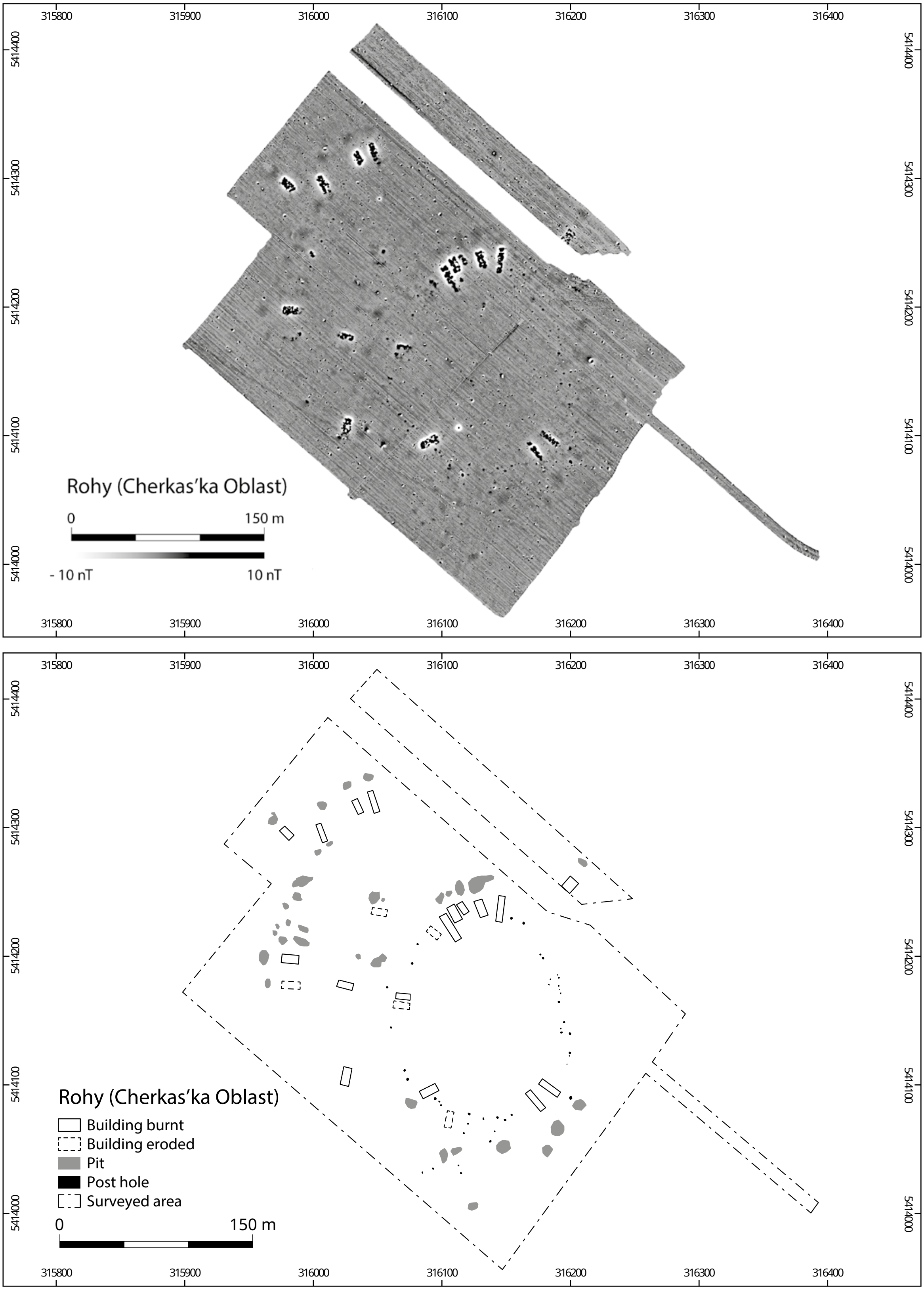


Figure 151. Magnetogram and interpretation of Rohy (Projection: UTM 36 North).

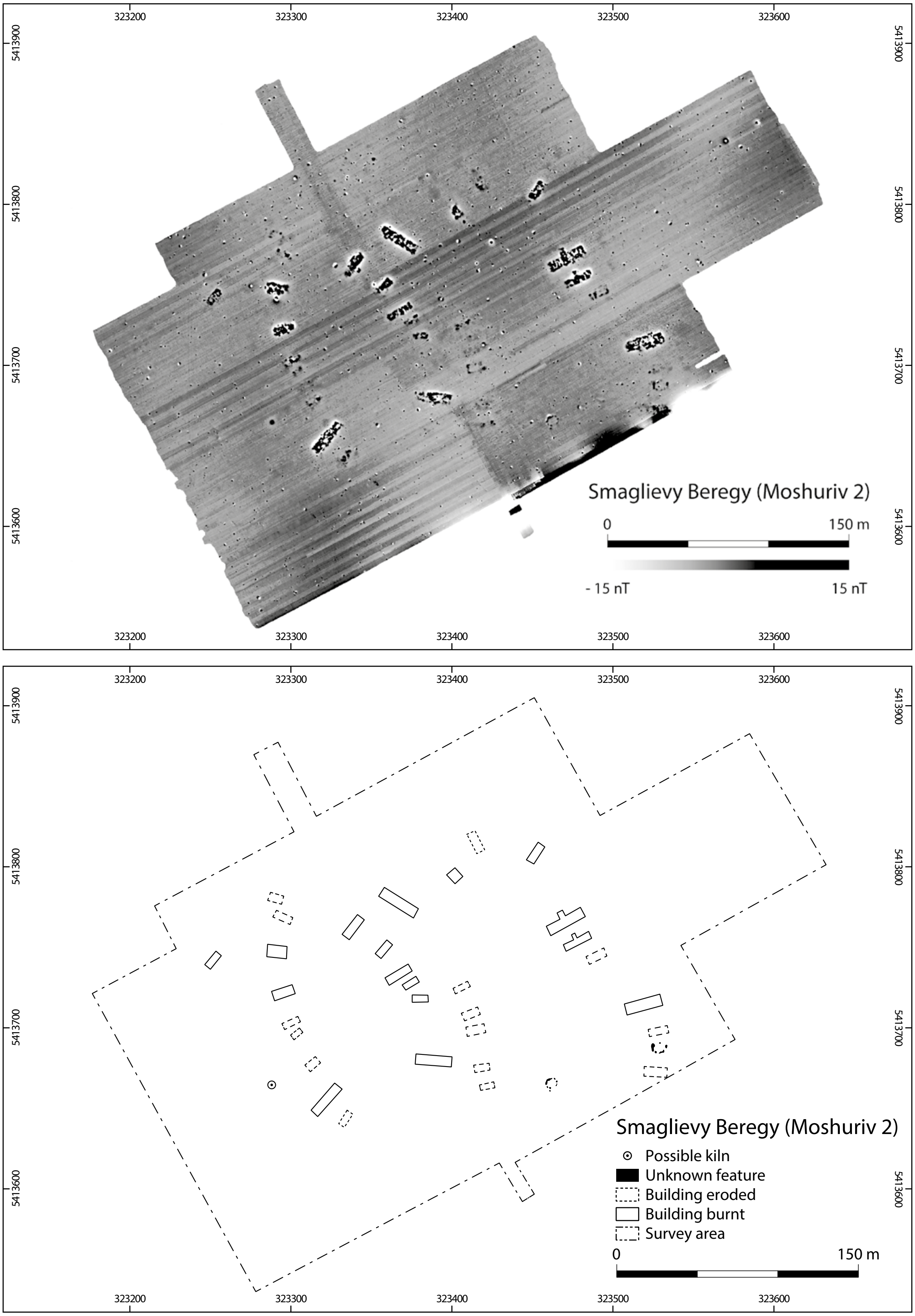


Figure 152. Magnetogram and interpretation of Smaglievy Berehy (Projection: UTM 36 North).

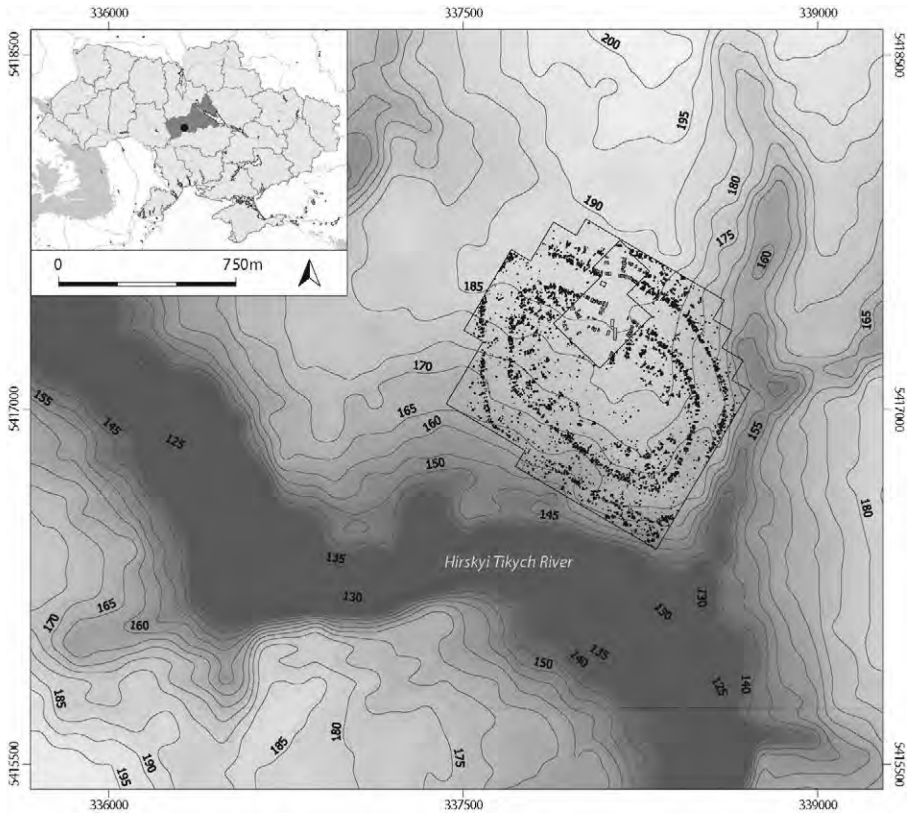


Figure 153. Topographic overview of the 'mega-site' near Hlybochok.

The site was surveyed for the first time on 9.1 ha, revealing a situation difficult to interpret. In sum, 16 clearly burned dwellings, 15 eroded or unburned dwellings and two circular pit alignments of unknown function were detected (fig. 152). There seems to be a partial outer ring of buildings, which was not completed. Two dwellings in the eastern part show an annex on the longer side of the building similar to buildings in Tal'yanky, but surface finds indicate that this is a multi-period site reaching from the Chalcolithic to the Middle Ages. The site's layout does not seem to follow the circo-radial principle, but rather an axis-symmetrical principle. It is unclear, if the site was measured completely due to its scattered layout, but so far, the surveyed settlement extends over 3.6 ha. To the south, the site is disturbed by a gas line.

8.3 New 'mega-structures'

Unfortunately, it was not possible to survey the target area of a 'mega-structure' in Maidanets'ke itself. This was partially done in the following summer campaign (see 4.1 Geomagnetic survey). Instead, another probable location 10.5 km to the northeast at Hlybochok was prospected. In addition, as an external validation of the pattern, Viitivka of the Chechel'nyk local group 90 km to the southwest presented a similar possible layout.

8.3.1 Hlybochok

The Trypillia settlement near today's Hlybochok (fig. 153) (Tal'nivs'kyi Raion in Cherkas'ka Oblast), is situated north of the Hirskyi Tikych River, a right tributary of the Tikych as part of the Southern Bug catchment on 180 m a.s.l. (48°53'14.41"N / 30°47'32.12"E). The 'mega-site' is relatively dated to the CTCC phase BII-CI, Nebelivska local group stage II/II, which ought to be contemporaneous to the To-

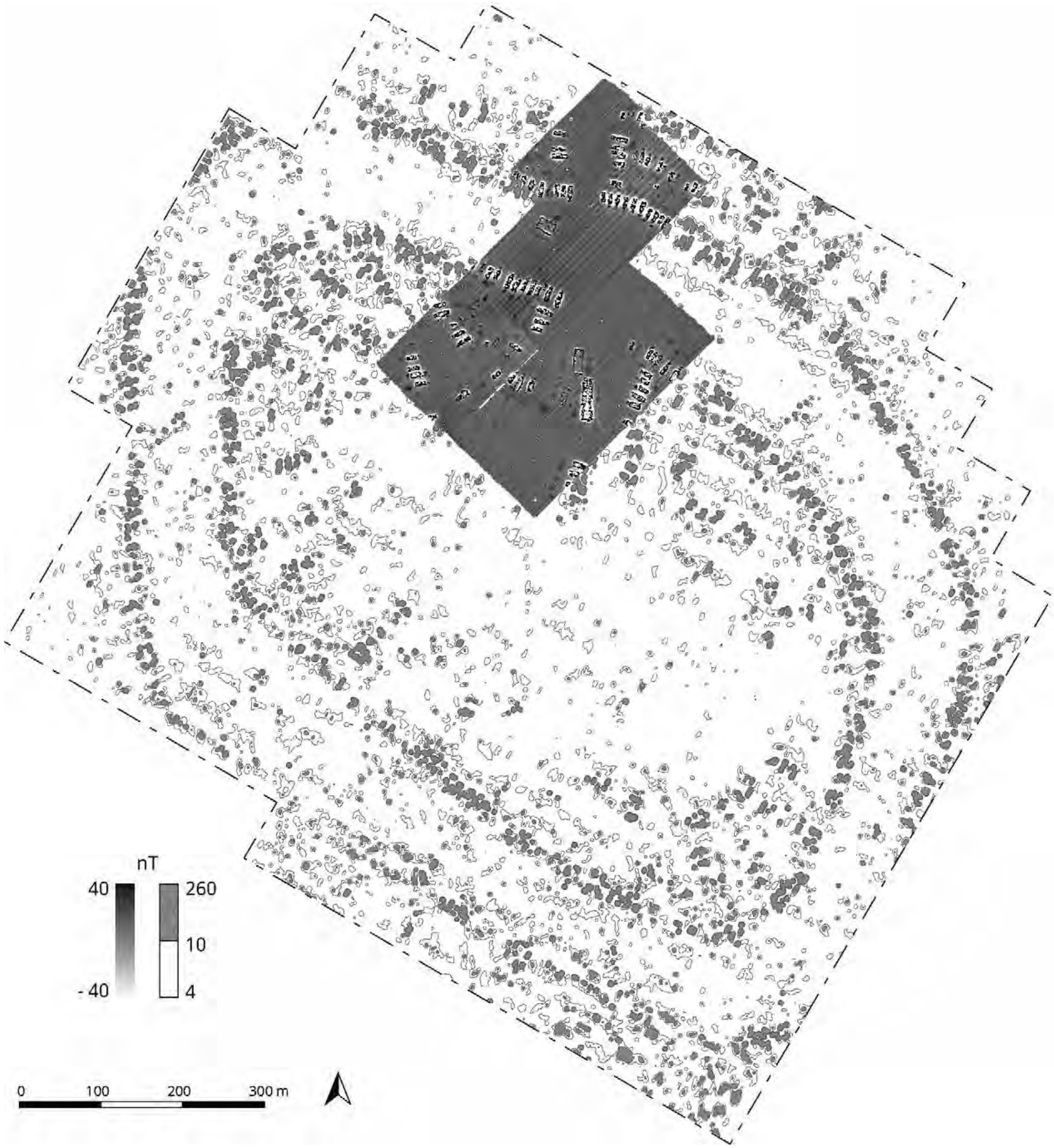


Figure 154. The old and new geomagnetic survey of Hlybochok (older data modified after Koshelev 2004).

mashivska local group stage I (after Ryzhov 1999). This situates Hlybochok in the time between Nebelivka and Maidanets'ke.

The settlement was first excavated by V.N. Domanitsky at the end of the 19th century. In the mid-1960s, the settlement was examined by the staff of the Uman Museum of History and Regional Studies Stefanovich and V.P. Didenko. A more detailed exploration of the settlement in 1981-83 was carried out by the detachments of the Trypillia expedition of the IA of Ukraine under the leadership of N.M. Shmagliy, T.G. Movsha and V.A. Kruts. From 1994-95, excavations on two houses by S.N. Ryzhov and a geomagnetic survey on 114 ha under the direction of V.P. Dudkin were conducted (Koshelev 2004, 84-86). The nearly complete survey suggests a total size of around 130 ha with ca. 1500 anomalies (fig. 154). In 2016, the site was revisited with a high-resolution gradiometer and 10.9 ha were surveyed, revealing new features. In sum, 77 clearly burned dwellings, eight eroded or unburned dwellings, one ring-building, one large building with burnt walls only, and one exceptionally large burned building as well as one possible kiln and 181 pits were detected (fig. 155). Additionally, a double ditch system enclosure to the north was found. This part of Hlybochok seems to reflect the situation in Nebelivka, as can be seen by the comparable position of the ring-building in relation to the 'mega-structure' ensemble. The three large buildings, accompanied by lateral pits or clusters of pits, spread over an area of 0.7 ha and face towards an entrance situation of the settlement to the north (fig. 156). While the smallest structure is oriented alongside the row of standard ploshchadki in the west, the two larger buildings face directly to the north. This might be a first hint at different phases of this special area. Interestingly, all structures appear to be architecturally different. The latent anomalies of the smallest of the three buildings (178.5 m²) reveal the standardised layout known from house models and excavations (Chernovol 2012). It is divided into an anteroom and a main room with a possible fireplace on the left-hand side of the entrance. Its lateral pits, however, qualify it as part of the 'mega-structure' ensemble. The next bigger building (315 m²) is also divided into a smaller room to the north and a main room, but without any anomalies hinting at further interior structures. The burned walls framing the structure resemble those typical for ring-buildings (fig. 156) yet missing the lower length to width ratio. With around 670 m², the largest of the 'mega-structures' is ten times the size of a standard ploshchadka. It appears to be completely burned with possibly several spatial divisions in its northern half.

8.4 'Mega-structures' in other regions

8.4.1 Viitivka

The Trypillia settlement to the northwest of today's Viitivka (fig. 157) (Bershads'kyi Raion in Vinnyts'ka Oblast) is located on a plateau at 210 m a.s.l. to the north of a tributary of the Dukhna River, only four kilometres south of the Southern Bug (48°27'6.03"N / 29°30'17.87"E). The site is radiocarbon dated to the mid-fourth millennium (Müller *et al.* forthcoming), which situates Viitivka later than Maidanets'ke at the end of CTCC phase CI.

The site was discovered by V. Rud via Google Earth and presented an ideal case to test the settlement pattern outside of the Uman region. In the target area, 9.7 ha were surveyed, revealing expected as well as new features. In sum, 38 clearly burned dwellings, three exceptionally large burned buildings and two special features of unknown function as well as three possible kilns and 61 pits were detected (fig. 158). Based on the crop marks visible in the satellite image, a settlement size of ca. 48 ha can be estimated. The three large buildings – partly accompanied by lateral pits – spread over an area of 0.9 ha and face towards an open plaza-like area inside the

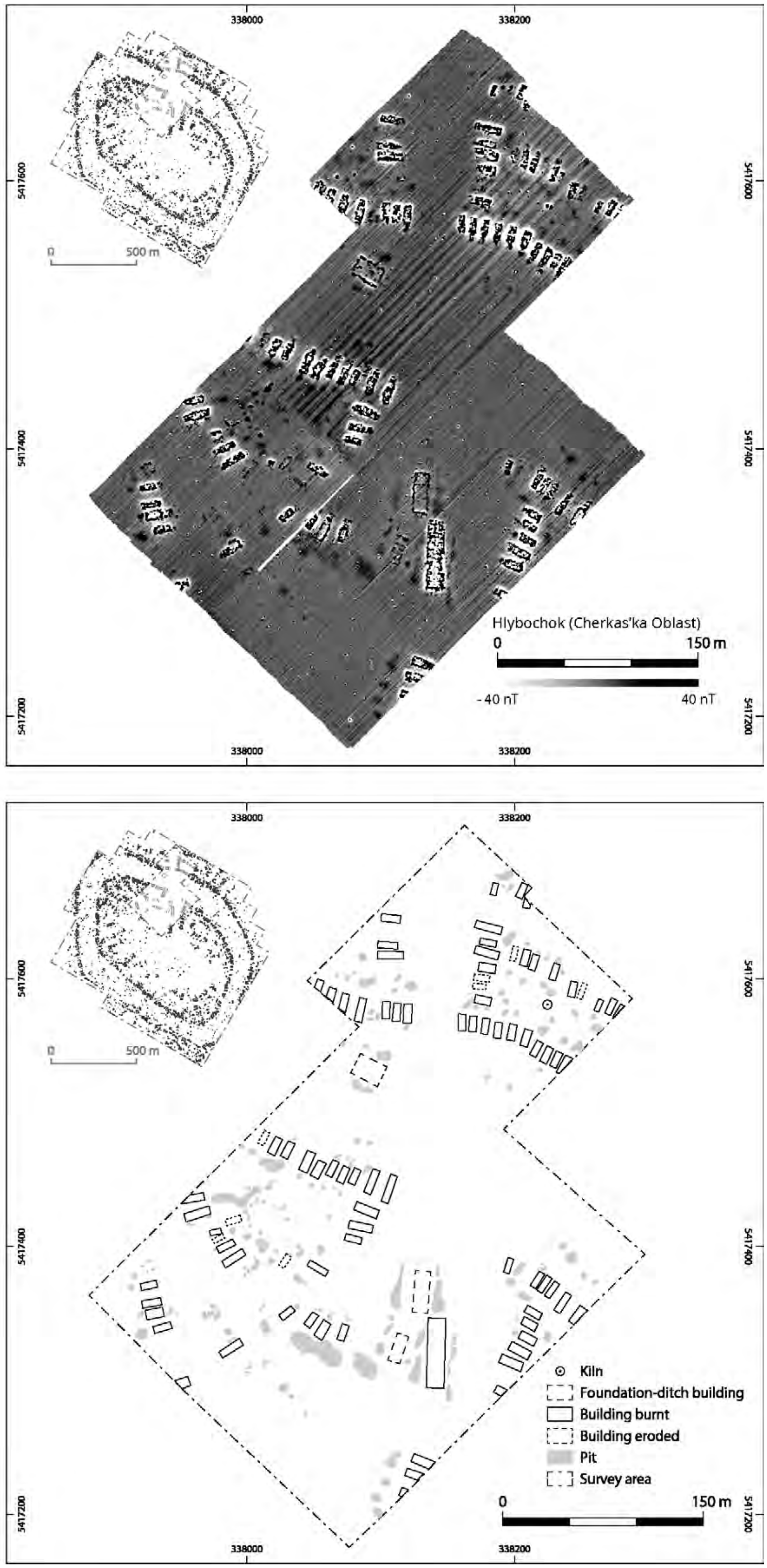


Figure 155. Magnetogram and interpretative plot of the target area at Hlybochok (Projection: UTM 36 North).

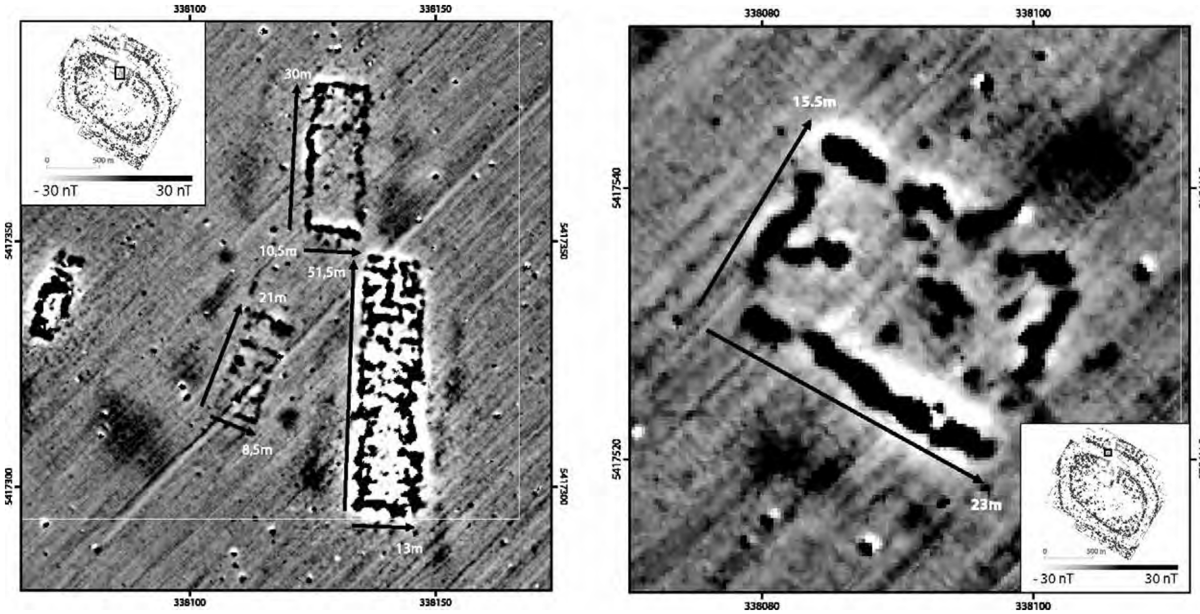


Figure 156. The 'mega-structure' ensemble and ring building at Hlybochok in detail (Projection: UTM 36 North).

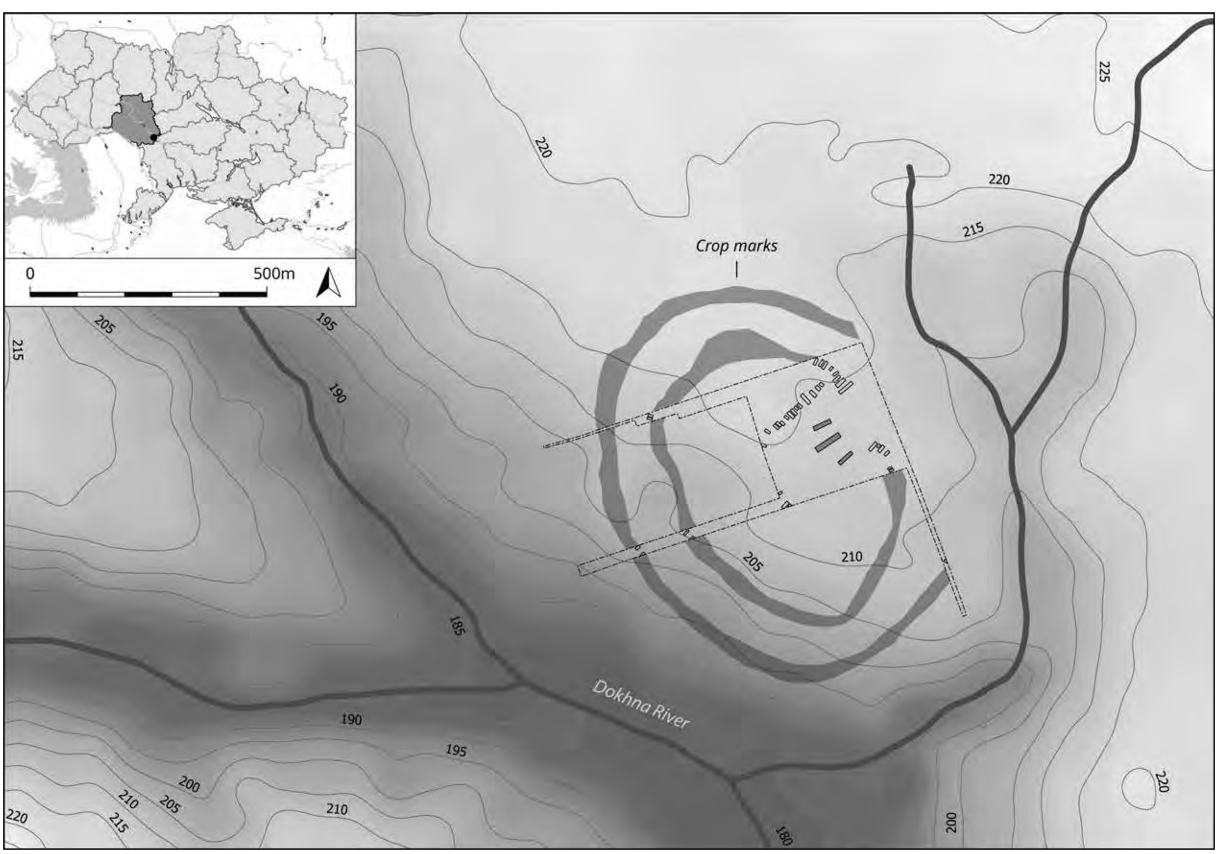


Figure 157. Topographic overview of the 'mega-site' near Viitivka.

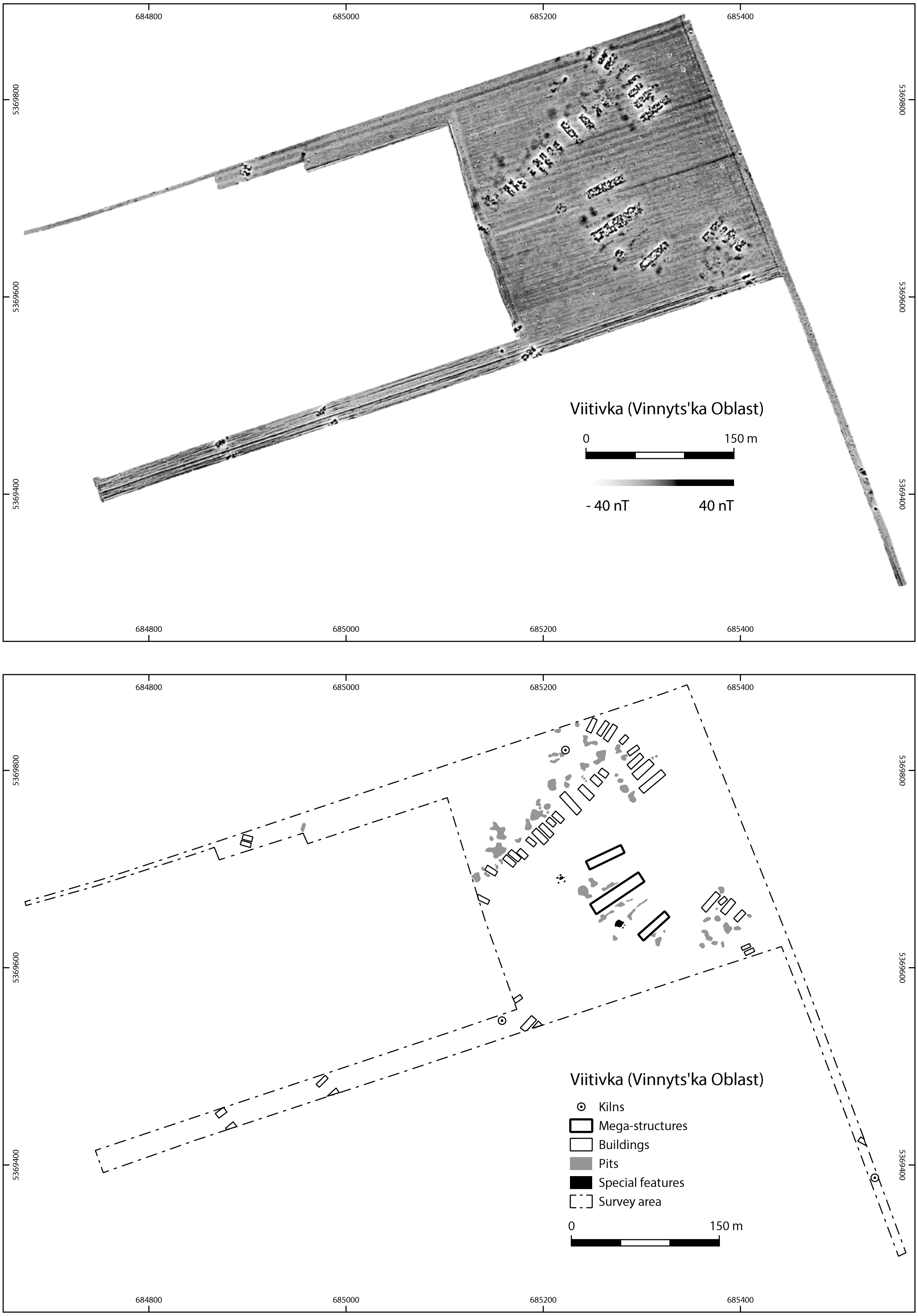


Figure 158. Magnetogram and interpretative plot of the target area at Viitivka.

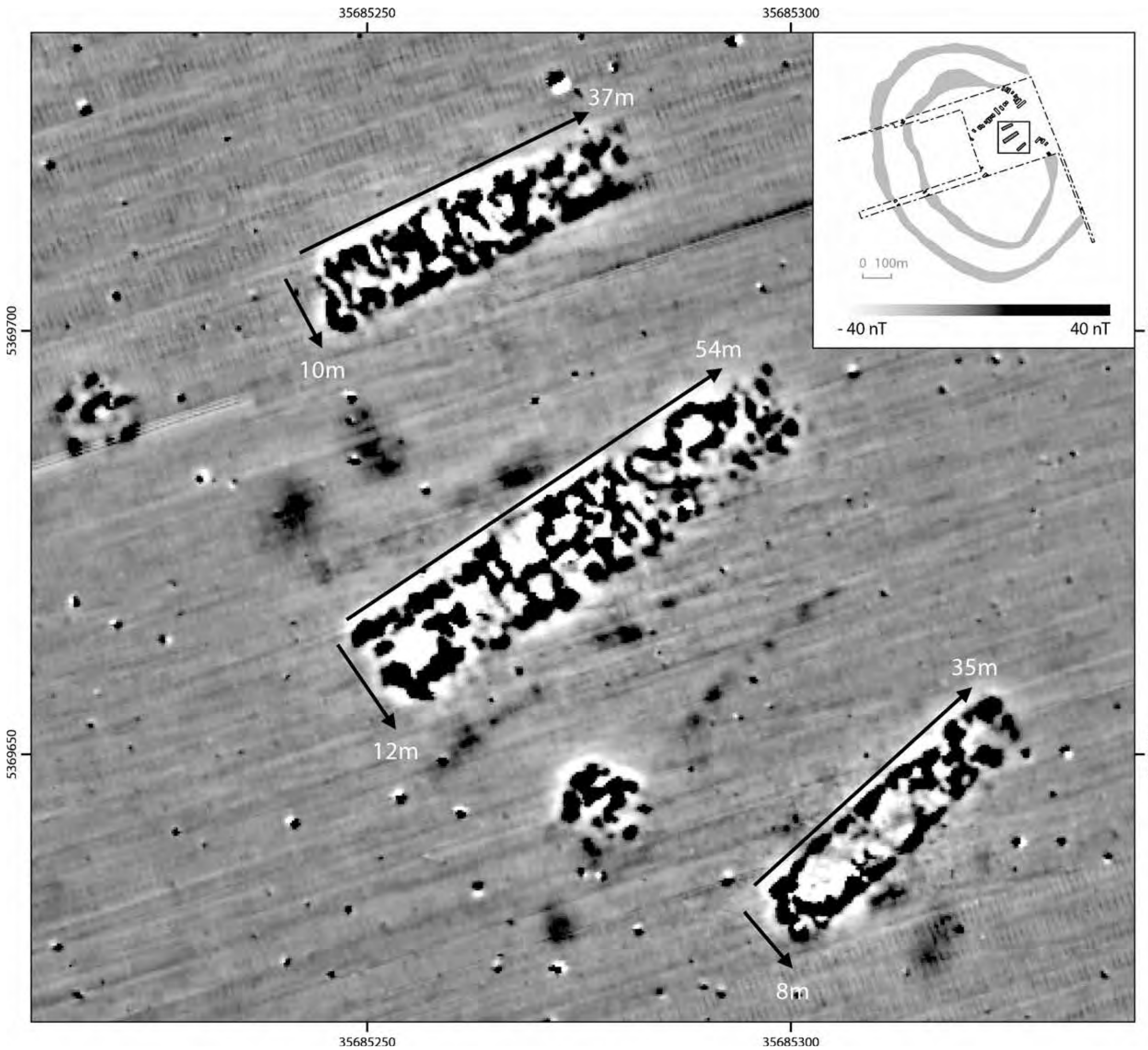


Figure 159. The 'mega-structure' ensemble at Viitivka.

settlement and an entrance situation of the main ring to the northeast (fig. 159). They are framed by at least one radial line of dwellings, although the crop marks of the satellite image indicate another line to the southeast. In contrast to Hlybochok, all three structures are burned. The smallest of them (280 m²) appears to be divided into two parts: a northeastern part full of burnt material and an open part to the southwest. The next larger one (370 m²) seems to be filled with burnt material, but lateral pits are missing, while the largest one (650 m²) can be divided into three evenly distributed parts. Besides a possible entrance to the northwest, the central part of the structure appears to be filled with burnt material.

The ensemble of 'mega-structures' from Viitivka is comparable to Hlybochok's features, except for two anomalies, which are difficult to interpret. The southern one has a higher flux density and stands in spatial relation to a 'lost' lateral pit or pit alignment between the largest and smallest of the 'mega-structures'. What kind of feature these anomalies resemble remains unclear until excavations can begin.

8.5 Consequences – 'mega-sites' and urbanism?

Based on the presented survey results of larger and smaller Trypillia settlements, we must question the very definition of a so-called 'mega-site' and its urban interpretation. Current definitions are both absolute and relative size-oriented with a 'mega-site' threshold of 100-150 hectares or sites ten times larger than regular settlements (Shmagliy and Videyko 2004; Müller and Rassmann 2016). Statistically, it was observed that according to a relational definition 'mega-sites' appear in all stages of Trypillia development. Based on the total sample, settlements of over 30 ha present statistical outliers to be considered as 'mega-sites' (see 2.2.5 Towards a new Trypillia 'mega-site' definition). By the given threshold of 100 ha, they begin to appear during stage BI-II (4350-3950 cal BCE). Besides settlement extent, factors such as contemporaneity of buildings and planning principles are identified as defining features (Müller and Rassmann 2016, 1).

The survey presented above had the task to make the observed planning principles explicit. In result, it could be determined that the examined settlement layout is not limited to the largest sites. On the contrary, we also see the same types of buildings, such as regular dwellings, larger economic dwellings, and ring-buildings, in comparable arrangements in small sites like Moshuriv 1 (fig. 160). Moreover, we observe production units, such as potential pottery kilns, in smaller settlements. Hence, at the current stage of research, no economic dependencies between larger and smaller sites is recognised. Thus, 'mega-sites' are nothing more than an upscaled version of the smaller sites based on the same kind of planning principles. In addition, as observed at Viitivka, we see settlements which are way below the 'mega-site' threshold of 100-150 ha and yet have three times as many top category buildings (mega-structures) than settlements five times their size (*e.g.* Nebelivka). In the case of 'mega-structures' and ring-buildings, it is still an open question what functions these different building types had and if they differed between larger and smaller sites. Nevertheless, it could be proven that the 'mega-structure' of Nebelivka is no singularity, but rather an exception with only one single large building. Therefore, the findings presented here indicate that all which remains of the 'mega-site' definition for the moment is a large population agglomeration.

Based on the regional survey, the development of a 'mega-site', such as Maidanets'ke, can be described. Smaller settlements, for example Moshuriv 1, with features comparable to 'mega-sites' imply a rather modular structure of the Trypillia settlement pattern. Not only do we see the same circo-radial overall layout, but also ring-buildings and presumably larger domestic buildings in prominent locations inside the settlement (fig. 160). While the larger domestic buildings at 'mega-sites' are located along cross-roads of the main pathway system (Ohlrau 2015, fig. 43), in smaller sites we observe them in the general location of the 'mega-structures' when comparing the overall pattern between these settlement categories (fig. 160).

On the one hand, this leads to the conclusion that the Trypillia settlement pattern is based on scalability. On the other hand, sites like Moshuriv 1 suggest a settlement pattern based on modularity. Taking the amount of ring-buildings and 'cross-road' economic dwellings per 'mega-site' into account, an integration of up to 20 smaller communities into one larger settlement like Maidanets'ke becomes apparent. This scenario is supported by results of the radiometric chronology for Maidanets'ke, which was consciously laid out in a larger scale, as can be seen by the early dating of the inner causewayed enclosure. Furthermore, the high increase of contemporaneous dwellings during the site's third occupation phase suggests a rapid population influx to the site, which neither fits natural population growth rates for agrarian based societies, nor the intrinsic growth rates of the Uman region during Trypillia times.

Figure 160. Structural comparison of the layout observed at smaller Trypillia settlements and 'mega-sites' (modified after Ohlrau 2015, fig. 43).

Thus, we can conclude that the foundation of a 'mega-site' was a conscious decision by several communities merging into a larger entity. This process of conscious agglomeration, known as *synoecism*, is exemplified by the emergence of Classic *poleis* in Ancient Greece (Snodgrass 1977; Ault 2019). There, *synoecism* describes the 'coming together' of several households or villages to form a new social entity: the city-state as a unity of the surrounding countryside and the city itself (Ault 2019, 151). The process of agglomeration is seen as a bottom-up development which was not dictated by an elite, but was rather implemented as a measure to defend or establish a territory.

While the observed modularity between larger and smaller settlements in the Trypillia case implies a comparable conscious agglomeration, no accentuated differences in institutions or economy is apparent between smaller and larger settlements according to the survey results. This leads to the question whether Trypillia 'mega-sites' can be characterised as urban, since functional differences between the countryside and larger settlements is a popular definition of cities or towns. With the investigation of urbanism being a complex undertaking, spreading over a variety of disciplines, a multitude of definitions has been proposed which can be divided into two trends emphasising functional and demographic characterisations (Smith 2016). Functional definitions of urbanism focus on economic and political differentiations between the relation of settlements and their surrounding territories. Urban sites could provide functions, such as markets and specialised industry, or administrative and religious institutions, to a wider area (Christaller 1933; Fox 1977; Smith 2016, 154). Demographic definitions are based on Wirth's (1938) influential paper in which he emphasised the size and density of an urban population, and with it, its social diversity. Today, demographic definitions of urbanism are usually connected to a proposed interdependence between population size and socio-political complexity (Johnson 1982; Feinman 2011; Bettencourt and West 2010; Bettencourt 2013; Lobo *et al.* 2013; Ortman *et al.* 2014; Ortman *et al.* 2015). For the Trypillia case, functional definitions can be excluded based on the given results, but demographic definitions remain potentially relevant for future investigations.

Going beyond monothetic definitions, Smith (2016, 159) developed a list of archaeological urban attributes based on various theoretical approaches of both functional and demographic definitions. Following Cowgill's (2004) proposal to use a polythetic approach to discuss the urban character of settlements in question, Smith (2016, 160) emphasised that his approach is not to be seen as a checklist in the fashion of Childe (1950), which has been criticized on countless occasions. Smith's (2016, tab. 10.1) attributes are divided into different categories, including settlement size, social impact, distinct urban functions, built environment and socio-economic features.

According to the different attributes, the potential urban character of Maidanets'ke can be discussed. The main arguments used to identify Trypillia 'mega-sites' as urban are related to their size, population and density. Indeed, several thousand coeval inhabitants and site sizes of over 300 ha present rare exceptions in European Prehistory. In contrast, the population density of these 'mega-sites' is estimated to be rather low compared to archetypical European medieval cities. For this reason, Trypillia 'mega-sites' have been described as low-density cities by some scholars (*e.g.* Chapman and Gaydarska 2016a). But since Maidanets'ke is clearly delimited by an enclosure, the site has no edgeless character. Moreover, most density estimates calculated for Maidanets'ke lie above the threshold of ten inhabitants per hectare, defining low-density sites according to Fletcher (1995).

Concerning the social impact and urban functions, Smith (2016) differentiates between the presence or absence of royal palaces and burials as well as large temples. Furthermore, the scale of civic architecture, craft production and markets or shops plays an important role as a measure of urban characteristics. In the case of Maidanets'ke, we see no evidence for palaces or prestigious burials.

Burials are absent from the Trypillia record in general. Large temples, however, are debatable following the interpretation of Burdo and Videyko (2016) concerning the Nebelivka 'mega-structure'. The British side sees the 'mega-structure' rather as civic architecture only relevant for the settlement itself and not for a wider territory (Nebbia *et al.* 2018). At Maidanets'ke, a comparable building has been partly observed, but not yet excavated. Instead, many ring-buildings were observed, which differ from dwellings in their architectural appearance and their location in public areas inside the settlement (Ohlrau 2015). They can be interpreted as lower-level civic architecture, structuring the site into several districts. However, such ring-buildings were also observed in settlements with a total size of a district in a 'mega-site'. Evidence for craft production (*e.g.* pottery kilns) was first observed via geomagnetic survey and later by the excavations at Tal'yanky and Maidanets'ke (Korvin-Piotrovskiy *et al.* 2016). Anomalies of potential pottery kilns were also found in smaller settlements. The number and capacity of production sites at 'mega-sites', such as Maidanets'ke, show no indication for an industrial level of pottery production for a wider territory. Another classic urban attribute is markets. While markets are archaeologically difficult to detect, the inner free area of many Trypillia settlements could fit such a purpose. There is, however, no evidence supporting such an assumption. In summary, there are hardly any indicators for a wider social impact and distinct urban functions at 'mega-sites' to characterise them as towns or cities. The scale of economic and administrative attributes did not exceed the limits of the settlements.

Another set of urban attributes proposed by Smith (2016) are related to the built environment. He differentiates between the presence or absence of fortifications, gates, connective architecture, lower level temples, residences of the lower elite, formal public space, and distinct planning of the settlement centre. While house clusters were interpreted as 'inhabited walls' with a defensive function (Shmagliy and Videyko 2004), with the renewed geophysical survey no fortifications were observed at Maidanets'ke. The causewayed enclosure around the settlement shows several intersections and is interpreted as a causewayed enclosure. As could be shown by the detailed evaluation of the excavation reports from previous campaigns, dwellings were not interconnected as 'inhabited walls', but show overlapping collapses of separate buildings. The pathway system inside the settlement of Maidanets'ke with economic dwellings at crossroads can be interpreted as connective infrastructure. Gates in a defensive or economic sense were, however, not observed. Ring-buildings can be interpreted as 'intermediate-order temples' following Burdo's and Videyko's (2016) argument for the 'higher-order temple' characterisation of the Nebelivka 'mega-structure'. Residential differences between commoners and lower elites were not observed. On the contrary, most of the dwellings show high uniformity and complementary differences in their household inventories. Larger dwellings, such as complex 'M', were rather associated with extended family households than with elites (Shmagliy and Videyko 2004). Formal public space is represented by the main settlement ring as well as the plaza around the 'mega-structure' ensemble discovered at Hlybochok and Viitivka. The circo-radial planning principle of Trypillia settlements is widely evident in both 'mega-sites' and regular sites, such as Moshuriv 1 or Tal'ne 3, as can be shown by the recent geophysical survey. Since this planning principle is observable from sites measuring 1.2 ha to sites of over 300 ha, the argument for a distinct urban planning of a city's epicentre remains ambivalent. Overall, we see only few urban attributes, such as connective infrastructure, intermediate-order temples, and formal public space, in the built environment of 'mega-sites'.

A last category of attributes suggested by Smith (2016) are socio-economic features of urbanism. Among them are burials of the lower elite, social diversity, neighbourhoods, agriculture within the settlement, and imports. While burials are generally missing from Trypillia contexts, evidence for lower elites is also absent in other contexts such as elaborate household inventories or large dwellings in special locations. Evidence for social diversity is also limited. One could possibly argue for such diversity on the basis of elaborate pottery decoration design elements rather than based on differences between household inventories. One clearly evident attribute is neighbourhoods. Both house clusters and districts related to the nearest ring-building are interpreted as neighbourhoods in the current debate concerning the social organisation of 'mega-sites' (Ohlrau 2015; Müller *et al.* 2016b; Chapman and Gaydarska 2016a; Nebbia *et al.* 2018). According to the current state of investigation, no evidence for agriculture inside Maidanets'ke or other 'mega-sites' has been observed. A final attribute is the relative amount of imports. According to previous excavations, nearly every dwelling at Maidanets'ke had either imported pottery, imitations of imported pottery, or special artefacts like quern stones or flint from distant sources. However, they were not concentrated in certain households. Prestige items, such as copper tools, were very rare, but if recovered, they were found in regular dwellings rather than in exceptional buildings. All these imports, however, do not qualify as luxury items imported to enable an urban lifestyle different from those household inventories observed at smaller sites. Again, only few urban attributes – neighbourhoods and possibly social diversity – can clearly be identified at the Maidanets'ke 'mega-site'.

In sum, the urban attributes of Trypillia 'mega-sites' can be narrowed down to large populations and settlement sizes, higher and lower-level temples or civic architecture represented by ring-buildings and 'mega-structures', connective infrastructure and public space observable in main settlement rings and radial pathway systems, central empty spaces, and the plaza around 'mega-structure' ensembles. Further attributes are the presence of neighbourhoods and districts in the form of house clusters and the regular spacing of ring-buildings in the pathway systems. But are these attributes sufficient to characterise 'mega-sites', such as Maidanets'ke, as urban?

Before we can try to answer this question, it must be made clear that the list of attributes was explicitly designed for cross-cultural comparison of settlements and their degree of urbanisation, not to strictly define whether sites classify as urban (Smith 2016, 160). Strict definitions tend to fail due to the immense variety of human dwelling habits. However, the observed attributes for settlement and population size partly support a demographic definition of urbanism, while evidence for a functional definition lacks completely in an examination of Trypillia 'mega-sites'. But as Smith (*ibid.*, 155) argues, the demographic and sociological definitions for urbanism are embedded into the functional approach of urbanism. The agglomeration of a large population alone does not make a town or city. Thus, we must conclude that, no, the Maidanets'ke 'mega-site' does not qualify as urban. The territorial interdependence between the surrounding smaller settlements and the 'mega-site' is lacking. While a large coeval population was reconstructed for the site, the population did not provoke an urban lifestyle, as expected by demographic approaches. Can we speak then of 'proto-urbanism' since we observed urban attributes such as neighbourhoods, districts, and a variety of public architecture?

The answer is again: no. The term 'proto-urbanism' was introduced by Kenyon (1957; 1960) in connection with the excavations at Tell es-Sultan and the Near-Eastern urban development from the Neolithic to the Early Bronze Age. According to her cultural evolutionary perspective, the Chalcolithic represents a proto-urban age in which the agglomeration of different communities led to the development of towns and cities in the Early Bronze Age (Kenyon 1960, 84-103). The main point to define the Palestine Chalcolithic as a 'proto-urban' period was the observation that settlement aggregations led to actual cities later on (Kenyon 1957, 102). Thus, characterising Trypillia 'mega-sites' as 'proto-urban' is misleading regarding the original definition of the term since the Trypillia development never led to actual urban sites. What remains is the observation that Trypillia 'mega-sites' are the result of an agglomeration process comparable to the Near-Eastern Chalcolithic and Ancient Greece. But if 'mega-sites' were neither urban nor 'proto-urban', what were they actually?

The process of agglomeration observed here and its consequences are more a relevant outcome of the current research phase than any specific efforts of urban characterisation. In recent years, the actual aggregation process of settlements has gained increasing interest (Birch 2013a; Gyucha 2019), whereby Trypillia 'mega-sites' present a valuable contribution to this debate. The advantage of focussing on aggregation processes on both a regional and a communal level is that they do not necessarily fit into typical stages of social evolution and, thus, help us to overcome implications associated with certain settlement types (Birch 2013b, 2). Following Birch (*ibid.*, 3-4), the development of aggregated sites can be defined as a phenomenon of its own – between villages and cities. They are characterised as a product of mobility and not internal population growth, a change from a dispersed towards a nucleated settlement pattern, permanent residence, and rapid social transformation to integrate larger groups. This transformation usually did not lead to centralised and hierarchical types of social organisation, but rather to institutions of collective decision-making (*ibid.*; Kowalewski 2006; Blanton and Fargher 2011). Aggregated settlements were observed to have developed from small village-based communities, could have been the result of a reorganisation of larger or more complex social formations, or could have been the product of a contact to larger social formations (Birch 2013b, 5). Later, aggregated sites were observed to have developed into cities, become part of states, or dispersed again into smaller social formations. Birch (*ibid.*) emphasises the relevance of investigations on how such sites developed and especially how they managed to maintain the integration communities. Investigating the role of institutions enabling aggregations is a key aspect for an understanding of such settlements.

Trypillia 'mega-sites' show many characteristics of aggregated settlements. For the regional development of the Southern-Bug-Dnieper interfluve, a development from many smaller to fewer larger sites was observed. The result of the palaeodemographic reconstructions at Maidanets'ke hint at a population growth driven by mobility and not by internal growth. Surveys at smaller settlements in the vicinity of Maidanets'ke revealed a scalable and modular settlement pattern, suggesting a concentration of up to twenty smaller communities into one 'mega-site'. These communities were integrated by different levels of public architecture such as ring-buildings and 'mega-structures'. The actual functions of these communal institutions are, however, still under investigation (Hofmann *et al.* 2019). Ultimately, the 'mega-sites' declined and dispersed pastoral societies emerged at the end of the 4th millennium BCE. Therefore, it is concluded here that Trypillia 'mega-sites' can best be characterised as aggregated settlements, which appears to be a more productive category for future research than villages or towns and cities. Their most fascinating feature is their scalability and modularity, ranging from settlements of a single hectare to 'mega-sites' of over 300 hectares. This is what makes them unique in Eurasian Prehistory.

9 Implications for the 'mega-site' debate

Based on the results of the excavation and its analysis, the development and decline of Maidanets'ke is put into the wider context of the 'mega-site' debate. To contextualise the results, a short overview of the initial debate and international reception is provided. Then, the current debate evolving around the renewed research phase is presented including all major aspects and detailed findings. On the basis of this overview, wider conclusions are drawn according to the results presented here.

9.1 The 'mega-site' debate before the renewed investigations

Since their discovery, large Trypillia settlements have been labelled 'large tribal settlements', 'super-centres', 'giant settlements', and 'proto-towns' or 'proto-cities' by Eastern European scholars. For the initial debate on these sites, Shmagliy and Videyko (2004, 125-131) provide a thorough overview.

Based on the discovery of Vladimirokva, Passek (1949, 108) characterised the 'mega-sites' as "large tribal settlements" [большие родовые поселения]. Later, Bibikov (1965, 58) described them as "kinship-based centres" organising social, economic and religious communication between Trypillia tribes. Thus, during the first phase of discovery, we can conclude that the 'mega-sites' were mainly envisioned as villages. In the 1960s and 1970s, the discovery of several even larger sites by Shishkin (1973; 1985) provoked another period of characterisations.

Interpreting the results of the aerial, conventional, and initial geomagnetic survey at Maidanets'ke, Shmagliy and colleagues (1973, 31; 1975, 69) suggested that the large sites could be 'proto-towns' [протомісто]. This characterisation was based on the previously unknown size, orderly layout and number of dwellings already estimated at ca. 1500 buildings in comparison to the 200 buildings recognised by conventional survey at Vladimirovka.

Based on the registration of Neolithic and Eneolithic sites in Moldova, Markevich (1973) observed several larger Trypillia settlements, which he described as "tribal administrative centres". Masson (1975) characterised the large sites of the Bug-Dnieper interfluve as 'super-centres' [суперцентры] of a larger agricultural landscape. However, he considered them to be an important step in the development towards early urbanisation. While Markevich's view represents a continuation of 'mega-site' characterisation as villages, Masson's interpretation is clearly influenced by social evolutionary theory with a trajectory in mind.

Summarising the first campaigns of the Tripolye-Complex-Expedition at Maidanets'ke, Shmagliy (1978, 42) then interpreted the large sites as "predecessors of ancient European cities" [предстанция древней европейского города]. He identified several traits, which should underline the urban character of Maidanets'ke (Shmagliy 1982): the orderly planning visible in the geophysical survey, a defensive wall represented by densely packed house-clusters, an acropolis, which is not explained further, and an agora represented by the central empty space inside the settlements. He identified traits of urbanisation in the mass production of pottery and their decoration, which he interprets as signs of a logographic script. However, in Shamgliy's view the process of urbanisation was not finished (*e.g.* ending up in 'true' cities).

This view was later elaborated according to the results of the long-term excavation at Maidanets'ke (Shmagliy and Videyko 2004).

Shmagliy and Videyko underline their interpretation of Maidanets'ke as a 'proto-city' based on demographic, structural, and economic findings. Demographic estimates were adjusted according to the observation that not all buildings were inhabited, but partly served as economic structures. Additionally, some structures were two-storeyed, while others were not. This resulted in population sizes between 7220-10,100 inhabitants, which clearly exceeded their defined demographic threshold of 5000 inhabitants for an urban population. Based on the size and concentration of the population, they interpret the large settlements as 'military centres' in which a considerable force of people is located.

Furthermore, the two main rings of house-clusters are interpreted as two lines of a defensive, 'inhabited wall' in which two-storey houses were connected along the upper floor. During the excavation of several house-clusters, an architectural differentiation between dwellings as well as economic and public buildings was observed. Building M is characterised by the excavators as either a public building or the dwelling of a "well-situated family" (Shmagliy and Videyko 2004, 68). This interpretation is derived from the unusual elaboration of the upper storey with two rooms and an ochre-painted and plastered bench. For the 'proto-city' argument, the 'residential walls' and potential public buildings are characterised as a "local type of monumental architecture based on the use of the most accessible building material – wood and clay" (*ibid.*).

Based on the settlement layout and the inventories of excavated house-clusters, a hierarchical structure with several levels of organisation is proposed for the site. The various differentiated buildings are suggested to be clustered in a community of around 20 structures, including dwellings and economic buildings as well as one 'rich' or public building. These clustered communities are then imagined to be organised in various rings, comparable to districts, whereas the number of buildings per ring, based on the original geophysical survey, are comparable to the number of buildings estimated for smaller settlements like Tal'ne 2 (90-120 structures). Thus, rings or districts are seen as community level entities comparable to regular-sized settlements.

On a regional level, a settlement hierarchy is suggested for stylistic local groups along the river systems in which the largest sites represent capitals. During the peak of the 'mega-sites' in Trypillia CI, the size of these 'polities' is estimated to lie between 25,000-34,000 people. This regional population size is then used for the 'proto-city' argument by comparing it to early polities in Mesopotamia of similar dimensions.

The economic potential of the sites is suggested to be sufficient enough to supply the emergence of early urban settlements. It is suggested that extensive agriculture and intensive pastoralism as well as periodic relocation of the large settlements after 50-70 years led to structures organising territories and the labour force for the reconstruction of the sites. It is then concluded that this level of organisation is comparable to the management of irrigated agriculture in the Near East. Moreover, an emerging labour division ought to be observable for activities, such as food processing, weaving, pottery production, and metallurgy, according to the varying house inventories. Finds of mostly finished tools made from Volhynian flint as well as copper tools are interpreted as long-distance trade of crucial goods. The prominent depiction of sledges in figurative art and regular finds of clay tokens are suggested to be further hints for an elaborate economy. It is concluded that the economy was sophisticated enough to support the estimated population, but also that the larger sites were dependent on tools imported from a wider territory.

All these findings led Shmagliy and Videyko to the conclusion that large Trypillia sites meet their criteria for a 'proto-city' defined as an economic, public, military, and ideological centre, which is still based on an agrarian subsistence economy.

From the neighbouring Tal'yanky perspective, Kruts and Ryzhov (1984) chose to characterise the large sites in more neutral terms as 'giant settlements' [поселений-гигантов]. In their view, the 'mega-sites' were independent agro-pastoral socio-economic units (*ibid.*, 29). Later, Kruts (2012, 76) named them both 'villages' as well as 'megalopoleis'.

While Kruts (2001; 2012) acknowledged the estimated population size and its military potential, he criticized most of the other claimed findings supporting the 'proto-city' interpretation. He remarked (2001, 90) that at the former stage of research no industrial complexes were found to support the idea of an economic centre. From an economic point of view, establishing such large settlements in the forest-steppe was for him a highly irrational act, provoking scarcity of most subsistence goods. Furthermore, the aggregation of people ought to provoke epidemics. According to the features and inventories of buildings excavated at Tal'yanky, Kruts (2012, 75) saw no economic differences between them, wherever located inside the settlement.

Additionally, he remarked that monumental architecture, like temples or palaces, were not found until that time. In addition, evidence for administration, such as emerging literacy visible in pottery decoration, was negated. The monumental and defensive nature of house-clusters in terms of a 'residential wall' were dismissed by Kruts (*ibid.*, 74), since clusters of three to four buildings were placed on average at a distance of 10-20 m apart from each other. In addition, excavations at Tal'yanky could show that some building entrances were facing away from the centre.

On a regional scale, Kruts (2001, 90) saw no evidence for economically supportive satellite settlements in the surroundings of the 'mega-sites', refuting the idea of settlement hierarchies and 'polities'. On the contrary, in his view (2012, 75) they were economically dependent on larger sites. Thus, besides their large population, nothing hinted at a special role of the 'giant-settlements' (*ibid.*, 77). Finally, he interpreted the overall social structure as a tribal community with the dwelling as the smallest social unit, the house-clusters as kin-groups and main productive unit, which came together in larger communities represented by regular-sized settlements (*ibid.*, 75). Up to 40 communities were said to have come together at Tal'yanky based on sizes of regular settlements ranging between 7-15 ha and a population between 200 to 500 inhabitants (*ibid.*).

9.2 International efforts of classification

The outstanding size of some Trypillia settlements was introduced internationally by Childe (1958, 6th edition) in 'Dawn of European Civilization' in which he mentions the sites' extent and the large number of dwellings observed at Vladimirovka, in contrast to settlements located on Romanian territory. Interestingly, he downplays the number of observed structures to 150 instead of the number of around 200 reported by Passek (1949). Although the extraordinary size was recognised, he (Childe 1958, 137) still referred to Vladimirovka as a 'village'. According to the excavation results from Kolomyshchina near Kyiv and Fedeleşeni in Moldova, Childe (*ibid.*, 142) observed two types of social organisation for Cucuteni-Trypillia settlements. Kolomyshchina is interpreted as "democratic and equalitarian", based on its house sizes, and Fedeleşeni is characterised as hierarchical, since the inventory of one house is well-equipped and also contained a stone animal sceptre-head that he (*ibid.*) related to a potential chief as a symbol of authority.

In conclusion, with this early characterisation of Vladimirovka and the social organisation of Trypillia settlements, Childe's interpretation remained ambiguous and the potential of these sites also remained unrecognised in the West.

A first thorough international attempt to fit the newly discovered 'mega-sites' of the Southern Bug Dnieper interfluve into a culture historical perspective was presented by Linda Ellis (1984).

Based on the limited data published by the end of the 1970s, Ellis (1984, 7, 199) characterised the large sites as "tremendous population aggregates" and "regional artistic and technological centres". From a socio-evolutionary stance, the sites represent to her an early "ranked society" or "chiefdom" undergoing technological and therefore social transformations (*ibid.*, 171). The social organisation ought to lie "somewhere on a continuum from what has been termed 'tribe' to the level of 'state' society" (*ibid.*, 197). While she does avoid characterising the large sites as either villages or towns, she traces the characteristics of Trypillia settlements according to social evolutionary theory. Ellis' (*ibid.*, 198-199) reconstruction of Cucuteni-Trypillia society is mainly inferred from pottery technology and estimated population sizes. Her recognisable criteria for a ranked society visible in the archaeological record are: (i) a high population density, (ii) increased total population, (iii) increase in the size of residence groups, indicated by two-storey buildings, (iv) territorial boundaries according to wall-ditch-systems in the west and the equal distance between large sites in the east, (v) great potential for territorial expansion as evident in the historical development from the sub-Carpathians towards the forest-steppe, and (vi) craft specialisation as represented by kiln batteries and pottery workshops, as well as the overall exceptional quality of ceramics. While figurines, house models and 'binocular' vessels are interpreted in relation to religious practices, no emergence of religious specialists was identified by her (*ibid.*).

The development from diverse vessel forms and polychrome decorations towards more standardised forms and reduced monochrome decorations in combination with the use of the slow pottery wheel during the time of the large sites are interpreted as an "adoption of mass production methods" (*ibid.*, 7). On the one hand, the production of high-quality storage vessels very early on in the development of Cucuteni-Trypillia is said to have enabled larger total population aggregates. On the other hand, the increased demand for vessels necessitated industrialisation and with it increased labour division (*ibid.*, 200).

Overall, she postulates that based on the large population, a high degree of organisation can be implied, and that full-time specialists accompanied by agricultural surplus producers can be inferred (*ibid.*). This led Ellis (*ibid.*, 198) to the conclusion that the large settlements were "centres which co-ordinated social, religious, and economic activities".

In his efforts to classify prehistoric settlement diversity in southeast Europe, Taylor (1987, 4) characterises Maidanets'ke as a large village, which emerged from "a background of small scattered villages". Villages in his classification are defined as small agglomerations of dwellings without considerable internal differentiation (*ibid.*). Referring to the stage of research presented by Ellis (1984), he (1987, 4) acknowledges the large number of houses observed at Maidanets'ke by aerial survey. Moreover, he (*ibid.*) speculates for craft specialisation in quarters at larger sites, referring to smaller settlements like Petreni in which dwellings with rich pottery inventories were interpreted as ceramic workshops. However, he (*ibid.*) remarks that large Trypillia settlements are not well enough understood to classify them as either villages or towns. Nevertheless, Taylor (*ibid.*, 19) speculates that from a linguistic point of view, the inhabitants of the Maidanets'ke site referred to their settlement as a town.

A first elaborate theoretical consideration of how the Trypillia case could contribute to the understanding of early urbanism was presented later by Fletcher (1995). In his study regarding the limits to settlement growth, he (*ibid.*, 198) characterises the Trypillia sites as potential 'bypass settlements' with their dimensions exceeding his hypothesised growth limit of 100 ha for non-urban agrarian-based settlements. He (*ibid*., 205) observed that

> '[…] *as communities reach high densities in very large settlements, there is a powerful break on their growth, consistent with the model of extreme stress in the wedge between the I*[nteraction]*- and C*[ommunication]*-limit*'.

To him, the Trypillia phenomenon provides a possible case to either refute his model or as evidence for a settlement system bypassing a cognitive threshold of interaction stress by reducing these stresses via residential dispersal (*ibid*., 112, 121-124). By dispersing into low-density sites, communities could overcome material behaviour constraints of high-density sites. However, he considers these kinds of settlements to be highly unstable, as they would have to constantly resist aggregation processes (*ibid*., 121).

With his material behaviour approach, Fletcher identifies several prerequisites that communities had to possess to cross the transition to initial agrarian-based urbanism. These prerequisites were material means to create predictable and therefore structured patterns for inhabitants to cope with audio-visual as well as spatio-temporal signals. This includes a clearly structured built space for orientation and predictable social arenas, a material information system to communicate passively and through time as well as spatial segregation and durable materials to reduce audio-visual stress, thus enabling higher residential density.

For the case of large Trypillia sites, Fletcher (*ibid*., 198) relies on dated information provided by Ellis (1984, see above). According to these data, he finds no evidence for internal segregation or an information system. Noting the lack of evidence for occupational duration and number of dwellings, he remains uncertain about the population density. Nevertheless, he (*ibid*., 198) expects a low density of inhabitants and therefore proposes them to be potential 'bypass settlements'. He (*ibid*., 200) also notes the unusual regional density of large Trypillia sites in contrast to initial urbanisation in Mesopotamia.

In conclusion, Fletcher (*ibid*., 198) suggests that the Trypillia case could present settlements without recent or ethnographic equivalents, and that we should be cautious to fit them into socio-evolutionary categories, for they might present

> '[…] *a source of potential refutations which may be able to reveal the restricted nature of contemporary experience*'.

His scheme to differentiate between urban and non-urban sites emphasises both a functional and a demographical perspective on settlement development. If one accepts the proposed low-density bypass settlement characterisation, the Trypillia 'mega-sites' would classify as villages without urban material culture, but with a population of 'urban size'.

A more critical stance towards the interpretation of Trypillia 'mega-sites' comes from Kohl (2007). While he (*ibid*., 12) too describes them as

> '*gigantic 'proto-urban' settlements* […] *that in their extent are as large or larger than the cities of southern Mesopotamia and that appear roughly 500 to 1000 years earlier*',

he admits that

> '*the neo-evolutionary term 'proto-urban'* […] *is correspondingly misleading*'.

Developments of aggregated settlements, like in the Trypillia case, should be seen as "devolution" or "cyclical transformation of social complexity" (*ibid*., 14), which appears to be an interesting case in its own right. He suggests that before squeezing the 'mega-sites' into a scheme, their structures and functions have to be understood.

In Kohl's view (2007, 49), "gigantic Tripolye settlements" do not classify as urban formations since they appear to show little social differentiation. His actual description of the Trypillia case is derived from an earlier article (Kohl 2002). Referring to Videyko (1996), craft specialisation might be observed. However, compared to Balkan metallurgy, the Cucuteni-Trypillia evidence is seen as rather basic, and might have been less important (2007, 37-38). Judging the archaeological record of copper artefacts, he (*ibid.*, 39) sees no evidence of an extended network for the circulation of metal. Trying, then, to infer the social structure of the 'mega-sites' from their built environment, he (*ibid.*, 49) sees no evidence to reconstruct an elaborate multi-tiered social hierarchy. Nevertheless, he (2002, 155) acknowledges special buildings like complex 'M' at Maidanets'ke and the clear planning of the large sites. Interpreting house clusters as fortifications appears illusory to him, since this view ought to be influenced by the kurgan invasion hypothesis. Rather, he (*ibid.*, 154) sees them as a

> '*system of enclosures for controlling* […] *large herds of cattle and other animals* […]'.

He (*ibid.*, 155) acknowledges that only few parts of the different kinds of features at the sites were excavated, and interpretations may change when open areas and the centre of the settlements are investigated. Comparing the houses of large and small sites, however, there appears to be no rural-urban difference (*ibid.*, 154).

A possible reason for the decline of the large sites is suggested by the vulnerability of the inferred extensive agriculture and the exploitation of the environment (*ibid.*, 158-159). Internal conflict, as previously suggested, is also acknowledged, although besides the population aggregation itself, evidence for aggression is lacking (*ibid.*).

In conclusion, Kohl's characterisation of the 'mega-site' phenomenon is mainly based on a functional interpretation of the archaeological evidence.

In his synthesising work, Anthony (2007, 277) envisions Trypillia settlements in general as 'agricultural towns', and the larger ones as 'super towns', which ought to be bigger than cities, but still economically based on an agro-pastoral subsistence strategy. Occasionally, 'town' and 'village' are used interchangeably. To characterise the Trypillia phenomenon, Anthony (*ibid.*, 282) directly contrasts the features of the large settlements with the slightly later Mesopotamian development. In result, the settlements do not classify as cities to him (*ibid.*, 264) since they "had no palaces, temples, town walls, cemeteries, or irrigation systems", and thus "lacked centralized political authority and specialized economy". Here, he (*ibid.*, 279) also refutes the hypothesis by Shmagliy and Videyko that the house-clusters had a defensive purpose. However, based on the high-quality pottery, metallurgy, and flint traditions shared over a larger region, he (*ibid.*, 225) suggests that there must have been "master craft specialists who were patronized and supported by chiefs". Nevertheless, he (*ibid.*) sees no evidence for centralized power in any village. According to the assumed pottery workshop at Varvarovka VIII and the flint production at Polivanov Yar (*ibid.*, 229), Anthony (*ibid.*, 234) identifies "specialized towns" in which, for example, finewares were produced and distributed, whereas coarse wares should have remained as a part of local household production. He (*ibid.*, 281) envisions the "super towns" to be centres with spatially segregated craft quarters based on the investigations at Maidanets'ke. There, the remains of loom weights in most of the excavated house clusters assumedly appear to resemble a 'weaver's quarter' (*ibid.*, 492).

The internal social organisation is seen in accordance to Shmagliy's and Videyko's suggestion that house clusters were organised in 'clan segments' connected to a larger building resembling a "community centre". These community centres should be equipped with a large assemblage of rare female figurines, fineware, and looms (*ibid.*, 281). To him (*ibid.*), the decision-making process of an estimated number of 150 to 300 community leaders possibly contributed to the demise of the larger sites.

On a regional scale, Anthony (*ibid.*) identifies a settlement hierarchy based on site sizes, which he equates with "an emerging political hierarchy and increasing centralisation of political power". In his view, the development into cities failed, however, as the 'super towns' were abandoned before a political hierarchy was established (*ibid.*). Referring to the Ukrainian debate, he sees the cause of the population aggregation based on endemic tribal warfare (*ibid.*, 237) and potentially as a defensive strategy against the steppe neighbours (*ibid.*, 264). The increasing influx of Cucuteni C pottery (coarse ware) is suggested to reflect an increasing steppe population present at the Trypillia settlements. This ought to indicate that the steppe inhabitants were a factor in the decline of the large Trypillia sites.

Anthony's 'mega-site' characterisation seems to be based partly on functional aspects, such as craft specialization, but also demographically based regarding the large population aggregation in the forest-steppe. Since he refers to earlier tell sites to the west as towns and economic centres, only the size of Trypillia settlements appears to be extraordinary to him.

Wengrow (2015, 19) characterises the 'mega-sites' as "early cities of the steppe-forest zone" and "first Ukrainian cities". For him, they represent an egalitarian experiment on an urban scale (*ibid.*, 3). In his view (*ibid.*, 15), the Mesopotamian and Trypillia cases were never thoroughly compared. He criticises that the 'mega-sites' were often denied urban status, especially in comparison to contemporaneous developments in Mesopotamia, since they do not seem to follow the trajectory of social evolutionary theory (*ibid.*, 7).

Wengrow (*ibid.*, 13) bases his egalitarian characterisation on the observation that there were presumably "no clear differences between monumental and residential buildings" in large sites, referring to Chapman and colleagues (2014b), and that neither "elite neighbourhoods" nor "grand burials" were found. On a regional level, he (Wengrow 2015, 10) acknowledges a "tiered settlement pattern" of "smaller towns and villages". In his view (*ibid.*, 11)

> *'centralising tendencies were muted, and never produced a clear distinction between private and public, or household and temple, spheres'.*

This ought to be observed in the diversity of pottery, which to him shows no signs of standardization (*ibid.*, 18).

While he acknowledges that clear spatial planning, long-distance imports of salt, flint, and copper as well as intensive pottery production have been observed, he sees no extreme social inequalities through craft or ritual specialization materialised in the archaeological record (*ibid.*), which for him would signify 'the state'.

By rejecting the necessity of interdependencies between population size and density as well as centralised organisational complexity, Wengrow (*ibid.*) argues that Trypillia 'mega-sites' illustrate the diversity of urban form. To him (*ibid.*, 19), the settlements show a "pristine urbanisation" that "operated effectively for many centuries with little centralised management or accumulation of resources above the level of the individual household or small neighbourhood". In conclusion, Wengrow's characterisation of 'mega-sites' as urban settlements is mainly based on aggregated population size.

As could be shown above, the international reception of large Trypillia sites up until 2015 is either based on early reports from the Trypillia Complex Expedition (Ellis 1984) or secondary sources, which then were based on early reports. This is partly due to the circumstance that few inventories were published by the respective excavators before the twenty-first century. Annual reports for the excavations at Tal'yanky started in 2001 and the summary of field reports from Maidanets'ke were published in 2004.

9.3 The renewed 'mega-site' debate

In 2009, a new research phase began with the establishment of two international projects, the Ukrainian-German collaboration, working in Romania, Moldova and Ukraine on several larger and smaller Cucuteni-Trypillia settlements, and the Ukrainian-British collaboration 'Early urbanism in prehistoric Europe: the case of the Trypillia mega-sites', working at Nebelivka (Müller *et al.* 2016c; Hofmann *et al.* 2018; Chapman *et al.* 2014a). The German collaboration with Ukrainian and Moldovan colleagues is continued in the CRC 1266 subproject D1 'Population agglomerations at Tripolye-Cucuteni mega-sites'. The aims of these partly ongoing projects are the identification of 'mega-site' settlement patterns, their economic foundation and environmental impact, and the reconstruction of their social organisation (Rassmann *et al.* 2014, 100). Ultimately, this might allow the evaluation of the 'mega-sites' place in the evolution of urbanism (Chapman *et al.* 2014a, 372).

This revival of Trypillia research was labelled "the second phase of a methodological revolution" (*ibid.*), whereas the first phase consisted of the initial aerial survey conducted by Shishkin (1973) followed by large scale geophysical prospection of Trypillia sites (Shmagliy *et al.* 1973; Dudkin 1978) and target excavations to confirm the survey results. The second phase was characterised by advances in geophysical prospection, enabling the detection of new features and feature combinations (Chapman *et al.* 2014a, 379-389). While the survey resolution massively increased, it has to be noted that we still benefit from the monumental work of Dudkin and his colleagues. Instead of a revolution, the renewed research should be called a state-of-the-art continuation. Nevertheless, these advances led to the discovery of unburnt dwellings, the regular combination of dwellings and pits, ring-buildings or assembly houses and the Nebelivka 'mega-structure', ditches around 'mega-sites', pottery kilns, and radial trackways (Rassmann *et al.* 2014; Chapman *et al.* 2014a; Ohlrau 2015). However, new evidence also sparked new debates about the nature of these findings and the character of large Trypillia settlements. In the following, the main results of the two projects are summarised and afterwards set into context with the new results from this study.

9.3.1 Structures and their interpretation

Dwellings classified as unburnt or eroded, at Nebelivka labelled 'probable houses,' occur regularly on both smaller and larger settlements. In general, these types of buildings make up between 14-27 % of the dwellings per site (Ohlrau 2015, 50). At Maidanets'ke, they lie at 21 %, comparable to the survey results at Nebelivka (Burdo and Videyko 2016, 107). Two of these structures were excavated by V. Rud in 2014 at Nebelivka (Rud 2015; Burdo and Videyko 2016, 104, 107-110). They show fewer artefacts than usual, but the typical set of pottery and stone tools as well as clay installations is present in these features. The typical massive clay platform (ploshchadka), however, appears to be missing. Still, the buildings were burnt, as can be observed on pottery and few pieces of vitrified daub, leading to the conclusion that these structures were typical, although ground level Trypillia dwellings.

The excavation results of the Nebelivka 'mega-structure' led to diverging interpretations within the Anglo-Ukrainian project (Chapman *et al.* 2014b; Burdo and Videyko 2016; Chapman *et al.* 2016). While the British excavators reconstruct a central roofed building with a walled courtyard attached at one side, which they interpret as an 'assembly house' (Chapman *et al.* 2016, 123), the Ukrainian excavators reconstruct a vast two-storeyed building with a courtyard to the east, which they label as a temple in analogy to Mesopotamian examples (Burdo and Videyko 2016). For this building, only preliminary results on the inventory have been published until now. Among the fixed interiors are typical features of regular Trypillia dwellings, but they appear either much larger or in higher number (Chapman *et al.* 2014b; Burdo and Videyko 2016, 111). Seven platforms or 'altars' were recorded with some of them showing paintings and incised decorations, a podium or bench of over 10 m in length with several daub pithoi of ca. 50 litre capacity fixed on it, two clay bins with quern stones still in place, a large fireplace, and a monumental threshold measuring over 2 m wide with a decorated arc, which led into the courtyard. Right outside the western short side of the building and inside the central roofed part, two smaller fireplaces were recognised.

Among the artefacts are twelve figurines, over 20 clay tokens of various shapes, a golden hair-ornament from inside the central part of the building, and a concentration of over 20 miniature cups with a unique graphite decoration retrieved from the outside wall of the central roofed building part facing the courtyard. Due to the high topographic location of the building, its remains were found close to the surface and nearly half of the artefacts were dislocated into the ploughing horizon. The pottery assemblage of over 3000 sherds shows a high number of painted fineware, but the number of vessels and the composition of types remain mostly unclear. Inside the roofed central part, a large vessel and two bowls are mentioned (Burdo and Videyko 2016, 112). Further bowls and pots as well as a binocular vessel were found on or close to the large platforms or altars (*ibid.*).

From the British perspective, the building was not inhabited. Additionally, despite the various special finds of several figurines, tokens, the set of cups and especially the extremely rare find of gold, they see no real differences to regular Trypillia dwellings (Chapman *et al.* 2016, 126). While the traditional Ukrainian interpretation of raised platforms as altars is refuted by the British side, since no figurines or comparable objects were found near them, they suggest that these features were places on which people sat and used ritual objects for short-term performances (Chapman *et al.* 2014b, 145). Hence, the British side interprets the 'mega-structure' as a public assembly house (*ibid.*, 154).

In the Ukrainian interpretation, the platforms and the podium were places of sacrifice, hinted at by charred lamb bones (Burdo and Videyko 2016, 112). The daub pithoi on the podium and large vessels on the raised platforms and inside the central roofed part are suggested to be storage vessels for grain (*ibid.*). The fireplace inside the central part of the building is seen as a place for a small permanent residence of 'personnel' (*ibid.*) They estimate the free space inside the western part of the building to be around 600 m² with enough space for several hundred people (*ibid.*). This led them to the conclusion that based on the monumental construction, its placement on a high point in the settlement, and the public space inside the building with places for sacrifice and storage, the 'mega-structure' classifies as a "central temple for the whole village community" (*ibid.*).

Both the Ukrainian and the British side agree that the 'mega-structure' had a public character, while mostly consisting of regular features known from typical Trypillia dwellings. What makes this building unique is its accumulation of ritual features and its public exposure inside the settlement layout. In conclusion, according to the excavators, the 'mega-structure' displays an integrative institution to various degrees with storage for redistribution and a public meeting place for ritual performances.

Apart from the 'mega-structure' at Nebelivka, an exceptional ring building (trench 111) was completely excavated at Maidanets'ke during the 2016 campaign (Hofmann *et al.* 2019b). Previous test excavations of such a ring building at Dobrovody resulted in little to no diagnostic artefacts except for a figurine and only a burnt surface in the centre enclosed by a thin wall of burnt daub (Korvin-Piotrovskiy *et al.* 2016; 2015, 201-2). The example at Maidanets'ke was divided into a roofed northwestern part and a large enclosed courtyard to the southeast. According to preliminary results, the whole structure consisted of only a ground level without a platform. In the northwestern roofed part, a fireplace was found, which showed at least three renovation layers comparable to features of the Nebelivka 'mega-structure' platforms. Overall, a minimum of 27 vessels was reconstructed with the typical spectrum of types. Cups were missing completely. In contrast to regular dwellings, this assemblage consists of a higher ratio of intermediate storage vessels. Kitchenware, indicating food processing, was found close to the fireplace inside the roofed part and outside near the walls of the southeastern courtyard. Several querns were found in both parts of the building, but most of them were broken along the northwestern walls and in the southeastern centre. While the broken ones are interpreted as secondarily used foundation for the construction of the building, only one intact quern set was found in the centre of the courtyard. Besides these indicators for cereal processing, the remains of two looms were found, one in the western corner, the other in the southern corner of the building. Polishing and whetstones have been recorded in the northwestern roofed part. The only figurine was found outside the structure to the north. Bones were mostly distributed close to the fireplace in the northwestern roofed area. They consisted of mostly cattle and pig bones. Charred feathergrass remains were observed in the southeastern courtyard. Besides underlining the open character of this part of the building, they can be an indicator for matting or basketry production (Dal Corso *et al.* 2019).

Comparable to the Nebelivka 'mega-structure', no domed hearth was observed in the Maidanets'ke ring building. Hence, according to the excavators, the structure was probably not as permanently inhabited as regular Trypillia dwellings. The presence of standard domestic activities in a semi-public internal space is interpreted as an indicator of communal integration, which generated group cohesion without specialised production and centralized redistribution.

Potential kiln anomalies were first observed during the renewed survey at Tal'yanky (Kruts *et al.* 2011). While standalone pottery kilns in various shapes were already known from Cucuteni-Trypillia for several decades (Ellis 1984; Tsvek 2004; Alaiba 2007), they were never observed for the larger settlements. These kinds of features are distributed differently inside the settlement layout of various 'mega-sites' (Korvin-Piotrovskiy *et al.* 2016, 249). Potential kiln anomalies occur in a ratio of 1:21 to 1:25 in relation to the number of dwellings observed at Tal'yanky and Petreni. At Maidanets'ke, the ratio lies at 1:130 or more, which is explained by the fact that multi-layered kilns were only observed at Maidanets'ke (*ibid.*, 225).

First excavations took place at Tal'yanky in 2013 to confirm the assumed kilns (kiln A-C). Another one was excavated in 2014 (kiln D). All four anomalies turned out to be three-channelled up-draft kilns with the firing chamber separated from the combustion chamber below (*ibid.*). At Maidanets'ke and Nebelivka, the combustion and firing chambers were not separated by a fixed installation of 'trestles' enabling the air flow between the two chambers. Instead, it is suggested by Burdo and Videyko (2016, 97-98) that clay slabs were used to regulate the airflow for these constructions. Baked clay disks and granite slabs were also observed *in situ* on several trestles of kilns at Tal'yanky (Korvin-Piotrovskiy *et al.* 2016, 231). Layers of pottery were found on top of all of these structures. Korvin-Piotrovskiy and colleagues (*ibid.*, 226) interpret these layers as remains from collapsed kiln domes, which is supported by vitrified and slagged pottery found on top of kiln A at Tal'yanky. Pottery was also built into the walls of the kilns to make the whole structures more fire resistant.

At Maidanets'ke and Nebelivka, kilns were accompanied by pits facing towards the opening of their fuel chamber. Excavation trenches at Tal'yanky were too small in scale to observe a similar connection between the two types of features. However, a larger pit anomaly lies in the direction of kiln C (*ibid.*, 227). Besides pits in potential connection to kilns at Maidanets'ke, the only other example comes from Nebelivka (Burdo and Videyko 2016, 97-98). There, pottery, animal bones, broken querns and lithics as well as burnt daub were distributed over four layers of infill. Most remarkable is a set of 30 anthropomorphic and two zoomorphic figurines found in this pit. Pottery remains showed no traces of second firing or misfiring. Hence, it was interpreted by the Ukrainian excavators as a domestic trash pit in which some kiln remains were deposited (*ibid.*, 98).

While most scholars agree that the excavated features were pottery kilns, the British team suggests them to be communal cooking facilities for seasonal feasting activities (Chapman and Gaydarska 2016a; Chapman 2017b, 230).

Ditches were known especially from the middle period and the western distribution of the Cucuteni-Trypillia-Cultural-Complex, but their discovery in context with 'mega-sites' was a surprise. Not all of them showed this feature, though. They were found to both follow the main layout of 'mega-sites' or were present inside settlements like Maidanets'ke or Petreni (Rassmann *et al.* 2014). Previous to the results from Maidanets'ke presented here, the ditch systems were both interpreted as defensive structures (Burdo and Videyko 2016) and a perimeter ditch characterised as a symbolic border (Chapman and Gaydarska 2016a; Chapman *et al.* 2016). Further parts of the ditch system outside of Nebelivka led Chapman and Gaydarska (2016a) to the assumption of a field system situated right outside the settlement.

Small parts of the Nebelivka ditch were explored in the northern and southern parts of the settlement. Again, there is a major disagreement between the British and Ukrainian excavators regarding the character of their results. The northern part of the ditch system is, on the one hand, interpreted as a massive construct, which was around 3-4 m wide and according to coring up to three meters deep (Burdo and Videyko 2016, 95), and, on the other hand, seen to have measured two meters wide and 1.5 m deep (Chapman *et al.* 2016, 119). Both teams agree that the ditch in the southern part of the site is much shallower measuring between 0.8 to 0.7 m deep. From the Ukrainian perspective (Burdo and Videyko 2016, 95), the infill of the ditch showed a mixed soil indicating a quick refilling process, whereas the British perspective refers to bulk samples of snails indicating an open-ditch-ecosystem (Chapman *et al.* 2016, 119). The Ukrainian hypothesis that the 'mega-site' was surrounded by a defensive palisade is refuted by the British excavators. Instead, they emphasise the gaps visible in the geomagnetic plot of the settlement. While some of the gaps can be explained by erosion and topography, others appear to be intentional. Hence, the British team characterises Nebelivka as a causewayed enclosure (*ibid.*, 129).

So far, trackways have not been investigated at Tal'yanky and Dobrovody. They are, however, also present at Stolniceni in Moldova, where a layer of fragmented sherds was observed during recent excavations (Ţerna pers. comm.).

9.3.2 Settlement patterns

The renewed surveys revealed regularly occurring clusters of dwellings interpreted as neighbourhoods as well as regular spacing of special buildings inside and outside the main circuits dividing the settlements into districts (Ohlrau 2015) or quarters (Chapman *et al.* 2014a). Neighbourhoods were defined by Chapman and Gaydarska (2016b) as clusters of three dwellings or more. A statistic evaluation of these clusters shows an average grouping of five and up to 41 dwellings at Maidanets'ke (Ohlrau 2015, 55). At Tal'yanky, average clusters consist of three but could reach sizes of up to 30 dwellings. These neighbourhoods appear both as linear groups and as nucleated groupings or so-called squares (Chapman *et al.* 2014a).

Initially, the 'mega-structure' and ring buildings were not differentiated at their discovery in 2009 due to a limited survey area of 15 ha (Chapman and Videyko 2011). At Maidanets'ke, however, regular spacing of exceptional buildings were observed following the main pathways of the site. While Rassmann and colleagues (2014, 132) argue for a regular spacing of about 200 m between each exceptional building, Chapman and Gaydarska (2016b, 94) observe a greater variability between them at Nebelivka.

Based on a spatial analysis of the renewed geophysical survey, a first model for a 'mega-site' settlement pattern was developed (Ohlrau 2015, 62). Four different categories were defined for this pattern. On the lowest level (D), it was observed that on average one pit was associated with one building. On the second level (C), groups of buildings with pits were observed. Larger-than-usual buildings, mostly unassociated with other buildings, but located along the pathways of radial rows, as well as kilns were classified as category (B). Finally, exceptional buildings or 'mega-structures', associated with large pits (A), were observed on the top level of the settlement pattern. By using catchments around exceptional buildings, districts were defined. At Maidanets'ke, these districts had a median size of 9 ha and consisted of 185 dwellings in

66 clusters with one larger, possibly expanded economic dwelling as well as sometimes a single kiln (Ohlrau 2015, 63). Three types of segments or districts were identified as main building blocks of 'mega-site' settlement pattern: an inner segment adjacent to the inner free space with an exceptional building following the radial clusters of dwellings, a central segment resembled by the main circuit with exceptional buildings following the circular main pathway, and a peripheral segment sometimes delimited by an enclosure with exceptional buildings following the radial pathways (Ohlrau 2015, 64).

The completed survey of Nebelivka provides important insights with total numbers for all parts of the settlement pattern. Based on radial clusters of dwellings, fourteen quarters were distinguished there, consisting of five to eighteen neighbourhoods (Chapman and Gaydarska 2016b, 93). Overall, 152 neighbourhoods were observed by the British team (*ibid.*, 95), but further quantities of economic buildings or pottery kilns remain unreported.

9.3.3 Radiometric dating

Both international projects launched extensive sampling strategies for radiocarbon dating. Preliminary results for Maidanets'ke were discussed by Müller and colleagues (2016a; 2017b). To derive a solid radiometric chronology from the entire settlement, test trenches were laid out for each of the nine building rings. When possible, Bayesian modelling was applied to appropriate contexts. After the initial campaign from 2013, 35 samples were dated by the Poznan laboratory. Overall, seven out of nine rings were dated with 14 samples being *termini ad quos* dates associated with dwellings and pits. To Müller and colleagues (2016a, 163), the results displayed statistically identical dates for all dwellings between 3800 to 3700 cal BCE. Thus, they concluded that most dwellings were contemporaneous until their deliberate destruction around 3785-3590 cal BCE. Pits were dated to a similar timeframe between 3915 to 3615 cal BCE. The earliest activities at the site were visible in the pits and dated between 3940 to 3790 cal BCE. With building remains found in some pits, the demolishment of dwellings, which belonged to an earlier phase at the site, was postulated (Müller and Videyko 2016, 91). This was taken as a further implication that the dwellings observed in the survey belonged to the peak occupation of Maidanets'ke (Müller *et al.* 2016a, 163).

Chapman and Gaydarska (2016a, 295) argued that based on the time depth visible in the Maidanets'ke survey, not all visible structures could have been coeval and that no population estimates would be possible without the radiocarbon dating of various features.

At Nebelivka, test trenches were not distributed along the building rings but across different districts. A number of over 80 samples appears to be currently modelled (Albert *et al.* 2019), whereby the sites were reportedly occupied from 3950 to 3750 cal BCE. Currently (*ibid.*), the beginning of Nebelivka's occupation is dated between 3980-3820 cal BCE (95.4 % probability) and its decline between 3870-3750 cal BCE (95.4 % probability). Earlier accounts (Chapman and Gaydarska 2015, 88) dated the beginning of Nebelivka between 4000 to 3870 cal BCE (95.4 % probability) and its abandonment between 3930 to 3760 cal BCE (95.4 % probability). The site's overall occupation was modelled between 20 to 220 calendar years (*ibid.*). However, details of this chronology were not made explicit and no radiocarbon dates were published before the editorial deadline of this study.

On a regional level, Nebbia and colleagues (2018) observed chronologically overlapping occupations between different 'mega-sites', as previously recognised by Müller and colleagues (2016a). Thus, there is an agreement that the succession of sites was a rather gradual development.

9.3.4 Population estimates

New estimates of 'mega-site' populations led to divisive opinions between the two international teams (Müller *et al.* 2016a; Chapman 2017a). According to the results of the radiocarbon dating at Maidanets'ke, it was concluded that either all burnt buildings or both burnt and presumably unburnt buildings were at some point coevally occupied (Rassmann *et al.* 2014, 132). Based on the average building size of 77 m² and a needed floor-area per person between 5-15 m², Rassmann and colleagues (*ibid.*) estimate between 12,000 to 46,000 inhabitants with a probable average of 29,000 residents for Maidanets'ke.

Based on a misreading of Rassmann and colleagues (*ibid.*) with 1960 instead of 2960 dwellings, Chapman and colleagues (2014a, 393) estimated between 5000 to 8000 inhabitants for Maidanets'ke, but without explicit methodological reasoning.

Elsewhere, the ratio between burnt and presumably unburnt buildings was used to determine the maximum coeval population (Ohlrau 2015). At Maidanets'ke, 78 % of all structures were burnt. To keep the estimated populations comparable to settlements of other phenomena, the traditional approach by Cook (1972) of calculating 4.5 to 7 inhabitants per household was given as a reference. For Maidanets'ke, this resulted in a population of 10,350 to 16,100, with an average of 11,500 coeval inhabitants. Porčić's (2012) re-evaluation of cross-cultural floor area demands per person was used as a basis to calculate several possibilities of coeval populations. Based on the high-precision geomagnetic survey, the built-up area and an extrapolation for areas yet to be measured were used to estimate the population. With an average demand of 6.97 m² per person after Porčić (*ibid.*), between 22,300 to 23,800 coeval inhabitants were estimated (Ohlrau 2015, 66). But according to the architectural reconstructions of Trypillia buildings by Chernovol (2012), only around one third of the buildings were classified as living space. Thus, in accordance to LeBlanc's (1971) methodology to calculate the floor-area demand for roofed living space, a coeval population between 6900 to 8300 and an average of 7400 to 7900 inhabitants was estimated (Ohlrau 2015, 67).

Later, Müller and colleagues (2016a, 164) calculated a population between 6000 and 23,000 persons, with an average of 14,500 inhabitants for Maidanets'ke, according to the premise that only half of all buildings were occupied coevally and based on the same methodology as presented in Rassmann and colleagues (2014).

The rough calculations based on the number and size of dwellings observed in the high-resolution settlement plans provided in Rassmann and colleagues (*ibid.*, 132) were later criticised by Chapman (2017a) as a maximalist perspective. He distinguished between a minimalist, standard and maximalist perspective on the estimated populations for 'mega-sites'. The standard perspective sees 'mega-sites' as "long-term, permanently occupied central places with many thousands of people" (*ibid.*, 223). The maximalist perspective is defined by Chapman (*ibid.*, 227) as the standard perspective but with population estimates between 7500 to 46,000 coeval inhabitants. A minimalist perspective envisioned the 'mega-sites' as "seasonal aggregation sites with much lower populations" (*ibid.*). A middle course between the standard and minimalist perspectives was characterised by permanent, but 'much smaller populations' (*ibid.*). In the minimalist view (*ibid.*, 234), a small permanent population maintained the 'mega-site', while most inhabitants would be visitors coming from a catchment of up to 100 km. These visitors would then bring their own subsistence goods as well as figurines and pottery with them. After several visits, they would burn their dwellings. Differences between visitors and permanent residents and how to observe them in the archaeological record to support this view were not made explicit in Chapman's (*ibid.*, 234) conceptualisation. Later, Nebbia and colleagues (2018, 11) argued that the permanent caretaker population would have been represented by the local group's pottery style. This local group would have lived in the district of the 'mega-structure'. Visitors would aggregate in the 'mega-site' for one month from July to August (*ibid.*, 12). These specifications were, however, not related to archaeological evidence.

Concerning actual population estimates, Chapman and Gaydarska (2015, 88) early proposed "a few thousand seasonal inhabitants or up to nine thousand people" for Nebelivka. The methodology of this estimation, however, was not made explicit.

Elaborating the minimalist view, Nebbia and colleagues (2018, 12) suggested two different models concerning seasonal assembly at Nebelivka. For both models, an overall occupation span of five generations, each lasting thirty years, was assumed. Furthermore, six people per dwelling were proposed to estimate populations.

In the first model, a small starter population of 100 to 150 per district, adding up to 1200 to 2100 inhabitants with a maximal growth of two percent per year was assumed. At least fifteen percent of the dwellings from earlier generations had to be revisited. The burning of dwellings was set between ten to twenty percent per generation. Archaeological support for these assumptions were not made explicit. In result, the 'mega-site' would have developed very slowly but reached a huge peak in its final phase. Since a mismatch between abandoned and newly built dwellings appeared to be present in most districts and a large population was not visible in the pollen record near Nebelivka, the first model was refuted.

The second model refers to their minimalist perspective with a starter population of 100 permanent residents in fifteen so-called guardian houses and 900 visitors. Starting from a limited number of occupied districts, further ones would have been founded in each generation with no new building activities in the last phase. In result, the main growth of the settlement would have occurred during the first three generations, peaked in the fourth generation and declined rapidly in the final generation. This model would show a continuity of several districts over several generations, which was interpreted as a long-term continuity of visitors (*ibid.*). To them, the second model would fit the pollen record with several burning horizons and a lack of human impact (*ibid.*, 15). During the peak occupation of Nebelivka, they estimate a coeval population of 3900 inhabitants in total, consisting of 300 permanent residents and around 3600 visitors during the seasonal assembly (*ibid.*).

9.3.5 Environmental impact

Environmental studies related to the impact of 'mega-sites' on the landscape sparked further disagreement between the two international teams. Two approaches were applied to this problem. On the one hand, population estimates were cross-checked against the potential carrying capacity of the landscape (Ohlrau 2015; Ohlrau *et al.* 2016; Dal Corso *et al.* 2019). On the other hand, a near-site pollen record was taken as a basis to estimate the human impact of a 'mega-site' and thus its population size and potential seasonal character (Chapman 2017b; Albert *et al.* 2019).

Based on a model developed for Early Neolithic Linear Pottery economies, Ohlrau (2015, 68) evaluated the various population estimates according to differing methodologies. In a classic catchment area of one to five-kilometre radius, estimates based on the entire house floor area would have exceeded the potential carrying capacity (*ibid.*). Conservative estimates based on roofed living space, however, would have fitted the limitations of the surrounding environment.

This study was later expanded to the wider region between the Southern Bug and Dnieper Basin, and was based on robust assumptions fitting the regional circumstances (Ohlrau *et al.* 2016). Chronological phasing suggested that most site locations were chosen to avoid intersections with former land-use areas (*ibid.*, 208). According to the presented model, arable land was not a limiting factor, even if maximal coeval populations were considered for the largest sites (*ibid.*, 210). Deforestation would have only affected a limited area as large as the settlements themselves (*ibid.*, 208).

Pasture, however, would have frequently overlapped. Thus, it was concluded that herding management was possibly organised cooperatively over longer distances, keeping the livestock away from the fields and settlements for most of the year. The change from forest-steppe to steppe would have been plausible after the main settlement activities of Trypillia phase C1 (*ibid.*, 210). That livestock might have been a crucial factor was also observed elsewhere. Using the currently most complex model to simulate Trypillia economy, Shukurov and colleagues (2015, 276) observed that settlements exceeding 300 inhabitants and an average size of 10 ha would demand innovations of manuring and land tilling to remain self-sufficiency. A rapid increase of grazing area needed for cattle led them to the conclusion that 'mega-sites' would necessitate the support of satellite villages (*ibid.*)

During the renewed excavations at Maidanets'ke, a buried cambisol indicating forested areas was observed (Kirleis and Dreibrodt 2016, 177; Müller *et al.* 2017b). Since settlement pits were dug into this cambisol, it was concluded that the environment was forested before and up until the establishment of the site. The fertile chernozem soil would then have formed during or after the Trypillia occupation in the area. Thus, the 'mega-site' population would have potentially transformed the landscape from forest-steppe to steppe.

Dal Corso and colleagues (2019) are using the current chronological phasing of Maidanets'ke as presented in this study as well as the archaeological, botanical and zoological record to reconstruct the landscape based on different climatic scenarios.

In the archaeological record, numerous wooden imprints on burnt building remains show that resources were either harvested from coppiced trees, which would imply woodland management, or gathered from naturally available young trees. Based on experimental house reconstructions and house burnings, ethnographic data on firewood demand as well as kiln firing experiments, resource demands per occupational phase were estimated.

With a mixture of sheep/goat, demanding open areas as well as cattle and pigs, which can be kept in forested environs, the archaeozoological record hints at the use of woodland as well as open grazing areas.

The charcoal record shows the presence of mixed oak woodlands, but also riverine forest species. In addition, steppe indicators were observed, which led to the conclusion that the surrounding environment was a patchy forest-steppe. While in the first occupational phases mainly ash was used, charcoal remains from the peak occupation show a shift towards elm from the riverine resources and oak as an alternative to ash. Since pioneering species, such as birch and pine, were very rarely observed, it was concluded that woodland resources were not overexploited, not even during the peak occupation.

For intermediate and wet climate conditions, the model developed by Dal Corso and colleagues (2019) predicts that abundant building material and firewood would have been available. Only in the case of drier climate conditions would scarcity – especially of firewood – possibly have become an issue for the inhabitants of Maidanets'ke.

Elsewhere, Müller and colleagues (2018, 257) concluded that the reason for the abandonment of 'mega-sites' was not environmental, but rather a political decision.

Doubts about the permanent occupation of 'mega-sites' were expressed early on by Chapman and Gaydarska (2016b, 89), when evaluating the results of coring alluvial sediments close to Nebelivka. According to Chapman (2017b), several deforestation periods, nine different fire events, and an intense fire event dated to 4190 BCE as well as a continuously high intake of *Cerealia* could be observed. These signals in the record would have not only been discernible during the estimated occupation of Nebelivka, but also long before and after the site's occupation. Furthermore, very little soil erosion would have been recorded which was interpreted in favour of either seasonal or very low populations at the site.

The actual coring results were recently published by Albert and colleagues (2019). The sediment core was extracted in six segments along a slope from an alluvial basin, which depicts a very difficult and dynamic archive to sample in contrast to lake sediments or bog sites. Several hiatus below some hundred years in duration could not be excluded. Especially a hiatus towards the end of the 'mega-site' occupation is indicated by sedimentation rates. Eight samples were used to date the core and construct an age-depth model. Chronologically, the core was divided into eight pollen zones of which borders show a variable range of around 300 calibrated radiocarbon years (95.4 % probability) (*ibid.*, tab. 1). The 'mega-site' occupation could be shifted accordingly. In depth, the occupational phase was located between 5050 to 5250 mm, in pollen zones four to six. Correlating the independent dating of Nebelivka and the age-depth model of the core, the occupation was narrowed down to a depth of 5085 to 5110 mm in pollen zone five. But unfortunately, it remains unclear if the occupation extends completely over the zones four to six or fits to some part in between. Furthermore, sedimentation rates vary from one to several decades.

Albert and colleagues (*ibid.*) expected to find a high number of markers for forest clearance, intensive charcoal concentrations, agro-pastoral activity, soil erosion, and stress on small streams for water supply. Finding these indicators would have supported arguments for a large and permanent population at 'mega-sites'. In their record, Albert and colleagues (*ibid.*) do observe gradual erosion and inconsistent radiocarbon dates, which would be caused by increased organic carbon intakes. This increased carbon intake is then seen as a marker for forest clearance during the initial occupation of Nebelivka. The observed soil erosion is another argument for human impact in the area. Concerning agro-pastoral activities, they observe a continuous *Cerealia* pollen intake and dung spores interpreted as markers for a population prior to the occupation of Nebelivka. Moreover, markers for cattle grazing were observed during the occupation of Nebelivka. However, Albert and colleagues (*ibid.*) see no indication for an intensification of agro-pastoral activity over the course of the 'mega-site' occupation. Water flow was high before the occupational phase, indicated by water species and a lack of algae. During the occupational phase, the sedimentation rate increased inferring higher soil erosion. In addition, water tables were observed to drop up to one meter. A maximum fire event in the charcoal record was observed in the beginning of the occupational phase (5210 mm). This charcoal peak is interpreted as a major clearing event in the catchment area. Following smaller fire events were connected to a continuous burning of dwellings. A major fire event was later observed at the end of the occupational phase (4980 mm). This may indicate a burning of many dwellings, but is rather interpreted as misplaced charcoal from earlier events. Fungi suggesting an increase in rotting wood mainly occur during the occupational phase and were interpreted to reflect the decay of a large number of houses.

While erosion and a decrease in water tables fit large populations during the occupational phase, the pollen record suggests rather extensive instead of intensive agriculture. Arguing from their survey in the vicinity of Nebelivka, where only few sherds were recovered, Albert and colleagues (*ibid.*) conclude that no extensive fields were present during Trypillia times. Overall, the coring results ought to support the minimalist view, yet the various indicators are rather ambiguous.

9.3.6 Social interpretations

At the beginning of the new research phase, a lack of both public buildings and obvious wealth differences were attested for the Trypillia settlements (Chapman *et al.* 2014a, 370). But with the discovery of new features, such as ring buildings and 'mega-structures', the question arose how the different parts of the settlement system were integrated (*ibid.*, 396).

Several social interpretations concerning the excavation results at Maidanets'ke were proposed by the German team. The initially observed levels of spatial organisation (Ohlrau 2015, 64) provided the basis for various reconstructions of 'mega-site' societies. The different levels of the internal settlement pattern, ranging from house-units, to clusters and districts, were used to calculate the level of scalar stress in the decision-making of Maidanets'ke (*ibid.*, 86). The ratio from one organisational level to another fit to the optimal decision group sizes of Johnson (1982, 393). With increasing levelling, the calculated performance decreases, which led to one possible explanation for the decline of the 'mega-site' phenomenon (Ohlrau 2015, 86).

Initially, the internal settlement patterns were interpreted as a hierarchical system of political institutions (Rassmann *et al.* 2014, 132). Later, Müller and colleagues (2017a, 77) argued that the apparent architectural standardisation of dwellings implied a heavily structured society. Based on the excavations of 2013, regular dwellings were described as households in detail (Müller *et al.* 2016b, 257-260). All artefacts in a burnt dwelling were seen as inventories representing former household activities with evidence for production, distribution and consumption on the upper floor, and mainly storage functions on the ground floor. According to inventories from Tal'yanky, a division of labour was observed for different sizes of dwellings (*ibid.*, 260). Buildings measuring below 60 m^2 show more millstone fragments than larger ones, which, on the contrary, show more loom-weight fragments. Therefore, a division between smaller dwellings responsible for primary subsistence, and larger ones for secondary subsistence is reconstructed. The golden hair-ornament found at the Nebelivka 'mega-structure' is assumed to indicate a monopolisation of certain goods for these buildings in contrast to regular dwellings (Müller *et al.* 2017a, 82).

Müller and colleagues (2016b; 2017a; Arponen *et al.* 2016b) derive five different levels of social organisation from the spatial distribution of various features in a 'mega-site'. On the lowest level, they allocate the regular household embedded in its neighbourhood. On the second level, they observe specialised households with pronounced economic functions, such as weaving or food processing, as well as an emphasis on ritual functions. Another level of organisation is represented by the household cluster, and concentric rings of dwellings, which they interpret as possible representations of lineages. With pottery decoration styles reaching beyond clusters and specialised households, a peaceful and collective neighbourhood is reconstructed (Müller *et al.* 2016b, 261). Above that, districts represented by ring buildings and pottery kilns are suggested to have formed a kind of supra-household specialisation. Finally, the standardised spatial planning of the settlement seems to show an overarching political institution which, in their view, could be responsible for the integration of the various districts. However, differences in the appearance of ring buildings and their attached pits is interpreted as potential autonomy of their associated districts (Müller *et al.* 2017a, 81).

Early on, Müller and colleagues (2016b, 267) coined the term 'agglo-control' as a key reason for the development of the phenomenon. This term describes the advantage of agglomeration for the distribution of specialised goods such as fineware pottery from kilns found at the 'mega-sites'. Furthermore, control over agglomerated populations is assumed to be easier than over dispersed ones. While, in their view, agglomeration was made possible by economic innovations, such as animal-drawn sledges, the creation of 'mega-sites' is seen as a political decision (Müller *et al.* 2018, 253). Likewise, the abandonment of these sites is seen as a politically motivated occurrence, since the investigation of the economy and landscape showed that 'mega-site' economies were sustainable.

Subsequently, the interpretation developed further with the view that stratification was not depicted with the different organisational levels, but rather that the settlement pattern shows integration by a 'balanced social constitution' reflected by the coexistence of different decision-making systems (*ibid.*, 247-249). By retracing the settlement system of circular layouts and larger public buildings over several centuries to the Precucuteni and Trypillia A times, 'mega-sites' seem to reflect long-lasting social structures (*ibid.*, 253). But despite 'mega-structures' in these settlements, they see no archaeological evidence for a stable central institution (*ibid.*, 257).

Under the premise that most dwellings were burnt down at the end of occupation at Maidanets'ke, Arponen and colleagues (2016b, 57) argued that the burning and abandonment of the site may have represented a peaceful collective decision, which was repeated over several centuries for other sites. The Trypillia case was strongly contrasted to the Bosnian case of Okolište, where it is argued that severe labour-division and monopolisation in some households led to unbearable capability deprivations for the other households, and in consequence the monopolists were burnt down (Arponen *et al.* 2016a; Müller *et al.* 2017a). They also state, however, that a similar scenario could have emerged in Tal'yanky (Müller *et al.* 2018, 257).

British interpretations tend to focus less on economic aspects of society, although it was argued early on that the Nebelivka 'mega-structure' would, with its limited inventory, reflect strong social constraints on material accumulation (Chapman *et al.* 2014a, 397). The recovered set of tokens was perceived as an implication of administrative activities (Chapman *et al.* 2014b, 151) and the set of small cups could have represented meetings or ceremonies that might have taken place in the 'mega-structure'. Hence, it was interpreted as a public building, integrating several neighbourhoods on various hierarchical levels. Despite the unexpectedly scarce inventory, the Nebelivka 'mega-structure' was also characterised as a 'prestige structure' (Chapman 2017a, 224). This conflict between the observed hierarchical settlement pattern and the actual non-hierarchical inventory of higher-tier buildings led the British team to identify what they call the 'Trypillia exchange paradox' (Chapman and Gaydarska 2017, 274). Based on the size of the 'mega-sites', they expected to find social hierarchies in accordance to standard models of social evolution in which complexity grows with population size, but only few finds of expected prestige goods, like copper or gold, were observed. Thus, they suggested three solutions to this paradox (*ibid.*). First, social differentiation might have been expressed in undiscovered mortuary practices. Second, social differentiation might have been expressed through the 'Big Other', and third, there might have been no social differentiation. In accordance with the material record, the third solution appeared to be the most plausible one. Later Nebbia and colleagues (2018, 11) suggested a heterarchical dual structure in which both top-down and bottom-up organisations were incorporated by the inhabitants of 'mega-sites'. On an inter-regional level, a non-specified top-down entity would have been responsible to coordinate the foundation of 'mega-sites' and to guide visitors to them. The integration of visitors and caretaker populations would have been organised locally in a bottom-up process by building dwellings and neighbourhoods. The contradiction between a large population and a presumed lack of integrative structures is in their view (*ibid.*) solved by a seasonal occupation to avoid long-term scalar stress of permanent large-scale inhabitation of 'mega-sites'.

Trapped in neo-evolutionary thinking, Chapman and Gaydarska (2017, 274) concluded that there had to have been fewer inhabitants to avoid issues of social stratification and scalar stress. A small permanent population ought to have been able to take care of the logistical provisioning of the visitors (Chapman and Gaydarska 2016b, 84). In any case, Nebbia and colleagues (2018, 16) suggested social differences between initial residents at a 'mega-site' and later arrivals, whereas the Nebelivka 'mega-structure' is proposed to have belonged to the local caretaker population.

With this assumption of a seasonal assembly place, the social interpretation took a more symbolic turn. Finds, such as broken figurines and house models, were associated with the deliberate burning of dwellings. This burning, the British side argues, would have enabled the social integration of different communities, for example, inhabitants, visitors, households and ancestors, in 'mega-sites'

(Chapman and Gaydarska 2016b, 85). Burning a dwelling ought to have reflected the burial rite for a former important household member (Chapman 2015) and the inventory of the burnt dwellings would have represented grave goods (Chapman and Gaydarska 2017, 270). However, the deposition of grave goods would not have reflected a tribute to the individual, but to the entire household (*ibid.*). Hence, to them, the burning of houses formed the basis for an egalitarian interpretation of Trypillia society.

Clusters of dwellings were interpreted as neighbourhoods forming a basic level of society. These groups showed large differences in the number of associated buildings (*ibid.*, 95). This variability was also observed for other parts of the settlement pattern at Nebelivka. While the Ukrainian-German team argued for regular spacing of exceptional buildings in the main ring, the British team suggested a greater variability between the distances and sizes of quarters. This variability led Chapman and Gaydarska (2016b, 94-95) to assume a "localized, bottom-up decision-making process rather than an overall centralized planning" for the 'mega-sites'.

Comparable to Central European opinions (see Andersen 1997; Meyer and Raetzel-Fabian 2006; Klassen 2014), the causewayed enclosure was seen as a sign for communal integration through monumental labour (Chapman *et al.* 2016, 119, 129). The absence of ditches in the survey results from Tal'yanky and Dobrovody were seen as deliberate decisions (*ibid.*, 117). While this should not necessarily represent a lack of communal integration, but rather an alternative at Dobrovody, since ring buildings were observed there, the Tal'yanky case with neither ditches nor obvious ring buildings was interpreted as possible communal disintegration (*ibid.*, 119-120).

Overall, the British team chose to use Lacan's concept of the 'Big Other' to describe the integration of several aspects of Trypillia society (Chapman and Gaydarska 2017). Relying on Žižek's (2006) reading of Lacan, they characterise the 'Big Other' as a general way of life, which allows for local interpretations without distorting its general idea (*ibid.*, 267). Žižek (2006) summarised the concept of the 'Big Other' as the anonymous symbolic order of society, which is constantly and unconsciously socially reproduced. For Chapman and Gaydarska (2017), the Cucuteni-Trypillia 'Big Other' ought to consist of three long-term traditions of houses, figurines and pottery (*ibid.*, 274). To them, all of these aspects reflect the tradition of valuing the settlement over the neighbourhood, the neighbourhood over the household and the household over the individual.

9.3.7 Urbanism

While the urban character of 'mega-sites' was a main point of discussion in the previous research phase, their urbanity is rarely questioned in the current phase of research. All international teams, however, have different views on the detailed character of the Trypillia phenomenon in an urban framework. The German side prefers a proto-urban label, whereas the British side argues for low-density urbanism.

Müller and colleagues (2016b, 267) identify the estimated demographic size of the 'mega-sites' and the standardised character of their spatial organisation as urban traits. However, the 'mega-sites' do not fit into the classic Weberian scheme of European urbanism with a rural-urban differentiation and internal divisions of quarters with craft specialisation and markets. By comparing the Trypillia phenomenon to the contemporaneous Mesopotamian development, Müller and Pollock (2016, 285) argue for a centralised development towards a stratified society with a repressive state administration in the Mesopotamian case, and for stratified or egalitarian autonomous parts of a society, which eventually aggregated in large settlements, in the Trypillia case. Since the 'mega-sites' were only occupied for a short time, Müller and colleagues (2016a, 267) argue to characterise them as proto-urban, or, since a rural-urban distinction is lacking, Müller and Pollock (2016, 285) label them as 'agricultural towns'.

In the British view, the 'mega-sites' represent a unique kind of urbanism, which was unrelated to the emergence of the state (Chapman 2017a, 223). Early on, the British-Ukrainian team argued for low-density urban traits at Nebelivka (Chapman *et al.* 2014a, 372). Referring to Fletcher (1995), the 'mega-sites' ought to be the sole exception from his limits to settlement growth (*ibid.*). Fletcher (*ibid.*, 112) described several trajectories and limits to site developments. To grow beyond a certain size and prior to hitting a limit, societies had to acquire a certain set of prerequisites to overcome increasing stresses with an increasing population. Communities would bounce off an interaction limit of 300 to 600 people per hectare for sedentary lifeways and hit a communication limit for integrating populations on an area between 70 to 150 hectares for the shift from villages to agrarian-based urbanism. A hypothetical alternative trajectory – when such prerequisites were lacking – was to disperse to densities below 10 people per hectare in order to avoid density stress (*ibid.*, 93). This alternative trajectory was labelled low-density urbanism. Chapman and Gaydarska (2016b, 82-83) define low-density urbanism as settlements dominated by unbuilt space, near-absence of hierarchies and the development of massive sites. To them (*ibid.*, 98), high-density settlements are defined by populations of over 300 to 600 inhabitants per hectare, whereas low-density sites would show densities below 50 people per hectare. According to their population estimates, between 36 and 56 inhabitants per hectare would have populated Nebelivka (*ibid.*, 99). Nevertheless, this is in clear contradiction to Fletcher's model of low-density-urbanism to which they refer.

In Chapman's and Gaydarska's (*ibid.*) conceptualisation of low-density urbanism, a trajectory from high- to low-density should occur, but for the Trypillia case they see no evidence for such a trajectory. With this missing key trait, they conclude that the 'mega-sites' were not regular, but "agglutinative low-density sites" which later grew to urban size (*ibid.*). However, based on palaeodemographic analysis conducted by Diachenko and Menotti (2017, 212), such a trend from smaller sites with higher density, to lower density and larger settlements was indeed observed.

Other important characteristics of low-density urbanism include its emergence shortly after the onset of farming as well as defence systems around high-quality arable soils (Chapman and Gaydarska 2016b, 100). While they observe a rather rapid development of larger sites in less than a millennium after the introduction of agriculture, no defence systems were found.

Elsewhere, Chapman and Gaydarska (2016a, 290) referred to yet another definition of low-density urbanism in a global context. They identified five characteristics of major building projects, modular, house-oriented planning principles, seasonality, lack or minimal occurrence of mortuary practices, and a hiatus after the decline of low-density sites. Despite their argument for the monumentality of the earthworks around Nebelivka, they see no evidence for major building projects in Trypillia contexts. With their characterisation of the settlement pattern, 'mega-sites' meet the second criterion of modular planning. A seasonal population is considered, but the last two points – a lacking mortuary practice and a hiatus after the 'mega-site' phenomenon – are not discussed. Thus, only two of their additional characteristics for Trypillia low-density urbanism are observed. Still, Chapman and Gaydarska (*ibid.*, 297) argue for Trypillia 'mega-sites' as an egalitarian, pre-state form of early, low-density urbanism.

On other occasions, Gaydarska (2016; 2017) questions the urban character of the 'mega-sites'. To her (Gaydarska 2016), both urban theory and methodology appear to lack nuances to adequately describe the character of the 'mega-site' phenomenon. However, she provides no alternative concepts to solve this problem, which was criticised on several accounts (Christophersen 2016; Ur 2016). In the traditional framework, Gaydarska (2016, 42) labels the settlements as large villages. The neighbourhood squares were interpreted by Chapman and Gaydarska (2016b, 87) as 'potting villages', providing other quarters with their goods. But the idea of regional scale production with specialised settlements for production and distribution was denied by them (Chapman and Gaydarska 2017, 273). Neighbourhoods and quarters were not seen as urban traits or markers for complexity, but related to 'small village components' of the Trypillia settlement pattern (Nebbia *et al.* 2018, 9). On the one hand, Gaydarska (2016, 53) argues that the 'mega-sites' ought not to be viewed in an evolutionary framework to lie between villages and cities. On the other hand, she characterises them as "pioneer urban settlements" or "emerging cities" with no urban predecessors in their region or contact zone (*ibid.*, 48). The urban character is derived from regional and interregional comparisons, in which 'mega-sites' appear outstanding in their time in Eurasia (Gaydarska 2017, 180). Specifically, the term urban is ascribed by her to sites of residential centrality with a high-intensity of social practice in contrast to other settlements (*ibid.*, 181). According to central place theory, the Nebelivka 'mega-site' would have shown many aspects of a central place with high-intensity, although they were mostly invisible. However, there would have been no hinterland to which the site would be central in a rural-urban relationship (Gaydarska 2016, 53). Despite criticising arguments for urbanity based on singular traits (Gaydarska 2017, 179), her remaining point for an urban character of Trypillia 'mega-sites' is size. Since a large population could have concentrated at certain times in these settlements, they may have had a higher social meaning than regular sized settlements (Gaydarska 2016, 53). This higher social meaning is, however, not observable in the material remains, but only inferred by her from the size of larger settlements.

The British conceptualisation of low-density urbanism was later evaluated by Diachenko and Menotti (2017). They observe three trends concerning the density of Trypillia settlements (*ibid.*, 212). First, contrary to the British view they do observe a decreasing density of dwellings in ever larger sites over time. Second, this trend appears to spread from the Dniester region to the northeast. Third, smaller sites show higher dwelling densities than larger ones.

Based on the state of research, Diachenko and Menotti (*ibid.*, 214) observe that a characterisation of Trypillia 'mega-sites' as pre-state, low-density urban settlements remains unsubstantiated, since still no actual evidence on the internal chronology, possible seasonality and social organisation of the inhabitants were reported by the British team. To Diachenko and Menotti (*ibid.*, 212), Gaydarska's (2016, 53) critique of the proto-urban interpretation to be unilinear evolutionistic remains unjustified, since advocates of proto-urbanism clearly agree that the evolution of dwelling was clearly multi-linear (Diachenko and Menotti 2017, 213). After all, a multi-linear development of urban settlements appears to be the key point of Gaydarska's (2016; 2017) papers. Finally, Diachenko and Menotti (2017, 215) conclude that based on earlier chronological and demographic investigations (Diachenko and Menotti 2012) Trypillia societies solved the issue of population pressure by constant migration from one settlement to another, rather than establishing low-density sites. In Gaydarska's framework of multi-linear evolution, Diachenko and Menotti (2017, 215) place the 'mega-sites' in a strain of non-urban development.

9.4 Conclusions – new results in light of the 'mega-site' debate

The results of this study contribute to a variety of arguments in the current debate on the structure and development of Trypillia 'mega-sites'. These contributions include excavated features and their interpretation, radiometric dating of 'mega-sites' and population estimates based on these datings as well as the general Trypillia settlement pattern and the question of urbanity.

9.4.1 Structures and their interpretations

Regarding features and their interpretation, the 2014 and 2016 excavations at Maidanets'ke provided several crucial observations. Connected to the discussion whether furnaces observed at Tal'yanky, Nebelivka, and Maidanets'ke represent pottery kilns or communal cooking features, as suggested by the British excavators at Nebelivka, the discovery of quartz as a raw material for temper and fired paste lumps with finger imprints of both fineware and coarse ware pottery found inside the infill of the furnace channels and in a surrounding pit at Maidanets'ke is proof for the pottery kiln interpretation. The taphonomic analysis also showed that sherds from the surrounding pits were characteristically more often vitrified and higher fragmented than sherds from burnt dwelling contexts. Hence, the fillings of the pits are interpreted as production waste rather than the remains of demolished dwellings. Since the furnaces at Tal'yanky and Nebelivka are of similar construction and comparable to the ones at Maidanets'ke, it is concluded that they were also used as pottery kilns at other sites, although the inventories of these other features are not yet published. Nevertheless, the pottery kilns excavated at Maidanets'ke are unique in the sense that they were built on top of each other after renovations. This context provides an explanation for the low density of potential kiln anomalies previously observed in the magnetogram of Maidanets'ke in relation to other sites such as Tal'yanky. Regarding the social significance of the observed pottery kilns, it was concluded here that while they were recently discovered in Trypillia 'mega-sites', the innovation of multi-chambered up-draught kilns preceded the emergence of these large sites. Thus, the potential social consequences of labour division, which were related to this technological innovation, already occurred nearly a millennium earlier and are probably unrelated to the 'mega-site' phenomenon.

The ditch system at Maidanets'ke provides important results for the debate whether it represented a defensive or civil structure. For Nebelivka, it was argued by the British excavators that the ditch system represented a causewayed enclosure since many gaps between larger segments were observed in the geomagnetic survey. The excavations at Nebelivka were, however, not able to provide proof for the proposed segmentation of the ditches. At Maidanets'ke, it was possible for the first time to observe such segmentation with a gap of 3.5 m. No ramparts or post holes indicating palisades were observed. The ditch segments were filled with burnt dwelling remains, such as burnt daub with wooden imprints on them, broken quern stones and pottery, as well as special finds such as zoomorphic figurines, tokens, and sledge models. The fragment of a bucranium and the unusually high number of upside-down placed bottoms of pottery vessels at the edge of the western ditch segment as well as an assemblage, including a sledge model, a figurine, and a token in the eastern ditch segment, suggest a symbolic character of the ditches. In particular, the deposition of bucrania in enclosures is known from Central European Michelsberg enclosures (Steppan 2002). In addition, Bayesian modelling suggests that the inner enclosure marks the earliest activity at the site, which was only later built up with dwellings in the centre. Hence, it is concluded that the ditch system of Maidanets'ke follows the tradition of Central European causewayed enclosures rather than defensive ditches of the Southeastern European Neolithic and Chalcolithic, which characterised the Middle Trypillia Period. Additionally, the enclosure is interpreted here as a site planning device, hinted at by a settlement pit cutting into the eastern ditch segment related to a dwelling outside the enclosure.

Concerning an older debate about the character of Trypillia architecture, the analysis of wooden imprints on burnt daub from the completely excavated dwelling 54 suggests a building with a ground floor and an upper floor. According to the distribution of rounded imprints, the building was constructed on several posts with a diameter of up to 15 cm on a foundation of repurposed quern stones.

The upper floor was divided into two parts. A platform resembling the upper floor was built on a foundation of split timbers crosswise to the long-axis of the building. An open front porch made up a quarter of the area of the building and was constructed on split timbers facing along the long-axis of the dwelling. With the help of the wooden imprints, it could be shown in this study that buildings with a platform were indeed 'two-storeyed' as suggested by many Ukrainian scholars.

Another result from the excavation of dwelling 54 concerns the classic debate whether Trypillia dwellings were intentionally burnt down. By analysing the distribution of vitrified pottery and daub it was possible in this study to identify two sources of fire suggesting the deliberate burning of the building. One source was located below the platform represented by a fired surface on the ground floor. The second source of fire is indicated by a concentration of vitrified daub along the wall between the front porch and the main living room of the dwelling. According to these results, it is concluded that the building was deliberately set on fire. Traces of secondary burning on pottery was found throughout the building and is proof that the fire was not set to make the dwelling more weather resistant by 'constructive fire', but rather to end its use-life.

9.4.2 Radiometric dating

One of the key arguments of the current 'mega-site' debate concerns the intra-site and regional dating of the settlements. The dating of 'mega-sites' is a crucial factor to estimate population sizes and densities – both controversial topics related to the interpretation of these sites as urban aggregations as well as to answer questions of regional succession or contemporaneity of settlements in the main distribution area of the 'mega-site' phenomenon. Such estimates will also help to evaluate the ecological impact of these large settlements – a topic to be investigated in future research. While it was suggested earlier that most dwellings at Maidanets'ke existed contemporaneously between 3800-3700 cal BCE and were then burnt down during abandonment, the Bayesian modelling of a variety of contexts in this study draws a different picture. According to radiometric dating, the development of Maidanets'ke can be divided into four phases and the total duration of settlement is estimated to involve ca. 350 years from 3990-3640 cal BCE. The earliest phase between 3990-3935 cal BCE is characterised by the establishment of the infrastructure. First activities included the construction of the inner enclosure and later the building of pottery kilns at the centre of the site. Hence, Maidanets'ke was initially founded as a causewayed enclosure and not as a settlement. The second phase between 3935-3800 cal BCE is characterised by the initial occupation of the site with the construction of dwellings in the centre of the enclosure and a second arc of dwellings independent from the main settlement layout in the northwestern part of the site. The independent clusters of dwellings in the northwest were first expected to date either earlier or later than the main settlement, thus, their dating came as a surprise. Here, the second phase is interpreted as a phase of competing settlers providing insights on the agglomeration and integration process of several communities in a developing 'mega-site'. The third phase between 3800-3700 cal BCE marked the peak occupation with a massive expansion of built space inside the inner enclosure. Contexts from all parts of the main settlement date to this phase. The duration of this phase fits to earlier assumptions about the short-lived total duration of 'mega-sites'. The final phase between 3700-3640 cal BCE is characterised by expansion due to a lack of building space and abandonment. In the remaining inner space, further buildings were constructed near existing clusters. They did, however, not fit into the original layout of the settlement. Furthermore, the inner enclosure was levelled and dwellings were built beyond the original border of the main settlement. Finally, the site was abandoned, and the next activity is marked by the construction of Yamnaya kurgans.

According to the dating of several domestic contexts, it can be concluded that dwellings were burnt throughout all the occupation phases described above, and not collectively during the abandonment in the final phase. With an occupation interval of around 350 years and its overgrown settlement layout, Maidanets'ke does presumably not represent the regular case of a Trypillia 'mega-site'. In regional contexts, Maidanets'ke was founded around the same time as Nebelivka and lasted over a century longer. Furthermore, Maidanets'ke was mostly contemporaneous with the nearby site of Tal'yanky. Since the chronological modelling for these settlements in the surrounding of Maidanets'ke is still under investigation, we can only assume a gradual population shift from one partially coeval site to the other until their peak occupations have been determined.

9.4.3 Population estimates

The radiometric dating of domestic contexts provided the basis for a detailed estimation of a 'mega-site' palaeodemography. Other calculations, such as sex-age ratios, were impossible to conduct due to the characteristic lack of burial evidence for Trypillia societies. However, it was possible for the first time to describe intra-site population development and the decline of a Trypillia 'mega-site', which present a key contribution to many arguments of the current debate. While earlier accounts had to rely on the ratio between burnt and presumably unburnt dwellings to estimate a coeval population based on the total number of observed buildings, it was now possible to calculate the number of coeval dwellings per occupation phase.

The settlement started with a moderate population size of 570-690 inhabitants based on Trypillia family sizes and reached its peak between 3800-3700 cal BCE with around 52 % of all dwellings being contemporaneous. This added up to a maximum population of 5940-7160 residents based on family size, or 3150-17,560 residents with a median of 6190 people for floor-area-demand based calculations. In result, these robust population estimates lie within the range of previous calculations. The estimated average population here is, however, way lower than previously calculated. Taking the area of the inner enclosure of the main settlement at Maidanets'ke into account, the population density dropped below ten inhabitants per hectare during the initial occupation phase, which is the crucial threshold for low-density settlements (Fletcher 1995). Thus, at least the demographic aspect of low-density urbanism becomes plausible as proposed by Chapman and Gaydarska (2016a) in the current debate. In this case, it remains questionable, however, if the initial occupation phase should be considered to define the overall character of a Trypillia 'mega-site'. In recent years, it appears that the concept of low-density urbanism, as originally defined, has shifted to tropic climate zones or been abandoned in favour of other concepts such as urban diaspora (Lucero *et al.* 2015).

Another aspect of the current debate concerns the question how 'mega-sites' developed. Traditional research suggested that these large sites were formed by the regional mobility of several communities. To investigate this proposition, the radiocarbon-based settlement duration was tested against annual growth rates derived from regional settlement development and palaeodemograhic reconstructions from rare mortuary remains. In result, it would have taken over 2500 years for the initial Maidanets'ke population to reach their estimated peak occupation, which according to radiocarbon dating took maximum 200 years. Thus, these estimations are another indication for the aggregation of several communities in 'mega-sites', rather than independent and internal settlement growth.

9.4.4 Settlement patterns and urbanity

Regarding the question about how Trypillia 'mega-sites' developed, the basic question how to define the 'mega-site' phenomenon had to be investigated. Concerning the total distribution of Cucuteni-Trypillia sites, it is concluded in this study that, based on threshold definitions of 100-150 hectare, 'mega-sites' developed between 4350-3950 cal BCE (stage BI-II) between the Southern Bug and the Dnieper River. According to relational definitions, sites with sizes of over 30 hectares present statistical outliers throughout all stages from Trypillia A to CII.

Geomagnetic surveys on smaller Trypillia settlements in the vicinity of 'mega-sites' in the Uman region resulted in a re-evaluation of the 'mega-site' definition established in the current debate. According to the survey, smaller sites between 1.2 to 7 hectares show planning principles comparable to 'mega-sites'. Like in larger settlements, clusters of regular dwellings were observed in single or two main rings with an exceptional building between these rings, and the largest buildings in a central position comparable to 'mega-structures'. Another key result is the observation that the Nebelivka 'mega-structure' presents no singularity in the Trypillia context, but that it is part of a wider planning principle. Groups of up to three 'mega-structure' buildings ten times the size of a regular dwelling and with differing architectural features appear both in 'mega-sites' of over 100 hectares and in settlements around 50 hectares in size. Thus, it was proven that no structural difference is observable between Trypillia settlements of various sizes from 7 to over 300 hectares. The Trypillia planning principles were scalable. Hence, the only remaining characteristic to define a Trypillia 'mega-site' appears to be the significant size of some settlements along the border between forest-steppe and steppe on the Northern Pontic plateaus. Furthermore, the distribution of exceptional ring buildings and larger dwellings with additional economic function, dividing 'mega-sites' into several districts, suggest a modular settlement pattern in which up to 20 smaller settlements would aggregate into one larger site.

One of the most controversial aspects of past and current debates about Trypillia 'mega-sites' is concerned with the question whether these settlements were of urban character. In this study, the results of regional surveys on settlements of varying sizes, including features, their radiometric dating, and robust population estimates, led to a negative re-evaluation of urban characterisation assumptions.

Based on a variety of urban attributes collected by Smith (2016), only few characteristics were identified for Trypillia 'mega-sites'. These attributes were narrowed down to a large population and site size in relation to other Trypillia settlements, higher and lower level public architecture represented by ring-buildings and 'mega-structures', connective infrastructure in the form of the main settlement ring and radial pathways as well as the central empty space at most 'mega-sites', and plazas around 'mega-structure' ensembles. Other attributes associated with urbanity included clusters of dwellings interpreted as neighbourhoods, and districts reconstructed according to the regular spacing of public architecture in the form of ring-buildings. However, neither of these attributes show functions of regional relevance. According to the regional survey, no differences between urban and rural settlements were found. Smaller sites show comparable public architecture and economic features such as potential pottery kiln anomalies. According to the excavations of a ring-building at Maidanets'ke and a 'mega-structure' at Nebelivka, no integrative function beyond the settlements themselves were observed. Thus, in the Trypillia case, only the population and settlement sizes remain for a demographic, rather than a functional definition of urbanism. However, such a demographic definition is embedded into the functional definition of urbanism. Hence, it was concluded that Trypillia 'mega-sites' do not qualify as urban sites. Instead, the diverging settlement rings observed during the second occupation phase at Maidanets'ke, the observed modularity of the settlement pattern visible in the layout of smaller and larger sites as well as the residential mobility of communities suggested by palaeodemographic growth rate calculations hint at the agglomeration of several communities in a 'mega-site'. This 'coming together' of communities is the central defining aspect of agglomerated sites as an independent settlement category between villages and cities (Birch 2013b). Here, Trypillia 'mega-sites' are characterised as such agglomerated settlements. 'Mega-sites' are not of proto-urban character, since this would per definition imply a development towards cities later on in a cultural evolutionary framework, and they are also not of low-density urban character, as they show no urban functions and, in the case of Maidanets'ke, only fall below the low-density threshold in the initial occupation phase of the settlement. This conclusion presents a main shift in the debate in which the urban character of these settlements was hardly questioned.

Concerning the question of development and decline, Maidanets'ke represents a site that developed from a causewayed enclosure towards an aggregated settlement in which several communities came together and grew beyond its originally planned limits before it was finally abandoned.

9.4.5 Future perspectives

This study was mainly concerned with the investigation of settlement structures and features to identify *how* Trypillia 'mega-sites' developed and declined. Based on this foundation, future research can better identify factors concerning *why* they emerged and what led to their demise. Such aspects for future research could include regional radiocarbon dating to clarify the contemporaneity or succession of peak occupations at 'mega-sites' and smaller settlements. A robust regional radiometric chronology could then also help to evaluate the environmental impact of 'mega-sites' taking into account the estimated population sizes of this investigation. On a settlement level, the development of house clusters and their social organisation remain open for investigation. In particular, the implied relation between different institutions, such as neighbourhoods, districts, and 'mega-structure' ensembles, provide potential for future research on Trypillia social organisation once the inventories and features of these structures are published in greater detail. Overall, Trypillia 'mega-sites' are a valuable case study considering the question how societies grew to ever larger agglomerations and how various communities were integrated in vast places. Although not characterised as urban, the observed aggregation processes provide valuable results for the topic of early urbanisation and comparative urbanism to be explored further in future research.

Zusammenfassung

Trypillia Siedlungen zwischen dem Südlichen Bug und Mittleren Dnjepr zählen zu den größten ihrer Zeit in Eurasien. Seitdem das volle Ausmaß mancher dieser Fundstellen bekannt ist, stellt sich die Frage, wie es zu einer Ansammlung von bis zu 3000 Haushalten an der Wende vom fünften zum vierten Jahrtausend v.u.Z. kommen konnte. Welche Strukturen und Bevölkerungsdynamiken stehen hinter der Entstehung und des Niedergangs dieses Phänomens und handelt es sich womöglich um erste stadtähnliche Siedlungen?

Die sogenannten Mega-sites wurden über die Jahre unterschiedlich charakterisiert. Als eines der Hauptmerkmale gilt bis heute ihre Größe von bis zu 320 ha. Grenzwerte für die Definition einer „Mega-site" reichen von über 100 ha zu relativen Angaben von zehnfacher Größe gegenüber durchschnittlichen Siedlungen. Anhand von Ausgrabungen an kleineren Siedlungen und neuen magnetometrischen Messungen im Rahmen dieser Arbeit kann jedoch eine herausragende Siedlungsstruktur als Charakteristikum ausgeschlossen werden. Sowohl die kreis- und strahlenförmige Anordnung der Gebäude als auch Sonderbauten finden sich neben Großsiedlungen auch bei kleineren Siedlungen von rund sieben Hektar wieder. Die Siedlungsstruktur war demnach skalierbar. Daher wurde entschieden sich bei der Definition von „Mega-sites" auf deren Größe und Verbreitung durch die Zeit zu konzentrieren. Dazu wurde ein bestehender Datensatz von über 650 Fundstellen mit bekannter Zeitstellung und Ausdehnung verwendet. Ein bekanntes Problem der überschätzen Größenangabe wurde verringert durch das Kalibrieren von Quadratflächen zu Kreisflächen. So liegen die Schätzungen näher an der tatsächlichen Ausdehnung der oftmals rundlichen Siedlungen. Im Ergebnis zeigt sich, dass die größten Siedlungen einer Phase sich von Westen kommend zum Gebiet zwischen Südlichem Bug und seines Seitenarms, dem Synjucha, hin ausdehnen. Die maximalen Siedlungsgrößen wachsen dabei von 4800 v.u.Z. pro Phase exponentiell an und erreichen um 3700 v.u.Z. mit Taljanky ihren Höhepunkt. In der letzten Phase fällt die maximale Siedlungsgröße wieder rapide ab und es kommt zu einem Hiatus im Hauptverbreitungsgebiet bis zur Aufschichtung von Kurganen durch Yamnaya Gesellschaften. Aus naturräumlicher Sicht liegen die größten Siedlungen pro Phase jeweils an der angenommenen Grenze zwischen Waldsteppe im Norden und dem Eurasischen Steppengürtel im Süden. Vergleicht man die Siedlungsgrößen aller Phasen, dann können sogenannte Mega-sites als statistische Ausreißer von über 30 ha beschrieben werden, die sich an einer naturräumlichen Grenze befinden. Diese Art von Siedlungen sind hauptsächlich auf den ausgedehnten Lössplateaus zwischen dem Südlichen Bug und dem Synjucha verbreitet.

Innerhalb dieses Hauptverbreitungsgebietes konnte die Siedlungsdynamik genauer beschrieben werden. Das in dieser Arbeit dargestellte Modell bezieht sich dabei auf mehrere Annahmen. Der gängigen Forschungsmeinung nach wird davon ausgegangen, dass sich die Großsiedlungen nach dem Aufbrauchen sämtlicher Ressourcen in ihrem Umkreis mehrere Kilometer verlagerten. Weiter wird anhand geringfügiger Überlagerungen von Befunden davon ausgegangen, dass die Hauptbelegungszeit der Siedlungen bei rund fünfzig Jahren lag. Mit Hilfe der Relativchronologie und der ^{14}C Datierung einiger Siedlungen konnten so die regionalen Siedlungs- und Bevölkerungsdynamiken dargelegt werden. Dabei beginnt die Verdichtung von Haushalten während der Volodymirivska Phase um 4100 v.u.Z. relativ gering, steigt dann aber zur Tomashivska Phase um 3850 v.u.Z. hin rapide an. Die regionale Anzahl an Haushalten bleibt hingegen weitgehend stabil bis zum Ende der Tomashivska Phase und sinkt dann stark mit dem generellen Ende der Großsiedlungen ab 3600 v.u.Z. Bezüglich der regionalen Siedlungsstruktur zeigt sich ein Wandel von vielen kleineren Siedlungen mit vergleichsweise wenigen Haushalten in der Nebelivska Phase, hin zu wenigen, dafür aber sehr großen Fundstellen mit bis zu 3000 Haushalten in der Tomashivska Phase. Die vorliegende Arbeit beschäftigt sich mit ebendieser Phase und insbesondere mit der offenbar am stärksten konzentrierten Siedlung bei Maidanets'ke. Wie aber entsteht eine solche „Mega-site" und sind die Gebäude wirklich überwiegend gleichzeitig genutzt worden?

Seit den 1970ern wird der Frage nach der Entstehung und Struktur von Großsiedlungen unter anderem in Maidanets'ke nachgegangen. Bei der Fundstelle südwestlich des heutigen Dorfes handelt es sich um die bisher komplexeste Trypillia Großsiedlung mit der größten bekannten Ansammlung an Gebäuden. Sie stellt daher eine ideale Fallstudie für die Frage nach der Entwicklung solcher Siedlungen dar. Ursprünglich in den 1920ern entdeckt, wurde die Ausdehnung Maidanets'kes Ende der 1960er durch den Militärfotografen Shishkin anhand von Luftbildern genauer bestimmt. Diese Aufnahmen bildeten die Grundlage für die „Tripolje-Komplex Expedition", welche als großangelegtes Forschungsprogramm mit verschiedenen Teams an unterschiedlichen Großsiedlungen ab den 1970ern bis zum Zerfall der Sowjetunion arbeitete. Experimentelle geophysikalische Messungen zur Bestätigung der Ausdehnung und genaueren Struktur Maidanets'kes wurden zwischen 1971-1972 von Dudkin durchgeführt und machten es im Folgenden möglich einzelne Befunde gezielt auszugraben. So wurden über 16 Feldkampagnen 47 Gebäude, 19 Gruben und zwei Kurgane von ukrainischer Seite untersucht. Die einzelnen Befunde sind in unterschiedlicher Qualität vorgelegt und wurden, wenn möglich, durch Archivberichte ergänzt.

Grundsätzlich zeigten sich anhand der Altgrabungen drei verschiedene Größenklassen von Gebäuden. Dabei wurde lediglich ein kleineres Gebäude von ca. 7 m² entdeckt. Den Großteil machen Häuser von 30-90 m² aus, darunter auch rein wirtschaftliche Gebäude. Die dritte Klasse ist durch zwei Bauten mit einer Größe von 170-190 m² charakterisiert.

Eine statistische Auswertung der Hausinventare ergab eine Reihe unterschiedlicher Sonderausstattungen für die verschiedenen Gebäude. So fanden sich Vergesellschaftungen von mehreren Mahlsteinen bei Gebäuden mit mehreren Wohnräumen, oder Silices in Verbindung mit fest verbauten Vorratsgefäßen. Des Weiteren fand sich eine erhöhte Anzahl an Webstühlen in Kombination mit sogenannten Keramikimporten aus benachbarten Lokalgruppen. Mahlsteine sind für die meisten Häuser bestätigt, jedoch wurden hochwertige Varianten aus nicht lokalem Gestein im Zusammenhang mit figuraler Plastik gefunden. Eine Besonderheit stellen Häuser mit Hortfunden, Token und menschlichen Überresten dar. Eine letzte Klasse an Gebäuden umfasst Vergesellschaftungen von verschiedenen Steingeräten und Keramikimitaten anderer Lokalgruppen.

Die unterschiedlichen Hausinventare lassen auf eine bedingte Arbeitsteilung und Segmentierung schließen. Haushalte mit Hortfunden enthalten seltene Güter wie Kupferbeile, die auf Fernhandel schließen lassen und mit Tokens einen Hinweis auf organisierten überwiegend lokalen Handel. Importkeramik in Verbindung mit Textilherstellung deutet sowohl auf eine mögliche Weiterverteilung von Gütern als auch auf Arbeitsteilung zwischen Haushalten hin. Lebensmittelverarbeitung in Form von Mahlsteinen scheint allerdings zur Grundausstattung der Häuser gehört zu haben. Eine erhöhte Anzahl an Mahlsteinen scheint nicht mit einer Überproduktion, sondern mit einer erhöhten Bewohneranzahl zusammenzuhängen, was durch die Assoziation von der Anzahl an Mahlsteinen mit mehreren Wohnräumen belegt ist.

Die früheren Ausgrabungen ließen hinsichtlich der Siedlungsentwicklung und Chronologie zahlreiche Fragen offen, die es in der aktuellen Forschung zu beantworten gilt.

Die nächste Forschungsphase in Maidanets'ke nach der „Tripolje Komplex Expedition" setzte mit den ukrainisch-deutschen Untersuchungen ab 2011 ein. Da die Grabungskampagne von 2013 zu weiten Teilen bereits vorgelegt wurde, flossen nur die für die Phaseneinteilung relevanten Befunde in die vorliegende Arbeit ein.

Nach den erneuerten geophysikalischen Untersuchungen unter der Leitung von Knut Rassmann zwischen 2011-2012 wurden die Messungen 2016 fortgeführt. Ziel der Frühjahrskampagne war es, das im Rahmen der vorliegenden Arbeit angenommene Siedlungsmuster zu überprüfen. Da das Zielgebiet eines Großbaus vom Typ der sogenannten Megastruktur von Nebelivka in Maidanets'ke nicht begehbar war, wurde zunächst auf weitere fehlende Messflächen im Osten der Siedlung ausgewichen. Dabei wurde festgestellt, dass etwa 10 ha Siedlungsfläche an den anschließenden Stausee des Dorfes verlorengegangen sind. Weiter wurde der schlechte Zustand der Befunde in Hanglage aufgezeigt. In der Sommerkampagne 2016 konnte dann das Zielgebiet vermessen werden, wobei Teile einer möglichen „Megastruktur" entdeckt wurden. Diese liegt allerdings überwiegend unter einem heutigen Knick und der ehemaligen Feldstraße. Der Erhaltungszustand des Befundes ist daher fraglich. Zudem konnten weitere Flächen des nördlichen Hauptringes der Siedlung vermessen werden, wobei drei weitere Sonderbauten festgestellt wurden. Innerhalb des Hauptringes wurde weiterhin eine Gebäudegruppe entdeckt, die der Ausrichtung nach zu den unabhängigen Hausringen im Nordwesten der Siedlung zu gehören scheinen. Die Fundstelle ist demnach noch komplexer als bisher angenommen. Insgesamt konnte die vermessene Fläche der Siedlungsausdehnung von 65 % auf 82 % erhöht werden. Frühere Hochrechnung für die Gesamtanzahl an Gebäuden wurden durch die hinzugekommenen Flächen angepasst, doch bleibt die hohe Anzahl von rund 2930 Strukturen dicht an der vorherigen Annahme von rund 2960 Gebäuden.

Anhand der geophysikalischen Vermessung konnten verschiedene Befunde ausgemacht werden, die vielversprechend für eine Reihe von Fragestellungen erschienen. In den Grabungskampagnen 2014 und 2016 wurden ein Töpferareal inklusive zugehöriger Gruben, ein komplettes abgebranntes Gebäude und ein Teil des inneren Grabenwerkes untersucht. Des Weiteren wurden Testschnitte an Gebäuden in verschiedenen Teilen der Siedlung ergraben, um diese radiometrisch und relativchronologisch zu datieren und so zu einem Entwicklungsmodell der Fundstelle zu gelangen. Bei der Grabung des Töpferofens stellte sich heraus, dass dieser aus mehreren Phasen bestand, die übereinander gebaut wurden. Es handelt sich dabei jeweils um einen dreikanaligen stehenden Ofen, bei dem der Feuerungs- und Brennraum nicht durch eine feste Lochtenne getrennt ist. Anhand der Ausrichtung der Feueröffnung der einzelnen Phasen und radiometrischer Datierung konnten die umliegenden Gruben zugeordnet werden. Dabei zeigt die Feueröffnung der ersten Phase und seiner Renovierung Richtung Süden auf die Gruben eins und zwei. Der erste Töpferofen und die zweite Grube stehen dabei über Keramikanpassungen aus der Grubenverfüllung und der Wandkonstruktion des Ofens miteinander in Verbindung. In der dritten Phase wurde der Ofen neu konstruiert, wobei die vorherigen Phasen planiert wurden. Diese dritte Phase zeigt mit der Feueröffnung Richtung Osten auf die Grube drei. Es wird im Analogieschluss zu den vorherigen Phasen davon ausgegangen, dass diese Grube mit der Nutzung der dritten Phase des Töpferofens in Verbindung steht. Nach der dritten Nutzungsphase des Ofens wurde dieser zerstört und diente danach als Deponie. Ein vergleichbares Verhalten wurde für den

Ofen in Nebelivka festgestellt. Dort wird allerdings die Charakterisierung als Töpferofen von britischer Seite angezweifelt. In Maidanets'ke hingegen zeigen Funde von fein- und grobkeramischem Rohmaterial aus der Verfüllung der Gruben und der Renovierung des Ofens eindeutig seine Funktion zur Keramikherstellung. Des Weiteren konnte anhand der Taphonomie des Keramikmaterials aus den Grubenverfüllungen ein klarer Unterschied zu deponiertem Hausbrandschutt in anderen Gruben festgestellt werden. Es handelt sich bei der Verfüllung um Produktionsabfall, der stark zerscherbt und oftmals gesintert oder sogar vitrifiziert ist. Die Befundlage des Töpferofens stellt im Vergleich zu den Batterien, wie sie in Taljanky ergraben wurden, einen Glücksfall dar, da sie eine für Großsiedlungen seltene chronologische Sequenz für die radiometrische Modellierung ergeben. Somit konnten anhand der besser erhaltenen Gefäße nun erstmals die für Maidanets'ke charakteristischen Formen und Verzierungen bestimmt und zeitlich fixiert werden, was eine typologische Grundlage für regionale Untersuchungen darstellt.

Vorläufige Interpretationen dieser Töpferöfen rückten deren soziale Bedeutung in Bezug auf Arbeitsteilung in Großsiedlungen in den Vordergrund. Bei genauerer Betrachtung musste hier allerdings festgestellt werden, dass die Innovation von stehenden Töpferöfen mit getrennter Brennkammer, und damit auch deren sozialen Konsequenzen, bereits zu Beginn des Trypillia Phänomens stattfand. Die Innovation der Herstellung hochwertiger Keramik unter stabilen Bedingungen ist demnach unabhängig von der Entwicklung von Großsiedlungen zu sehen.

Während der Grabungskampagne von 2014 wurde zudem ein vollständiges, abgebranntes Gebäude im nordwestlichen Zentrum der Siedlung ausgegraben. Nachdem das Gebäude aus der vorherigen Kampagne teilweise durch Beraubung zerstört wurde, sollten nun Fragen zum Hausinventar, der Architektur und Taphonomie des Hausbrandes geklärt werden. Insgesamt wurden über 1,2 t an Hüttenlehm gefunden und auf Konstruktionsmerkmale hin untersucht. Dabei konnte festgestellt werden, dass das Gebäude grundsätzlich in zwei Räume aufgeteilt ist, einem geschlossenen Hauptraum und einem halboffenem Anteraum, die sich auf einer vom Boden abgesetzten Plattform befinden. Dabei wird die Plattform aus Stampflehm von bis zu 25 cm breiten Planken gestützt, die im Teil des Hauptraumes quer zur Längsachse des Gebäudes verlaufen. Der halboffene Frontbereich wird hingegen von Planken gestützt, die der Längsachse folgen. Anhand der Verteilung der maximalen Durchmesser von gerundeten Holzabdrücken konnten mehrere Pfostenstandorte festgestellt werden. Die andernfalls durch Tiergänge nicht feststellbaren Pfosten befanden sich mit einem Durchmesser von 10 cm an den Ecken der Plattform sowie mit einem Durchmesser von 15 cm im Zentrum des Gebäudes, an der Teilung zwischen Haupt- und Anteraum. Anhand der durch die Botaniker bestimmten Esche, die zur Konstruktion verwendet wurde, konnte so eine maximale Höhe von etwa 9 m für den zentralen, und etwa 6 m für die Eckpfosten geschätzt werden. Dabei stand wohl zumindest der zentrale Pfosten auf einem zweckentfremdeten Mahlsteinunterlieger. Aufgrund der Planken unter der Plattform und der geschätzten Höhe der verschiedenen Pfosten kann davon ausgegangen werden, dass das Gebäude aus einem Erdgeschoss und einem oberen Stockwerk bestand, wobei das Erdgeschoss aufrecht begehbar war. Dennoch beschränkt sich die Fundverteilung unterhalb der Plattform hauptsächlich auf das Areal unter dem Frontbereich. Im überdachten Hauptraum auf der Plattform wurden mehrere Installationen festgestellt, die in ihrer Anordnung mit Darstellungen aus tönernen Hausmodellen übereinstimmen. Das Interieur bestand aus einer Herdstelle rechts des Eingangsbereiches, einem Mahlstein auf der gegenüberliegenden Seite und einer mit Rillen verzierten Lehmplatte im hinteren Bereich des Raumes, die in der ukrainischen Forschung als Altar angesprochen wird. Im Frontbereich befanden sich mehrere Mahlsteinfragmente und eine Scherbenkonzentration unterhalb der Konstruktion. Eine weitere Scherbenkonzentration fand sich hinter dem Gebäude an dessen Rückwand.

Insgesamt wurden rund 55 kg und 1700 Scherben geborgen, aus denen 67 Gefäße aus Feinware und fünf Gefäße aus Grobware rekonstruiert werden konnten. Den Großteil machen dabei Schüsseln aus mit insgesamt 45 %, gefolgt von bikonischen Gefäßen mit 27 %. Weiter wurden kleine und große Becher rekonstruiert sowie ein sogenannter „Import"-Becher mit mehligem Scherben und abweichender Form und Verzierung (10 %). Das weitere Inventar umfasst „Krater"-förmige (6 %) und ein birnenförmiges Gefäß sowie 7 % Töpfe mit S-Profil und zwei Deckel, von denen einer als „Import" klassifiziert wurde. Schüsseln finden sich überall, sind jedoch auf der Ablage an der linken Hauswand vom Eingang aus betrachtet, und auf der verzierten Lehmplatte gehäuft vorzufinden. Bikonische Gefäße konzentrieren sich hingegen um den Herd, wobei sich ein großes containerartiges doppelkonisches Gefäß nahe der verzierten Lehmplatte und ein weiteres auf der Ablage fand. Becher wurden teilweise unterhalb der Plattform und im Frontbereich gefunden, aber auch auf der Plattform verteilt. Grobware konzentriert sich um den Herd. Hier wurden fünf Gefäße rekonstruiert. Neben der Keramik wurden noch verschiedene Steingeräte geborgen, darunter ein Polierstein aus dem oberen Brandschutt und eine große Silexklinge außerhalb des Gebäudes. Andere Fragmente, wie eine Flache Steinplatte, sind nicht klar als Mahlsteine zu identifizieren. Ihre Funktion bleibt daher offen. Weiter wurden zwei Fragmente figürlicher Plastik gefunden, eine nahe der verzierten Lehmplatte, die andere in der Nähe des Herdes. Anhand des vorliegenden Inventars kann davon ausgegangen werden, dass es sich bei dem Gebäude um ein Wohnhaus handelt, denn es wurde sowohl eine Feuerstelle als auch Nahrungsverarbeitung sowie Geräteinstandhaltung und Lagerung nachgewiesen. Zudem wird die verzierte Lehmplatte in der ukrainischen Forschungstradition als Kultinstallation auch in Verbindung mit Figurinen gewertet. Lediglich Textilherstellung wurde nicht nachgewiesen.

Eine weitere Fragestellung betrifft den Hausbrand. Ob es sich bei den Häusern um beabsichtigten Hausverbrennung oder zufällige Ereignisse handelt, ist in der Forschung umstritten. Dabei sind auch die Motive einer bewussten Verbrennung umstritten. Auf der einen Seite wird mit konstruktiven Feuern argumentiert, die das Gebäude widerstandfähiger gegen Umwelteinflüsse machen sollen, auf der anderen Seite wird der Hausbrand als bewusstes Beenden der Hausnutzung angesehen. Anhand der Untersuchung des Brandlehms konnten zwei Brandherde festgestellt werden. Zum einen wurde eine Konzentration von vitrifiziertem Material im Frontbereich, an der Wand zum Hauptraum gefunden, zum anderen fand sich im Erdgeschoss unterhalb des Hauptraumes eine verziegelte Oberfläche. Es wird daher davon ausgegangen, dass bewusst ein Feuer unterhalb und an der Fassade des Hauses gelegt wurde. Anhand der Menge an geborgener Keramik mit sekundären Brandspuren kann ein Konstruktionsfeuer ausgeschlossen werden. Die hohe Anzahl an Gefäßen innerhalb des Hauptraumes und die Deponierung von bikonischen Vorratsgefäßen um die Herdstelle sowie die Niederlegung von mehreren Gefäßen hinter und vor dem Haus werden als „Überausstattung" gewertet und als Zeichen einer „Hausbestattung" interpretiert.

Sieht man das Inventar als Teil einer „Hausbestattung", hat das wiederum Auswirkungen auf mögliche soziale Interpretationen der Siedlungsgemeinschaft. Demnach können Hausinventare nicht ohne eingehende Quellenkritik für die Analyse von Ungleichheit zwischen ehemaligen Haushalten herangezogen werden.

Neben den vorgestellten größeren Schnitten wurden auch neun Testschnitte an verschieden Stellen innerhalb der Siedlung angelegt. Dabei wurden elf Gebäude und eine Grube untersucht. Die verbrannten Häuser zeigen vergleichbare Befunde zu dem vollständig ergrabenen Haus, darunter die charakteristische Plattform mit Holzabdrücken an der Unterseite oder verziegelte Oberflächen im Erdgeschoss. Dadurch, dass die Schnitte in verschiedenen Teilen der Gebäude angelegt wurden, unterscheidet sich die Menge an geborgenem Material sehr stark. So konnte teilweise kein geeignetes Probenmaterial für eine radiometrische Datierung der Befunde gewonnen werden. Auf der anderen Seite schwankt auch die Menge an diagnostischer Keramik zwischen den

Strukturen, was sich letztendlich auch in der Seriation bemerkbar machte. Dennoch wurde eine ganze Reihe an eindeutigen Kontexten beprobt, die im Folgenden eine Darstellung der Phaseneinteilung und Entwicklung der Siedlung ermöglichten.

In der folgenden Grabungskampagne von 2016 wurde neben einem Sonderbau im Hauptring der Siedlung, dessen Ergebnisse nicht Teil dieser Arbeit sind, auch das innere Grabenwerk untersucht. Dabei stellte sich heraus, dass der Graben nicht durchgängig, sondern in Segmenten angelegt wurde. Im Ostteil wird einer der Grabensegmente durch eine Konstruktionsgrube geschnitten, die zu einem Gebäude jenseits der Grabenanlage gehört. Die Grabensegmente sind stumpf im Profil und es konnten keine Palisadenstandspuren erkannt werden. Stattdessen war das Westsegment mit Keramik, dem Teil eines Bucraniums und Mahlsteinfragmenten verfüllt. Im Ostteil wurde weniger Material geborgen, allerdings stehen beide Segmente durch Scherbenanpassung einer Füßchenschale miteinander in Verbindung. Während im Westteil übermäßig viele Keramikböden mit der Unterseite nach oben gefunden wurden, fand sich im Ostteil ein Fragment eines Schlittenmodells zusammen mit einer durch Punktierung verzierten Rinderfigurine und dazu ein sphärischer Token. Es wird daher angenommen, dass der Graben keinen vordergründigen Verteidigungscharakter hatte. Stattdessen wird im Zusammenhang der schneidenden Konstruktionsgrube von einer siedlungsplanerischen Funktion zur Festlegung der Kreisform und Orientierung beim Bau ausgegangen. Die spätere Verfüllung hatte womöglich Symbolcharakter, aber auch praktische Gründe der Planierung zwecks einer Siedlungserweiterung Richtung Nordwesten. Insgesamt weisen die Gräben mit ihren Segmenten Ähnlichkeiten zu zeitgleichen Michelsberger Grabenwerken in Zentraleuropa auf. Sie stehen mit ihren Unterbrechungen und ihrer geringen Tiefe nicht in Tradition mit den teils massiven Anlagen der mittleren Trypillia Phase zwischen dem Karpatenvorland und dem Dnister.

Anhand einer detaillierten technologischen Aufnahme des Keramikmaterials aus dem Grabenschnitt konnten die traditionellen Warendefinitionen von Fein- und Grobkeramik bestätigt werden. Feinkeramik besteht aus Kaolinit- und eisenhaltigen Tonmischungen mit einer 1-3 prozentigen und einer 0,5-2 mm körnigen Quartzmagerung, die ursprünglich oxidierend gebrannt wurde. Grobkeramik besteht hingegen aus eisenhaltigen Tonmischungen mit einer 5-7 prozentigen und bis zu 5 mm körnigen Quartzmagerung, wobei auch Glimmer und Muschelgrus als Beimengungen auftreten können. Anhand der Magerung von Grobware zeigte sich eine zeitliche Entwicklung bei der Verwendung von Muschelgrus in frühen Kontexten und dem Auftreten von Glimmer zur Spätphase der Siedlung.

Für die statistische Auswertung des Keramikmaterials der Grabungen 2014 und 2016 wurden 142 Merkmale definiert, die an 275 diagnostischen Keramikeinheiten festgestellt wurden. Insgesamt flossen 20 Befunde in die Analyse ein, darunter hauptsächlich Hausinventare. Während für morphologische Merkmale keine nennenswerten Entwicklungen festgestellt werden konnten, ergab die Auswertung der Verzierung eine generelle Entwicklungstendenz, die grob mit der radiometrischen Datierung übereinzustimmen scheint. Jedoch lässt sich anhand der Seriation der zweiten Achse der Korrespondenzanalyse keine detaillierte Abfolge von Häusern ablesen, um auch die Kontexte ohne radiometrische Datierung in die generelle Phaseneinteilung der Siedlung einzuordnen.

Zur formalen chronologischen Modellierung der radiometrischen Daten wurden sowohl die Proben selbst als auch ihr Kontext im Detail evaluiert. Hierfür wurden auch die bereits veröffentlichten Daten der Kampagne von 2013 verwendet. Für die Modellierung der eigentlichen Besiedlung Maidanets'kes wurden nur Daten verwenden, die aus dem verbrannten Hausschutt der jeweiligen Häuser stammen. Daten des ehemaligen Laufhorizonts wurde jedoch als allgemeine Aktivität an der Fundstelle miteinbezogen. Da es sich um sehr dicht beieinanderliegende Datierungen handelt, wurde für die Darstellung der Siedlungsentwicklung nur die Wahrscheinlichkeitsverteilung von 68,2 % verwendet.

Im Ergebnis zeigt sich eine längere Laufzeit von rund 350 Jahren zwischen 3990-3640 v.u.Z., wobei die eigentliche Besiedlung zwischen 3935-3640 v.u.Z. nachgewiesen wurde. Mit Hilfe der kalibrierten und modellierten Daten lässt sich ein detailliertes Bild der Entwicklung Maidanets'kes zeigen. Dabei kann die Besiedlungsgeschichte in vier Phasen eingeteilt werden.

Die erste Phase zwischen 3990-3935 v.u.Z. zeichnet sich durch die Anlage von Infrastruktur aus. In dieser Zeit wurde der innere Graben ausgehoben und der erste Töpferofen konstruiert. Dies lässt darauf schließen, dass Maidanets'ke von Anfang an als Großsiedlung geplant war.

Der Beginn der eigentlichen Besiedlung wird dann in der zweiten Phase zwischen 3935-3800 v.u.Z. nachgewiesen. Die frühesten Häuser befinden sich dabei im Zentrum nahe der inneren Freifläche. Jedoch datieren auch die unabhängigen Hausreihen im Nordwesten in diese Zeit. Es scheint also trotz der in der ersten Phase sichtbaren Planung Abweichler gegeben zu haben, deren alternative Siedlungsplanung allerdings nicht zu Ende geführt wurde.

In der dritten Phase zwischen 3800-3700 v.u.Z. kommt es dann zu einem rapiden Anstieg der Besiedlung. Zu dieser Zeit wird der gesamte Bereich innerhalb des inneren Grabensystem massiv ausgebaut. Die Besiedlung erreicht ihren Höhepunkt in einem Bereich von rund 55 Jahren zwischen 3765-3710 v.u.Z., was früheren Schätzungen der Belegungsdauer einer Großsiedlung entspricht.

In der letzten Phase zwischen 3700-3640 v.u.Z. wird die Siedlung über das ursprüngliche Grabensystem hinaus ausgebaut und bereits bestehende Häuserzeilen werden vereinzelt durch weitere Gebäude ergänzt. Danach wurde die Siedlung offenbar aufgegeben.

Mit Hilfe der definierten Phasen konnte die Bevölkerungsentwicklung der Siedlung genauer gefasst werden. Während frühere Schätzungen von 12.000 bis 46.000 gleichzeitig lebenden Einwohnern ausgegangen wurde, konnte die maximale Bevölkerungsgröße auf 3.150 bis 17.560 Einwohner mit einem Median von 6.190 Personen eingegrenzt werden. Zur Bevölkerungsrekonstruktion wurden die jeweiligen Datierungen der Nutzungszeiten von 19 Häusern verwendet. Der prozentual wahrscheinlich gleichzeitige Anteil dieser Stichprobe wurde auf die geschätzte Gesamtanzahl von 2930 Häusern für Maidanets'ke hochgerechnet. Dabei ergaben sich für die Gründungsphase der Siedlung eine Anzahl von rund 150 Haushalten und respektive eine Startbevölkerung von 300 bis 1.690 Einwohnern. In einer ersten Hochphase der Besiedlung zwischen 3900-3850 v.u.Z. steigt die Anzahl auf rund 620 Haushalte mit 1.270 bis 7.090 Einwohnern. Mit einem rapiden Anstieg an Häusern zwischen 3800-3735 v.u.Z. erreicht die Siedlung ihre Hochphase mit bis zu 1.550 gleichzeitigen Haushalten und 3.150 bis 17.560 Einwohnern. Während des Niedergangs bestanden noch rund 770 gleichzeitige Haushalte mit 1.580 bis 8.070 Bewohnern, bevor Maidanets'ke dann endgültig aufgeben wurde. Das detaillierte chronologische Modell erlaub erstmals eine genauere Schätzung der potenziell gleichzeitigen Bevölkerung einer Trypillia Großsiedlung, wobei der hier ermittelte Höchstwert im unteren Drittel der vorherigen Schätzungen liegt.

Anhand der berechneten Bevölkerungen und der Ausdehnung der Siedlung von rund 200 ha konnten auch die Bevölkerungsdichten der jeweiligen Phasen bestimmt werden. Dabei fällt lediglich in der ersten Besiedlungsphase die Dichte teilweise unter 10 p/ha. Während der Hauptbelegungszeit lag die Bevölkerungsdichte zwischen 18.5 und 103.3 p/ha mit einer durchschnittlichen Dichte von 36.4 p/ha. Die berechneten Bevölkerungsdichten widersprechen damit Britischen „Mega-site" Interpretationen, welche die Großsiedlungen als „low-density urban sites" charakterisieren. Denn dieser „low-density urbanism" ist hauptsächlich durch Siedlungen mit einer regionalen Bevölkerungsdichte oder einer Dichte von unter 10 p/ha definiert.

Eine weitere demographische Frage betraf die Entstehung von Großsiedlungen. Dabei wurde in der vorliegenden Arbeit die traditionelle Hypothese von Bevölkerungsansammlungen in Großsiedlungen durch Mobilität getestet. Zur Gegenüberstellung dieser These wurden zwei Werte für natürliches Bevölkerungswachstum verwendet. Zum einen wurde aus der regionalen Siedlungsentwicklung ein Wachstum von 0.417 % pro Jahr ermittelt, zum anderen wurde ein Wachstum von 0.3 % basierend auf Berechnungen eines Gräberfeldes vom Ende des Trypillia Phänomens genutzt. Auf Basis der Bevölkerungsberechnung von der ersten Bevölkerungsphase bis zur Hochphase in Maidanets'ke wurden ein logistisches Modell mit der Annahme einer Obergrenze für Wachstum und ein exponentielles Modell berechnet. Im Ergebnis zeigte sich, dass es anhand der Werte für natürliches Bevölkerungswachstum zwischen 700 und 2500 Jahren brauchen würde, um von der Einwohnerzahl zu Beginn der Besiedlung zur Bevölkerungsanzahl zur Hochphase zu gelangen. Da diese Zeitspannen weit außerhalb der radiometrisch bestimmten rund 200 Jahre liegen, kann davon ausgegangen werden, dass Großsiedlungen hauptsächlich durch zuziehende Bevölkerungen entstanden.

Durch die alleinige Untersuchung der Großsiedlungen lässt sich die Entstehung des Phänomens jedoch nicht hinreichend verstehen. Deswegen wurden in der Frühjahrskampagne von 2016 geophysikalische Messungen sowohl an bestimmtem Stellen von Großsiedlungen als auch an verschiedenen kleineren Fundstellen im Umkreis durchgeführt. Ziel war, es kleinere zeitgleiche Siedlungen mit modernen Methoden zu vermessen, um die Art und Anzahl der Befunde mit denen der Großsiedlungen zu vergleichen zu können. Es konnten dabei vier Fundstellen vermessen werden, von denen Moshuriv 1 und Tal'ne 3 in die gleiche Phase wie Maidanets'ke fallen. Beide Siedlungen zeigen die typische kreis- und strahlenförmige Anordnung der Häuserzeilen.

Die kleinere Fundstelle Tal'ne 3 ist rund 1,2 ha groß und besteht aus sechs klar und 13 weniger stark verbrannten oder erodierten Gebäuden sowie 31 Gruben. Die Bauten sind in einem einzelnen Ring angeordnet mit einer aus vier Häusern bestehenden Zeile in der Mitte. Bei dieser Siedlungsgröße wurden keine Hinweise auf mögliche Töpferöfen oder Sonderbauten entdeckt. Die Hausgrößen sind vergleichbar zu anderen Siedlungen und weisen keine Ausreißer auf.

Moshuriv 1 ist hingegen rund 7 ha groß und besteht aus einem doppelten Häuserring mit einer aus drei Gebäuden bestehenden Zeile im Zentrum. Insgesamt wurden 57 klar und 27 weniger stark verbrannte oder erodierte Häuser sowie 84 Gruben aufgedeckt. Zusätzlich fand sich im westlichen Teil zwischen den beiden Ringen ein Sonderbau, wie er aus den Hauptringen von Großsiedlungen bekannt ist. Er hat eine vergleichbare Größe und zeigt verbrannte Fundamente mit einem weitgehend leeren Innenbereich. Außerdem deuten drei geomagnetische Anomalien am äußeren Häuserring auf mögliche Töpferöfen hin. Die Hausgrößen sind vergleichbar mit anderen Siedlungen, wobei sich das größte reguläre Gebäude abgesetzt im östlichen Teil des inneren Ringes befindet. Diese Position innerhalb der Siedlung ist vergleichbar mit der Position der sogenannten Megastruktur von Nebelivka.

Ein weiteres Ziel der Kampagne war nachzuweisen, ob ebendiese „Megastruktur" einen Einzelfall innerhalb des Trypillia Siedlungsmusters darstellt oder sich auch an weiteren Fundstellen wiederfindet. Dabei unterscheidet sich dieses Sondergebäude von den Ringbauten dadurch, dass es etwa doppelt so groß ist und sowohl aus gebrannten Umfassungsfundamenten als auch Plattformteilen besteht. Aus räumlicher Sicht befindet sich die „Megastruktur" in abgesetzter Lage am inneren Hauptring im östlichen Teil der Großsiedlung. Vergleichbare abgesetzte Freifläche wurden auf den ukrainischen Geomagnetikplänen von Maidanets'ke und der benachbarten Großsiedlung bei Glybochok beobachtet. Während in Maidanets'ke lediglich Teile einer potenziellen „Megastruktur" gemessen werden konnten, wurden in Glybochok gleich drei solcher Gebäude in der erwarteten Position entdeckt. Der größte Bau zeigt eine vergleichbare geomagnetische

Signatur eines verbrannten Wohnhauses, ist allerdings mit rund 13 x 51.5 m um das Zehnfache größer. Dazu wurden neben den jeweiligen Großbauten Längsgruben festgestellt, die denen bandkeramischer Langhäuser ähneln.

Zusätzlich wurde mit Viitivka eine weitere Siedlung vermessen, die sich weiter westlich, am Rand des Hauptverbreitungsgebiets der Großsiedlungen befindet. Die Fundstelle ist mit rund 48 ha deutlich kleiner, zeigt aber auch das typische Doppelring und strahlenförmige Muster. Im Satellitenbild war ebenfalls eine Aussparung im inneren östlichen Ring sichtbar. Auch dort fanden sich drei Großbauten, teilweise mit Längsgruben und Maßen von bis zu 12 x 54 m. Dem Messbild nach zu urteilen bestehen auch sie überwiegen aus Brandlehm. Anhand dieser Ergebnisse konnte nachgewiesen werden, dass die „Megastruktur" von Nebelivka kein Einzelfall ist. Mit den Befunden von Viitivka zeigte sich zudem, dass diese Bauten auch außerhalb des Verbreitungsgebietes der größten Siedlungen zu finden sind. Des Weiteren konnte mit Moshuriv aufgezeigt werden, dass das Siedlungsmuster auch an Fundstellen durchschnittlicher Größe vorhanden, und somit beliebig skalierbar war.

Was bedeutet das nun für die Entstehung von Großsiedlungen? Anhand der präsentierten Ergebnisse lässt sich ein modulares Siedlungskonzept für Trypillia Gesellschaften rekonstruieren. Dabei lassen sich die verschiedenen Gebäudetypen von Ringbauten und größeren Wohnhäusern, wie sie in kleineren Siedlungen beobachtet wurden, nahtlos in das Siedlungsgefüge einer Großsiedlung einfügen. Anhand der Anzahl an Ringbauten pro Siedlung, kann davon ausgegangen werden, dass bis zu 20 Gemeinschaften kleinerer Siedlungen von der Größe Moshurivs in einer „Mega-site" zusammenkamen. Dass es sich dabei um eine bewusste Entscheidung gehandelt hat, zeigt die Chronologie Maidanets'kes, wo mit dem inneren Grabenwerk von Beginn an die Größe der Siedlung festgelegt wurde, als auch die demographischen Modellierungen. Auch lässt sich anhand der rapiden Zunahme an Haushalten in der dritten Besiedlungsphase darauf schließen, dass sich dabei um einen Bevölkerungszuzug gehandelt hat, da die Bevölkerungszunahme sowohl dem „natürlichen" Wachstum traditioneller Gesellschaften, als auch der damaligen regionalen Wachstumsrate widerspricht.

Daher wird im Ergebnis davon ausgegangen, dass die Gründung von Trypillia Großsiedlungen auf einer bewussten Zusammenlegung von Haushalten oder Dörfern zu größeren Gemeinschaften beruhte. Dieses Phänomen von agglomerierten Siedlungen ist beispielsweise für das Klassische Griechenland und die Entstehung von Stadt-Staaten bekannt. Doch deutet im Falle der Trypillia Großsiedlungen wenig auf einen urbanen Charakter hin. Abgesehen von der hohen Bevölkerungszahl gibt es in den Funden und Befunden der Sonderbauten und der „Mega-struktur" nichts, was auf eine Bedeutung jenseits der Siedlungsgrenzen hinweist. Zusammen mit dem ring- und strahlenförmigen Wegesystem, dem zentralen Platz im Zentrum der Siedlungen und den Sonderbauten deutet jedoch vieles auf zivile Infrastruktur hin, die als ein urbanes Kriterium angesehen wird. Auch Häusergruppen, die als Nachbarschaften angesehen werden können stellen ein urbanes Kriterium dar. Insgesamt reichen diese Kriterien jedoch nicht aus, um von einer sichtbar funktionalen Bedeutung dieser Siedlungen für ein weiteres Umland im Sinne von Städten zu sprechen. Es handelt sich ebenfalls nicht um sogenannte proto-urbane Siedlungen, da dieser Begriff per Definition einen Zwischenschritt zu einer späteren Entstehung von Städten aus einer evolutionären Sichtweise beschreibt. Im Nordschwarzmeerraum findet diese spätere Entwicklung jedoch nicht statt. Daher sind Trypillia „Mega-sites" als agglomerierte Siedlungen zu charakterisieren, die als eigenständige Kategorie, per Definition, in ihrer Komplexität zwischen Dörfern und Städten stehen. Sie repräsentieren eine ebenso spannende Siedlungskategorie wie Städte, da hier die Untersuchung des sozialen Zusammenhalts in den Vordergrund der Forschung rückt, um diese Siedlungen zu verstehen.

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Context Catalogue

For finds mentioned in the catalogue see plates 1-83. For details on the geochemical and geophysical properties of the sediments see Müller and colleagues (2017b, 60-65).

Trench 80

Context 80001

Feature: Topsoil
Description: Layer of humic, dark-brownish, coarse silty soil with occasional displaced artefacts.
Interpretation: Chernozem (Ap).
Stratigraphy: Above 80002
Finds: F80001 (Plate 1, 2).

Context 80002

Feature: Topsoil
Description: Highly humic, dark-brownish, coarse silty soil enriched with pedogenic carbonate. Intense bioturbation with occasionally displaced artefacts.
Interpretation: Axh horizon of Chernozem.
Stratigraphy: Below 80001, above 80003, 80017 and 80025 as well as 80004, 80005, 80006, 80007, 80008, 80012 and 80014
Finds: F80055-ID3418 (Plate 1, 1).

Context 80003

Feature: Occupation layer
Description: Humic, brownish, coarse silty sediment enriched with pedogenic carbonate and disturbed by intense bioturbation. Sparse scatter of horizontally oriented artefacts.
Interpretation: Former Trypillia occupation layer.
Stratigraphy: Identical to 80017, below 80002, above 80025 and 80027
Finds: KE80027 (Plate 1, 3), KE80028 (Plate 1, 4), KE80029 (Plate 1, 5), KE80030 (Plate 1, 7), KE80032 (Plate 1, 8), KE80033 (Plate 2, 1), KE80034 (Plate 2, 2), KE80035 (Plate 2, 3).

Context 80004

Feature: Pit 2
Description: Upper layer of a shallow pit with diffuse borders filled with humic, brownish, coarse silty sediment. Slightly darker and more compact than the surrounding soil.
Interpretation: Western part of pit 2 in planum view.
Stratigraphy: Identical to 80005, below 80002, above 80024
Finds:-

Context 80005

Feature: Pit 2
Description: Upper layer of a shallow pit with diffuse borders filled with humic, brownish, coarse silty sediment. Slightly darker and more compact than the surrounding soil with a few pieces of amorphous burnt daub less than 1 cm in diameter.
Interpretation: Eastern part of pit 2 in planum view.
Stratigraphy: Identical to 80004, below 80002, above 80013
Finds: KE80076 (Plate 17, 4).

Context 80006

Feature: Kiln – End
Description: Funnelshaped pit filled with humic, brownish, coarse silty sediment. Diffuse borders also distinguished from surrounding soil by presence of several pottery artefacts and a few pieces of amorphous burnt daub up to 10 cm in diameter.
Interpretation: Infill of the loading zone to the combustion chamber of the south-facing pottery kiln.
Stratigraphy: Identical to 80015, below 80002, contemporary to 80007 and 80016
Finds: KE80014 (Plate 8, 4), KE80015 (Plate 8, 5), KE80016 (Plate 8, 6), KE80017 (Plate 8, 7), KE80018 (Plate 9, 1), KE80019 (Plate 9, 2) KE80020 (Plate 9, 3).

Context 80007

Feature: Kiln – End
Description: Scatter of pottery artefacts and amorphous burnt daub of up to 10 cm in diameter with diffuse borders in loosely packed, greyish, coarse silty sediment.
Interpretation: Waste scatter zone after the use-life of the pottery kiln.
Stratigraphy: Identical to 80016, below 80002, above 80027
Finds: KE80021 (Plate 9, 4).

Context 80008

Feature: Kiln – phase 3
Description: Fragmented burnt daub forming three east-northeast oriented channels.
Interpretation: Outline of the east-facing pottery kiln in horizontal.
Stratigraphy: Identical to 80019, 80023 and 80031, 80032 and 80033, below 80016 and 80009, 80010 and 80011
Finds:-

Context 80009

Feature: Kiln – End
Description: Infill of humic, brownish and loosely packed, coarse silty sediment with inclusions of several pottery artefacts and amorphous burnt daub up to 10 cm in diameter.
Interpretation: Infill of the northern channel of the east-facing pottery kiln.
Stratigraphy: Contemporary to 80010, 80011, 80007 and 800016, below 80002, above 80008.
Finds: KE80022 (Plate 9, 5), KE80024 (Plate 10, 1).

Context 80010

Feature: Kiln – End
Description: Infill of humic, brownish and loosely packed, coarse silty sediment with inclusions of amorphous burnt daub up to 10 cm in diameter.
Interpretation: Infill of the central channel of the east-facing pottery kiln.
Stratigraphy: Contemporary to 80009, 80011, 80007 and 800016, below 80002, above 80008.
Finds:-

Context 80011

Feature: Kiln – End
Description: Infill of humic, brownish and loosely packed, coarse silty sediment with inclusions of several pottery artefacts and amorphous burnt daub up to 10 cm in diameter.
Interpretation: Infill of the southern channel of the east-facing pottery kiln.
Stratigraphy: Contemporary to 80009, 80010, 80007 and 800016, below 80002, above 80008.
Finds: KE80023 (Plate 9, 6), KE80134 (Plate 8, 5).

Context 80012

Feature: Pit 3
Description: Oval-shaped pit with clear borders filled with lots of secondarily burnt pottery, bones and ash-layers in greyish-brown, coarse silty sediment matrix. Lots of amorphous burnt daub of up to 10 cm in diameter deposited in the upper part of the fill.
Interpretation: Upper fill of pit 3 in planum.
Stratigraphy: Below 80002, above 80044.
Finds: KE80096 (Plate 22, 1), KE80097 (Plate 22, 2), KE80098 (Plate 22, 3), KE80102 (Plate 23, 1), KE80103 (Plate 23, 2), KE80105 (Plate 23, 4), KE80107 (Plate 23, 6), KE80109 (Plate 24, 2), KE80110 (Plate 24, 3), KE80111 (Plate 24, 4), KE80112 (Plate 24, 5), KE80113 (Plate 24, 6), KE80117 (Plate 25, 1), KE80118 (Plate 25, 2), KE80120 (Plate 25, 4), KE80122 (Plate 25, 6), KE80123 (Plate 25, 7), KE80124 (Plate 25, 8), KE80125 (Plate 25, 9), KE80126 (Plate 25, 10) KE80127 (Plate 25, 11), KE80131 (Plate 26, 3), KE80132 (Plate 26, 4), KE80133 (Plate 26, 5), F80542-oID20 (Plate 26, 1).

Context 80013

Feature: Pit 2
Description: Pit with diffuse borders and a fill of greyish, coarse silty sediment with inclusions of several pottery artefacts, bones and a small amount of amorphous burnt daub less than 1 cm in diameter.

Interpretation: Eastern fill of pit 2.
Stratigraphy: Identical to 80024, below 80005, above 80026, 80028 and 80029, cutting 80014
Finds: KE80067 (Plate 15, 6), KE80068 (Plate 15, 7), KE80069 (Plate 16, 1), KE80070 (Plate 16, 2), KE80071 (Plate 16, 3), KE80072 (Plate 16, 4), KE80073 (Plate 16, 5), KE80074 (Plate 16, 6), KE80075 (Plate 16, 7), KE80077 (Plate 18, 1), KE80078 (Plate 18, 2), KE80080 (Plate 18, 4), F80332 (Plate 17, 1), F80367oID21 (Plate 17, 2), F80381oID24 (Plate 17, 3).

Context 80014

Feature: Pit 1
Description: U-shaped pit with diffuse borders. Fill of greyish-brown, coarse silty sediment with lots of pottery artefacts, bones and a few pieces of amorphous burnt daub of up to 10 cm in diameter.
Interpretation: Pit 1 in horizontal.
Stratigraphy: Cut by 80013, above 80046
Finds: KE80038 (Plate 11, 5).

Context 80015

Feature: Kiln – End
Description: Funnel-shaped pit with diffuse borders. Fill of greyish-yellow, coarse silty sediment with a few pieces of amorphous burnt daub less than 1 cm in diameter.
Interpretation: Fill of the loading zone to the combustion chamber of the south-facing pottery kiln.
Stratigraphy: Identical to 80006, below 80002, above 80027
Finds:-

Context 80016

Feature: Kiln – End
Description: Scatter of pottery artefacts and a few pieces of amorphous burnt daub less than 1 cm in diameter with diffuse borders in loosely packed, greyish, coarse silty sediment.
Interpretation: Waste scatter zone after the use-life of the east-facing pottery kiln.
Stratigraphy: Identical to 80007, below 80002, above 80017
Finds: KE80025 (Plate 10, 2), KE80026 (Plate 10, 3), KE80135 (Plate 10, 5), KE80136 (Plate 10, 6), KE80137 (Plate 11, 1), KE80138 (Plate 11, 2), KE80139 (Plate 11, 3), KE80140 (Plate 11, 4).

Context 80017

Feature: Occupation layer
Description: Greyish-yellow, coarse silty sediment with occasional horizontally oriented artefacts and amorphous burnt daub less than 1 cm in diameter.
Interpretation: Former Trypillia occupation layer.
Stratigraphy: Identical to 80003, above 80025 and 80027
Finds: KE80036 (Plate 2, 4).

Context 80018

Feature: Kiln – End
Description: Loosely packed greyish layer of coarse silty sediment with high calcium carbonate fallout.
Interpretation: Waste scatter zone after the use-life of the east-facing pottery kiln.
Stratigraphy: Identical to 80016, above 80021
Finds:-

Context 80019

Feature: Kiln – phase 3
Description: Flattened and crumbling yellowish burnt daub.
Interpretation: High temperature fired, collapsed dome of east-facing pottery kiln.
Stratigraphy: Identical to 80023, contemporary to 80008, below 80002, above 80035
Finds:-

Context 80020

Feature: Kiln – phase 3
Description: Funnel-shaped pit with diffuse borders. Fill of brownish-grey, coarse silty sediment with a few pieces of amorphous burnt daub up to 10 cm in diameter.
Interpretation: Fill of the loading zone to the combustion chamber of the east-facing pottery kiln.
Stratigraphy: Identical to 80021 and 80022, below 80007 and 80016, above 80027
Finds:-

Context 80021

Feature: Kiln – phase 3
Description: Funnel-shaped pit with diffuse borders. Fill of brownish-grey, coarse silty sediment with a few pieces of amorphous burnt daub less than 1 cm in diameter.
Interpretation: Fill of the loading zone to the combustion chamber of the east-facing pottery kiln.
Stratigraphy: Identical to 80020 and 80022, below 80007 and 80016, above 80027
Finds:-

Context 80022

Feature: Kiln – phase 3
Description: Funnel-shaped pit with diffuse borders. Fill of brownish-grey, coarse silty sediment with a few pieces of burnt daub up to 10 cm in diameter.
Interpretation: Fill of the loading zone to the combustion chamber of the east-facing pottery kiln.
Stratigraphy: Identical to 80020 and 80021, below 80007 and 80016, above 80027
Finds:-

Context 80023

Feature: Kiln – phase 3
Description: Reddish-grey, coarse silty sediment with a high amount of flattened, crumbling, yellowish burnt daub up to 10 cm in diameter.
Interpretation: Collapsed dome of east-facing pottery kiln.
Stratigraphy: Identical to 80019, contemporary to 80008, below 80002, above 80035
Finds:-

Context 80024

Feature: Pit 2
Description: Shallow pit with diffuse borders. Fill of brownish-grey, coarse silty sediment with few pottery artefacts, bones and occasional amorphous burnt daub up to 10 cm in diameter.
Interpretation: Western part of pit 2.
Stratigraphy: Identical to 80013, below 80004, above 80025
Finds: KE80079 (Plate 18, 3).

Context 80025

Feature: Occupation layer
Description: Greyish-yellow, coarse silty sediment with occasional horizontally oriented artefacts and amorphous burnt daub less than 1 cm in diameter.
Interpretation: Former Trypillia occupation layer.
Stratigraphy: Identical to 80017, below 80024, above 80027
Finds: KE80037 (Plate 2, 5).

Context 80026

Feature: Pit 2
Description: Shallow lens of brownish-grey, coarse silty sediment containing many pottery artefacts and bones.
Interpretation: Depression filled with artefacts as part of pit 2.
Stratigraphy: Below 80013, above 80027
Finds: KE80081 (Plate 18, 5).

Context 80027

Feature: Geological layer
Description: Layer of brownish-yellow, coarse silty soil with occasional argillic clay accumulations and intense bioturbation.
Interpretation: Buried Cambisol (Bw).
Stratigraphy: Below 80015, 80016, 80025, 80026, 80028, 80029, 80034, 80040 and 80043
Finds:-

Context 80028

Feature: Pit 2
Description: Pit infill of brownish-grey, coarse silty sediment with lots of amorphous and flattened burnt daub more than 10 cm in diameter, bones and pottery artefacts.
Interpretation: Eastern part of pit 2.
Stratigraphy: Identical to 80029, below 80013, above 80027
Finds: KE80001 (Plate 3, 1), KE80082 (Plate 18, 6), KE80083 (Plate 18, 7), KE80084 (Plate 19, 1), KE80085 (Plate 19, 2), KE80086 (Plate 19, 3), KE80087 (Plate 19, 4), KE80088 (Plate 19, 5), KE80089 (Plate 19, 6), KE80090 (Plate 19, 7), KE80091 (Plate 20, 1), KE80092 (Plate 20, 4), KE80093 (Plate 20, 2), KE80094 (Plate 20, 3), KE80095 (Plate 21, 1).

Context 80029

Feature: Pit 2
Description: Pit infill of brownish-grey, coarse silty sediment with lots of amorphous and flattened burnt daub more than 10 cm in diameter, bones and pottery artefacts.
Interpretation: Western part of pit 2.
Stratigraphy: Identical to 80028, below 80024, above 80027
Finds:-

Context 80030

Feature: Kiln – phase 1
Description: Fragmented burnt daub with occasional inclusion of pottery artefacts.
Interpretation: Eastern wall of the south-facing pottery kiln.
Stratigraphy: Identical to 80036, contemporary to 80041 and 80043, below 80008
Finds:-

Context 80031

Feature: Kiln – phase 3
Description: Fragmented burnt daub with inclusions of occasional pottery artefacts.
Interpretation: Northern furnace channel of the east-facing pottery kiln.
Stratigraphy: Identical to 80008, contemporary to 80019, 80020, 80021, 80022, 80023, 80032 and 80033, above 80036
Finds:-

Context 80032

Feature: Kiln – phase 3
Description: Fragmented burnt daub with inclusions of occasional pottery artefacts.
Interpretation: Central furnace channel of the east-facing pottery kiln.
Stratigraphy: Identical to 80008, contemporary to 80019, 80020, 80021, 80022, 80023, 80031 and 80033, above 80036
Finds:-

Context 80033

Feature: Kiln – phase 3
Description: Fragmented burnt daub with inclusions of occasional pottery artefacts.
Interpretation: Southern furnace channel of the east-facing pottery kiln.
Stratigraphy: Identical to 80008, contemporary to 80019, 80020, 80021, 80022, 80023, 80031 and 80032, above 80036
Finds:-

Context 80034

Feature: Pit 3
Description: Oval-shaped pit with clear borders filled with lots of secondarily burnt pottery, bones and ash-layers in a greyish-brown, coarse silty sediment matrix. Lots of amorphous burnt daub of up to 10 cm in diameter deposited in the upper part of the fill.
Interpretation: Pit 3 in profile.
Stratigraphy: Identical to 80012, below 80002, above 80027
Finds: KE80100 (Plate 22, 5), KE80101 (Plate 22, 6), KE80104 (Plate 23, 3), KE80106 (Plate 23, 5), KE80108 (Plate 24, 1), KE80114 (Plate 24, 7), KE80115 (Plate 24, 8), KE80116 (Plate 24, 9), KE80119 (Plate 25, 3), KE80121 (Plate 25, 5), KE80128 (Plate 25, 12), KE80129 (Plate 25, 13), KE80130 (Plate 25, 14).

Context 80035

Feature: Kiln – phase 2
Description: Fragmented thin plaster on burnt daub forming three south-facing channels.
Interpretation: Outline of the refurbished south-facing pottery kiln in planum.
Stratigraphy: Identical to 80037, 80038, 80039 and 80042, below 80008, above 80036
Finds:-

Context 80036

Feature: Kiln – phase 1
Description: Fragmented burnt daub forming three south-facing channels.
Interpretation: Outline of the south-facing pottery kiln in planum.
Stratigraphy: Identical to 80030, 80041 and 80043, below 80035, above 80027
Finds: KE80001 (Plate 3, 1).

Context 80037

Feature: Kiln – phase 2
Description: Loosely packed fill of amorphous burnt daub up to 10 cm in diameter, stones of up to 5 cm in diameter and pottery artefacts in a whitish-grey, coarse silty sediment matrix.
Interpretation: Fill of the western channel of the south-facing pottery kiln.
Stratigraphy: Contemporary to 80038 and 80039, above 80042 below 80008
Finds: KE80010 (Plate 7, 4), KE80013 (Plate 7, 6).

Context 80038

Feature: Kiln – phase 2
Description: Loosely packed fill of amorphous burnt daub up to 10 cm in diameter, stones of up to 5 cm in diameter and pottery artefacts in a whitish-grey, coarse silty sediment matrix.
Interpretation: Fill of the central channel of the south-facing pottery kiln.
Stratigraphy: Contemporary to 80037 and 80039, above 80042, below 80008
Finds: KE80010 (Plate 7, 4), KE80011 (Plate 7, 5), KE80012 (Plate 8, 2), F80938ID3076 (Plate 8, 1).

Context 80039

Feature: Kiln – phase 2
Description: Loosely packed fill of amorphous burnt daub up to 10 cm in diameter, stones of up to 5 cm in diameter and pottery artefacts in a whitish-grey, coarse silty sediment matrix.
Interpretation: Fill of the eastern channel of the south-facing pottery kiln.
Stratigraphy: Contemporary to 80037 and 80038, above 80042, below 80008
Finds:-

Context 80040

Feature: Pit 1
Description: Pit with diffuse borders. Fill of greyish-brown, coarse silty sediment with lots of layered pottery artefacts, bones and a few pieces of burnt daub less than 1 cm in diameter.
Interpretation: Pit 1 in profile.
Stratigraphy: Identical to 80014, below 80027
Finds: KE80039 (Plate 11, 6), KE80040 (Plate 12, 1), KE80041 (Plate 12, 2), KE80042 (Plate 12, 3), KE80043 (Plate 12, 4), KE80044 (Plate 13, 1), KE80045 (Plate 13, 2), KE80046 (Plate 13, 4), KE80047 (Plate 13, 3), KE80048 (Plate 13, 5), KE80049 (Plate 13, 6), KE80050 (Plate 13, 7), KE80051 (Plate 13, 8), KE80052 (Plate 13, 9), KE80053 (Plate 13, 10), KE80054 (Plate 14, 1), KE80055 (Plate 14, 2), KE80056 (Plate 14, 3), KE80057 (Plate 14, 4), KE80058 (Plate 14, 5), KE80059 (Plate 14, 6), KE80060 (Plate 14, 7), KE80061 (Plate 14, 8).

Context 80041

Feature: Kiln – phase 1
Description: Fragmented burnt daub with occasional inclusion of pottery artefacts.
Interpretation: Outer walls of the south-facing pottery kiln.
Stratigraphy: Identical to 80036, contemporary to 80030 and 80043, below 80042
Finds: KE80001 (Plate 3, 1), KE80002 (Plate 4, 1), KE80003 (Plate 5, 1), KE80004 (Plate 6, 1), KE80005 (Plate 6, 2), KE80006 (Plate 6, 3), KE80007 (Plate 7, 1), KE80008 (Plate 7, 2), KE80009 (Plate 7, 3).

Context 80042

Feature: Kiln – phase 2
Description: Fragmented white plaster on burnt daub observed in parts of the central and eastern channel of the south-facing kiln.
Interpretation: Renovation of the original south-facing pottery kiln.
Stratigraphy: Identical to 80035, below 80037, 80038 and 80039, above 80036
Finds:-

Context 80043

Feature: Kiln – phase 1
Description: Layer of reddish-yellow crumbling burnt coarse silty sediment below the original south-facing pottery kiln.
Interpretation: Foundation of the south-facing pottery kiln.
Stratigraphy: Identical to 80036, contemporary to 80030 and 80041, above 80027
Finds:-

Context 80044

Feature: Pit 3
Description: Oval-shaped pit with clear borders filled with lots of secondarily burnt pottery, bones and ash-layers in a greyish-brown, coarse silt sediment matrix.
Interpretation: Second fill of pit 3.
Stratigraphy: Below 80012, above 80045
Finds:-

Context 80045

Feature: Pit 3
Description: Oval-shaped pit with clear borders, filled with lots of secondarily burnt pottery, bones and ash-layers in a greyish-brown, coarse silty sediment matrix.
Interpretation: First fill of pit 3.
Stratigraphy: Below 80044, above 80027
Finds:-

Context 80046

Feature: Pit 1
Description: Pit with diffuse borders. Fill of greyish-brown, coarse silty sediment with lots of layered pottery artefacts, bones and a few amorphous pieces of burnt daub less than 1 cm in diameter.
Interpretation: Fourth fill of pit 1.
Stratigraphy: above 80047, below 80014
Finds:-

Context 80047

Feature: Pit 1
Description: Pit with diffuse borders. Fill of greyish-brown, coarse silty sediment with lots of layered pottery artefacts, bones and a few amorphous pieces of burnt daub less than 1 cm in diameter.
Interpretation: Third fill of pit 1.
Stratigraphy: Above 80048, below 80046
Finds:-

Context 80048

Feature: Pit 1
Description: Pit with diffuse borders. Fill of greyish-brown, coarse silty sediment with lots of layered pottery artefacts, bones and a few amorphous pieces of burnt daub less than 1 cm in diameter.
Interpretation: Second fill of pit 1.
Stratigraphy: Above 80049, below 80047
Finds:-

Context 80049

Feature: Pit 1
Description: Pit with diffuse borders and flat bottom. Fill of greyish-brown, coarse silty sediment with lots of layered pottery artefacts, bones and a few amorphous pieces of burnt daub less than 1 cm in diameter.
Interpretation: First fill of pit 1.
Stratigraphy: Above 80027, below 80048
Finds:-

Trench 91

Context 91001

Feature: Topsoil
Description: Layer of humic, dark-brownish, coarse silty soil with occasional displaced artefacts.
Interpretation: Chernozem (Ap).
Stratigraphy: Above 91002 and 91005
Finds:-

Context 91002

Feature: Topsoil
Description: Humic, dark-brownish, coarse silty soil enriched with pedogenic carbonate. Intense bioturbation with occasional displaced artefacts.
Interpretation: Chernozem (Axh).
Stratigraphy: Identical to 91005 and 91006, below 91001, above 91004
Finds:-

Context 91003

Feature: Dwelling 55 collapse
Description: Fragments of amorphous burnt daub between 110 cm in diameter.
Interpretation: Collapsed superstructure of the former dwelling.
Stratigraphy: Identical to 91007 and 91008, below 91004
Finds: F91006-oID37 (Plate 28, 1).

Context 91004

Feature: Dwelling 55 collapse
Description: Compact greyish-yellow, coarse silty sediment with a few amorphous pieces of burnt daub 110 cm in diameter between elements of the collapsed superstructure of the building.
Interpretation: Layer after the abandonment of the dwelling.
Stratigraphy: Below 91002, above 91003
Finds:-

Context 91005

Feature: Topsoil
Description: Humic, dark-brownish, coarse silty soil enriched with pedogenic carbonate. Intense bioturbation with occasional displaced artefacts.
Interpretation: Chernozem (Axh).
Stratigraphy: Identical to 91002 and 91006, below 91001, above 91007, 91008, 91009 and 91010
Finds:-

Context 91006

Feature: Topsoil
Description: Humic, dark-brownish, coarse silty sediment enriched with pedogenic carbonate. Intense bioturbation with occasional displaced artefacts.
Interpretation: Chernozem (Axh).
Stratigraphy: Identical to 91002 and 91005, below 91001, above 91004
Finds:-

Context 91007

Feature: Dwelling 55 collapse
Description: Fragments of amorphous burnt daub over 10 cm in diameter.
Interpretation: Collapsed superstructure of the former dwelling.
Stratigraphy: Identical to 91003 and 91008, below 91004, above 91016
Finds: KE91001 (Plate 26, 6), KE91002 (Plate 26, 7).

Context 91008

Feature: Dwelling 55 collapse
Description: Fragments of amorphous burnt daub over 10 cm in diameter, several fragments of pottery and broken querns.
Interpretation: Collapsed superstructure of the former dwelling.
Stratigraphy: Identical to 91003 and 91007, below 91004, above 91016
Finds: KE91003 (Plate 27, 1), KE91004 (Plate 27, 2).

Context 91009

Feature: Occupation layer
Description: Greyish-yellow, coarse silty sediment with occasional horizontally oriented artefacts and amorphous burnt daub less than 1 cm in diameter.
Interpretation: Former Trypillia occupation layer.
Stratigraphy: Identical to 91013, below 91005, above 91018
Finds:-

Context 91010

Feature: Pit
Description: Shallow pit with diffuse borders and a fill of darkish-brown, coarse silty sediment with a few pieces of amorphous burnt daub up to 10 cm in diameter and occasional pottery artefacts.
Interpretation: Pit to dwelling 54 in trench 92.
Stratigraphy: Identical to 91014, below 91005, above 91018
Finds: KE91005 (Plate 27, 4).

Context 91011

Feature: Dwelling 55 ground floor
Description: Fragments of flattened burnt daub over 10 cm in diameter.
Interpretation: Former platform (ploshchadka) of the dwelling.
Stratigraphy: Below 91003, 91007 and 91008, above 91012, 91016 and 91017
Finds:-

Context 91012

Feature: Dwelling 55 ground floor
Description: Brownish, coarse silty sediment with a few amorphous pieces of burnt daub between 110 cm in diameter, several pottery artefacts and stone fragments.
Interpretation: Ground floor of the former dwelling.
Stratigraphy: Identical to 91016 and 91017, below 91011, above 91018
Finds: KE91006 (Plate 27, 3).

Context 91013

Feature: Occupation layer
Description: Greyish-yellow, coarse silty sediment with occasional horizontally oriented artefacts and amorphous burnt daub less than 1 cm in diameter.
Interpretation: Former Trypillia occupation layer.
Stratigraphy: Identical to 91009, below 91005, above 91018
Finds: KE91006 (Plate 27, 3).

Context 91014

Feature: Pit
Description: Fill of darkish-brown, coarse silty sediment with a few pieces of burnt daub up to 10 cm and occasional pottery artefacts.
Interpretation: Pit to dwelling 54 in trench 92.
Stratigraphy: Identical to 91010, below 91005, above 91018
Finds:-

Context 91015

Context number unused.

Context 91016

Feature: Dwelling 55 ground floor
Description: Brownish, coarse silty sediment with a few amorphous pieces of burnt daub between 110 cm in diameter and pottery artefacts.
Interpretation: Ground floor of the former dwelling.
Stratigraphy: Identical to 91012 and 91017, below 91011, above 91018
Finds:-

Context 91017

Feature: Dwelling 55 ground floor
Description: Brownish, coarse silty sediment with a few amorphous pieces of burnt daub between 1-10 cm in diameter and pottery artefacts.
Interpretation: Ground floor of the former dwelling.
Stratigraphy: Identical to 91012 and 91016, below 91011, above 91018
Finds:-

Context 91018

Feature: Geological layer
Description: Layer of brownish-yellow, coarse silty soil with occasional argillic clay accumulations and intense bioturbation.
Interpretation: Buried Cambisol (Bw).
Stratigraphy: Below 91016, 91017, 91013 and 91014
Finds:-

Trench 92

Context 92001

Feature: Topsoil
Description: Layer of humic, dark-brownish, coarse silty soil with occasional displaced artefacts.
Interpretation: Chernozem (Ap).
Stratigraphy: Above 92002
Finds:-

Context 92002

Feature: Topsoil
Description: Humic, dark-brownish, coarse silty soil enriched with pedogenic carbonate. Intense bioturbation with occasional displaced artefacts.
Interpretation: Chernozem (Axh).
Stratigraphy: Below 92001, above 92003, 92004, 92005, 92012, 92013, 92014 and 91015
Finds: KE92001 (Plate 32, 7), KE92007 (Plate 42, 2), KE92008 (Plate 34, 1), KE92019 (Plate 28, 3), KE92026 (Plate 28, 5), KE92030 (Plate 29, 5), KE92044 (Plate 37, 2), KE92061 (Plate 32, 1), KE92062 (Plate 28, 4), KE92064 (Plate 28, 6).

Context 92003

Feature: Dwelling 54 collapse
Description: Compact greyish-yellow, coarse silty sediment with a few amorphous pieces of burnt daub 110 cm in diameter between elements of the collapsed superstructure of the building.
Interpretation: Layer after the abandonment of the dwelling.
Stratigraphy: Identical to 92004, below 92002, above 92007
Finds: KE92002 (Plate 29, 2), KE92009 (Plate 45, 2), KE92030 (Plate 29, 5), KE92060 (Plate 42, 6).

Context 92004

Feature: Dwelling 54 collapse
Description: Compact greyish-yellow, coarse silty sediment with a few amorphous pieces of burnt daub 110 cm in diameter between elements of the collapsed superstructure of the building.
Interpretation: Layer after the abandonment of the dwelling.
Stratigraphy: Identical to 92003, below 92002, above 92007
Finds:-

Context 92005

Feature: Dwelling 56 collapse
Description: Compact greyish-yellow, coarse silty sediment with a few amorphous pieces of burnt daub 110 cm in diameter between elements of the collapsed superstructure of the building.
Interpretation: Layer after the abandonment of the dwelling.
Stratigraphy: Below 92001
Finds: KE92009 (Plate 45, 2), KE92025 (Plate 45, 3).

Context 92006

Feature: Dwelling 54 collapse
Description: Concentration of amorphous burnt daub over 10 cm in diameter located in the southern corner of the dwelling. Below several pottery vessels were found.
Interpretation: Part of the wall collapse fallen from the front porch.
Stratigraphy: Below 92003, contemporary to 92007 and 92008
Finds: KE92015 (Plate 29, 4), KE92020 (Plate 29, 3), KE92030 (Plate 29, 5), KE92033 (Plate 35, 5).

Context 92007

Feature: Dwelling 54 collapse
Description: Loose layer with fragments of amorphous burnt daub over 10 cm in diameter and several artefacts.
Interpretation: Collapsed superstructure of the former dwelling.
Stratigraphy: Identical to 92008, below 92003 and 92004, contemporary to 92006 and 92016
Finds: KE92003 (Plate 30, 1), KE92004 (Plate 30, 2), KE92013 (Plate 31, 1), KE92014 (Plate 31, 2), KE92017 (Plate 30, 3), KE92027 (Plate 35, 3), KE92028 (Plate 35, 4), KE92029 (Plate 30, 4), KE92031 (Plate 31, 3), KE92046 (Plate 42, 5), KE92051 (Plate 31, 4), KE92061 (Plate 32, 1), KE92063 (Plate 32, 2).

Context 92008

Feature: Dwelling 54 collapse
Description: Loose layer with fragments of amorphous burnt daub over 10 cm in diameter and several artefacts.
Interpretation: Collapsed superstructure of the former dwelling.
Stratigraphy: Identical to 92007, above 92009, contemporary to 92006 and 92016
Finds: KE92022 (Plate 32, 4).

Context 92009

Feature: Dwelling 54 platform
Description: Fragments of flattened burnt daub over 10 cm in diameter. The lower surface shows imprints of timbers.
Interpretation: Former platform (ploshchadka) of the dwelling.
Stratigraphy: Contemporary to 92010, 92011 and 92019, below 92008, above 92021, 92022 and 92023
Finds: KE92006 (Plate 33, 1), KE92008 (Plate 34, 1), KE92010 (Plate 34, 2), KE92011 (Plate 34, 4), KE92012 (Plate 34, 4), KE92023 (Plate 35, 1), KE92024 (Plate 35, 2), KE92027 (Plate 35, 3), KE92028 (Plate 35, 4), KE92033 (Plate 35, 5), KE92034 (Plate 36, 1), KE92036 (Plate 36, 2), KE92037 (Plate 36, 3), KE92038 (Plate 36, 4), KE92039 (Plate 36, 5), KE92043 (Plate 37, 1), KE92044 (Plate 37, 2), KE92045 (Plate 37, 3), KE92049 (Plate 38, 2), KE92050 (Plate 38, 1), KE92052 (Plate 38, 2), KE92053 (Plate 39, 1), KE92054 (Plate 40, 1), KE92059 (Plate 38, 4), KE92066 (Plate 38, 5), KE92067 (Plate 39, 2), KE92069 (Plate 39, 3), KE92071 (Plate 39, 5), KE92073 (Plate 41, 1), KE92074 (Plate 41, 2), KE92075 (Plate 41, 3).

Context 92010

Feature: Dwelling 54 platform
Description: Fragments of burnt daub over 10 cm in diameter with wooden imprints following the long axis of the former dwelling. Only preserved in the southeastern part of the dwelling.
Interpretation: Part of the front porch of the former dwelling.
Stratigraphy: contemporary to 92009, below 92008
Finds: KE92070 (Plate 39, 4).

Context 92011

Feature: Dwelling 54 interior
Description: Fragmented flattened burnt daub over 10 cm in diameter fixed to the platform. Located in the central eastern part of the former dwelling.
Interpretation: Threshold of the former hearth.
Stratigraphy: Identical to 92018, contemporary to 92019, above 92009, below 92008
Finds:-

Context 92012

Feature: Occupation layer
Description: Greyish-yellow, coarse silty sediment with occasional horizontally oriented artefacts and amorphous burnt daub less than 1 cm in diameter. Eastern quarter of the trench.

Interpretation: Former Trypillia occupation layer.
Stratigraphy: Contemporary to 92013, 92014 and 92015, below 92003
Finds: KE92055 (Plate 43, 5), KE92056 (Plate 44, 1), KE92065 (Plate 44, 4).

Context 92013

Feature: Occupation layer
Description: Greyish-yellow, coarse silty sediment with occasional horizontally oriented artefacts and amorphous burnt daub less than 1 cm in diameter. Southern quarter of the trench.
Interpretation: Former Trypillia occupation layer.
Stratigraphy: Contemporary to 92012, 92014 and 92015, below 92003
Finds: KE92002 (Plate 29, 2), KE92016 (Plate 43, 2), KE92021 (Plate 43, 3), KE92033 (Plate 35, 5), KE92040 (Plate 42, 4), KE92057 (Plate 44, 2), KE92058 (Plate 44, 3).

Context 92014

Feature: Occupation layer
Description: Greyish-yellow, coarse silty sediment with occasional horizontally oriented artefacts and amorphous burnt daub less than 1 cm in diameter. Western quarter of the trench.
Interpretation: Former Trypillia occupation layer.
Stratigraphy: Contemporary to 92012, 92013 and 92015, below 92003
Finds: KE92032 (Plate 43, 4), KE92054 (Plate 40, 1), KE92073 (Plate 41, 1), KE92076 (Plate 32, 8).

Context 92015

Feature: Occupation layer
Description: Greyish-yellow, coarse silty sediment with occasional horizontally oriented artefacts and amorphous burnt daub less than 1 cm in diameter. Northern quarter of the trench.
Interpretation: Former Trypillia occupation layer.
Stratigraphy: Contemporary to 92012, 92013 and 92014, below 92003
Finds: KE92047 (Plate 32, 5), KE92066 (Plate 38, 5), KE92068 (Plate 44, 5).

Context 92016

Feature: Dwelling 54 collapse
Description: Concentration of several pottery vessels partly filled with animal bones. The concentration is located on the northern short side of the former dwelling and partly crushed by wall collapse of amorphous burnt daub between 1-10 cm in diameter.
Interpretation: Storage located in the back of the former dwelling when it burned down.
Stratigraphy: Contemporary to 92007, below 92003
Finds: KE92001 (Plate 32, 7), KE92047 (Plate 32, 5), KE92048 (Plate 32, 6), KE92076 (Plate 32, 8).

Context 92017

Feature: Dwelling 54 interior
Description: Fragmented podium made from mineral tempered burnt daub located in the central northern part of the former dwelling. The rounded podest is flattened, fixed to the platform and incised with several parallel lines.
Interpretation: So-called altar according to Ukrainian scholarship.
Stratigraphy: Below 92008, above 92009
Finds:-

Context 92018

Feature: Dwelling 54 interior
Description: Concentration of highly fired, compact reddish burnt daub over 10 cm in diameter located in the central eastern part of the former dwelling.
Interpretation: Former hearth of the dwelling.
Stratigraphy: Contemporary to 92011, 92019 and 92009, below 92008
Finds:-

Context 92019

Feature: Dwelling 54 interior
Description: Fragments of flattened burnt daub following the short axis of the former dwelling between the hearth and front porch.
Interpretation: Wall of the hearth towards the front of the dwelling.
Stratigraphy: Contemporary to 92018, 92011 and 92009, below 92008, above 92009
Finds:-

Context 92020

Feature: Dwelling 54 interior
Description: Compact triangular burnt daub following the short axis of the former building. Located in the central southern part of the former dwelling next to the hearth.
Interpretation: Entrance threshold between the front porch and interior of the dwelling.
Stratigraphy: below 92008, above 92009
Finds:-

Context 92021

Feature: Dwelling 54 ground floor
Description: Highly fragmented, flattened, burnt surface located below the central part of the dwelling.
Interpretation: Fireplace below the dwelling. Potential source of the fire which destroyed the house.
Stratigraphy: Below 92009, above 92023
Finds:-

Context 92022

Feature: Dwelling 54 ground floor
Description: Concentration of roughly flattened burnt daub over 10 cm in diameter.
Interpretation: Platform on the ground floor of the former dwelling.
Stratigraphy: Below 92009, above 92023
Finds:-

Context 92023

Feature: Dwelling 54 ground floor
Description: Brownish, coarse silty sediment with a few amorphous pieces of burnt daub between 110 cm in diameter and several pottery artefacts and stone fragments.
Interpretation: Ground floor of the former dwelling.
Stratigraphy: Below 92009, 92021 and 92022
Finds: KE92005 (Plate 42, 1), KE92007 (Plate 42, 2), KE92011 (Plate 34, 4), KE92018 (Plate 41, 5), KE92035 (Plate 42, 3), KE92040 (Plate 42, 4), KE92046 (Plate 42, 5), KE92053 (Plate 39, 1), KE92060 (Plate 42, 6), KE92073 (Plate 41, 1).

Trench 93

Context 93001

Feature: Topsoil
Description: Layer of humic, dark-brownish, coarse silty sediment with occasional displaced artefacts.
Interpretation: Chernozem (Ap).
Stratigraphy: Above 93003, 93004 and 93005
Finds:-

Context 93002

Feature: Dwelling 57
Description: Fragmented amorphous burnt daub up to 10 cm in diameter.
Interpretation: Collapsed superstructure of the former dwelling.
Stratigraphy: Below 93001, above 92002b
Finds: KE93001 (Plate 46, 1), KE93002 (Plate 46, 2), KE93003 (Plate 46, 3), KE93004 (Plate 46, 4), KE93005 (Plate 46, 5), KE93006 (Plate 47, 1), KE93007 (Plate 47, 2), KE93008 (Plate 47, 3), KE93013 (Plate 49, 2).

Context 93002a

Feature: Dwelling 57
Description: Area of vitrified daub up to 10 cm in diameter.
Interpretation: Place of severe heat inside the building. Potential origin of house conflagration.
Stratigraphy: Below 93004, above 92002b
Finds:-

Context 93002b

Feature: Dwelling 57
Description: Fragmented and flattened burnt daub over 10 cm in diameter.
Interpretation: Former platform (ploshchadka) of the dwelling.
Stratigraphy: Below 93004
Finds:-

Context 93003

Feature: Occupation layer
Description: Greyish layer of coarse silty sediment with occasional amorphous pieces of burnt daub up to 10 cm in diameter and horizontally oriented pottery artefacts.
Interpretation: Former Trypillia occupation layer. Alley between dwelling 57 and 58.
Stratigraphy: Below 93001
Finds:-

Context 93004

Feature: Dwelling 57
Description: Compact greyish-yellow, coarse silty sediment with a few amorphous pieces of burnt daub 110 cm in diameter between elements of the collapsed superstructure of the building.
Interpretation: Layer after the abandonment of the dwelling.
Stratigraphy: Above 93002 and 93002a
Finds: KE93006 (Plate 47, 1), KE93008 (Plate 47, 3).

Context 93005

Feature: Dwelling 58
Description: Fragmented amorphous burnt daub of up to 10 cm in diameter.
Interpretation: Collapsed superstructure of the former dwelling.
Stratigraphy: Below 93001, above 93005a
Finds: KE93009 (Plate 47, 4), KE93010 (Plate 47, 5), KE93011 (Plate 48, 1), KE93012 (Plate 49, 1).

Context 93005a

Feature: Dwelling 58
Description: Fragmented and flattened burnt daub over 10 cm in diameter.
Interpretation: Former platform (ploshchadka) of the dwelling.
Stratigraphy: Below 93001
Finds:-

Trench 94

Context 94001

Feature: Topsoil
Description: Layer of humic, dark-brownish, coarse silty sediment with occasional displaced artefacts.
Interpretation: Chernozem (Ap).
Stratigraphy: Above 94002, 94003, 94004 and 94005
Finds:-

Context 94002

Feature: Dwelling 59
Description: Fragmented amorphous burnt daub between 110 cm in diameter.
Interpretation: Collapsed superstructure of the former dwelling.
Stratigraphy: Contemporary to 94003, below 94001
Finds: KE94001 (Plate 52, 1).

Context 94003

Feature: Dwelling 59
Description: A few amorphous pieces of burnt daub between 110 cm in diameter.
Interpretation: Less burnt collapsed superstructure of the former dwelling.
Stratigraphy: Contemporary to 94002, above 94006
Finds: KE94001 (Plate 52, 1).

Context 94004

Feature: Occupation layer
Description: Brownish-yellow, coarse silty sediment with a few amorphous pieces of burnt daub less than 1 cm in diameter.
Interpretation: Former Trypillia occupation layer.
Stratigraphy: Identical to 94005, below 94001, above 94007
Finds:-

Context 94005

Feature: Occupation layer
Description: Brownish-yellow, coarse silty sediment with a few amorphous pieces of burnt daub less than 1 cm in diameter.
Interpretation: Former Trypillia occupation layer.
Stratigraphy: Identical to 94004, below 94001, above 94007
Finds:-

Context 94006

Feature: Dwelling 59
Description: Brownish-yellow, coarse silty sediment with a few amorphous pieces of burnt daub between 110 cm in diameter.
Interpretation: Ground floor of the former dwelling.
Stratigraphy: Below 94003, above 94007
Finds:-

Context 94007

Feature: Geological layer
Description: Layer of brownish-yellow, coarse silty soil with occasional argillic clay accumulations and intense bioturbation.
Interpretation: Buried Cambisol (Bw).
Stratigraphy: Below 94005 and 94006
Finds:-

Trench 95

Context 95001

Feature: Topsoil
Description: Layer of humic, dark-brownish, coarse silty sediment with occasional displaced artefacts.
Interpretation: Chernozem (Ap).
Stratigraphy: Above 95002
Finds:-

Context 95002

Feature: Topsoil
Description: Humic, dark-brownish, coarse silty sediment enriched with pedogenic carbonate. Intense bioturbation with occasional displaced artefacts.
Interpretation: Chernozem soil formation (Axh).
Stratigraphy: Below 95001, above 95003, 95004 and 95005
Finds: KE95001 (Plate 53, 1).

Context 95003

Feature: Dwelling 60
Description: Loosely packed brownish-yellow, coarse silty sediment with a few amorphous pieces of burnt daub less than 1 cm in diameter.
Interpretation: Unburnt interior of the former dwelling.
Stratigraphy: Identical to 95007 and 95012, below 95002, above 95011
Finds: KE95002 (Plate 53, 2), KE95003 (Plate 53, 3) and KE95004 (Plate 53, 4).

Context 95004

Feature: Dwelling 60
Description: Fragmented amorphous burnt daub over 10 cm in diameter.
Interpretation: Collapsed superstructure of the former dwelling.
Stratigraphy: Below 95002, above 95006 and 95008
Finds:-

Context 95005

Feature: Occupation layer
Description: Layer of brownish-yellow, coarse silty sediment with occasional horizontally oriented pottery artefacts.
Interpretation: Former Trypillia occupation layer.
Stratigraphy: Identical to 95010, below 95002, above 95016
Finds: F95029-oID15 (Plate 53, 5).

Context 95006

Feature: Dwelling 60
Description: Fragmented and flattened burnt daub over 10 cm in diameter.
Interpretation: Former platform (ploshchadka) of the dwelling.
Stratigraphy: Identical to 95009 and 95014, contemporary to 95003, 95007 and 95012, below 95004, above 95011 and 95015
Finds:-

Context 95007

Feature: Dwelling 60
Description: Compact greyish, coarse silty sediment with a few amorphous pieces of burnt daub less than 1 cm in diameter.
Interpretation: Unburnt interior of the former dwelling.
Stratigraphy: Identical to 95003 and 95012, above 95011
Finds: F95035-oID31 (Plate 53, 7) and F95036-oID17 (Plate 53, 8).

Context 95008

Feature: Dwelling 60
Description: Light yellowish and highly fragmented burnt daub between 110 cm in diameter with a flattened upper surface and an amorphous lower surface.
Interpretation: Burnt surface and potential origin of the dwelling's conflagration.
Stratigraphy: Identical to 95013, below 95003, above 95011
Finds:-

Context 95009

Feature: Dwelling 60
Description: Fragmented burnt daub, mineral-tempered with sizes of over 10 cm and a flattened upper surface.
Interpretation: Former platform (ploshchadka) of the dwelling.
Stratigraphy: Identical to 95006 and 95014, below 95004, above 95011
Finds:-

Context 95010

Feature: Occupation layer
Description: Layer of compact brownish, coarse silty sediment with a few amorphous pieces of burnt daub less than 1 cm in diameter.
Interpretation: Former Trypillia occupation layer.
Stratigraphy: Identical to 95005, below 95002, above 95016
Finds:-

Context 95011

Feature: Dwelling 60
Description: Compact brownish-yellow layer of coarse silty sediment with a few amorphous pieces of burnt daub between 110 cm in diameter.
Interpretation: Ground floor of the former dwelling.
Stratigraphy: Identical to 95015, below 95012, 95013 and 95014
Finds:-

Context 95012

Feature: Dwelling 60
Description: Very compact greyish, coarse silty sediment with a few amorphous pieces of burnt daub less than 1 cm in diameter.
Interpretation: Unburnt interior of the former dwelling.
Stratigraphy: Identical to 95003 and 95007, above 95011
Finds:-

Context 95013

Feature: Dwelling 60
Description: Light yellowish and highly fragmented burnt daub between 110 cm in diameter with a flattened upper surface and an amorphous lower surface.
Interpretation: Burnt surface and potential origin of the dwelling's conflagration.
Stratigraphy: Identical to 95008, below 95003, above 95011
Finds:-

Context 95014

Feature: Dwelling 60
Description: Fragmented burnt daub, mineral-tempered with sizes of over 10 cm and a flattened upper surface.
Interpretation: Former platform (ploshchadka) of the dwelling.
Stratigraphy: Identical to 95006 and 95009, below 95004, above 95011
Finds:-

Context 95015

Feature: Dwelling 60
Description: Compact brownish-yellow layer of coarse silty sediment with a few amorphous pieces of burnt daub between 110 cm in diameter.
Interpretation: Ground floor of the former dwelling.
Stratigraphy: Identical to 95011, below 95012, 95013 and 95014
Finds:-

Context 95016

Feature: Geological layer
Description: Layer of brownish-yellow, coarse silty soil with occasional argillic clay accumulations and intense bioturbation.
Interpretation: Buried Cambisol (Bw).
Stratigraphy: Below 95010, 95011 and 95015
Finds:-

Trench 96

Context 96001

Feature: Topsoil
Description: Layer of humic, dark-brownish, coarse silty soil with occasional displaced artefacts.
Interpretation: Chernozem (Ap).
Stratigraphy: Above 96002, 96004, 96005 and 96008
Finds:-

Context 96002

Feature: Dwelling 61
Description: Greyish-brown, coarse silty sediment with a few amorphous pieces of burnt daub less than 1 cm in diameter.
Interpretation: Less burnt collapsed superstructure of the former dwelling.
Stratigraphy: Identical to 96011, contemporary to 96004 and 96005
Finds: KE96001 (Plate 54, 1), KE96002 (Plate 54, 2), KE96007 (Plate 54, 3), KE96004 (Plate 55, 1), KE96007 (Plate 56, 1), KE96009 (Plate 56, 3), KE96010 (Plate 56, 4), KE96012 (Plate 56, 6).

Context 96003

Feature: Dwelling 61
Description: Fragmented burnt daub over 10 cm in size. Upper part with amorphous daub tempered with chaff, lower part with flattened daub and mineral temper.
Interpretation: Collapsed superstructure and platform (ploshchadka) of the former dwelling (not distinguished).
Stratigraphy: Contemporary to 96009 and 96010, below 96002 and 96011
Finds: KE96005 (Plate 55, 2), KE96006 (Plate 55, 3).

Context 96004

Feature: Dwelling 61
Description: Brownish, coarse silty sediment with inclusions of amorphous burnt daub less than 1 cm in diameter.
Interpretation: Less burnt collapsed superstructure of the former dwelling.
Stratigraphy: Contemporary to 96002 and 96005, below 96001, above 96003
Finds:-

Context 96005

Feature: Dwelling 61
Description: Greyish-brown, coarse silty sediment with a few amorphous pieces of burnt daub less than 1 cm in diameter.
Interpretation: Less burnt collapsed superstructure of the former dwelling.
Stratigraphy: Contemporary to 96002 and 96004, below 96001, above 96003
Finds:-

Context 96006

Feature: Dwelling 62
Description: Fragmented burnt daub over 10 cm in diameter. Upper part with amorphous daub tempered with chaff, lower part with flattened daub and mineral temper.
Interpretation: Collapsed superstructure and platform (ploshchadka) of the former dwelling (not distinguished).
Stratigraphy: Identical to 96013, contemporary to 96007, below 96001, above 96014
Finds:-

Context 96007

Feature: Dwelling 62
Description: Greyish-brown, coarse silty sediment with a few amorphous pieces of burnt daub between 110 cm in diameter.
Interpretation: Less burnt collapsed superstructure of the former dwelling.
Stratigraphy: Contemporary to 96006 and 96013, below 96001, above 96014
Finds:-

Context 96008

Feature: Occupation layer
Description: Layer of brownish-yellow, coarse silty sediment with a few amorphous pieces of burnt daub between 110 cm in diameter.
Interpretation: Former Trypillia occupation layer. Alley between dwelling 61 and 62.
Stratigraphy: Below 96001, above 96015
Finds:-

Context 96009

Feature: Dwelling 61
Description: Elongated concentration of fragmented burnt daub over 10 cm in diameter parallel to the former building.
Interpretation: Collapsed superstructure and outer boundary of the former dwelling.
Stratigraphy: Contemporary to 96003, below 96001, above 96015
Finds:-

Context 96010

Feature: Dwelling 61
Description: Greyish-brown, coarse silty sediment with a few amorphous pieces of burnt daub less than 1 cm in diameter.
Interpretation: Less burnt interior of the former dwelling.
Stratigraphy: Identical to 96005, contemporary to 96003 and 96009, below 96001, above 960015
Finds:-

Context 96011

Feature: Dwelling 61
Description: Greyish-brown, coarse silty sediment with a few amorphous pieces of burnt daub less than 1 cm in diameter.
Interpretation: Less burnt collapsed superstructure of the former dwelling.
Stratigraphy: Identical to 96002, above 96003
Finds:-

Context 96012

Context number unused.

Context 96013

Feature: Dwelling 62
Description: Fragmented burnt daub over 10 cm in diameter. Upper part with amorphous daub tempered with chaff, lower part with flattened daub and mineral temper.
Interpretation: Collapsed superstructure and platform (ploshchadka) of the former dwelling (not distinguished).
Stratigraphy: Identical to 96006, contemporary to 96007, below 96001, above 96014
Finds: KE96004 (Plate 55, 1), KE96006 (Plate 55, 3), KE96007 (Plate 56, 1).

Context 96014

Feature: Dwelling 62
Description: Compact brownish-yellow layer of coarse silty sediment with a few amorphous pieces of burnt daub between 110 cm in diameter.
Interpretation: Ground floor of the former dwelling.
Stratigraphy: Below 96006, 96007, and 960013, above 96015
Finds:-

Context 96015

Feature: Dwelling 61
Description: Compact brownish-yellow layer of coarse silty sediment with a few amorphous pieces of burnt daub between 110 cm in diameter.
Interpretation: Ground floor of the former building.
Stratigraphy: Below 96003, 96009 and 96010
Finds: KE96008 (Plate 56, 2), KE96011 (Plate 56, 5).

Trench 100

Context 100001

Feature: Topsoil
Description: Layer of humic, dark-brownish, coarse silty soil with occasional displaced artefacts.
Interpretation: Chernozem (Ap).
Stratigraphy: Above 100002
Finds:-

Context 100002

Feature: Topsoil
Description: Humic, greyish, coarse silty soil enriched with pedogenic carbonate. Intense bioturbation with occasional displaced artefacts.
Interpretation: Chernozem (Axh).
Stratigraphy: Below 100001, above 100003, 100004 and 100005.
Finds:-

Context 100003

Feature: Dwelling 63
Description: Greyish-brown, coarse silty sediment with a few amorphous pieces of burnt daub less than 1 cm in diameter.
Interpretation: Less burnt interior of the former dwelling.
Stratigraphy: Contemporary to 100004 and 100005, below 100002
Finds: KE100001 (Plate 57, 1) and KE100002 (Plate 57, 2).

Context 100004

Feature: Dwelling 63
Description: Concentration of fragmented and amorphous burnt daub over 10 cm in diameter in the southern central part of the trench.
Interpretation: Collapsed superstructure of the former dwelling.
Stratigraphy: Identical to 100005, contemporary to 100003, below 100002
Finds:-

Context 100005

Feature: Dwelling 63
Description: Concentration of fragmented and amorphous burnt daub between 1-10 cm in diameter in the eastern part of the trench.
Interpretation: Collapsed superstructure of the former dwelling.
Stratigraphy: Identical to 100004, contemporary to 100003, below 100002
Finds:-

Trench 101

Context 101001

Feature: Topsoil
Description: Layer of humic, dark-brownish, coarse silty soil with occasional displaced artefacts.
Interpretation: Chernozem (Ap).
Stratigraphy: Above 101002
Finds:-

Context 101002

Feature: Topsoil
Description: Humic, greyish, coarse silty soil enriched with pedogenic carbonate. Intense bioturbation with occasional displaced artefacts.
Interpretation: Chernozem (Axh).
Stratigraphy: Below 101001, above 101003, 101004 and 101005
Finds: KE101002 (Plate 57, 4).

Context 101003

Feature: Dweling 64
Description: Concentration of amorphous burnt daub over 10 cm in diameter.
Interpretation: Collapsed superstructure of the former dwelling.
Stratigraphy: Below 101002, 101004 and 101005
Finds: KE101004 (Plate 58, 1).

Context 101004

Feature: Dwelling 64
Description: Greyish, coarse silty soil with a few inclusions of amorphous burnt daub between 1-10 cm in diameter.
Interpretation: Soil development after the destruction of the former dwelling.
Stratigraphy: Identical to 101005, below 101002, above 101003.
Finds:-

Context 101005

Feature: Dwelling 64
Description: Greyish, coarse silty soil with a few inclusions of amorphous burnt daub between 1-10 cm in diameter.
Interpretation: Soil development after the destruction of the former dwelling.
Stratigraphy: Identical to 101004, below 101002, above 101003.

Finds: KE101003 (Plate 57, 5).

Context 101006

Context number unused.

Context 101007

Feature: Dwelling 64
Description: Fragmented burnt daub over 10 cm in diameter with mineral temper and a flattened upper surface.
Interpretation: Former platform (ploshchadka) of the dwelling.
Stratigraphy: Identical to 101008 and 101009, below 101003
Finds:-

Context 101008

Feature: Dwelling 64
Description: Fragmented burnt daub over 10 cm in diameter with mineral temper and a flattened upper surface.
Interpretation: Former platform (ploshchadka) of the dwelling.
Stratigraphy: Identical to 101007 and 101009, below 101003
Finds: KE101005 (Plate 58, 2).

Context 101009

Feature: Dwelling 64
Description: Fragmented burnt daub over 10 cm in diameter with mineral temper and a flattened upper surface.
Interpretation: Former platform (ploshchadka) of the dwelling.

Stratigraphy: Identical to 101007 and 101008, below 101003
Finds:-

Context 101010

Feature: Dwelling 64
Description: Loosely packed, greyish, coarse silty sediment with inclusions of amorphous burnt daub between 1-10 cm in diameter.
Interpretation: Less burnt interior of the former dwelling.
Stratigraphy: Contemporary to 101007, 101008 and 101009, below 101003
Finds:-

Context 101011

Feature: Dwelling 64
Description: Greyish-yellow, coarse silty sediment with few inclusions of amorphous burnt daub between 1-10 cm in diameter.
Interpretation: Former ground floor below the platform (ploshchadka) of the dwelling.
Stratigraphy: Below 101007, 101008, 101009 and 101010
Finds: KE101001 (Plate 57, 3).

Trench 102

No plana were recorded for this trench.

Context 102001

Feature: Topsoil
Description: Layer of humic, dark-brownish, coarse silty soil with occasionally displaced artefacts.
Interpretation: Chernozem (Ap).
Stratigraphy: Above 102002, 102003 and 102004
Finds:-

Context 102002

Feature: Dwelling 65
Description: Fragmented and amorphous burnt daub between 110 cm in diameter.
Interpretation: Collapsed superstructure of the former dwelling.
Stratigraphy: Identical to 94002, below 102001, above 102005
Finds:-

Context 102003

Feature: Dwelling 65
Description: Fragmented and amorphous burnt daub between 110 cm in diameter.
Interpretation: Collapsed superstructure of the former dwelling.
Stratigraphy: Below 102001, above 102005
Finds:-

Context 102004

Feature: Occupation layer
Description: Brownish-yellow, coarse silty sediment with a few amorphous pieces of burnt daub less than 1 cm in diameter.
Interpretation: Former Trypillia occupation layer.
Stratigraphy: Below 102001, above 102005
Finds:-

Context 102005

Feature: Geological layer
Description: Layer of brownish-yellow, coarse silty soil with occasional argillic clay accumulations and intense bioturbation.
Interpretation: Buried Cambisol (Bw).
Stratigraphy: Below 102002, 102003 and 102004
Finds:-

Trench 103

Context 103001

Feature: Topsoil
Description: Layer of humic, dark-brownish, coarse silty soil with occasional displaced artefacts.
Interpretation: Chernozem (Ap).
Stratigraphy: Above 103002
Finds: KE103001 (Plate 58, 3).

Context 103002

Feature: Topsoil
Description: Humic, greyish, coarse silty soil enriched with pedogenic carbonate. Intense bioturbation with occasional displaced artefacts.
Interpretation: Chernozem (Axh).
Stratigraphy: Below 103001
Finds:-

Context 103003

Context number unused.

Context 103004

Feature: Dwelling 66
Description: Fragmented and amorphous burnt daub over 10 cm in diameter.
Interpretation: Collapsed superstructure of the former dwelling.
Stratigraphy: Below 103002, above 103005.
Finds:-

Context 103005

Feature: Geological layer
Description: Layer of brownish-yellow, coarse silty soil with occasional argillic clay accumulations and intense bioturbation.
Interpretation: Buried Cambisol (Bw).
Stratigraphy: Below 103004 and 103006
Finds:-

Context 103006

Feature: Dwelling 66
Description: Fragmented and amorphous burnt daub between 1-10 cm in diameter.
Interpretation: Less burnt collapsed superstructure of the former dwelling.
Stratigraphy: Contemporary to 103004, below 103002, above 103005.
Finds:-

Trench 110

Context 110001

Feature: Topsoil
Description: Layer of humic, dark-brownish, coarse silty soil with occasional displaced artefacts.
Interpretation: Chernozem (Ap).
Stratigraphy: Above 110002
Finds: KE110003 (Plate 83, 4), KE110004 (Plate 83, 5), KE110005 (Plate 83, 6), KE110006 (Plate 83, 7), KE110035 (Plate 81, 3).

Context 110002

Feature: Topsoil
Description: Humic, greyish, coarse silty soil enriched with pedogenic carbonate. Intense bioturbation with occasional displaced artefacts.
Interpretation: Chernozem (Axh).
Stratigraphy: Below 110001, above 110003, 110005, 110006, 110008, 110009, 110014, 110015, 110017, and 110018
Finds: KE110001 (Plate 82, 2), KE110002 (Plate 83, 2), KE110148 (Plate 75, 9), KE110150 (Plate 76, 2), KE110151 (Plate 76, 3).

Context 110003

Feature: Dwelling 67
Description: Compact greyish-yellow, coarse silty sediment with a few amorphous pieces of burnt daub between 110 cm in diameter located between elements of the collapsed superstructure of the building.
Interpretation: Layer after the abandonment of the dwelling.
Stratigraphy: Below 110002, above 110004
Finds: KE110021 (Plate 79, 1), KE110022 (Plate 79, 2), KE110023 (Plate 79, 3), KE110029 (Plate 80, 2).

Context 110004

Feature: Dwelling 67
Description: Loose layer with fragments of amorphous burnt daub over 10 cm in diameter and occasional artefacts.
Interpretation: Collapsed superstructure of the dwelling.
Stratigraphy: Below 110003, above 110012
Finds: KE110017 (Plate 77, 1), KE110018 (Plate 77, 2), KE110020 (Plate 78, 1), KE110024 (Plate 79, 4), KE110026 (Plate 79, 6), KE110031 (Plate 80, 4), KE110032 (Plate 80, 5), KE110033 (Plate 81, 1), KE110034 (Plate 81, 2).

Context 110005

Feature: Occupation layer
Description: Layer of compact brownish, coarse silty sediment with a few amorphous pieces of burnt daub between 1-10 cm in diameter.
Interpretation: Former Trypillia occupation layer.
Stratigraphy: Contemporary to 110006, below 110002, above 110010
Finds:-

Context 110006

Feature: Occupation layer
Description: Layer of compact brownish, coarse silty sediment with a few amorphous pieces of burnt daub between 1-10 cm in diameter.
Interpretation: Former Trypillia occupation layer in the southeastern part of the trench.
Stratigraphy: Contemporary to 110005, below 110002, above 110010
Finds:-

Context 110007

Feature: Child burial
Description: Well-preserved skeleton of an individual without grave goods 50 cm below the surface. The body was laid down in a supine extended position with the head to the west. *In situ* length: 50 cm.
Interpretation: Burial not connected to Trypillia. Probably a Christian burial related to the Holodomor.
Stratigraphy: Below 110003, above 110010
Finds:-

Context 110008

Feature: Occupation layer
Description: Layer of compact brownish, coarse silty sediment with a few amorphous pieces of burnt daub between 1-10 cm in diameter and several horizontally deposited artefacts.
Interpretation: Former Trypillia occupation layer around the dwelling.
Stratigraphy: Below 110003, above 110010
Finds: KE110007 (Plate 82, 1), KE110010 (Plate 82, 4).

Context 110009

Feature: Ditch segment (West)
Description: Shallow and elongated trough-shaped pit 4 m wide and max. 1.5 m deep below the former occupational surface. Filled with compact greyish brown, coarse silty sediment. The lower 50 cm are filled with several pottery vessels mostly deposited bottom up, a broken quern probably related to the broken quern in context 110019, bones and a cattle horn as well as amorphous and flattened burnt daub over 10 cm in diameter.
Interpretation: Ditch segment of the inner causewayed enclosure.
Stratigraphy: Contemporary to 110019 and 110016, below 110002, above 110010
Finds: KE110066 (Plate 63, 2), KE110067 (Plate 63, 3), KE110068 (Plate 64, 1), KE110069 (Plate 64, 2), KE110070 (Plate 64, 3), KE110071 (Plate 64, 4), KE110072 (Plate 64, 5), KE110073 (Plate 64, 6), KE110074 (Plate 64, 7), KE110075 (Plate 65, 1), KE110076 (Plate 65, 2), KE110077 (Plate 65, 3), KE110078 (Plate 65, 4), KE110079 (Plate 65, 5), KE110080 (Plate 65, 6), KE110081 (Plate 66, 1), KE110082 (Plate 66, 2), KE110083 (Plate 66, 3), KE110084 (Plate 66, 4), KE110085 (Plate 66, 5), KE110086 (Plate 66, 6), KE110087 (Plate 67, 1), KE110088 (Plate 67, 2), KE110089 (Plate 67, 3), KE110090 (Plate 67, 4), KE110091 (Plate 67, 5), KE110092 (Plate 68, 1), KE110093 (Plate 68, 2), KE110094 (Plate 68, 3), KE110095 (Plate 68, 4), KE110096 (Plate 68, 5), KE110097 (Plate 68, 1), KE110098 (Plate 69, 2), KE110099 (Plate 69, 3), KE110100 (Plate 69, 4), KE110101 (Plate 69, 5), KE110102 (Plate 70, 1), KE110103 (Plate 70, 2), KE110104 (Plate 70, 3), KE110105 (Plate 70, 4), KE110106 (Plate 70, 5), KE110107 (Plate 70, 6), KE110108 (Plate 71, 1), KE110109 (Plate 71, 2), KE110110 (Plate 71, 4), KE110111 (Plate 71, 5), KE110112 (Plate 71, 6), KE110113 (Plate 71, 7), KE110114 (Plate 71, 8), KE110115 (Plate 72, 1), KE110116 (Plate 72, 2), KE110117 (Plate 72, 3), KE110118 (Plate 72, 4), KE110119 (Plate 72, 5), KE110120 (Plate 72, 6), KE110121 (Plate 72, 7), KE110122 (Plate 72, 8), KE110123 (Plate 72, 9), KE110124 (Plate 73, 1), KE110125 (Plate 73, 2), KE110126 (Plate 73, 3), KE110127 (Plate 73, 4), KE110128 (Plate 73, 5), KE110129 (Plate 73, 6), KE110130 (Plate 73, 7), KE110131 (Plate 74, 1), KE110132 (Plate 74, 2), KE110133 (Plate 74, 3), KE110034 (Plate 74, 4), KE110135 (Plate 74, 5), KE110136 (Plate 74, 6), KE110137 (Plate 74, 7), KE110138 (Plate 74, 8), KE110139 (Plate 74, 9), KE110140 (Plate 74, 10), KE110141 (Plate 75, 1), KE110142 (Plate 75, 2), KE110143 (Plate 75, 3), KE110144 (Plate 75, 4), KE110145 (Plate 75, 6), KE110146 (Plate 75, 7), KE110147 (Plate 75, 8), KE110149 (Plate 76, 1), KE110152 (Plate 75, 5).

Context 110010

Feature: Geological layer
Description: Layer of brownish-yellow, coarse silty soil with occasional argillic clay accumulations and intense bioturbation.
Interpretation: Buried Cambisol (Bw).
Stratigraphy: Below 110005, 110006, 110007, 110008, 110009, 110011, 110013, 110014, 110015, 110016, 110017, 110018, 110019 and 110020
Finds: KE110008 (Plate 82, 2), KE110011 (Plate 82, 5), KE110012 (Plate 82, 6), KE110014 (Plate 82, 8).

Context 110011

Feature: Ditch segment (east)
Description: Rounded elongated pit 1.5 m wide and max. 50 cm deep from the former occupational surface. Filled with loose greyish, coarse silty sediment and chaotically distributed amorphous burnt daub between 1-10 cm in diameter.
Interpretation: Ditch segment of the inner causewayed enclosure.
Stratigraphy: Identical to 110016, below 110020, above 110010
Finds: KE110036 (Plate 59, 1), KE110040 (Plate 59, 5), KE110047 (Plate 60, 5), KE110056 (Plate 61, 2), KE110058 (Plate 61, 4), KE110065 (Plate 62, 4).

Context 110012

Feature: Dwelling 67
Description: Highly fragmented burnt daub between 1-10 cm in diameter and with mineral temper. The daub has a flattened upper surface.
Interpretation: Former platform (ploshchadka) of the dwelling.
Stratigraphy: Below 110004, above 110013
Finds:-

Context 110013

Feature: Dwelling 67
Description: Brownish, coarse silty sediment with a few amorphous pieces of burnt daub between 110 cm in diameter and several pottery artefacts.
Interpretation: Ground floor of the former dwelling.
Stratigraphy: Below 110004 and 110012, above 110010
Finds: KE110019 (Plate 77, 3), KE110025 (Plate 79, 5), KE110027 (Plate 79, 7), KE110028 (Plate 80, 1), KE110030 (Plate 80, 3).

Context 110014

Feature: Occupation layer
Description: Layer of compact brownish, coarse silty sediment with a few amorphous pieces of burnt daub between 1-10 cm in diameter.
Interpretation: Former Trypillia occupation layer in the central part of the trench.
Stratigraphy: Below 110002, above 110010
Finds: KE110009 (Plate 82, 3), KE110013 (Plate 82, 7), KE110015 (Plate 82, 9), KE110016 (Plate 82, 10).

Context 110015

Feature: Occupation layer
Description: Layer of compact brownish, coarse silty sediment with a few amorphous pieces of burnt daub between 1-10 cm in diameter.
Interpretation: Former Trypillia occupation layer in the western part of the trench.
Stratigraphy: Below 110002, above 110010
Finds:-

Context 110016

Feature: Ditch segment (central)
Description: Rounded, elongated pit 2 m wide and max. 1 m deep from the former occupational surface. Filled with an upper layer of brownish, coarse silty sediment mixed with lots of horizontally deposited amorphous and flattened burnt daub over 10 cm in diameter. In this upper layer, fragments of a sledge model and a zoomorphic figure were found as well as a fragment of a footed bowl, which was refitted with other fragments from the western ditch segment 110009. Below, a layer of brownish-yellow, coarse silty sediment mixed with occasional amorphous burnt daub less than 1 cm in diameter was found.
Interpretation: Ditch segment of the inner causewayed enclosure.
Stratigraphy: Identical to 110011, contemporary to 110009, below 110002, above 110010
Finds: KE110037 (Plate 59, 2), KE110038 (Plate 59, 3), KE110039 (Plate 59, 4), KE110041 (Plate 59, 6), KE110042 (Plate 59, 7), KE110043 (Plate 60, 1), KE110044 (Plate 60, 2), KE110045 (Plate 60, 3), KE110046 (Plate 60, 4), KE110048 (Plate 60, 6), KE110049 (Plate 60, 7), KE110050 (Plate 60, 8), KE110051 (Plate 60, 9), KE110052 (Plate 60, 10), KE110053 (Plate 60, 11), KE110054 (Plate 60, 12), KE110055 (Plate 61, 1), KE110057 (Plate 61, 3), KE110059 (Plate 61, 5), KE110060 (Plate 61, 6), KE110061 (Plate 61, 7), KE110062 (Plate 62, 1), KE110063 (Plate 62, 2), KE110064 (Plate 62, 3), KE110091 (Plate 67, 5).

Context 110017

Feature: Occupation layer
Description: Concentration of amorphous burnt daub between 1-10 cm in diameter.
Interpretation: Debris from settlement activity.
Stratigraphy: Identical to 110018, contemporary to 110014, below 110002, above 110010
Finds:-

Context 110018

Feature: Occupation layer
Description: Concentration of amorphous burnt daub between 1-10 cm in diameter.
Interpretation: Debris from settlement activity.
Stratigraphy: Identical to 110017, contemporary to 110014, below 110002, above 110010
Finds:-

Context 110019

Feature: Ditch segment (west)
Description: Artefact concentration of a broken quern stone and coarse ware pottery on the edge of the western elongated pit. This concentration is located close to the gap between the western and the eastern ditch segment.
Interpretation: Part of the causewayed enclosure marking an entrance to the settlement.
Stratigraphy: Contemporary to 110009, below 110002, above 110010
Finds:-

Context 110020

Feature: Pit
Description: Rounded pit 3 m wide and max. 70 cm deep from the former occupational surface. Filled with compact greyish-brown, coarse silty sediment mixed with occasional amorphous pieces of burnt daub 1-10 cm in diameter. At the bottom of the pit a broken stone, pottery and horizontally deposited pieces of painted burnt daub were observed. The pit clearly cuts the eastern ditch segment 110011.
Interpretation: Clay extraction pit for the dwelling in the north.
Stratigraphy: Above 110011, below 110002
Finds:-

Appendix

Supplementary material can be downloaded under the following url:
http://www.jma.uni-kiel.de/en/research-projects/data-exchange-platform/maidanetske-phd-rene-ohlrau

Appendix 1

Trypillia settlements with known size modified after Shukurov and Videyko (2017).

Appendix 2

Inventories of dwellings and economic buildings excavated by the Trypillia Complex Expedition at Maidanets'ke I.

Appendix 3

List of wooden imprints per quadrant, their character and metrics at trench 92.

Appendix 4

List of the amount of pottery in weight per quadrant at trench 92.

Appendix 5

List of vitrified daub and pottery in weight per quadrant at trench 92.

Appendix 6

List of the percentage of burnt pottery in relation to the total amount of pottery in weight per quadrant at trench 92. See appendix 4.

Appendix 7

List of technological traits from pottery at trench 110.

Appendix 8

List of temper size and type from pottery at trench 110.

Appendix 9

Contingency table for the correspondence analysis of taphonomical pottery traits from the 2014 and 2016 excavations.

Appendix 10

Contingency table for the correspondence analysis of morphological pottery traits from the 2014 and 2016 excavations.

Appendix 11

Contingency table for the correspondence analysis of decoration on pottery from the 2014 and 2016 excavations.

Appendix 12

Oxcal codes for Bayesian modelling of radiocarbon dates from trenches 50, 51 and 52, 60, 79, 80, 92, and 110.

Appendix 13

List for modelling the number of coeval dwellings per five-year steps at Maidanets'ke according to radiocarbon probability distributions.

Plates

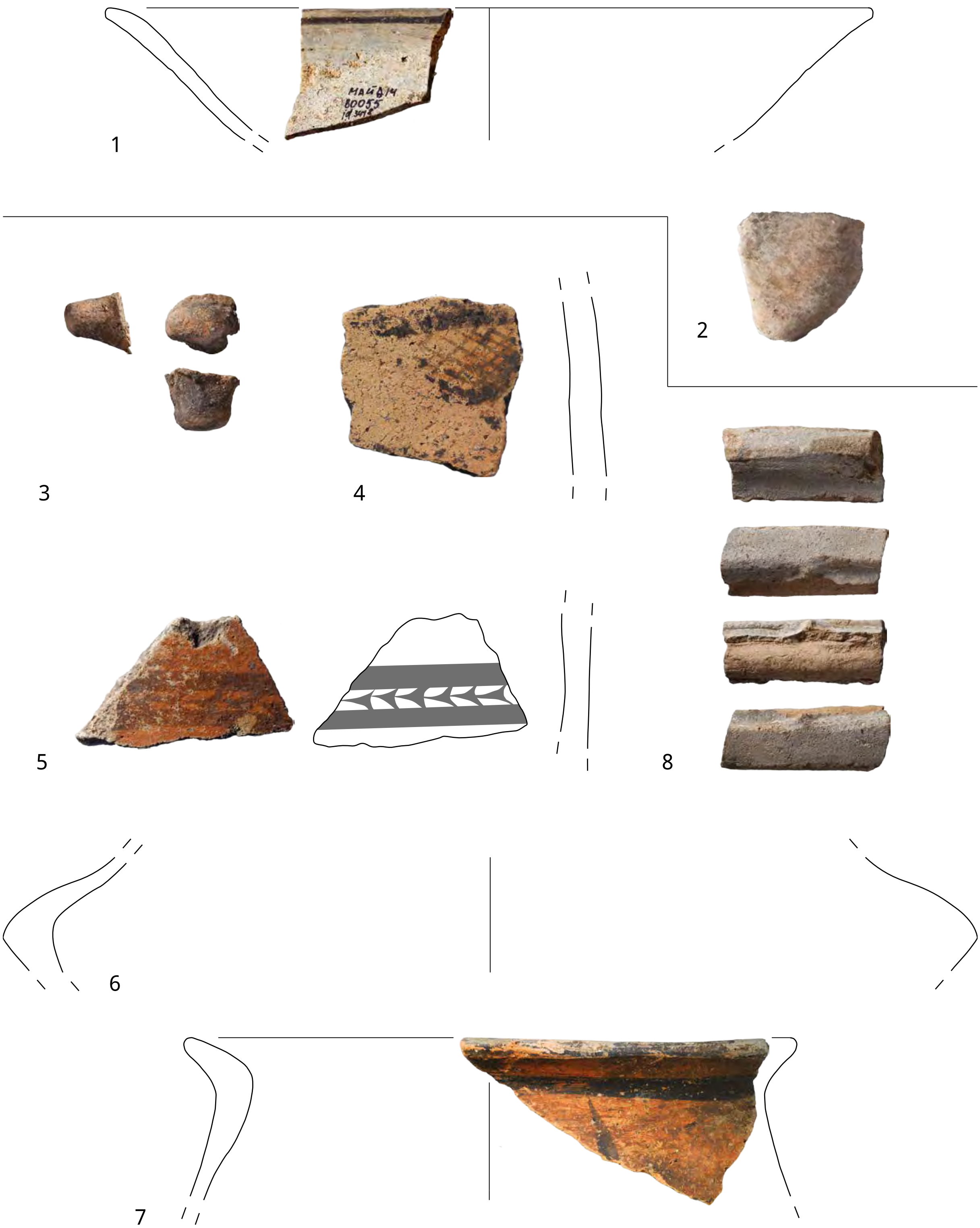

Plate 1. Trench 80. 1 F80055 Scale 1:2 (topsoil); 2 F80001 Scale 1:2 (topsoil); 3 KE80027 Scale 1:2 (context 80003); 4 KE80028 Scale 1:1 (context 80003); 5 KE80029 Scale 1:1 (context 80003); 6 F80142 Scale 1:2 (context 80003); 7 KE80030 Scale 1:2 (context 80003); 8 KE80032 Scale 1:2 (context 80003).

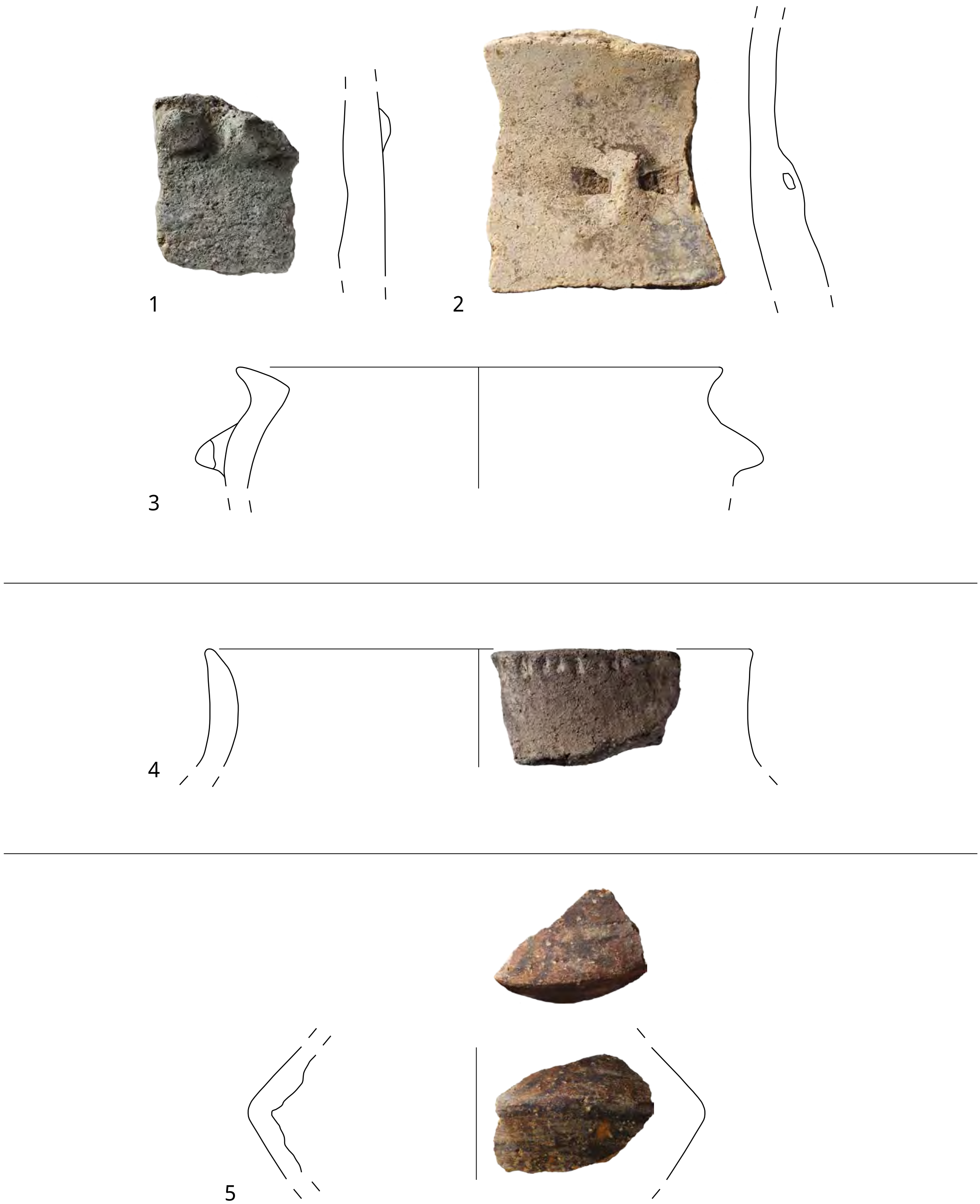

Plate 2. Trench 80. 1 KE80033 Scale 1:1 (context 80003); 2 KE80034 Scale 1:1 (context 80003); 3 KE80035 Scale 1:2 (context 80003); 4 KE80036 Scale 1:2 (context 80017); 5 KE80037 Scale 1:2 (context 80025).

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Plate 3. Trench 80. 1 KE80001 Scale 1:3 (contexts 80036, 80041, and 800028).

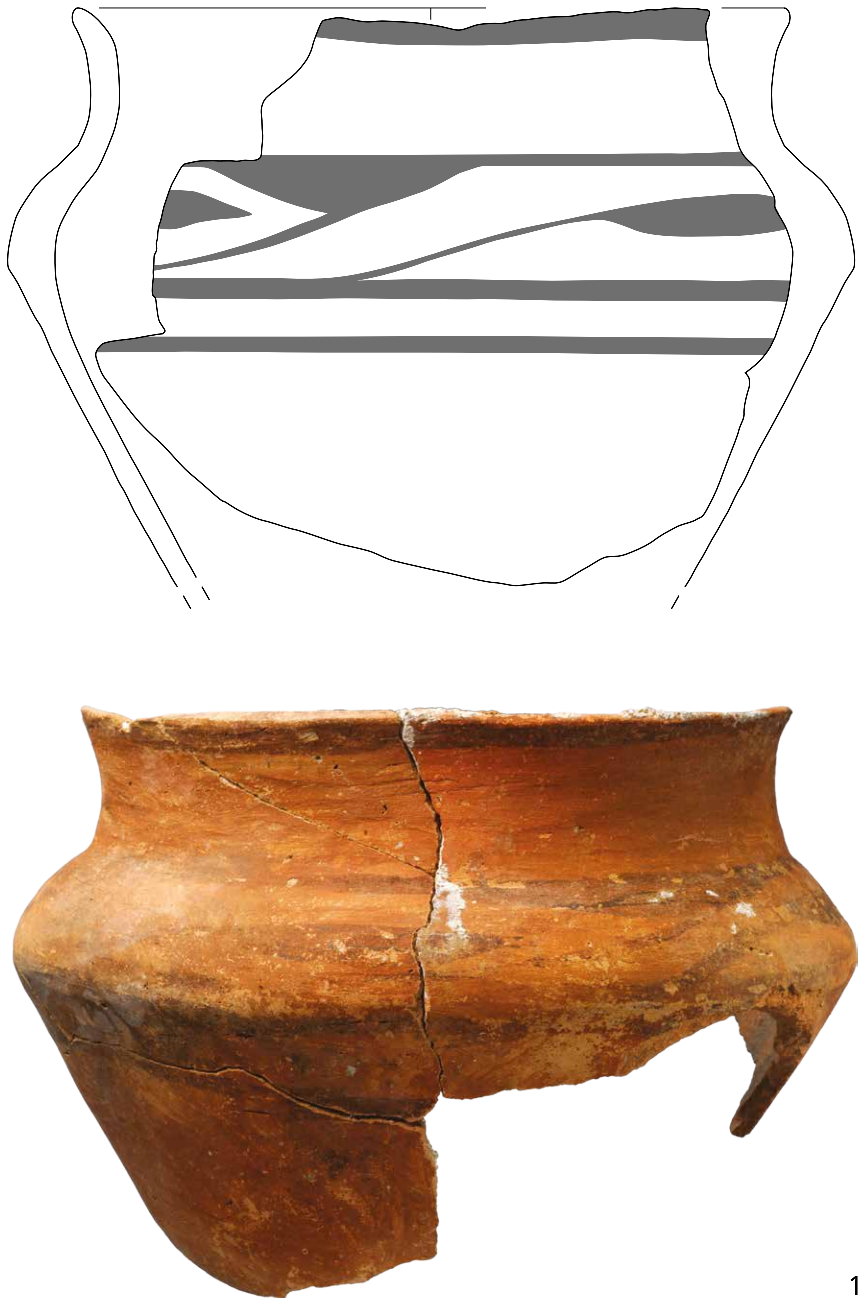

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Plate 4. Trench 80. 1 KE80002 Scale 1:2 (context 80041).

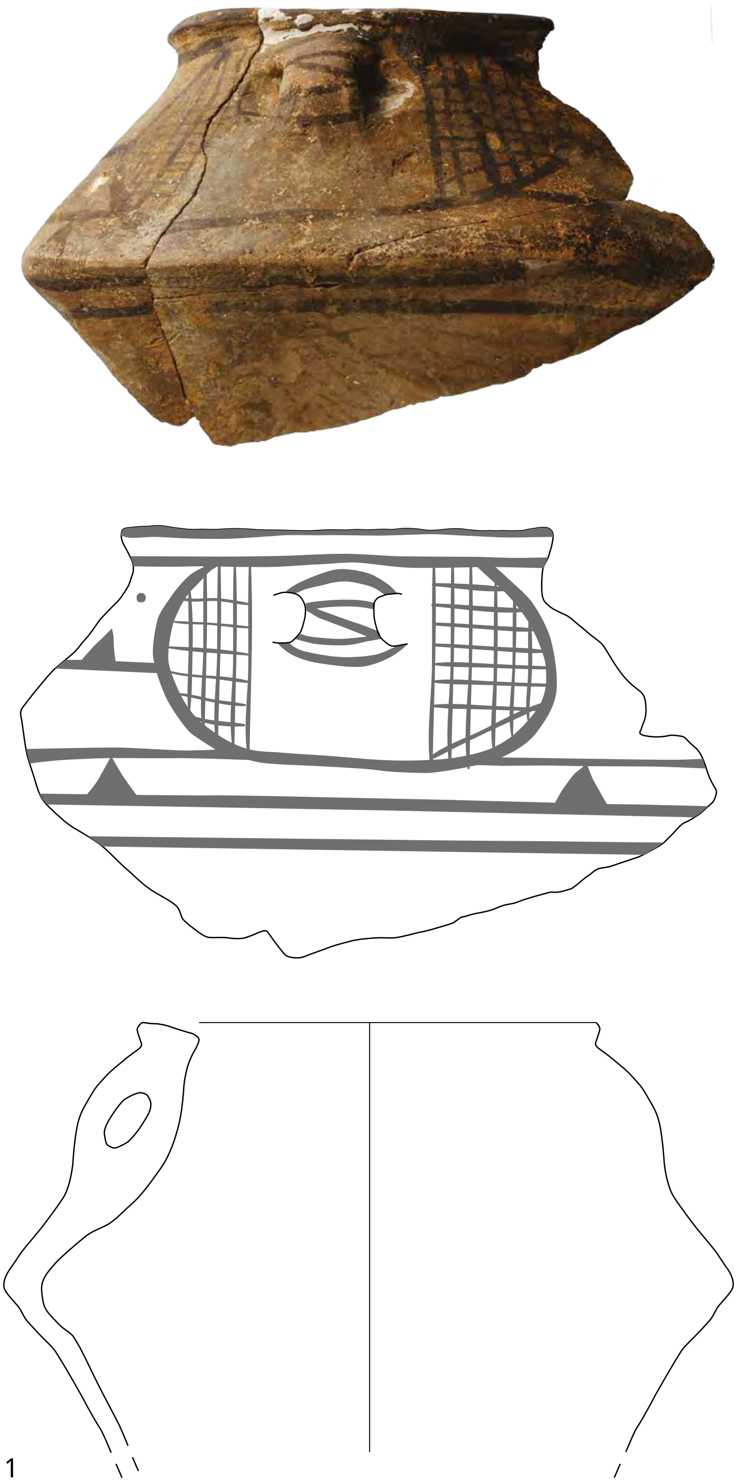

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Plate 5. Trench 80. 1 KE80003 Scale 1:2 (context 80041).

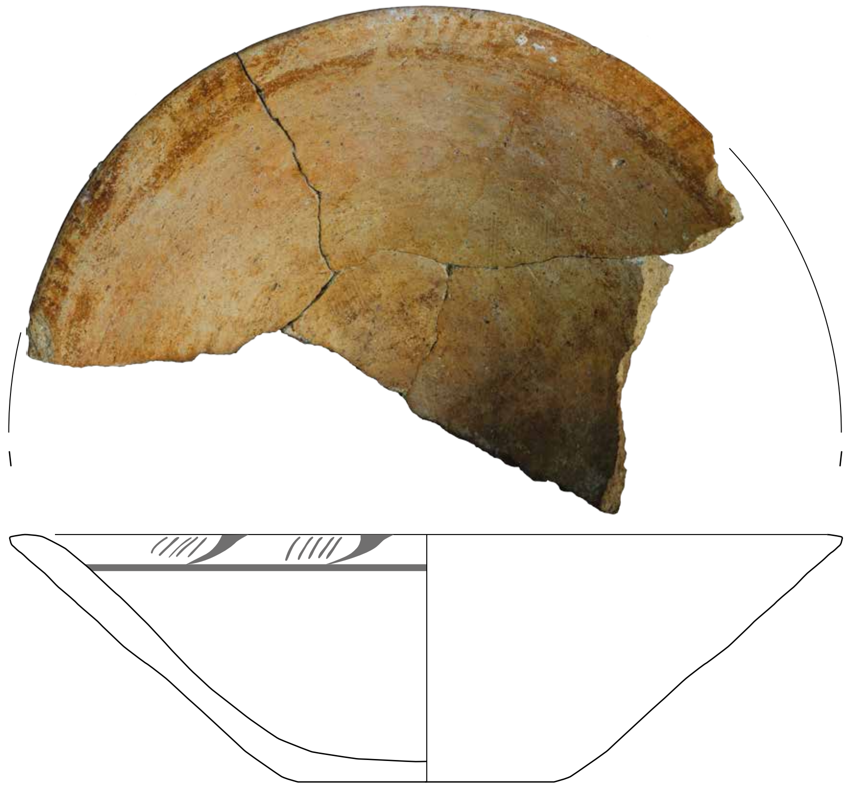

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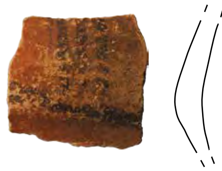
Plate 6. Trench 80. 1 KE80004 Scale 1:2 (context 80041); 2 KE80005 Scale 1:3 (context 80041); 3 KE80006 Scale 1:2 (context 80041).



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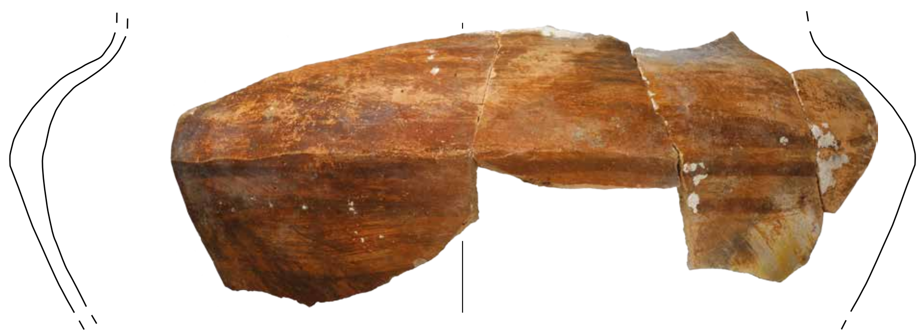

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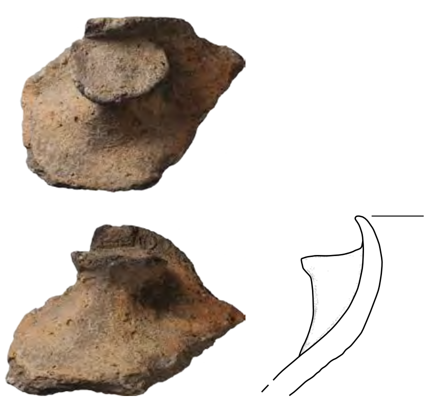

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Plate 7. Trench 80. 1 KE80007 Scale 1:2 (context 80041); 2 KE80008 Scale 1:2 (context 80041); 3 KE80009 Scale 1:3 (context 80041); 4 KE80010 Scale 1:3 (contexts 80037 and 80038); 5 KE80011 Scale 1:2 (contexts 80037 and 80038); 6 KE80013 Scale 1:2 (contexts 80037 and 80038).

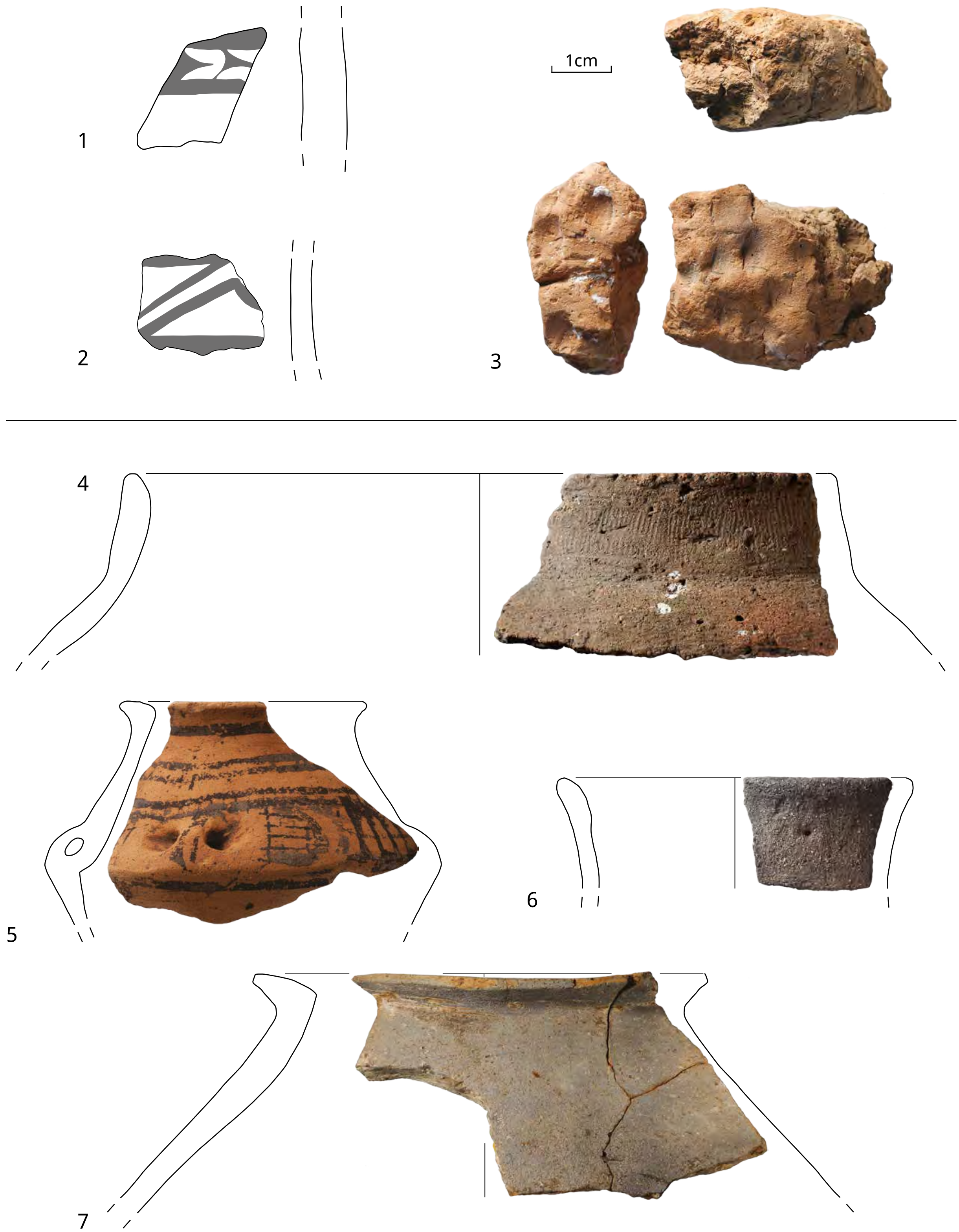

Plate 8. Trench 80. 1 F80938 ID 3076 Scale 1:1 (context 80038); 2 KE80012 Scale 1:2 (context 80038); 3 F80912 Scale 1:1 (context 80038); 4 KE80014 Scale 1:2 (context 80006); 5 KE80015 Scale 1:2 (context 80006); 6 KE80016 Scale 1:2 (context 80006); 7 KE80017 Scale 1:3 (context 80006).

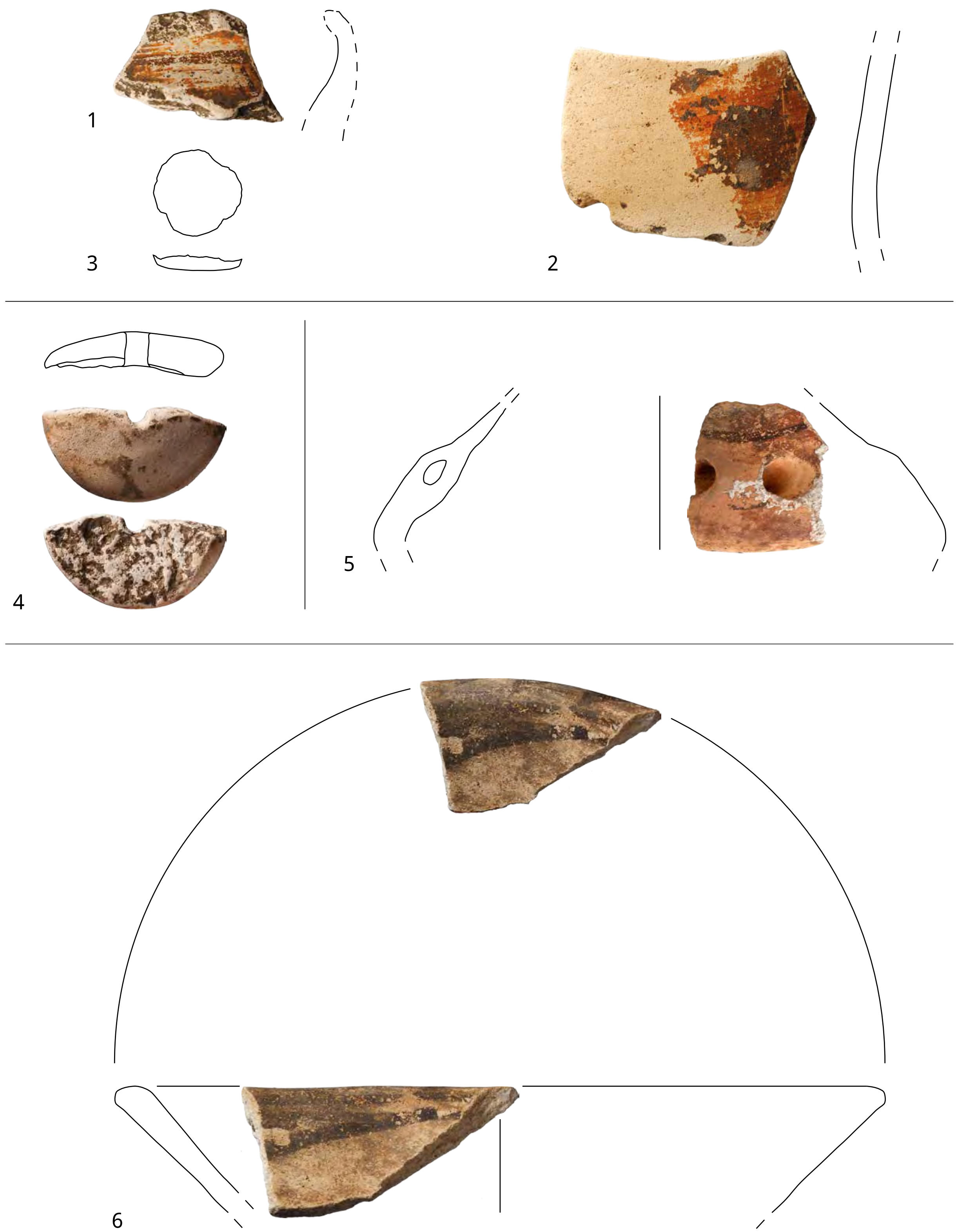

Plate 9. Trench 80. 1 KE80018 Scale 1:2 (context 80006); 2 KE80019 Scale 1:2 (context 80006); 3 KE80020 Scale 1:2 (context 80006); 4 KE80021 Scale 1:2 (context 80007); 5 KE80022 Scale 1:3 (context 80009); 6 KE80023 Scale 1:2 (context 80011).

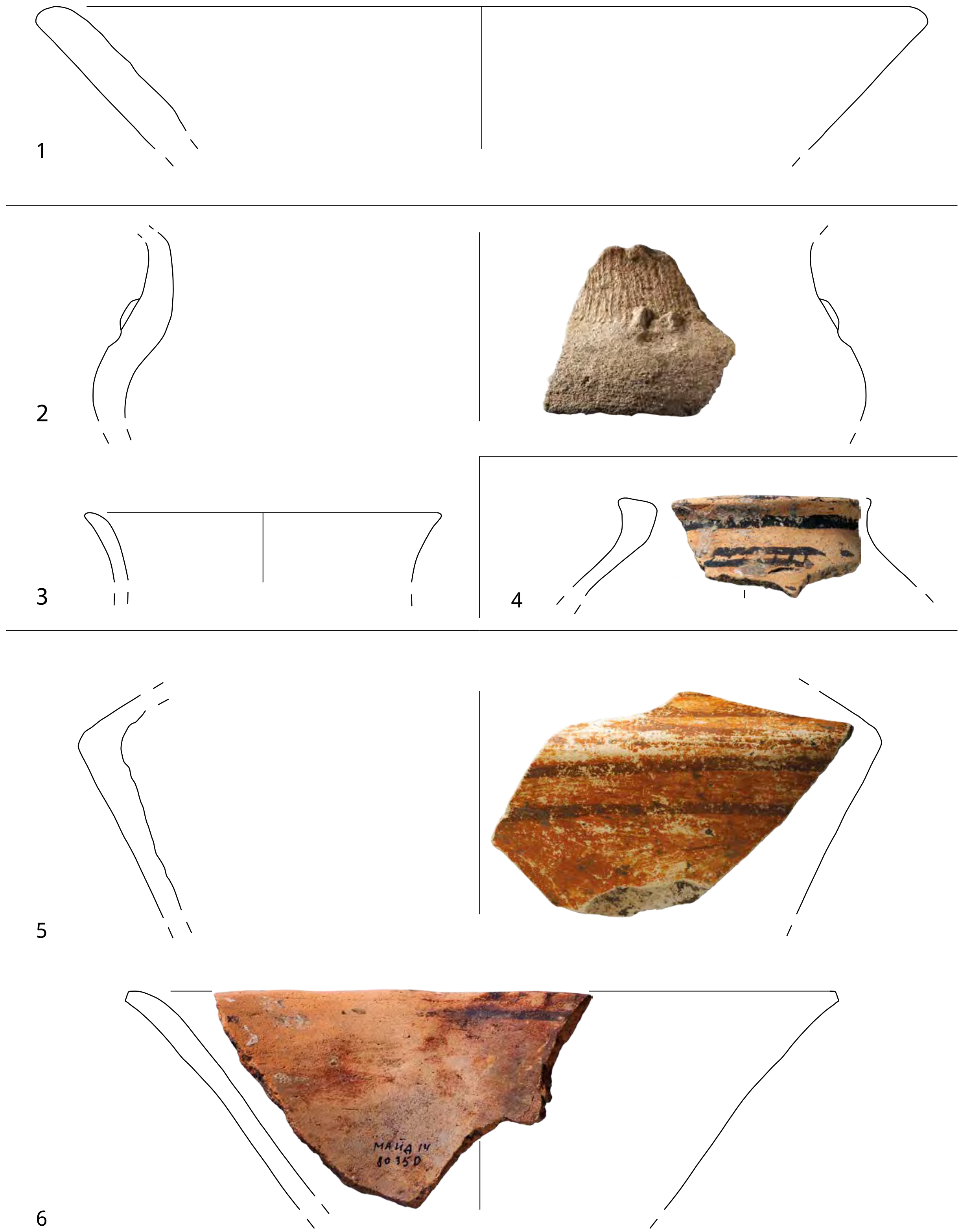

Plate 10. Trench 80. 1 KE80024 Scale 1:2 (context 80009); 2 KE80025 Scale 1:2 (context 80016); 3 KE80026 Scale 1:2 (context 80016); 4 KE80134 Scale 1:2 (context 80011); 5 KE80135 Scale 1:2 (context 80016); 6 KE80136 Scale 1:2 (context 80016).

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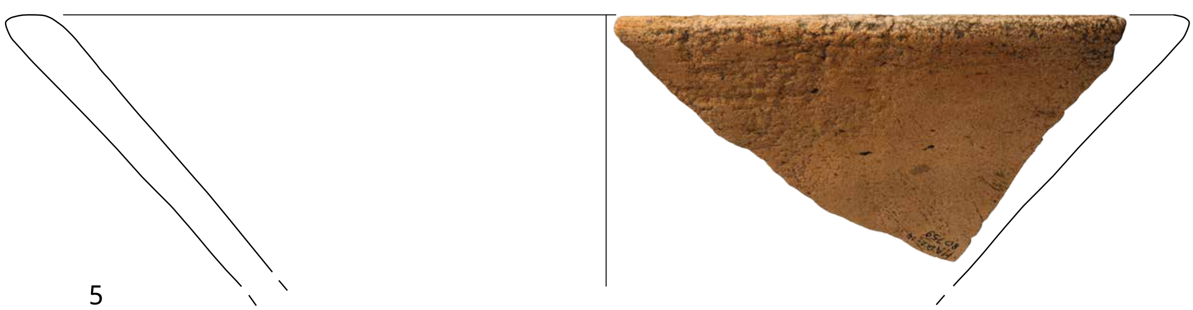

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Plate 11. Trench 80. 1 KE80137 Scale 1:2 (context 80016); 2 KE80138 Scale 1:2 (context 80016); 3 KE80139 Scale 1:2 (context 80016); 4 KE80140 Scale 1:2 (context 80016); 5 KE80038 Scale 1:3 (context 80014); 6 KE80039 Scale 1:2 (context 80040).

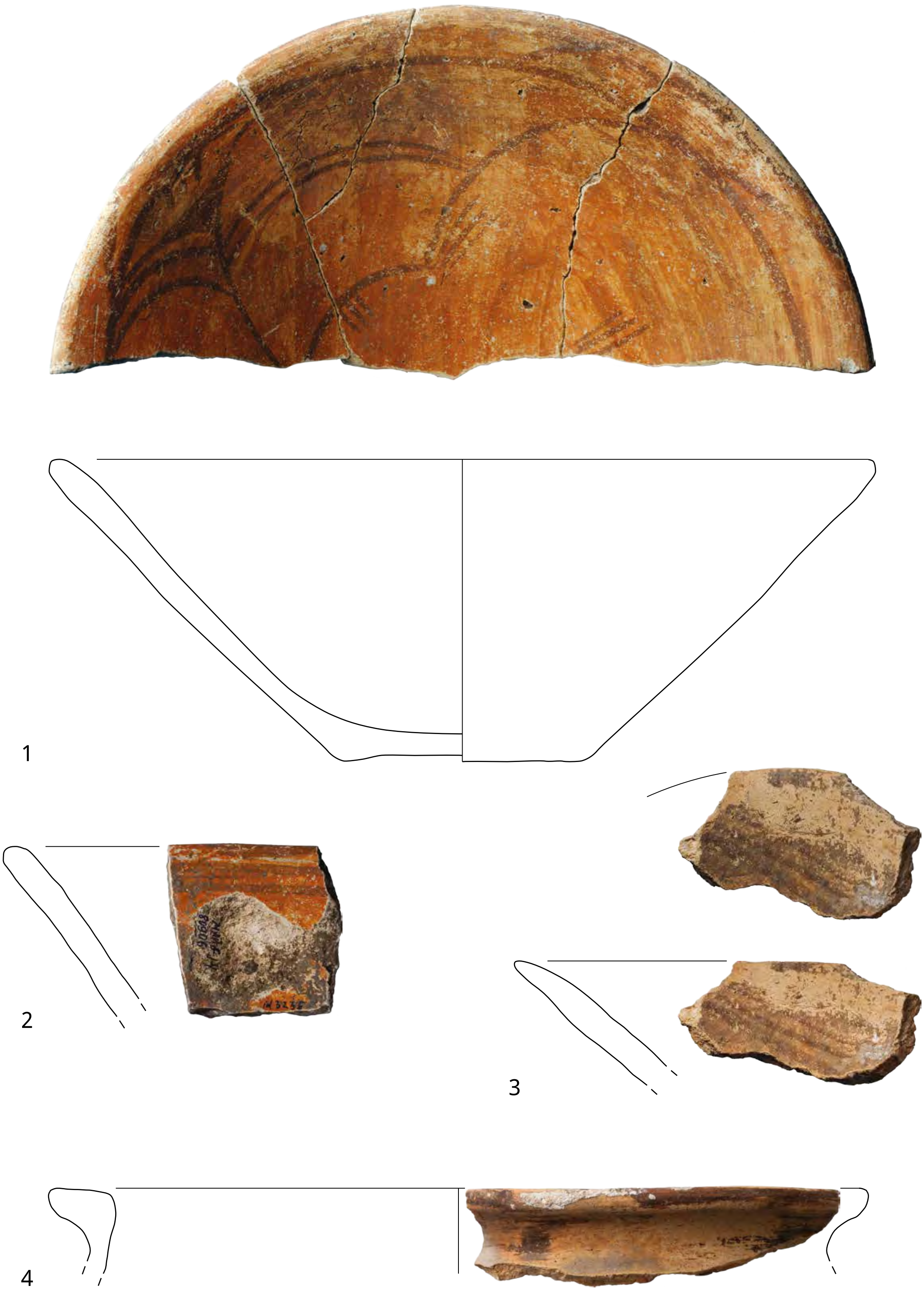

Plate 12. Trench 80. 1 KE80040 Scale 1:2 (context 80040); 2 KE80041 Scale 1:2 (context 80040); 3 KE80042 Scale 1:2 (context 80040); 4 KE80043 Scale 1:2 (context 80040).

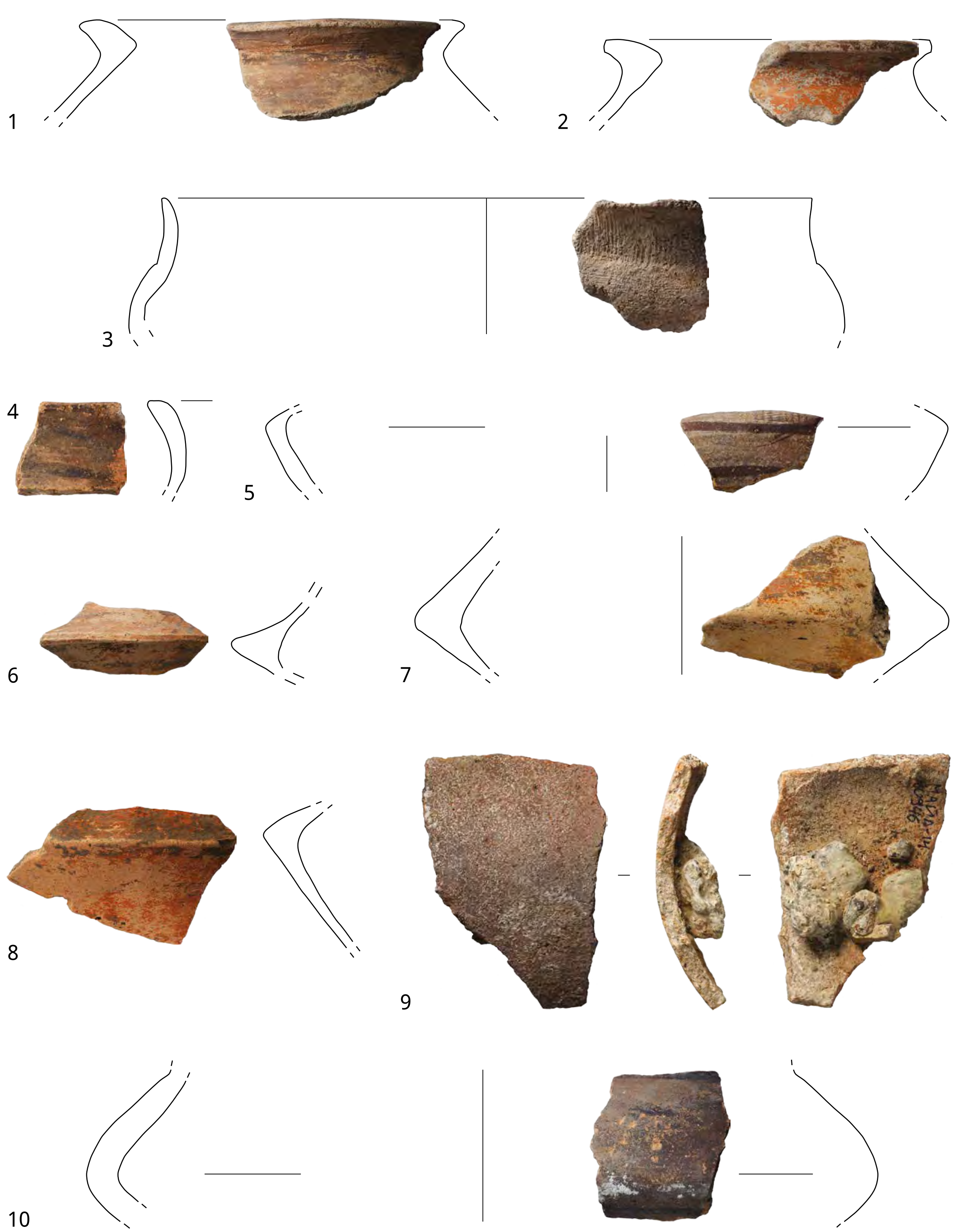

Plate 13. Trench 80. 1 KE80044 Scale 1:2 (context 80040); 2 KE80045 Scale 1:2 (context 80040); 3 KE80047 Scale 1:3 (context 80040); 4 KE80046 Scale 1:2 (context 80040); 5 KE80048 Scale 1:2 (context 80040); 6 KE80049 Scale 1:2 (context 80040); 7 KE80050 Scale 1:2 (context 80040); 8 KE80051 Scale 1:2 (context 80040); 9 KE80052 Scale 1:2 (context 80040); 10 KE80053 Scale 1:3 (context 80040).

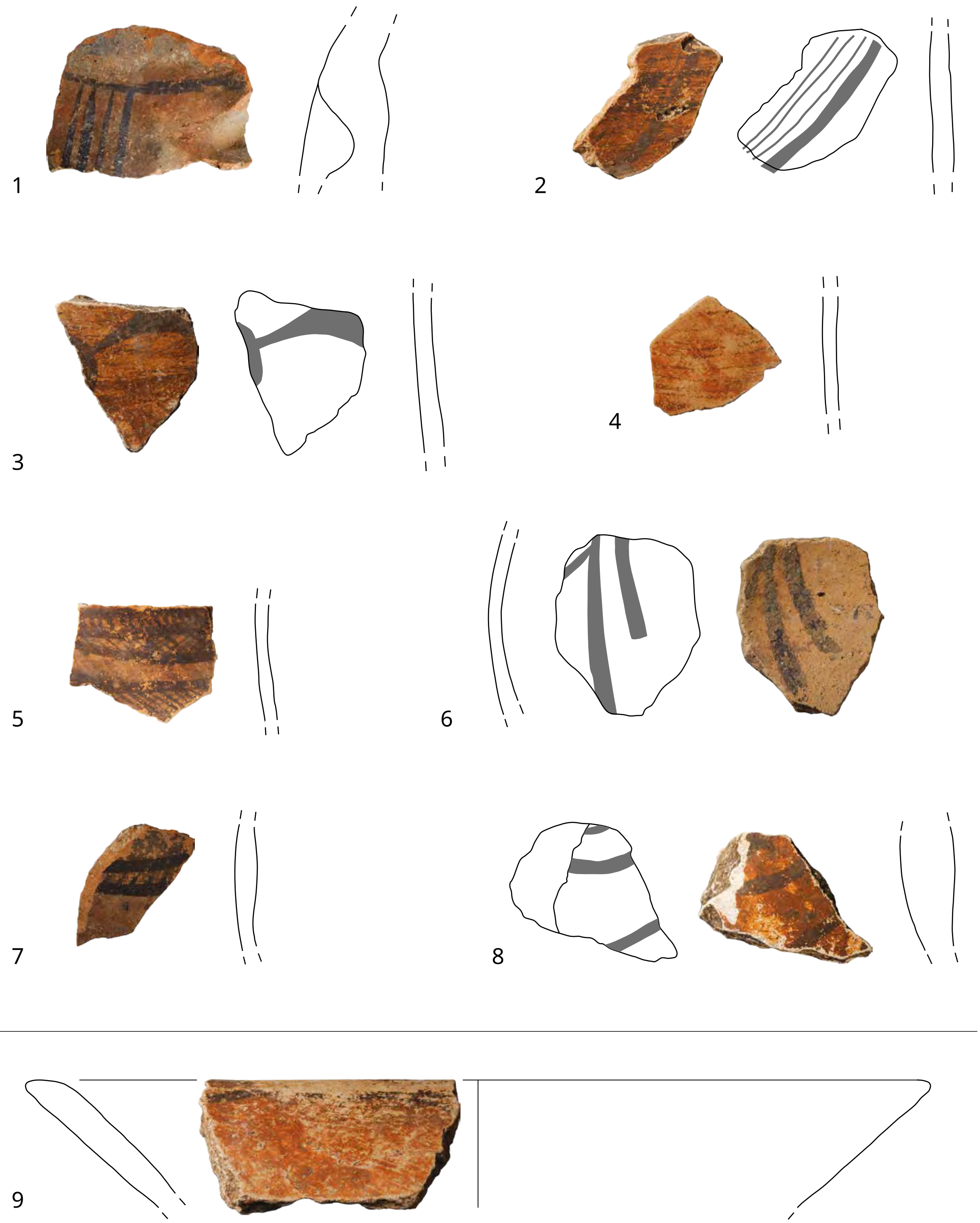

Plate 14. Trench 80. 1 KE80054 Scale 1:2 (context 80040); 2 KE80055 Scale 1:2 (context 80040); 3 KE80056 Scale 1:2 (context 80040); 4 KE80057 Scale 1:2 (context 80040); 5 KE80058 Scale 1:2 (context 80040); 6 KE80059 Scale 1:2 (context 80040); 7 KE80060 Scale 1:2 (context 80040); 8 KE80061 Scale 1:2 (context 80040); 9 KE80063 Scale 1:2 (context 80044).

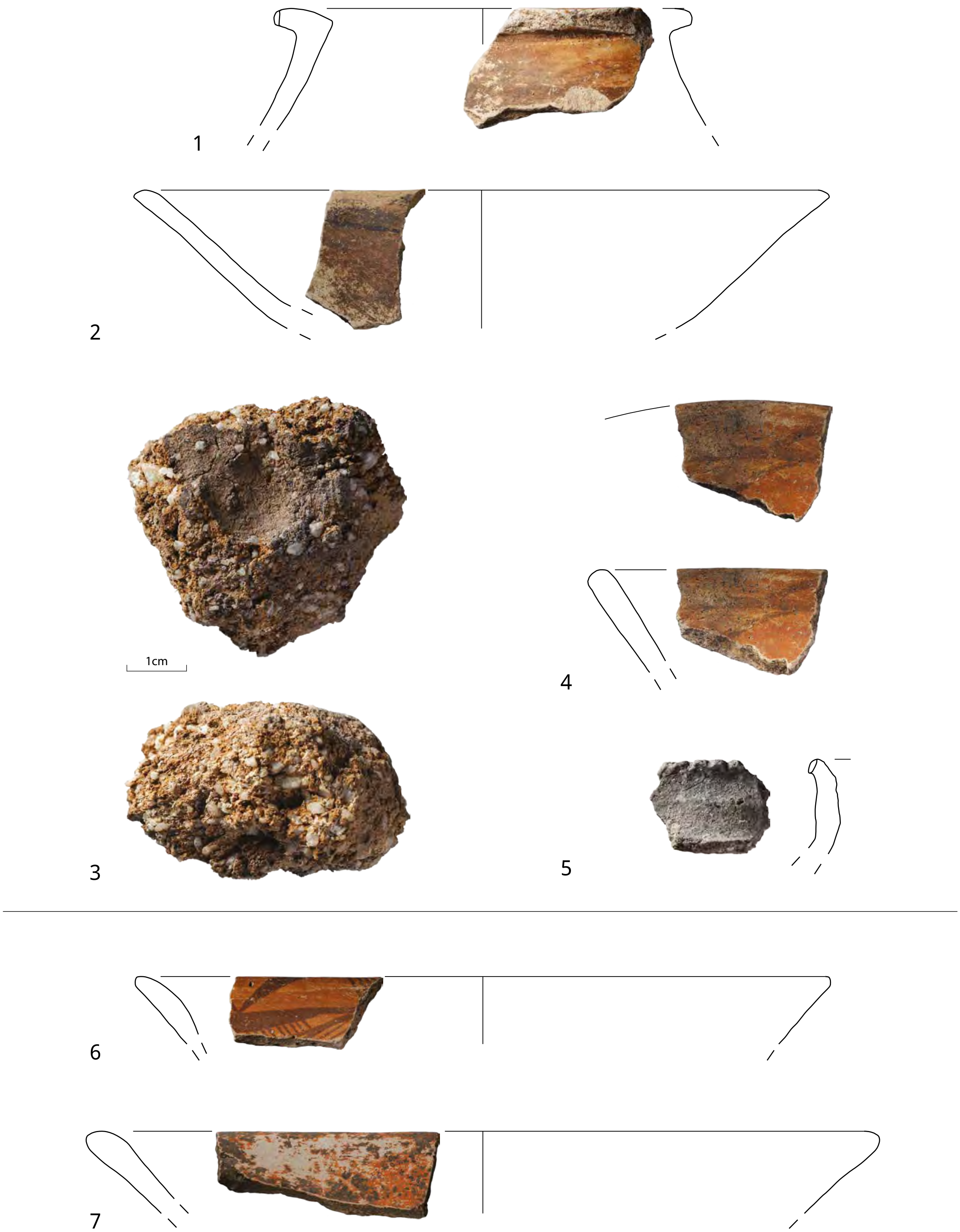

Plate 15. Trench 80. 1 KE80066 Scale 1:2 (context 80044); 2 KE80064 Scale 1:3 (context 80044); 3 F80977 Scale 1:1 (context 80044); 4 KE80062 Scale 1:2 (context 80044); 5 KE80065 Scale 1:2 (context 80044); 6 KE80067 Scale 1:3 (context 80013); 7 KE80068 Scale 1:3 (context 80013).

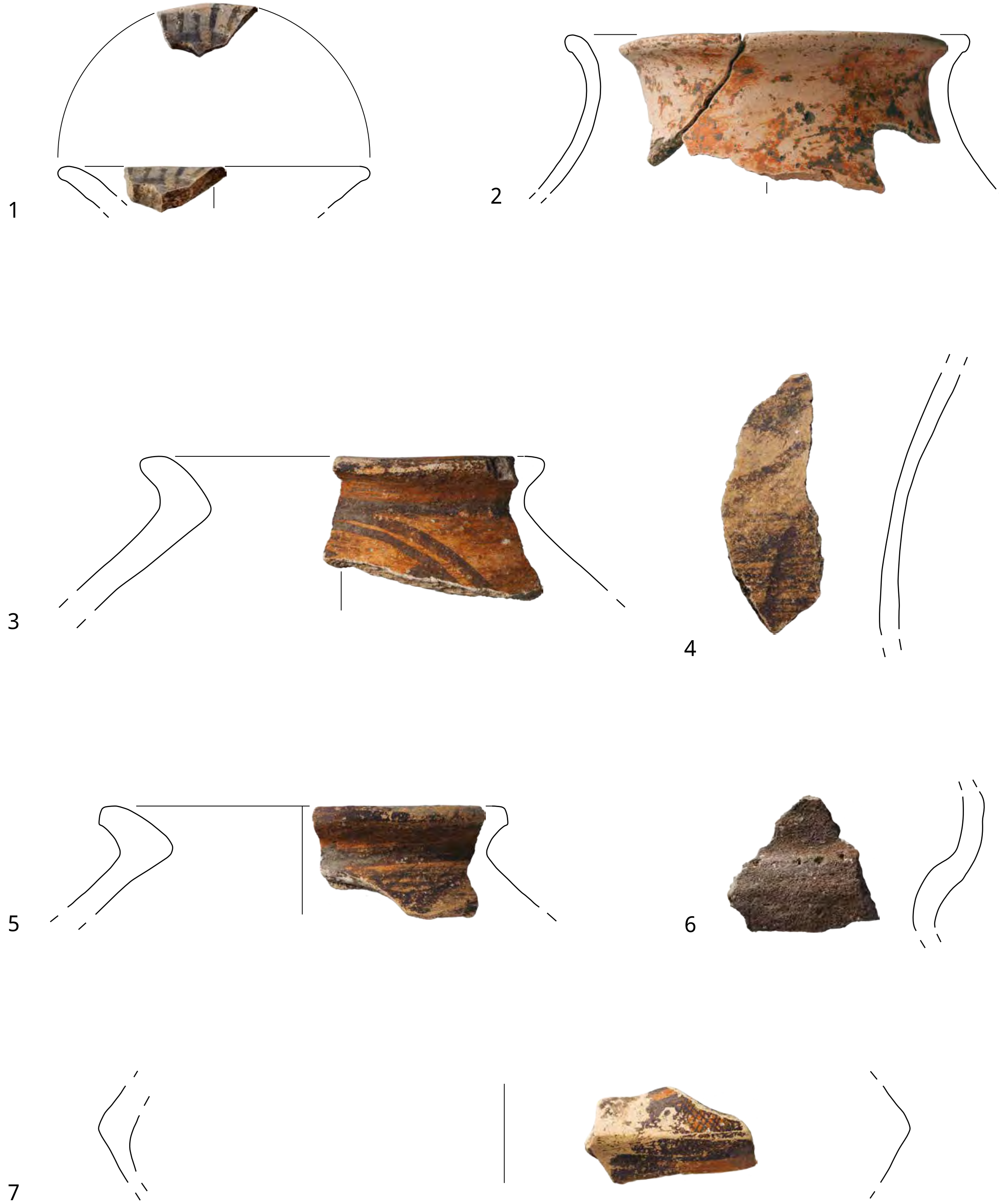

Plate 16. Trench 80. 1 KE80069 Scale 1:2 (context 80013); 2 KE80070 Scale 1:3 (context 80013); 3 KE80071 Scale 1:2 (context 80013); 4 KE80072 Scale 1:2 (context 80013); 5 KE80073 Scale 1:2 (context 80013); 6 KE80074 Scale 1:2 (context 80013); 7 KE80075 Scale 1:2 (context 80013).

Plate 17. Trench 80. 1 F80332 Scale 1:2 (context 80013); 2 F80367 Scale 1:1 (context 80013); 3 F80381 Scale 1:1 (context 80013); 4 KE80076 Scale 1:1 (context 80005).

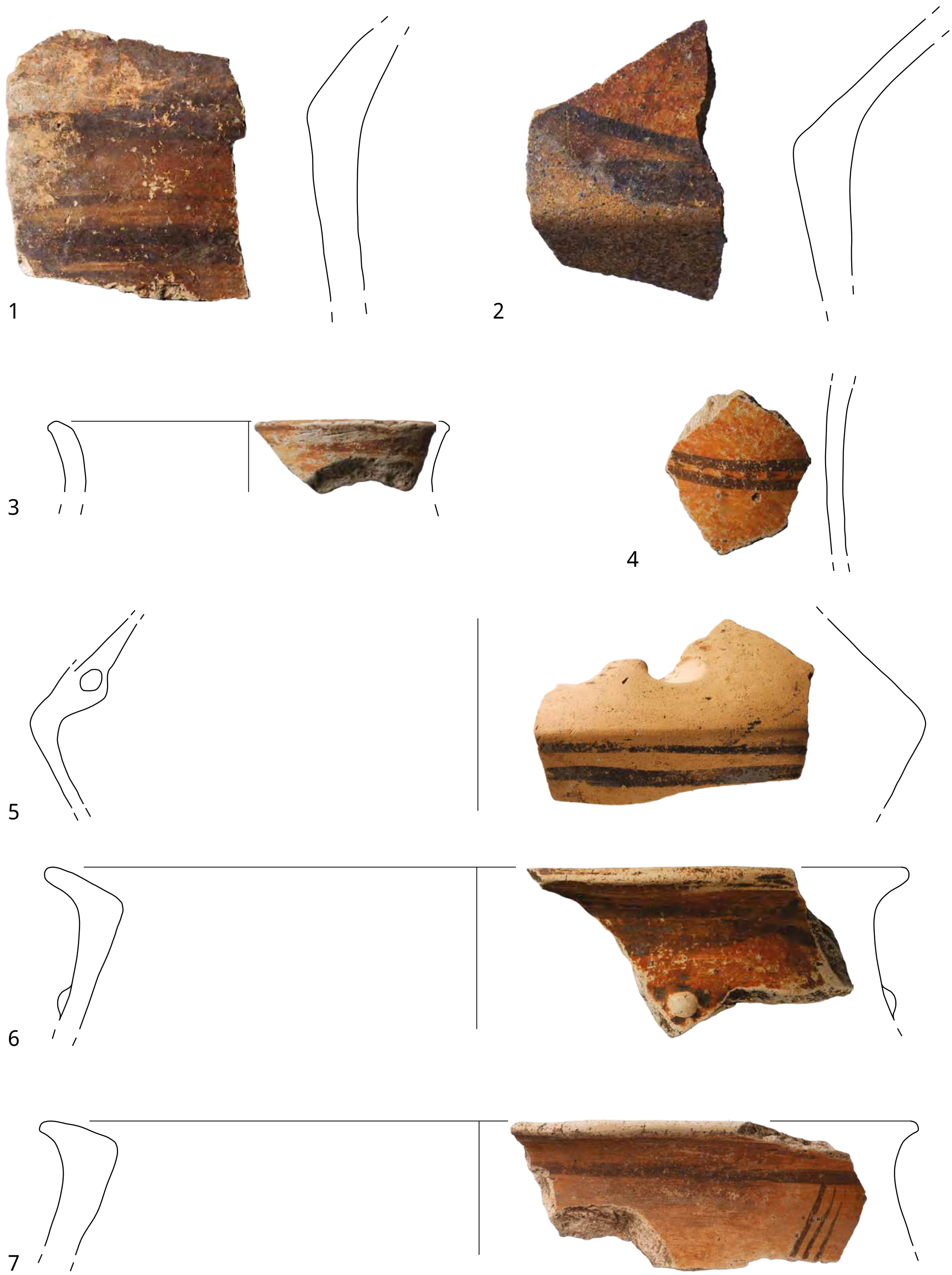

Plate 18. Trench 80. 1 KE80077 Scale 1:2 (context 80013); 2 KE80078 Scale 1:2 (context 80013); 3 KE80079 Scale 1:2 (context 80024); 4 KE80080 Scale 1:2 (context 80013); 5 KE80081 Scale 1:2 (context 80026); 6 KE80082 Scale 1:2 (context 80028); 7 KE80083 Scale 1:2 (context 80028).

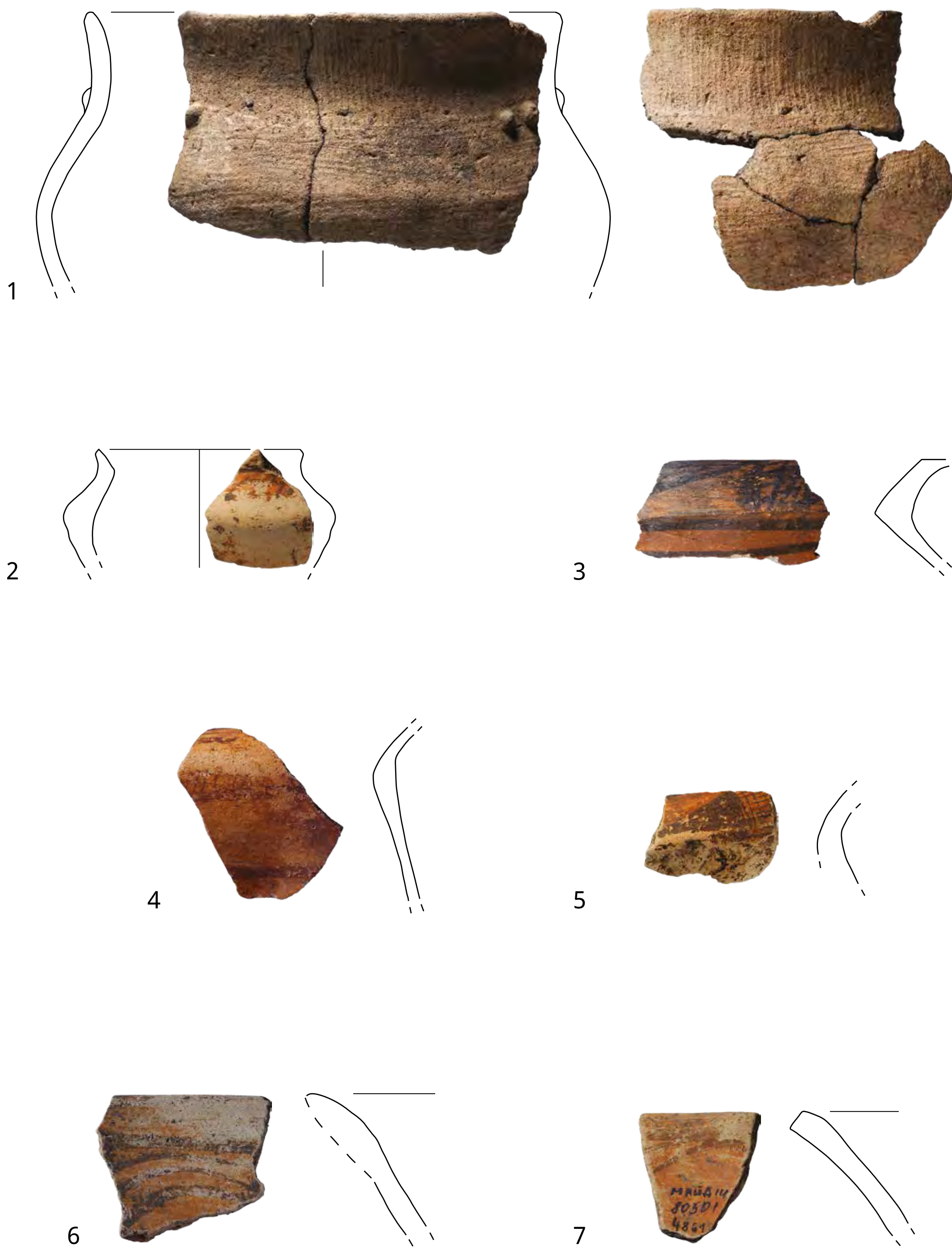

Plate 19. Trench 80. 1 KE80084 Scale 1:2 (context 80028); 2 KE80085 Scale 1:2 (context 80028); 3 KE80086 Scale 1:2 (context 80028); 4 KE80087 Scale 1:2 (context 80028); 5 KE80088 Scale 1:2 (context 80028); 6 KE80089 Scale 1:2 (context 80028);7 KE80090 Scale 1:2 (context 80028).

Plate 20. Trench 80. 1 KE80091 Scale 1:2 (context 80028); 2 KE80093 Scale 1:2 (context 80028); 3 KE80094 Scale 1:2 (context 80028); 4 KE80092 Scale 1:2 (context 80028).

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Plate 21. Trench 80. 1 KE80095 Scale 1:2 (context 80028).

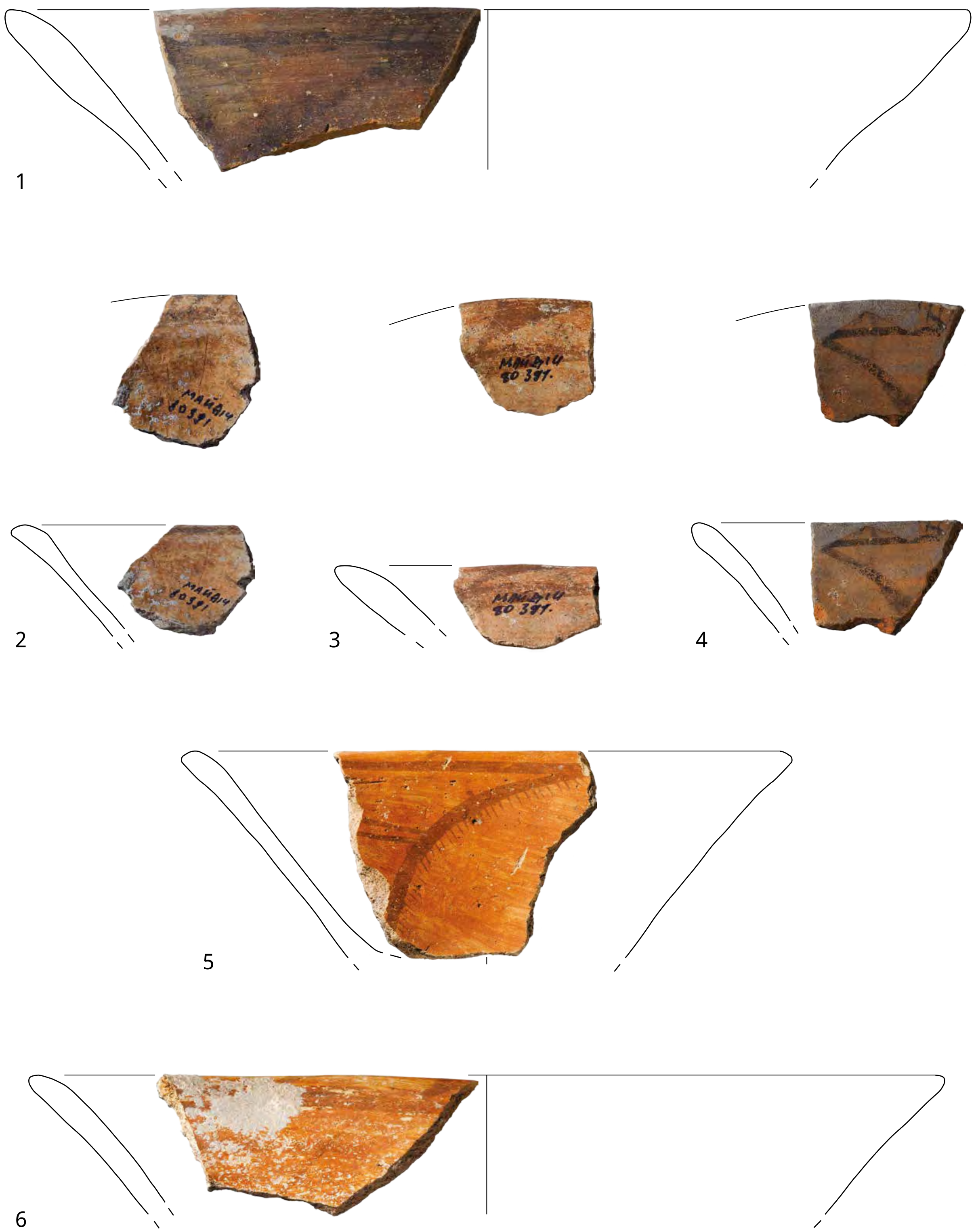

Plate 22. Trench 80. 1 KE80096 Scale 1:2 (context 80012); 2 KE80097 Scale 1:2 (context 80012); 3 KE80098 Scale 1:2 (context 80012); 4 KE80099 Scale 1:2 (context 80012); 5 KE80100 Scale 1:2 (context 80034); 6 KE80101 Scale 1:2 (context 80034).

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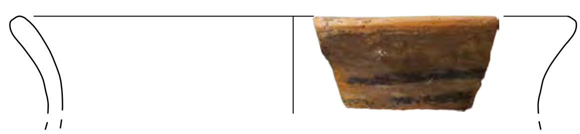

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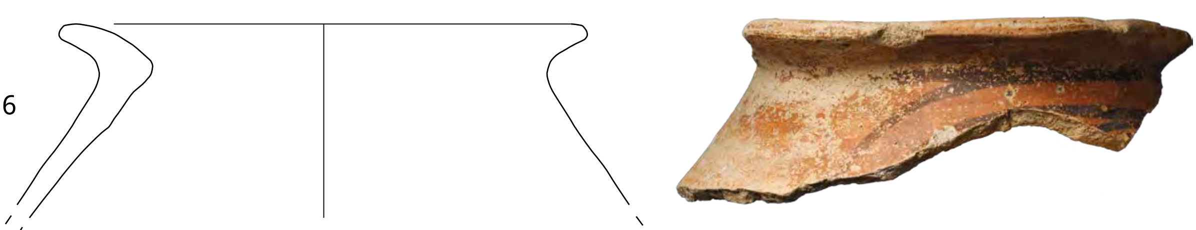

Plate 23. Trench 80. 1 KE80102 Scale 1:2 (context 80012); 2 KE80103 Scale 1:2 (context 80012); 3 KE80104 Scale 1:2 (context 80034); 4 KE80105 Scale 1:2 (context 80012); 5 KE80106 Scale 1:2 (context 80034); 6 KE80107 Scale 1:2 (context 80012).

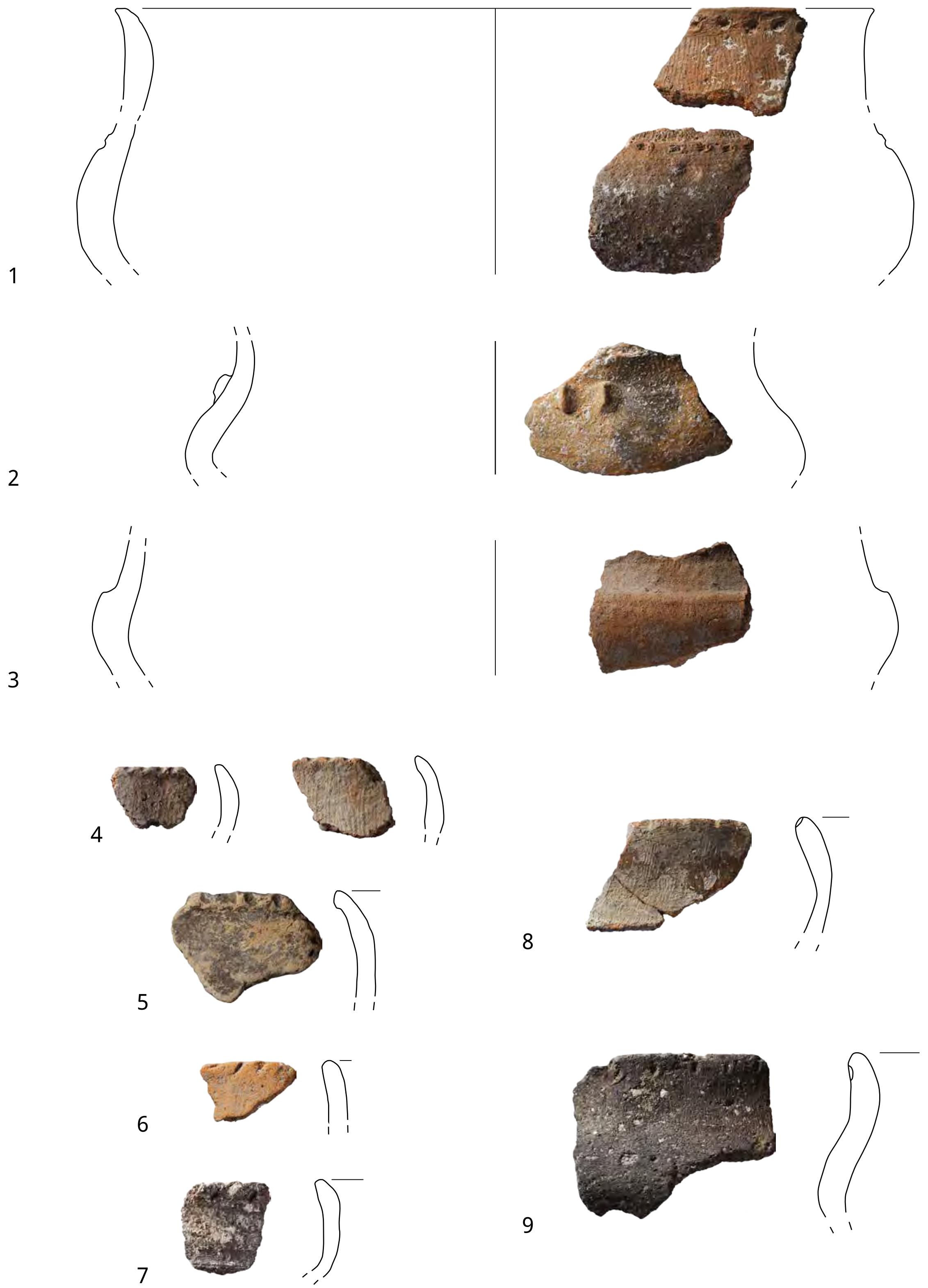

Plate 24. Trench 80. 1 KE80108 Scale 1:2 (context 80034); 2 KE80109 Scale 1:2 (context 80012); 3 KE80110 Scale 1:2 (context 80012); 4 KE80111 Scale 1:2 (context 800112); 5 KE80112 Scale 1:2 (context 80012); 6 KE80113 Scale 1:2 (context 800112); 7 KE80114 Scale 1:2 (context 80034); 8 KE80115 Scale 1:2 (context 80034); 9 KE80116 Scale 1:2 (context 80034).

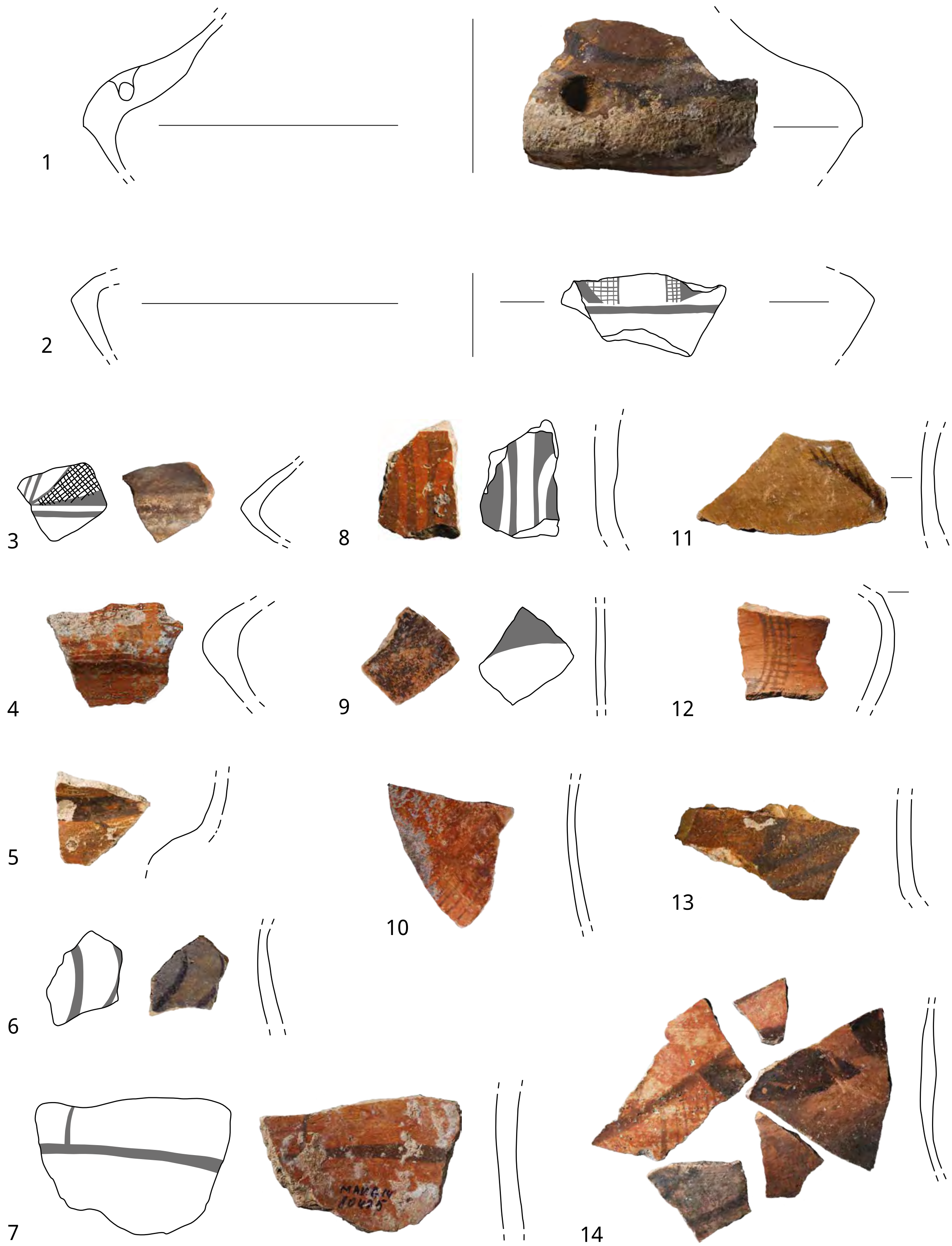

Plate 25. Trench 80. 1 KE80117 Scale 1:3 (context 80012); 2 KE80118 Scale 1:3 (context 80012); 3 KE80119 Scale 1:2 (context 80034); 4 KE80120 Scale 1:2 (context 80012); 5 KE80121 Scale 1:2 (context 80034); 6 KE80122 Scale 1:2 (context 80012); 7 KE80123 Scale 1:2 (context 80012); 8 KE80124 Scale 1:2 (context 80012); 9 KE80125 Scale 1:2 (context 80012); 10 KE80126 Scale 1:2 (context 80012); 11 KE80127 Scale 1:2 (context 80012); 12 KE80128 Scale 1:2 (context 80034); 13 KE80129 Scale 1:2 (context 80034); 14 KE80130 Scale 1:2 (context 80034).

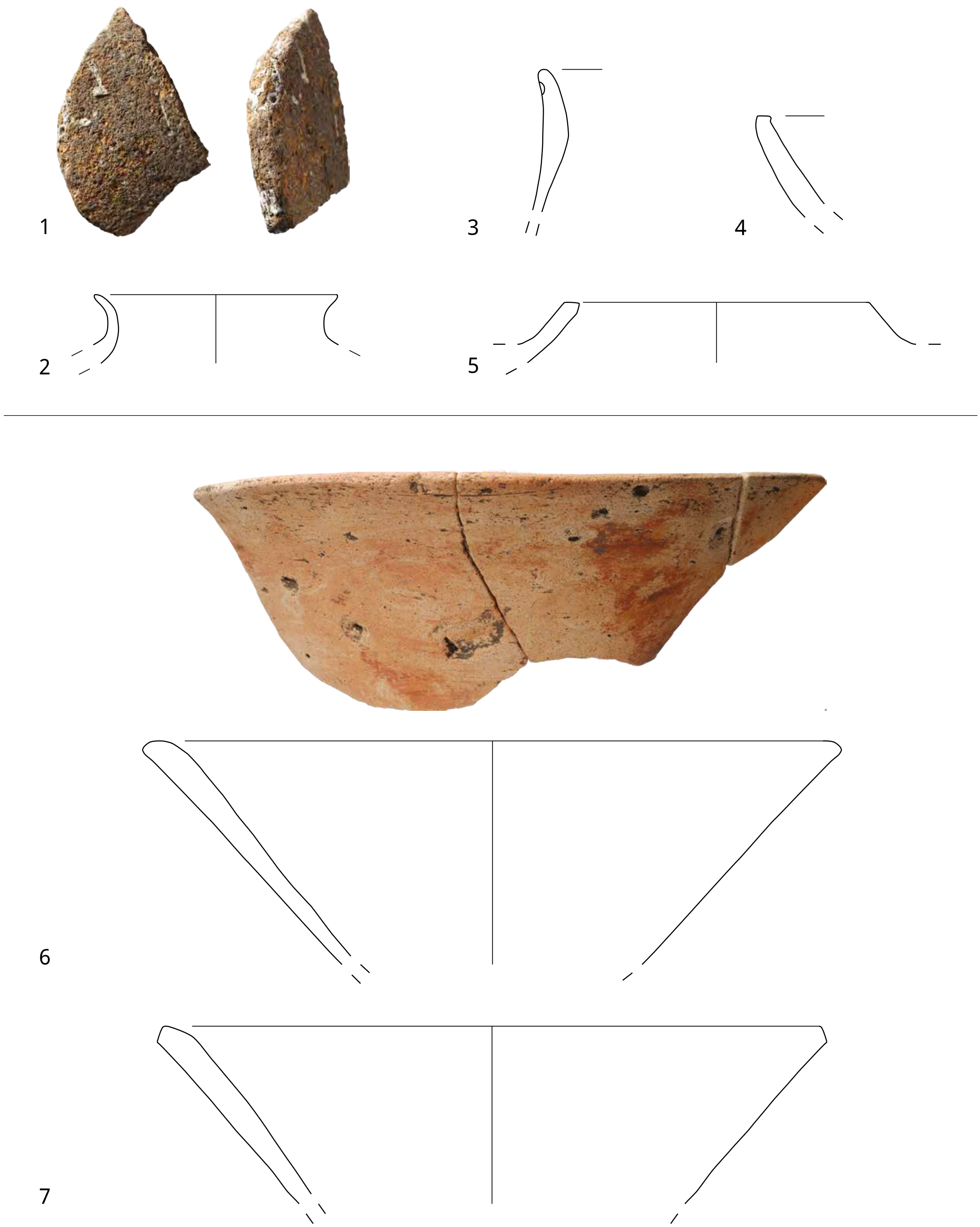

Plate 26. Trench 80. 1 F80542 Scale 1:1 (context 80012); 2 F80882 ID 4407 Scale 1:2 (context 80034); 3 KE80131 Scale 1:2 (context 80012); 4 KE80132 Scale 1:2 (context 80012); 5 KE80133 Scale 1:2 (context 80012). Trench 91.
Dwelling 55. 6 KE91001 Scale 1:2 (context 91007); 7 KE91002 Scale 1:2 (context 91007).

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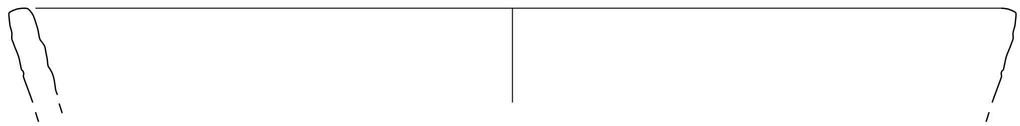

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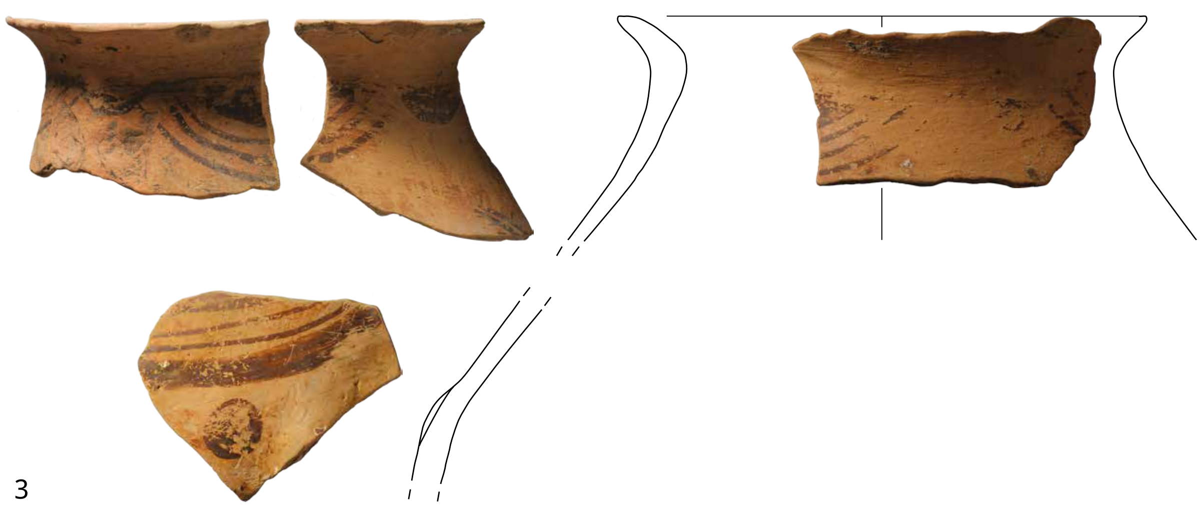

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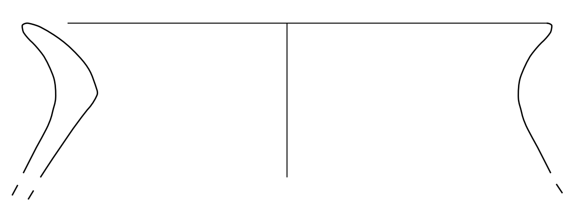

Plate 27. Trench 91. Dwelling 55. 1 KE91003 Scale 1:3 (context 91008); 2 KE91004 Scale 1:2 (context 91008); 3 KE91006 Scale 1:2 (contexts 91012 and 91013); 4 KE91005 Scale 1:2 (context 91010).

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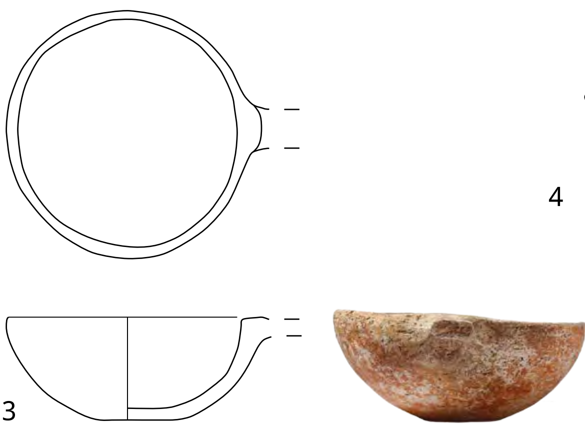

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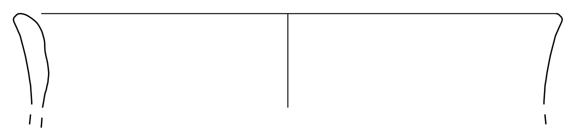

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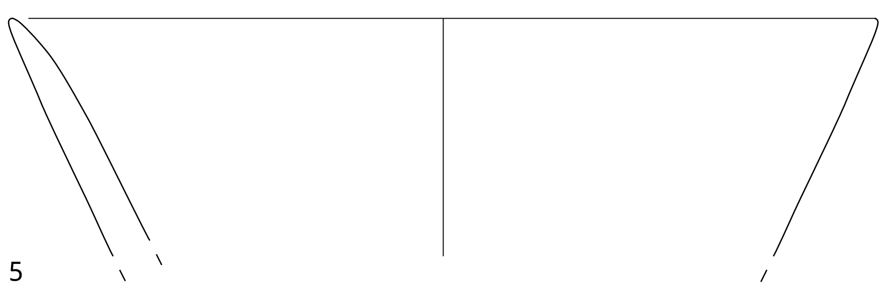

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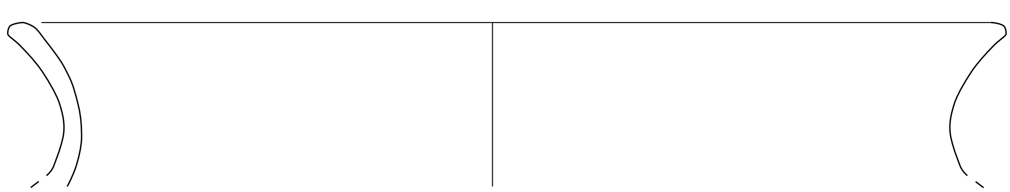

Plate 28. Trench 91. Dwelling 55. 1 F91006 Scale 1:3 (context 91003); 2 F91033-35 Scale 1:2 (context 91008). Trench 92. Dwelling 54. 3 KE92019 Scale 1:2 (context 92002); 4 KE92062 Scale 1:3 (context 92002); 5 KE92026 Scale 1:2 (context 92002); 6 KE92064 Scale 1:3 (context 92002).


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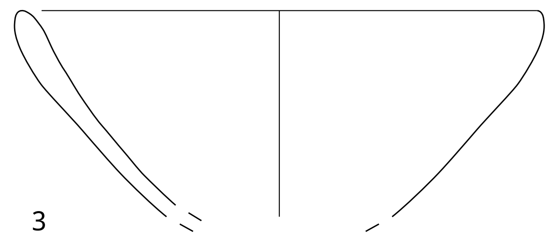
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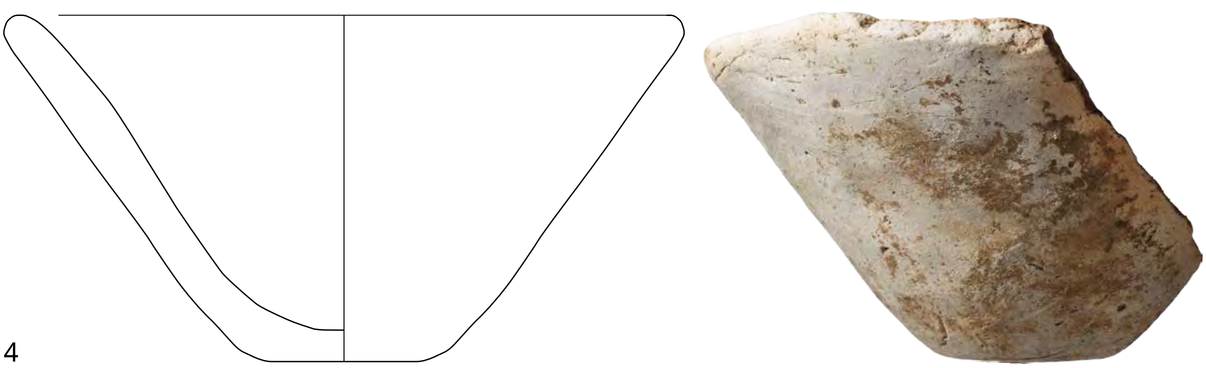
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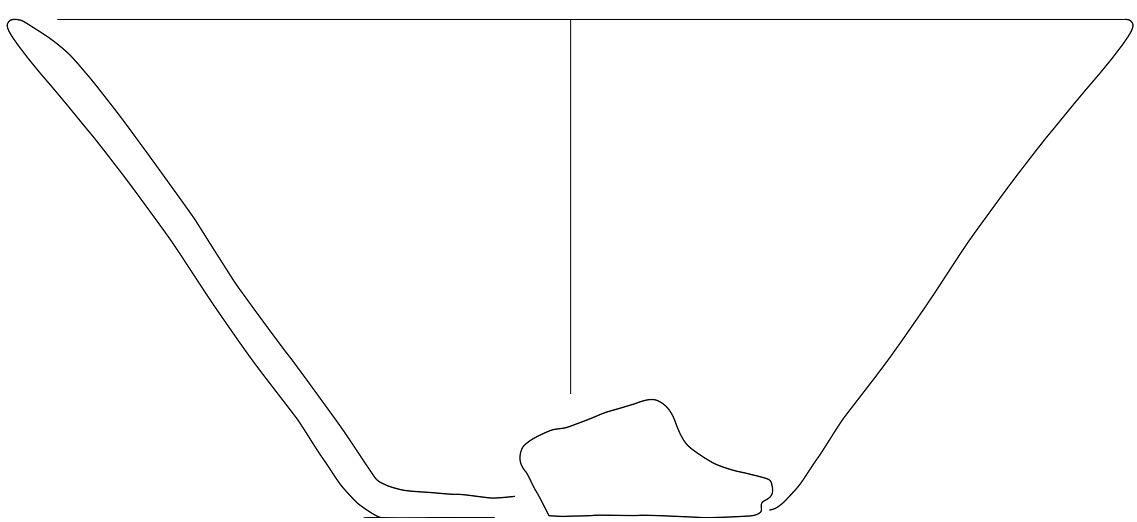
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Plate 29. Trench 92. Dwelling 54. 1 F92064 Scale 1:2 (context 92002); 2 KE92002 Scale 1:2 (context 92003); 3 KE92020 Scale 1:2 (context 92006); 4 KE92015 Scale 1:2 (context 92006); 5 KE92030 Scale 1:2 (context 92006).

Plate 30. Trench 92. Dwelling 54. 1 KE92003 Scale 1:2 (context 92007); 2 KE92004 Scale 1:2 (context 92007); 3 KE92017 Scale 1:2 (context 92007); 4 KE92029 Scale 1:2 (context 92007).

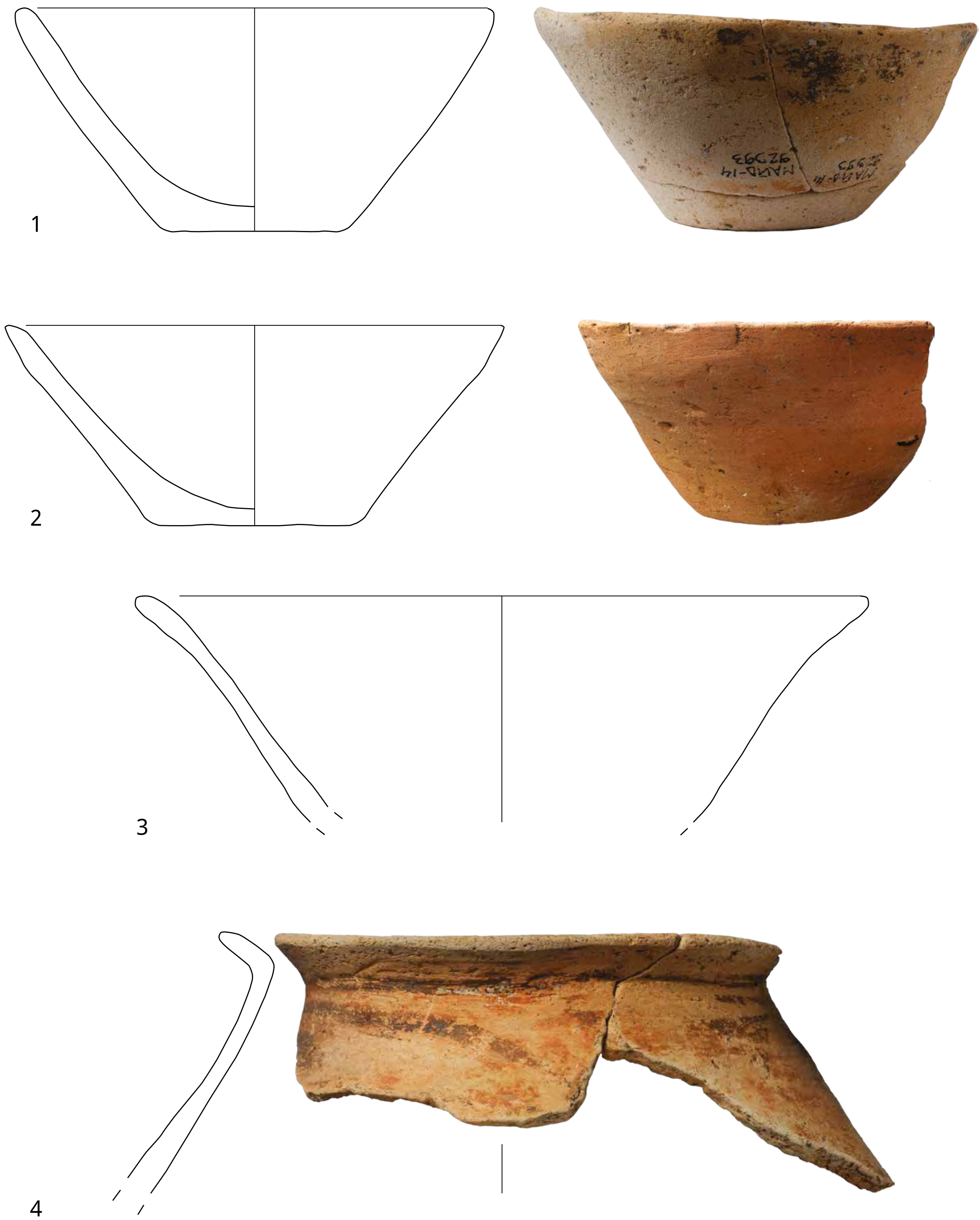


Plate 31. Trench 92. Dwelling 54. 1 KE92013 Scale 1:2 (context 92007); 2 KE92014 Scale 1:2 (context 92007); 3 KE92031 Scale 1:3 (context 92007); 4 KE92051 Scale 1:2 (context 92007).

Plate 32. Trench 92. Dwelling 54. 1 KE92061 Scale 1:3 (contexts 92002 and 92007); 2 KE92063 Scale 1:3 (context 92007); 3 F92323 Scale 1:1 (context 92007); 4 KE92022 Scale 1:2 (context 92008); 5 KE92047 Scale 1:3 (contexts 92015 and 16); 6 KE92048 Scale 1:3 (context 92016); 7 KE92001 Scale 1:2 (contexts 92002 and 92016); 8 KE92076 Scale 1:3 (contexts 92014 and 92016).

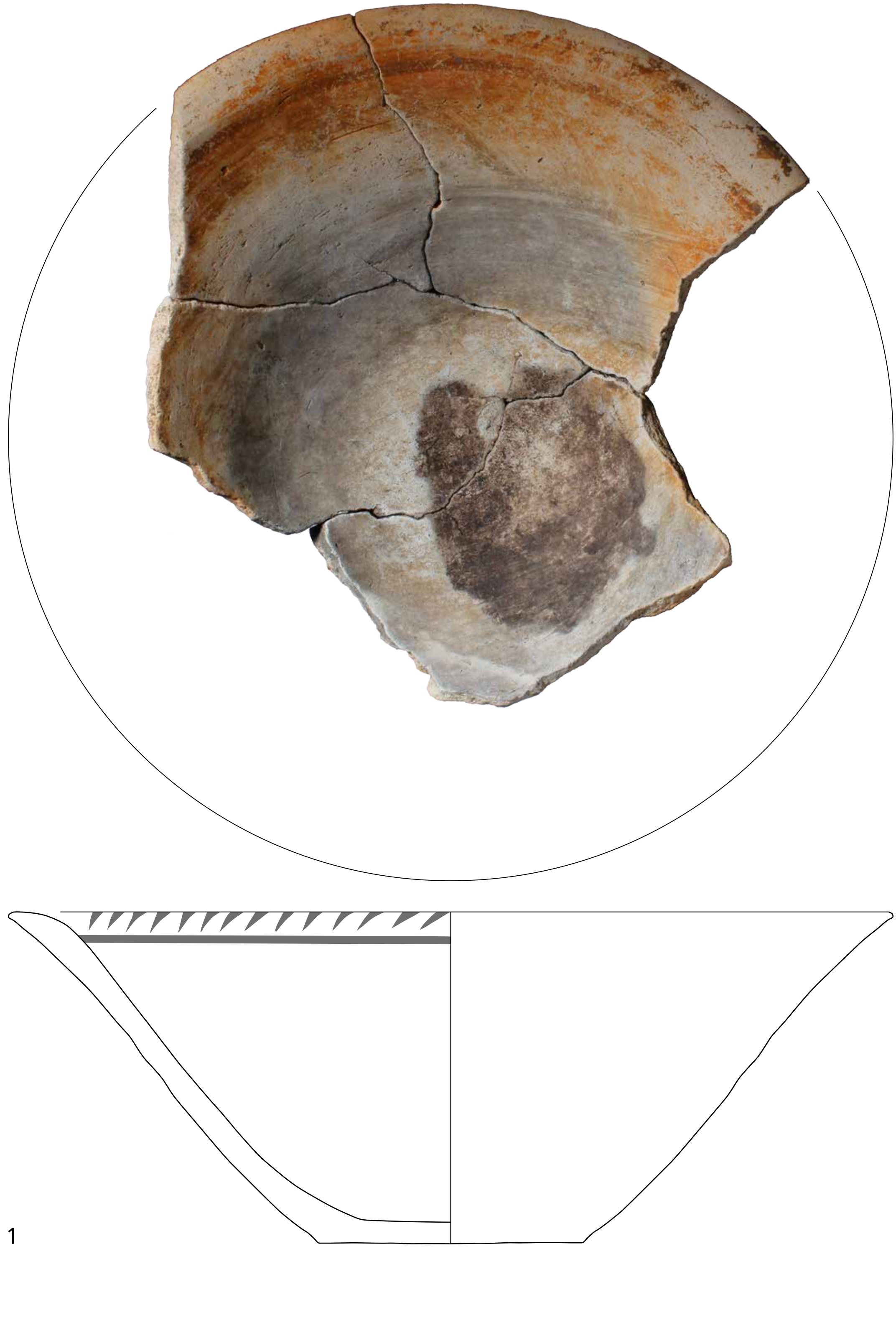
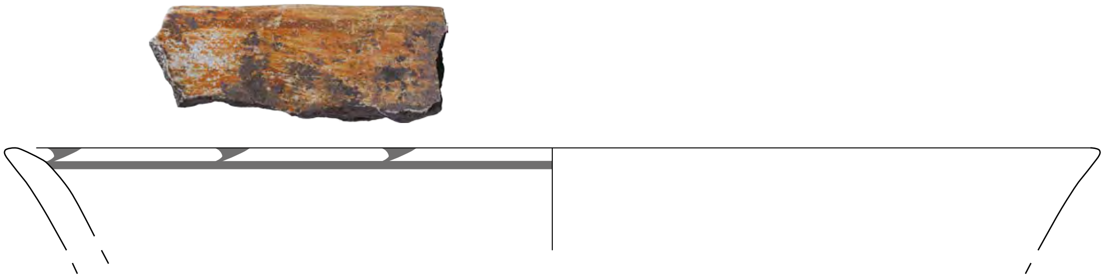


Plate 33. Trench 92. Dwelling 54. 1 KE92006 Scale 1:2 (context 92009).



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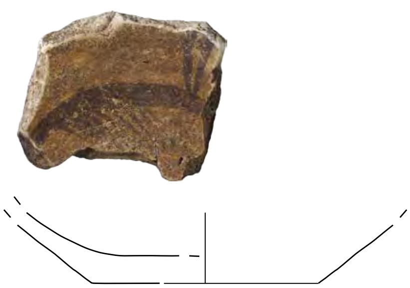

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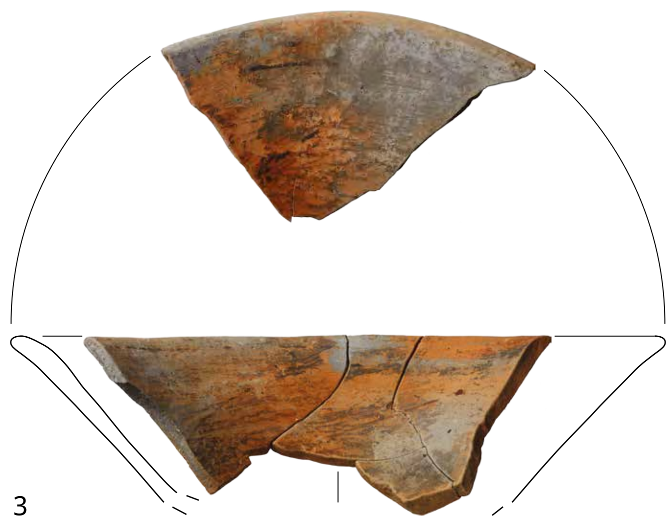

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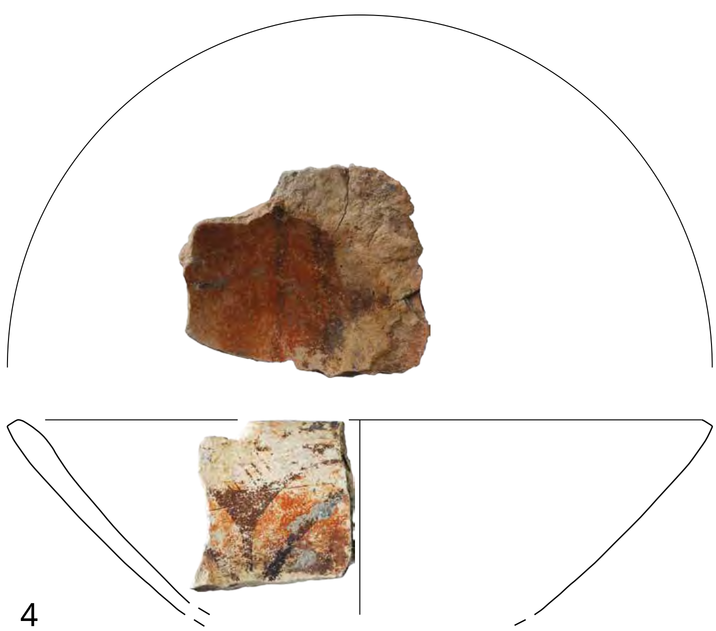

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Plate 34. Trench 92. Dwelling 54. 1 KE92008 Scale 1:2 (contexts 92002 and 92009); 2 KE92010 Scale 1:2 (context 92009); 3 KE92012 Scale 1:3 (context 92009); 4 KE92011 Scale 1:3 (contexts 92009 and 92023).

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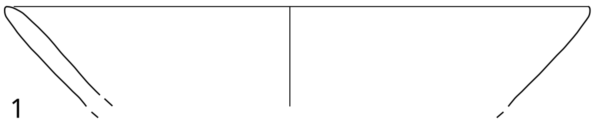

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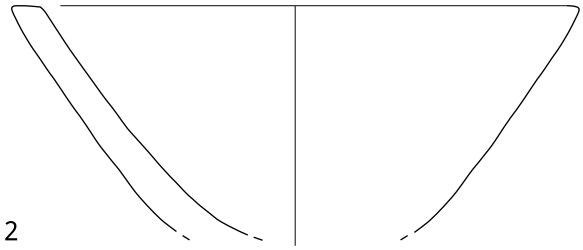

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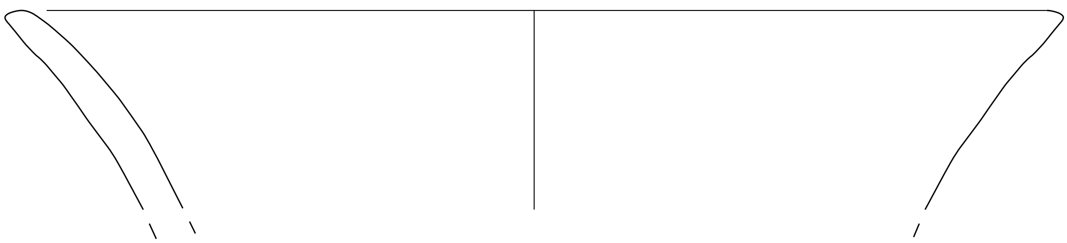

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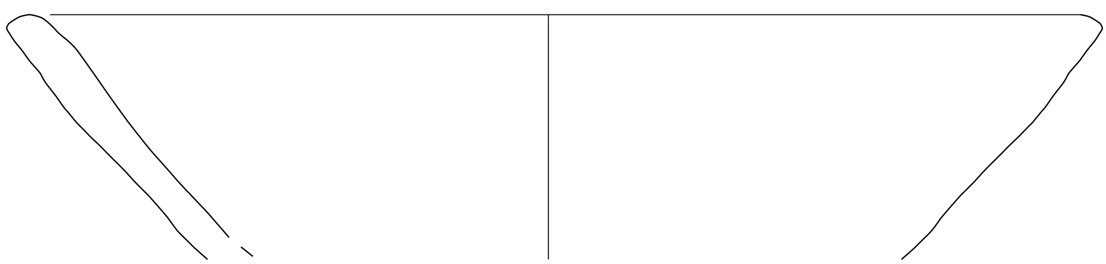

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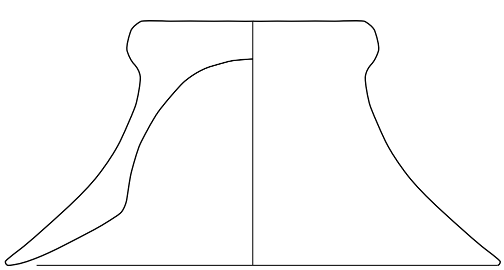

Plate 35. Trench 92. Dwelling 54. 1 KE92023 Scale 1:2 (context 92009); 2 KE92024 Scale 1:2 (context 92009); 3 KE92027 Scale 1:2 (contexts 92007 and 92009); 4 KE92028 Scale 1:2 (contexts 92007 and 92009); 5 KE92033 Scale 1:2 (contexts 92006, 92009, and 92013).

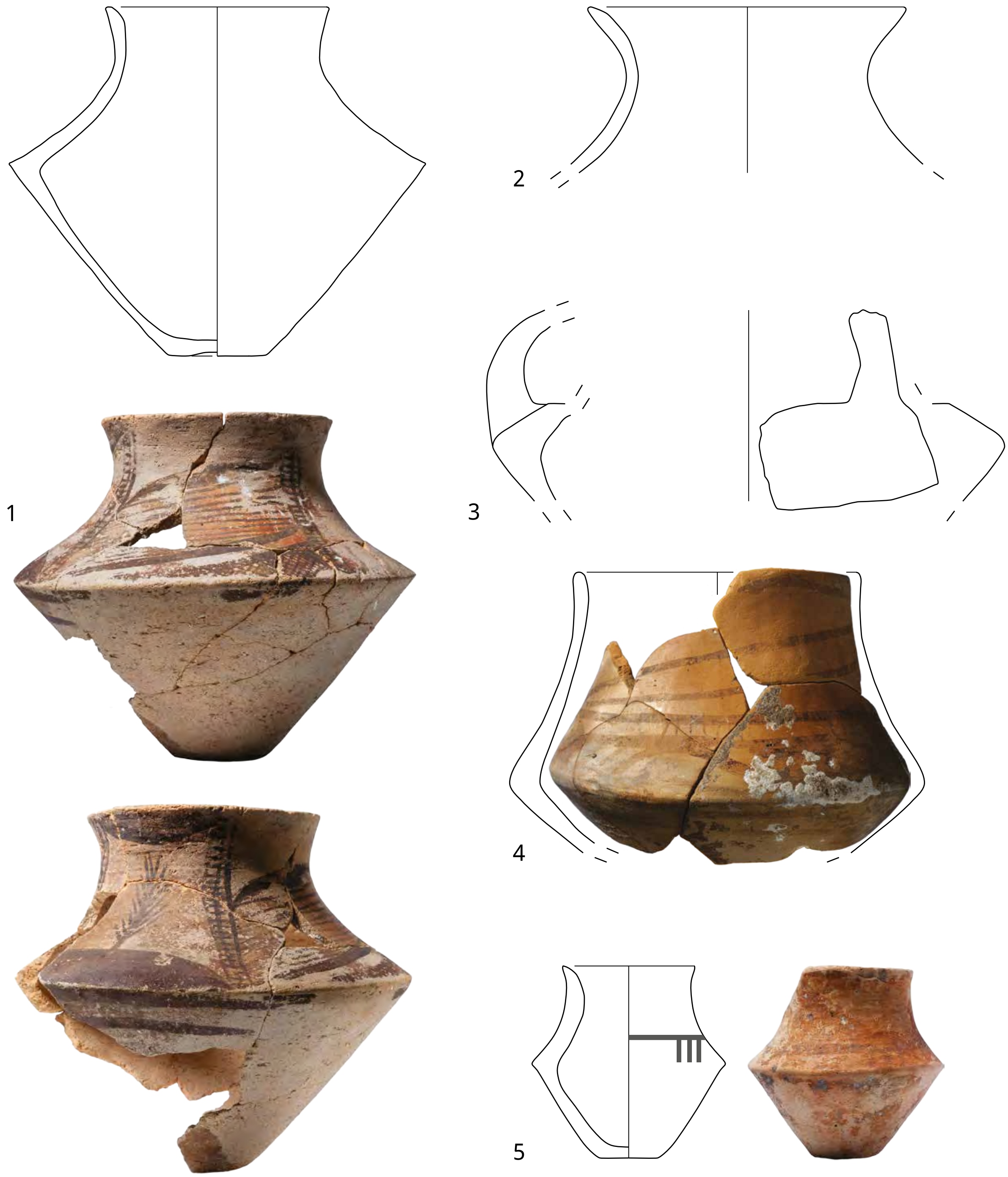

Plate 36. Trench 92. Dwelling 54. 1 KE92034 Scale 1:2 (context 92009); 2 KE92036 Scale 1:2 (context 92009); 3 KE92037 Scale 1:2 (context 92009); 4 KE92038 Scale 1:2 (context 92009); 5 KE92039 Scale 1:2 (context 92009).

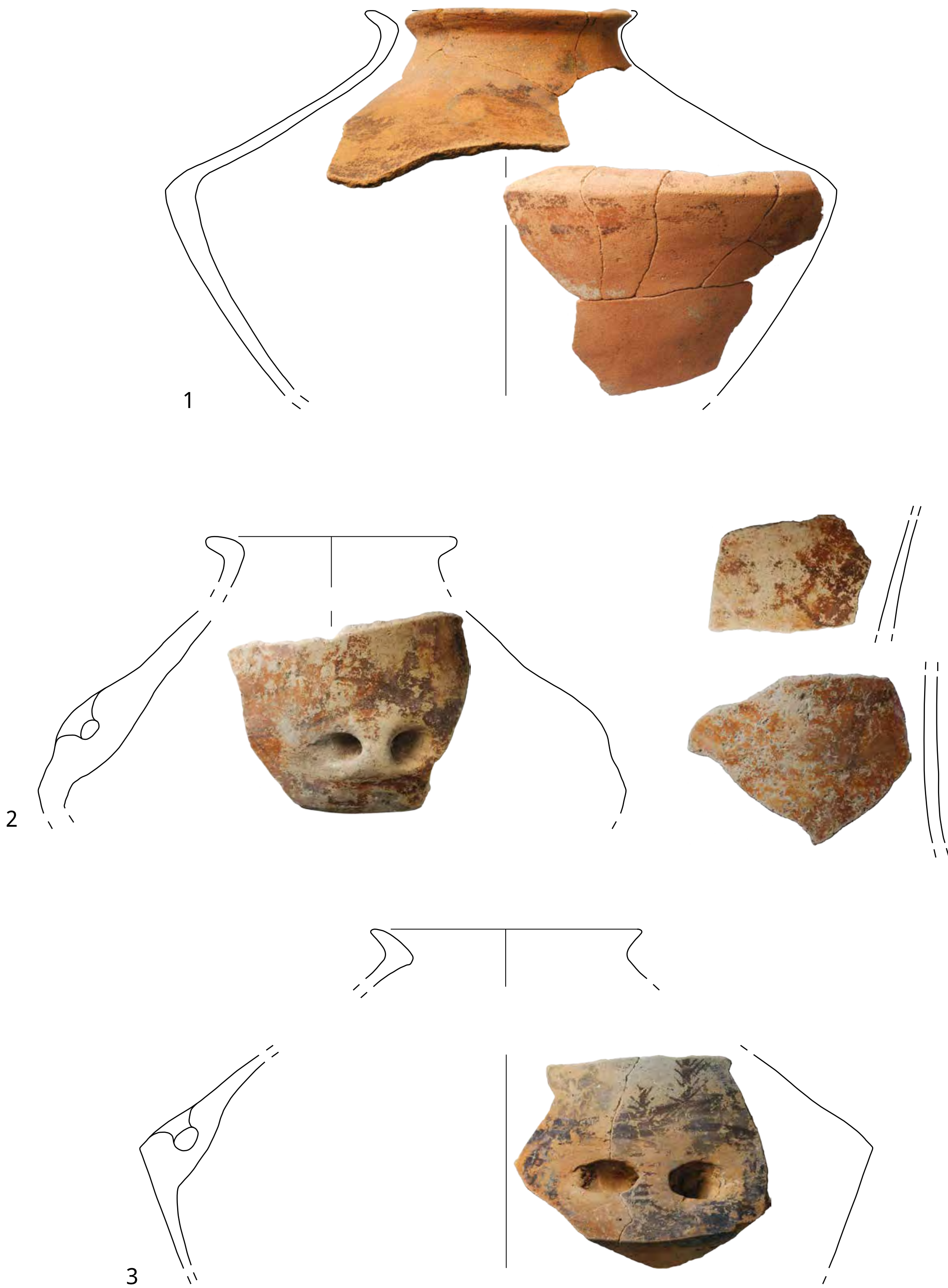

Plate 37. Trench 92. Dwelling 54. 1 KE92043 Scale 1:3 (context 92009); 2 KE92044 Scale 1:3 (contexts 92002 and 92009); 3 KE92045 Scale 1:3 (context 92009).

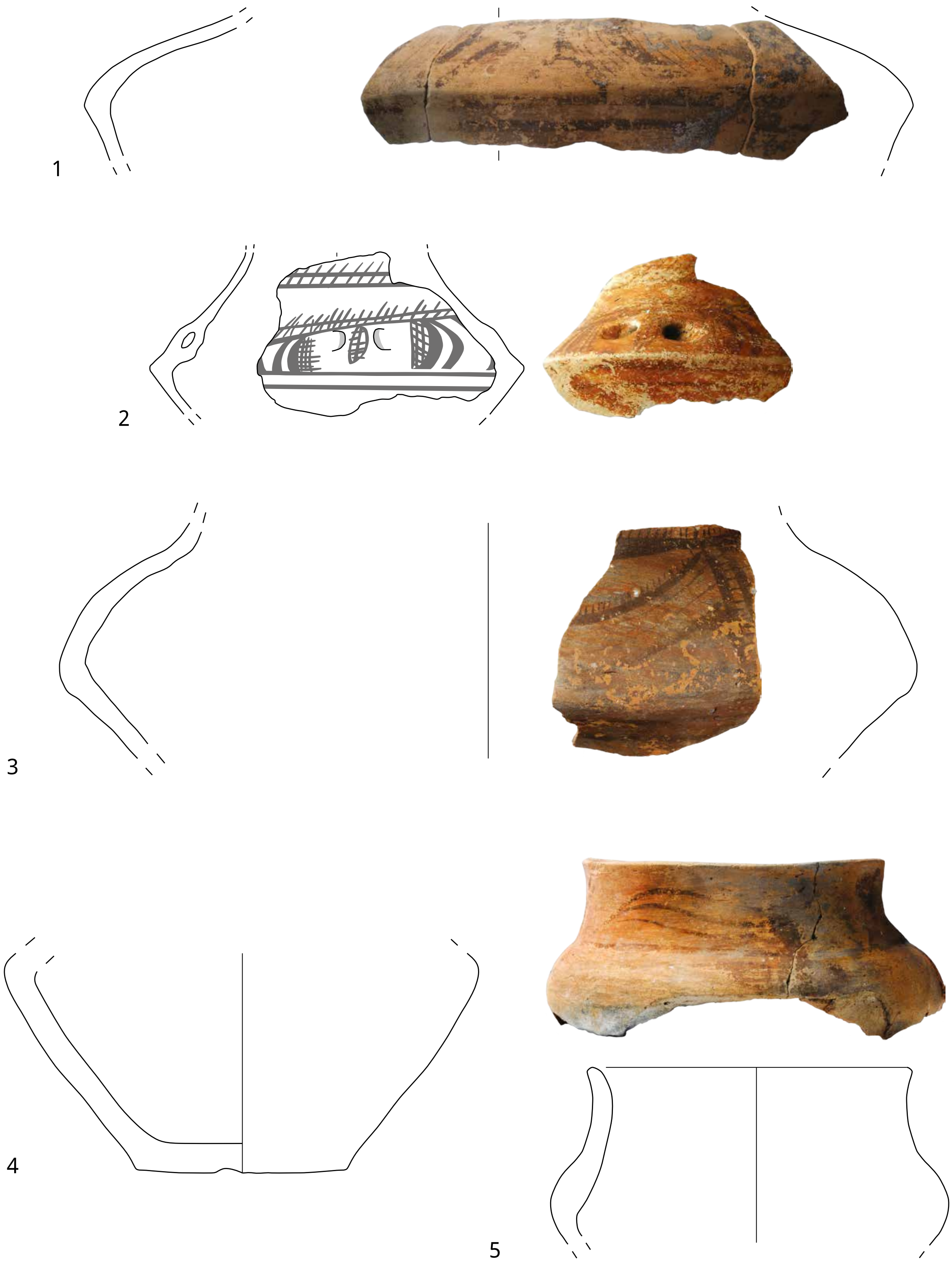

Plate 38. Trench 92. Dwelling 54. 1 KE92050 Scale 1:3 (context 92009); 2 KE92049 Scale 1:3 (context 92009); 3 KE92052 Scale 1:2 (context 92009); 4 KE92059 Scale 1:2 (context 92009); 5 KE92066 Scale 1:3 (contexts 92009 and 92015).

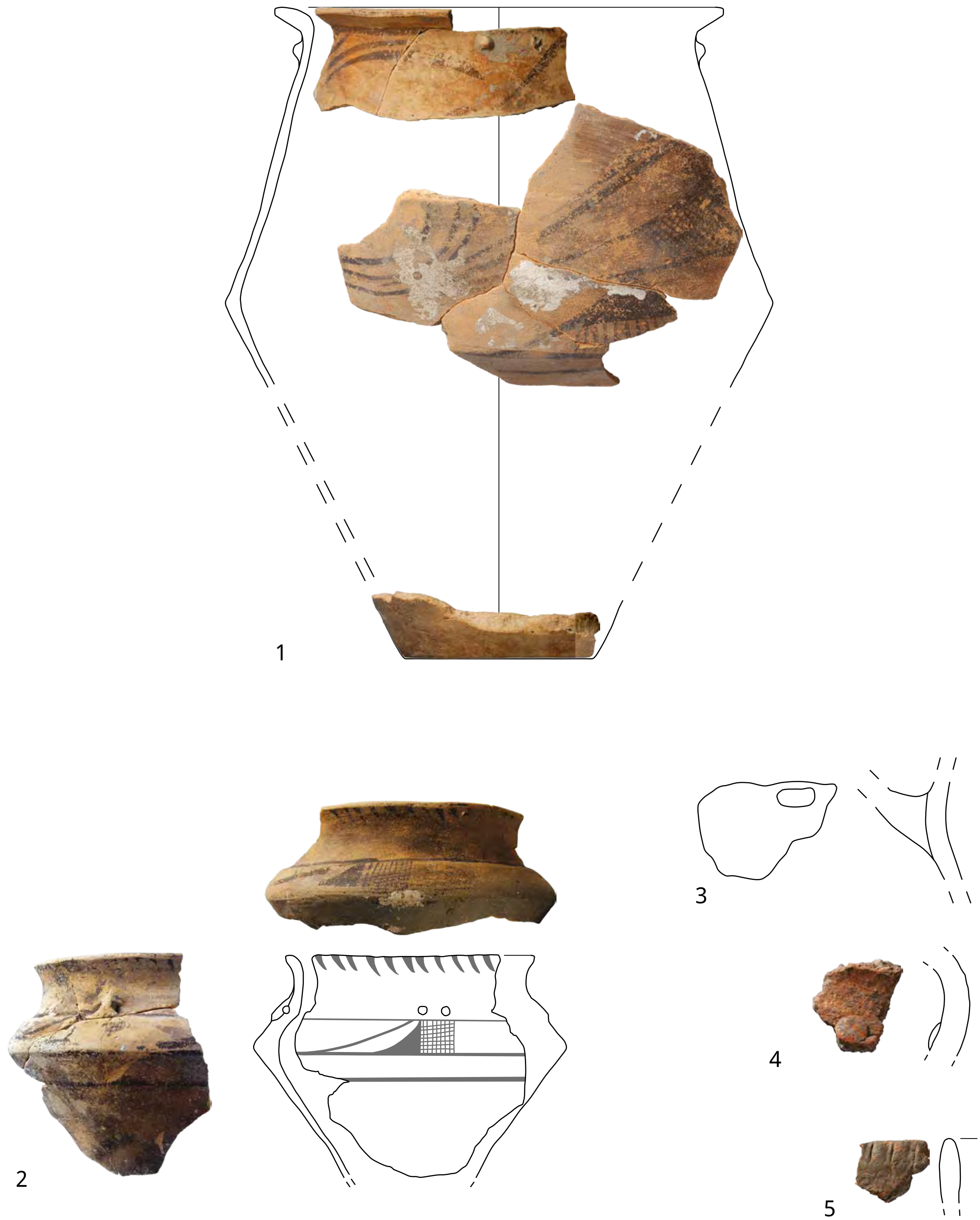

Plate 39. Trench 92. Dwelling 54. 1 KE92053 Scale 1:3 (contexts 92009 and 92023); 2 KE92067 Scale 1:3 (context 92009); 3 KE92069 Scale 1:2 (context 92009); 4 KE92070 Scale 1:2 (context 92010); 5 KE92071 Scale 1:2 (context 92009).

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Plate 40. Trench 92. Dwelling 54. 1 KE92054 Scale 1:4 (contexts 92009 and 92014).

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Plate 41. Trench 92. Dwelling 54. 1 KE92073 Scale 1:2 (contexts 92009 and 92014); 2 KE92074 Scale 1:3 (context 92009); 3 KE92075 Scale 1:2 (context 92009); 4 F92818 Scale 1:1 (context 92013); 5 KE92018 Scale 1:2 (context 92023).

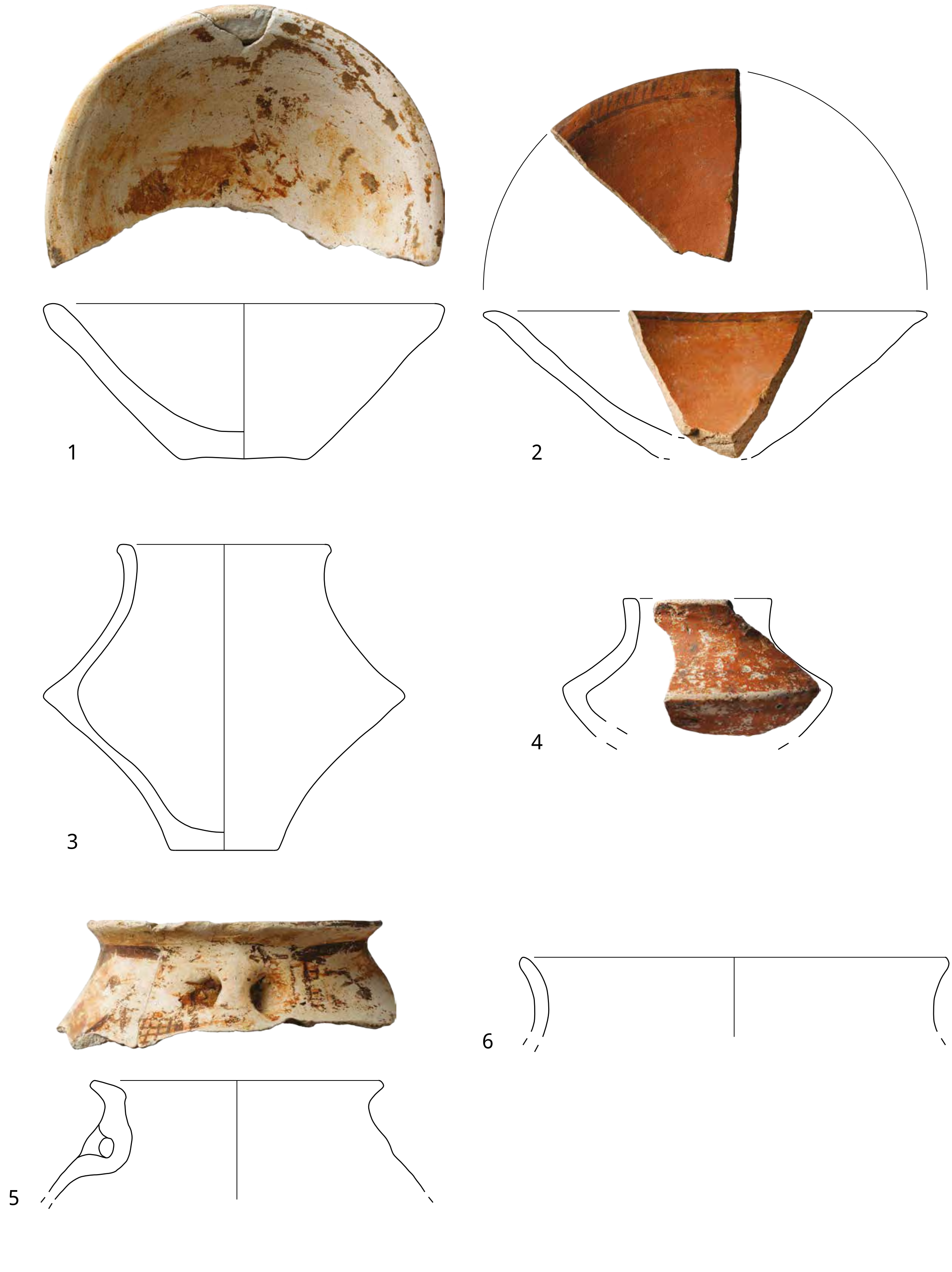

Plate 42. Trench 92. Dwelling 54. 1 KE92005 Scale 1:2 (context 92023); 2 KE92007 Scale 1:2 (contexts 92002 and 92023); 3 KE92035 Scale 1:2 (context 92023); 4 KE92040 Scale 1:2 (contexts 92013 and 92023); 5 KE92046 Scale 1:2 (contexts 92007 and 92023); 6 KE92060 Scale 1:3 (contexts 92003 and 92023).

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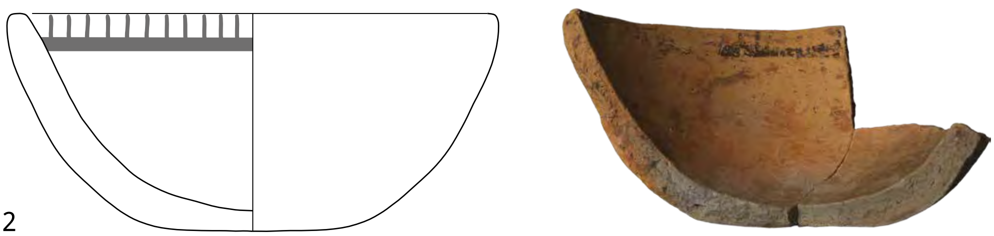

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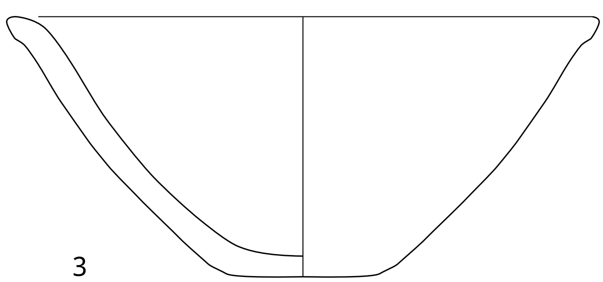

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Plate 43. Trench 92. Dwelling 54. 1 KE92072 Scale 1:3 (context 92023); 2 KE92016 Scale 1:2 (context 92013); 3 KE92021 Scale 1:2 (context 92013); 4 KE92032 Scale 1:2 (context 92014); 5 KE92055 Scale 1:2 (context 92012).

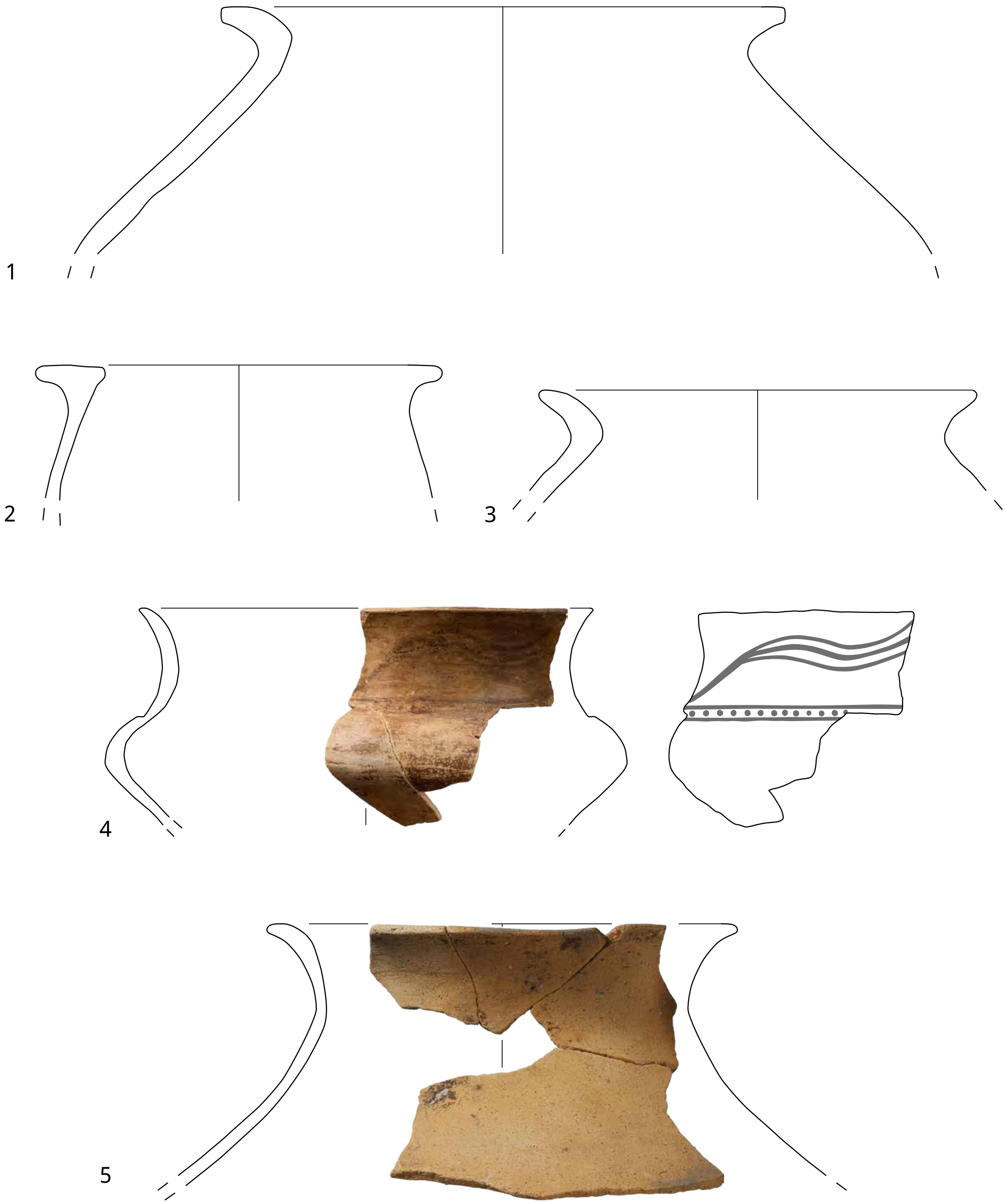

Plate 44. Trench 92. Occupational layer. 1 KE92056 Scale 1:2 (context 92012); 2 KE92057 Scale 1:2 (context 92013); 3 KE92058 Scale 1:2 (context 92013), 4 KE92065 Scale 1:3 (context 92012); 5 KE92068 Scale 1:2 (context 92015);


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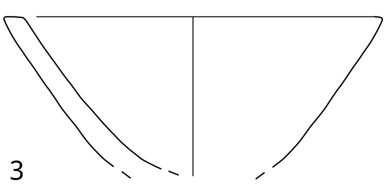
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Plate 45. Trench 92. Occupational layer. 1 F92504 Scale 1:2 (context 92014). Dwelling 56. 2 KE92009 Scale 1:2 (contexts 92003 and 92005); 3 KE92025 Scale 1:2 (context 92005); 4 F92038 Scale 1:2 (context 92005);

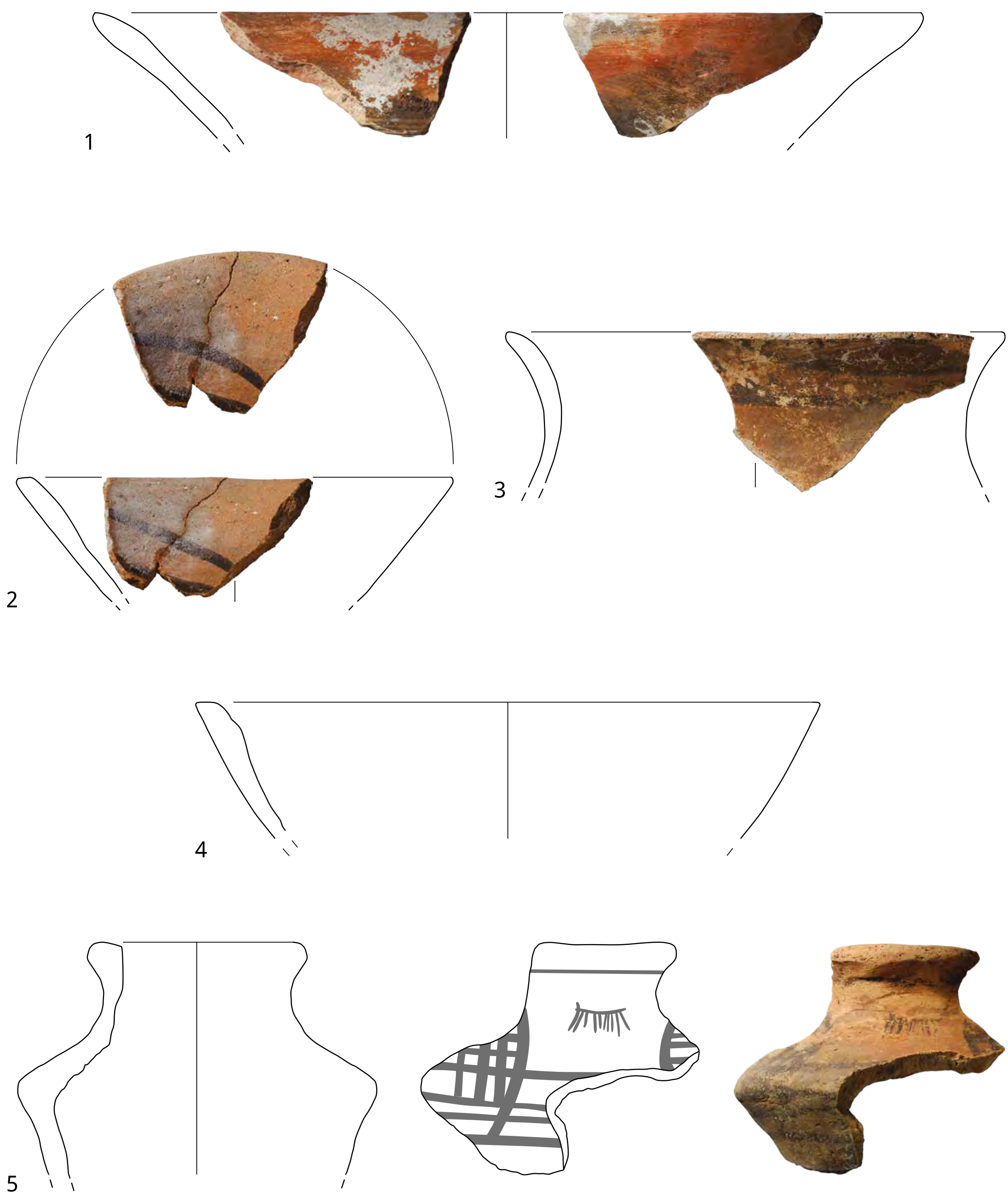

Plate 46. Trench 93. Dwelling 57. 1 KE93001 Scale 1:3 (context 93002); 2 KE93002 Scale 1:2 (context 93002); 3 KE93003 Scale 1:2 (context 93002); 4 KE93004 Scale 1:2 (context 93002); 5 KE93005 Scale 1:2 (context 93002).

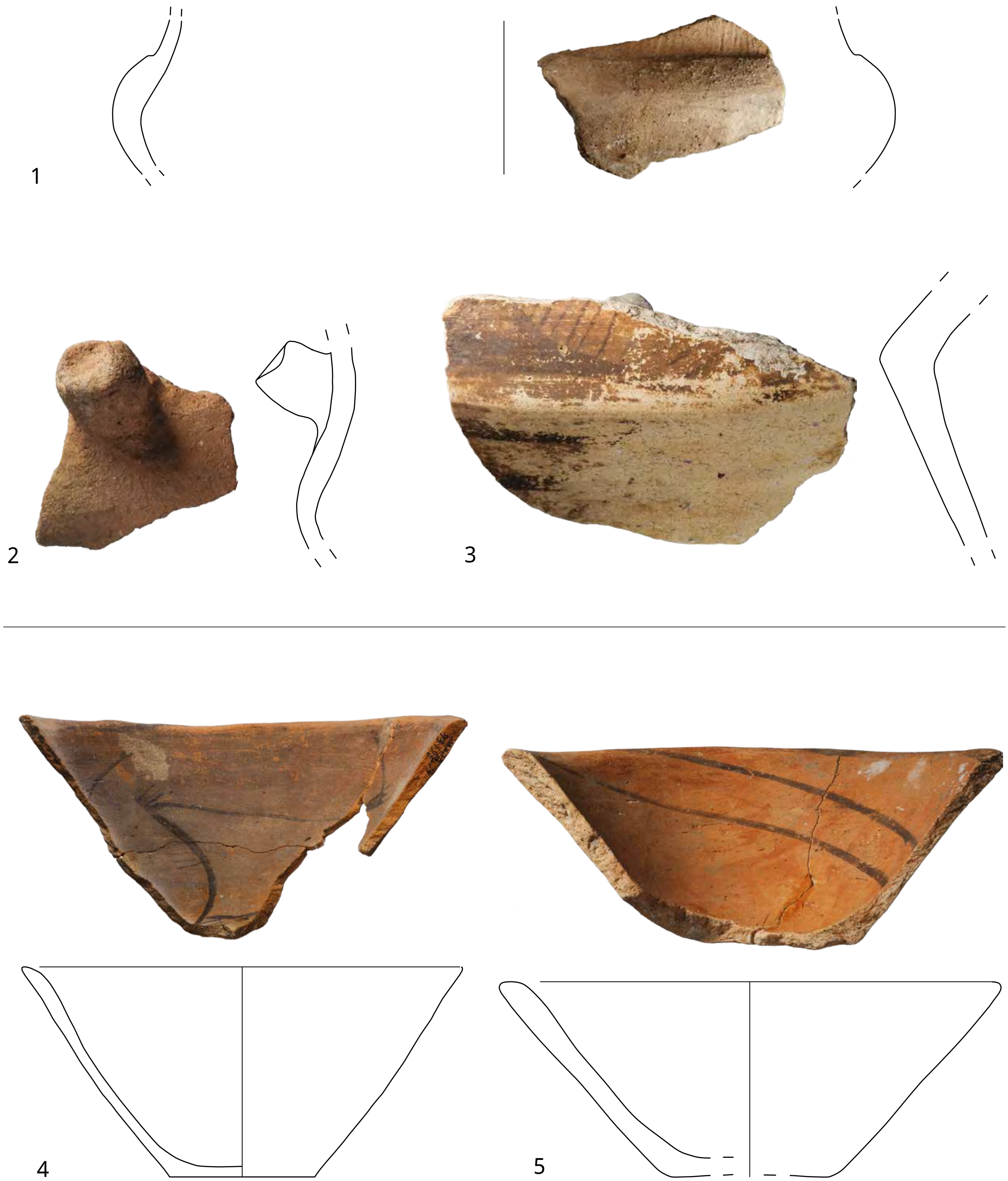

Plate 47. Trench 93. Dwelling 57. 1 KE93006 Scale 1:2 (contexts 93002 and 93004); 2 KE93007 Scale 1:2 (context 93002); 3 KE93008 Scale 1:2 (contexts 93002 and 93004).
Dwelling 58. 4 KE93009 Scale 1:3 (context 93005); 5 KE93010 Scale 1:2 (context 93005).

Plate 48. Trench 93. Dwelling 58. 1 KE93011 Scale 1:3 (context 93005).

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Plate 49. Trench 93. Dwelling 58. 1 KE93012 Scale 1:2 (context 93005); 2 KE93013 Scale 1:2 (context 93005).

Plate 50. Trench 93. Dwelling 58. 1 F93072 Scale 1:2 (context 93004); 2 F93076 Scale 1:2 (context 93005); 3 F93065 Scale 1:2 (context 93003); 4a-d F93067 Scale 1:2 (context 93004); 5 F93071 Scale 1:2 (context 93004); 6 F93163 Scale 1:2 (context 93004).

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Plate 51. Trench 93. Dwelling 58. 1 F93123 Scale 1:2 (context 93005).

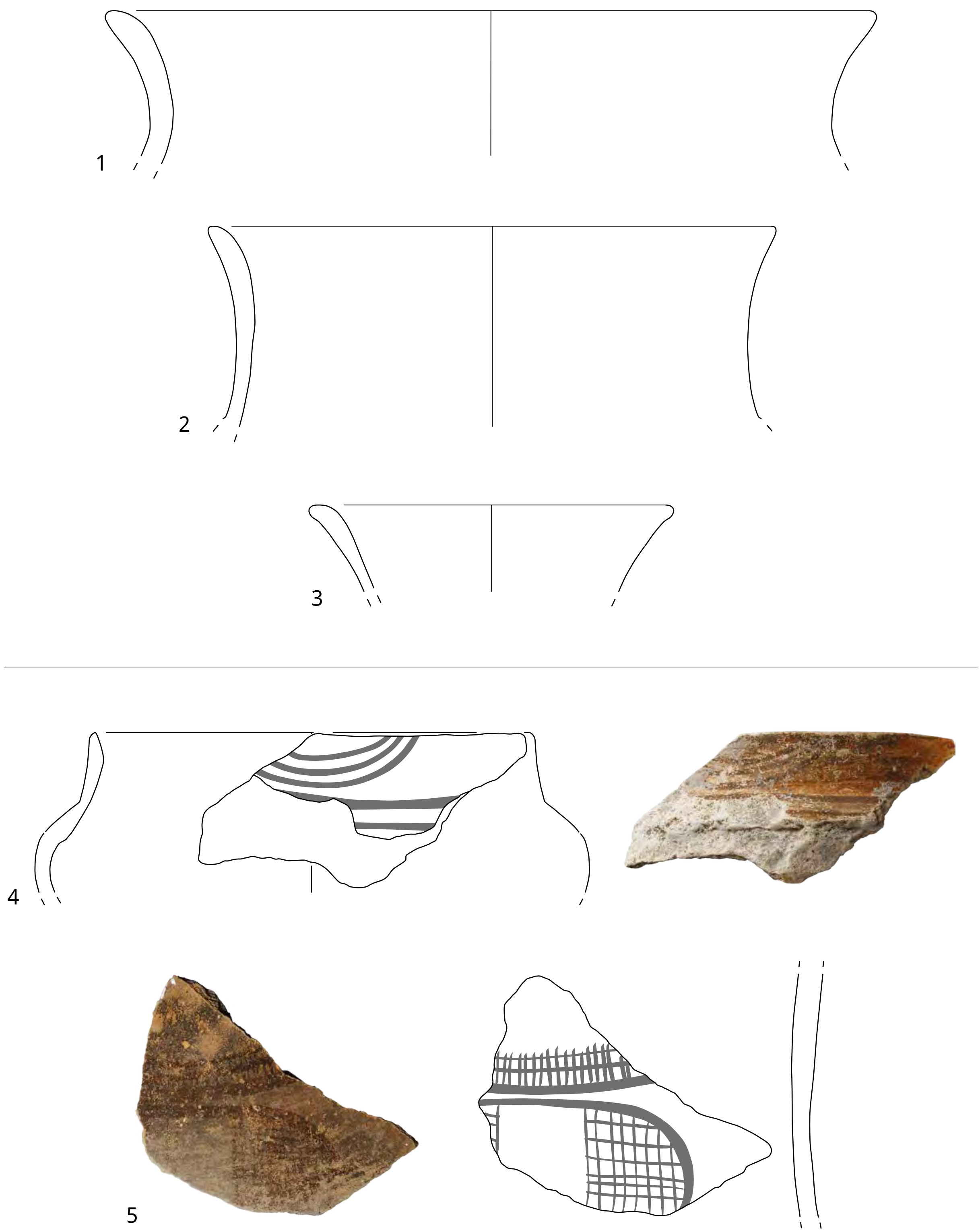

Plate 52. Trench 94. Dwelling 59. 1 KE94001 Scale 1:3 (contexts 94002 and 94003); 2 KE94002 Scale 1:3 (contexts 94002 and 94003); 3 KE94003 Scale 1:2 (contexts 94002 and 94003); 4 KE94004 Scale 1:2 (contexts 94002 and 94003); 5 KE94005 Scale 1:2 (contexts 94002 and 94003).

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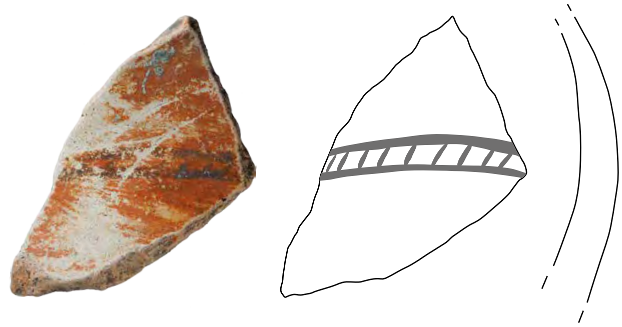

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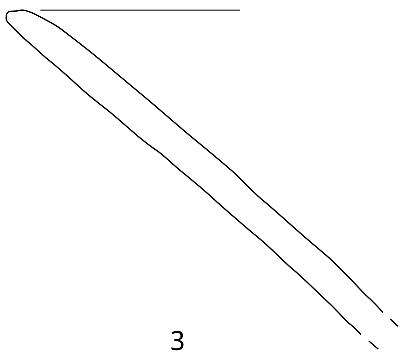

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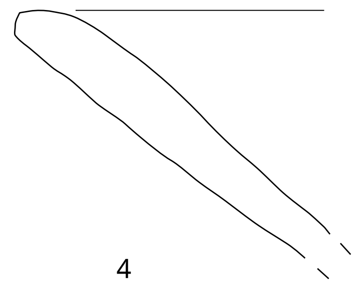

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Plate 53. Trench 95. Dwelling 60. 1 KE95001 Scale 1:2 (context 95002); 2 KE95002 Scale 1:2 (context 95003); 3 KE95003 Scale 1:2 (context 95003); 4 KE95004 Scale 1:2 (context 95003); 5 F95029 Scale 1:3 (context 95005); 6 F95034 Scale 1:3 (context 95006); 7 F95035 Scale 1:3 (contexts 95005 and 95007); 8 F95036 Scale 1:3 (contexts 95005 and 95007).

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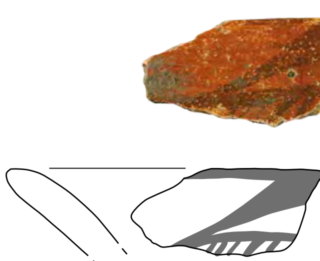

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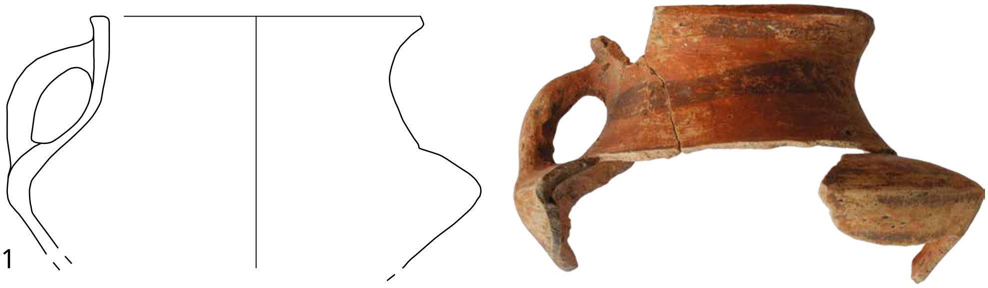
Plate 54. Trench 96. Dwelling 61. 1 KE96001 Scale 1:2 (context 96002); 2 KE96002 Scale 1:2 (context 96002); 3 KE96003 Scale 1:2 (context 96002).



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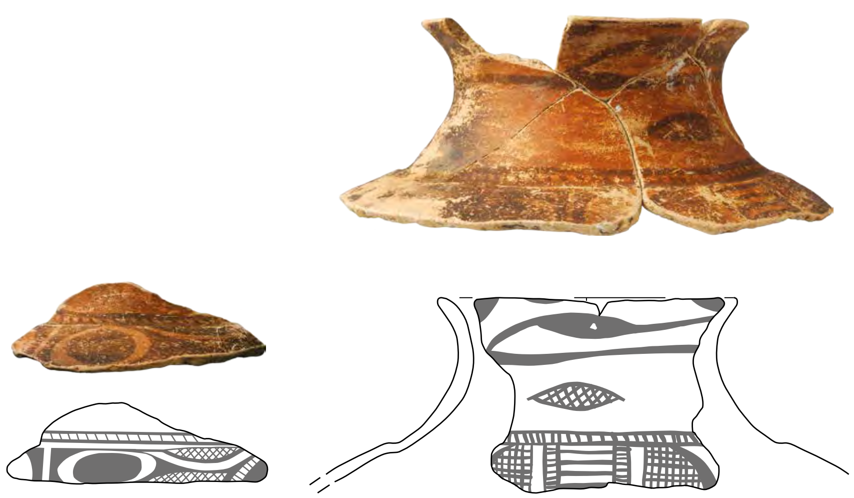

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Plate 55. Trench 96. Dwelling 61. 1 KE96004 Scale 1:3 (contexts 96002 and 96013); 2 KE96005 Scale 1:3 (context 96003); 3 KE96006 Scale 1:3 (contexts 96003 and 96013).

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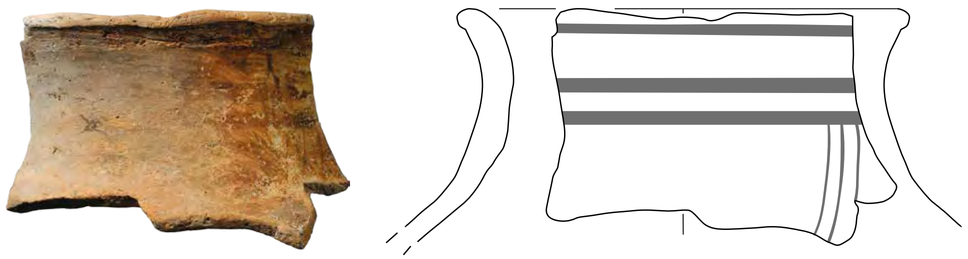

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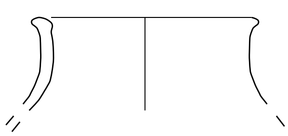

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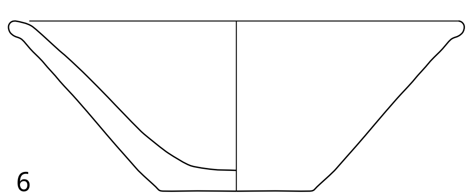

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Plate 56. Trench 96. Dwelling 62. 1 KE96007 Scale 1:2 (contexts 96002 and 96013); 2 KE96008 Scale 1:2 (context 96015); 3 KE96009 Scale 1:2 (context 96002); 4 KE96010 Scale 1:2 (context 96002); 5 KE96011 Scale 1:2 (context 96015); 6 KE96012 Scale 1:2 (context 96002).


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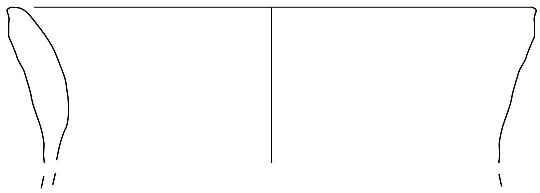
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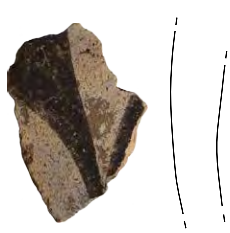
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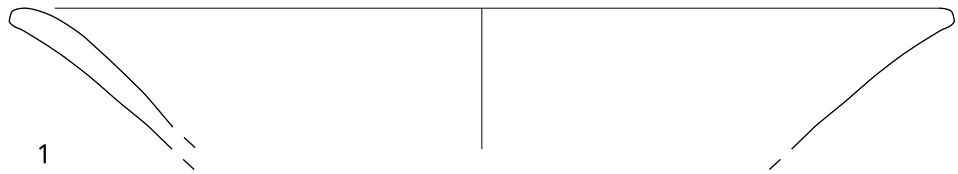
Plate 57. Trench 100. Dwelling 63. 1 KE100001 Scale 1:2 (context 100003); 2 KE100002 Scale 1:2 (context 100003). Trench 101. Dwelling 64. 3 KE101001 Scale 1:2 (context 101011); 4 KE101002 Scale 1:2 (context 101002); 5 KE101003 Scale 1:2 (context 101005).



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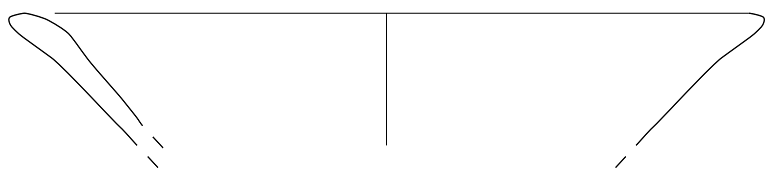

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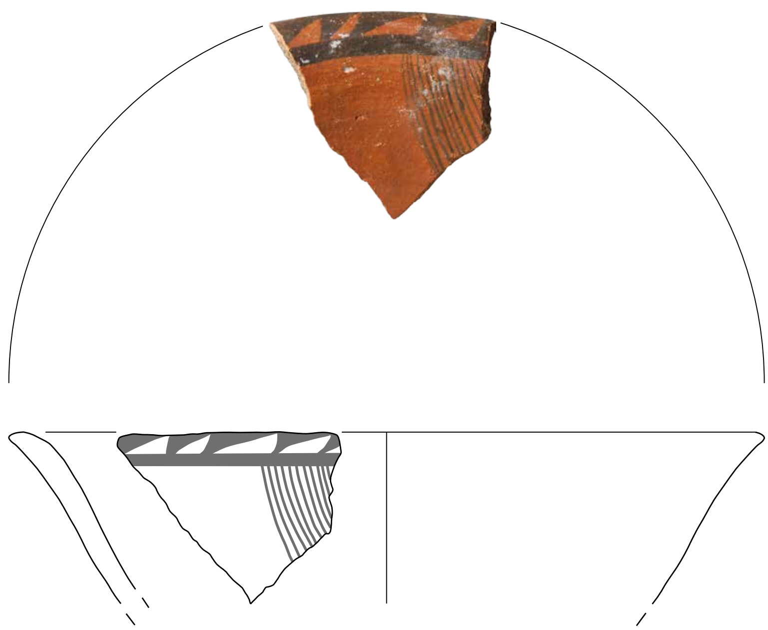

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Plate 58. Trench 101. Dwelling 64. 1 KE101004 Scale 1:2 (context 101003); 2 KE101005 Scale 1:2 (context 101008). Trench 103. Dwelling 66. 3 KE103001 Scale 1:2 (context 103001).

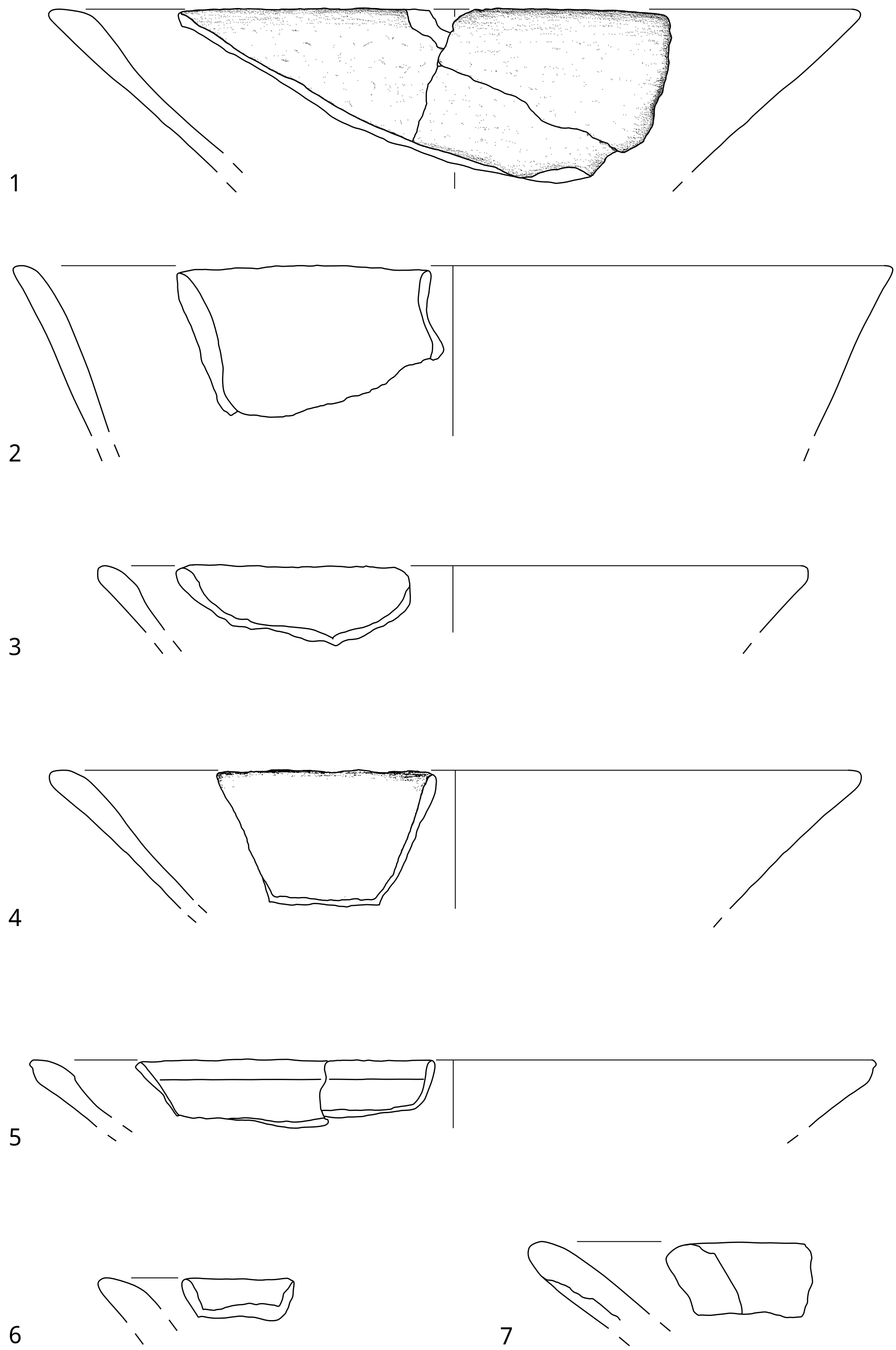

Plate 59. Trench 110. Ditch east. 1 KE110036 Scale 1:2 (context 110011); 2 KE110037 Scale 1:2 (context 110016); 3 KE110038 Scale 1:2 (context 110016); 4 KE110039 Scale 1:2 (context 110016); 5 KE110040 Scale 1:2 (context 110011); 6 KE110041 Scale 1:2 (context 110016); 7 KE110042 Scale 1:2 (context 110016).

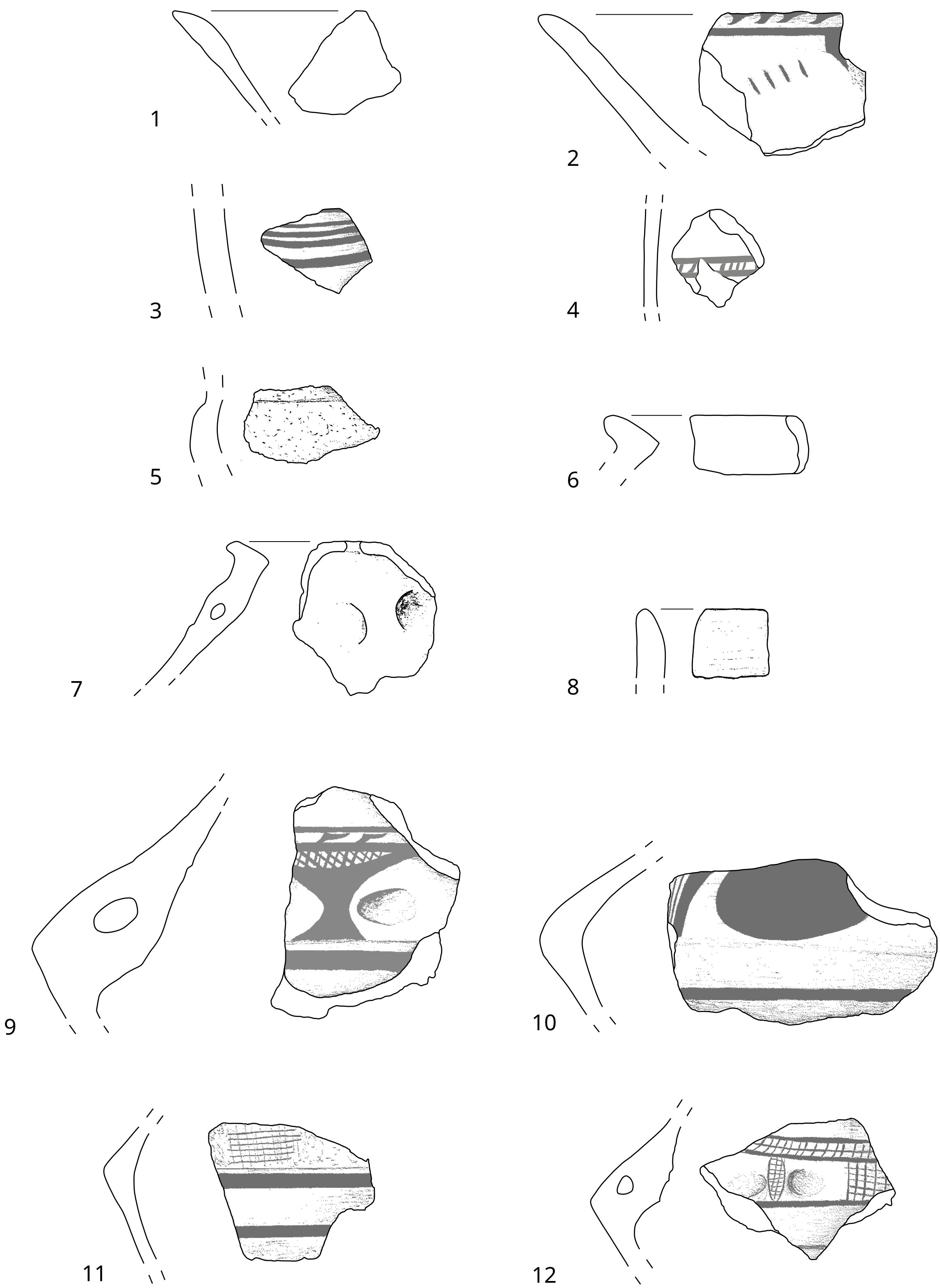

Plate 60. Trench 110. Ditch east. 1 KE110043 Scale 1:2 (context 110016); 2 KE110044 Scale 1:2 (context 110016); 3 KE110045 Scale 1:2 (context 110016); 4 KE110046 Scale 1:2 (context 110016); 5 KE110047 Scale 1:2 (context 110011); 6 KE110048 Scale 1:2 (context 110016); 7 KE110049 Scale 1:2 (context 110016); 8 KE110050 Scale 1:2 (context 110016); 9 KE110051 Scale 1:2 (context 110016); 10 KE110052 Scale 1:2 (context 110016); 11 KE110053 Scale 1:2 (context 110016); 12 KE110054 Scale 1:2 (context 110016).

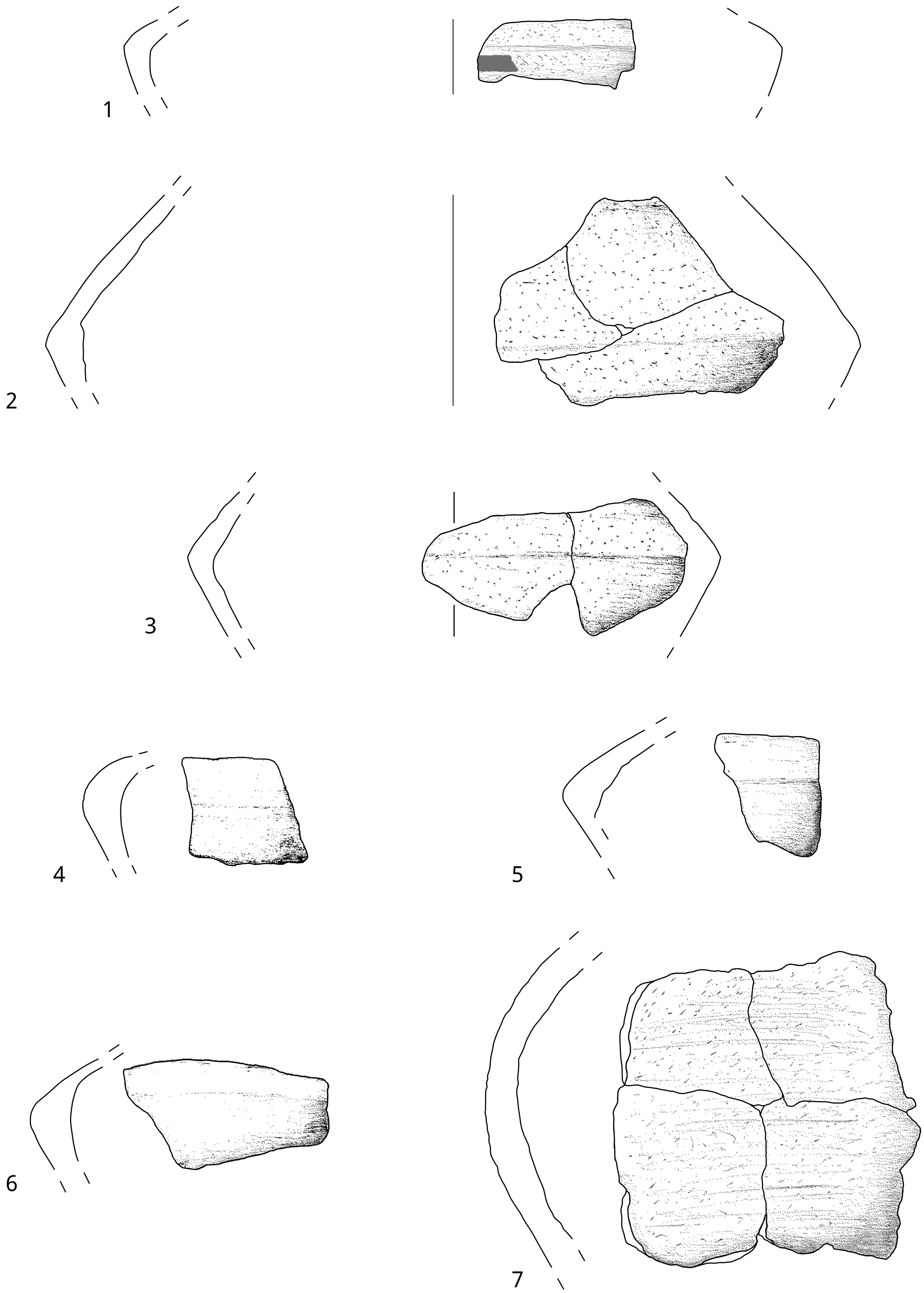

Plate 61. Trench 110. Ditch east. 1 KE110055 Scale 1:2 (context 110016); 2 KE110056 Scale 1:2 (context 110011); 3 KE110057 Scale 1:2 (context 110016); 4 KE110058 Scale 1:2 (context 110011); 5 KE110059 Scale 1:2 (context 110016); 6 KE110060 Scale 1:2 (context 110016); 7 KE110061 Scale 1:2 (context 110016).

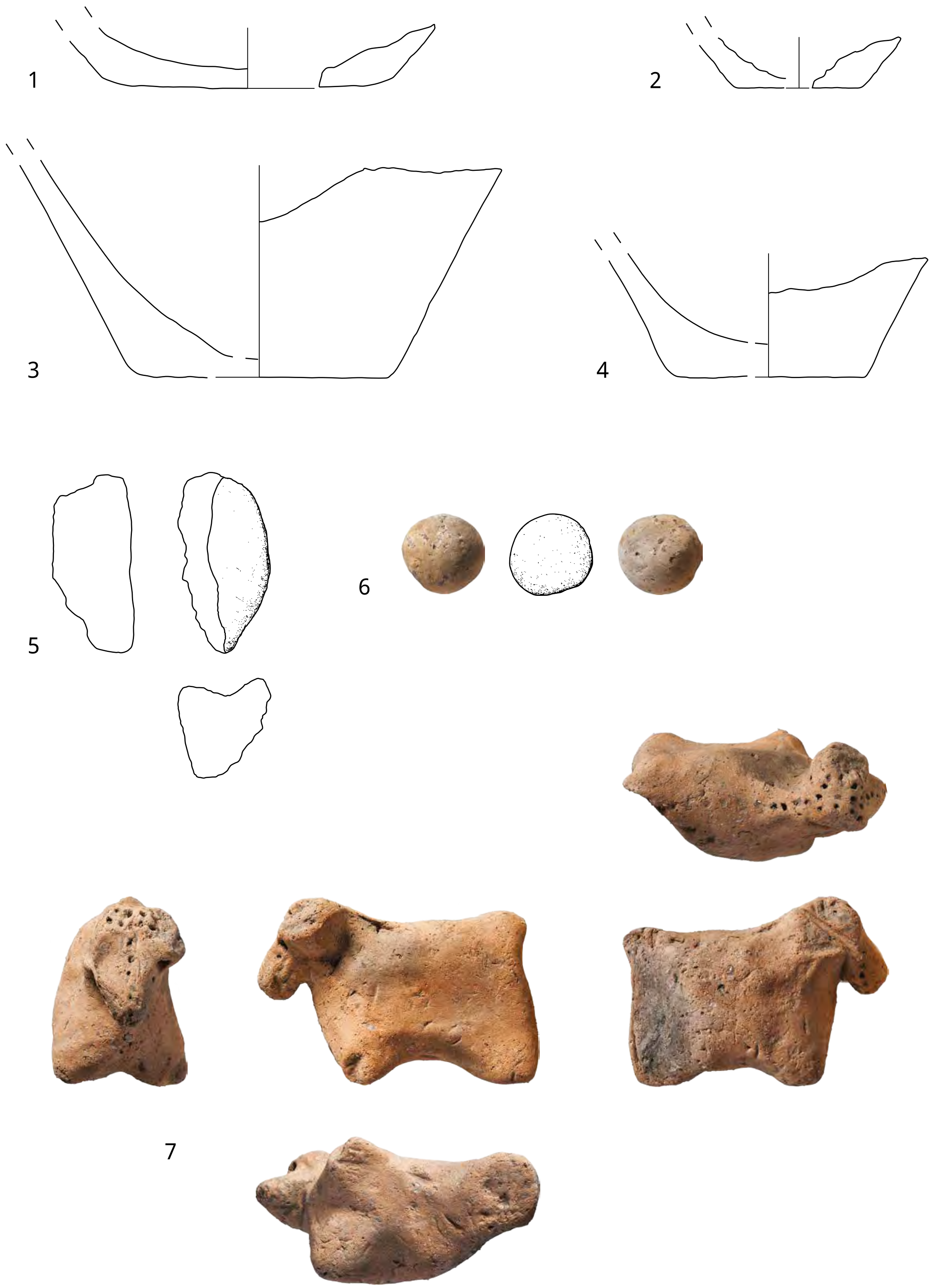

Plate 62. Trench 110. Ditch east. 1 KE110062 Scale 1:2 (context 110016); 2 KE110063 Scale 1:2 (context 110016); 3 KE110064 Scale 1:2 (context 110016); 4 KE110065 Scale 1:2 (context 110011); 5 F110305 Scale 1:2 (context 110016); 6 F110068 Scale 1:2 (context 110002); 7 F110336 Scale 1:1 (context 110016).

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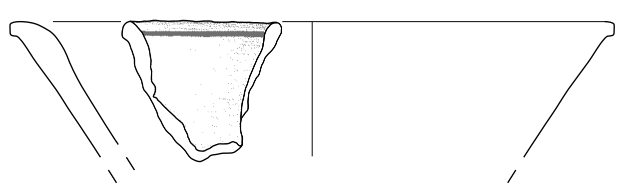

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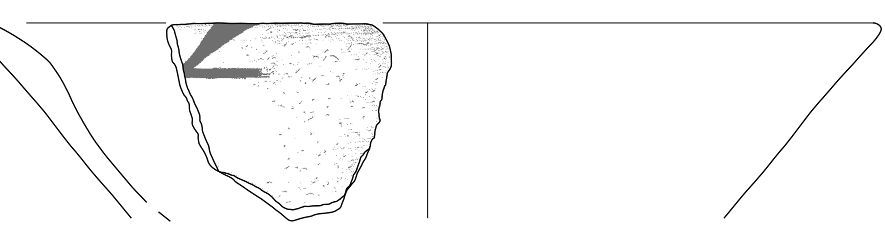

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Plate 63. Trench 110. Ditch east. 1 F110336 Scale 1:1 (context 110016).
Ditch west. 2 KE110066 Scale 1:2 (context 110009); 3 KE110067 Scale 1:2 (context 110009).

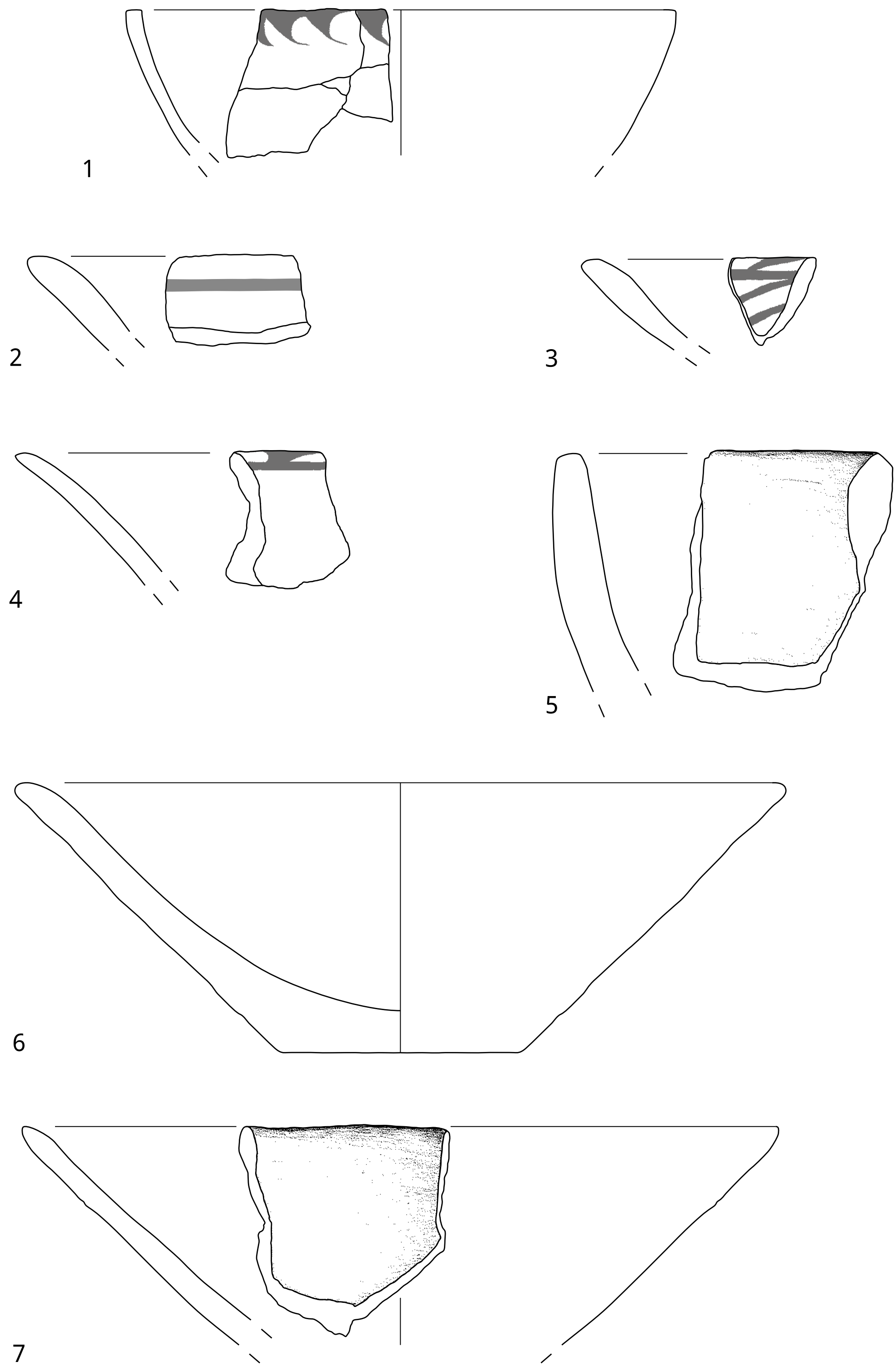
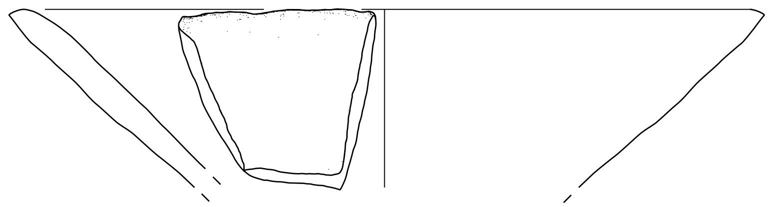


Plate 64. Trench 110. Ditch west. 1 KE110068 Scale 1:2 (context 110009); 2 KE110069 Scale 1:2 (context 110009); 3 KE110070 Scale 1:2 (context 110009); 4 KE110071 Scale 1:2 (context 110009); 5 KE110072 Scale 1:2 (context 110009); 6 KE110073 Scale 1:2 (context 110009); 7 KE110074 Scale 1:2 (context 110009).



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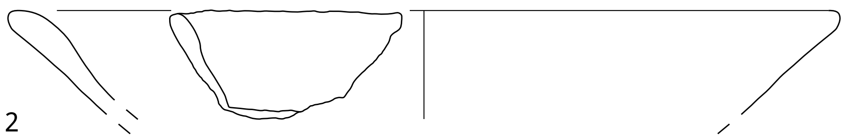

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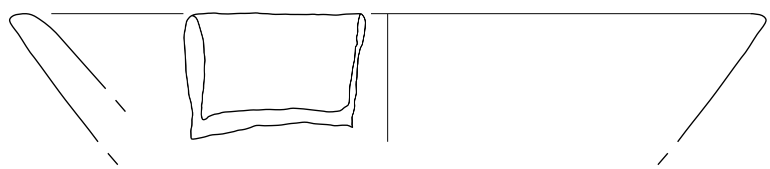

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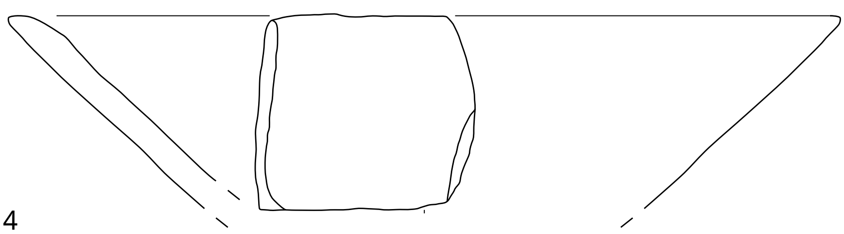

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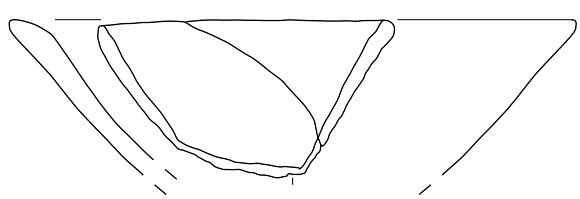

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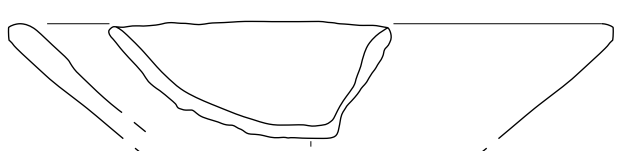

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Plate 65. Trench 110. Ditch west. 1 KE110075 Scale 1:2 (context 110009); 2 KE110076 Scale 1:2 (context 110009); 3 KE110077 Scale 1:2 (context 110009); 4 KE110078 Scale 1:2 (context 110009); 5 KE110079 Scale 1:2 (context 110009); 6 KE110080 Scale 1:2 (context 110009).

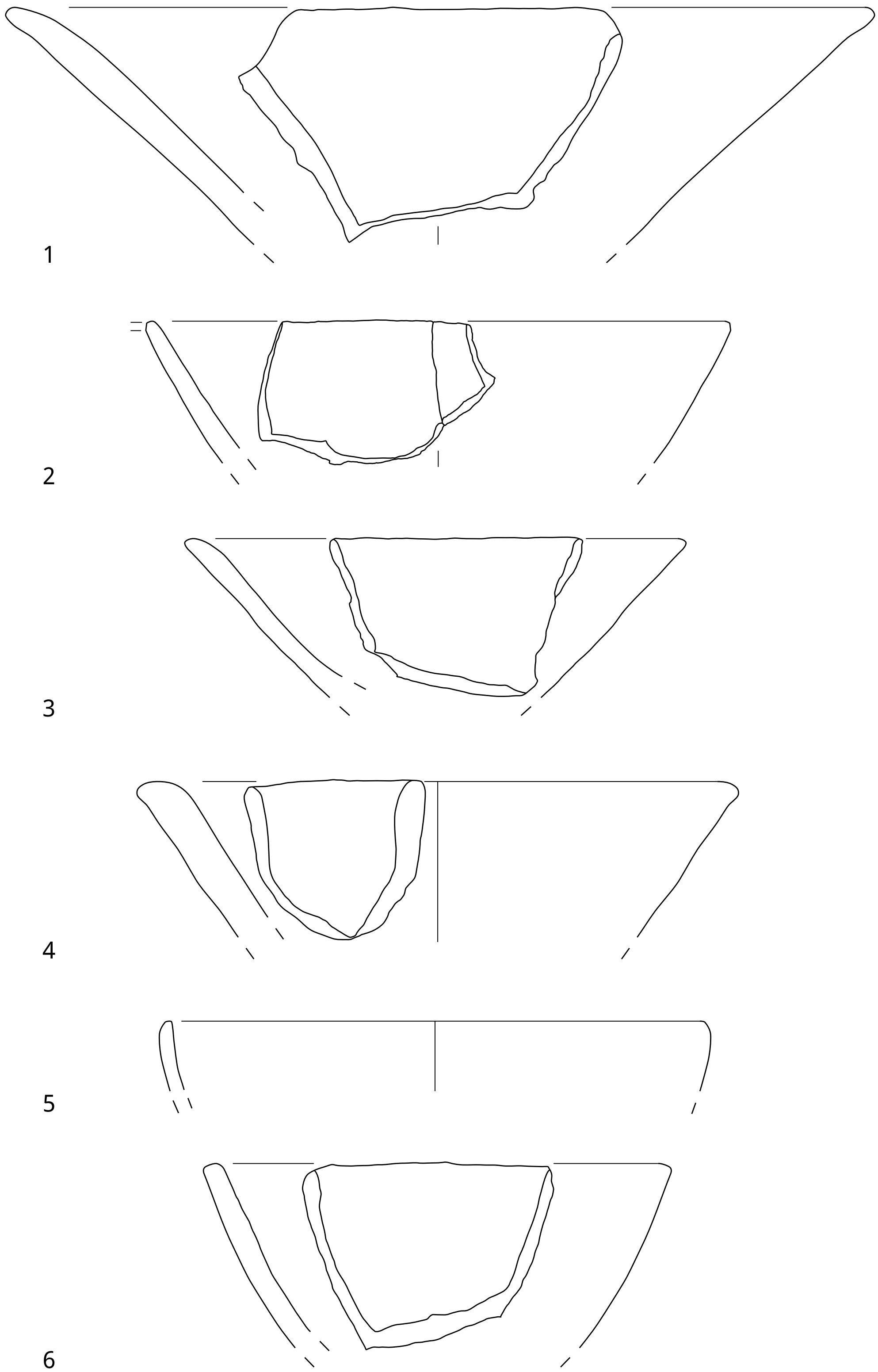


Plate 66. Trench 110. Ditch west. 1 KE110081 Scale 1:2 (context 110009); 2 KE110082 Scale 1:2 (context 110009); 3 KE110083 Scale 1:2 (context 110009); 4 KE110084 Scale 1:2 (context 110009); 5 KE110085 Scale 1:3 (context 110009); 6 KE110086 Scale 1:2 (context 110009).

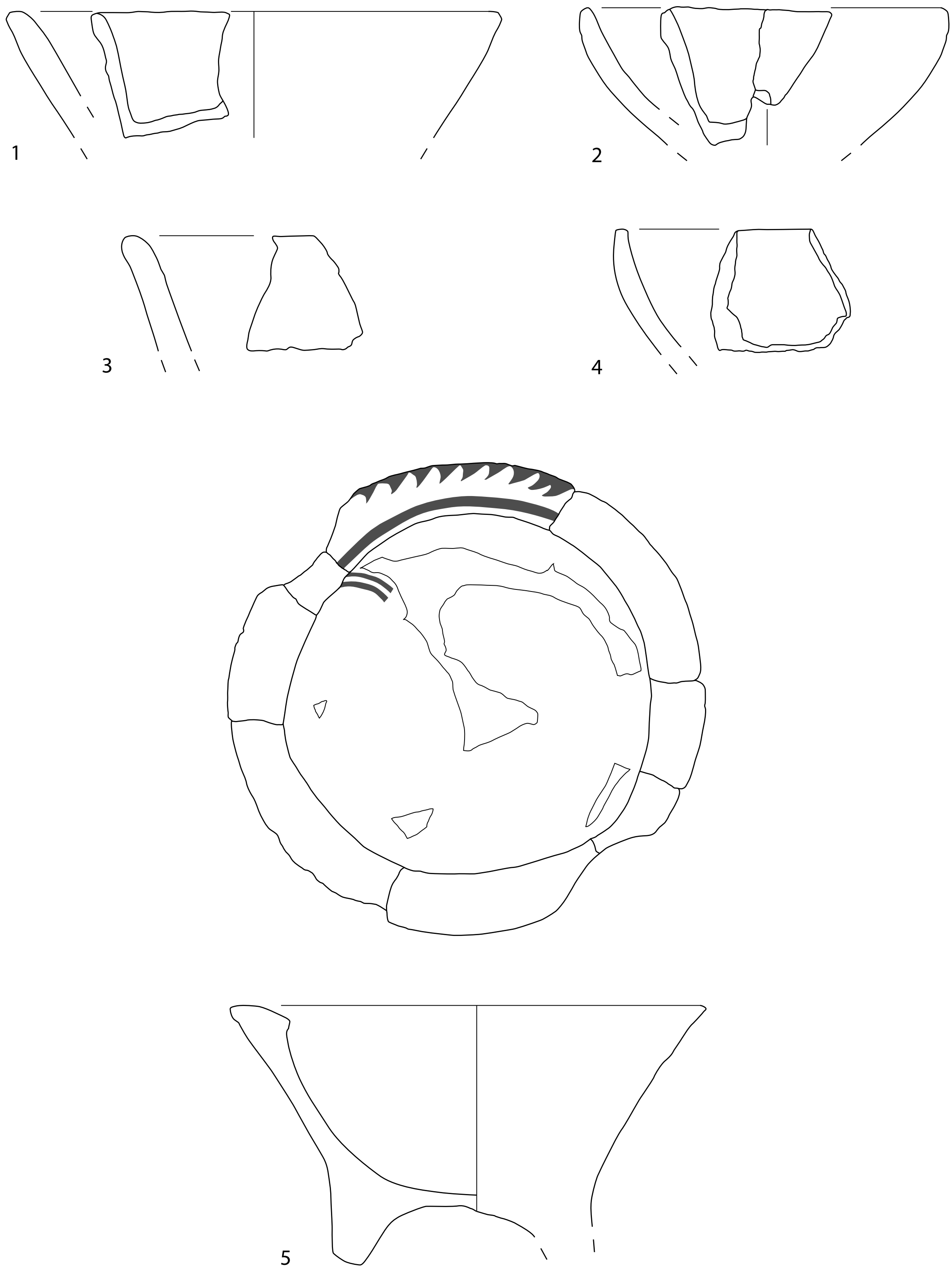


Plate 67. Trench 110. Ditch west. 1 KE110087 Scale 1:2 (context 110009); 2 KE110088 Scale 1:2 (context 110009); 3 KE110089 Scale 1:2 (context 110009); 4 KE110090 Scale 1:2 (context 110009).
Western and eastern ditch segment. 5 KE110091 Scale 1:2 (contexts 110009 and 110016).

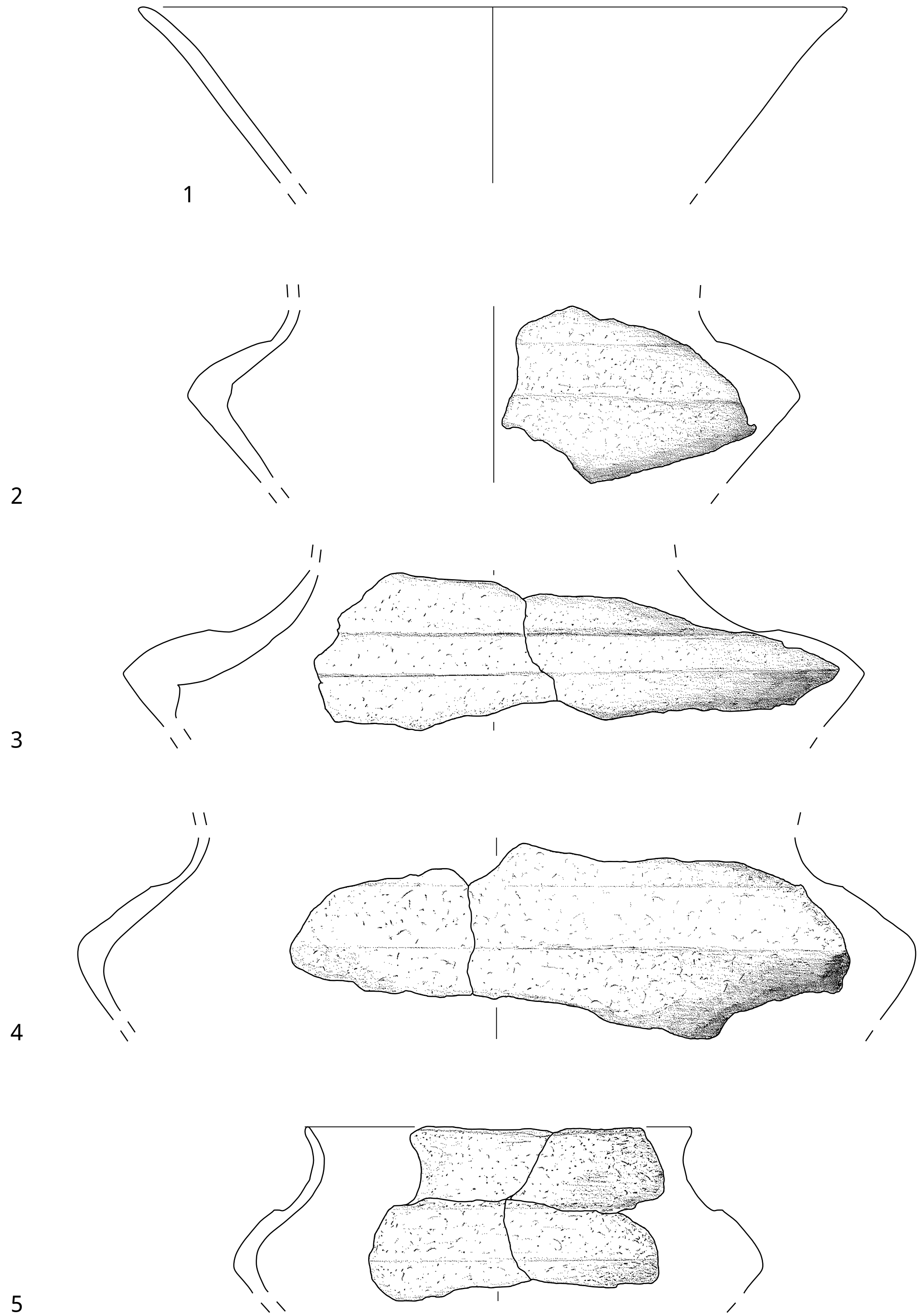


Plate 68. Trench 110. Ditch west. 1 KE110092 Scale 1:2 (context 110009); 2 KE110093 Scale 1:2 (context 110009); 3 KE110094 Scale 1:2 (context 110009); 4 KE110095 Scale 1:2 (context 110009); 5 KE110096 Scale 1:2 (context 110009).

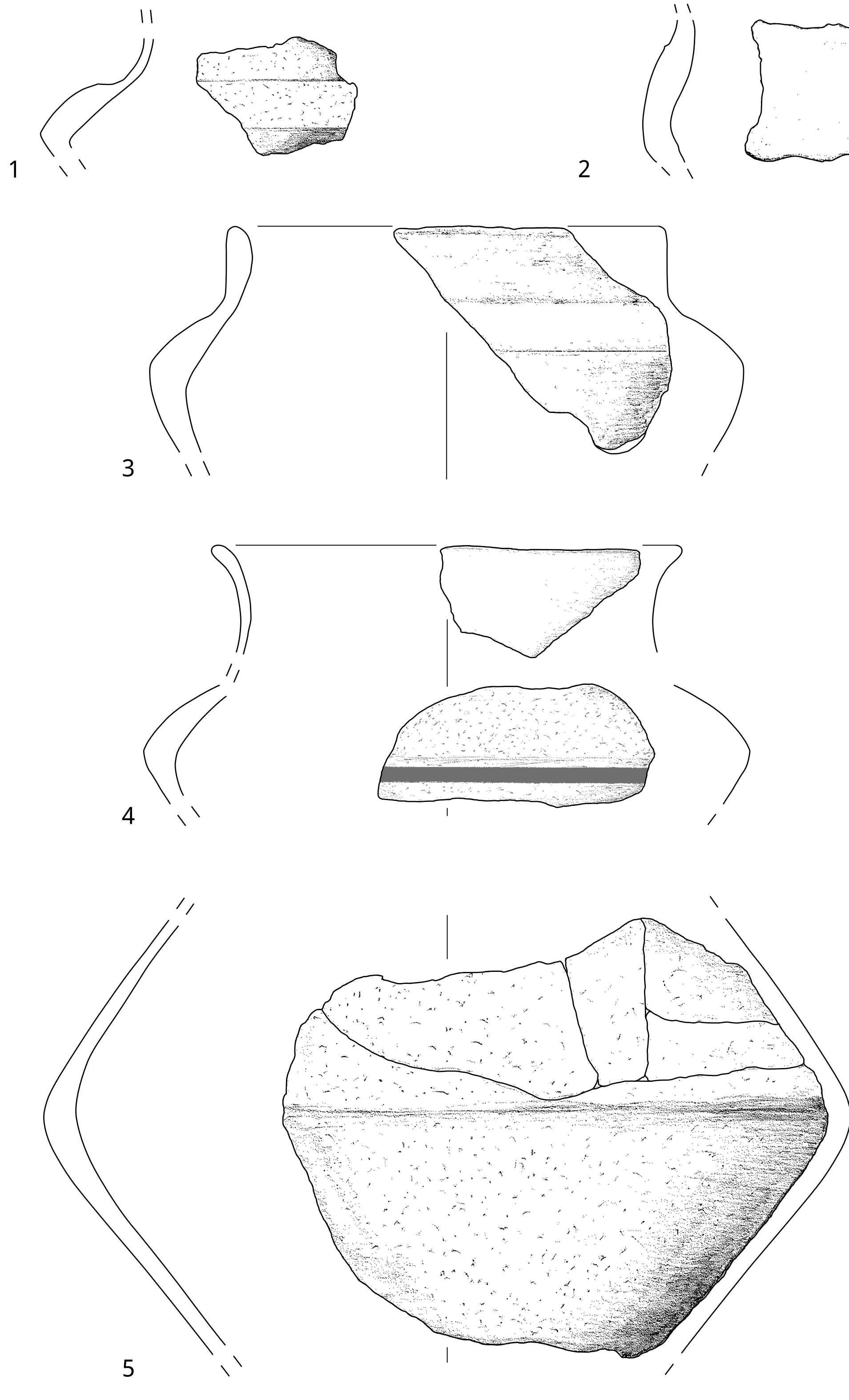


Plate 69. Trench 110. Ditch west. 1 KE110097 Scale 1:2 (context 110009); 2 KE110098 Scale 1:2 (context 110009); 3 KE110099 Scale 1:2 (context 110009); 4 KE110100 Scale 1:2 (context 110009); 5 KE110101 Scale 1:2 (context 110009).

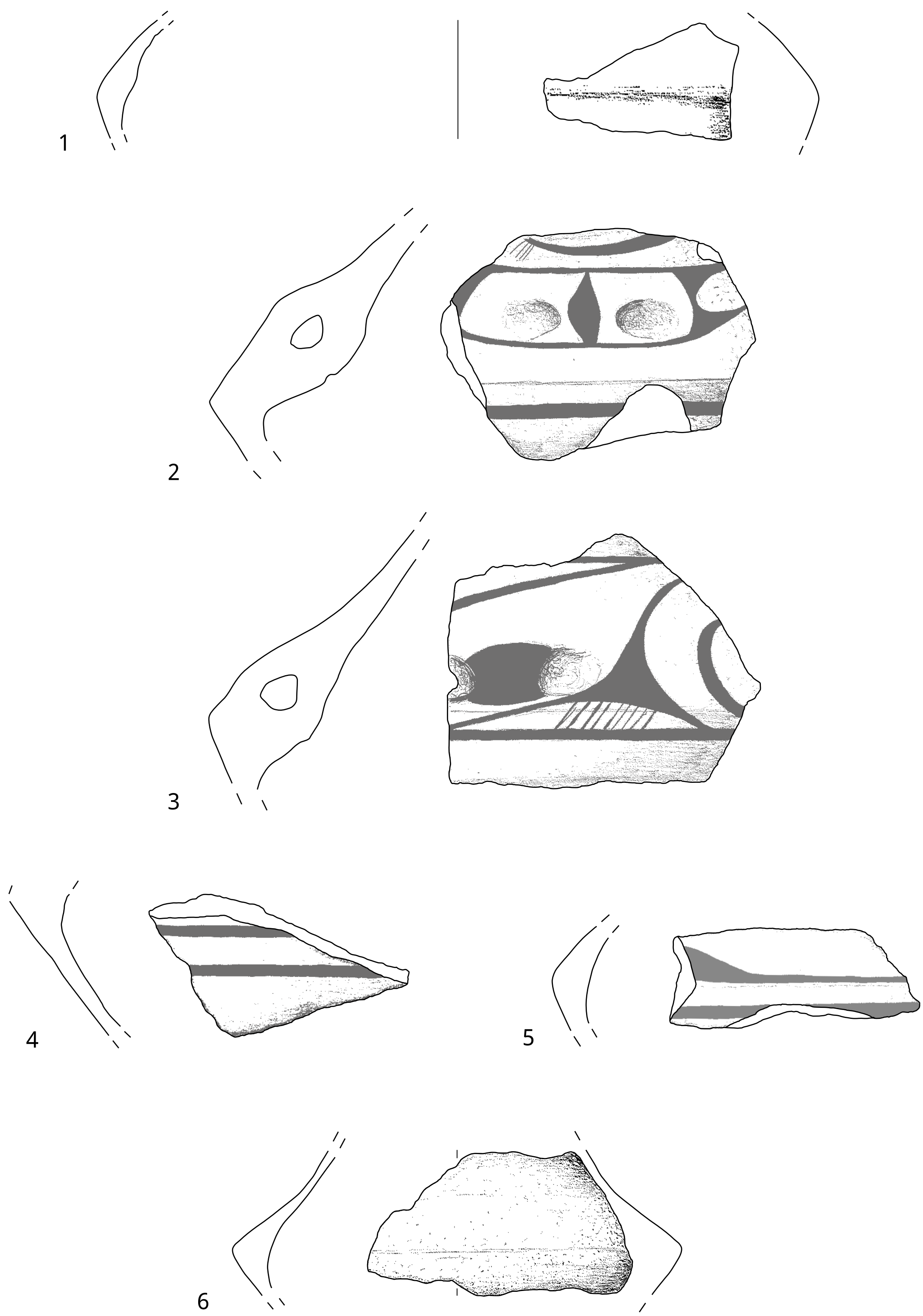


Plate 70. Trench 110. Ditch west. 1 KE110102 Scale 1:2 (context 110009); 2 KE110103 Scale 1:2 (context 110009); 3 KE110104 Scale 1:2 (context 110009); 4 KE110105 Scale 1:2 (context 110009); 5 KE110106 Scale 1:2 (context 110009); 6 KE110107 Scale 1:2 (context 110009).

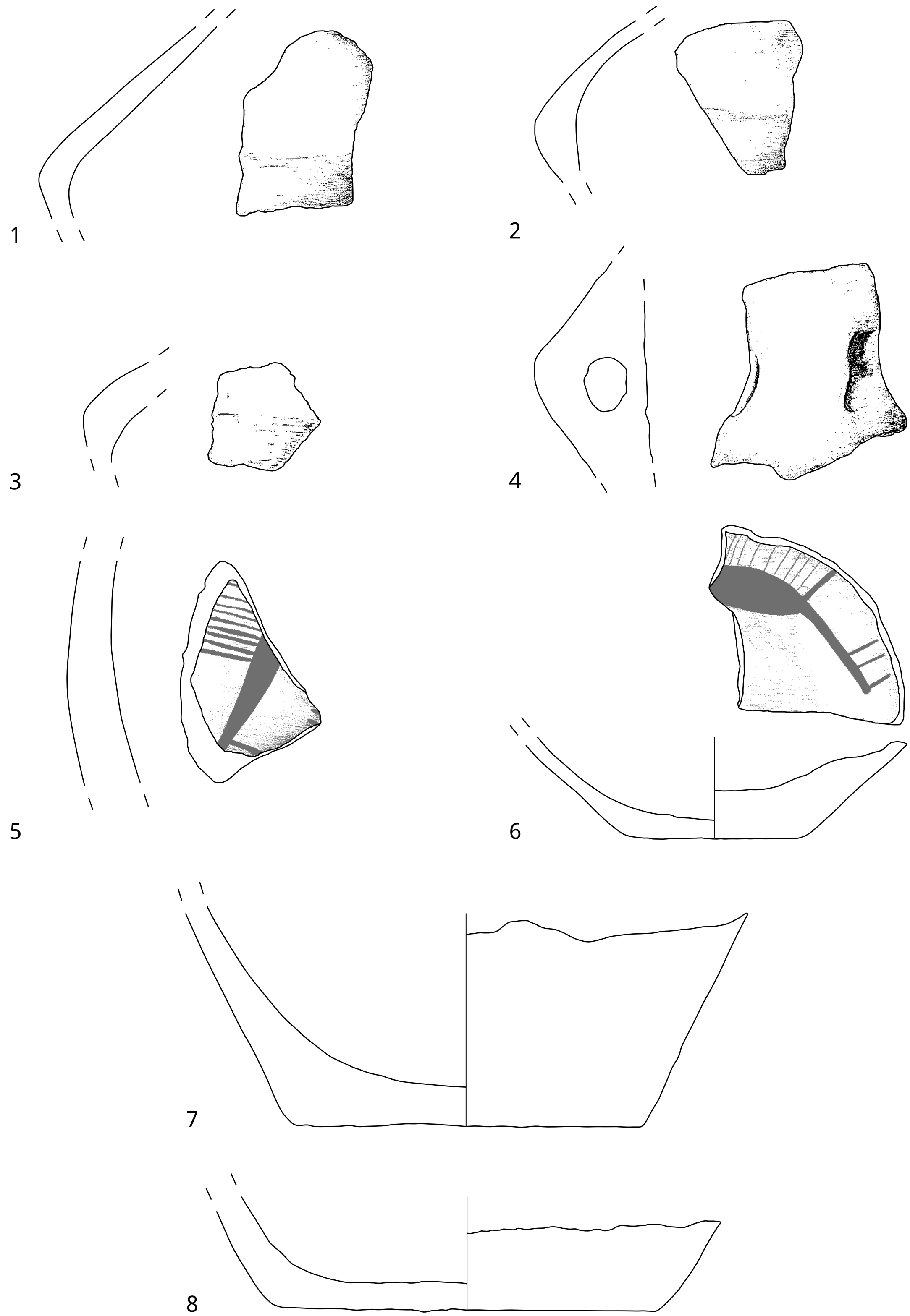


Plate 71. Trench 110. Ditch west. 1 KE110108 Scale 1:2 (context 110009); 2 KE110109 Scale 1:2 (context 110009); 3 F110377 Scale 1:2 (context 110009); 4 KE110110 Scale 1:2 (context 110009); 5 KE110111 Scale 1:2 (context 110009); 6 KE110112 Scale 1:2 (context 110009); 7 KE110113 Scale 1:2 (context 110009); 8 KE110114 Scale 1:2 (context 110009).

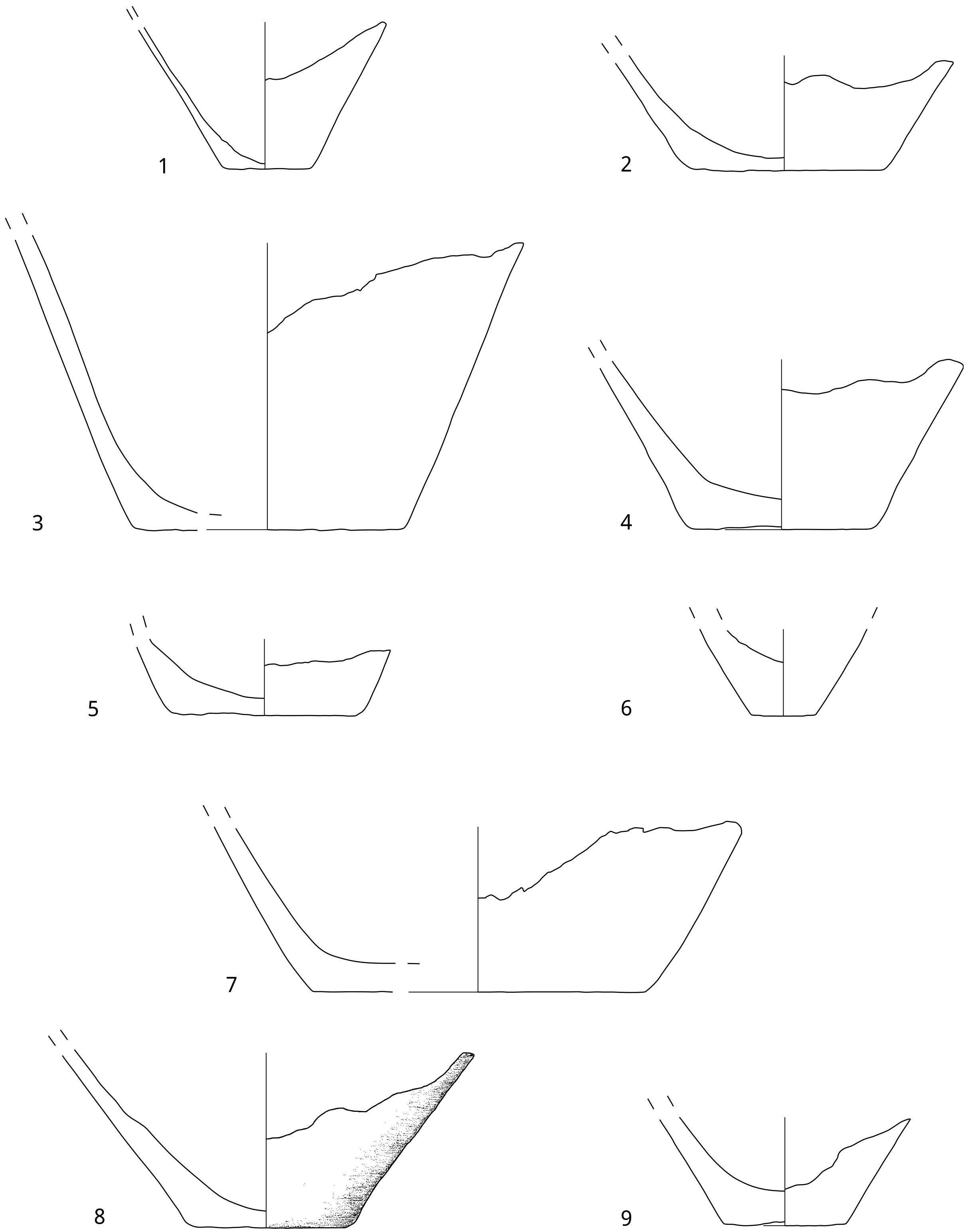


Plate 72. Trench 110. Ditch west. 1 KE110115 Scale 1:2 (context 110009); 2 KE110116 Scale 1:2 (context 110009); 3 KE110117 Scale 1:2 (context 110009); 4 KE110118 Scale 1:2 (context 110009); 5 KE110119 Scale 1:2 (context 110009); 6 KE110120 Scale 1:2 (context 110009); 7 KE110121 Scale 1:2 (context 110009); 8 KE110122 Scale 1:2 (context 110009); 9 KE110123 Scale 1:2 (context 110009).

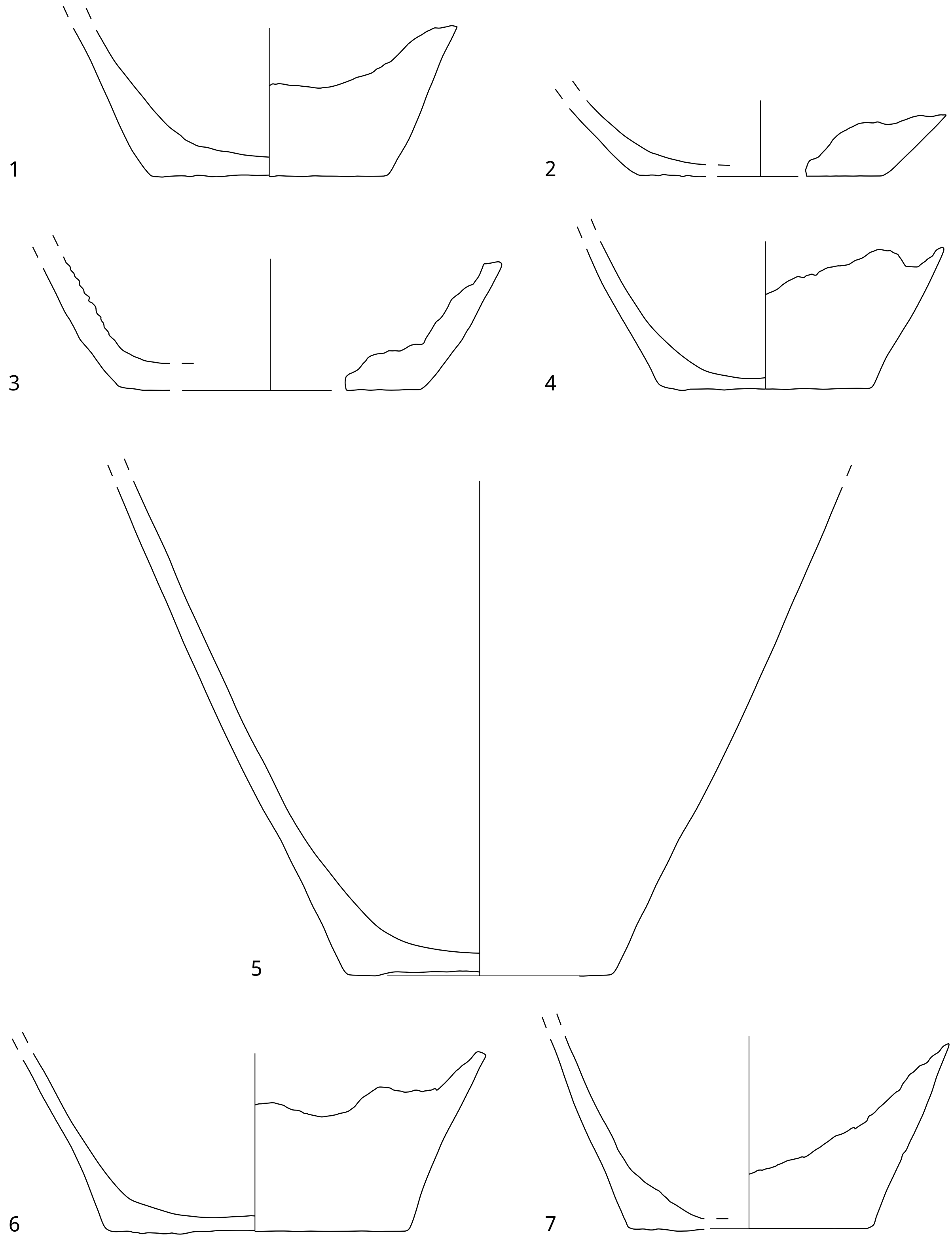


Plate 73. Trench 110. Ditch west. 1 KE110124 Scale 1:2 (context 110009); 2 KE110125 Scale 1:2 (context 110009); 3 KE110126 Scale 1:2 (context 110009); 4 KE110127 Scale 1:2 (context 110009); 5 FKE110128 Scale 1:2 (context 110009); 6 KE110129 Scale 1:2 (context 110009); 7 KE110130 Scale 1:2 (context 110009).

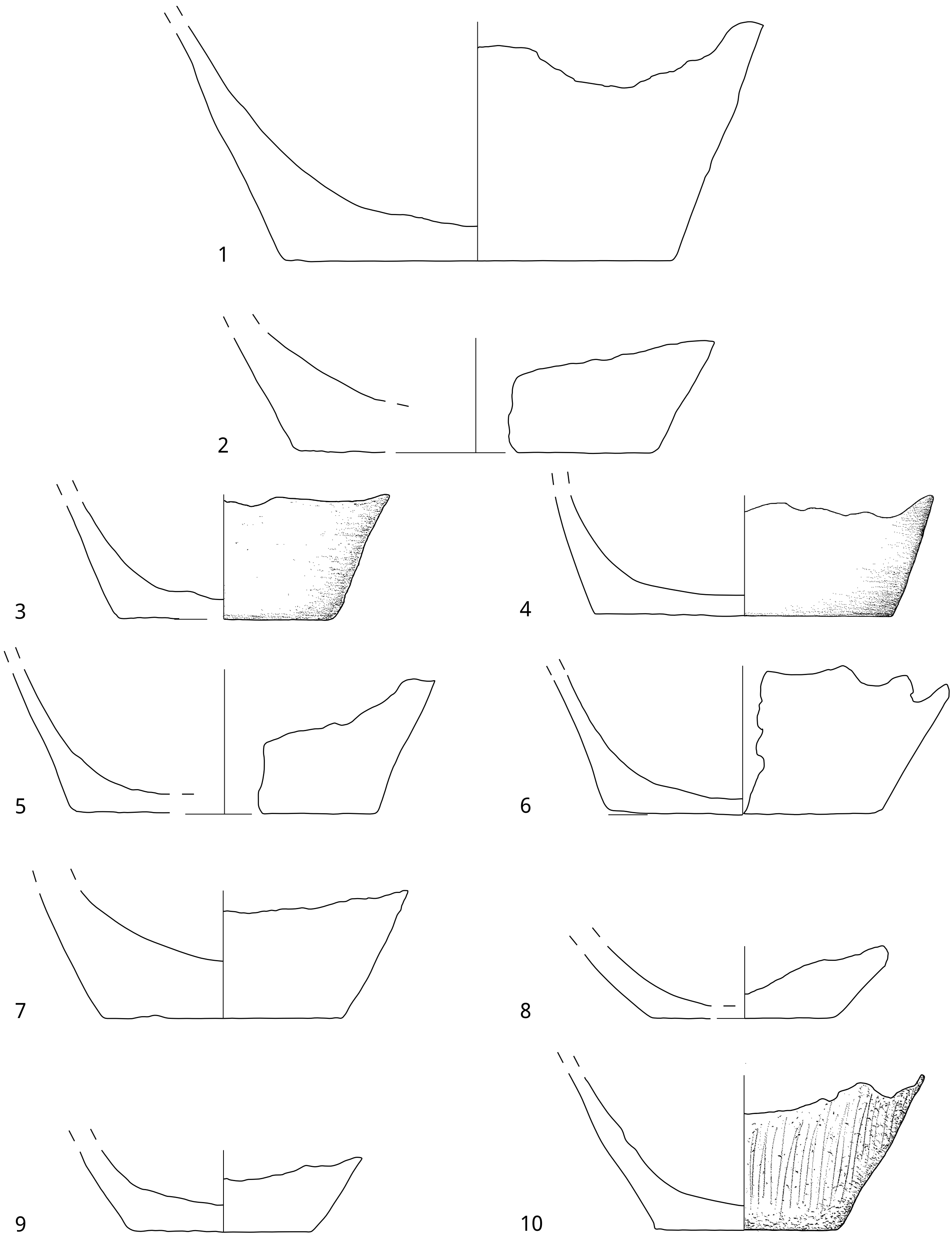


Plate 74. Trench 110. Ditch west. 1 KE110131 Scale 1:2 (context 110009); 2 KE110132 Scale 1:2 (context 110009); 3 KE110133 Scale 1:2 (context 110009); 4 KE110134 Scale 1:2 (context 110009); 5 KE110135 Scale 1:2 (context 110009); 6 KE110136 Scale 1:2 (context 110009); 7 KE110137 Scale 1:2 (context 110009); 8 KE110138 Scale 1:2 (context 110009); 9 KE110139 Scale 1:2 (context 110009); 10 KE110140 Scale 1:2 (context 110009).

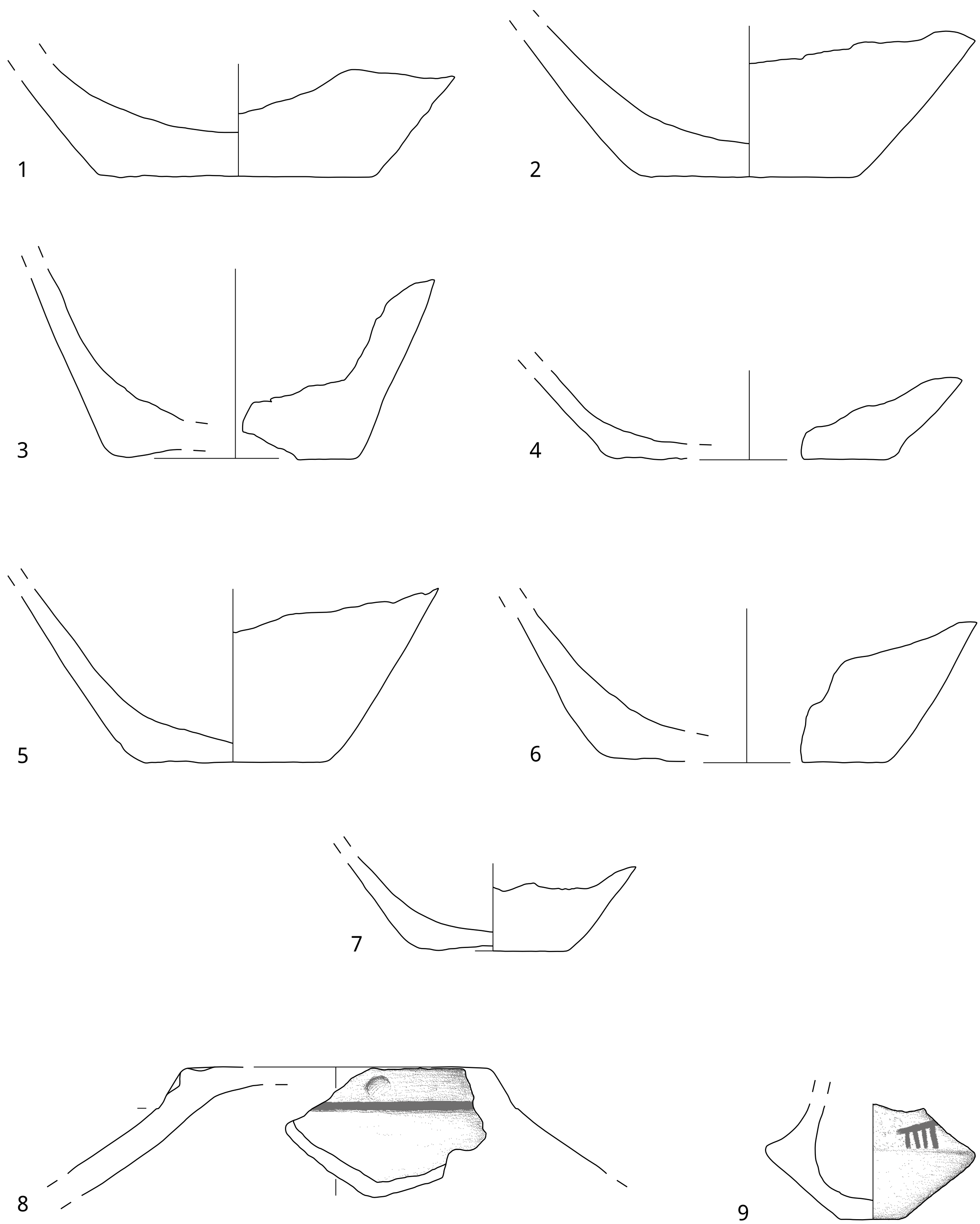
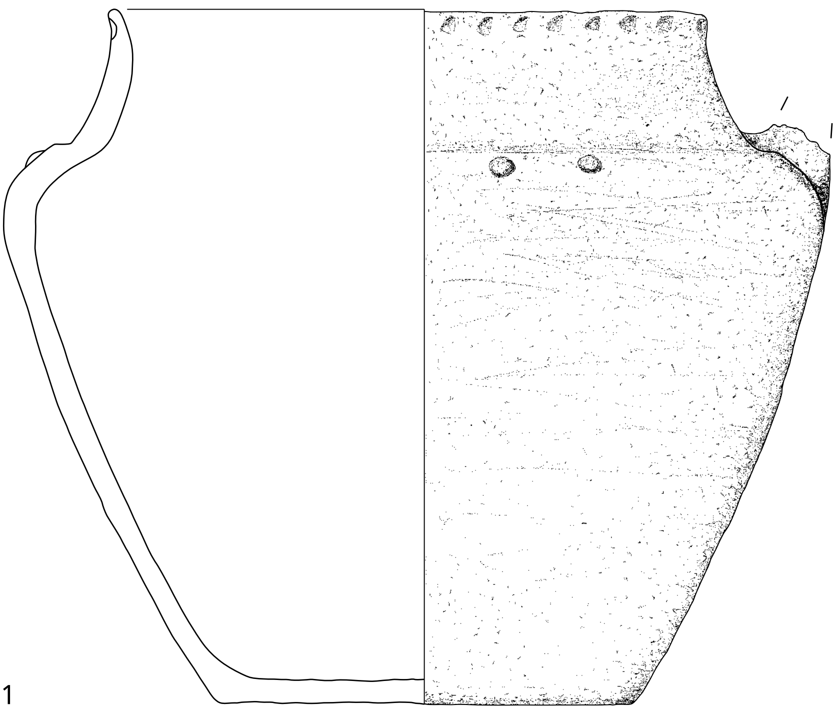


Plate 75. Trench 110. Ditch west. 1 KE110141 Scale 1:2 (context 110009); 2 KE110142 Scale 1:2 (context 110009); 3 KE110143 Scale 1:2 (context 110009); 4 KE110144 Scale 1:2 (context 110009); 5 KE110152 Scale 1:2 (context 110009); 6 KE110145 Scale 1:2 (context 110009); 7 KE110146 Scale 1:2 (context 110009); 8 KE110147 Scale 1:2 (context 110009); 9 KE110148 Scale 1:2 (context 110002).



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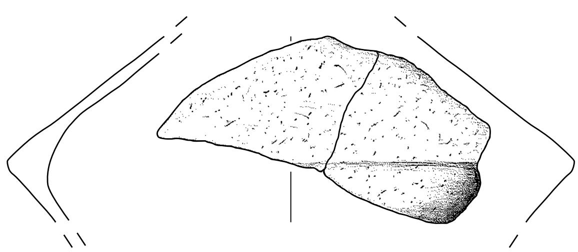

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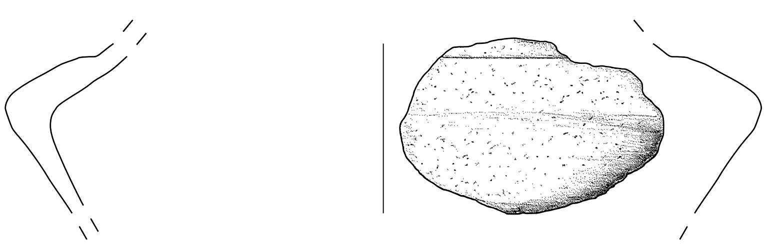

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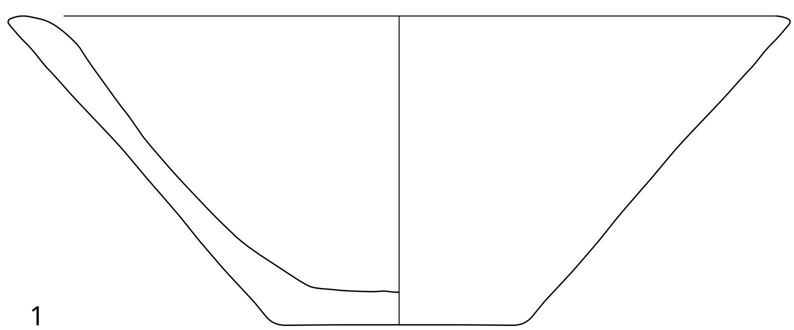
Plate 76. Trench 110. Ditch west. 1 KE110149 Scale 1:2 (context 110009); 2 KE110150 Scale 1:2 (context 110002); 3 KE110151 Scale 1:2 (context 110002).



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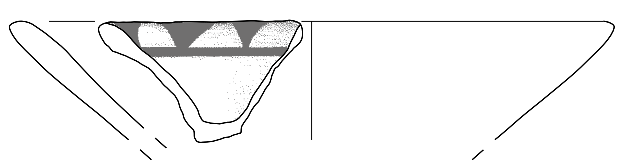

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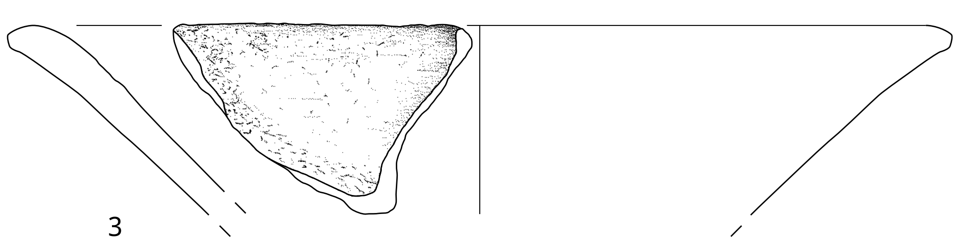

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Plate 77. Trench 110. Dwelling 67. 1 KE110017 Scale 1:2 (context 110004); 2 KE110018 Scale 1:2 (context 110004); 3 KE110019 Scale 1:2 (context 110013).


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Plate 78. Trench 110. Dwelling 67. 1 KE110020 Scale 1:2 (context 110004).

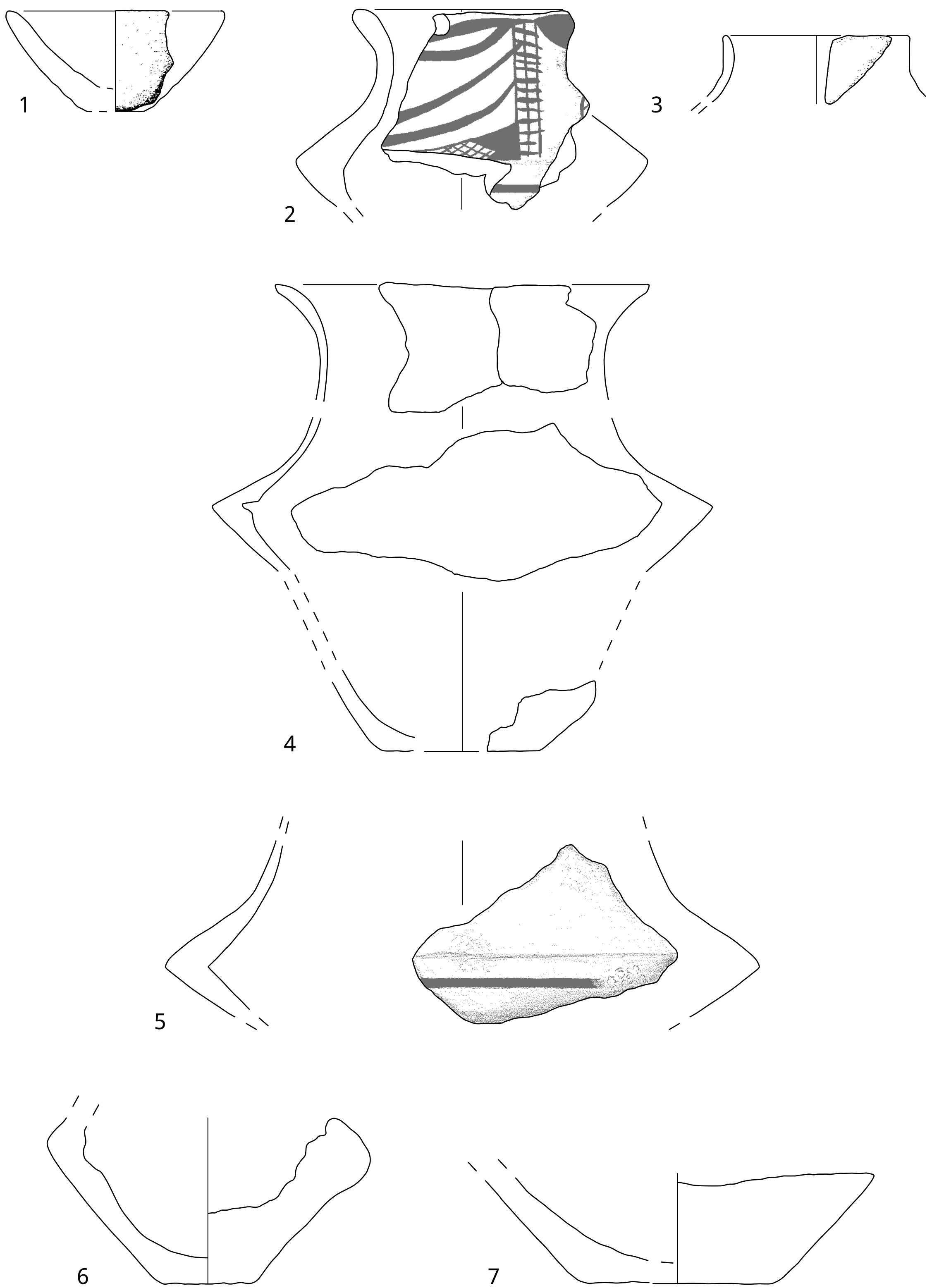

Plate 79. Trench 110. Dwelling 67. 1 KE110021 Scale 1:2 (context 110003); 2 KE110022 Scale 1:2 (context 110003); 3 KE110023 Scale 1:2 (context 110003); 4 KE110024 Scale 1:2 (context 110004); 5 KE110025 Scale 1:2 (context 110013); 6 KE110026 Scale 1:2 (context 110004); 7 KE110027 Scale 1:2 (context 110013).

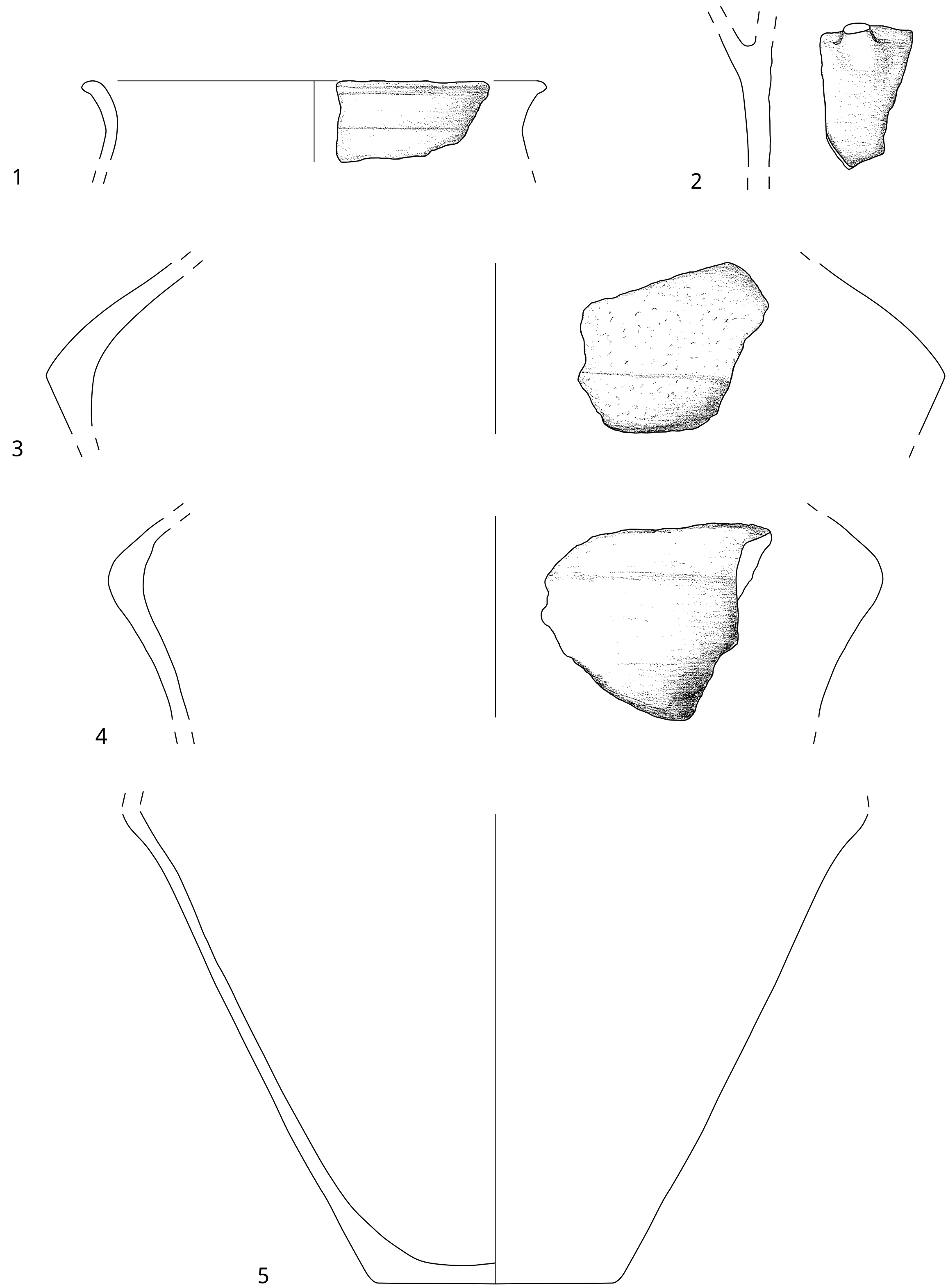

Plate 80. Trench 110. Dwelling 67. 1 KE110028 Scale 1:2 (context 110013); 2 KE110029 Scale 1:2 (context 110003); 3 KE110030 Scale 1:2 (context 110013); 4 KE110031 Scale 1:2 (context 110004); 5 KE110032 Scale 1:2 (context 110004).

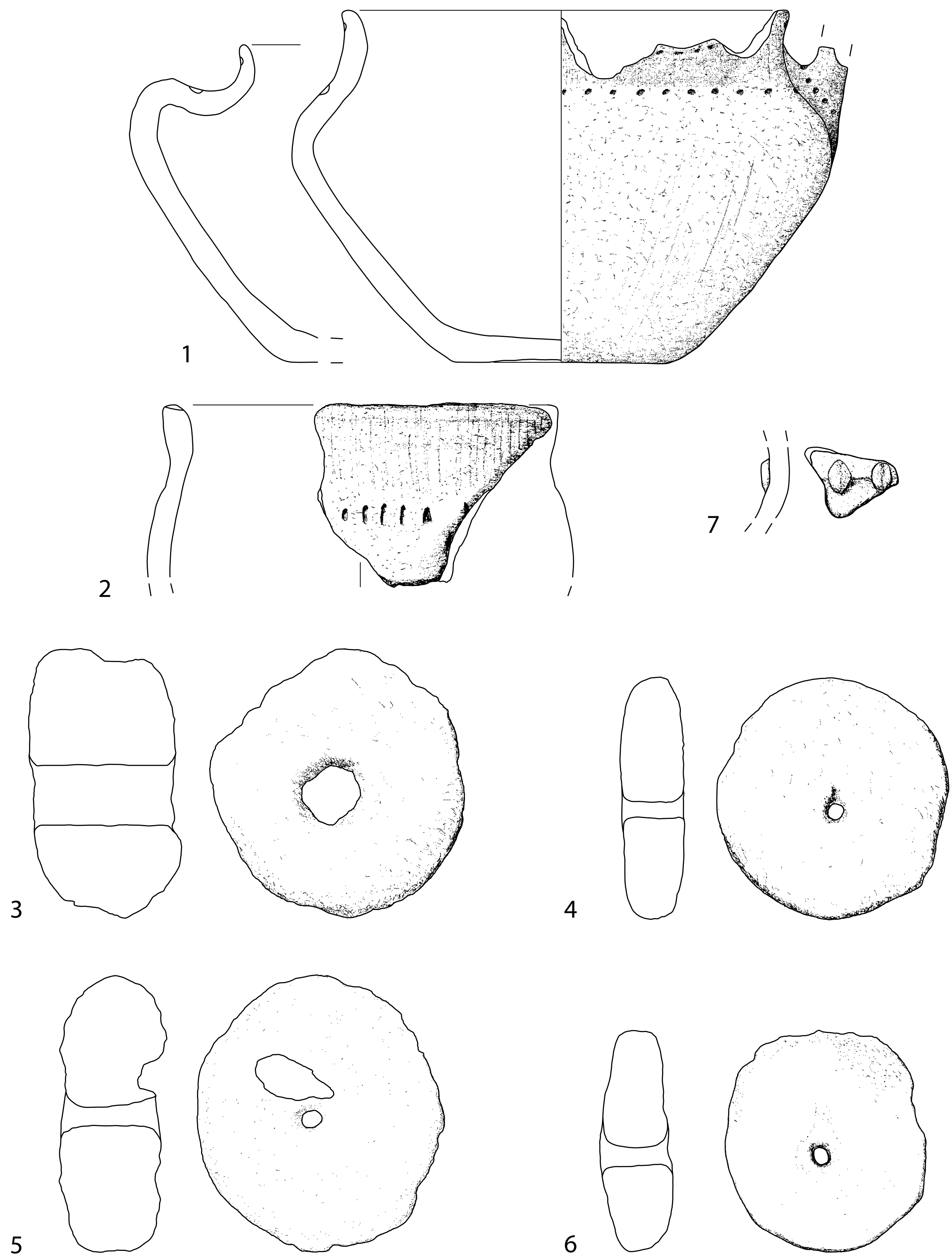

Plate 81. Trench 110. Dwelling 67. 1 KE110033 Scale 1:2 (context 110004); 2 KE110034 Scale 1:2 (context 110004); 3 KE110035 Scale 1:2 (context 110001); 4 F110237 Scale 1:2 (context 110004); 5 F110321 Scale 1:2 (context 110013); 6 F110350 Scale 1:2 (context 110001); 7 F110011 ID17 Scale 1:2 (context 110003).

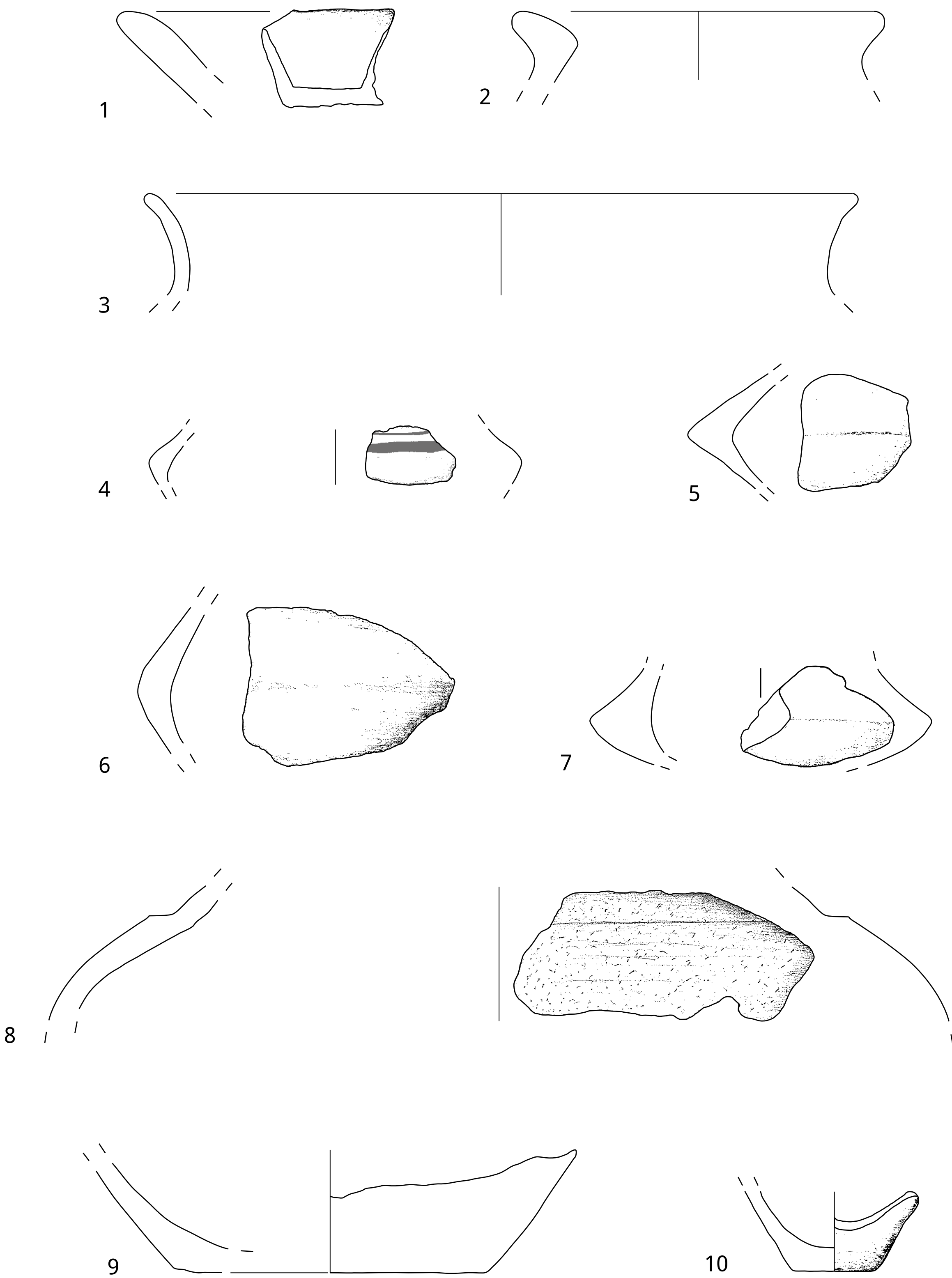

Plate 82. Trench 110. Occupational layer. 1 KE110007 Scale 1:2 (context 110008); 2 KE110008 Scale 1:2 (context 110010); 3 KE110009 Scale 1:2 (context 110014); 4 KE110010 Scale 1:2 (context 110008); 5 KE110011 Scale 1:2 (context 110010); 6 KE110012 Scale 1:2 (context 110010); 7 KE110013 Scale 1:2 (context 110014); 8 KE110014 Scale 1:2 (context 110010); 9 KE110015 Scale 1:2 (context 110014); 10 KE110016 Scale 1:2 (context 110014).

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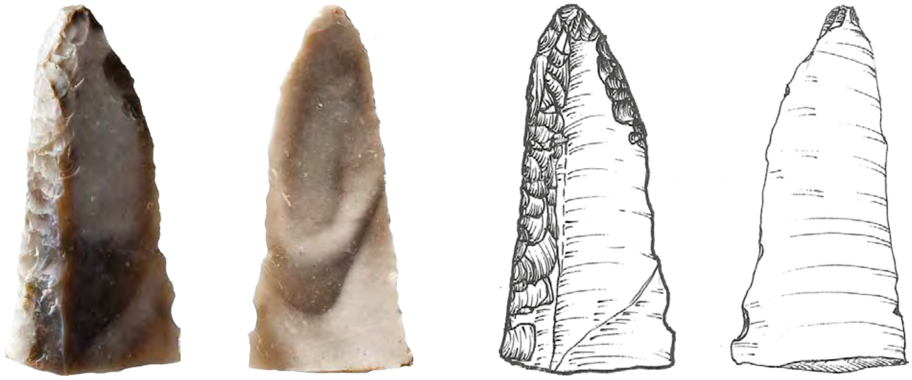

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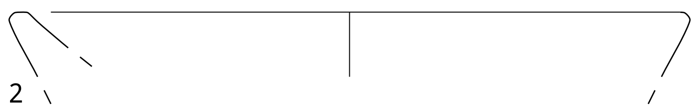

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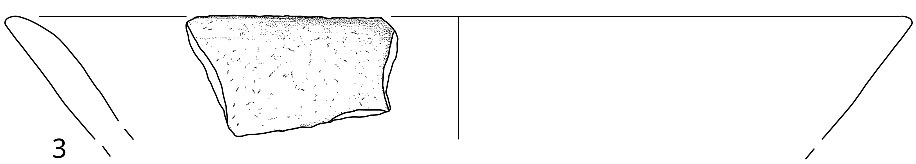

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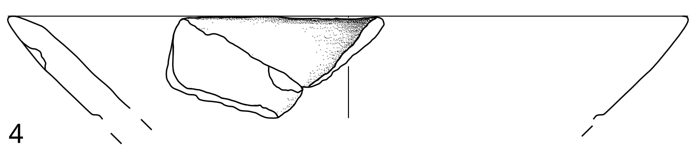

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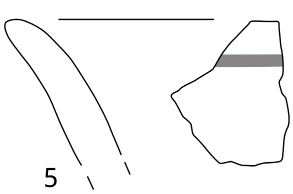

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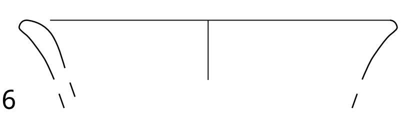

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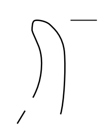

Plate 83. Trench 110. Occupational layer. 1 F110207 Scale 1:1 (context 110014).
Topsoil. 2 KE110001 Scale 1:2 (context 110002); 3 KE110002 Scale 1:2 (context 110002); 4 KE110003 Scale 1:2 (context 110001); 5 KE110004 Scale 1:2 (context 110001); 6 KE110005 Scale 1:2 (context 110001); 7 KE110006 Scale 1:2 (context 110001).

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MAIDANETS'KE – Development and decline of a Trypillia mega-site in Central Ukraine

At the end of the 5th millennium BCE, some of the vastest settlements of the time emerged on the forest steppe north of the Black Sea. The largest of these sites were found between the Southern Bug and Dnieper river. There they occur only tens of kilometres apart and are assumed to be partly coeval. The Trypillia 'mega-sites' reached sizes of up to 320 hectares with up to 3000 buildings in one place. During their peak times as many as 11,000 people could have lived in one of those settlements.

But how did people come together in these Trypillia 'mega-sites' with several thousand dwellings? How long were such sites inhabited, and how many people lived there? Were these settlements the first towns, preceding the Mesopotamian development? To address these questions, this book presents the results of the investigations at the Maidanets'ke 'mega-site'.

To date, Maidanets'ke represents the most complex of these enormous sites and is also among the best investigated ones. Based on new excavations by international teams, the settlement's history, its structure and regional context are addressed. The excavation results, with features like a pottery production site, a causewayed enclosure and several dwellings, are presented in detail. An extensive radiocarbon dating program conducted on various parts of the site, in combination with pottery studies, revealed several phases of continuous occupation between 3990-3640 cal BCE. According to the number of contemporary structures, the demography of a 'mega-site' is reconstructed in detail for the first time.

Targeted geophysical surveys in the core area of the 'mega-site' phenomenon show that exceptional non-inhabited buildings and so-called mega-structures occur regularly in both larger and smaller settlements. Overall, the Trypillia settlement system appears scalable, with small sites being structurally similar to larger ones. With no clear differences in the settlement pattern except size, the urban character of 'mega-sites' is called into question.

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