

Stolniceni – Excavation results from the 2017 campaign

Stanislav Țerna¹, Andreea Vornicu-Țerna², Robert Hofmann³,
Marta Dal Corso³, Liudmyla Shatilo³, Mariana Vasilache-Curoșu⁴,
Vitalii Rud⁵, Hannes Knapp⁶, Wiebke Kirleis³, Knut Rassmann⁷,
Johannes Müller³

Abstract

During extensive field work, different aspects of the large Tripolye settlement Stolniceni I in northwest Moldova were investigated by an international team. These investigations allow a reassessment of these population agglomerations from the first half of the 4th millennium BCE in Moldova and their comparison with more eastern Tripolye sites. The investigations carried out in 2017 included the completion of the archaeo-magnetic survey of the settlement and the targeted archaeological excavations of various types of contexts. Besides the investigation of a ditch enclosing the site and test trenches in different parts of the settlement, the excavations focused mainly on two areas in the north of the settlement: On the one hand, excavations were carried out in a pottery production complex, including the uncovering of a pottery kiln, several pits and a dwelling. On the other hand, one specific ‘ash-mound-like’ anomaly was investigated which are arranged in regular intervals at the periphery of the settlement. The archaeological excavations were accompanied by comprehensive archaeobotanical analyses, which provide an insight into the subsistence and wood selection in the settlement, as well as permitting environmental reconstructions. A larger series of ¹⁴C-datings proves the occupation of the settlement Stolniceni I over a longer period between about 3925 and 3700 BCE.

Introduction: Site location, description and history of research

Since 2016, a project on agglomerated Tripolye settlements has been funded by the German Research foundation in the frame of the Collaborative Research Centre 1266 “Scales of Transformation: Human-environmental Interaction in Prehistoric and Archaic Societies” of Kiel University. In the frame of this project field work is conducted, *inter alia*, in Moldova, building on the long-term cooperation with the Romano-Germanic Commission of the German Archaeological Institute, together with the University „High Anthropological School” Chișinău. These investigations aim at a better understanding of the development of large agglomerated settlement in a transect reaching from Central Ukraine (Müller et al. 2016; Hofmann et al. 2018; Müller et al. 2018; Hofmann et al. 2019; Ohlrau in press, via Southwestern Ukraine (Rud et al. 2019) to Northern Moldova (Rassmann et al. 2016; Țerna et al. 2016; Церпа et al. 2017). In 2017, archaeological excavations were conducted, building on previous archaeo-magnetic investigations. In this report we inform about the results.

Article history:

Received 21 October 2019

Reviewed 4 November 2019

Published 6 December 2019

Keywords: Tripolye, magnetometry,
¹⁴C-dating, population agglomeration,
pottery production, enclosure,
house architecture

Cite as: Stanislav Țerna, Andreea Vornicu-Țerna,
Robert Hofmann, Marta Dal Corso, Liudmyla
Shatilo, Mariana Vasilache-Curoșu, Vitalii Rud,
Hannes Knapp, Wiebke Kirleis,
Knut Rassmann, Johannes Müller: Stolniceni –
Excavation results from the 2017 campaign
JNA 21, 2019, 209–282 [doi 10.12766/jna.2019.9]

Authors’ addresses:

¹ “High Anthropological School” University,
Chișinău, Str. Alexe Mateevici, 60 Chișinău,
MD-2009, Republic of Moldova
ternastas@mail.ru

² Botoșani County Museum, Romania,
Str. Unirii 15, Botosani 710221, Romania
andreea.vornicu.tf@gmail.com

³ Kiel University, Institute of Pre- and
Protohistoric Archaeology,
Johanna-Mestorf-Straße 2–6,
24118 Kiel, Germany:
robert.hofmann@ufg.uni-kiel.de;
mdalcorso@ufg.uni-kiel.de;
m.shatilo@ufg.uni-kiel.de;
wiebke.kirleis@ufg.uni-kiel.de;
johannes.mueller@ufg.uni-kiel.de

⁴ National Museum of History of Moldova,
Str.31 August 1989, 121 A, MD 2012, Chisinau,
Republic of Moldova
marianavasilake@gmail.com

⁵ Institute of Archaeology of Ukrainian
National Academy of Sciences,
St. Hrushevsky, 4, 01001 Kyiv, Ukraine,
rud.vitalii12@gmail.com

⁶ Frankfurt am Main, Germany
hannes-knapp@gmx.de

⁷ Deutsches Archäologisches Institut (DAI),
Römisch-Germanische Kommission (RGK),
Palmengartenstraße 10–12,
60325 Frankfurt am Main, Germany
rassmann@rgk.dainst.de

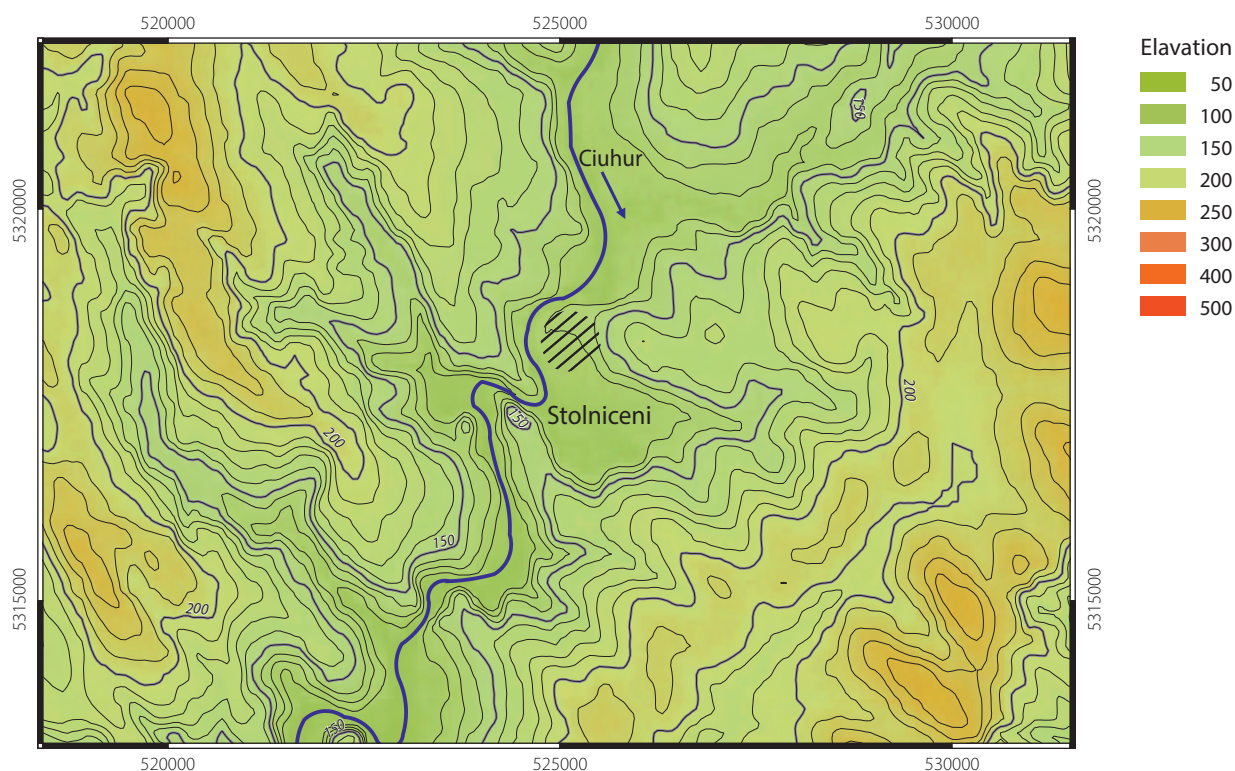


The settlement Stolniceni I is located in the Northern Republic of Moldova, ca. 1.5 km southwest from the village Stolniceni (Edineț district) and about 16 km southwest from Edineț (Fig. 1). The geographical coordinates of the center of the site are 525127 m E and 5318277 m N (UTM 35N) or 48°1'2.25"N and 27°20'13.04"E (in degrees, minutes and seconds). The Stolniceni area belongs to the vast forest-steppe zone of plateaus and valleys of Northern Moldova and lays at the border between the forest-steppe plateau of Northern Moldova and the forest-steppe valley of Middle Prut basin. The settlement is situated on a high oval promontory formed by a meander of the Ciuhur River, one of the main left tributaries of Prut (Fig. 2–3).

The Stolniceni¹ site was discovered in the 1970s by K. Shishkin, a military topographer interested in aerial photography of archaeological sites. Deciphering of aerial images allowed him to identify several prehistoric settlements between the villages of Stolniceni and Pociumbăuți (Edineț and Rîșcani districts). Among these, a very large settlement with a concentric structure attracted the attention of the researcher. The site got the name Stolniceni I. The plan of the settlement was first published by V. Sorochin (1993). Later, the site was mentioned in works by V. Bicbaev and M. Videiko in the context of a broader evaluation of the problem of large complex sites from the late phase of Cucuteni-Tripolye evolution (Бикбаев 2007; Видейко 2012; 2013). It has been estimated that the settlement near Stolniceni covers an area of ca. 80–100 ha and therefore is the largest Copper Age site known from the territory of the Republic of Moldova. In 1980 a team led by V. Marchevici² investigated the settlement and targeted one of the burnt dwellings from its northern part with a test-trench.

Fig. 1. Location of the site (red point) on the physical map of the Northeastern Black Sea region (map: R. Hofmann).

- 1 Since the site is located on the territory of two distinct administrative districts and the land is assigned to two different villages, the settlement has been registered with the name Zăicani II in archaeological catalogues; we nevertheless use „Stolniceni I” as traditionally referred to in archaeological publications.
- 2 The team which visited the settlement in 1980 included several well-known archaeologists such as E. Chernysh (Moscow), M. Videiko and N. Burdo (Kiev) and V. Bicbaev (Chișinău).



A new chapter in the investigation of Stolniceni settlement started in 2015³ within a broader general background of extensive interdisciplinary joint research on Cucuteni-Tripolye large sites from Ukraine (Nebelivka, Maidanetske, Talianki) and the Republic of Moldova (Petreni), based on new geophysical plans obtained by means of using modern high-resolution equipment (Chapman et al. 2014; Rassmann et al. 2014; Rassmann et al. 2016; Müller et al. 2016; Müller et al. 2017; Uhl et al. 2017). Following the striking new information coming from the East (=Ukraine), the question on the western limits of the spread of the phenomenon of complex Cucuteni-Tripolye settlements came into consideration. Taking into account the location of Stolniceni in Prut region, its preliminary dating with the Cucuteni B – Tripolye C1 stage and an estimated surface of ca. 100 ha (according to K. Shishkin and V. Sorochin), the start of systematic investigations at this very site has been considered of major importance.

Thus, in 2015, we started with the geophysical prospection of the north-eastern part of the site and the subsequent opening of a test-trench targeting one of the pit anomalies in order to obtain material for absolute and relative dating of the settlement (Țerna et al. 2016). Given the variety and complexity of the spectrum of anomalies from the geophysical map, in the next 2016 campaign we tested different kinds of anomalies by excavation trenches of various size; thus, we sectioned the three ditches and the palisade (the latter in two different trenches), placed a trench perpendicularly over the linear trackway anomaly, investigated a pottery kiln (Церна и др. 2017) and opened a segment of a pit corresponding to a large house from the inner circle of the site. The excavations turned out to be successful and validated the interpretation of the geophysical plan (for the geophysics, see Scholz et al. 2018). Moreover, they led to the first archaeological investigation of a prehistoric trackway of the Cucuteni-Tripolye culture and the discovery of an extremely well-preserved pottery firing kiln. At the same time, we have not been able to record the exact configuration of the external ditch and obtain

Fig.2. Geographical background of the site in the Ciuhur river valley (map: S. Țerna).

- 3 The investigations on the site have been conducted within a cooperation between the “High Anthropological School” University (Chișinău, Republic of Moldova) and the Romano-Germanic Commission of the German Archaeological Institute (Frankfurt am Main, Germany). From 2017, the Institute of Pre- and Protohistory of Kiel University (Germany) has become a partner in the project.



suitable material for its absolute dating since the ditch segment opened in our trench turned out to be damaged by a later pit from the first centuries AD.

Fig.3. View over the site from the north (photo: S. Ţerna).

The settlement plan

The magnetic prospections in Stolniceni in 2015 and 2017 revealed detailed data of a Tripolye settlement (Fig.4). In 2015, the north-eastern part of the settlement (23 ha) was surveyed with a 5-channel magnetometer (Fa. Sensys). The system was mounted on a push-cart fibreglass array. The gradiometers were set at of 0.5 m interval (Церна et al. 2017). The magnetometers used were FGM-650B tension band fluxgate vertical gradiometers with 650 mm sensor separation, a ± 3000 nT measurement range and 0.1nT sensitivity. Precise georeferencing with an accuracy of ca. ± 0.05 m was similarly achieved through the utilisation of a Leica RTK-DGPS (base/rover). In November 2017 the prospection of the settlement was completed by a 16-channel magnetometer system (Fa. Sensys), mounted on a vehicle-towed, non-magnetic array of fibreglass. The gradiometers are set closer than with the 5-channel magnetometer at intervals of 0.25 m. The array is 4 m wide. The 16 magnetometers used were FGM-650B as those on the 5-channel magnetometer. A Trimble RTK-DGPS systems consisting of a base station and a rover served for the precise georeferencing of the magnetometer data.

The prospection covered an area of 70 ha. The magnetic data allow us to reconstruct the general structures of the settlement (Fig.5–6). Around 370 burnt houses are visible, a system of three ditches, around 540 settlement pits and 17 pottery kilns. Outside the ditch system some circular anomalies with a diameter of 25–30 m were found. One of them was excavated in 2017. Some linear anomalies of lower nT-values particularly visible in the southern and northern periphery of the settlement indicate paths. The course of the paths is in some cases connected with gaps in the ditches and the arrangement of house rows.

The magnetic prospection revealed nearly 370 houses of different sizes. The shape of the magnetic anomalies and their contrast indicate differences in their preservation and the composition of the remains of burnt houses.

Nearly 540 circular anomalies of different size and magnetic contrast were classified as settlements pits. Thanks to the settlement research of the Romano-Germanic Commission and Kiel University in Moldova and Ukraine, more than 20 other settlements revealed a diverse picture of the of settlements structure from 4500 to 3500 BCE in Romania, Moldova and Ukraine. The results from Stolniceni are mostly similar to the data from Petreni, but a more detailed comparison of both site revealed a number of differences and specific research questions defined the starting point of our excavation project.

Stanislav Ţerna, Andreea Vornicu-Ţerna, Robert Hofmann, Marta Dal Corso, Liudmyla Shatilo,
 Mariana Vasilache-Curoşu, Vitalii Rud, Hannes Knapp, Wiebke Kirleis, Knut Rassmann, Johannes Müller
Stolniceni – Excavation results from the 2017 campaign
 6 December 2019

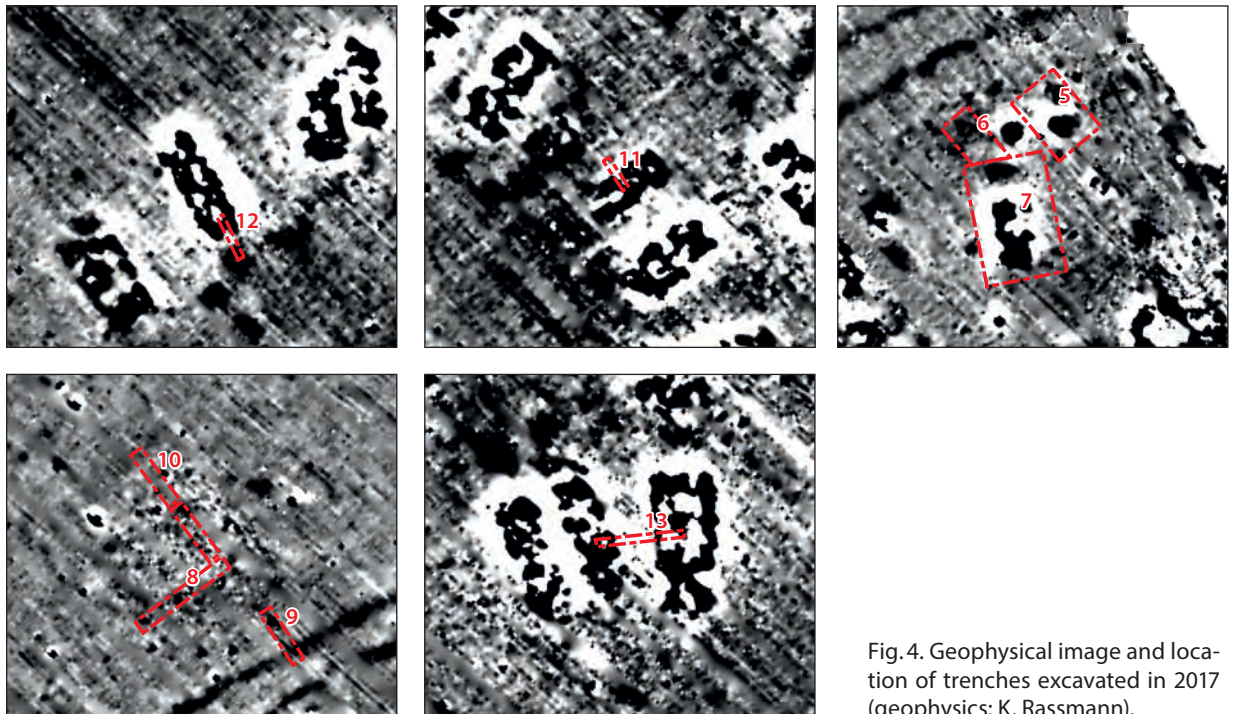
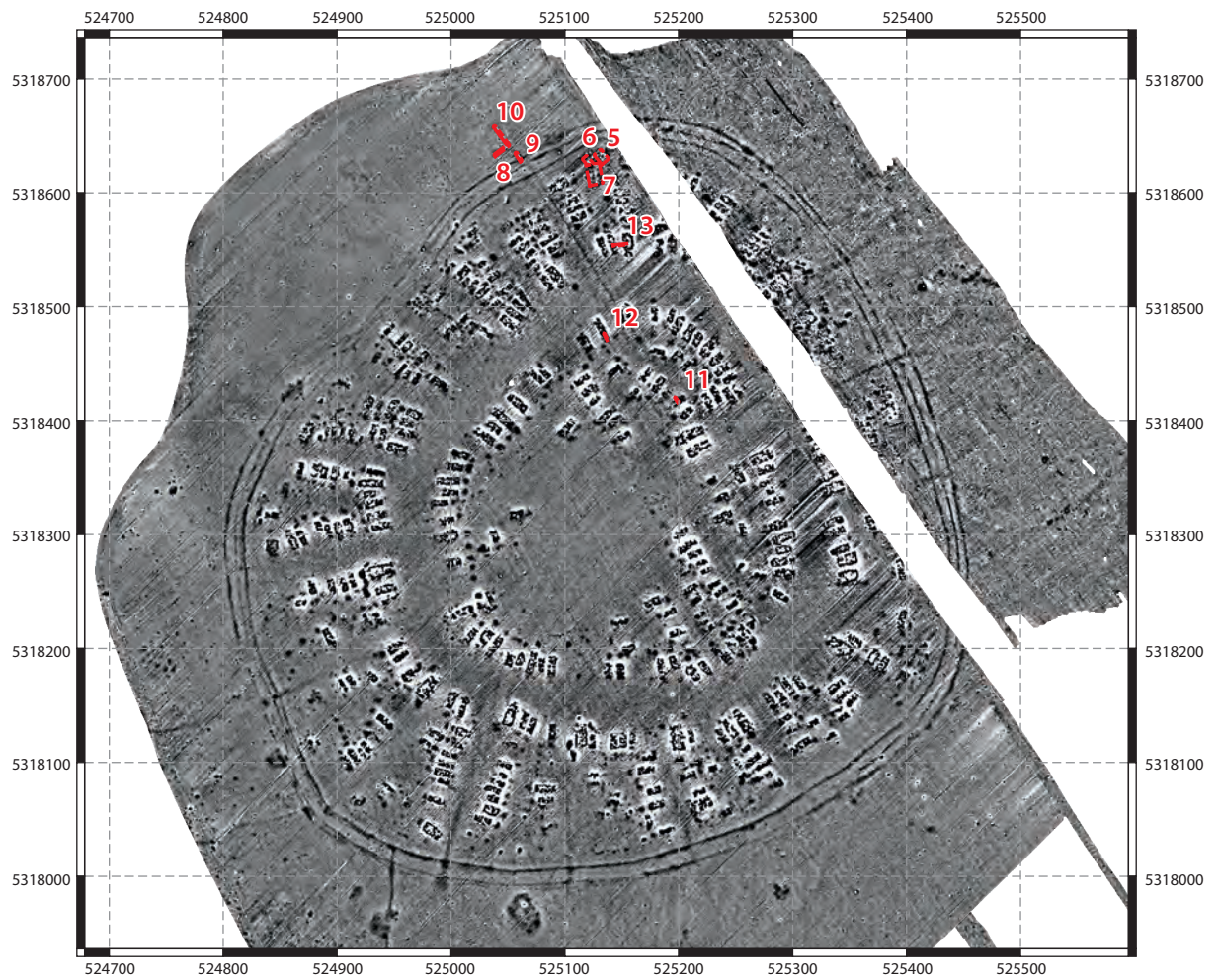


Fig.4. Geophysical image and location of trenches excavated in 2017 (geophysics: K. Rassmann).

Stanislav Ţerna, Andreea Vornicu-Ţerna, Robert Hofmann, Marta Dal Corso, Liudmyla Shatilo,
 Mariana Vasilache-Curoşu, Vitalii Rud, Hannes Knapp, Wiebke Kirleis, Knut Rassmann, Johannes Müller
Stolniceni – Excavation results from the 2017 campaign
 6 December 2019

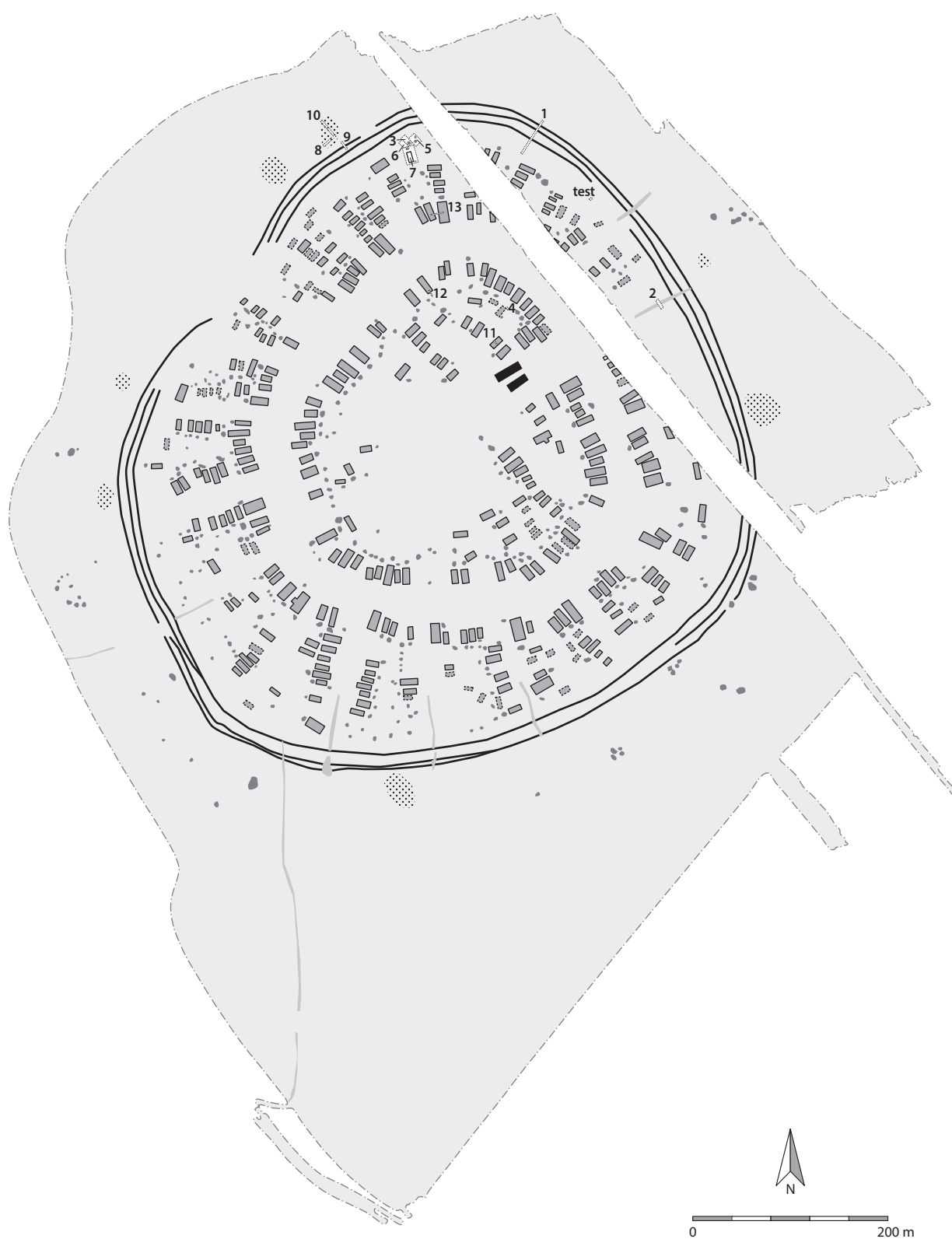
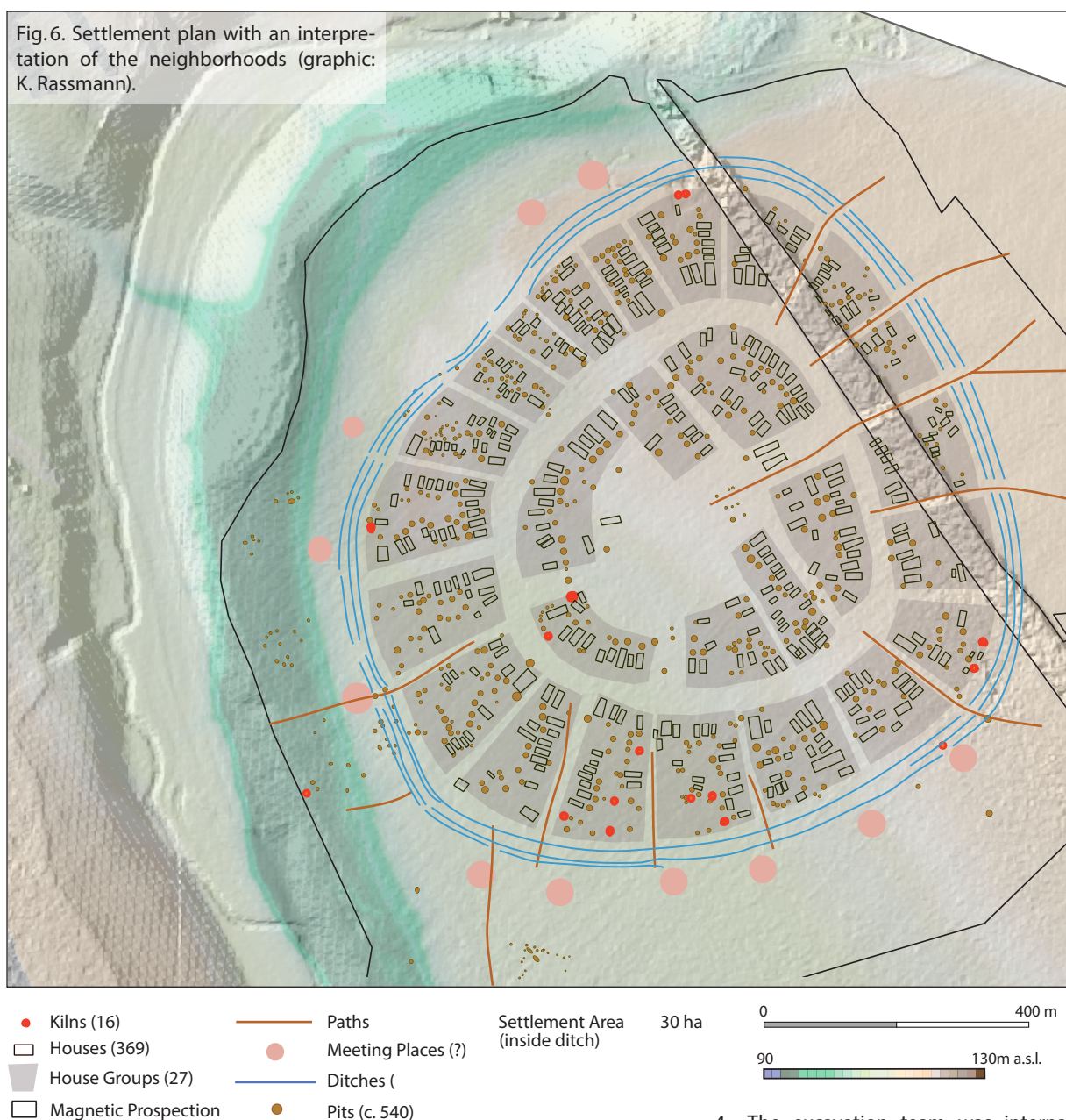


Fig.5. Settlement plan with the reconstructed houses and the excavation trenches of 2017 (graphic: R. Hofmann).



Research objectives of the 2017 campaign

- For the 2017 campaign, we identified the following research objectives:
- Complete investigation of the pottery production complex by uncovering the second pottery kiln and the adjacent pit, the “potter’s” house as well as finishing the excavation of the “potter’s pit” next to the kiln of 2016 (Fig. 7: trenches 3, 5–7).
- Continuation of testing various anomaly types, namely the “ash-mound-like” circular features outside the external ditch (Fig. 7: trenches 8 and 10).
- Opening a trench on an undamaged sector of the external ditch (Fig. 7: trench 9).
- Obtaining data for systematic absolute and relative dating of the settlement’s structural components by targeting houses and pits from various rings and house-groups (Fig. 7: trenches 4, 11–13).
- In order to fulfill these objectives, an extensive excavation campaign has been organized, lasting from 15 July to 30 September 2017⁴.

- 4 The excavation team was international: Kiel University: Johannes Müller, Wiebke Kirleis, Marta Dal Corso, Robert Hofmann, Liudmyla Shatilo, Stefan Dreibrodt, Svetlana Ibens, Sara Jagiolla, Pia Bodden; Lennart Brandstätter, Bjarne Kortmann, Malte Loetz, Wiebke Mainusch, David Mateo, Jan Oehlerking; Chisinau: Stanislav Țerna, Mariana Vasilache-Curoșu ; Botoșani: Andreea Vornicu-Țerna, Kiev: Olha Karhalyk, Vitalii Rud, Kirivograd: Slava Fedorov; Iași: Diana Mariuca Vornicu, Frankfurt: Kai Radloff, Knut Rassmann; Stolniceni: Ruslan Solonenco, Mihail Russu, Serghei Calicașan, Vadim Tomașevschii, Vitali Tomașevschii, Iaroslav Tomașevschii, Andrei Ianciu, Serghei Gheletiu, Serghei Sugac, Maxim Galagot, Denis Misiovski, Nicolai Vlasov, Irina Levco, Liudmila Russu.

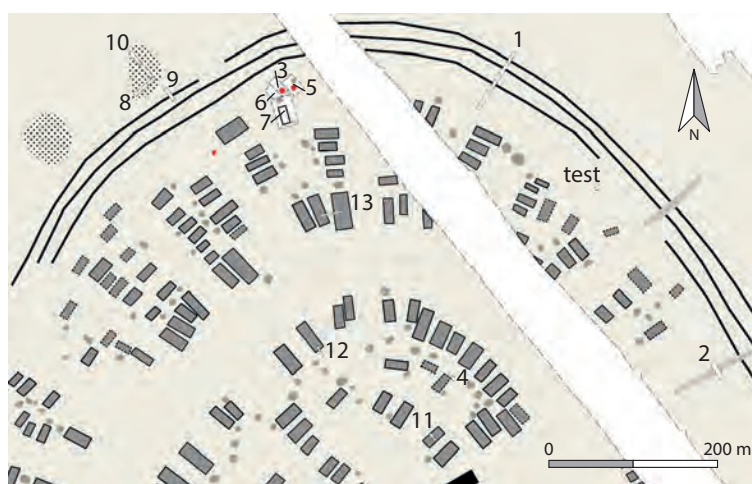


Fig.7. Stolniceni, excavation trenches of 2017. Also mapped are the trenches from the 2015 (test) and 2016 campaign (1–3).

Archaeological investigations have been complemented by flotation of soil samples for botanical macro-remains, systematic collections of samples for determination of phytoliths and geoarchaeological research as well as detailed geophysical investigations of various features both within the excavation trenches and on the yet not researched parts of the site.

Investigation of the pottery firing complex

In order to complete the investigation of the pottery firing complex we opened three trenches over the neighbouring anomalies bordering excavation trench no. 3/2016 from West, South and East (Fig. 7). Thus, trench 5 was located to the east and targeted another pottery kiln anomaly as well as an adjacent pit; trench 6 was located to the west and allowed us to finish the investigation of the pit in front of the 2016 kiln while trench 7 was located to the south and included the anomaly of a burnt dwelling with the adjacent pit as well as the extensive investigation of the prehistoric step-surface near the house.

Trench 5

Trench 5 represented the continuation to the east of the trench no. 3 (2016); it included two well-visible circular anomalies of various intensity which have been preliminary interpreted as corresponding to a pottery firing kiln and a pit. The trench had a northwest-southeastern orientation and the dimensions of 11×8 m or 88 m^2 .

Prehistoric surface

On the prehistoric surface level, the trench displayed a scatter of material including pottery, bones and small finds. The distribution of artifacts was uneven and consisted of several agglomerations.

Thus, feature 5004 was recorded in squares F-G/1–2. It represented an agglomeration of 16 stones of various dimensions (from $5 \times 6 \times 3$ to $31 \times 25 \times 11$ cm; total weight 43.9 kg) with no traces of working or reshaping (Fig. 8). The stones were not overlapping each other and were forming an oval of ca. 0.5 m^2 . Except for several dispersed shards, no other finds have been found in connection to these stones and their function is unclear.

Feature 5006 represented a discontinuous agglomeration of dispersed waste in the squares A-B/9 and A/10, spread over an area of ca. 5.5 m². The material included pottery (also vitrified), bones, flints and the fragment of an anthropomorphic figurine attached to a piece of daub from kiln construction. This feature represents the western off-shot of the large discard of waste covering the pottery firing kiln investigated in 2016 (feature 3005). The eastern sector of this agglomeration has been investigated in trench 6 (feature 6003).

Fig.8. Agglomeration of stones on the prehistoric surface in trench 5 (photo: S. Ţerna).



Feature 5005 was assigned to an agglomeration of finds corresponding to the location of the anomaly interpreted as pit, in the squares F-G/6, F-H/7, E-H/8–9, E-G/10. It had an irregular-trapezoidal shape of an extension of 3.2–4.3 m (east-west axis) to 2.5–3 m (north-south axis), with a total area of 10.4 m². The finds were irregularly distributed and included a large quantity of vitrified daub, medium- and low-fragmented pottery shards (among them many vitrified), bones as well as flints, polished stone tools, several clay miniatures, a bone pointed tool and a perforated tooth worn as a pendant. Noticeable are fragments of slabs used for pottery production, similar to the ones unearthed in the pottery kiln from 2016.

Some of the daub fragments had imprints from branches with a diameter of 1–1.5 cm on one of the sides. Most of them were arranged in a northwestern-southeastern direction. A larger daub fragment had a half-beam imprint on its lower side, with a north-south orientation.

At a depth of ca. 45–60 cm, the agglomeration of material above the pit was only found in the squares F-H/7–9 and dissolved into two distinct features (Fig. 9). The first one is the continuation of feature 5005 with a similar character of finds. The second one got the number 5011 and represented a compact, single-layered agglomer-

ation of daub in the squares G-H/7–8, on an area of 4.6 m². The daub represented a mixture of whitish kaolin (?) clay and lumps of burnt/dried reddish argil; the latter had an admixture of chaff of small size (1–2 mm to 2–3 cm). Overall, the daub from this feature did not display any smoothed surface or imprints from wood.

At this level, the general outline of both 5005 and 5011 features was of an irregular-circular shape marking the contour of the pit below.

The pit

Fig.9. Find agglomerations corresponding to the pottery kiln and adjacent pit (photo: S. Ťerna).



The dark-greyish fill of the pit became visible immediately after removing the features mentioned above while the contour has been well defined after cleaning the surface at a depth of ca. 90–100 cm (Fig. 10). The pit got the generic feature number 5013. It had an almost regular circular shape, slightly elongated on the north-south axis, with a diameter of 2.3–2.4 m and an area of 4.7 m². The bottom of the pit was reached at a depth of 160 cm from modern-day surface and ca. 110–120 cm from the prehistoric surface.

In profile, the pit had a trapezoidal shape with slightly oblique walls and an irregular straight bottom (Fig. 11). Despite intense bioturbations, several refill events were distinguishable. The first one represents a succession of three thin layers in the central part of the pit on its bottom. Thus, the bottommost layer 5025 had a thickness of 2–7 cm and consisted of compact brownish clay with no finds; it was covered by a 1–2 cm thick layer of black compact soil (5023) above which a 2–5 cm thick layer of yellow sterile clay was situated (5024). These thin strata have been subsequently covered by two sloping layers (5021 and 5022) extending from the border towards the center of the pit along its walls. They consisted of grey-black half-compact soil with yellowish admixture and contained small quantities of vitrified daub, ceramic shards, bones and several small finds distrib-



uted regularly within the fill. The last refill event is represented by a thick layer of dark-grey half-compact soil with many ashy and charcoal inclusions (feature 5020). This layer had an irregular funnel-like shape partly overlaying strata 5021/5022 and partly reaching layer 5024. A large quantity of ceramic shards has been deposited on the bottom layer 5020, coming from complete or near-complete fine and coarse vessels; the painting on the fine pottery was well-preserved. Judging by the aspect of certain stylistic elements, we presume that the ware from this layer has been produced by one and the same potter. The spectrum of vessels deposited in layer 5020 included large conical bowls, two complete goblets (one bearing a cross-like figure), an incomplete goblet-like vessel as well as fragments from several amphorae including one with zoomorphic figures.

The small find inventory of the pit consisted of flints, polished stone tools, a bone tool and a clay horn. Noticeable is the small quantity of clay miniatures as well as lack of anthropomorphic figurines which are usually very characteristic for settlement pits at Stolniceni.

From observations on the stratigraphy and composition of successive refill layers we conclude that the pit was left open for a certain time period with some burning (?) event on its bottom (5025) covered by the probably pluvial layer 5023. Layers 5021 and 5022 may represent a mixture of anthropogenic deposition with the partially collapsed clay walls of the pit (hence the yellow clayish component) while layer 5020 may be connected to the activity of the pottery kiln and served for discarding ashes and some of the broken vessels. At the same time, larger refuse from pottery firing such as vitrified pottery and larger pieces of daub was not discarded into the refill but instead has been found in the agglomeration of finds covering the pit (feature 5005).

Fig. 10. Pottery kiln and the adjacent pit (photo: S. Ţerna).

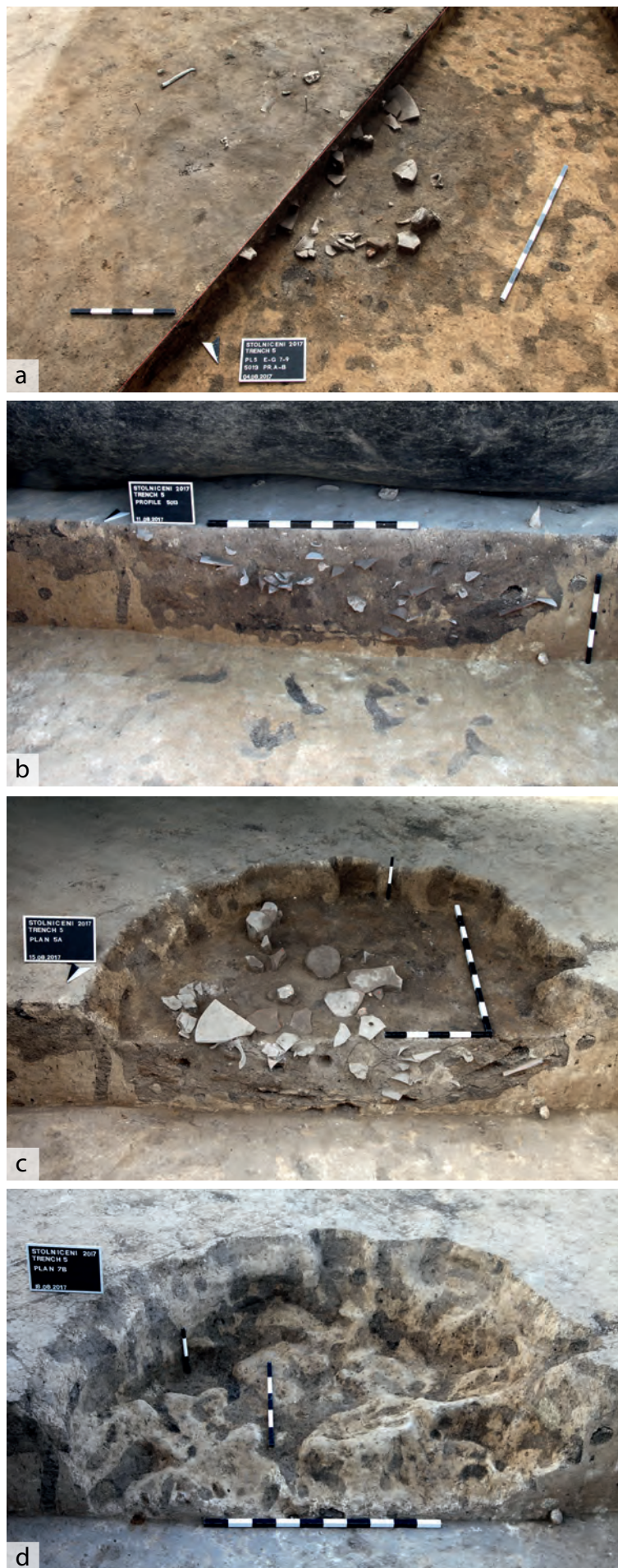


Fig. 11. Pit in trench 5 (photos: S. Țerna and V. Rud).

The pottery firing kiln

The kiln was situated to the south from the pit and has been first identified on the prehistoric surface by the presence of several specific fragments of greenish plaster coming from the coating of the kiln base walls. At a depth of 67–73 cm, several distinct features were present – daub from kiln construction (5012), fill of the firing chamber (5007) and a dark-grey spot in the front of the chamber (5010) (Fig. 12). The two parallel channels of the combustion chamber became well visible at a depth of 90–100 cm; they were numbered 5014 (southern channel) and 5015 (northern channel); subsequently, further details of the construction of the kiln got several distinct numbers such as 5016 (northern wall of the kiln), 5017 (southern wall), 5019 (partition wall between the channels) and 5018 (firing platform in front of the kiln under feature 5010) (Fig. 13).



Fig. 12. Waste discarded above the pottery kiln (photo: K. Radloff).



Fig. 13. Pottery firing kiln (photo: K. Radloff).

The kiln's construction was similar to the one excavated at Stolniceni in 2016 (trench 3). The oval combustion chamber was dug into the prehistoric surface and consisted of two parallel channels oriented towards eastnortheast; the channels were about 35 cm wide and divided by a 30-cm partition wall. Two openings led from the channels to the firing platform located in the front of the kiln with the dimensions of 120 × 85 cm. After digging out and shaping the sterile clay, the combustion chamber, the lower part of the walls of the kiln and the firing platform have been coated with a plaster of various thickness, from about 1 cm on the platform to 5–7 cm in the channels and 12–18 cm on the partition and external walls. The plaster was



Fig. 14. Layers of kiln plaster renewal (photo: S. Ţerna).

renewed during the use of the kiln as revealed by the successive layers of plaster from external walls partly collapsed into the westernmost parts of the channels; tiny renewal layers have been also observed on various daub fragments from the substructure of the kiln (Fig. 14). The exterior walls had an initial thickness of 27–30 cm, recorded despite the poor preservation of the segments close to the opening. The firing platform was slightly sloped raising gradually from the opening of the kiln towards the end of the firing complex (Fig. 15).

The overall length of the kiln represented 1.9 m (without platform) and 2.8 m (with platform). Maximal width of the combustion chamber was ca. 1.6 m. The total area of the kiln including the firing platform was 3.5 m². Of this, the working platform, on which the vessels intended to be fired were put, covered ca. 1.5–1.7 m².

Both channels contained fragments from clay slabs located almost *in situ* and corresponding to the last firing; initially, they covered the channels and served, together with the combustion chamber walls, as base for the pottery load. Like in 2016, we did not find any consistent remains from the walls and roof of the firing chamber (cupola?). Some of the daub fragments with branch imprints found in the waste covering the kiln and the pit described above may, however, be linked to these constructional elements.

After the use-life of the kiln ended, it was refilled with soil and finds constituting features 5007 and 5010. Feature 5007 (above the firing chamber) had a dark-grey half-compact soil component with small quantity of ceramic shards, daub and several flints. Feature 5010 had the same color as 5007 with an ashy tint; it contained some dispersed pottery fragments, some flint implements, a clay ball and fragments from several clay slabs used for ceramic production. Noticeable is the discovery of a human bone (humerus) in square E/5, on a fragment of clay slab on the firing platform, close to the opening of the northern kiln channel.

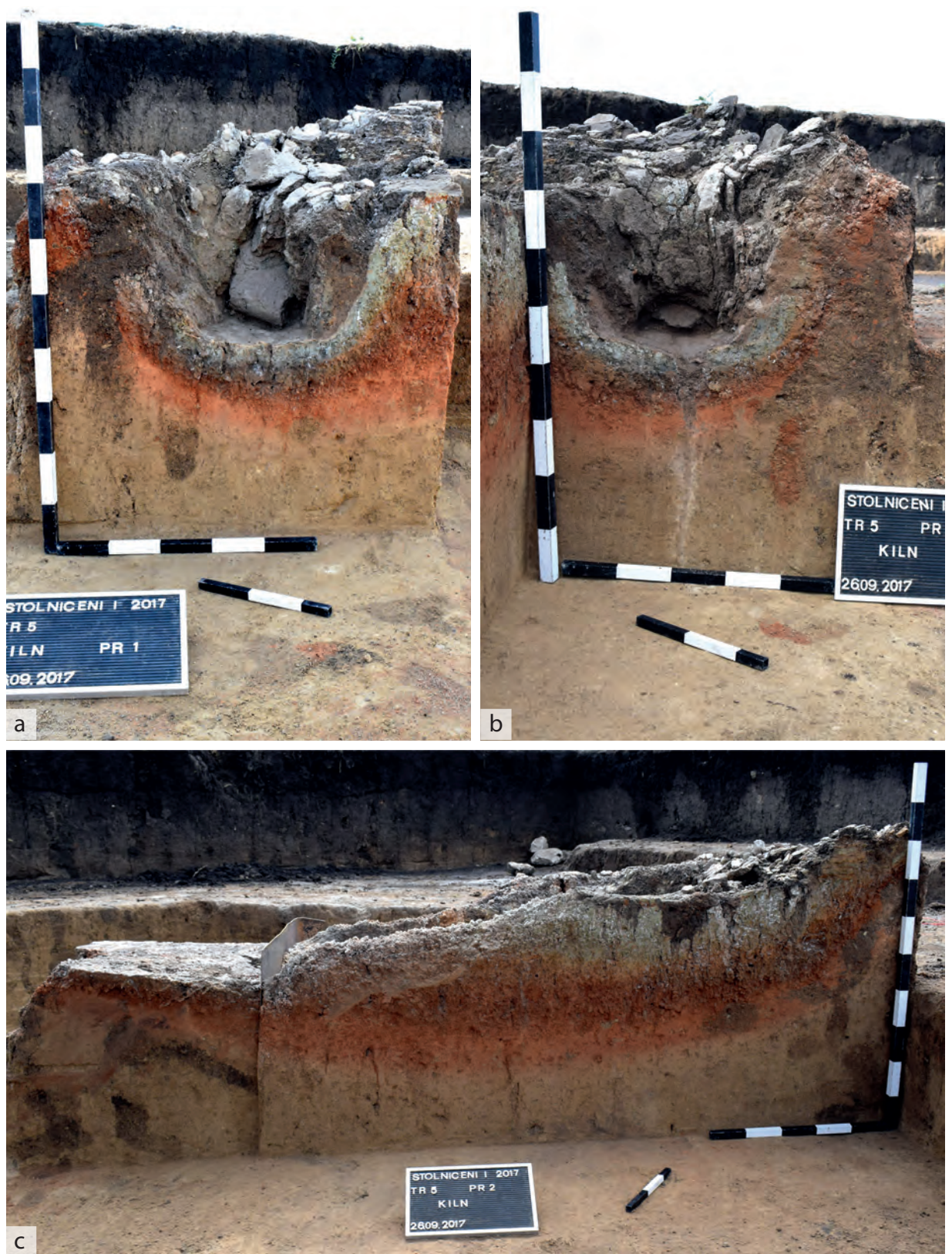


Fig. 15. Profiles through kiln construction (photos: M. Vasilache-Curoşu).



Investigation of charcoal remains from pit in trench 5 (M. Dal Corso, H. Knapp, W. Kirleis)

Fig. 16. Charcoal concentrations in the filling of the pit in trench 5 adjacent to the kiln during excavation (photo: M. Dal Corso).

Anthracology – Method

The botanical macro-remains samples from trench 5 in Stolniceni were rich in wood charcoal, which was visible also at naked eye in the filling of the pit aside the ceramic furnace (Fig. 16). 17 to 66 charcoal fragments have been subsampled from sixteen samples for botanical macro-remains of 10 l each (Tab. 1; Fig. 17–18). The subsampling for charcoal followed flotation and drying as explained for macro-remains. The charcoal fragments have been analyzed for taxonomic identification using a binocular microscope and a reflected light microscope at magnifications from x8 to x500. Charcoals have been identified by Hannes Knapp (Université de Lorraine) with help of a reference collection of artificially charred wood species and wood anatomy atlases (Schweingruber 1990a; 1990b).

When possible, the charcoal fragments have been measured and subdivided into five diameter size classes after Ludemann (1996) (Tab. 2). The measured diameter is a minimum value, because the shrinkage of wood (15–20%: Schläpfer/Brown 1984) during combustion should be taken into account. The interpretation of the size class measurements of wood diameter usually considers that mean diameter (mD) values below 5 cm refer to branches or twigs, values between 6 and 9 cm refer to young trees or trees from coppicing stands and diameters over 13 cm refer to the use of trunk wood (Nelle 2002).

Anthracological results

The charcoal originates from the filling of a pit close to the pottery kiln exposed in trench 5. The taxonomic identification of charcoal fragments showed that five tree taxa were used in relation to

Table 1. The table gives an overview on the charcoal record from the pit filling in trench 5 in Stolniceni.

Taxa	n.
<i>Betula</i>	4
<i>Acer</i>	4
<i>Cornus</i>	20
<i>Fraxinus</i>	22
<i>Quercus</i>	474
Sum	524

the pottery kiln: deciduous oak (*Quercus*), ash (*Fraxinus*), dogwood (*Cornus*), maple (*Acer*) and birch (*Betula*) (see Table 1 and Fig. 17). Deciduous oak largely dominates the record (90.5%), followed by equal proportion of dogwood and ash (ca. 4%) and very rare fragments of maple (from samples 5600 and 5520) and birch (only from sample 5600) (Fig. 18).

The measurement of the minimum wood diameter through charcoal fragments was possible in the case of 337 out of 524 taxonomically identified pieces. Measurements of diameter (Fig. 19) were possible for many oak fragments, in more than half of the record of dogwood and ash and in the only birch fragment (the single birch fragment was class 5). The results show that 50% of oak fragments have mean diameter of 15 cm, 36% have mean diameter of 7.5 cm and 12% of 4 cm. For ash, mean diameter of 7.5 cm (38%) is the most represented followed by 4 cm and 15 cm (23% each), and 2.5 cm (15%). Most of dogwood fragments show mean diameters of 2.5 cm and 4 cm (33% each), followed by mean diameters of 1 cm and 7.5 cm (16% each).

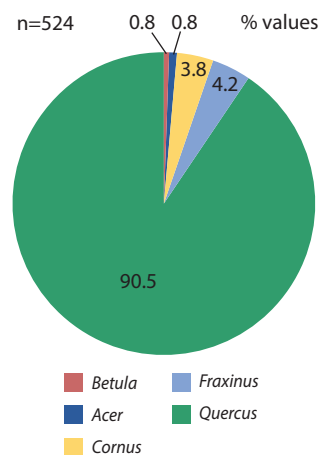
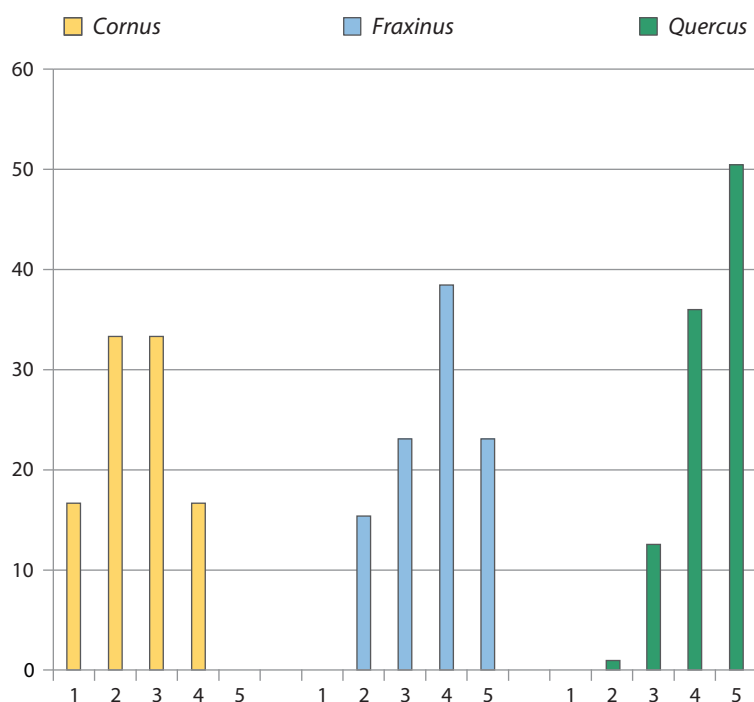
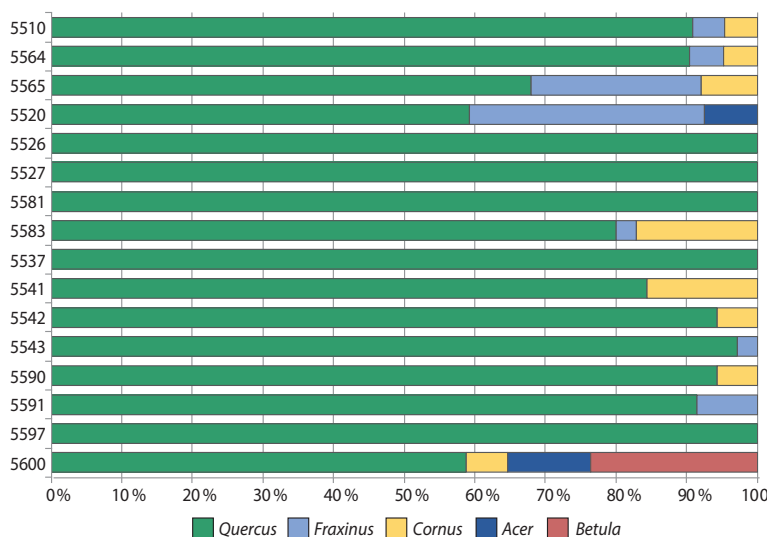


Fig. 17. Relative values of tree taxa composing the charcoal record from trench 5.

Fig. 18. Relative values of the tree taxa composing the charcoal record per sample from trench 5. Samples are arranged according to depth (from the lowermost sample 5600 to the uppermost sample 5510). The number on the left indicates the amount of fragments analyzed.

Fig. 19. Relative distribution of the identified charcoal fragments (n = total number of fragments, mD = mean diameter) per wood diameter size classes (sc) according to Ludemann and Nelle (2002).

Table 2. Wood diameter size classes according to Ludemann and Nelle (2002).

Size class	Diameter	Mean diameter
1	< 2 cm	1 cm
2	2–3 cm	2.5 cm
3	3–5 cm	4 cm
4	5–10 cm	7.5 cm
5	> 10 cm	15 cm

Discussion of the anthracological record

The results of charcoal analysis from the filling of the pit near the pottery furnace in trench 5 indicate that the inhabitants of the Chalcolithic village of Stolniceni used the main tree canopy, dominated by oak and ash, and the understory shrubs (e.g. dogwood) of mixed deciduous oak woodland. Among the wood taxa from the charcoal spectrum from trench 5 pioneer species like birch are rare in frequency and relative abundance. The dominance of the oak charcoal hints to the good availability of oak in old-growth forests in the vicinity of the site. Two of the main tree taxa, oak and dogwood, also offer edible fruits, but evidence of them is missing in the ancient seeds and fruits record from Stolniceni.

The analysis of wood diameters for many of the identified charcoal fragments suggests a selection of different wood size per species, especially trunks (mD > 15 cm) for oak and branches for dogwood. Since oak is by far the dominant wood species in the charcoal record of the pit, accordingly parts of large trunks of oak were preferably used as firewood. The hardwood of oak has good properties as fuel since it provides a long-lasting fire with excellent glow (Schütt et al. 1992), which could have been essential in (high quality) pottery production. Usually, the hard and durable oak wood with large and high quality timber (Eaton et al. 2016) is considered to be used as construction wood that is too precious to be used as fuel. Its attestation in the kiln-related pit may be an indirect indication for the high degree of knowledge of the potter. He obviously was aware of the excellent burning properties of oak that are of benefit for ceramic production. Because the potter must have had access to this precious wood, he or she probably was of high social ranking in the local community. However, it is also possible that only the waste part after timber production and oak woodcutting for other purposes was disposed of as fuel.

Differently to oak, dogwood is mostly represented by middle and low mean diameter values, which imply the use of branches. Moreover, the amount of this kind of wood is much less compared to that of oak. This suggests that dogwood branches, “tough, hard and elastic” (Popescu et al. 2016, 84) might have been selected for the making of the pottery furnace itself, as structural elements of the wattle in the wattle and daub earthen architecture. Flexible branches, known to be used as wickers (Popescu et al. 2016), would have allowed the construction of a roof or cupola over the firing chambers. This is usually not preserved (e.g. Korvin-Piotrovsky et al. 2016, Fig. 41, 250; Tencariu et al., 2018) apart from dispersed daub fragments which however bear clearly distinguishable imprints of twigs and branches from the wooden substructure. Such fragments have been found near both pottery kilns investigated at Stolniceni. Ash wood might have been used for both kinds of functions. It has been recovered mostly in middle to low mean diameter size classes (i.e. flexible branches) but also in high size classes related to trunks. The amount of ash is, however, much lower than that of oak. Forthcoming anthracological investigations of further archaeological contexts in Stolniceni apart from the kiln will allow evaluating if the oak dominated signal identified here is a specific pattern relating to ceramic production, or if in general old-growth oak forest was the main available woodland resource.

Trench 6

Trench no. 6 bordered trench no. 3 in the west and has been opened in order to finalize the investigation of the potter's pit no. 3014, located in front of the kiln from trench 3 2016 and serving for management of firing. The trench has been conceived to be larger than the expected pit outline in order to investigate the prehistoric surface to the west of the kiln. There we expected to find the limits of the agglomeration of waste discarded above the pottery firing complex. The trench had an northwest-southeast orientation and trapezoidal shape with the dimensions of $5 \times 7\text{--}10\text{ m}$ or 41 m^2 .

Prehistoric surface

The prehistoric surface revealed at the depth of 40–50 cm an agglomeration of pottery, bones and small finds. The artifacts were distributed irregularly within two clusters: a larger one located in the squares A–E/5–8 and A–D/9–10 and a second located along the eastern trench border in the squares E/2, D–E/3–5 and E/6. The first cluster got feature number 6003 and represented waste thrown onto the old surface while the second cluster with number 6005 represented waste discarded above the western part of the potter's pit.

Feature 6003 had an irregular shape, elongated along the south-east-northwest direction. Its maximal length on this axis represented ca. 4.9 m while the maximal width was of 3.8 m with a total area of 15.4 m^2 . It contained many pottery shards as well as several flints and clay miniatures.

Pit

The eastern half of the pit no. 3014, uninvestigated in the 2016 campaign, first appeared as an agglomeration of finds on the prehistoric surface (no. 6005; see above). This feature contained multiple pottery shards, some flint implements, a pointed bone tool and several clay miniatures, among which most notable is the discovery of a fragmented realistic figurine, first of this kind at Stolniceni (Find no. 6198).

After removing the find assemblage and proceeding with successive cleaning of the trench, the oval contour of the pit became well visible at a depth of ca. 80 cm (Fig. 20). Within the trench, the pit had an area of 1.6 m^2 and reached its maximal depth at 112/115 cm from modern-day surface or 65–70 cm from the prehistoric level. The overall shape of the pit including the segment investigated in 2016 was an irregular-oval one with the longer axis along northwest-southeast, with a maximal length of 2.1 m, a maximal width of 1.7 m and a total area of 3.1 m^2 . The pit had a 14–24 cm wide step alongside its north-eastern limit, recorded in both excavation campaigns.

The inventory of the pit was a modest one, with a moderate quantity of pottery and daub as well as several stone implements. The fill consisted of dark-grey homogenous soil; surprisingly, it did not contain many ashes indicating the repetitive cleaning of the pit after each firing. Instead, the soil composition suggests a single refill event of the dugout feature followed by a massive discard of waste originating from household and pottery production activities above the entire pottery firing complex.



Fig. 20. Pit in trench 6 (photos: S. Ţerna, M. Vasilache-Curoşu).

Trench 7

Trench 7 was located to the south of trenches 3, 5 and 6, targeting several anomalies, namely the one of a burnt dwelling with its adjacent pits. In order to investigate the prehistoric surface near the house, the trench borders exceeded the longitudinal outline of the dwelling both towards west and east by at least 3 meters, allowing us to uncover an area of 216 m² (18 × 12 m).

Prehistoric surface

The prehistoric surface was located at a depth of ca. 50 cm from modern-day level. It presented an array of features, mostly connected to the dwelling (Fig. 21). The burnt dwelling will be described separately below; first we will focus on the characterization of other features from the prehistoric surface. As mentioned, most of them are connected to the dwelling and represent various discard of finds around the burnt dwelling area.

We will start with the most consistent one, feature 7006, located near the eastern side of the dwelling, close to its central part. It comprised two find agglomerations (Fig. 22). The southern one (squares G–I/9–10) included an fragmented oval grinding stone with a convex bottom, a 40 cm long trapezoidal calcareous stone slab, naturally flat, with no visible traces of reshaping, as well as several vessels of fine category. The northern agglomeration (squares G–I/11–12)



consisted of nine crushed vessels (large crater, pear-shaped vessel, several goblets and amphorae), disposed compactly, and a massive flint core, probably of imported Volhynian raw material. Altogether, the pottery from feature 7006 is very friable and has a specific non-uniform greyish color; we presume that these vessels have not been fired and were probably left to dry after applying the painted decoration prior to firing in the pottery kiln when the dwelling collapsed. In fact, it is the heat from the burning dwelling which partly fired the pottery, as suggested by the non-uniform color of the vessels' outer surface.

Moving further clockwise around the house, the agglomeration of finds located to the south-east from house, in squares F–H/1–3, received the feature number 7010. This feature represented a scatter of pottery fragments, bones and some stones on a more or less circular area of ca. 3.8 m². Some of the bones were burnt; most probably, this happened during the burning of the house. An interesting agglomeration of artifacts has been recorded in square G/2. It consisted of about 20 ceramic fragments (Fig. 23), a fragmented grinding stone, the upper part of a large anthropomorphic figurine (70155) and a fragment of a massive clay object which can be interpreted as an architectural miniature (?), most probably a house (Find ID 7846).

The finds near the south-western corner and along the western wall of the dwelling (features 7015 and 7020) had a similar appearance as the features described above representing fragmented household waste located on the prehistoric surface just next to the house.

The scatter of finds to the north-west of the house has been designated feature 7017. It consisted of shards, bones, daub fragments and stones dispersed on an area of ca. 17 m², partly overlapping the large pit adjacent to the burnt dwelling. The bones are slightly burnt on the upper side and have a weathered look indicating their presence on the prehistoric surface when the dwelling took fire. A large trapezoidal grinding stone (length 47 cm) has been found in square B/5.

Fig. 21. Burnt house and prehistoric surface in trench 7 (photo: R. Hofmann).



Fig.22. Agglomeration of unfired pottery and stone tools near the burnt house (photo: R. Hofmann).



Fig.23. Agglomeration of pottery fragments, daub and a large anthropomorphic figurine on the prehistoric surface near the burnt house (photo: R. Hofmann).

A scattered deposition of finds (feature 7016) has been encountered in the north-eastern corner of the trench, close to the two pottery kilns. It may be interpreted as the southern extension of the discard of waste in the pottery production area. It had an irregular shape and consisted of over a dozen pottery fragments (including vitrified ware), several daub pieces, both regularly burnt and vitrified, few stones with no working traces and a bone deposited on an area of ca. 7.4 m².

The burnt dwelling

The agglomeration of daub, pottery and other artifacts representing the remains of a burnt house appeared first at a depth of 32–35 cm and covered a total area of 36.9 m². It had an irregular-rectangular shape, oriented with its long axis along a northwest-southeast direction (Fig. 24), with a maximal length of 10.4 and a maximal width of 4.3 m. A modern intrusion destroyed a part of the house remains in squares F–G/9–10 on an area of 1.3 m² (feature 7008).

Methodological premise

By far, the most characteristic type of archaeological feature on a Cucuteni-Tripolye large site is the burnt dwelling. Since these dwellings are easily observable even on the modern-day arable surface

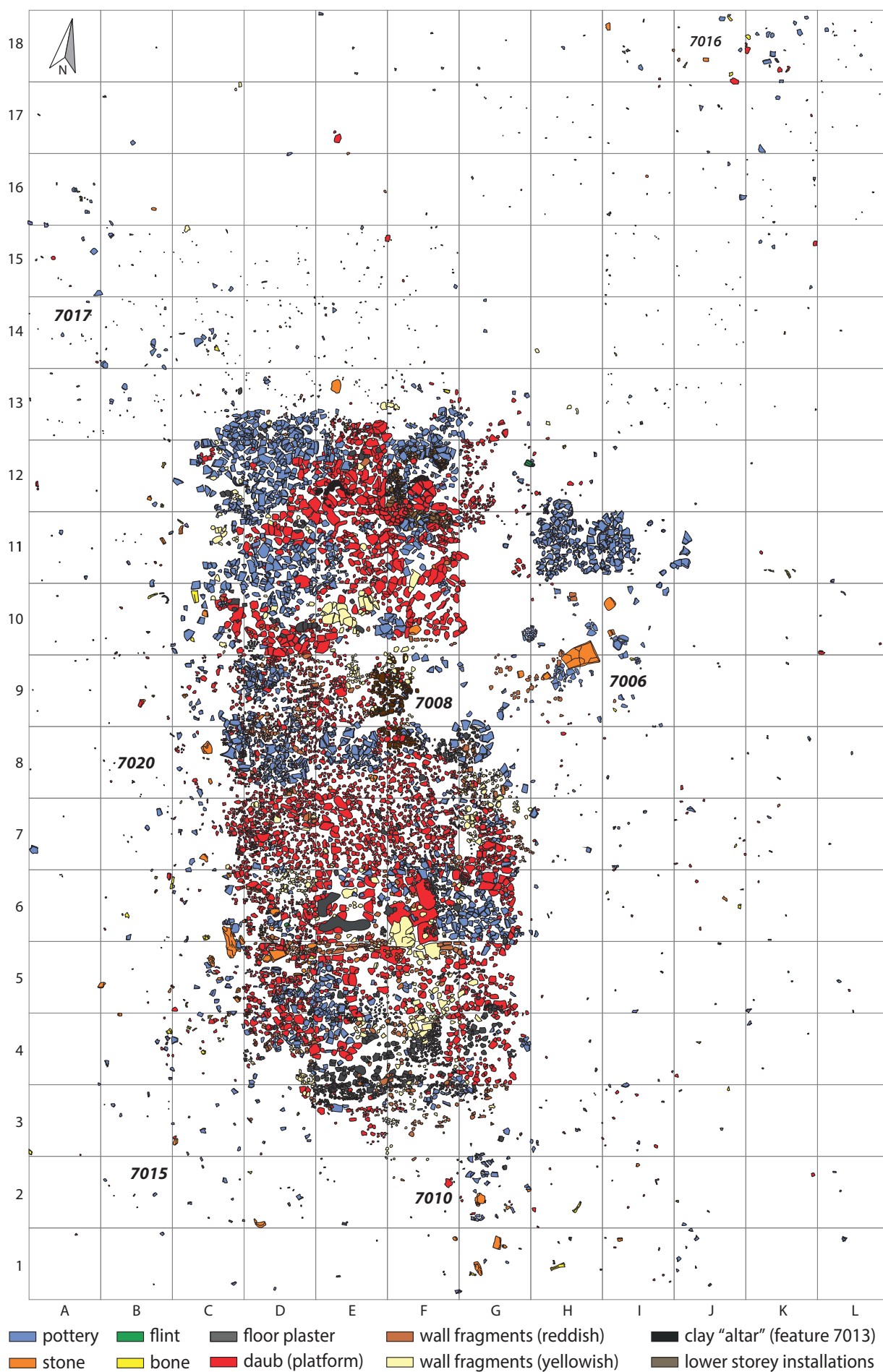


Fig. 24. Burnt house and prehistoric surface in trench 7 (graphic: S. Țerna, A. Vornicu-Țerna, M. Vasilache-Curoșu).

due to the large amount of burnt daub displaced by ploughing, they have been extensively investigated from the very beginning of Copper Age archaeology in the North-West Black Sea region, long before the introduction of non-invasive methods such as geophysical prospection. As burnt houses are extremely complex objects representing a mixture of architectural remains, inventory and interior constructions, their investigation is still a methodological challenge, especially in the context of the ongoing discussion regarding the interpretation of the successive daub layers found when excavating such a feature⁵. Since the investigation of burnt houses has a long history in southeast European archaeology, various excavation and documentation techniques have been developed in time. In our approach to the burnt dwelling from Stolniceni, we sought to combine traditional methods of investigation, developed mainly in the 1940–1980's, with research possibilities offered by modern non-invasive and digital equipment; in an ontological way, such an association of local knowledge, based on decades of experience in dealing with specific burnt house remains, and present-day documentation techniques developed in western Europe, should represent the core of joint fieldwork within an East-West co-operation.

Thus, for the documentation of the remains of this burnt house and its inventory we used a multifold approach combining various techniques of data recording which involved the application of various instruments.

- Absolute coordinates and heights for feature contours and single finds have been measured using electronic tachymeters related to the fixpoints placed on the site with the help of differential GPS.
- All plana and features have been documented by means of classical photography with digital cameras (mainly Canon EOS 5D Mark II and Nikon D3300).
- All features have been thoroughly described in the field diary with observations on position, dimensions, preservation, color and consistence of soil/clay component, construction, inventory and possible interpretation of features.
- All excavation plana have been documented from air with a DJI Phantom 3 UAV.
- For the uppermost planum related to the burnt house we produced an interpretative realistic drawing on millimeter paper (scale 1:10). Various types of clay from house remains and finds have been recorded using a colour-based codification. The scanned drawings have been digitized in vector graphic software (Corel DRAW) and referenced in QGIS. Further, this planum has been documented by means of 2D and 3D photogrammetry using handheld cameras (Canon EOS 5D Mark II) and the Photomop device for above-ground photography, equipped with a Ricoh GR II camera.
- For the uppermost planum the magnetic susceptibility has been recorded.
- For the clay platform (= second storey floor/ground storey ceiling) we used a digital AutoCAD/Corel DRAW drawing based on a 3D model produced in Agisoft Photoscan.
- For the ground floor we used a digital Corel DRAW drawing based on 2D photogrammetry produced in QGIS.

Since the uppermost layer of the burnt dwelling represents a mixture of various types of daub originating from house walls, the clay platform or installations from the house interior, the documentation and interpretation of these remains requires constant field observation made by specialists with a certain experience in dealing with

5 Today, most of the archaeologists dealing with late Cucuteni-Tripolye culture in Moldova, Ukraine and Romania seem to accept the idea of two-storey architecture first substantially argued by the Moldavian archaeologist Vsevolod Marchevici in the 1970's. Nevertheless, the debate regarding "one" vs. "two-storey" architecture is still vivid as suggested by some recent publications (Korvin-Piotrovskiy et al. 2012; Chernovol 2012; Cotiugă et al. 2016).

these burnt houses. That is why we decided to document this situation by means of traditional interpretative hand drawing directly in field and not by off-field digitization of a 2D or 3D photogrammetry. The successive layers below have a different characteristic, they are more homogenous in terms of daub categories and therefore can be digitized off-field.

A crucial documentation technique for understanding the architecture of a burnt house, namely the way the remains from walls and floor overlapped each other during collapse, is the systematic recording of imprints from wooden substructure on the construction daub (an approach developed mainly by Soviet archaeologists for documenting Cucuteni-Tripolye dwellings in the 1970–1980's). This is realized by producing a detailed plan of all the imprints from successive daub layers of a burnt house with specific codification of various kinds of imprints as well as their orientation and – when measurable – thickness. Thus, we used separate symbols for imprints of twigs, round wood, planks and beams combined with signs for flattening or vitrification of the respective daub fragment.

After removing the daub and documenting its type and – where applicable – imprints, all of the fragments were classified according to composition and firing, counted, weighted and recorded using special documentation sheets.

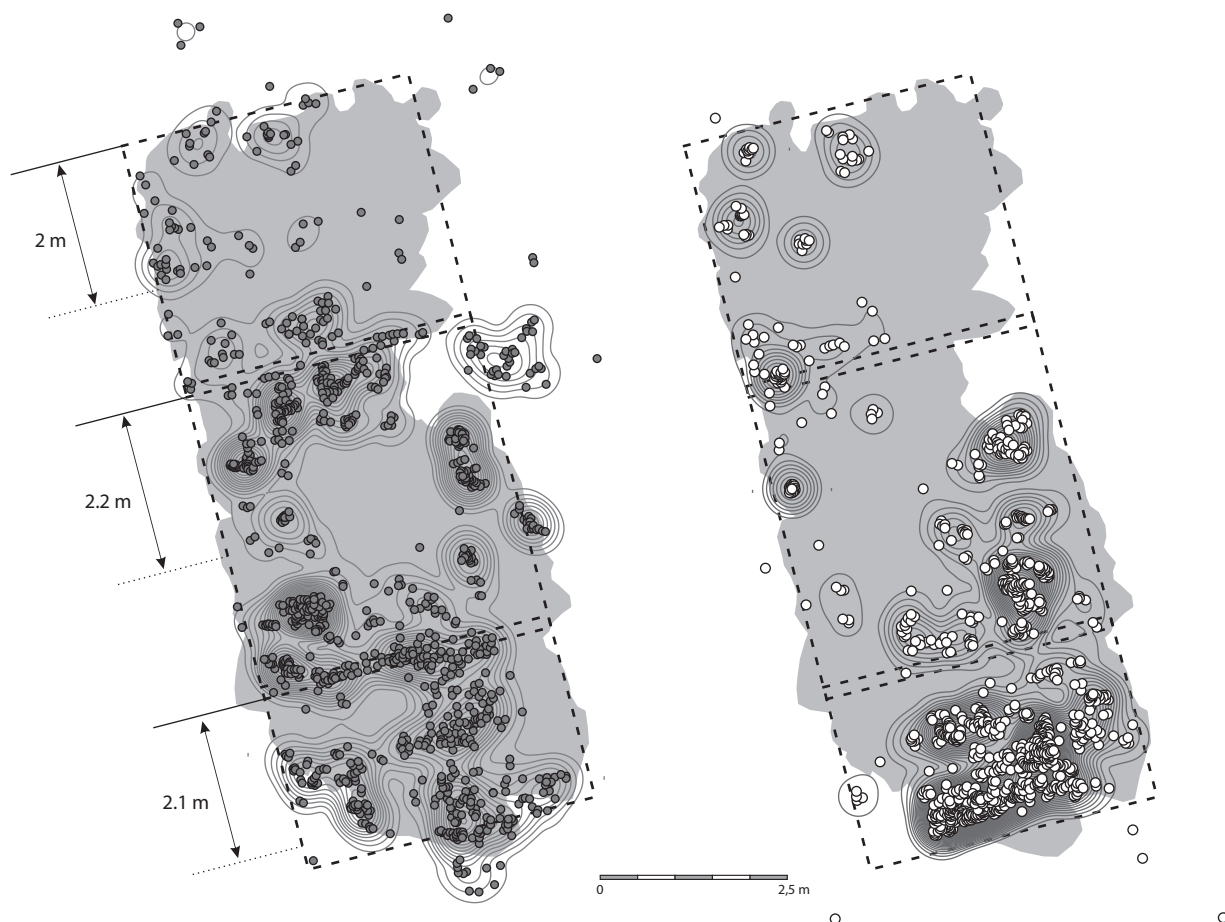
The combination of the above-mentioned documentation techniques allowed us to discern the architecture, size and partition of the two-storey house. In the following, we will give a description of the successive daub layers which correspond to both storeys, from upper to lower one, as well as of their inventories in terms of inner installations and finds.

Upper floor and its installations. Walls

The remains of the upper storey appeared as a mixture of daub coming from collapsed walls, daub from clay installations and floor plaster, pottery and other artifacts. The preservation of the upper storey is moderate with large portions of its northern and central part removed by ploughing.

The crumbly daub coming from upper storey walls had a yellowish or reddish color and was admixed with chaff. Differences in colour are due to differing firing regimes. In some cases, a thin coating layer of ca. 5 mm thickness has been observed on the external surface. The wall fragments were spread irregularly over the entire surface of the storey, forming several agglomerations in the central and southern parts of the house. The imprints on the wall fragments, although not very numerous due to incomplete preservation, come mainly from split wood, round wood and twigs. They are mainly oriented along the main axis of the dwelling, indicating an initially vertical position. We can reconstruct the wooden substructure of the walls as consisting of vertical rectangular and round beams, at least 7 cm wide, reinforced with horizontally interwoven twigs; this wooden frame has been subsequently covered with chaff-tempered clay coated with a thin external layer.

Two base portions of partition walls have been identified. The northern one was preserved mainly in square F/10 and consisted of two parallel rows of daub fragments, arranged perpendicularly to the main axis of the dwelling. The width of this wall was about 16 cm. The southern one, much better preserved, was encountered in squares D/5 and E–G/5–6; a consistent portion of it was documented still standing (feature 7025). It represented an east-south-east-west-northwest oriented array of vertically standing daub fragments, arranged in two parallel rows, partly inclined towards south.



The height of these burnt clay remains varied from 8 to 22 cm, while the width of the wall can be estimated at ca. 17 cm.

Based on the spatial distribution and frequency of the wall fragments (Fig. 25) and keeping in mind the general observation that the house collapsed into southern direction, we can reconstruct the height of the upper storey walls as ca. 2–2.2 m.

Below wall fragments and above the daub platform, multiple fragments from floor plastering have been encountered. These represented 5 mm thin greyish/brown “tablets” made out of fine-grained clay with no visible impurities, attached well to the platform daub. The plastering was initially painted with red color, as proven by spots of paint preserved on several fragments. It showed traces of renewal forming two or three successive layers. These plaster “tablets” were distributed unevenly across the dwelling, depending on conservation; most of them were located in the southern part of the house being preserved by fallen wall remains (Fig. 25).

A clay installation was investigated in the northern compartment of the house (Fig. 26). It was heavily damaged with just a small narrow rounded portion preserved *in situ*. The clay of this structure was crumbly, had a yellow color and some chaff in its composition. It is impossible to reconstruct the shape of this installation; it could have been either round and small in size or cruciform and larger in size.

The upper storey had an abundant inventory consisting of ceramic vessels, polished stones, flints and several clay miniatures. Most of the pottery was located in the northern half of the house while polished stone tools were concentrated in the south. The total amount of uncovered vessels represents several dozens. However, in the case of the compact agglomerations of pottery from squares C–F/10–13, where the preservation of the platform was worse, it is hard to say whether the pottery belonged to the upper or the ground

Fig. 25. Kernel Density Estimation of wall fragments (left) and floor plaster (right) on the platform contour and reconstruction of house partition, upper storey. Raster 50 cm, increment between contour lines = 2 (graphic: S. Ľerna).

storey. Some of the vessels were definitely located above the platform while others may have been displaced during house collapse and mixed with the upper floor inventory. The spectrum of morphological shapes is varied and ranges from small bowls and goblets to large craters, goblet-like and pear-shaped vessels.



Clay platform

The clay platform played a double role as ceiling of the ground storey and as floor of the upper one. It consisted of daub fragments spread over a total area of ca. 36 m². Within this surface, the pieces of daub were distributed unevenly in terms of compactness, preservation and size (Fig. 27).

The daub contained abundant chaff temper. Its upper side was flattened and hand-smoothed. The firing of the daub was generally uniform and as it has a red colour. In the southern compartment, the firing of the platform was weaker, with the colour ranging from dark-grey (upper side) to red (middle). We can conclude that the southern part of the building collapsed first which reduced the flow of oxygen and resulted in irregular firing.

Most of the fragments are 6–8 cm thick and their dimensions do not exceed 15 × 15 cm, except for squares in lines 6–7, where daub fragments reached over 20 × 20 cm. Generally, the southern half of the platform is better preserved and display higher compactness. The central part is worst preserved while the northern one is of moderate preservation and somehow more compact in the north-eastern corner (Fig. 29).

While the upper side of the platform was smoothed, the lower one displayed imprints from the wooden substructure. This consisted of split wood, namely massive rectangular beams and half-round

Fig.26. Upper storey features on the platform contour and reconstruction of house partition (graphic: S. Ţerna).



Fig. 27. Daub platform of the burnt house, view from the south (photo: R. Hofmann).

timber reaching a width of 15 cm (Fig. 28). All imprints had a similar orientation which was perpendicular in relation to the long axis of the dwelling.

Despite incomplete preservation, the outline of the platform provides us with clear indications regarding its original dimensions. Thus, its length was ca. 10 m while the width measured about 4 m, resulting in an estimated area of 40 m².

Ground floor and its installations

After removing the daub platform (Fig. 32), we encountered the inventory of the ground storey, consisting of clay installations, pottery, polished stones and other small finds (Fig. 30). Being preserved by the collapsed ceiling and the upper floor, the ground storey displayed several inner constructions which are connected to the activities performed there. We will describe them from north to south (Fig. 31).

Thus, a fireplace was discovered in the northeastern corner of the ground floor, in squares E–F/11–12. It was of rectangular shape with slightly rounded corners, oriented along the main axis of the dwelling. Despite the damaged central and northern part, we can reconstruct its dimensions as being 1.3 × 1 m.

It consisted of a layer of 1.8 cm thick fine-grained plaster with no visible impurities, applied over a bedding of horizontally placed low-fragmented fine and coarse ware pottery shards. The fireplace had a thickened rim with oblique external walls, preserved only on its southern side. Here, the plaster thickness reached 3–5 cm. When the building collapsed, the western, northern and eastern sides got heavily damaged and the reconstruction of the overall dimensions of the feature is possible only thank to the layout of the shards from its better preserved bedding. The feature has been also affected in post-Eneolithic time, together with the general northern part of the house remains, most probably due to modern ploughing.

Multiple ceramic vessels have been placed near the fireplace and to the west of it, in the empty space of the northern part of the ground storey. Thus, an amphora and a bowl were located directly by the southern side of the fireplace, in squares E–F/11. Further to



Fig. 28. Beam imprint on a fragment of the daub platform (photo: S. Ţerna).

Stanislav Ţerna, Andreea Vornicu-Ţerna, Robert Hofmann, Marta Dal Corso, Liudmyla Shatilo,
 Mariana Vasilache-Curoşu, Vitalii Rud, Hannes Knapp, Wiebke Kirleis, Knut Rassmann, Johannes Müller
Stolniceni – Excavation results from the 2017 campaign
 6 December 2019



Fig. 29. Daub platform (3D model) (graphic: K. Rassmann, R. Scholz, A. Heitmann).

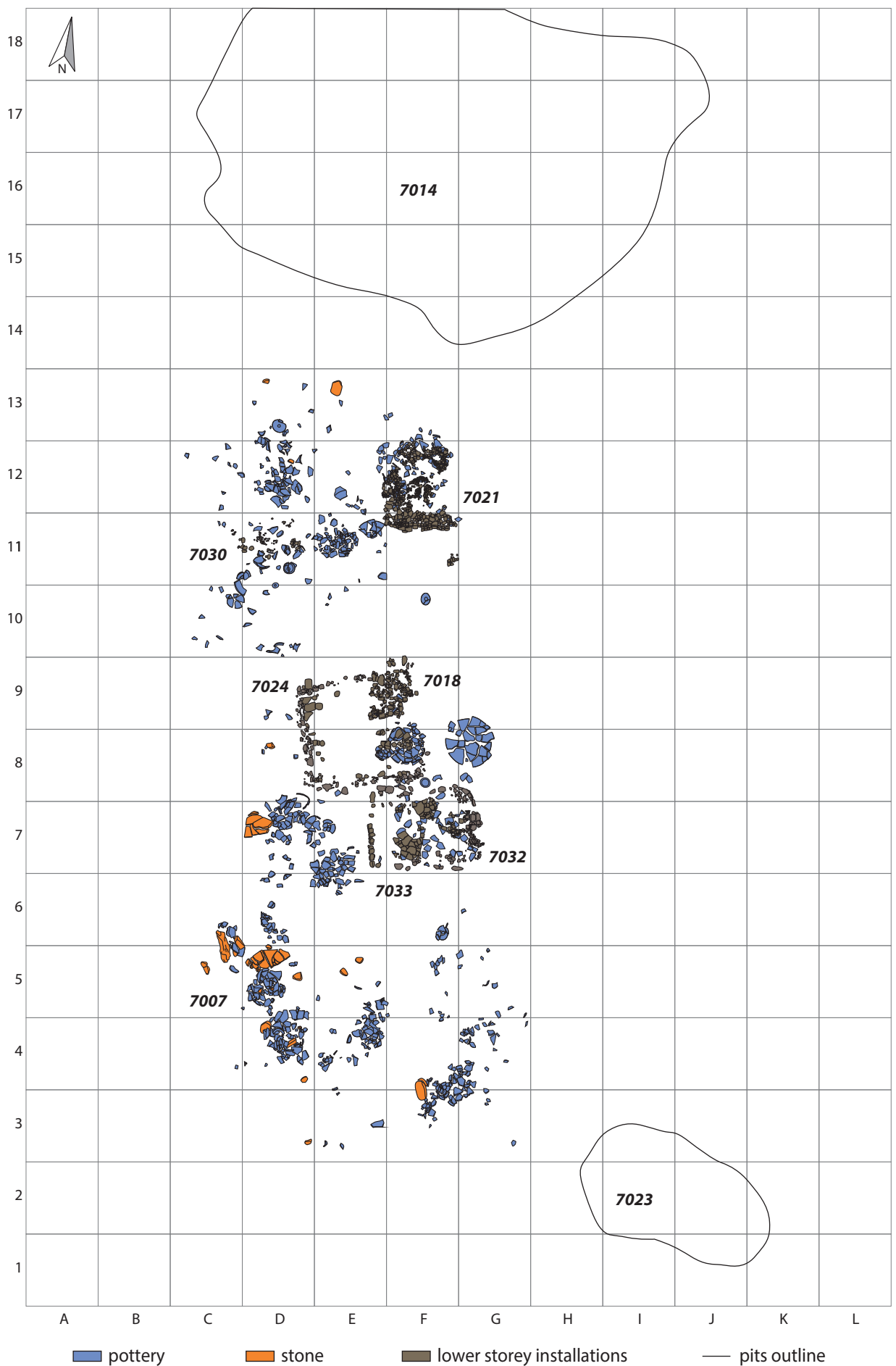
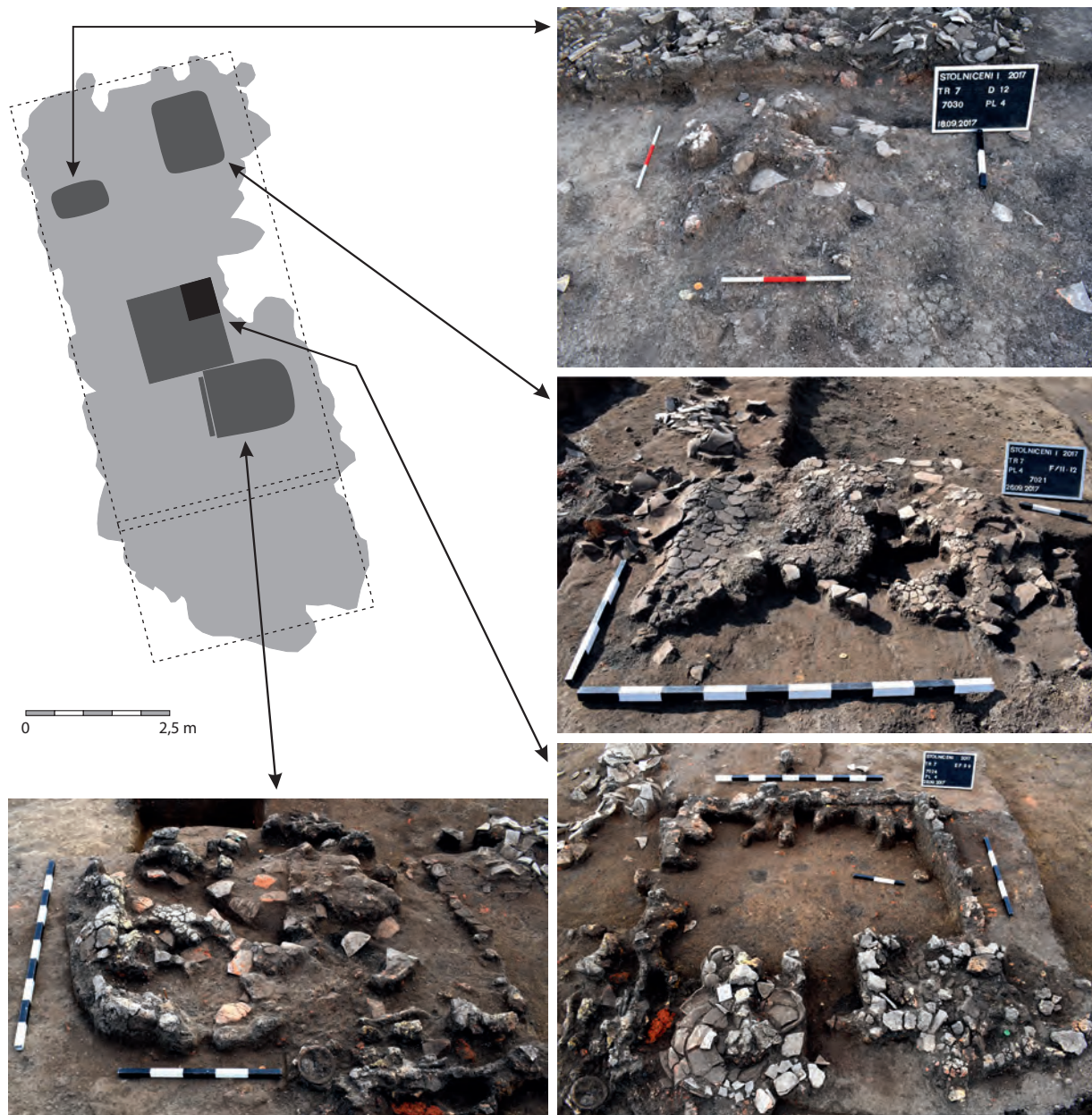


Fig.30. Plan of the ground storey and pits near the house (graphic: S. Ţerna).

Stanislav Ţerna, Andreea Vornicu-Ţerna, Robert Hofmann, Marta Dal Corso, Liudmyla Shatilo,
 Mariana Vasilache-Curoşu, Vitalii Rud, Hannes Knapp, Wiebke Kirleis, Knut Rassmann, Johannes Müller
Stolniceni – Excavation results from the 2017 campaign
 6 December 2019



the west, several agglomerations of pottery were recorded, one in squares C–E/12–13 (large biconical vessel, an amphora, a bowl and a small amphora distorted by secondary burning, associated with a grinding stone) and another in squares C–F/10–11 (several bowls, a lid and fragments from larger half-closed vessels).

Within and partly below these pottery remains, in squares C–D/11 dispersed fragments from another clay structure have been encountered (feature 7030). The daub pieces were smoothed on the upper side and looked similar to the ones of the fireplace 7021 described above. Several of them consisted of two layers indicating renewal activities. The remains were scattered across an area of ca. 85 x 55 cm (0.5 m²) and formed several distinct agglomerations. Obviously, we deal here with a second, heavily damaged fireplace built on the floor of the ground storey. Some of the pottery fragments mixed with daub may represent remains from its substructure.

Further to the south, in squares E–F/8–9, the central part of the house, another clay structure was investigated (feature 7024). It had a rectangular shape, with a length of 153–163 cm and a width of 128–145 cm. The installation represented a “box” with up to 6 cm

Fig.31. Ground storey features on the platform contour and reconstruction of house partition (graphic: S. Ţerna).



Fig.32. Burnt house stratigraphy: a base of wall on upper storey; b daub platform; c bowl lying on the floor of the ground storey under fragments of the daub platform (photo: S. Ţerna).

thick walls made of crumbly red-yellowish clay with chaff admixture. The floor of this bin was plastered with a 4 cm thick reddish crumbly clay with chaff in its composition, partly preserved along the western side. Here, imprints from twigs have been recorded on the inner side of some daub fragments, both from the wall of the bin (4 cm wide imprint) and its floor (2–3 cm wide imprints). The imprints had a general north-south orientation with some deviation occurred during the collapse of the dwelling. We reconstruct this bin as made out of clay applied on a horizontal substructure of longitudinally placed twigs.

The eastern side of the bin was open with no wall remains. Instead, in its northeastern corner, a heavily fragmented rectangular clay installation was unearthed (feature 7018). It had dimensions of 65 x 45–54 cm and was made out of 3 cm thick compact, fine-grained clay with no visible admixture. This structure represented a sort of clay table and was located at a certain height above the ground storey floor on a wooden frame, as indicated by imprints of narrow planks observable on the inner side of the daub fragments. When the house collapsed, the installation fell from its raised position and broke, with some of the clay pieces relocated and found above the two vessels which were located in the southeastern corner of the bin; namely a pear-shaped vessel and a biconical one. The lid found to the south of the bin, in square F/8, initially covered the pear-shaped vessel. A large bowl and a half of a large zoomorphic figurine were found to the east of the bin, near the external wall of the house.

Remains from a clay oven were unearthed further to the south, in squares E–G/7–8 (feature 7032). It was partly destroyed during the house collapse; the eastern wall is better preserved. The oven had a quasi-rectangular, horseshoe-like shape, with a straight western and a rounded eastern side. It was oriented perpendicularly to the house's main axis and had a length of 1.4 m with a width of ca. 1.2 m. The feature measured about 1.4 m².

The oven had a complex structure. Its base (bedding) consisted of horizontally placed low-fragmented pottery shards covered by at least two successive 1.5 cm thick layers of fine-grained plaster with no visible impurities (each layer representing a renewal). Subsequently, the walls of the vault have been erected upon this base. Better preserved along the eastern side of the oven, the walls were 3.5–5 cm thick and consisted of crumbly yellowish clay with chaff admixture, coated with a thin reddish smoothed plastering layer. On the eastern (rear) side of the construction, these walls had still an oblique (45°) or almost vertical position in relation to the horizontal base. Obviously, the vault or cupola of the oven had been of an oval or truncated-conical shape; although the preserved wall fragments do not allow an accurate reconstruction of its height, we can presume that it measured at least 50–60 cm.

The western side of the construction was open representing the frontal (access) part of the oven. It had a threshold consisting of 10 fragments of fine-grained 1.5 cm thick reddish clay with no impurities, smoothed on both the upper and the lateral external surface. The main preserved *in situ* part of the threshold had a length of ca. 60 cm and a width of 8–10 cm. Further fragments of this threshold were found to the north; their location correspond to the width of the oven. Some of the fragments had been displaced and were found above one of the vessels from the southeastern corner of the clay bin 7024 described above.

Taking into account the distribution of pottery fragments and the plaster which formed the bedding of the oven, we can presume that the oven had two interconnected chambers. The main (and probably taller) of them had dimensions of ca. 117 x 99 cm or about 1.15 m², while the 30 cm wide area between the threshold and the operational area could represent a lower chamber. If so, the main chamber was used for the fire while the lower access chamber was used both for operating the fire and probably for exposing items or food to the heat. We cannot exclude that the oven had a horizontal roof where further dishes had been placed; unfortunately, no roof parts were preserved well enough to allow an exact reconstruction.

An agglomeration of pottery shards and a large stone was located in front of the oven, in the area between the oven and the eastern external house wall. It consisted of few bowls and several half-closed large vessels including an amphora, a crater and a pear-shaped vessel. The trapezoidal stone was ca. 37 cm long and had no visible working traces.

The southern part of the ground floor area in the squares D–G/3–5 contained further ceramic vessels and is characterized by a concentration of polished stones (feature 7007). The pottery included both small (bowls, lids, goblets) and large vessels (pear-shaped, crater). The stones had various sizes and shapes, ranging from oval small rounded polish stones to larger trapezoidal grinding stones with flattened working surface.

Partition

We reconstruct the house as a two-storey one. The upper floor had three compartments: the northern and central one represented ordinary rooms with walls from all sides while the southern one is probably a “balcony” with its southern, western and eastern sides open. The second storey was probably accessed by a ladder. The northern room had 13 m², the central one 16 m² and the southern compartment had 9 m². The total area of the upper floor including walls measured therefore about 39.5 m². Due to incomplete preservation and later damage from modern ploughing, we cannot say too much about the inner outfit of the second storey, except for a rounded or cruciform “altar” located in the center of the northern room. The upper storey had a plastered floor with traces of red paint and the height of its walls was about 2.2 m.

Since the walls of the ground floor are not preserved, we can say less about its partition. Nevertheless, the mutual location of the installations inside, namely the oven, the clay bin and two fireplaces, may indicate a single large room with no other divisions, since otherwise the movement between and along the installations would be problematic. The area of this room would represent ca. 29.5 m². The southern wall probably corresponded to the location of the southern wall of the second storey, thus ensuring the stability of the dwelling. The floor consisted of trampled earth, with no other clay plastering. The lack of preserved walls (and imprints) does not allow us to estimate the height of the ground floor; still, it must have been tall enough to allow people operating the multiple installations discovered there. In our opinion, the ground floor storey measured at least 1.8 m in height. The space below the “balcony” of the upper floor (= space to the south of the large room on ground floor) was probably open, with no massive walls and represented a storage/working area with ceramic vessels and many polished stones. Here, the platform probably rested on supporting posts; unfortunately, no traces of them were found in the heavy bioturbated soil. Such a construction may explain why the southernmost part of the dwelling collapsed first, as witnessed both by the direction of walls collapsing (towards south) and the weaker firing of the platform.

Judging from the size of the platform, we can reconstruct the house as being 10 m long and 4 m wide, standing on an area of 40 m².

Pits

Two pits were investigated in the vicinity of the house. Both were visible on the geophysical image. The larger was located directly to the north of the dwelling while the second smaller one was located to the south-east. The pits were visible at planums 3 and 4, at a depth of ca. 60–80 cm below the modern-day surface.

The northern pit (feature 7014) appeared at a depth of 60 cm, as a large darker spot located at a distance of ca. 75 cm from the house (Fig. 33). The feature covered an area of 23 m² and was of an irregular-trapezoidal or “8-like” shape, with two larger areas connected by a narrow segment. At this level, its fill included only few finds; important is the discovery of several daub “tablets” coming from the fireplace no. 7021 which fell into the obviously still partly open pit during the house collapse. Further 20 cm deeper, the fill contained pottery fragments (including large pieces from a bowl and a goblet), some fragmented bones and flints.

At a depth of ca. 100 cm, the characteristics of the feature changed. It now consisted of two well-visible, partly interconnected pits,



which were numbered 7026 (western pit, irregular-oval shape) and 7027 (eastern one, irregular-round shape). Both pits were about 1 meter deep and can be interpreted as distinct events in clay procurement within the generic 7014 feature. The maximum depth of the pit 7014/7026/7027 is ca. 2.1 m from modern-day level or about 1.6 m from the prehistoric surface.

The pit had an inhomogeneous fill (Fig.34). The bottommost layer, about 10 cm thick, contained a mixture of dark soil with charcoal and burning traces and yellowish clay. It was covered by a well-visible package of ca. 15 successive ashy layers with a total thickness of over 50 cm. The topmost layer had a thickness of about 100 cm and consisted of dark-brown half-compact soil. Obviously, this pit had been dug in order to extract clay for house construction and was used afterwards for discard of refuse connected to house activities. Its inventory included many pottery shards (with some almost completely restorable vessels in the ashy layers), animal bones as well as multiple flints, some polished stones, over 15 bone tools, two bone pendants and over 40 clay miniatures such as tokens, clay balls and figurines.

The second, smaller pit, was located at a distance of about 1 meter to the southeast of the southeastern corner of the house. It had an oval shape, which was oriented along a northwestern-southeastern direction, and dimensions of 2.7×1.4 m or 3.4 m^2 . Its maximal

Fig.33. Daub platform and the large pit to the north of the house, view from north-west (photo: R. Hofmann).



Fig.34. Profile through the pit 7014/7026 (photo: S. Ţerna).



Fig.35. Lower part of the fill of pit 7023 (photo: A. Vornicu-Ţerna).

depth reached ca. 50 cm from the prehistoric surface. The inventory consisted of pottery (including a couple of restorable bowls), animal bones, flints and several clay miniatures (Fig. 35). The fill was homogenous and consisted of dark-grey moderately compact soil.

If pit 7014/7026/7027 was used for clay extraction for house building and subsequent refill during the lifetime of the house, pit 7023 probably represents a much shorter event. It might have been dug for household purposes and refilled shortly after, as suggested by the homogenous fill and its modest dimensions.

Concluding remarks on the pottery firing complex

During the two campaigns 2016–2017, we uncovered an area of 400 m² within the pottery firing complex in the northern part of the settlement. The excavations allowed us to unearth two pottery firing kilns, one burnt house, four pits and various features on the prehistoric surface, that is: all main anomalies visible on the geophysical image, which may be connected to pottery production (Fig. 36).

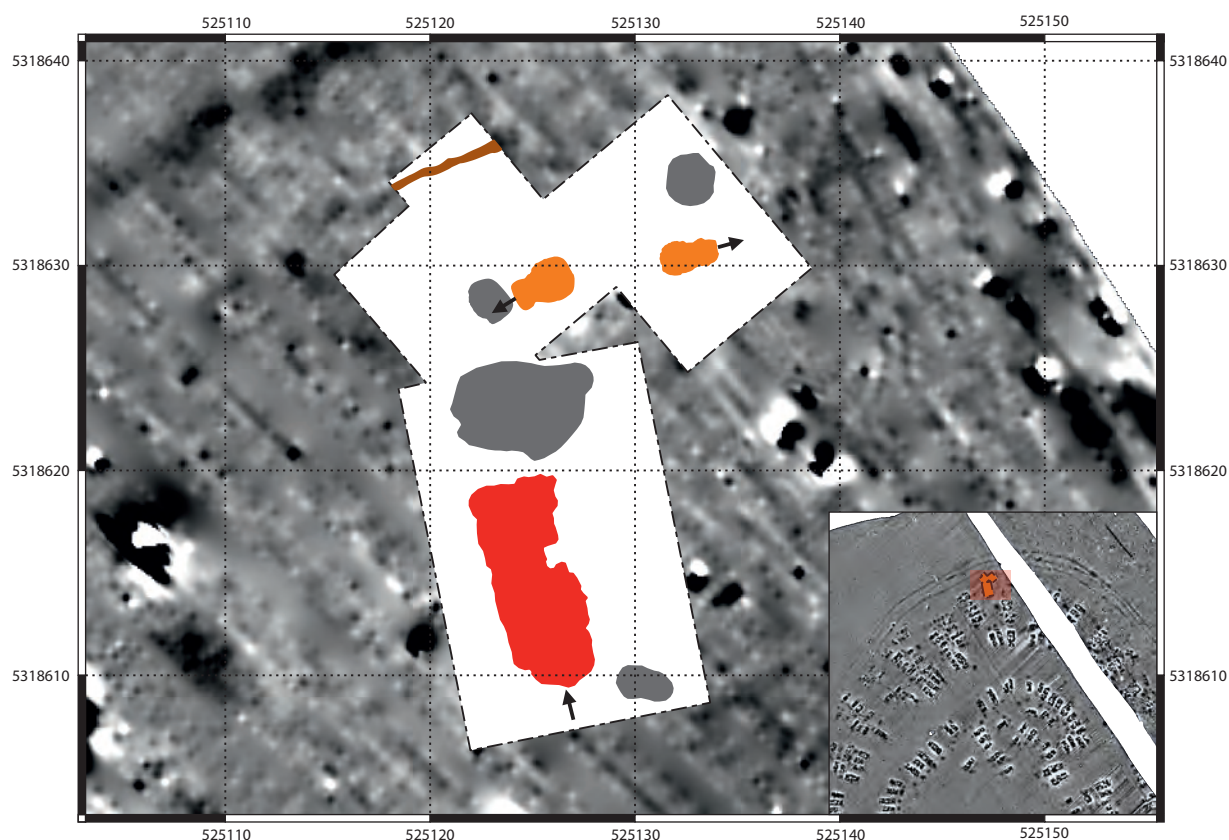
At this stage, we may summarize the following general observations on the structure and use of the pottery firing complex:

- The production of pottery on the site was organized in specialized complexes including a house accompanied by an agglomeration of kilns and other features (a similar complex is located in the southern part of the settlement). We have indications for labor specialization in terms of pottery production.
- Two dual-chambered updraught kilns located in the backyard of the house served for pottery firing. Their openings were oriented in opposite directions. Each kiln had been used for many years as suggested by multiple layers of plaster renewal. It is not likely that both kilns were in operation at the same time; probably, they represent distinct generations. The kiln from 2016 was covered with abundant waste including much production refuse such as vitrified pottery, clay and fragments of clay stands. The 2017 kiln did not show such an agglomeration of refuse. We therefore conclude that the 2016 (or western) kiln is the older one. It was covered with waste coming from operation of the eastern kiln investigated in 2017.
- A pit was located near each of the kilns. The pit near the western kiln served for the operation and management of firing process. The pit near the eastern kiln was dug for clay extraction and

refilled with finds and production waste, including a layer of burnt caolinite clay on its top.

- The house is definitely connected to the kilns as suggested by its location outside the limits of the regular pie-like house clusters which formed the outer ring of the site. The inventory of the dwelling suggests its use both as a normal living facility (with cooking and heating installations) and a place for depositing and working the pottery. The quantity of ceramics recovered from the house is really large (over 100 restorable vessels from 40 m²) and their shapes are morphologically very varied, covering a wide spectrum from small bowls and goblets to various half-closed large vessels. Some of the vessels bear traces of reparation while one side of a large crater was vitrified due to firing in the kiln (and not during secondary burning when the house collapsed). A large quantity of polished stones including many pebble-like items with rounded edge (burnishers?) were found in the southern part of the house. Maybe, there were used in various pottery preparation activities such as mineral crushing and grinding or surface treatment.
- In contrast to the pits near the kilns, the pits near the house have no uncommon characteristics and were filled with normal household waste.
- The prehistoric surface around house and kilns was extensively involved in pottery production and refuse discard activities. Thus, the unburnt vessels near the house might have been placed there for drying; also, in several places polished stones or agglomerations of stones with no visible working traces were found. The later may have been used for clay wedging. Most of the technological and household waste generated by the house and the two pottery kilns was discarded on the surface, below the palisade (as witnessed in 2016 excavations) or above the features out of operation (like the western kiln and the adjacent pit).

Fig.36. The pottery production complex investigated in 2016–2017. Red: house of the potter; orange: kilns; brown: palisade; grey: pits. Arrows indicate the direction of access to the kilns and into the house (graphic: S. Ţerna).



A deeper insight into the *chaîne opératoire* of pottery production will be gained after the processing of all finds and obtaining data from use-wear analysis of stone and bone implements, experimental firing of ceramics, and analysis of charcoal remains in the pits.

Investigations of an “ashplace” on the periphery of the settlement

Several large sites from the Prut-Dniester interfluvium, including Stolniceni, display a distinctive element of spatial organization, which is the presence of *extra muros* structures radially arranged around the settlement. They are well visible on modern satellite images as whitish spots similar to Bronze Age ash mounds. Despite earlier interpretations as structures with a defensive function (“towers”), a first description of such structures was made by V. Bicbaev, who investigated them visually and placed small test-trenches on respective features of the settlements Pîrjota and Petreni (Бикбаев 2007). He described them as concentrations of fragmented pottery and animal bones and emphasized that these structures could in no way represent remains of defensive features.

At Stolniceni, the structures as seen on satellite imagery correspond broadly to house quarters; they number around 18. Their geomagnetic imprint is weak, leading to a poor identification by magnetometry; in the case of Stolniceni, only four anomalies were clearly distinguishable (Scholz et al. 2018, Fig. 7).

In order to check the nature and function of these features, one of them was investigated by excavations. The anomaly is located on the northern part of the site, in the vicinity of the pottery production complex. Its contours appear fuzzy on the geomagnetic image, the object’s diameter can be estimated at around 20 m.

Two trenches of 2 m and 16 m width, respectively, and 20 m length were positioned perpendicularly, so that they covered the northern and southwestern limits as well as the central part of the anomaly. A large amount of finds was observed even on the ground surface and continued to appear in the first excavated layer, which corresponds to the modern arable soil (chernozem soil). Being in secondary position, the finds were scattered all over excavated area. Just below the black soil, there was a stratum of about 20 cm of unconsolidated greyish soil containing a dense mass of archaeological remains found *in situ* (feature 8003/10003). Ceramic shards of low and medium fragmentation and animal bones are the main components (Fig. 37), yet at the same time, clay miniatures, flint, bone or stone finished objects and by products were often encountered. The borders of this agglomeration in both trenches corresponded broadly to the limits of the magnetic anomaly. Outside this area, there was a typical off site stratigraphy with a rich cultural layer lacking, with few, high fragmented finds. The prehistoric surface was identified at the interface of the grayish and the dark-brown soil. Here, the impact of feature 8003/10003 is discernable by the presence of numerous whitish limestone inclusions, probably formed as a result of water stagnation in the sediment.

Though the limited character of the excavations does not allow detailed observations regarding the spatial distribution of finds, several agglomerations composed mainly of pottery and animal bones were distinguished in the cultural layer: features 8011, 8012, 10005, 10006. Their dimensions vary from 1 to 4 m², but it was not possible to delimit them clearly. The analysis of the distribution of finds by means of Kernel Density Estimation shows several concentrations located in different areas of the anomaly (Fig. 38).



Another type of feature, a pit, was identified at the prehistoric surface level (feature 8019), below the agglomeration 8011. It is a pit of small size of ca. 85 x 45 cm, with the long axis oriented in northwest-southeast direction and a maximum depth of 95 cm from the modern surface (approximately 45 cm from the prehistoric surface). It was of rectangular shape with rounded corners and slightly sloped walls. The filling consisted of unconsolidated dark-gray soil with very few small fragments of pottery and bones. In the southern wall of the pit, a larger bone fragment (proximal end of a cattle metapodial) was found.

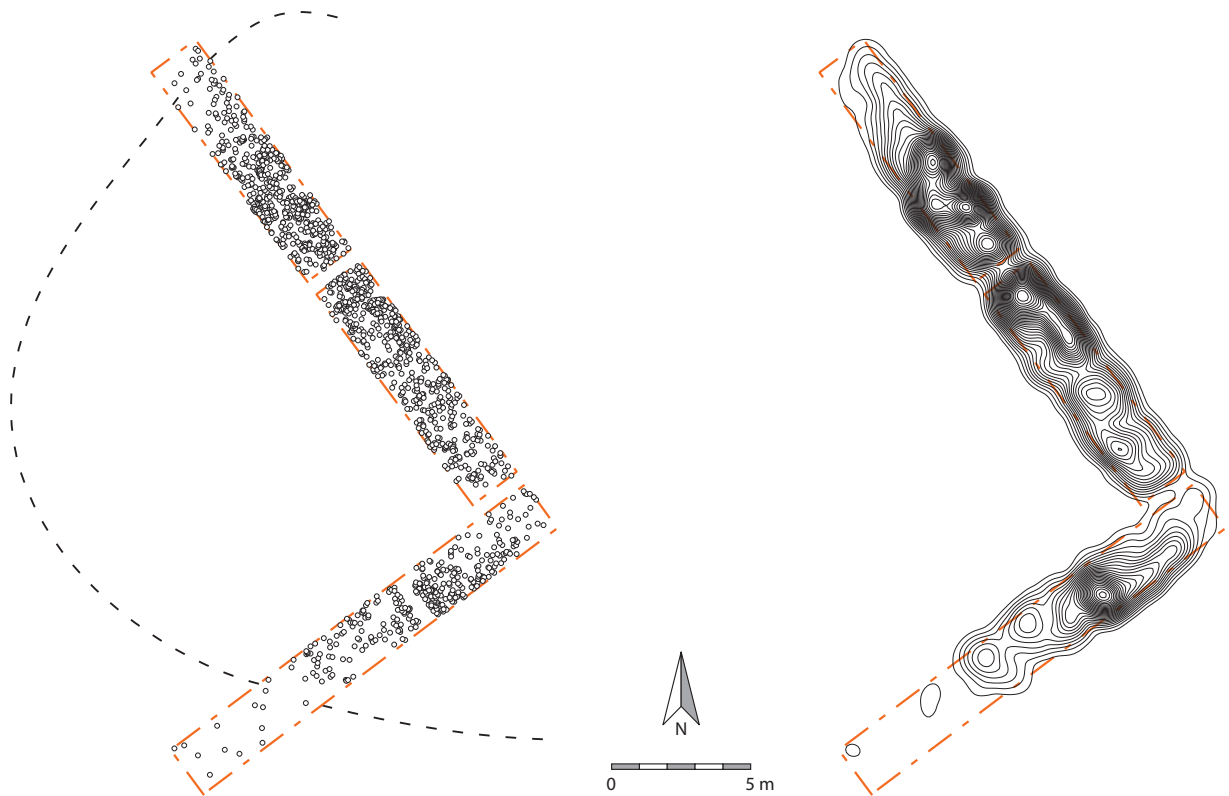
A feature similar to a post hole was observed in the northeastern corner of the pit. It has a diameter of about 18 cm and the maximum depth is ca. 90 cm below the modern surface (Fig. 39).

The data obtained from the excavation indicate that the anomaly represents an area designed for waste disposal. We assume that different discarding events took place successively, as the presence of several agglomerations of finds suggests. The waste probably contained a high quantity of organic material, which would explain the sediment characteristics, but this is to be confirmed by further XRF analysis. The types of artefacts discarded and the activities they were used in, should again be clarified after lab processing. At the moment, we can say that they are diverse in terms of raw material: the inventory contains around 30 clay miniatures (tokens, figurines, balls), few polished stones, several flint arrowheads and an impressive quantity of bone and antler products (around 36).

Judging by the thick cultural layer, we assume that the area had the characteristic of a rubbish heap. The function of the small pit and its role within the discarding events is unclear yet.

Further excavations on a larger scale will help in a better understanding of the formation processes and inner structure of such "ash-mounds".

Fig.37. Find agglomeration within the „ashplace” in trench 10 (photo: A. Vornicu-Ţerna).



Investigations of the outer ditch

At Stolniceni, the existence of a system of three ditches reinforced by a palisade system was first verified by geophysical prospections in 2015. In 2016, a 40 × 2 m excavation trench (no. 1) was placed perpendicularly over these anomalies in the northeastern part of the settlement in order to section and document them within a single long profile (Fig. 7). The fieldwork led to the investigation of a palisade (including the discovery of postholes) and of the inner and middle ditches; the outer ditch was destroyed by a pit of the first centuries AD in the excavated sector which did not allow us to document the dimensions and get datable material for this outermost ditch.

Therefore, we decided to open another trench targeting the external ditch, this time in the northern part of the site, close to the two trenches on the “ashplace”. Trench 9 (Fig. 7) had dimensions of

Fig.38. Trenches 8 and 10. Contour of the „ashplace anomaly” from geophysical imagery and distribution of bulk finds (pottery, bones, daub) marked with points (left); Kernel Density Estimation of bulk finds (raster 100cm, increment between contour lines = 2) (Graphic: S. Țerna, A. Vornicu-Țerna).



Fig.39. Profile through the pit and possible posthole in trench 8 (photo: A. Vornicu-Țerna).

9 × 2 m and was oriented in north-south direction, perpendicularly to the ditch and a nearby located anomaly. The excavations allowed us to investigate the earthwork while the other anomaly located to the north of the ditch turned out to have no archaeological significance.

The ditch

In the southern part of the trench in squares A-B/1-5, the darker fill of the ditch (feature 9005) started to be visually recognizable at a depth of 70 cm below the modern-day surface as a 250 cm wide strip of homogenous dark-brown silt (Fig. 40). Unlike the inner and middle ditches investigated in 2016, the soil above this level contained very few finds and did not yield any agglomerations of pottery and animal bones on the prehistoric surface (estimated at a depth of ca. 50 cm).

The ditch had a maximal depth of 145 cm below the modern-day level or ca. 0.95 m below the prehistoric surface. Its shape was truncated, V-like with flattened bottom. The width of the bottom ranged from 15 to 80 cm as the contour of the lowermost ditch fill layer was irregular, displaying two wider segments connected by a narrow stripe (Fig. 41). The sterile clay below the ditch showed abundant inclusions of tiny whitish limestone (calcium carbonate)



Fig. 40. Ditch outline on planum 4 (photo: K. Radloff).



Fig.41. Outline of the ditch bottom (photo: K. Radloff).

which have probably formed as a result of water agglomeration in the open earthwork.

Generally, the fill of the ditch was fairly homogenous (Fig.42), consisting of dark-brown, moderately compact soil which contained a low amount of finds such as pottery shards, flint implements, bones and stones of various size (Fig.40). The distribution of finds was more or less horizontal, indicating a slow, long-lasting refill. Some of the pottery fragments were weathered and marked the top of the ditch at a certain stage of the backfill.

At the bottom of the ditch, the soil composition slightly changed into light-brown compact clayish silt.



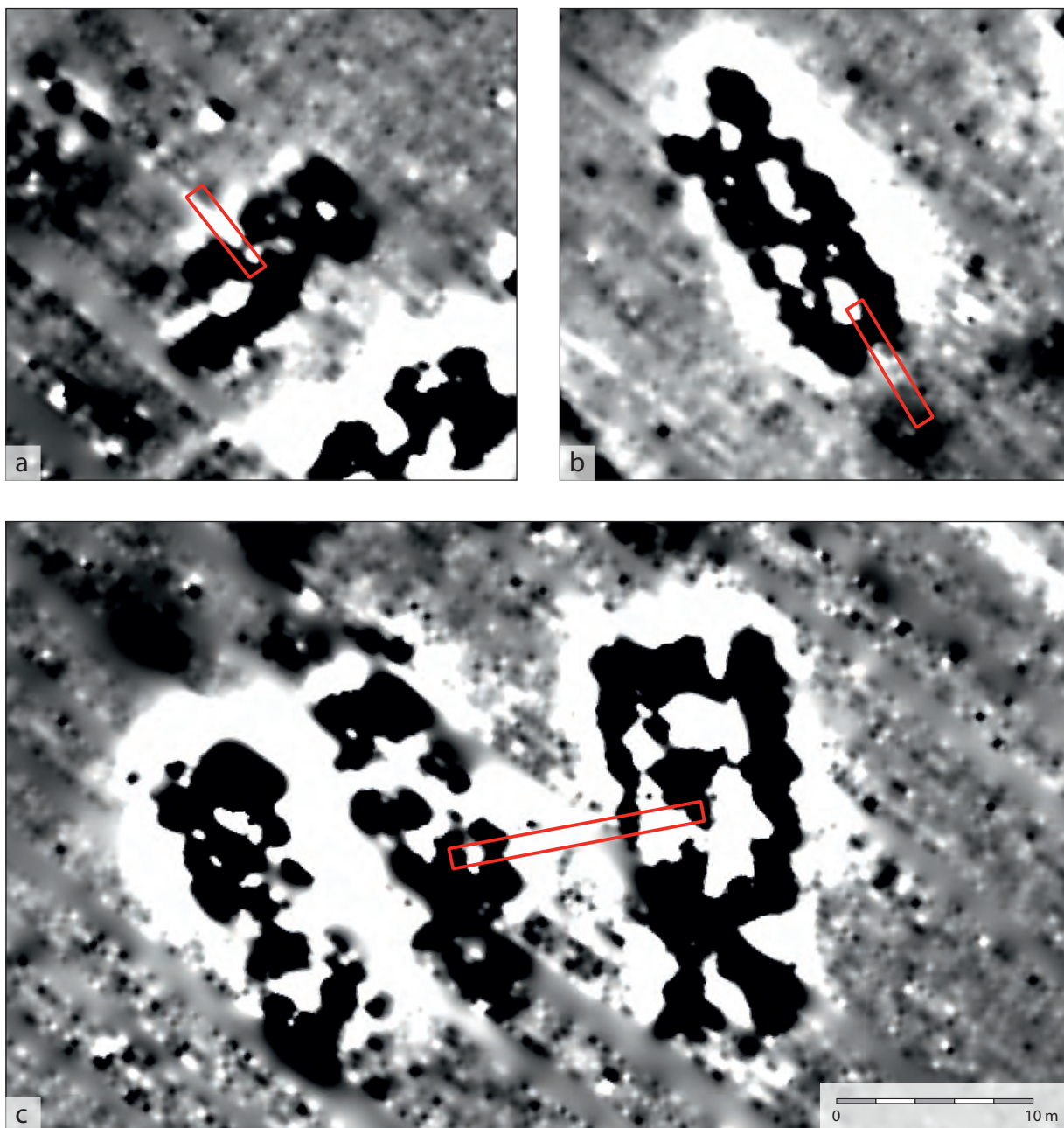
Fig.42. Ditch profile in eastern wall of the trench (photo: K. Radloff).

Interpretation

The outermost ditch investigated in 2017 completed the research of the earthworks of the settlement, initiated in 2016. The external ditch turned out to have similar characteristics and dimensions compared to the inner and middle ones, with a depth not exceeding 100 cm below the Copper Age occupation level. However, in contrast to the other two ditches, it did not reveal any waste agglomerations on the prehistoric surface. After having been dug, the ditch was left open and its refilling process was long, with no rapid massive discards of anthropic nature. As with other large sites of the Cucuteni B-Tripolye B2/C1 period, the earthworks did not have a defensive function.

When further compared to the ditches unearthed in 2016, the earthwork from trench 9 displayed another interesting peculiarity, namely the strongly irregular outline at the bottom, with two wide sections and a narrow junction between them. Probably, we deal here with indications for task differentiation during the excavation of the ditch, when each of the segments of yet unknown length was assigned to a different worker (or group of workers).

Fig.43. Stolniceni. Detail pictures of the magnetic plan showing the location of the test trenches excavated 2017: a Trench 11; b Trench 12; c Trench 13 (magnetic plan: K. Rassmann).



Test-trenches

During the excavation campaign 2017 several test trenches were located in three different areas of the site Stolniceni (Fig. 7, 4, 5 and 43):

In trench 11, a small burnt house was partially uncovered that is located in the rear area of the inner row of the ring corridor and thus a potentially secondarily settled area.

In trench 12, a single-standing house-pit combination was explored, which belongs to the inner row of the ring corridor. In contrast to the house investigated in trench 11, this building potentially represents a building in a primarily settled area of the settlement.

In trench 13, the stratigraphic relation of two neighboring houses was in the focus of our interest which are located in the outer row of the ring corridor approximately 50 m south of trench 7 (belonging to the same block of houses). These are a large head building in the east situated at the entrance of a road (house row) leading radially outwards from the ring corridor to the fringe of the settlement, and a smaller dwelling west of it. The observation that the longitudinal alignment of these two houses deviates relatively strongly could indicate a different age of these buildings.

Trench 11

The house feature examined in trench 11 has a length of about 13 m and a width of 5.5 m (Fig. 43). With a floor size of 72 m², it is smaller than the average of all dwellings in Stolniceni (mean: 87 m², median: 78 m²). The highly magnetic signature of the house is interrupted by areas with low magnetisation only in the central part and along the central longitudinal axis. Therefore, it was obvious already before excavation that we deal with a classic Ploshchadka type with a massive clay platform.

Prehistoric surface

In the area of trench 11, the terrain surface at the use time of the explored house runs at a level of about 165.15 m, 0.55 m below today's terrain surface. Outside the house only relatively few pottery fragments, bones and a stone were recovered, which altogether indicates a rather low intensity of use of this area. Presumably, outdoor activities were rather concentrated on zones southwest and northeast of the house: In front of the southwestern gable wall a pit is situated which probably marks the rear area. The front of the house was probably located on the northeastern end, where an unbuilt settlement zone runs parallel to the ring corridor which is not interrupted by pits (Fig. 4–5; 7).

The burnt dwelling

Trench 11 had a size of 1 x 5 m and cut from northnorthwest on a length of about 2.5 m into the centre of the northwestern longitudinal side of the explored house (Fig. 43–44). In other Tripolye houses, the main room is usually located at this place. About 0.5 m below the terrain surface and the Chernozem top layer, a massive package of burnt house debris was encountered with a thickness of 0.1–0.15 m. On top of this package rather small sized wall fragments were situated intermixed and partly superimposed by large pottery fragments of at least two big collapsed vessels (Fig. 44A). In addition, a large bowl was embedded into the wall debris, which probably stood in the interior space of the house directly in front of the outer wall.

Below that layer, the remains of the massive clay platform followed (Fig. 44B). The majority of the large platform fragments showed a flat upper surface. In small areas, this clay platform was interrupted (disturbed) by several holes congruent to low magnetised areas

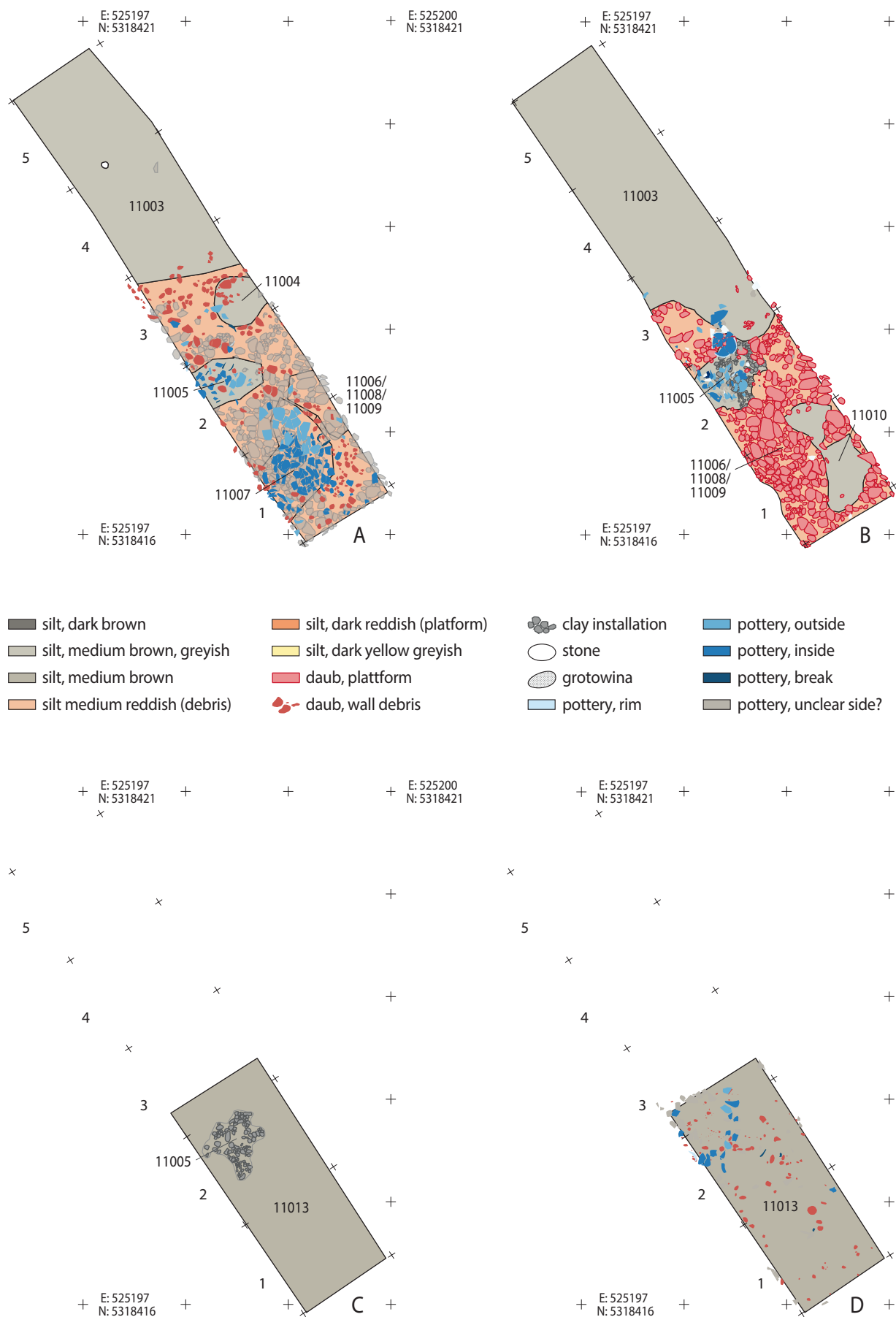


Fig. 44. Remains of a dwelling and the adjacent open space in trench 11: A Planum 3 with remains of collapsed walls of the upper storey and pottery remains; B Planum 3a with remains of the house platform; C Planum 3b with a clay installation below the platform; D Planum 3d with daub pieces and the circular substructure of the clay installation made of ceramic shafts (graphic: R. Hofmann).

in the magnetic plan. The back of the platform fragments showed numerous imprints of split wood planks from a massive wooden ceiling construction arranged transversely to the longitudinal direction of the house.

Below the platform, the remains of a clay installation became visible already early during excavation, situated in front of the north-western longitudinal side of the house (Fig. 44C; 45). This clay installation consisted of a on its surface carefully smoothed layer of clay broken into many small pieces and a substructure made of large ceramic fragments (Fig. 44D). The ceramic fragments were concentrated in a ring along the outer boundary of the installation.

Also based on analogous findings, we can reconstruct a kind of two-storey house with an elevated upper main floor and a basement below. The basement must have been at least high enough to use the clay installation. The location of this installation close the outer wall of the house and its construction with a substructure of ceramic fragments is rather unusual.



Fig.45. Trench 11. Substructure of the clay installation with remains of the smoothed layer of clay (photo: Jan Oehlerking).

Trench 12

The house examined in trench 12 was visible in the magnetic plan as 16.5 m long and 6 m wide anomaly (Fig. 43B). The feature showed an almost continuously high magnetization. Therefore, it was obvious that we are dealing with a classic Ploshchadka type with a massive platform.

From the southeastern gable wall, our trench reached about 2.7 m into the house anomaly. In the southeast, an associated pit was partially excavated which in the magnetic picture showed a round shape with a diameter of about 4 m.

Prehistoric surface

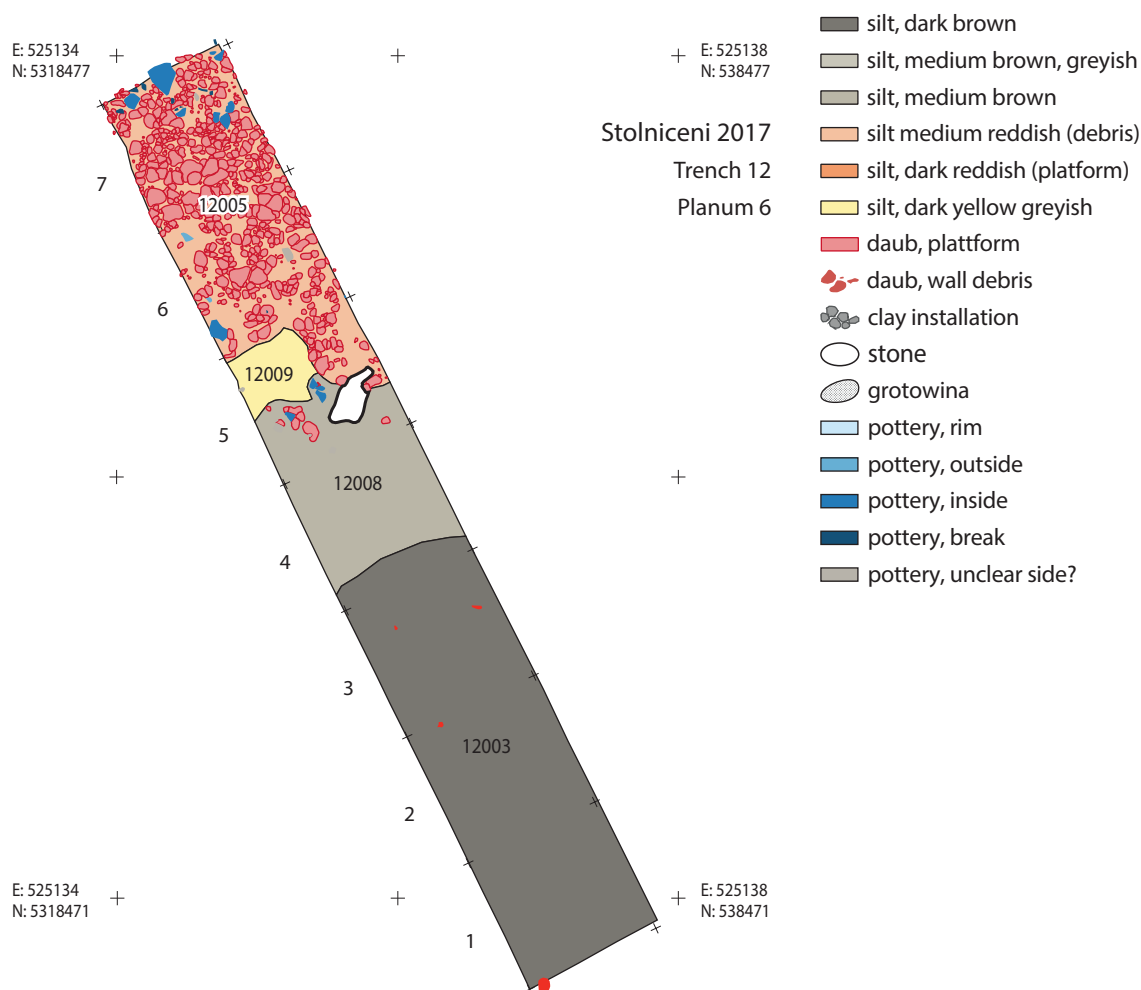
In trench 12, the level of the prehistoric surface could not be fully clarified. Possibly, some horizontal shards lying at the southern lower border of the daub package marked the ancient surface at a high of 165.05 m, about 0.7 m below the present surface.

Pit

The upper edge of the pit was visible with reasonable certainty at a depth of 0.8 m at the level of Planum 6 (194.95 m) (Fig. 46). From there, the pit wall were sloping down evenly for 0.9 m to a level of 164.05 m, where, however, the deepest point of the pit was not reached.

The pit showed a differentiated filling with medium to black-grey material: At medium depth, an (ash?) layer separated two horizons strongly enriched with numerous ceramic fragments and bones. This stratification proves the backfilling of the pit in several events and could also indicate a possible longer use as a waste pit of the associated household.

Fig. 46. Planum 6 of test trench 12 with remains of a dwelling and an associated pit (graphic: R. Hofmann).



Dwelling

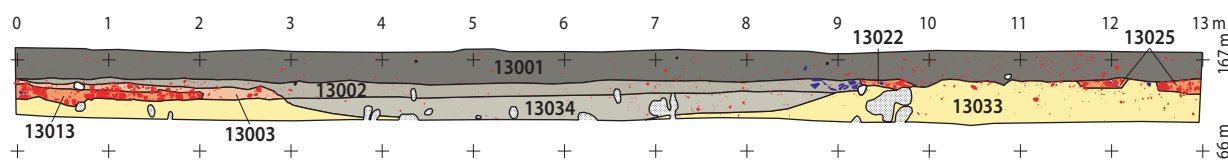
The upper edge of the house emerged at a level of about 145.3 m, 0.45 m below today's terrain surface. As a possible consequence of post-Tripolye activities (e.g. ploughing), only very few fragment from the walls of the upper storey were found on top of the massive platform remains. However, some large fragments of conical bowls were found, which, however, did not seem to represent waste in the primary position of use. Additionally, a large grinder was found at the foot of the southeastern gable wall of which it is unfortunately unclear whether it originated from inside the building or from the outdoor area.

Overall, the excavation of trench 12 confirmed our initial assumption that the anomaly under investigation represented a classical Tripolye house with a massive platform.

Trench 13

Trench 13 targeted the central parts of both houses where in other Tripolye houses the main room on the ground floor is situated (Fig. 43). The western house anomaly is 17.5 m long and about 6 m wide, including an ante-chamber (house part with lower magnetisation) facing the ring corridor. The eastern house appears in the magnetic plan as anomaly about 21 m long and 9.5 m wide. While the western building is characterized by extensive magnetization also of the interior space, the eastern building shows high magnetization mainly along the outer walls and in the center. In contrast to the neighbouring house, large parts of the interior are characterized by very low magnetisation which should correspond to low daub masses (cf. Pickartz et al. 2019). The excavation, among other things, had to clarify whether this picture was based on different preservation conditions or architectural differences.

Fig. 47. Profile of test trench 13 with remains of two buildings and a passage between (graphic: R. Hofmann).

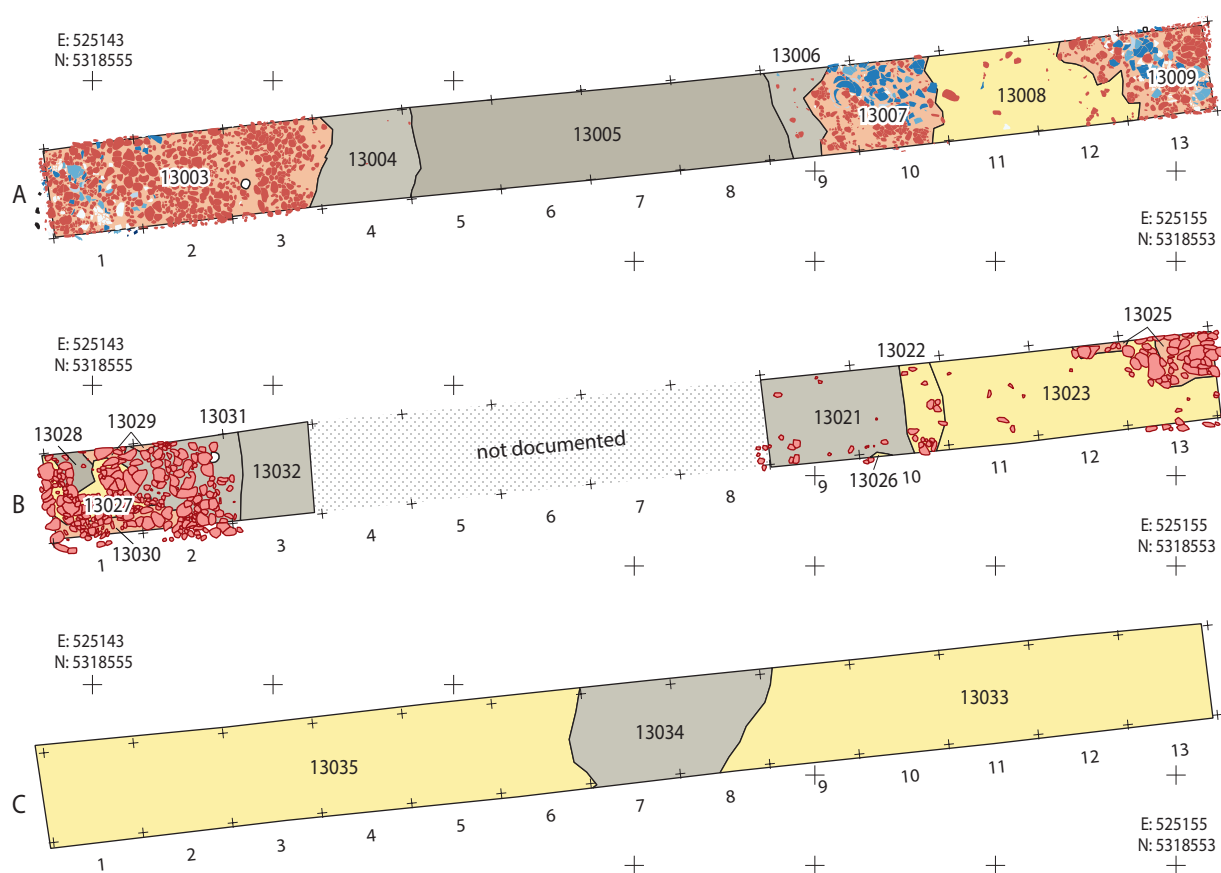


Prehistoric surface between the houses

The prehistoric surface between the two houses was identified most reliably below the collapsed wall debris of the western house. It ran at a level of 166.58 m, about 0.5 m below the current terrain surface. Thus, the collapsed remains of the two houses towered 0.15–0.2 m above the terrain surface, before, later, a Chernozem layer grew above them. In the central area of the trench, between the investigated houses, a layer enriched with humus, pottery and bones reached down at least 0.3 m below the Copper Age terrain surface (Fig. 47). The high density of finds and the tub-like shape of this layer is probably the result of intensive use and long-term trodding of the area between the two houses. Probably, the space between the houses was frequently used as a passageway from the ring corridor to the backyard area of the quarter, where pottery kilns (Trenches 3 and 5) and the above described house of the potter (Trench 7) were located (cf. Fig. 4 and 5).

Western dwelling

Trench 13 cut from the original house border about 2 m into the internal space of the dwelling (Fig. 43C; 48). Below the debris of the collapsed outer walls, the remains of a massive platform became visible already in the first stage of the excavation, covered by large fragments of storage vessels, collapsed *in situ*. Fragments of the exterior walls were concentrated especially in the eastern half of the house, from where they extended about 1 m beyond the end of the platform into the adjacent lane. In the wall fragments, impressions of both small logs and split wood planks were observed.



On the platform, the fragments of at least one *in situ* collapsed large storage vessel (pear-shaped vessel) were located in squares A1 and A2. The clay fragments of the platform are about 0.1 m thick. Their upper side is smoothed, while on their bottom side impressions of split wood planks or half beams ran parallel to the longitudinal direction of the house. No installations or other structures were observed below the platform.

Taking into account analogies from other excavated examples, the described remains allow the reconstruction of a normal Tripolye house which upper floor was raised above ground. However, it is not possible to make any statements about the height and appearance of the ground floor due to the very limited excavation area.

Eastern building

In the area of the eastern building, and in accordance with the magnetic plan, significant masses of daub were found only in small parts. A small concentration of daub was discovered in square A10, belonging to the highly magnetised zone along the enclosing wall of the building. Below numerous fragments of bowls and storage vessels, only small pieces of burnt clay were found, some of which showed flat upper surfaces. However, massive fragments of a clay platform are clearly missing.

A second daub concentration, situated at the eastern end of the trench (squares A12–13), belongs to the highly magnetised anomaly in the center of the building. Also in this case, the daub was covered by numerous fragments of large, *in situ* collapsed vessels. Although the daub pieces found below this ceramic layer were much more massive than those near the house walls, they showed flat bottom sides and no imprints of split wood plank impressions as

Fig.48. House remains and passageway in test trench 13. A Planum 2 with wall fragments on pottery; B Planum 3 after removal of wall fragments and pottery; C Planum 5 with remains of the passageway (graphic: R. Hofmann).

characteristic for platforms of Tripolye houses. However, the origin of these pieces remains unclear due to the limited extent of the trench.

Consequently, in the case of the eastern house there is only little evidence for a classical Ploshchadka type. Due to the undisturbed ceramic layers we can exclude erosion-caused damages of the house remains, therefore it seems that we were dealing with a building of a different constructive design. Just recently, ground level constructions with considerably lower masses of daub deviating from standard Tripolye dwellings have been recognised in the site Maidanetske for both, domestic houses and special public buildings (Pickartz et al. 2019; Hofmann et al. 2019).

Chronology

Absolute chronology

Until now 38 radiometric ^{14}C -dates are available from Stolniceni (Tab. 3). These dates were critically analysed in respect to their depositional context and then included in separate Bayesian calibrations for different features (Fig. 49–50). Due to the structure of the calibration curve, in many cases a precise dating of single events or single structures is not possible, but mainly a dating in certain intervals (Fig. 51):

- Two dates from the kiln in trench 5 and one date from the kiln in trench 3 excavated in 2016: They are spanning the period between ca. 3950 and 3790 BCE, but are positioned within a flat part of the calibration curve. The dates belong to the fills of the firing chambers or one of the channels. Therefore, they probably date infilling events just before or shortly after the final use of the kilns, for which the highest probability is 3925–3800 BCE in the case of the kiln in trench 3 and 3870–3800 BCE for the kiln in trench 5.
- Several dates from the 3-ditch and palisade system of the site are available. The filling of the outer ditch is roughly dated by two samples from different parts of the lower infill, probably dating 3870–3710 BCE, but the real date might be masked by a wiggle of the calibration curve. On the one hand, the highest probability points to infilling dates around 3790 and 3705 BCE, on the other hand, the wiggle around 3900 BCE is still within the probability distribution and thus an earlier activity is also possible. The lower level of the ditch was interpreted as the result of continuous infilling. Two radiocarbon dates from the middle and inner ditch indicate a similar time scale (3750 BCE; primarily 3800–3700 BCE; 3850 \pm 66 BCE), if we take the position of the sample within the stratigraphy of each ditch into account (middle part of the middle ditch, lower part of the inner ditch). Two further samples belong to the inner palisade that dates between 3950 and 3750 BCE with the highest probability around 3870 BCE. In summary, the ditch and palisade system was probably constructed in the 39th century BCE.
- Pit 5 also dates in the 39th century BCE (3920–3870 BCE, means), more or less contemporary with the adjacent kiln. Pit 6 yielded a weighted mean around 3870 BCE, dating from 3950 to 3800 BCE, an age which is outweighed by the one sample from the prehistoric surface with a mean around 3920 BCE, dating from 3980 to 3820 BCE.
- Four dates come from the circular structure. Together with the early structure pit they date the structure in the 39th century (3900–3830 BCE, means), and the use of the surrounding lasted until 3770 BCE (mean). Also the mean of the boundaries of all dates together indicate a duration from 3890 to 3750 BCE.

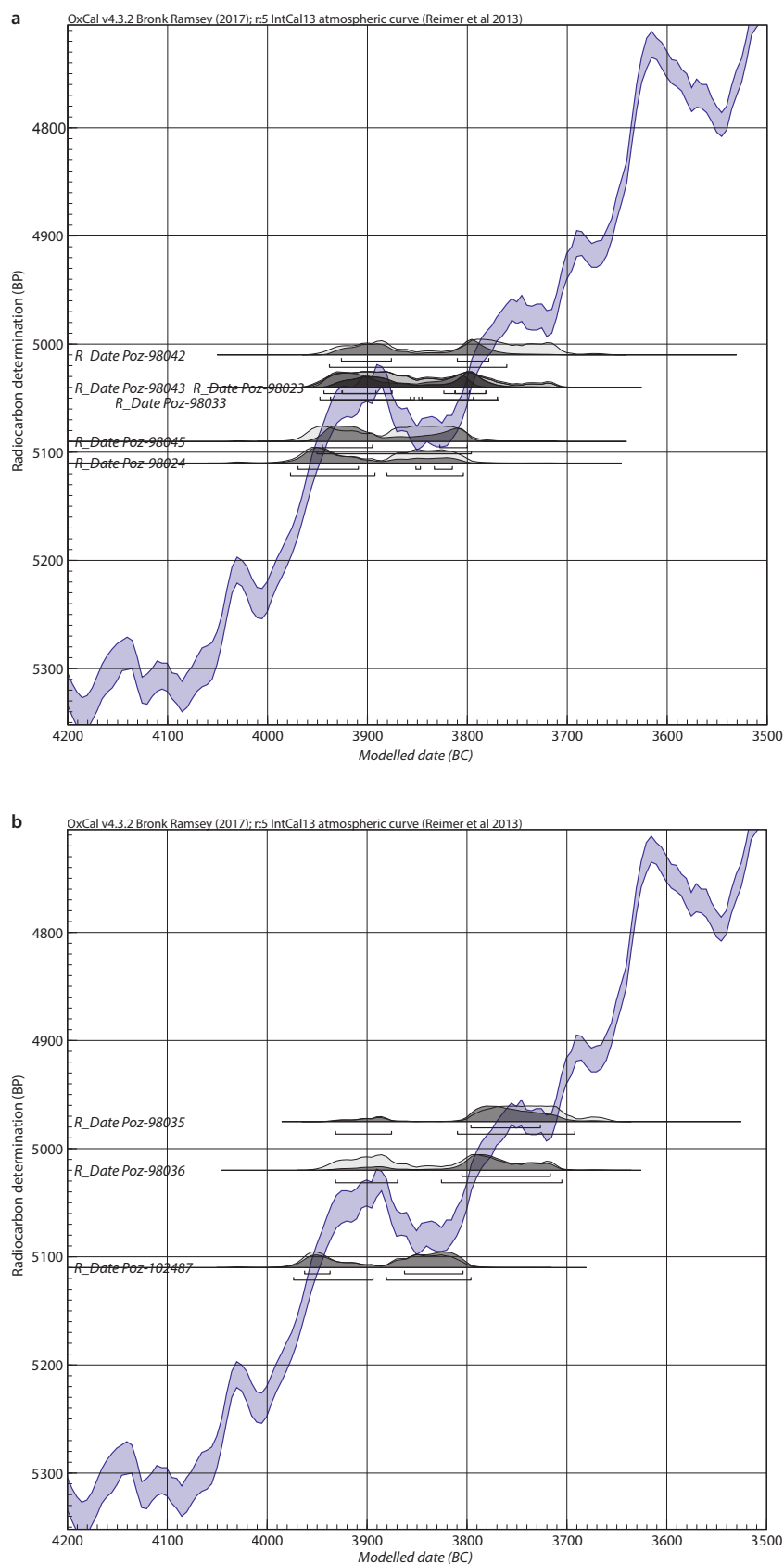
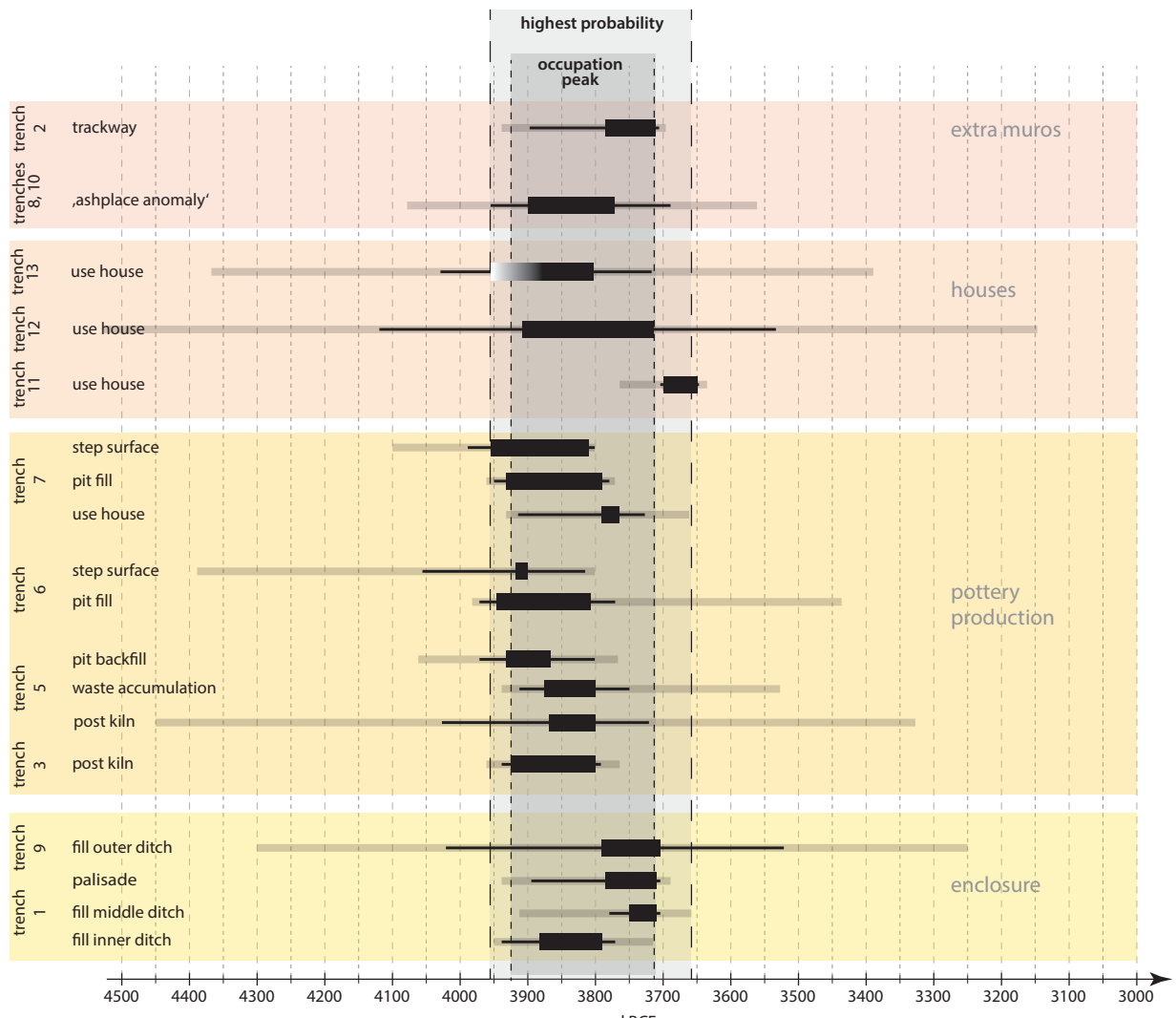


Fig. 49. Examples of Bayesian Calibrations plotted on the calibration curve:
 a Sequence in trench 7 with prehistoric surface, pit and dwelling;
 b Backfilling sequence in the outer enclosing ditch in trench 9.

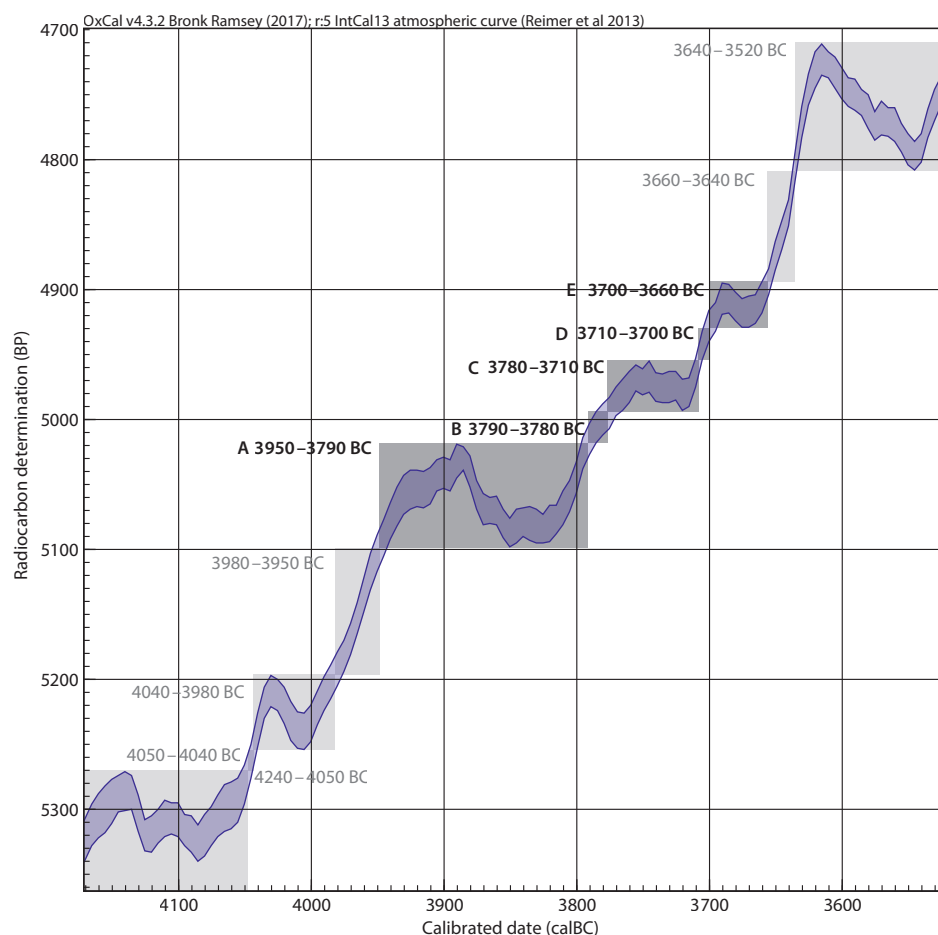
- Four samples belong to house 7. Together with one sample from the prehistoric surface (3930 BCE) and one from the the extraction pit (3870–3830 BCE), they date the house to 3830–3780 BCE (mean of boundaries). The use-life of the house amounts to 50 years. Four other houses are dated by one ¹⁴C-date each, but they fall into a similar range (means: 3875 BCE [house trench 12 west], 3870 BCE [house trench 12 east], and 3690 BCE [house trench 11]). If modelled together without the house from trench 11, the duration of the house occupation ranges between 3920 and 3820 BCE.
- One sample from the layer at one of the trackways yields a date around 3800 BCE (mean, 3800–3710 BCE [60.9%]).

Fig. 50. Overview of the results of Bayesian modelling of the ¹⁴C datings from Stolniceni (after Bronk Ramsey 2009 using the calibration curve INTCAL13 after Reimer et al. 2013). Grey = 95%, thin black lines = 68%, black square = highest dating probability (graphic: R. Hofmann).



Already based on these 38 samples and only a few stratigraphically bounded models, some tendencies are obvious. In respect to Stolniceni, five dating intervals of the calibration curve are of interest: A 3950–3790 BCE, a large wiggle; B 3790–3780 BCE, a short steep part; C 3780–3710 BCE, a plain part of the curve below A and B; D 3710–3700 BCE, the calibration slope, and E 3700–3660 BCE, another small wiggle (Fig. 51). As the wiggle of B reaches beyond the values of A, four general dating intervals prevail: 4000–3950 BCE, 3950–3800 BCE, 3800–3700 BCE, 3700–3630 BCE.

Some surface activities, the kilns, some pits and the palisade around the settlement might have started around 3950 BCE, and 3900 BCE at the latest. But even though Bayesian statistics suggest



such an early start, because of the calibration curve we cannot exclude the possibility of a much later dating shortly before 3800 BCE.

Other dates, namely for the inner and middle ditches, the road and some houses, are later than 3800 BCE, but date before 3700 BCE. Both for the houses and the circular structure an existence from the early 39th to the late 38th century BCE is probable.

In consequence, Stolniceni is dated to the 39th and 38th century BCE. As none of the samples only date to the steep part of the calibration curve before 3950 BCE, a dating before 3925 is difficult to argue. Furthermore, because of the wiggly structure of the curve the tendencies for differences in the dating of specific contexts are similarly difficult to establish, even if the sum calibrations support such a view. Nevertheless, the palisade, the kilns and the pits clearly indicate an early demarcation of the place by an enclosure, an early erection of infrastructural elements and early domestic activities. Afterwards, the 'filling' of the enclosed space, the development of the enclosure with a ditch system and the installation of the circular structures took place. Insofar, the tendencies indicated by the ¹⁴C-dates point to a realistic scenario for the development of the site.

Fig.51. The structure of the calibration curve limits the dating accuracy. The intervals A–D, which are relevant for Stolniceni, are marked (graphic: C. Lange).

Stanislav Terna, Andreea Vornicu-Terna, Robert Hofmann, Marta Dal Corso, Liudmyla Shatilo,
 Mariana Vasilache-Curoșu, Vitalii Rud, Hannes Knapp, Wiebke Kirleis, Knut Rassmann, Johannes Müller
Stolniceni – Excavation results from the 2017 campaign
 6 December 2019

Table 3. List of ^{14}C dates from Stolniceni.

laboratory id	^{14}C date	N (%)	C (%)	col (%)	$\delta^{13}\text{C}$	$\delta^{13}\text{C}$ deviation (‰)	find-id	feature-id	level	find x	find y	trench-id	sample material	species	sample material details	context description	source
Poz-87972	5030±40	3.8	10.5	7.1			OS1		PI100	A	1	S1	bone	undetermined		settlement pit, planum 100, Sondage 1	unpublished
Poz-87973	4945±35	2.1	7.9	4.1			OS3		PI117	A	1	S1	bone	undetermined		settlement pit, planum 117, Sondage 1	unpublished
Poz-87974	5030±35	1.9	7.0	5.0			1353		PI7	B	9	1	bone	undetermined		planum 7, fill of the inner ditch	unpublished
Poz-87977	5035±35	2.5	8.4	3.3			1386		PI7	B	3	1	bone	undetermined		planum 7, material connected to the palisade	unpublished
Poz-87979	4970±35	1.7	7.0	1.3			1255		PI5	A	19–20	1	bone	undetermined		planum 5, fill of the middle ditch	unpublished
Poz-87980	5015±35	1.0	5.3	2.3			4055		PI9	B	19	1	bone	undetermined		planum 9, settlement pit	unpublished
Poz-87981	5000±35	1.3	6.1	2.4			2371		PI6	C	3	2	bone	undetermined		planum 6, bottommost layer of the road	unpublished
Poz-87976	5050±35						3353	3012				3	bone	undetermined		kiln	Terna et al. 2017
Poz-87976	5050±35	1.3	5.4	2.1			3353		PI5	CD	2	3	bone	undetermined		planum 5, fill of the ceramic oven (sample from one of the channels)	unpublished
Poz-87978	5035±30	1.0	4.6	3.1			3189		PI3	A	11	3	bone	undetermined		planum 3, material connected to the palisade	unpublished
Poz-98032	5050±40	0.8	4.9	2.3			5150	5005	2a	F	10	5	bone	cattle	teeth M3 sup.	find concentration above pit	unpublished
KIA-52654	5140±35				-20.3	0.4	5150	5005	2a	F	10	5	bone	cattle	teeth M3 sup.	find concentration above pit	unpublished
Poz-97940	5090±35	2.6	9.9	6.6			5491	5007	4	D	4	5	bone	cattle	phalange II	fill of the firing chamber (kiln)	unpublished
KIA-52653	5085±35				-21.9	0.3	5491	5007	4	D	4	5	bone	cattle	phalange II	fill of the firing chamber (kiln)	unpublished
Poz-97941	5065±35	2.9	10.0	9.4			5579	5021	6	F	8	5	bone	cattle	tibia	lower part of the fill of the pit	unpublished
KIA-52652	5050±35				-21.0	0.4	5579	5021	6	F	8	5	bone	cattle	tibia	lower part of the fill of the pit	unpublished
Poz-97942	5135±35	1.0	7.2	2.5			6058	6003	2	D	9	6	bone	cattle	coxal (pelvis)	find concentration on prehistoric step-surface	unpublished
Poz-98022	5080±40	3.1	11.3	10.8			6262	6005	4	E	4	6	bone	cattle	humerus	?	unpublished
Poz-98023	5040±40	1.4	7.3	3.8			7046	7020	3	C	10	7	bone	cattle	scapula	find concentration along the western side of the dwelling	unpublished
Poz-98024	5110±40	1.0	5.9	2.8			7059	7011	3	B	11	7	bone	cattle	matur, phalange II	finds from space around the house on prehistoric step-surface	unpublished

Stanislav Ţerna, Andreea Vornicu-Ţerna, Robert Hofmann, Marta Dal Corso, Liudmyla Shatilo,
 Mariana Vasilache-Curoşu, Vitalii Rud, Hannes Knapp, Wiebke Kirleis, Knut Rassmann, Johannes Müller
Stolniceni – Excavation results from the 2017 campaign
 6 December 2019

Table 3, continued. List of ^{14}C dates from Stolniceni.

laboratory id	^{14}C date	N (%)	C (%)	$\delta^{13}\text{C}$	$\delta^{13}\text{C}$ deviation (‰)	find-id	feature-id	level	find x	find y	trench-id	sample material	species	sample material details	context description	source
Poz-98033	5040±35	3.0	10.4	7.3		7298	7010	3	G	1	7	bone	sheep/goat	matur, radius	find concentration near the SE corner of the house	unpublished
Poz-98042	5010±40	3.0	8.1	2.8		7594	7023	5a	I	2	7	bone	cattle	bos taurus, humerus	pit near the SE corner of the house	unpublished
Poz-98043	5040±35	0.7	3.4	1.9		7574	7027	8	G	17	7	bone	small ruminant	teeth	pit in front of the house	unpublished
Poz-98044	4960±35	2.6	8.3	1.8		7905	7029	4	E	6	7	bone	sheep/goat	metatarsal	ground floor of the house	unpublished
Poz-98045	5090±40	1.3	4.5	1.9		7859	7026	8	G	16	7	bone	large ruminant	large ruminant, teeth	pit in front of the house	unpublished
Poz-98034	5000±35	2.7	9.7	3.5		8137	8003	2a	H	1	8	bone	cattle	metatars	circular ashmound, find concentration	unpublished
Poz-98035	4975±35	1.0	4.7	8.1		9193	9009	6	A	2	9	bone	cattle	astragalus	lower fill of the ditch	unpublished
Poz-98036	5020±35	1.5	6.5	4.3		9211	9009	5	B	3	9	bone	cattle	matur, tibia	lower fill of the ditch	unpublished
Poz-102487	5110±35					9209	9010	7	B	2-3	9	seeds	stipa	43 stipa awn fragments	lowest part of the ditch backfill	unpublished
Poz-98037	5010±35	3.1	11.2	3.6		10561	10006	3a	B	10	10	bone	cattle	matur, metatars	circular ashmound, filling of small pit	unpublished
Poz-98038	5015±35	1.6	8.8	5.4		10583	10003	3a	A	15	10	bone	cattle	humerus	circular ashmound, find concentration	unpublished
Poz-98039	5040±40	1.3	7.9	2.8		10292	10003	2a	B	7	10	bone	sheep/goat	teeth M3 sup.	circular ashmound, find concentration	unpublished
Poz-98040	4910±35	2.1	8.5	2.0		11034	11004		A	4	11	bone	cattle	cattle (?), tibia	house debris	unpublished
Poz-98046	4980±40	1.1	5.0	1.6		12259	12003	11	A	1	12	bone	small ruminant	teeth	pit	unpublished
Poz-98047	5070±40	0.5	5.1	1.3		12103	12005	5	A	5	12	bone	large ruminant	teeth	house	unpublished
Poz-98111	5085±35	1.9	6.0	3.0		13194	13034	5	A	7	13	bone	small ruminant	teeth	find concentration	unpublished
Poz-98112	5085±35	2.5	7.5	5.4		13020	13003	2	A	2	13	bone	undetermined	mandible, perhaps cattle	house	unpublished
Poz-98113	5210±40	1.7	5.9	3.1		13070	13005	3a	A	8	13	bone	undetermined	probably part of the cranium	house interspace	unpublished

Relative chronology

The morphological and stylistic characteristics of the Stolniceni pottery allows us to place the site within the Tripolye B2/C1 stylistic period, which corresponds to the Cucuteni B1 stage of the Romanian classification. For the Prut-Dniester interfluve, a similar ceramic inventory has been recorded at settlements like Shipency, Caracușeni Vechi, Brînzani IV, Petreni and Glavan which belong to the Caracușeni (= Karakushanskaya) and Petreni stages of the relative periodization by V. Marchevici (Маркевич 1981: 57–59, табл. 1) or to stages 1–3 of the late period according to the periodization by E. Chernysh (Черныш 1982: 214–217). Within these typological periodizations, the above-mentioned authors suggested that the Petreni settlement should be slightly later than the Stolniceni (=Brînzani IV, Shipency) one, according to ceramic morphology and stylistics. The radiocarbon dates, however, rather suggest contemporaneity of the two settlements. This means that the discrepancies between the ceramic complexes of Stolniceni and Petreni sites either reflect rather the existence of local diversities between the Middle Prut and Dniester basins of contemporary sites rather than temporal differences (cf. Рижов 2000; Ryzhov 2005) or that the changes of stylistic repertoire occurred within a time span which is narrower than the calibration interval of the available dates. From a relative-chronological point of view, the formation of sites like Stolniceni and Petreni is connected to the preceding settlements of the Racovăț and Mereșăuca types (Маркевич 1981; Сорокин 1990; Рижов 2000). It has been reported that some of these sites have significant dimensions (Racovăț: 60 ha after Черныш 1973; Brînzani VIII: 30 ha after Sorochin 1993; cf. Țerna/Heghea 2017) and therefore can be included in the category of large settlements just as Stolniceni and Petreni, even if their real dimensions might be a bit smaller as the reported ones. Further investigations on these sites are of great importance for understanding the formation process of large sites and their spread into the western area of the Cucuteni-Tripolye culture.

On the other side of the River Prut, in Northeastern Romania, the closest – so far – analogies for the Stolniceni ceramic inventory come from Ștefănești, Stâncă Doamnei (Nițu/Șadurschi 1994); also, some stylistic elements are found within the pottery assemblage of the later (Tripolye C1/C2) settlement of Trușești (cf. Ткачук 2005). Generally, the right bank of the Middle Prut zone is much lesser investigated than the left one. Recent fieldwork in the Botoșani County in Northeastern Romania (Vornicu-Țerna/Țerna 2017; Vornicu-Țerna et al. 2018a; 2018b; 2019) has yielded extremely interesting data for building up the relative-chronological sequence of both banks of Prut in the Tripolye B2 and C1 stages as well as establishing correspondences between Romanian and Moldavian large sites and their layout. Continuation and intensification of fieldwork in the Middle Prut basin in both countries is a major task for future research of the western formative area of the phenomena of Cucuteni-Tripolye complex settlements (cf. Țerna et al. 2018).

Finds

The excavations provided a huge amount of finds, namely pottery, daub, animal bones, a human bone, chipped and polished stone, bone and antler implements, adornments and clay miniatures. Since the various materials are still being processed and will be published in detail in other forthcoming studies, we will limit ourselves here to a brief overview of the main find categories.



Pottery

In terms of completeness and preservation, the most representative pottery assemblages come from the pit close to the pottery kiln in trench 5 (Fig. 54) and the burnt houses in test-trenches and trench 7; the latter is remarkable due to the high quantity of restorable pots (over 100) (Fig. 52; 53; 55). Technologically, the absolute majority of the shards belong to fine ware, followed by coarse and caoline pottery.

From a morphological point of view, dishes used for serving food and liquids (bowls and goblets) are most numerous within the fine ware category, followed by half-closed large vessels such as

Fig.52. Agglomeration of broken vessels and grinding stones in the northern part of the ground storey of the house in trench 7 (photo: S. Ţerna).



Fig.53. Large bowl and a zoomorphic figurine in the eastern part of the ground storey of the house in trench 7 (photo: S. Ţerna).

Stanislav Ţerna, Andreea Vornicu-Ţerna, Robert Hofmann, Marta Dal Corso, Liudmyla Shatilo,
 Mariana Vasilache-Curoşu, Vitalii Rud, Hannes Knapp, Wiebke Kirleis, Knut Rassmann, Johannes Müller
Stolniceni – Excavation results from the 2017 campaign
 6 December 2019



Fig.54. Ceramic vessels from the pit in trench 5 (photos: S. Jagiolla).

Stanislav Țerna, Andreea Vornicu-Țerna, Robert Hofmann, Marta Dal Corso, Liudmyla Shatilo,
Mariana Vasilache-Curoșu, Vitalii Rud, Hannes Knapp, Knut Rassmann, Johannes Müller
Stolniceni – Excavation results from the 2017 campaign
6 December 2019



Fig.55. Ceramic vessels from the burnt house in trench 7 (photos: S. Țerna).

amphorae, craters, goblet-like and pear-shaped recipients. Lids, four-legged and binocular vessels occur less often. The coarse ware spectrum includes crater-like pots and, rarely, bowls. As in previous campaigns, the caoline ware is represented exclusively by bowl fragments, most of which have been found in the context of the pottery production complex.

As for decoration techniques, the pottery displays a certain variety, especially on coarse ware. Vessels of fine category were usually covered with engobe (thin layer of colored slip applied over the surface), often polished and subsequently overlaid with mono- or bichrome ornamentation. Coarse vessels were never painted; instead, their surface was ornamented using wooden or bone tools, resulting in various impressions, carvings, grooves, incisions, notches and “pseudo-cord” ornamentation, arranged in specific patterns.

Stylistically, the decoration applied on both fine and coarse ware is organized into ornamental schemes (as defined by Ryzhov, see Рижов 1999; 2000; Ryzhov 2012) which are composed of ornamental elements; each scheme consists of a certain combination of these elements. On fine ware, some of the schemes are characteristic for specific morphological shapes while others are encountered on several vessel types. For bowls, the “comet-like” scheme is most typical, followed by “8-like”, “festooned”, “radial”, “concentric”, “angular” and “cruciform” ones. The metopic scheme is characteristic for goblets and goblet-like vessels. On half-close large shapes, the ornamental repertoire includes “wavy”, “horizontal 8”, *Tangentenkreisband*, “S-like”, “metopic”, “cruciform”, “angular” or “face-like” schemes. The spectrum of stylistic elements which compose the abovementioned schemes is wide, ranging from simple circumferential lines to complex “cross-in-circle” or zoomorphic and ornithomorphic elements. On coarse ware, the ornamentation is mostly restricted to the rim area and is represented by various impressed and incised patterns, sometimes forming a “festooned” scheme.

Small finds

As on other settlements of this period, most of the small finds come from areas with massive discards of waste, such as agglomerations on the prehistoric surface, pits and the “ashplace”.

The flint assemblage is large (over 700 finds) and is represented both by debris and finished artefacts, made out of local Prut and, possibly, imported Volhynian raw material. A massive core found within a find agglomeration near the burnt house (feature 7006) is particularly remarkable (Fig. 56). The collection of polished stones is also very varied and consists of tools of various function, such as adzes, grinding stones and polishers. The latter have been found mainly inside the house and might be connected to the surface treatment of vessels during pottery production. The worked bone and antler category is represented by both finished objects and byproducts, displaying various functional and technological types (pointed tools, beveled tools, adzes, spatula-like tools) (Fig. 57). Clay miniatures include multiple tokens, clay balls, anthropomorphic and zoomorphic figurines as well as a probable house model (Fig. 58). Notable is the discovery of a fragment of a so-called “realistic” figurine in trench 6; one of the few discovered so far in the Prut-Dniester region. The collection of jewellery is small and includes pendants made from animal teeth (Fig. 57) as well as clay and bone beads.

Stanislav Terna, Andreea Vornicu-Terna, Robert Hofmann, Marta Dal Corso, Liudmyla Shatilo,
Mariana Vasilache-Curoșu, Vitalii Rud, Hannes Knapp, Wiebke Kirleis, Knut Rassmann, Johannes Müller
Stolniceni – Excavation results from the 2017 campaign
6 December 2019



Fig.56. Flint implements (photos: S. Jagiolla).



Botanical macro-remains (M. Dal Corso and W. Kirleis)

To gain an understanding of the plant economy and ecology at the Chalcolithic site of Stolniceni, macrobotanical studies were carried out on soil samples from different archaeological contexts.

Methods and Material

For the study of botanical macro-remains a systematic sampling strategy has been applied during the fieldwork in summer 2017, when nine trenches (trenches 5–13) were excavated at the site of Stolniceni. In trenches 5 and 6, pits and a kiln were present that were sampled context-wise. Trench 7 exposed in planum 1 a dwelling and some pits in its close surroundings: sampling was carried out here per feature every 2nd square meter, adapting to interesting contexts inside and outside of the dwelling. Trenches 8 and 10, at the border of the site, concerned a sparse distribution of diverse archaeological finds with unclear contexts and the sampling targeted the areas with major find agglomerations. The test-trenches 11 and 13 crossed dwellings and trench 12 concerned a pit, which have been sampled per feature and context.

Every sample consisted of 10 l of sediment, which was floated: the sample was subdivided into five buckets, covered with water and gently moved, before the suspended fraction was sieved through a sieve for scientific analysis with 300 µm mesh. For each sample this procedure was repeated three times. Each residue in the bucket was scanned for additional finds that did not float. Samples were air-dried in textile bags during fieldwork. Subsequently, the remains were sorted and identified at a binocular microscope Olympus SZ51 with magnification of 0.8 to 40x at Kiel University.

Fig. 57. Implements of hard animal material (photos: S. Jagiolla).

Stanislav Ţerna, Andreea Vornicu-Ţerna, Robert Hofmann, Marta Dal Corso, Liudmyla Shatilo,
Mariana Vasilache-Curoşu, Vitalii Rud, Hannes Knapp, Wiebke Kirleis, Knut Rassmann, Johannes Müller
Stolniceni – Excavation results from the 2017 campaign
6 December 2019



Fig. 58. Clay miniatures (photos: S. Jagiolla).

During the fieldwork in 2017, overall 1,369.3 l of sediment, originating from 149 samples and 58 features, have been processed through flotation. Only the samples from the deepest excavation levels (levels 3–6, 106 samples, 1,081.3 l of sediment) are considered hereafter. Samples from upper levels (levels 1–2, 44 samples) were excluded to avoid intrusions of modern seeds and fruits.

The botanical macro-remains from levels 3–6 identified to a taxonomic level sum up to 936 items and include charred remains (926) and very rare mineralized seeds (10) of White goosefoot (*Chenopodium album*). In addition, some partly charred cereal remains (84 from the levels 3–6) have been retrieved, which look well preserved (e.g. cell anatomy on glumes is visible, shiny surface), different from the fully charred ancient macro-remains. Such partly charred remains were found in the upper part of the stratigraphy, and they concern cereal species not present as fully charred material like bread wheat (*Triticum aestivum/durum/turgidum*) and spaghetti wheat (*T. durum*). These partly charred remains are considered as modern intrusion, originating from recent burning of the stubble field after harvest, and have thus been excluded from this overview.

Results and discussion

The macrobotanical assemblage at Stolniceni mainly comprises crops and the grassland steppe species feathergrass (*Stipa*). They are supplemented by a single nutshell fragment of hazel and some weed species (Fig. 59; Tab. 4). The overall find concentration is low but acceptable and reaches one find per liter.

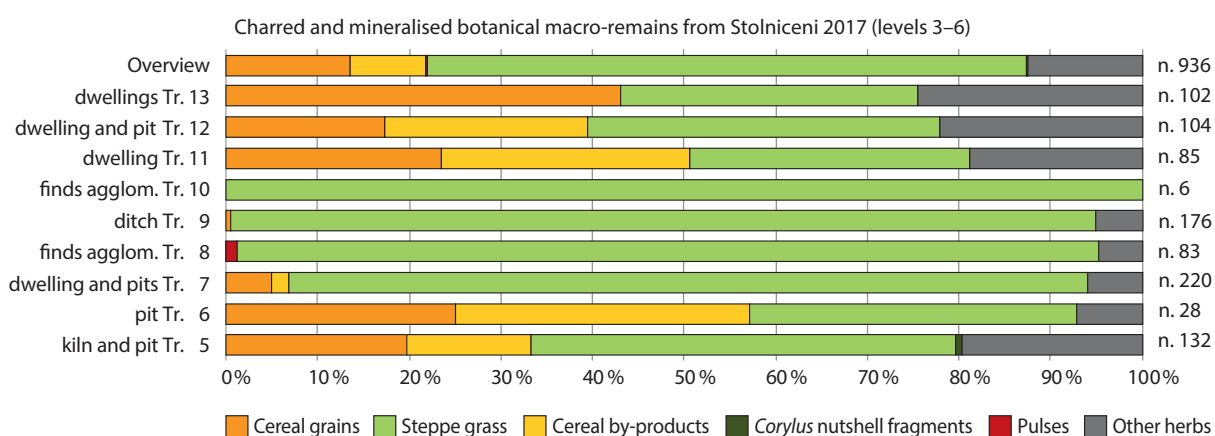


Fig. 59. The different plant groups represented in the record of charred and mineralized botanical macro-remains from Stolniceni (excavation 2017, levels 3–6). Overview of all finds, and trench-wise data. Plant categories and taxonomic identification within are explicated in Table 3.

Stanislav Țerna, Andreea Vornicu-Țerna, Robert Hofmann, Marta Dal Corso, Liudmyla Shatilo,
 Mariana Vasilache-Curoșu, Vitalii Rud, Hannes Knapp, Wiebke Kirleis, Knut Rassmann, Johannes Müller
Stolniceni – Excavation results from the 2017 campaign
 6 December 2019

Table 4. Absolute frequency of the botanical macro-remains from Stolniceni (excavation 2017, levels 3–6), sorted according to state of preservation.

Stolniceni (excavation 2017), Moldova	Trench 5	Trench 6	Trench 7	Trench 8	Trench 9	Trench 10	Trench 11	Trench 12	Trench 13	
Archaeological context	kiln, pit	pit	d, pits	f.	ditch	f	d	d, pit	ds	Sum
Samples volume (l)	2363	30	259	39	100	9	81	149	178	1081,3
Number of samples	26	3	27	2	7	1	6	16	18	106
Number of features	9	2	6	2	7	2	6	5	13	52
Charred plant remains	132	28	220	83	176	6	85	104	92	926
Cereal grains	26	7	11	0	1	0	20	18	44	127
<i>Hordeum vulgare</i>	3	0	3	0	0	0	4	2	0	12
<i>Hordeum vulgare nudum</i>	1	0	0	0	0	0	0	0	0	1
<i>Hordeum vulgare vulgare</i>	0	0	0	0	0	0	0	1	0	1
<i>Triticum dicoccum</i>	0	0	1	0	0	0	0	4	7	12
<i>Triticum monococcum</i>	4	2	0	0	0	0	0	0	13	19
<i>Triticum monococcum/dicoccum</i>	0	0	1	0	0	0	0	0	0	1
Cerealia indet.	18	5	5	0	1	0	16	11	24	80
<i>Panicum miliaceum</i>	0	0	1	0	0	0	0	0	0	1
Cereal by-products	18	9	4	0	0	0	23	23	0	77
<i>Hordeum vulgare</i> , awn fragment	0	1	0	0	0	0	0	0	0	1
<i>Triticum dicoccum</i> , glume base	1	0	1	0	0	0	0	11	0	13
<i>Triticum monococcum</i> , glume base	17	8	2	0	0	0	0	0	0	27
<i>Triticum monococcum/dicoccum</i> spec., glume base	0	0	1	0	0	0	0	3	0	4
Cerealia indet., awn fragment	0	0	0	0	0	0	0	1	0	1
Cerealia indet., glume	0	0	0	0	0	0	3	4	0	7
Cerealia indet., stem/culm	0	0	0	0	0	0	20	4	0	24
Pulses	0	0	0	1	0	0	0	0	0	1
Fabaceae (cult.), seed	0	0	0	1	0	0	0	0	0	1
Ruderal and segetal vegetation	5	1	5	1	2	0	0	3	3	20
<i>Galium spurium</i> , seed/fruit	0	0	0	0	2	0	0	1	0	3
<i>Galium aparine</i> , seed/fruit	0	0	0	0	0	0	0	0	1	1
<i>Galium aparine/spurium</i> , seed/fruit	0	0	0	0	0	0	0	0	1	1
<i>Chenopodium album</i> , seed/fruit	5	1	5	1	0	0	0	2	0	14
<i>Chenopodium</i> spec., seed/fruit	0	0	0	0	0	0	0	0	1	1
Grassland vegetation	61	10	193	78	166	6	26	40	33	613
<i>Stipa</i> spec., awn fragment	61	10	192	78	166	6	26	40	33	612
<i>Trifolium</i> spec., seed/fruit	0	0	1	0	0	0	0	0	0	1

Stanislav Ţerna, Andreea Vornicu-Ţerna, Robert Hofmann, Marta Dal Corso, Liudmyla Shatilo,
 Mariana Vasilache-Curoşu, Vitalii Rud, Hannes Knapp, Wiebke Kirleis, Knut Rassmann, Johannes Müller
Stolniceni – Excavation results from the 2017 campaign
 6 December 2019

Table 4, continued. Absolute frequency of the botanical macro-remains from Stolniceni (excavation 2017, levels 3–6), sorted according to state of preservation.

Stolniceni (excavation 2017), Moldova	Trench 5	Trench 6	Trench 7	Trench 8	Trench 9	Trench 10	Trench 11	Trench 12	Trench 13	
Archaeological context	kiln, pit	pit	d, pits	f.	ditch	f	d	d, pit	ds	Sum
Deciduous woodland	1	0	0	0	0	0	0	0	0	1
cf. <i>Corylus avellana</i> , nutshell fragm.	1	0	0	0	0	0	0	0	0	1
Other plant remains	21	1	7	3	7	0	16	20	12	87
Caryophyllaceae p. p., seed/fruit	1	0	0	0	0	0	0	2	0	3
Chenopodiaceae p. p., seed/fruit	0	0	0	0	0	0	0	1	0	1
Poaceae p. p., seed/fruit	2	0	2	0	0	0	0	0	0	4
Poaceae p. p., stem/culm	0	0	0	0	0	0	15	1	0	16
cf. <i>Ajuga</i> , seed/fruit	1	0	0	0	0	0	0	0	0	1
cf. <i>Phleum</i> , seed/fruit	1	0	0	0	0	0	0	0	0	1
cf. <i>Stachys</i> spec., seed/fruit	0	0	0	0	0	0	1	0	0	1
Indet. seeds/fruits	12	1	5	3	6	0	0	15	7	49
Indet. vegetative parts p.p. (stem/culm)	4	0	0	0	1	0	0	1	5	11
Mineralised plant remains	0	0	0	0	0	0	0	0	10	10
<i>Chenopodium album</i> , seed/fruit	0	0	0	0	0	0	0	0	10	10
SUM cereal grains	26	7	11	0	1	0	20	18	44	127
SUM cereal by-products	18	9	4	0	0	0	23	23	0	77
SUM pulses	0	0	0	1	0	0	0	0	0	1
SUM Stipa awn fragments	61	10	192	78	166	6	26	40	33	612
SUM Corylus nutshell fragments	1	0	0	0	0	0	0	0	0	1
SUM other herbs	26	2	13	4	9	0	16	23	25	118
SUM plant macro-remains	132	28	220	83	176	6	85	104	102	936
Charred non-plant remains	0	0	0	0	1	0	8	9	5	23
<i>Cenococcum geophilum</i> , fungus sclerotium	0	0	0	0	0	0	2	1	0	3
Indet. porridge/flat bread/pulp	0	0	0	0	0	0	6	2	5	13
Indet. fungi	0	0	0	0	0	0	0	6	0	6
Indet. animal bones/teeth	0	0	0	0	1	0	0	0	0	1
Non-charred non-plant remains	418	100	955	522	353	38	478	437	292	3593
Indet. coprolithes	0	0	0	0	0	0	48	0	0	48
Indet. animal bones/teeth	0	0	51	21	0	0	7	14	105	198
Indet. mollusca	418	100	898	501	353	38	423	423	185	3339
Indet. ostracode	0	0	6	0	0	0	0	0	2	8
Undetermined	0	0	12	0	0	0	4	5	0	21
SUM all identified remains	550	128	1175	605	530	44	571	550	399	4552
SUM all identified remains										

Crop assemblage

At Stolniceni the crop assemblage is mostly composed by cereals, with 62% grains and 38% by-products (Fig.60). The main cereals detected are the hulled wheat species einkorn (*Triticum monococcum*) and emmer (*Triticum dicoccum*) as well as barley (*Hordeum vulgare*) (Fig.61A–B). In addition, one grain of naked barley (*H. vulgare nudum*) and hulled barley (*H. v. vulgare*) each have been identified. Further, one tiny grain of broomcorn millet (*Panicum miliaceum*) has been attested in the fill of a large pit north of the dwelling in trench 7 (feature 7014). The millet grain is most probably intrusive: recent research focusing on millet arrival in Europe shows that millet does not appear before the mid-2nd millennium BCE in Ukraine (Dal Corso et al. in prep) and in Central Europe (Filipovic et al. in prep.). Cultivated pulses are present only with a single find from trench 8 (Tab. 4; Fig. 59).

Considering the different trenches and archaeological contexts within the site, most of the cereal remains derive from pits, or are related to the dwellings (e.g. features 6005, 7014, 7024) and to the pottery kiln (e.g. features 5013 and 5021). Moreover, cereals have been found also in the fill of the kiln chambers (features 5007 and 5015) that may correspond to waste in secondary deposition, inside dwellings (features 11004, 11010, 13015) and on the prehistoric surface close to houses (features 11003, 13005). Further cereals were found in features 12006 and 13023. From the area of the trenches 8 and 10 that is interpreted as rubbish dump, cereal remains were absent. Thus, if waste disposal of organic matter, as suggested earlier in this paper (see above), took place here, this does not relate to charred seeds and fruits. In the ditch in trench 9 only one cereal grain has been attested. One interesting observation is that einkorn, including grains and glume bases, is mostly found close to the pottery kiln (trenches 5 and 6). It is possible that einkorn spikelets were roasted in the vicinity of/in the kiln prior to parching, to facilitate the de-husking of the grains. Emmer is present as grains and glume bases in dwellings and pits (trenches 12, 13 and 7). Barley does not show a specific deposition pattern. The cereal stem/culm fragments are attested mainly in the dwelling in trench 11 and some in trench 12.

Two different activities of cereal processing are documented in the cereal by-product assemblage: First, there are the parts of cereal stems that are separated by the ears while threshing, one of the first steps of processing carried out directly after harvesting (Fig.62; Tab. 4). Second, there are depositions of fine by-products such as glumes, glume bases and awns that are related to de-husking, a routine step preceding food preparation from hulled cereals that indicates ordinary kitchen waste (Fuller et al. 2014).

Wild plants

The record of wild plants from Stolniceni is largely dominated by the charred fragments of feathergrass awn fragments (*Stipa* sp.), the species being a typical component of steppe vegetation. The remaining record from wild plants is scarce and concerns grasses and herbs, apart from a fragment of nutshell of hazel from a pit fill (features 5013). The feathergrass awn fragments are particularly abundant where samples were collected also from the ancient surfaces and/or open areas, such as outside the house in trench 7 (feature 7019), in the agglomeration of finds in trench 8 and in the ditch fill in trench 9 (feature 9010). One radiocarbon date from feature 9010 on multiple (43) charred *Stipa* awn fragments dates to 3976–3799 cal. BCE



Fig.60. Charred cereal grains and cereal by-products in the crop assemblage from Stolniceni (excavation 2017, levels 3–6, excluding *Panicum*).

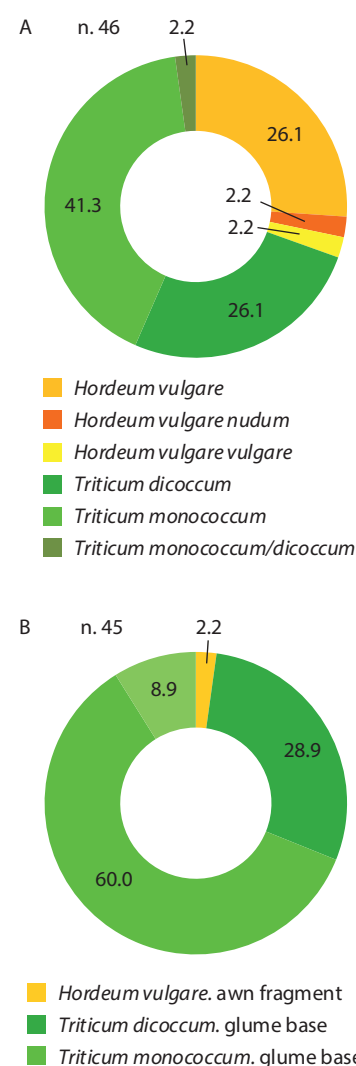
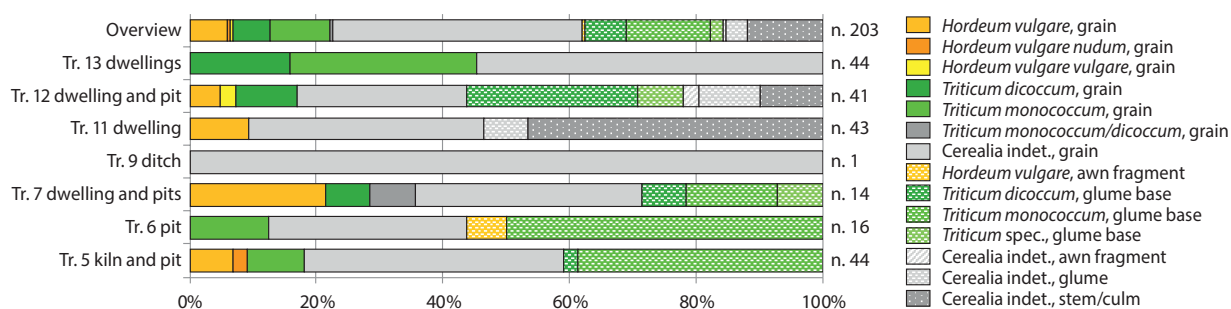


Fig.61. The different cereals from Stolniceni (excavation 2017, levels 3–6). A Charred grains; B Cereal by-products.



(2σ; Poz-102487, 5110 ± 35 uncal. BP). This radiocarbon-dated attestation of Chalcolithic feathergrass is very important because the charred awn fragments are tiny and could have moved within the stratigraphy and derive from uppermost layers. Feathergrass awn fragments have been recovered from Neolithic contexts in Poland (Bieniek 2002) and Germany (Dannath et al. 2019; Körber-Grohne 1987), from Chalcolithic Ukraine (Dal Corso et al. 2018), and from Bronze Age features in the Czech Republic (Bieniek/Pokomy 2005) and Russia (Rühl et al. 2015). In some cases, the gathering of the plant has been suggested, in relation to uses of the stalks and leaves for mats/mattresses, basketry, or the use of grains as food component (Bieniek 2002; Körber-Grohne 1987). The spiky awns tend to stick to animal fur and may have reached the settlement with domestic animals that were grazing on open grassland patches in the vicinity. It is also possible that the awn fragments entered the archaeological record accidentally, transported by wind from the surrounding of the site: the amounts of charred *Stipa* from the ditch and other open areas at Stolniceni suggest that burning might have occurred on the grasslands directly, possibly even to get rid of the plant populations in favor of arable land.

Fig. 62. The cereal assemblages of grains and by-products from Stolniceni (excavation 2017, levels 3–6). The numbers on the right indicate the total counts of finds per trench on which the percentage values are based.

Conclusions

First archaeobotanical investigations at Stolniceni on material from the excavation campaign 2017 show that the plant economy was mainly based on the hulled wheat species einkorn and emmer, and barley. Indicated activities related to cereal processing include cereal threshing as well as de-husking prior to food preparation. The different plant species and plant parts show distinct distribution patterns in specific archaeological contexts. The charred plant remains from steppe vegetation were most possibly deposited in the settlement because of transport by wind or domestic animals. They allow reconstructing open grassland patches in the vicinity of the site. Further investigations have to prove if this first data is representative.

Final remarks

The 2017 excavations at Stolniceni offered further insights into settlement structure and socio-economic life at a Cucuteni-Tripolye large site.

On the settlement's periphery, the outer ditch has been investigated in order to complete the information gained by the 2016 excavations of two inner ditches and the palisade. Furthermore, for the first time one of the circular "ashmound"-like anomalies surrounding the settlement has been extensively researched; there, the distribution and character of findings suggest repetitive depositional

practices pointing to a possible social/integrative interpretation of these features.

Extensive investigations of the pottery production complex continued the work started in 2016 and led to the research of two pottery firing kilns, several pits, a dwelling and various features on the prehistoric surface. These are the first modern excavations of pottery production facilities to the east of the Dniester River, in the vast western area of the Cucuteni-Tripolye culture. Field observations allowed us to discern the possible succession of kilns operation within two distinct generations while the anthracological investigations of the charcoal remains from the pit next to the kiln offered extremely interesting data concerning the use of wood for kiln construction and fueling of the firing process. The huge assemblage of vessels and tools from the house of the potter will represent a valuable source for further investigations of technological aspects of pottery production as well as the morphological and stylistic variety of ceramics on a large settlement.

The investigations in the three test-trenches had a twofold outcome: first, they provided materials for both relative and absolute dating of the respective structural elements of the site (house groups within rings) and second, they offered valuable information in regard to the architecture of houses of different size, the interior installations and adjacent features such as a household pit (trench 12) and the space between houses, probably used as a passageway (trench 13).

A crucial outcome of the investigations on various feature types and structural units of the settlement is the growing collection of radiocarbon dates. Despite inherent calibration problems due to the shape of the ^{14}C -curve, the data allows the reconstruction concerning the foundation and growth of the settlement. Its demarcation by a palisade and the production of pottery started already during the incipient phase of the settlement while the subsequent construction of further features within the enclosed space followed a strict and well-thought spatial planning. This is comparable with the results from Maidanetske (Ohlrau in press), where a demarcation and the installation of certain infrastructural elements was also followed by the deliberately planned development of the mega-site.

The vast collection of pottery, bone, antler and stone implements as well as clay miniatures and various jewellery provides a good basis for the evaluation of socio-economic household tasks and ritual activities at the settlement. The archaeological material is complemented by botanical investigations which offered data for reconstruction both of plant economy and the paleoenvironment.

All things considered, the 2017 campaign at Stolniceni proved to have been successful both in terms of the specifics and preservation of various documented features and with regard to the rich find assemblage. A detailed assessment and extensive publication of the excavation results is a task for the future. Field research on the site shall be focused on further investigations of various features from the complex geophysical image of the settlement.

Stanislav Ţerna, Andreea Vornicu-Ţerna, Robert Hofmann, Marta Dal Corso, Liudmyla Shatilo,
 Mariana Vasilache-Curoşu, Vitalii Rud, Hannes Knapp, Wiebke Kirleis, Knut Rassmann, Johannes Müller
Stolniceni – Excavation results from the 2017 campaign
 6 December 2019

Acknowledgments

The research was funded by the DFG Collaborative Research Centre CRC1266 “Scales of Transformation – Human-Environmental Interaction in Prehistoric and Archaic Societies” (German Research Foundation, Project number 2901391021 – SFB1266) and basic funds by the involved institutions. Of course, our extensive fieldwork would not have been possible without the support of many persons in Stolniceni, Moldova and Germany. We would therefore like to thank the local businessmen and landowners, Mr. Victor Bajereanu and Mr. Constantin Tăbârță, for providing us the necessary goodwill and infrastructure for opening and covering of the trenches. We received a constant attention and support from Dr. Hab. Gheorghe Postică (Head of the Archaeological Commission and deputy Minister of Culture, Science and Education, who visited us at Stolniceni), Dr. Hab. Eugen Sava (Director of the National Museum of History of Moldova), Dr. Mark Tkaciuk (Director of the „High Anthropological School” University, Chişinău) and Dr. Igor Manzura („High Anthropological School” University, Chişinău). We are also grateful to our Moldavian, Romanian and German colleagues from other Copper Age expeditions who visited us and discussed the site with us: the Gordineşti expedition (Dr. Ghenadie Sîrbu, Livia Sîrbu, Victoria Surdu, Vitalie Burlacu and students) and the Scânteia expedition (Dr. Doris Mischka, Dr. Senica Ţurcanu and students). We thank Svetlana Ibens and Pia Bodden (both Kiel) for technical support with the flotation during the field work and Tanja Reiser, Kiel, for the processing of the botanical macro remains in the laboratory. We would also like to thank our photographers Sara Jagiolla and Agnes Heitmann for the high-quality execution and processing of find photographs. Great thanks also go to Kai Radloff, Berlin, Stanislav Fedorov, Kirovograd, as well as Roman Scholz and Johannes Kalmring, both Frankfurt/Main, for technical support during the excavation and the magnetic survey. Last but not least, we are also grateful to the participating students from Berlin, Barcelona and Kiel for their enthusiastic work.

References

- Bieniek 2002: A. Bieniek, Archaeobotanical analysis of some Early Neolithic Settlements in the Kujawy region, central Poland, with potential plant gathering activities emphasised. *Vegetation History and Archaeobotany* 11/1, 2002, 33–40.
- Bieniek/Pokorný 2005: A. Bieniek/P. Pokorný, A new find of macrofossils of feather grass (*Stipa*) in an Early Bronze Age storage pit at Vliněves, Czech Republic: local implications and possible interpretation in a Central European context. *Vegetation History and Archaeobotany* 14/4, 2005, 295–302.
- Bronk Ramsey 2009: C. Bronk Ramsey, Bayesian analysis of radiocarbon dates. *Radiocarbon* 51, 2009, 337–360.
- Chapman et al. 2014: J. Chapman/M. Videjko/D. Hale/B. Gaydarska/N. Burdo/K. Rassmann/C. Mischka/J. Müller/A. Korvin-Piotrovskiy/V. Kruts, The Second Phase of the Trypillia Mega-Site Methodological Revolution. A New Research Agenda. *European Journal of Archaeology* 17/3, 2014, 369–406.
- Chernovol 2012: D. Chernovol, Houses of the Tomashovskaya local group. In: F. Menotti/A. Korvin-Piotrovskiy (eds.) *The Tripolye culture giant settlements in Ukraine: formation, development and decline* (Oxford 2012) 182–209.
- Cotiugă et al. 2016: V. Cotiugă/N. Ursulescu/S. Caliniuc, On the multi-storied dwellings of the Cucuteni culture. In: C. Preoteasa/C.-D. Nicola (eds.), *Cucuteni culture within the European Neo-Eneolithic context* (Piatra-Neamț 2016) 701–724.
- Dal Corso et al. 2018: M. Dal Corso/W. Out/R. Ohlrau/R. Hofmann/S. Dreibrodt/M. Videiko/J. Müller/W. Kirleis, Where are the cereals? Contribution of phytolith analysis to the study of subsistence economy at the Trypillia site Maidanetske (ca. 3900–3650 BCE), central Ukraine. *Journal of Arid Environments*, 157, 2018, 137–148.
- Dannath et al. 2019: Y. Dannath/I. Heske/W. Kirleis, Ein weiter Blick in die Landschaft. Entdeckungen an einem Standort der Stichbandkeramik. *Archäologie in Niedersachsen*, 22, 2019, 50–54.
- Eaton et al. 2016: E. Eaton/G. Caudullo/S. Oliveira/D. de Rigo, 2016. *Quercus robur* and *Quercus petraea* in Europe. Distribution, habitat, usage and threats. In: J. San-Miguel-Ayanz/D. de Rigo/G. Caudullo/T. Houston Durrant/A. Mauri (eds.), *European Atlas of Forest Tree Species* (Luxembourg 2016) 160–163.
- Fuller et al. 2014: D.Q. Fuller/C. Stevens/M. McClatchie, Routine activities, tertiary refuse and labor organization: social inferences from everyday archaeobotany. *Ancient plants and people, contemporary trends in archaeology* (Tuscon 2014) 174–217.
- Hofmann et al. 2018: R. Hofmann/M. Shatilo/R. Ohlrau/M. Dal Corso/S. Dreibrodt/M. Videiko/K. Rassmann/W. Kirleis/J. Müller, Tripolye – Strategy and Results of an ongoing Ukrainian-European Project. *Vita Antiqua* 10, 2018, 146–154.
- Hofmann et al. 2019: R. Hofmann/J. Müller/L. Shatilo/M. Videiko/R. Ohlrau/V. Rud/N. Burdo/M. Dal Corso/S. Dreibrodt/W. Kirleis, Governing Tripolye: Integrative architecture in Tripolye settlements. *PLoS ONE* 14/9, 2019, 1–54 (e0222243. <https://doi.org/10.1371/journal.pone.0222243>).
- Körber-Grohne 1987: U. Körber-Grohne, Federgras-Grannen (*Stipa pennata* L. s. str.) als Vorrat in einer mittelneolithischen Grube in Schöningen, Landkreis Helmstedt. *Archäologisches Korrespondenzblatt* 17/4, 1987, 463–466.
- Korvin-Piotrovskiy et al. 2012: A. Korvin-Piotrovskiy/V. Chabanyuk/L. Shatilo, Tripolian house construction: conceptions and experiments. In: F. Menotti/A. Korvin-Piotrovskiy (eds.), *The Tripolye culture giant settlements in Ukraine: formation, development and decline* (Oxford 2012) 210–229.
- Korvin-Piotrovskiy et al. 2016: A. Korvin-Piotrovskiy/R. Hofmann/K. Rassmann/M. Videiko/L. Brandstätter, Pottery kilns in Trypillian settlements. Tracing the division of labour and the social organization of Copper Age communities. In: J. Müller/K. Rassmann/M. Videiko (eds.), *Trypillia Mega-Sites and European Prehistory 4100–3400 BCE* (London/New York 2016) 208–221.

- Ludemann 1996: T. Ludemann, Die Wälder im Sulzbachtal (Südwest-Schwarz-
 wald) und ihre Nutzung durch Bergbau und Köhlerei. Mitteilungen des
 Vereins forstlicher. Standortskunde und. Forstpflanzenzüchtung 38,
 1996, 87–118.
- Ludemann/Nelle 2002: T. Ludemann/O. Nelle, Die Wälder am Schauinsland
 und ihre Nutzung durch Bergbau und Köhlerei. Freiburger Forstliche
 Forschung 15 (Freiburg 2002) 1–137.
- Müller et al. 2016: J. Müller/K. Rassmann/M. Videiko (eds.) Trypillia Mega-
 Sites and European Prehistory. 4100–3400 BCE. Themes in Contempo-
 rary Archaeology 2 (London/New York 2016).
- Müller et al. 2017: J. Müller/R. Hofmann/W. Kirleis/S. Dreibrodt/R. Ohlrau/
 L. Brandtstätter/M. Dal Corso/W. Out/K. Rassmann/N. Burdo/M. Videiko,
 Maidanetske 2013. New excavations at a Trypillia mega-site (Bonn 2017).
- Müller et al. 2018: J. Müller/R. Hofmann/R. Ohlrau/L. Shatilo, The social con-
 stitution and political organsiation of Tripolye mega-sites: hierarchy
 and balance. In: H. Meller/D. Gronenborn/R. Risch (eds.) Überschuss
 ohne Staat – Politische Formen in der Vorgeschichte. Surplus without
 the State – Political Forms in Prehistory. 10. Mitteldeutscher Archäolo-
 gentag vom 19. bis zum 21. Oktober 2017 in Halle (Saale). 10th Archae-
 ological Conference of Central Germany October 19–21, 2017 in Halle
 (Saale). Tagungen des Landesmuseums für Vorgeschichte Halle 18 (Halle
 an der Saale 2018) 247–260.
- Nelle 2002: O. Nelle, Zur holozänen Vegetations- und Waldnutzungsge-
 schichte des Vorderen Bayerischen Waldes anhand von Pollen- und
 Holzkohleanalysen. HOPPEA. Denkschriften der Regensburgischen
 Botanischen Gesellschaft 63, 2002, 161–361.
- Nițu/Șadurschi 1994: A. Nițu/P. Șadurschi, Săpăturile de salvare de la „Stân-
 ca Doamnei” (sat Stânca – Ștefănești, județul Botoșani). Hierasus 9, 1994,
 181–194.
- Ohlrau in press: R. Ohlrau, Maidantes’ke. Development and decline of a
 Trypillian mega-site in Central Ukraine (Leiden).
- Pickartz et al. 2019: N. Pickartz/R. Hofmann/S. Dreibrodt/K. Rassmann/
 L. Shatilo/R. Ohlrau/D. Wilken/W. Rabbel, Deciphering Archaeologi-
 cal Contexts from the Magnetic Map: Quantification of Daub Distri-
 bution and Masses of Chalcolithic House Remains. Holocene 29, 2019,
 1637–1652.
- I. Popescu/G. Caudullo/D. de Rigo, 2016. Cornus sanguinea in Europe: distri-
 bution, habitat, usage and threats. In: J. San-Miguel-Ayanz/D. de Rigo/
 G. Caudullo/T. Houston Durrant/A. Mauri (eds.), European Atlas of Forest
 Tree Species (Luxembourg 2016) 84.
- Rassmann et al. 2014: K. Rassmann/R. Ohlrau/R. Hofmann/C. Mischka/N. Bur-
 do/M. Videjko/J. Müller, High precision Tripolye settlement plans, de-
 mographic estimations and settlement organization. Journal of Neolith-
 ic Archaeology 16, 2014, 63–95.
- Rassmann et al. 2016: K. Rassmann/P. Mertl/H.-U. Voss/V. Bicbaiev/A. Popa/
 S. Musteață, Copper Age Settlements in Moldova: Insights into a Com-
 plex Phenomenon from Recent Geomagnetic Surveys. In: J. Müller/
 K. Rassmann/M. Videiko (eds.), Trypillia Mega-Sites and European Pre-
 history 4100–3400 BCE. Themes in Contemporary Archaeology 2 (Lon-
 don/New York 2016) 55–70.
- Reimer et al. 2013: P.J. Reimer/E. Bard/A. Bayliss/J.W. Beck/P.G. Blackwell/
 C. Bronk Ramsey/P.M. Grootes/T.P. Guilderson/H. Haflidason/I. Hajdas/
 C. Hatté/T.J. Heaton/D.L. Hoffmann/A.G. Hogg/K.A. Hughen/K.F. Kaiser/
 B. Kromer/S.W. Manning/M. Niu/R.W. Reimer/D.A. Richards/E.M. Scott/
 J.R. Southon/R.A. Staff/C.S.M. Turney/J. van der Plicht, IntCal13 and Ma-
 rine13 Radiocarbon Age Calibration Curves 0–50,000 Years cal BP.
 Radiocarbon 55/4, 2013, 1869–1887.
- Ryzhov 2005: S. Ryzhov, The Tripolye BII–CI sites of the Pruth-Dniester re-
 gion. In: G. Dumitroaia/J. Chapman/O. Weller (eds.), Cucuteni. 120 years
 of research. Time to sum up. (Piatra-Neamț 2005) 193–208.
- Ryzhov 2012: S. Ryzhov, Tripolian pottery of the giant-settlements: charac-
 teristics and typology. In: F. Menotti/A. Korvin-Piotrovskiy (eds.), The
 Tripolye culture giant-settlements in Ukraine. Formation, development
 and decline (Oxford 2012) 139–168.
- Rud et al. 2019: V. Rud/R. Hofmann/V. Kosakivskiy/O. Zaitseva/J. Müller,
 Trypillia mega-sites west of Southern Buh River: Preliminary results of

- Bilyi Kamin site investigation in 2018. *Journal of Neolithic Archaeology* in press.
- Rühl et al. 2015: L. Rühl/C. Herbig/A. Stobbe, Archaeobotanical analysis of plant use at Kamennyi Ambar, a Bronze Age fortified settlement of the Sintashta culture in the southern Trans-Urals steppe, Russia. *Vegetation History and Archaeobotany* 24/3, 2015, 413–426.
- Schläpfer/Brown 1948: P. Schläpfer/R.C. Brown P. Schläpfer/R.C. Brown, Über die Struktur der Holzkohlen. Bericht Eidg. Materialprüfungs- und Versuchsanstalt für Industrie, Bauwesen und Gewerbe (Zürich 1948) 153–121.
- Scholz et al. 2018: R. Scholz/K. Rassmann/S. Țerna, Stolniceni, Petreni, Brînzani, Republik Moldau. Luftbildaufnahmen mit Drohnen (UAV) von kupferzeitlichen Siedlungen in Moldawien im Kontext magnetischer Prospektionen und Ausgrabungen. *Die Arbeiten der Jahre 2009 bis 2017. DAIE-Forschungsberichte*, 1, 2018, 76–83.
- Schütt et al. 1992: P. Schütt/H.J. Schuck/B. Stimm (eds.) *Lexikon der Baum- und Straucharten* (Weinheim 1992).
- Schweingruber, 1990a. F.H. Schweingruber, *Anatomie Europäischer Hölzer* (Bern and Stuttgart 1990).
- Schweingruber 1990b. F.H. Schweingruber, *Mikroskopische Holzanatomie* (Birmensdorf 1990).
- V. Sorochin, Modalitățile de organizare a așezărilor complexului cultural Cucuteni-Tripolie. *Arheologia Moldovei* 16, 1993, 69–86.
- Tencariu et al. 2018: F.-A. Tencariu/S. Țerna/D.-M. Vornicu/F. Mățău/A. Vornicu-Țerna, A Experimental (re)construction and use of a Late Cucuteni-Tripillia kiln. *Arheologia Moldovei* 41, 2018, 236–241.
- Țerna/Heghea 2017: S. Țerna/S. Heghea, Middle and Late Copper Age settlements from the Brînzani microzone on the Prut river: older research in a modern background. *Sprawozdania Archeologiczne* 69, 2017, 397–325.
- Țerna et al. 2016: S. Țerna/K. Rassmann/M. Vasilache/K. Radloff, Stolniceni I – new research on a Cucuteni-Tripolye large site. In: A. Zancó/E. Kaiser/M. Kashuba/M.B. Izbitser (eds.), *Mensch, Kultur und Gesellschaft von der Kupferzeit bis zur frühen Eisenzeit im nördlichen Eurasien. Beiträge zu Ehren zum 60. Geburtstag von Eugen Sava. Man, Culture, and Society from the Copper Age until the Early Iron Age in Northern Eurasia. Contributions in Honour of the 60th Anniversary of Eugen Sava. Tyrageia International* 1 (Chișinău 2016) 41–52.
- Țerna et al. 2018: S. Țerna/A. Vornicu-Țerna/K. Rassmann, New data on the formation of complex sites in the Western area of the Cucuteni-Tripolye culture. In: Бруяко (ред.), *Народы и культуры Нижнего Дуная в древности. Материалы Международной научно-практической конференции. Измаил*, 15–25.
- Vornicu-Țerna/Terna 2017: A. Vornicu-Țerna/S. Țerna 2017, Ripiceni-Popoaia. A New Cucuteni B Settlement in North-Eastern Romania. *Memoria Antiquitatis* 2017, 31–32 and 97–112.
- Vornicu-Țerna et al. 2018a: A. Vornicu-Țerna/S. Țerna/A. Asăndulesei/F.-A. Tencariu/D.-M., Vornicu/M.S. Ciupu, Mitoc, comuna Mitoc, jud. Botoșani. Punct: Pisc. *Cronica cercetărilor arheologice din România. Campania 2017* (București 2018) 228–229 and 476–479.
- Vornicu-Țerna et al. 2018b: A. Vornicu-Țerna/S. Țerna/A. Asăndulesei/F.-A. Tencariu/D.-M. Vornicu, 2018. Ripiceni, comuna Ripiceni, jud. Botoșani. Punct: Popoaia. *Cronica cercetărilor arheologice din România. Campania 2017* (București 2018) 231–232 and 480–483.
- Vornicu-Țerna et al. 2019: A. Vornicu-Țerna/S. Țerna/K. Rassmann/J. Kalmbach, Ștefănești, comuna Ștefănești, jud. Botoșani. Punct: Hulboca. *Cronica cercetărilor arheologice din România. Campania 2018. Institutul Național al Patrimoniului, București*, in print.
- Uhl et al. 2017: R. Uhl/M. Vasilache-Curoșu/M. Sîrbu/L. Sîrbu/V. Bicbaev/D. Steiniger/P. Zidarov/E. Sava/S. Hansen, Petreni in der nördlichen Moldaurepublik. Bericht über die Ausgrabungen der Jahre 2011–2013. *Eurasia Antiqua* 20, 2017, 185–205.
- Бикбаев 2007: В.М. Бикбаев, «Башни» Петрен (от археологической интерпретации аэрофотоснимков к реконструкции жизни трипольских поселений). *Tyrageia serie nouă* 1/1, 2007, 9–26.
- Видейко 2012: М.Ю. Видейко, Комплексное изучение крупных поселений трипольской культуры: 1971–2011. *Stratum Plus* 2012/2, 225–264.

- Видейко 2013: М.Ю. Видейко, Комплексное изучение крупных поселений трипольской культуры. V-IV тысячелетия до н.э. Saarbrücken: LAP.
- Маркевич 1981: В.И. Маркевич, Позднетрипольские племена Северной Молдавии (Кишинев 1981).
- Рижов 1999: С.М. Рижов, Кераміка поселень трипільської культури Буго-Дніпровського межиріччя як історичне джерело. Дисертація на здобуття наукового ступеня кандидата історичних наук (Київ 1999).
- Рижов 2000: С.М. Рижов, Локально-хронологічний поділ трипільських пам'яток прудо-дністровського регіону (етапи BII – CI). In: Н.Г. Ковтанюк (ed.), Вікентій В'ячеславович Хвойка та його внесок у вітчизняну археологію (до 150-річчя від дня народження) (Київ 2000) 152–158.
- Сорокин 1990, В.Я. Сорокин, К проблеме хронологии памятников среднего Триполья Молдавии. In: И.Т. Черняков (ed.), Раннеземледельческие поселения – гиганты трипольской культуры на Украине (Тальянки/Веселый Кут/Майданецкое 1990) 94–102.
- Ткачук 2005: Т. Ткачук, Локально-хронологические группы культуры Кукутень этапов B1 и B2 в румынской Молдове. *Stratum Plus* 2005/2, 204–255.
- Церна et al. 2017: С. Церна/К. Рассманн/В. Рудь, Гончарный горн с позднетрипольского поселения Столничень I (Единецкий район, Республика Молдова) и производство керамики к востоку от Карпат в 4-м тысячелетии до н.э. *Stratum Plus* 2017/2, 301–330.
- Черныш 1973: Е.К. Черныш, Трипольское поселение Раковец, Краткие Сообщения Института Археологии АН СССР 134, 1973, 48–57.
- Черныш Е.К. 1982. Энеолит Правобережной Украины и Молдавии. In: В.М. Массон/Н.Я. Мерперт, (eds.), Энеолит СССР (Москва 1982) 165–320.

Imprint

ISSN 2197–649X

Layout draft: Holger Dieterich,
 Ines Reese
 Technical edition: Agnes Heitmann
 Language revision: Nils Müller-Scheeßel
 © 2019 Stanislav Ţerna et al./
 UFG CAU Kiel
 Published by the Institute of
 Prehistoric and Protohistoric
 Archaeology, Kiel University;
 All rights reserved.
 For further information consult
 www.jna.uni-kiel.de