

Differences in the selection of raw materials at the site of Polgár-Csőszhalom, northeast Hungary

Norbert Faragó ^a

^a Institute of Archaeological Sciences, Eötvös Loránd University, H-1088 Budapest, Múzeum krt. 4/b, Hungary; norbert.farago@gmail.com

ABSTRACT

Chipped stone artefacts played an important role in sustaining human life not just in the Palaeolithic, but in the Neolithic period also. The raw material preferences and choices became more indicative as more complex settlements and societies emerged. Chipped stones in different contexts teach us to take into consideration the many aspects of the prehistoric worldview. The Late Neolithic site of Polgár-Csőszhalom reflects well this combined phenomenon, where two different habitation units (tell and horizontal settlement), two different geographical regions (Central Europe and the Balkans), two different aspects of life (ritual and profane) met and mixed with each other. Although we would like to think of these categories as more plastic and permeable for the prehistoric people, it is worth trying to investigate separately the various situations in which chipped stone artefacts played their role. Through these analyses it became clear that generally the local raw material is more related to the supposed everyday life part of the settlement, while the tell is more oriented toward distant sources. In the meantime, in other situations the stone itself became a medium and bears a significance, no matter which type was used. In some cases, the choice of raw material and technology used may have been dictated by practical reasons, without any other underlying motivation.

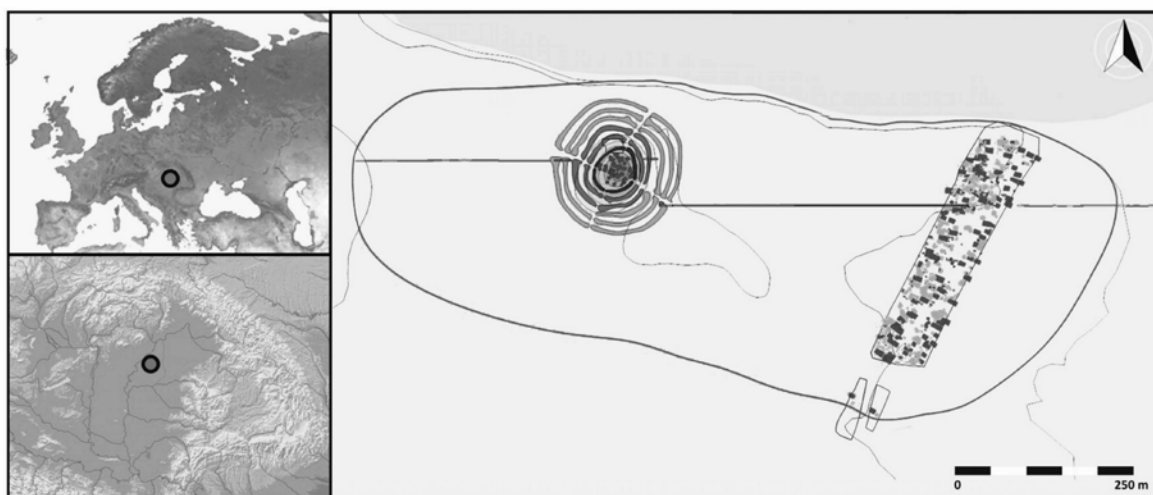
KEYWORDS

Late Neolithic, chipped stones, intra-site analysis, household archaeology, raw materials

Introduction

Polgár-Csőszhalom is one of the key sites of the Hungarian Late Neolithic, for several reasons. Firstly, it was inhabited in a region where influences from multiple directions came together (fig. 1). This fact is reflected on the one hand by the mixed material culture of the site, and on other by the dual nature of the settlement. The Lengyel culture and the Tisza-Herpály complex did not just simply mix here, but created a new cultural entity, with minor Stichband and Icld elements. Moreover, the tell and circular ditch system in the same locality represents the fusion of different traditions from the south and west. Secondly, with an excavated area of 3.5 ha this site is one of the largest researched horizontal settlements from the period in Hungary. This, together with the huge quantity of archaeological remains, makes it possible to conduct a complex household network analysis. Before going into detail about the meaning, in this context, of 'complex household network analysis', it is necessary to summarize briefly the history of research at this site.

The Polgár-Csőszhalom archaeological site has been known since the beginning of the 20th century, but systematic research began only in 1957, when Ida Kutzián started an excavation with a sondage on the mound to clarify its chronological sequence (Bognár-Kutzián 1958; Bognár Kutzián 1966). Despite the few published accounts of this early



*Fig. 1. Location of Polgár-Csőszhalom and the horizontal settlement
(after Raczky et al. 2015, 22, fig. 1)*

*Обр. 1. Разположението на Полгар-Чосхалом и хоризонталното селище
(no Raczky et al. 2015, 22, fig. 1)*

investigation, the site was introduced into the scientific literature as a tell-like settlement having close connections with other neighbouring Late Neolithic cultures, and situated far to the north of the original territory of the Herpály and Tisza tells (Bánffy 2007; Bánffy, Bognár-Kutzián 2007). Later, beginning in 1989 a large-scale excavation was initiated by the Institute of Archaeological Sciences of Eötvös Loránd University directed by Pál Raczky. In 1995, this project was linked to the construction of the M3 motorway and, so far, has lasted for twelve seasons. Within the framework of this excavation, research has concentrated on the horizontal settlement. Since the beginning of the excavation several preliminary reports and articles have been published concerned, for example, with the special role of the tell and the finds below one of the central buildings (Raczky et al. 1996), the relationship between the two distinct settlement parts (Raczky 1998), the detailed archaeological and geoarchaeological evaluation of the site and its finds (Raczky et al. 2002) or the social and demographic aspects of the settlement (Raczky, Anders 2006). Later a monograph partly dedicated to Polgár-Csőszhalom was published, in which this significant place was again considered from several viewpoints (Anders, Nagy 2007; Erdélyi-Bácskay 2007; Raczky et al. 2007; Sebők 2007). Most recently, the different spatial and temporal symbology of the tell and the horizontal settlement was emphasized through its special character and its analogies (Raczky, Anders 2008; Raczky et al. 2011).

The first article on the lithic material was a short report by Erzsébet Bácskay and Katalin T. Biró, which provided a description of the raw materials, the basic tool types, as well as a possible reconstruction of the network of connections with neighbouring regions (Bácskay, Biró 2002). According to this reconstruction, the population of Polgár-Csőszhalom maintained connections in almost every direction, insofar as this can be demonstrated by stone raw materials. Later E. Bácskay published the preliminary results of a microwear analysis of the tools from the horizontal settlement (Erdélyi-Bácskay 2007).

Our project started in 2012 with the aim of evaluating the enormous quantity of archaeological material from Polgár-Csőszhalom, and designed to reconstruct the past society through an intra-site analysis. To accomplish this task, we employed multilevel statis-

tics and a geographic information system (GIS), which we considered the most useful tools to conduct a household-level evaluation (Faragó 2015). Although there is still much work to be done on our multi-level investigation model, we have interesting results from the analysis of the raw materials used for the chipped stone artefacts from Polgár-Csőszhalom. The detailed way in which this was conducted allows us to produce a more comprehensive picture of the inner structure of the community.

Materials

Altogether 12,276 chipped stone artefacts have been enumerated from the horizontal settlement part of Polgár-Csőszhalom. In contrast, the tell part has produced 6650 pieces. The majority of the pieces are made of limnosilicite varieties originating from the Tokaj Mountains, which are 50–70 km from the site (fig. 2, Table 1). The genesis and attributes of these raw materials are different from those of flints of shallow marine sedimentary origin and which are well known from Western and Northern Europe. The decreasing water level of the Paratethys Sea resulted in various environmental areas in the North Hungarian Mountains during the Tertiary volcanism and post-volcanism 12–16 million years ago. During these latter events, already heated silica gels came into contact with lake and lagoon sediments in different ways, thus forming extremely varied limnosilicite types (Biró 1998, 34; Gyarmati, Szepesi 2007, 18, 32–33; Mester et al. 2012, 281; Mester, Faragó 2016). Hence the classification of these raw materials is very difficult, and sometimes impossible. However, among the lithic assemblage from Polgár-Csőszhalom three main subtypes can be distinguished thanks to the MA research of Adrienn Szekszárdi (Szekszárdi et al. 2010). The comparative reference collection of the Institute of Archaeological Sciences of Eötvös Loránd University also proved to be advantageous during the evaluation (Mester et al. 2012, 275–293).

Among the material from Polgár-Csőszhalom three main types dominate: type 1 is brownish, translucent and generally more corticated. Type 2 is light brown-white, rather opaque and contains microfossils that are even visible with the naked eye. Type 3 is bluish-greyish and has a banded character. This last mentioned is referred to in the scientific literature as Mezőzombor silex (Biró 1998).

A minority of the assemblage showed clear connections with territories 250–400 km distant from northeast Hungary. Most of the radiolarite pieces originated in Transdanubia, while some others were possibly connected to the Flysch Belt outside the Carpathians. A more important region, in our view, is the Cracow/Częstochowa plateau and the Holy Cross Mountains, because most of the finds of distant origin can be attributed to them in the form of Cracow Jurassic flint and chocolate flint. Finally, the region of Volhynia and Podolia also yielded raw material.

Even a preliminary evaluation revealed an interesting difference between the two major settlement parts. Comparing the total assemblages (12,276 pieces from the horizontal settlement and 6650 pieces from the tell) with the sizes of the excavated areas (35,000 m² of the horizontal settlement and 745 m² of the tell) leads to the conclusion that the tell yielded 18 times as many chipped stone artefacts per square metre as the horizontal settlement (fig. 2). Moreover, the distant flints, namely Cracow Jurassic flint, chocolate flint and Volhynian/Prut flint, are more frequent on the tell, constituting 16% of the lithic assemblage. Another important difference is the abundance of Mezőzombor type silex on the tell.

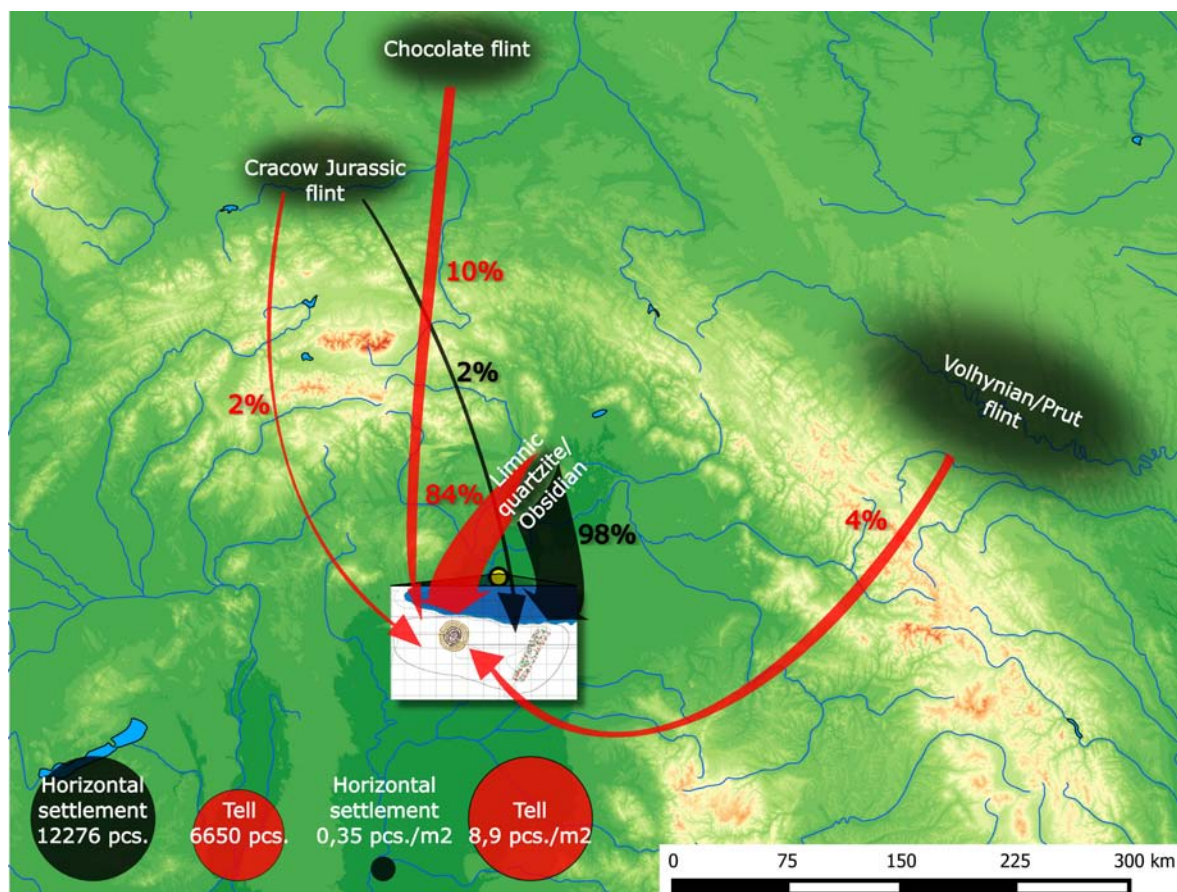


Fig. 2. Distant raw materials and their frequencies at Polgár-Csőszhalom

Обр. 2. Суровини с отдалечен произход и тяхната честота в Полгар-Чосхалом

Methods

Our project started in 2012 from the perspective of complex household analysis. The first step to accomplishing such an analysis is to create a database by plotting all the finds independently of one another with their coordinates in a virtual map (Faragó 2015). This data set is arranged by archaeological components – ceramics, stones and animal remains – forming distinct virtual layers. Although nowadays we have the benefit of information technology and GIS software, the huge quantity of archaeological finds makes this work difficult and time consuming. The second step is to reconstruct social groups on different levels with the aid of statistical and spatial analysis tools. The chipped stone industry is very suitable for this kind of investigation, especially when a palaeoethnological approach is applied. The main idea behind this method is that each knapped piece can be placed in the technological chain by reading the stigmata on it. When this mental reconstruction is connected with the locations of the respective chipped stone artefacts, much of the original toolmaking process can be visualized. There is no space here to cite all the results of this palaeoethnological approach, but an early example from Pincevent (Leroi-Gourhan, Brézillon 1983) and more recent examples from a thematic volume (Gaudzinski-Windheuser et al. 2011) show the inherent potential of this approach.

We had to deal with several complications to accomplish this research during the intra-site analysis of Polgár-Csőszhalom. Firstly, it was a rescue excavation associated with the construction of the M3 motorway; therefore, the spatial information of the finds is confined

Raw materials coming from the distance of 50-70 km	Horizontal settlement part		Tell settlement part	
	Number of chipped stones	Weight of chipped stones (g)	Number of chipped stones	Weight of chipped stones (g)
Limnosilicite type 1	4369	68693	745	6960
Limnosilicite type 2	2592	54727	756	8671
Mezőzombor type limnosilicite	1982	57888	2757	44902
Obsidian	1351	6113	443	2369
Other limnosilicite, opalite	1747	36681	914	9415
Felsitic quartz porphyry	8	284	-	-
Raw materials coming from the distance of 250 – 400 km	Horizontal settlement part		Tell settlement part	
	Number of chipped stones	Weight of chipped stones (g)	Number of chipped stones	Weight of chipped stones (g)
Radiolarite from Bakony Mts.	39	296	6	39
Cracow jurassic flint	185	2063	789	4026
Volhinian/ Prut flint	3	9	240	1249

Table 1. Distribution of different raw material variants at Polgár-Csőszhalom, both tell and horizontal settlement part (frequencies and weights)

Таблица 1. Честота и тегло на артефакти от различни суровини в Полгар-Чесалом (от селищната могила и площното селище)

to the spatial information of the archaeological features. It also means that our finds were picked up and stored by stratigraphic unit. Moreover, the settlement features were excavated with shovel and spade, not on a metre square grid system with more precise methods. Unfortunately, this gives less precise results compared to those Palaeolithic examples where every find was recorded independently. Understanding site formation processes is the most crucial part of the investigation; however, this goes way beyond the scope of this paper. As Schiffer pointed out, artefacts in a given archaeological context can be missing definite article result of many different factors, but rarely can be found as originally associated objects (Schiffer 1972, 1987). However, scholars of household archaeology often sidestep this problem, especially in the case of large archaeological sites and assemblages. They are forced to do so, because intensive occupation areas with numerous finds are the best way to reconstruct households; however, a detailed analysis of site formation process can take a lot of time, energy and financial resources. Also, the rules of waste handling in a given society can be driven by practical and symbolic factors, but can be analysed from a distance to visualize the wider picture. A good example is from Kalinga, Philippines, where an ethnoarchaeological project proved that most of the discarded vessels reached the nearest midden (Beck 2006). During this research, the waste strategies of 71 households were followed weekly by recorded interviews with local people. On the one hand, a broken vessel remained close to its original area – household, activity area – on other hand, the broken pieces tended to accumulate around water sources or pathways to water sources. After the disposal, these middens were heavily disturbed by further processes (children's play, animal feeding, cleaning, etc.), which were reflected in sherd size distribution. However, the author would encourage other archaeologists to use these results in their own household concepts.

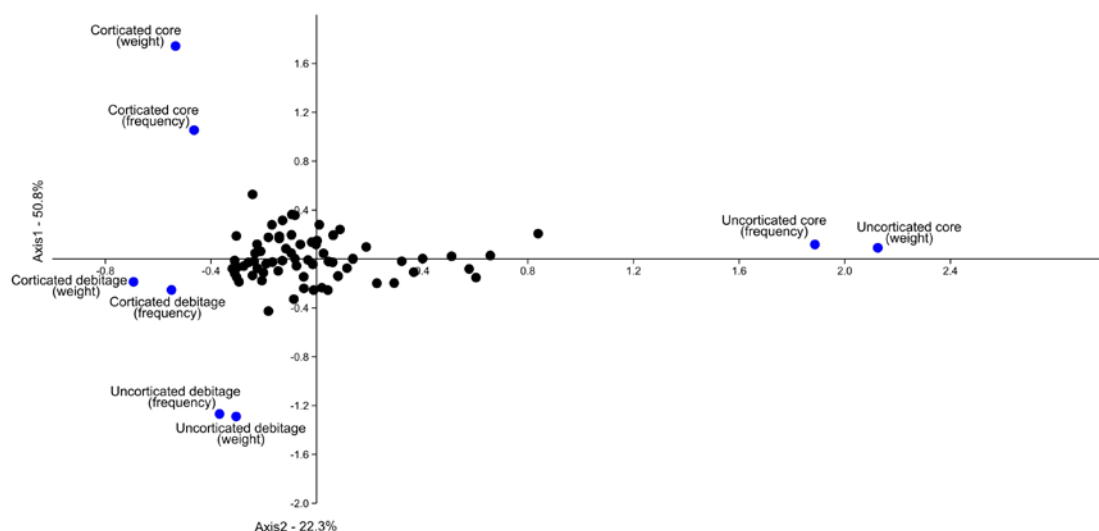


Fig. 3 . Correspondence analysis of type 1 limnosilicite
Обр. 3. Кореспондент анализ на лимно-силикат тип 1

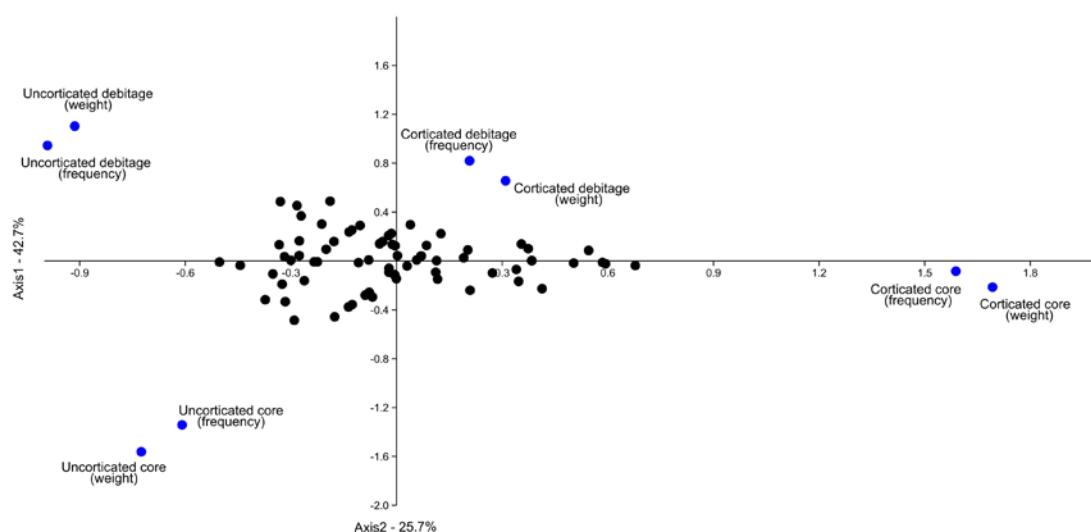


Fig. 4 . Correspondence analysis of type 2 limnosilicite
Обр. 4. Кореспондент анализ на лимно-силикат тип 2

Secondly, there was no possibility of detecting the floor level of the houses at the horizontal settlement, because evidence of deliberate burning, which is common on the tell, is missing there. All the finds are only indirectly connected to the houses. Even if the circumstances of a rescue excavation could allow for the use of a range of specialist analyses, identifying the late floor levels of these houses is unlikely. The explanation is very simple; in Central Europe (and elsewhere, perhaps) these floors remain hidden unless a deliberate or accidental burning event preserves them. Some sophisticated, planned research can achieve moderate success in this topic, but only on a small scale. One brief example from

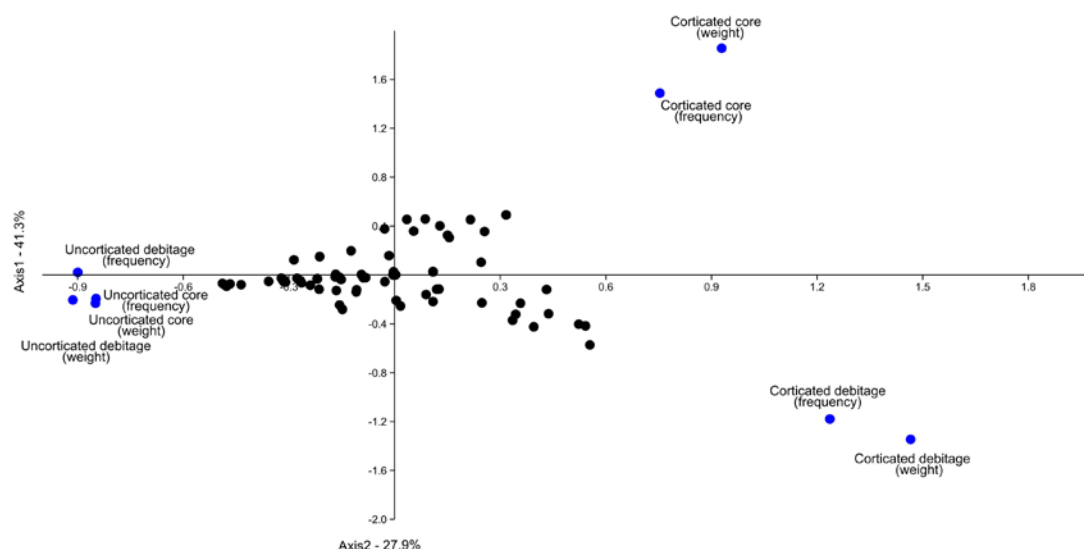


Fig. 5 . Correspondence analysis of Mezőzombor type limnosilicite
Обр. 5. Кореспондент анализ на лимношисти тип Мезозомбор

Hungary is Ecsefalva 23, which Early Neolithic site was investigated in the late 1990s–early 2000s by the cooperative work of Cardiff University and the Hungarian Academy of Sciences under the leadership of Alasdair Whittle (Whittle 2007). Trench 23B was 10 by 5 metres and was excavated from 1999 to 2001. The excavators anticipated minimal preservation of the occupation deposits and maximal presence of subsoil features. During the removal of the topsoil (which was not screened) it became apparent, that an extremely rich layer of the Körös culture survived above the subsoil. Overall, the site area covered an occupation or cultural layer normally up to 30 cm thick, with two pits that were only partially excavated. Despite all the archaeological and natural scientific efforts and the absence of major taphonomic disturbance (deep ploughing), there was no clear sign of specific floors or surfaces within the deposit. Another brief example is from Hanau-Klein-Auheim and Eythra, Germany. The result of waste accumulation in an occupation layer around a house (Hanau-Klein-Auheim) is compared with waste accumulation in long pits along an LBK house (Eythra) (Wolfram 2013). The result is more or less similar in the reconstruction of domestic space; waste accumulates around the living area. Another interesting question is how we can use established household models applied during the investigation of LBK settlements (Boelicke 1982; Rück 2012)). The debate about the ‘Hofplatz’ and ‘Zeilensiedlung’ models can reveal instructive details in later Neolithic periods also.

Thirdly, the Polgár-Csőszhalom settlement was inhabited over a long period, for 250–300 years according to the AMS dates, so it is necessary to pay special attention to the problems of horizontal stratigraphy (Raczky et al. 2015). Furthermore, the theoretical question of the lifespan of the houses or the pits makes this aspect of the work more problematic.

The difference between the horizontal settlement part and the tell part in itself is very important considering their supposed roles in the lifetime of the settlement (Raczky 1998; Raczky, Anders 2008; Raczky et al. 2011; Raczky, Sebők 2014). But what does this differentiation really mean? How can we imagine these processes in space and time in more detail? Does it mean that the distant raw materials were used only in a sacral context? What do the few distant pieces in the assemblage from the horizontal settlement really mean? Did some

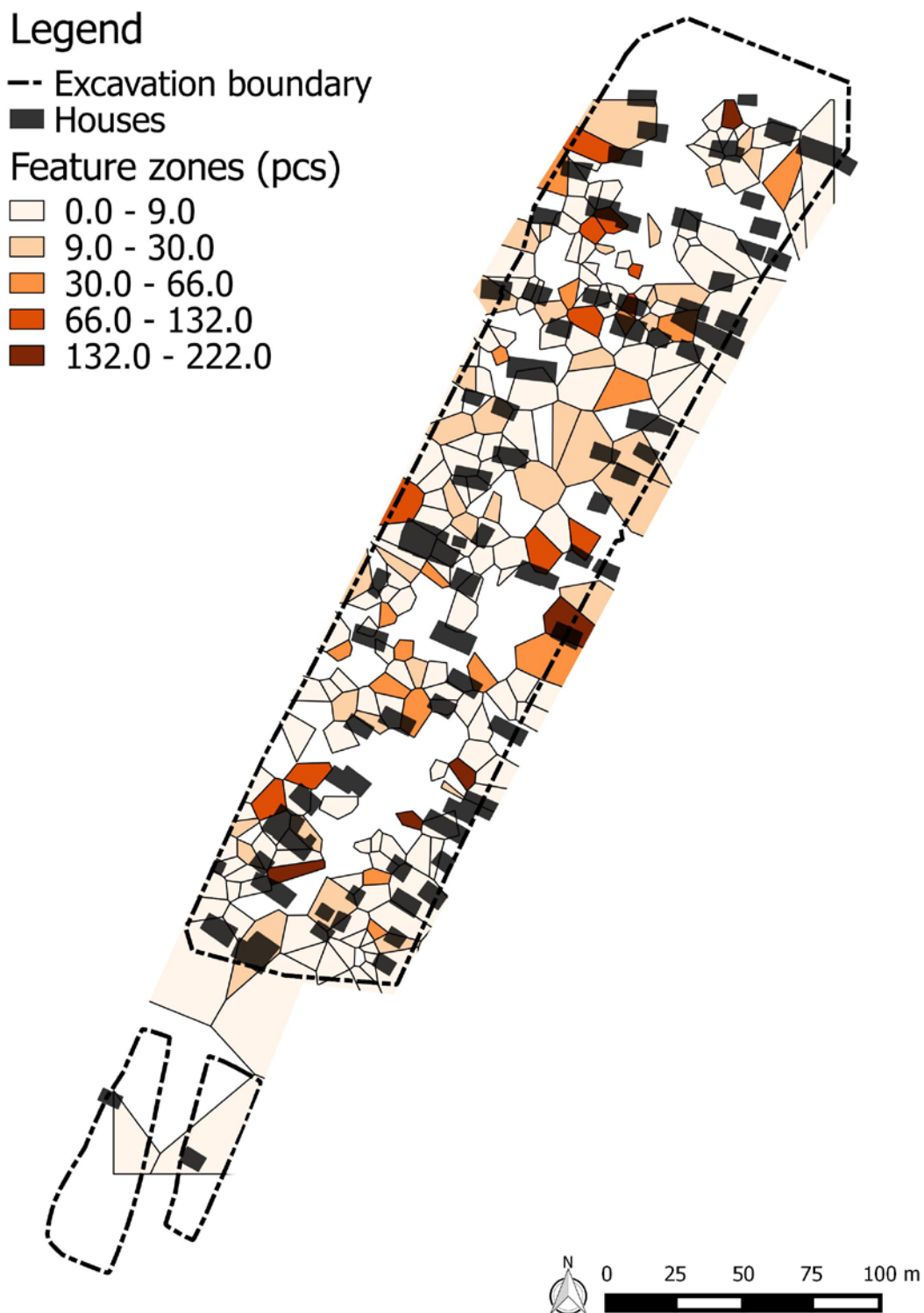


Fig. 6. Spatial distribution of type 1 limnosilicite

Обр. 6. Пространственно распространение на лимно-силикат тип 1

person or household expressed their identity or wealth with them? What if this difference is merely a result of some taphonomic effect or research strategy?

According to these questions, the raw material distribution is discussed from four different aspects: spatial, temporal, symbolic and taphonomic. In our opinion, these di-

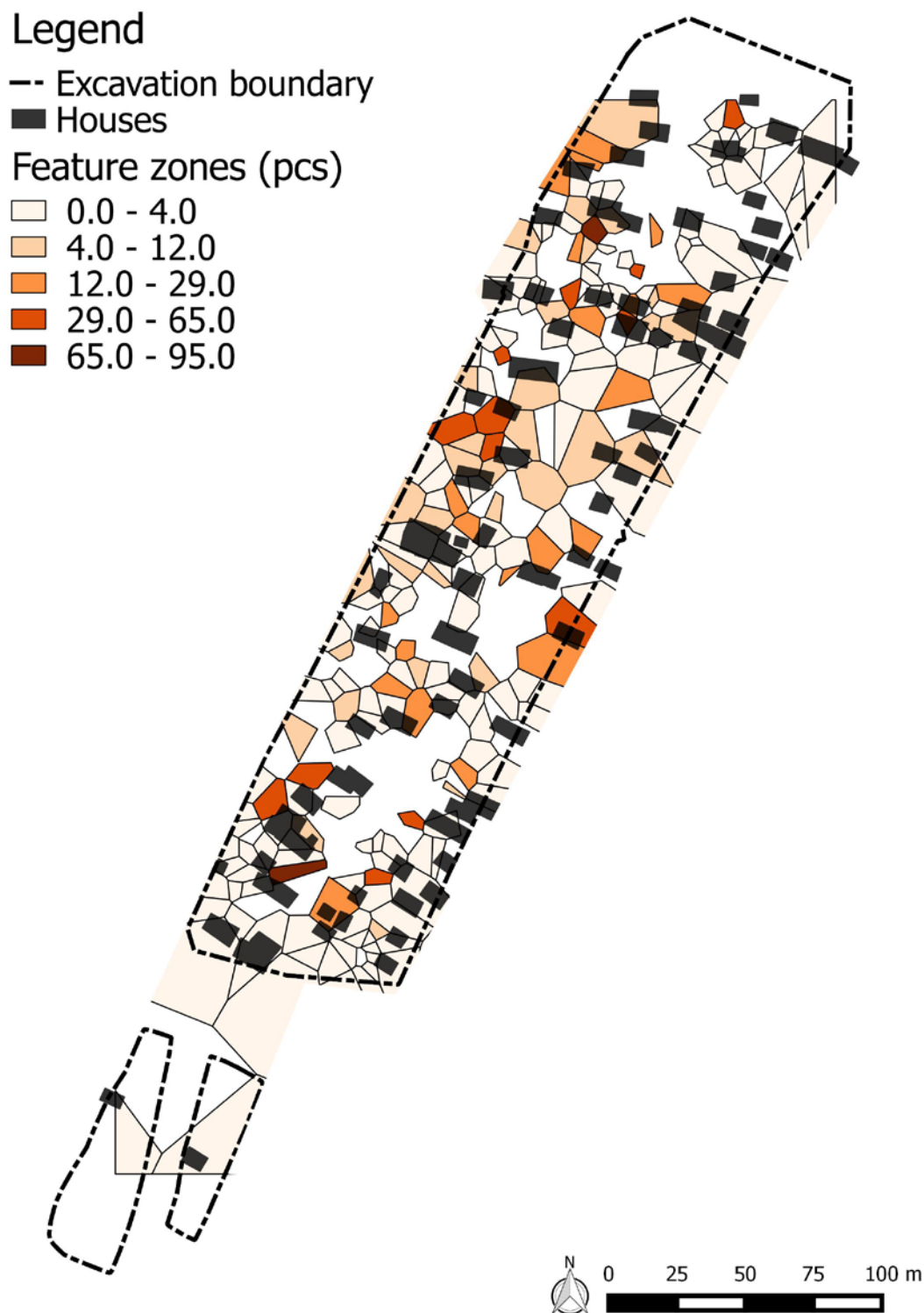


Fig. 7. Spatial distribution of Mezőzombor type limnosilicite
 Обр. 7. Пространственно распространение лимношисти тип Мезозомбор

mensions are the best way to approach our analysis of the material of Polgár-Csőszhalom. The raw material distribution of the horizontal settlement was the subject of another paper aimed at analyzing the data from a spatial and temporal perspective (Faragó 2016). However, since the raw material distribution of the tell part can also be reconstructed, the entire assemblage can be analyzed in these terms and more detailed conclusions drawn.

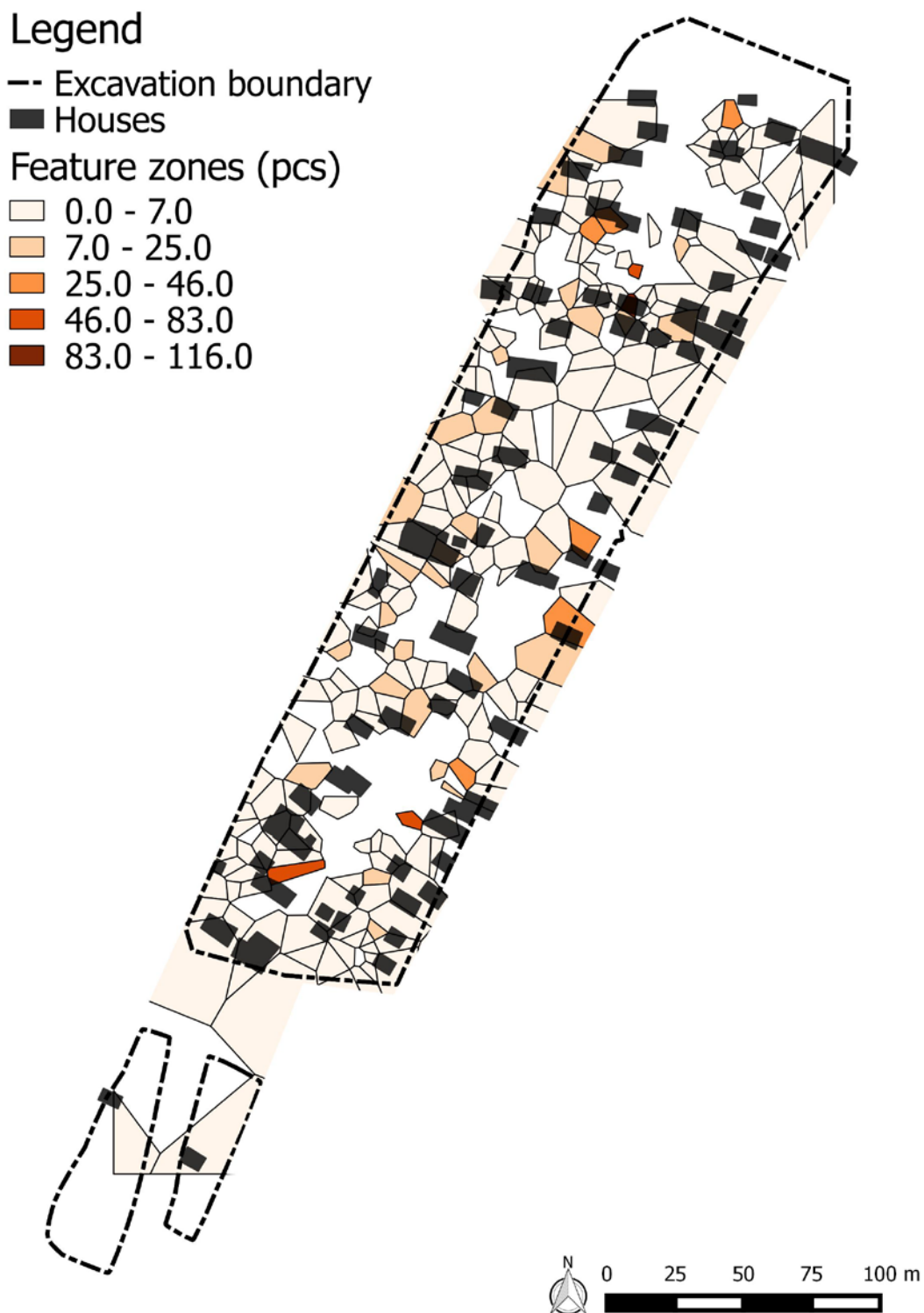


Fig. 8 . Spatial distribution of obsidian
 Обр. 8. Пространствено разпространение на обсидиан

Results

Spatial aspect – horizontal settlement part

The horizontal settlement part produced 79 built structures, 123 burials, 68 wells and more than 200 pits. Concentrating only on those chipped stone finds that are from spe-

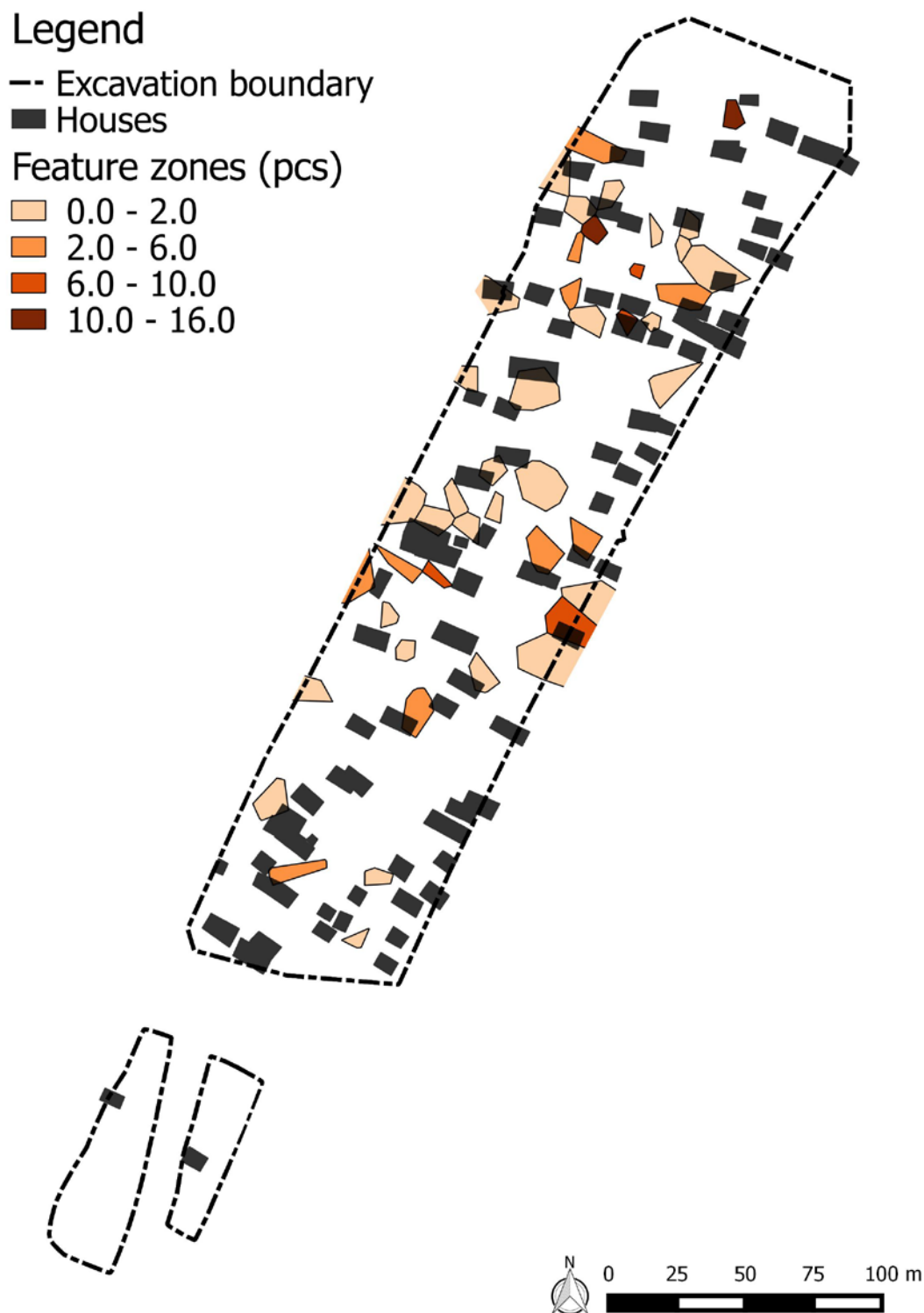


Fig. 9 . Spatial distribution of Cracow Jurassic flint

Обр. 9. Пространствено разпространение е на юрски кремък от Краков

cifically Neolithic contexts (pits) 88% of the 12,276 pieces were taken into consideration (Faragó 2016). A series of correspondence analyses were conducted to look for inherent relationships between the different archaeological features, raw materials, cores, debitage products, cortication attributes, frequencies or weights. The general conclusion was (apart from small deviations) that the chipped stone artefacts were distributed evenly (fig. 3-5).

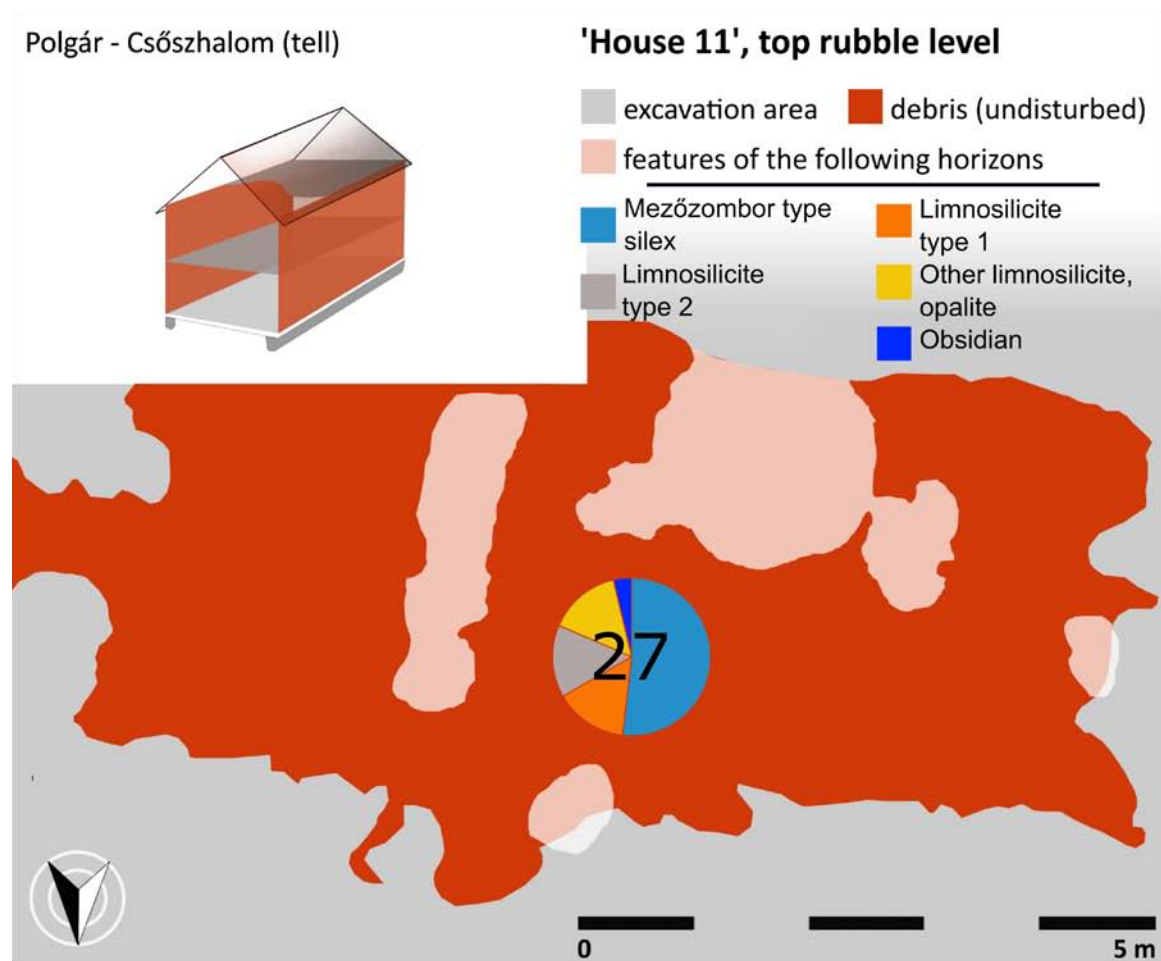


Fig. 10. House 11 on the tell, top rubble level, frequency of the chipped stones (after Raczký, Sebők 2014, 65, fig. 5)

Обр. 10. Жилище 11 на селищната могила, най-горното ниво на деструкции – честота на кремъчните изделия (по Raczký, Sebők 2014, 65, fig. 5)

In other words, there are no exceptional features, where only one raw material type dominates, or where just the corticated pieces were deposited. There is no special location where just cores were discarded, nor where series of debitage products were placed. The richest features in terms of chipped stone artefacts are always the same, no matter which attributes are considered.

Thiessen polygons were plotted around the central points of features to visualize the distribution of the chipped stone artefacts on the site map (Faragó 2016) (fig. 6-9). Kernel density estimation is a good method to visualize the spatial distribution of the finds, but Thiessen polygons were chosen for other advantages. These polygons were created to visualize the encircling, nearest zones of each of the pits. Simple kernel density analysis would not have been appropriate, because it has no ability to reveal fine differences between zones. Moreover, the resulting plot has no connection with the actual borders of the archaeological features, it is only a rough abstraction of the find distribution over the excavated surface. Thiessen polygons are abstractions also, of course, but their extension and position are connected to real excavated features. This distribution shows that the most prominent features are scattered evenly all around the excavated part of the settlement. This situation proved to be valid for all three sub-types of limnosilicites and obsidian, as well as distant raw materials. The locations with the highest frequencies, or activity zones, are 30–50 m distant from one another, and consist of 400–1500 pieces, weighing 7–30 kg. Comparing these results with the spatial distribution of the houses, Thiessen polygons were also created around the central points of the buildings. In this way, the two spatial systems, two spatial grids (pits and houses) were compared with each other. The resulting plot suggest that the outer lines of dense spots follows the borders of distinct house groups; in this way 16 different house groups, or households, were outlined according to our model (Faragó 2016).

The question of defining households is problematic even in the case of LBK settlements in Central Europe, and it seems more complicated in the earlier phases (Boelicke 1982; Smolnik 2012). Results from the LBK settlement of Bylany suggest that the ruins of later houses served as rubbish dumps, so the larger the settlement the more it was needed to handle the waste cooperatively (Kvetina 2010). Some models of LBK settlement layout and society also suggest that distinct households formed larger, cooperating units (Link 2012). This later model of Thomas Link tries to merge the ‘Hofplatz’ and ‘Zeilensiedlung’ theories into one (Boelicke 1982; Rück 2012). Analysis of the chipped stone artefact distribution at Elsloo produced a similar result, with some households possibly associated with specialized tools for hide processing (van Gijn, Mazzucco 2013).

Spatial aspect – tell settlement part

The tell was excavated from 1989 to 1994 over an area of 745 m² in four trenches. Trenches III and IV yielded 14-16 distinct buildings, several graves, pits and remains of an enclosure system. To conduct a spatial analysis of the tell, one of the first built structures was chosen from Trench IV. House number 11 was erected as a two-storey building, which had been deliberately burnt at the beginning of the formation of the mound (4785-4725 cal BC) (Raczky, Sebők 2014). Before the erection of this structure the area had been already used, as pits were excavated partly underneath the floor of this house. The top level is represented by a thick layer of burnt rubble, which is interpreted as the roof, wall remains and attic (str. 922-960, 965, 978-1015) (fig. 10-11). This layer yielded 68 pieces, mainly (>50%) Mezőzombor type silex. Below this layer was the first floor, with 20 pieces (str. 1033-1034) (fig. 12), 12 of which are Mezőzombor type silex. The lowermost layer corresponds to the

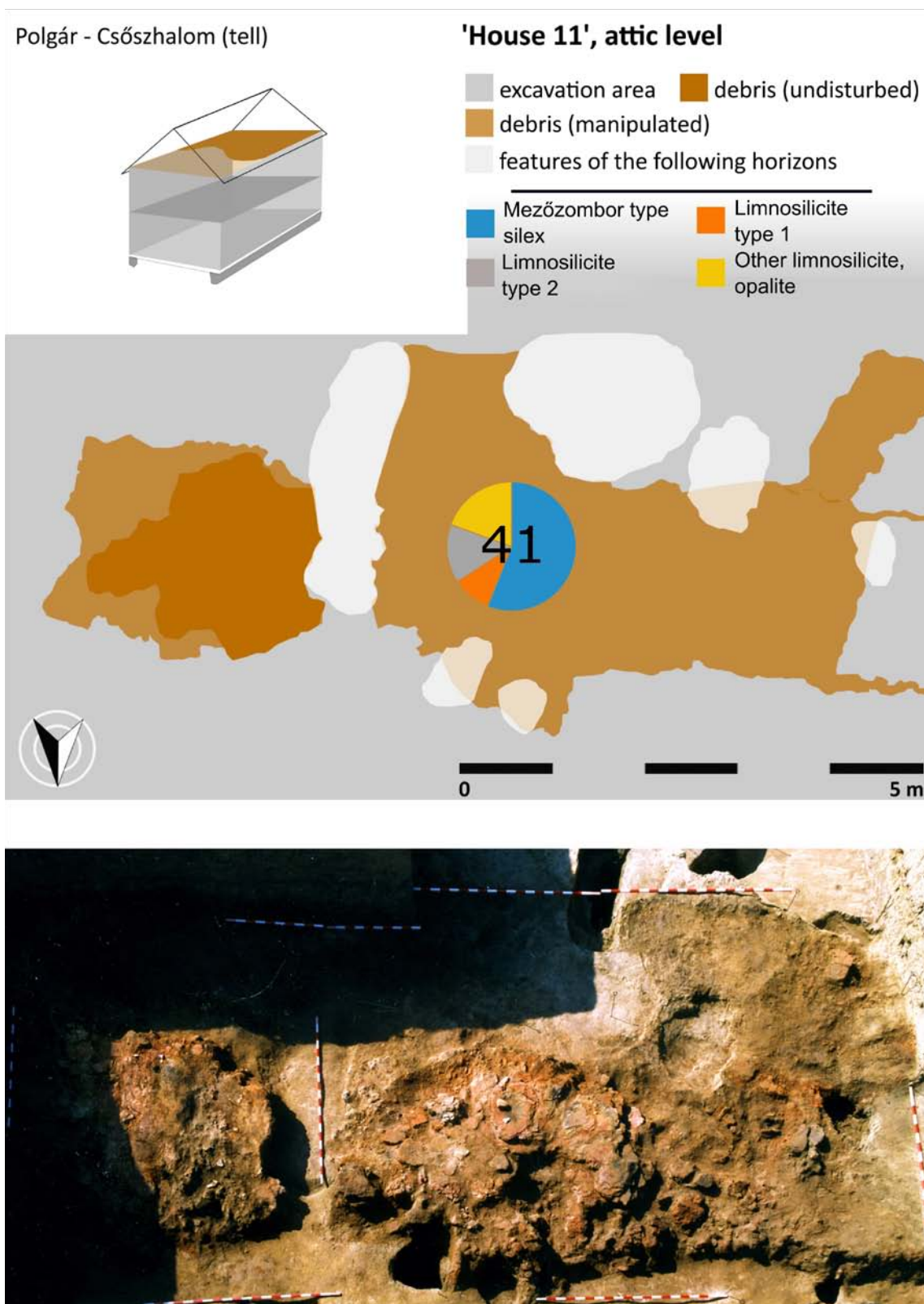


Fig. 11. House 11 on the tell, attic level, frequency of the chipped stones
(after Raczky, Sebők 2014, 65, fig. 6)

Обр. 11. Жилище 11 на селищната могила, таванска част – честота на кремъчните изделия (по Raczky, Sebők 2014, 65, fig. 6)

ground floor and the bedding trenches (str. 1025, 1031) which contained no lithic artefacts (fig. 13). On the other hand, features antedating the foundation of the house contained 67 pieces, almost exclusively Mezőzombor type silex.

Therefore, varying amounts of chipped stone artefacts can be attributed to different levels of this burnt structure, but two main features are evident. The Mezőzombor type silex always dominates the assemblages and there are no pieces of distant raw materials. Toward the bottom level of the building the distribution becomes uneven, since the lowest floor level remained without any finds. This implies the clearing out of the building before the burning process (Raczky, Sebők 2014). The features closest to the house retained significant amounts of the chipped stone material, but still no distant raw material occurred. One further observation requires explanation – the extremely small number of burnt pieces found among the burnt debris of the house. Only ten pieces occurred among the debris, most of them from the remains of the attic. This matches the results of the ceramic analyses, where 148 of the 3081 sherds showed secondary burning (Raczky, Sebők 2014, 82). This could mean that either the house was totally emptied before the destruction event or knapping activity did not take place there at all.

The spatial distribution of the chipped stones on the tell of Polgár-Csőszhalom can be compared in some respects with other, similar investigations. At Berettyóújfalu-Herpály detailed analysis of layers 7-8 showed chipped stone artefacts distributed evenly in the dwellings (Kaczanowska, Kozłowski 2015). The frequency of the chipped stone material is similar to Polgár-Csőszhalom, varying between 1 and 116 pieces per house. The authors detected only minimal differences in the toolkit and they reconstructed the lithic production inside the dwellings. At Okolište, Bosnia, a detailed analysis was published of the chipped pieces belonging to area 3 (Müller et al. 2011). As a result, distinct activities could be attributed to different houses (hunting, woodworking, tool production, etc.), because the different technological and typological categories are distributed unevenly.

Temporal aspect – horizontal settlement part

The duration of the horizontal settlement was analyzed through 74 AMS dates on samples from graves, postholes, wells and pits (Anders, Raczky 2013). The results suggest four main phases (fig. 14). The first can be dated between 4870/4850–4855/4790 cal BC, the second 4850/4770–4830/4725 cal BC, the third 4800/4720–4770/4660 cal BC, and the fourth 4730/4655–4665/4625 cal BC. As the map indicates every corner of the settlement showed activity during its overall lifetime. The material from six different pit features was analyzed to investigate temporal patterning in the use of lithic raw materials. These features contained sufficient numbers of artefacts to be statistically representative of three of the four main phases of occupation. Feature 44 represents the first phase, with its 487 chipped pieces (fig. 14). Features 916 and 932 belong to the second phase, with their nearly identical AMS dates (4830–4725 cal BC and 4825–4715 cal BC)¹. Feature 916 yielded 40 pieces, while feature 932 produced 235 pieces. Three features belong to the third phase, 312 with 48 pieces, 546 with 245 pieces, and 966 with 346 chipped pieces. The chart shows that, apart from small fluctuations, the raw material distribution remained more or less constant throughout the 250

¹ These two pit complexes were already subjected to detailed analysis, see Raczky et al. (2015) and Faragó (2015). Since then, many more chipped stone finds have been attributed to feature 932, which is why the total numbers differ. However, the main conclusion remains the same, as the limited raw material, technological and typological differences between the two features could be the signs of different knapping activities.

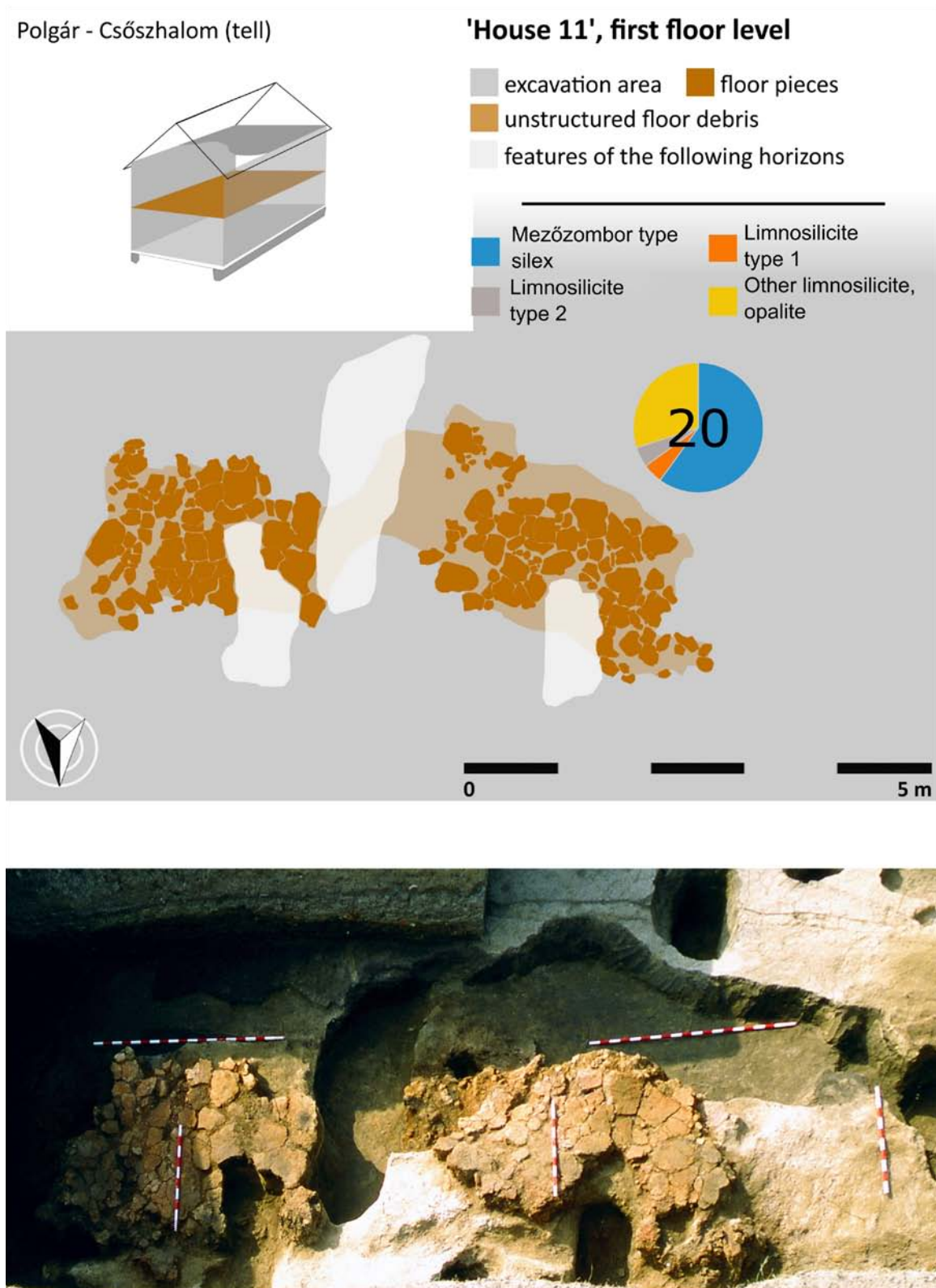


Fig. 12. House 11 on the tell, first floor level, frequency of the chipped stones
(after Raczky, Sebők 2014, 66, fig. 7)

Обр. 12. Жилище 11 на селищната могила, първи етаж – честота на кремъчните изделия
(no Raczky, Sebők 2014, 66, fig. 7)

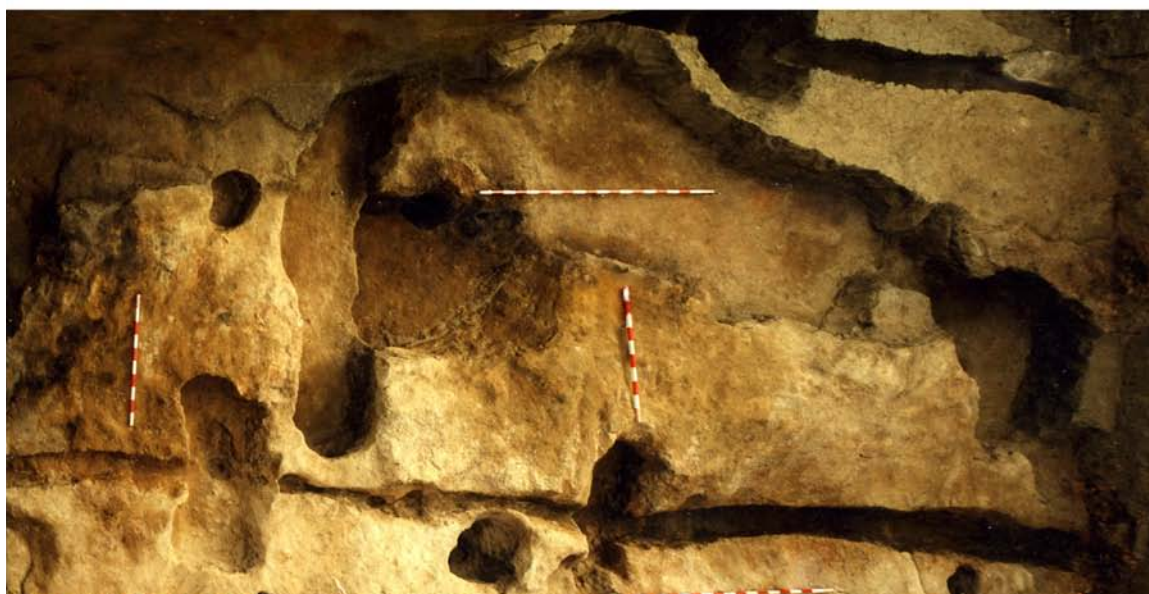
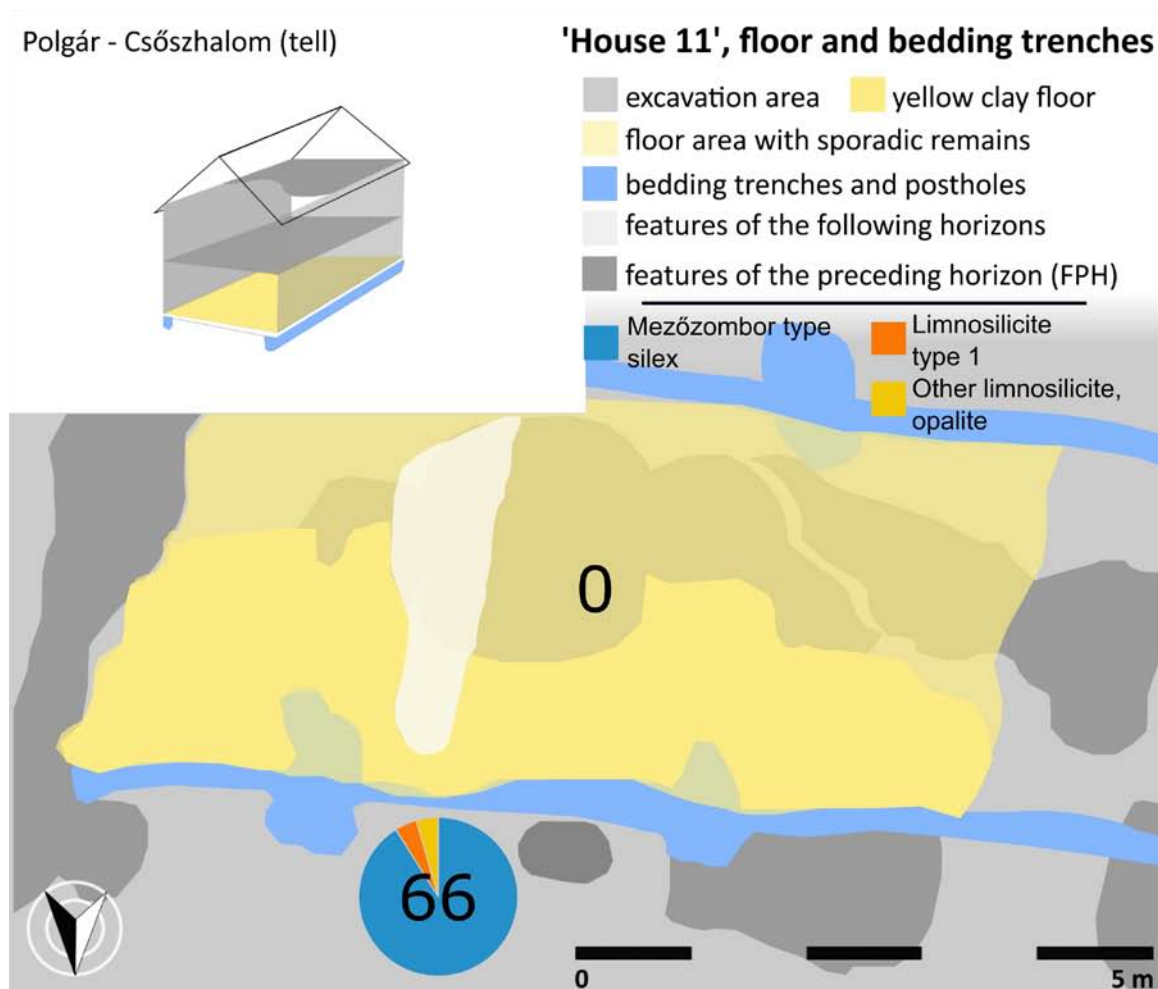


Fig. 13. House 11 on the tell, floor and bedding trenches, frequency of the chipped stones (after Raczky, Sebők 2014, 66, fig. 8)

Обр. 13. Жилище 11 на селищната могила, подово ниво и основи на сградата – честота на кремъчните изделия (по Raczky, Sebők 2014, 66, fig. 8)

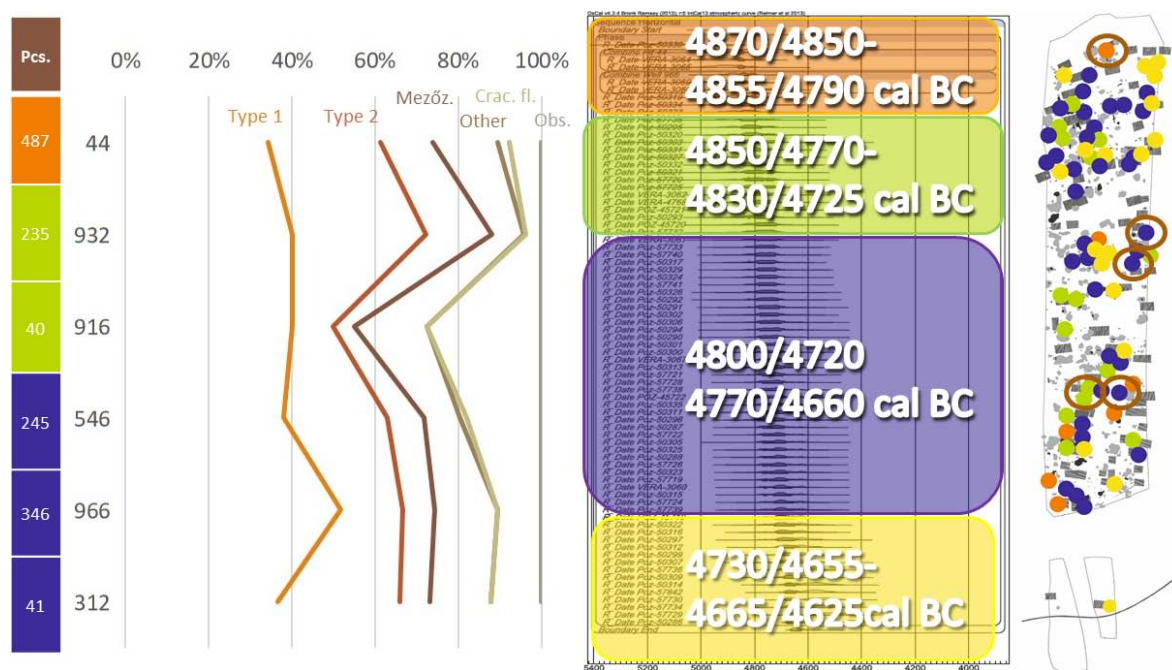


Fig. 14. Frequency of different raw materials among the selected features (no. 44, 312, 546, 916, 932, 966), radiocarbon sequence of the settlement and the situation of the sample spots
 Обр. 14. Честота на различните суровини сред избраните структури (№№ 44, 312, 546, 916, 932, 966); последователност от радио-въглеродни дати от селището и разположението на пробите

years of the horizontal settlement (fig. 14). Type 1 limnic quartzite was the most abundant, which was followed by type 2. Thus, most of the raw materials came from the north side of the Tokaj Mountains remaining more or less constant from the beginning to the end. Extra-local raw materials, such as Cracow Jurassic flint, remained insignificant through most of the lifetime of the horizontal settlement. Interestingly, the biggest differences occur within the second phase, between feature 916 and 932, while spatially these two locations are very close to one another (Faragó 2015; Raczky et al. 2015).

Thus, according to the AMS dates the same areas of the site were used for a longer period than we thought. This could mean that the same pits and houses served the inhabitants continuously over several decades (Raczky et al. 2015, 25.); moreover, the same activity zones or households could have been maintained over a long time. It seems that for 200–250 years the raw material preferences of this entire society remained very conservative.

Temporal aspect – tell settlement part

The vertical stratigraphy of the tell might yield more detailed information about the correspondence between settlement duration and raw material composition. The occupation of this part of the settlement began 4920/4785 cal BC and lasted until 4505/4450 cal BC. Among the four trenches excavated, trenches III and IV produced enough chipped material to be able to analyze the temporal relationships (fig. 15). Trench IV, situated in the middle part of the tell, contained fewer chipped stone artefacts, 1142 pieces. At the bottom of the sequence no distant raw material was present, as in the case of house 11 (see above). However, these layers are not very rich in chipped stone artefacts (level 9 – 51 pieces, level 8 – 20 pieces and level 7 – 151 pieces). Starting with the fifth level in the sequence, which is

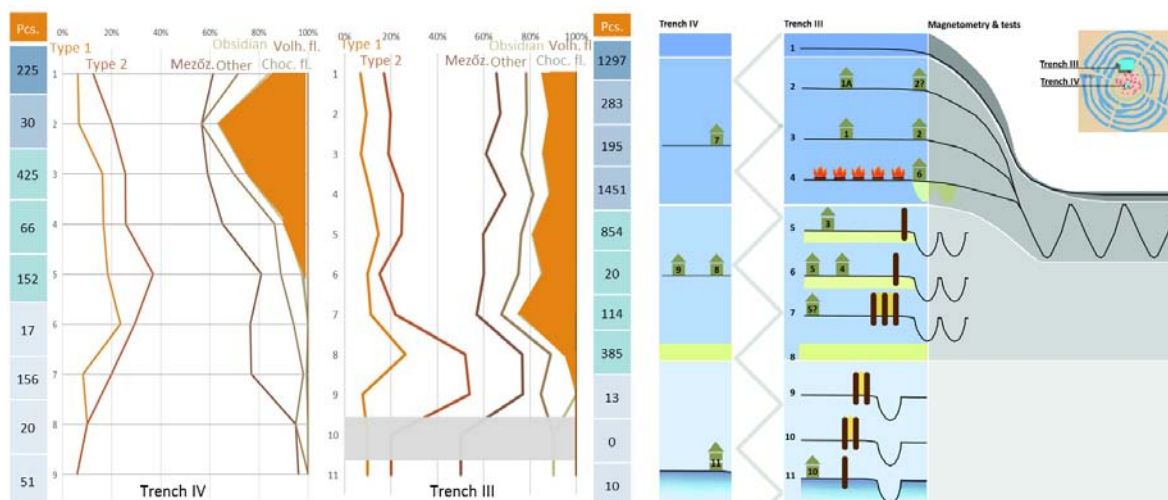


Fig. 15. Frequency of different raw materials through the layers of the tell and the situation of trenches III and IV (after Raczký, Sebők 2014, 60, fig. 3)

Обр. 15. Честота на различните суровини от слоевете на селищната могила и положението на Траншеи III и IV (по Raczký, Sebők 2014, 60, fig. 3)

a thick filling layer, chipped stone artefacts became more numerous, while at the same time the ratio of distant raw materials became more significant. In the third layer, which is the richest in finds (425 pieces), the frequency of extra-local raw materials reached 25 percent. Moreover, the numbers of chipped stone artefacts in different layers shows an alternating pattern, the layers abundant in finds being followed by layers that lack material. Comparing these results with those from trench III the same phenomena is evident. However, chipped stone artefacts found here are three times as numerous as in Trench IV, altogether 4632 pieces. The bottom levels seem to be less rich, but more and more chipped stone artefacts were found from level 8 (385 pieces), which is contemporaneous with the thick filling layer in level 5 of Trench III. Moreover, distant raw materials were more frequent above this level, sometimes reaching 20 percent. The layers with the greatest numbers of chipped stone pieces are level 4 (1451 pieces) and level 1 (1297 pieces). The general raw material composition is broadly the same in the two trenches, with Mezőzombor type silex being the most abundant, its frequency ranging between 30–50% from layer to layer.

In contrast to Polgár-Csőszhalom, detailed publications of other Late Neolithic tells and their chipped stone materials are not available from Hungary. However, the general picture of the raw material economy and circulation of the Great Hungarian Plain is already well known thanks to the works of Katalin T. Biró (Biró 1998) and Małgorzata Kaczanowska (Kaczanowska 1985). From their publications, it seems that every settlement and region had their preferences in raw materials and distribution routes, often favouring distant raw materials. The only general phenomenon that connects the whole region is the low frequency of Carpathian obsidians. Based on preliminary information from Hódmezővásárhely-Gorzsa Banat flint is the most frequent with a significant role for Transdanubian and Mecsek radiolarites (Starnini et al. 2007; 2015). At Öcsöd often the chipped stone finds are made of limno- and hydroquartzites, opalites originating from the North Hungarian Mountains (Kaczanowska et al. 2009; Kaczanowska, Kozłowski 2015). At Herpály, Volhynian flint and chocolate flint is the most abundant (Biró 1998).

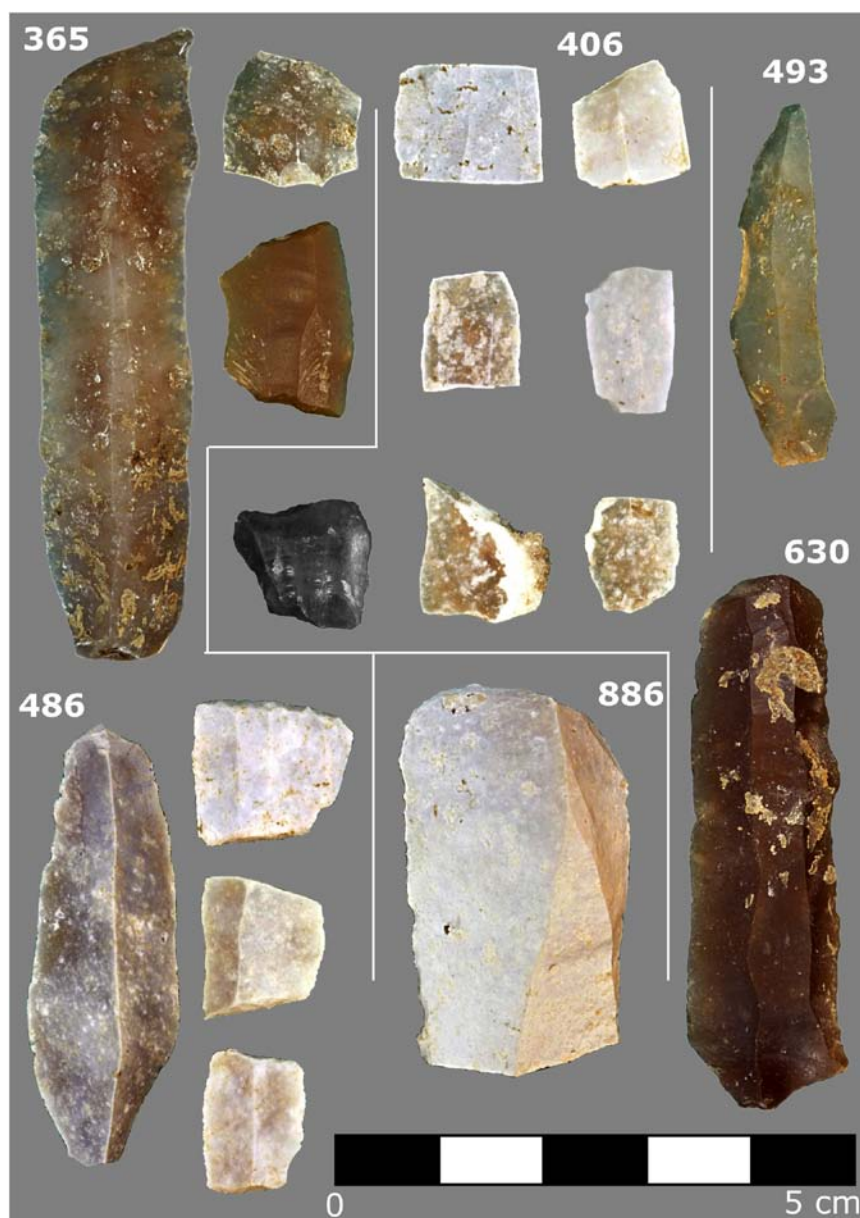


Fig. 16. Collection of chipped stones from six different graves – no. 365, 406, 486, 493, 630, 886 (photos by N. Faragó)

Обр. 16. Колекция от кремъчни изделия от шест различни гроба – № 365, 406, 486, 493, 630, 886 (снимки Н. Фараго)

Symbolic aspect

It is widely accepted that some kinds of lithic materials served as prestige objects in a particular assemblage, mainly those made of distant raw materials (Siklósi 2005, 31-33). Chipped stone artefacts may have a special meaning too, if they required a special technical know-how, for example regular blades made by pressure technique (Knutsson 2001). In this respect, they might represent the economic role, craftsmanship, wealth and power of the owner. A third option for a symbolic role is when a stone tool was deposited in a special context, e.g. as a funerary object. In this context, it should refer to the lifetime of its owner, when it was still in use. These three aspects meet each other in the succeeding period on the Great Hungarian Plain in graves of the early and middle Copper Age (Tiszapolgár

and Bodrogkeresztúr culture) (Csongrádi-Balogh 2014). However, chipped stone artefacts rarely occur in the graves of the Late Neolithic Tisza-Herpály-Csőszhalom chronological horizon (Anders, Nagy 2007). At Polgár-Csőszhalom, among the 123 graves, only fifteen contained chipped stone artefacts. Six were analyzed in more detail, where the chipped stones count as true grave goods. Four were males, one was a female and one was a child (fig. 16). Among the funerary objects whole blades, regular blade fragments, and trapezes were exclusive to male graves. The only mature female was associated with an endscraper made on a blade fragment (fig. 16 – str. 886), and the child had a small blade (fig. 16 – str. 493). The raw materials used for these pieces are not special – they reflect the general picture summarized above: only two pieces, a trapeze (fig. 16 – str. 365) and a complete blade (fig. 16 – str. 630) were made of chocolate flint from the Holy Cross Mountains, Poland. Moreover, trapezes are not very frequent among the material of the horizontal settlement, only three pieces among the 12,276 chipped stone artefacts came from other features (pits). The most numerous tool type, the endscraper, dominates the entire assemblage (>60%), but as we saw only one piece followed its owner to the other world. The other burial offerings in these two graves (limestone bead, head ornament, ochre, necklace, bracelet, etc.) are like the rest; there is nothing of special significance.

Apart from the graves, the analysis of chipped stone artefacts from ordinary settlement structures hardly has significance beyond the everyday life. As Duncan Garrow pointed out, archaeological research moved toward the broad application of ‘structured deposition’ at the expense of everyday practice (Garrow 2012). In his opinion, this term should be applied more explicitly from case to case; moreover, too much emphasis is placed on the meaningfulness of every material culture patterning. Only those pieces that are obviously connected with symbolic activity can reveal more information. Feature 539 is one example; this once served as a well, which later was filled in with numerous, carefully chosen and deposited vessels, and the whole assemblage then sealed by burned daub and soil from elsewhere (Sebők et al. 2013, 55). Altogether 11 chipped stone artefacts were unearthed from the filling around the ceramics (fig. 17). In terms of their raw material, they correspond to the types known from the settlement. There were three pieces that can be attributed to type 1 and one piece each of type 2 and type 3 limnic quartzites. Two more pieces are made from a grey limnic quartzite variant, and one piece is made of a fine raw material with white cortex, also possibly from the North Hungarian Mountains. The last piece is a low-quality radiolarite nodule with embedding limestone, with some test flaking (‘test piece’). This assemblage is suitable only for limited technological examination because of its small size. Apart from the large raw material nodule there is one core, three flakes and two blades. The four retouched pieces were made exclusively on blades. The core is exhausted; before the last removals, attempts to obtain useful pieces were made on several faces. The blades are ordinary, their platforms were carefully prepared while their knapping angle is around 80–90 degrees, which indicates indirect percussion or pressure technique. The retouched pieces fit well into the Late Neolithic toolkit: 2 endscrapers, 1 dorsal truncated blade and 1 double borer retouched on both proximal and distal ends (fig. 18).

The knapped stones from this feature have no obvious significance at first glance. But a closer look at their context led to an interesting observation. At the lowest level among these vessels the large, otherwise very poor quality, radiolarite nodule was found. At the same level, there was also an extensively worked type 3 limnic quartzite core. In the upper layers the debitage products comprise flakes and blade blanks. The retouched tools, as the end-products of the knapping activity, were unearthed at the top of this stratigraphic unit.



Fig. 17. Chipped stones connected to feature 272. 1-4 – retouched tools, 5 – core, 6 – raw material nodule, 7-11 – unretouched debitage products (flakes, blades) (photos by N. Faragó)

Обр. 17. Артефакти, свързани със структура 272. 1-4 – ретуширани изделия, 5 – ядро, 6 – суровина, 7-11 – неретуширан дебитаж (отломъци и пластини) (снимки Н. Фараго)

These pieces are not made of the same raw material or by the same debitage process, but they reflect a virtual chaîne opératoire in their thoughtful locus of deposition. The chaîne opératoire has not only a natural component; it is not just a response to environmental challenges and physical laws (Schlanger 1994). Technology has a strong human component that is culturally determined, just like other categories of social life. There are aspects beyond the economic and functional that control the whole tool production process, not just raw material and toolkit choice (Perlès 2009). The process of fabricating something from the raw material has its own structure with phases and subphases, and every piece has its own function. At certain stages an individual is free to make alterations, according to his own whim or cultural heritage, and some stages are more critical in this process (Lemonnier 1989). Moreover, the toolmaking mind, faced with the possibilities of the raw material and technical limits, is practical and creative, but at the same time it is a complex and reversible cognition; it is an intellectual, theoretical mind also (van der Leeuw 1994). Thus, we can see the symbiosis between them, when the starting point (the core), the middle stages (the flakes and blade blanks) toward the end point (the retouched tools) of an everyday activity becomes something more, becoming symbols of the duration of a ritual activity. The applied raw materials and the variability of the tool types can also bear meaning through their insignificance, because they represent the completeness of the knapping activity in the settlement. The real purpose of this ritual can be debated, but it is possible that, in its visualized story the notion of universe, creation and time played a significant

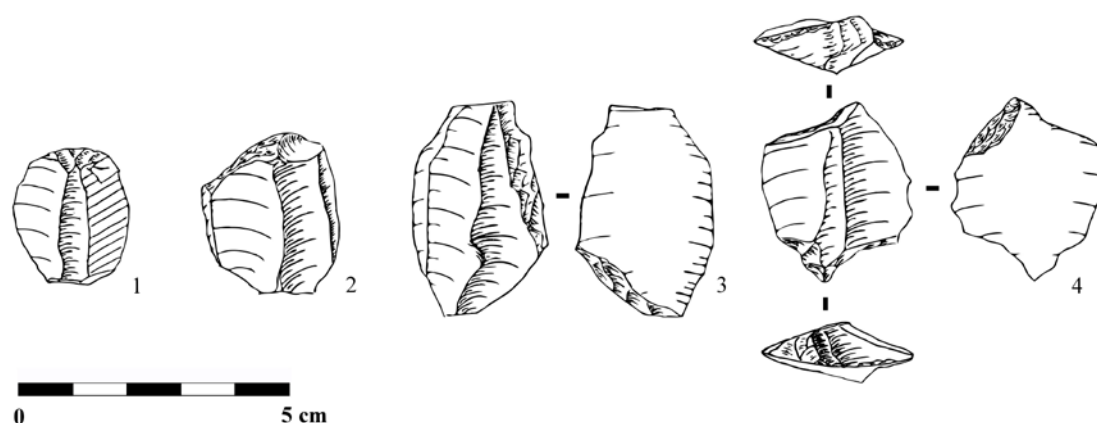


Fig. 18. Retouched tools from feature 272. 1-2 – endscrapers, 3 – truncated blade, 4 – atypical double borer (drawings by N. Faragó)

Обр. 18. Ретуширани сечива от структура 272. 1-2 – стъргалки, 3. – пластина с напречно затъпяване, 4 – атипичен двоен свредел (рисунки Н. Фараго)

role. If we considering the exact locus of all of these, a water well sealed by burned daub, we quickly arrive at a complex world image where water and fire were envisaged in the same time (Sebők et al. 2013, 58-59).

Taphonomic aspect

It is very rare when the effect of an excavation method on collection of material can be measured. One can never be sure that all the remains have been found, and nothing distorts the picture. In this respect, the material from stratigraphic unit 205 in pit 44 provided an important opportunity. During the excavation of this pit, 89 chipped stone pieces were collected from this stratigraphic unit. In order to look for further finds the soil was carefully dry sieved after the recovery of the pieces using standard rescue excavation methods. Unsurprisingly, the number of pieces unearthed by sieving was twenty times greater; a total of 2347 pieces were found. What is particularly instructive is how the ratio of the different raw materials changed (fig. 19). For example, there were no obsidian pieces prior to sieving, but more than three hundred were recovered with this more precise method. The different types of limnosolites are more evenly distributed, with types 1 and 3 occurring more frequently. Surprisingly, there was no significant change in the proportion of Cracow Jurassic flint, only one more piece was found due to the sieving. The ratio of the technological categories also differs; the number of cores sharply decreased, while the number of blades increased to become more or less equal with the flakes.

The frequency of the main technological categories also changed: the number of cores decreased, while the ratio of blades to flakes changed in favour of blades. More interestingly, the number of retouched pieces stayed around 10%. The average dimensions of the pieces decreased, by at least 10 mm. The blades became more homogenous; however, the main tendencies could be seen without sieving. The conclusion is that broader blades were produced from larger limnic quartzite type 2 cores with many regularizing removals (more flakes), while the type 1 and 3 blades were narrower, made from smaller cores with the aid of fewer regularizing flake removals. Nevertheless, the length distribution of broken pieces remained roughly the same, no matter which raw material they were made from. Obsidian is special, because even the raw material pebbles are so small, and it is harder to find any

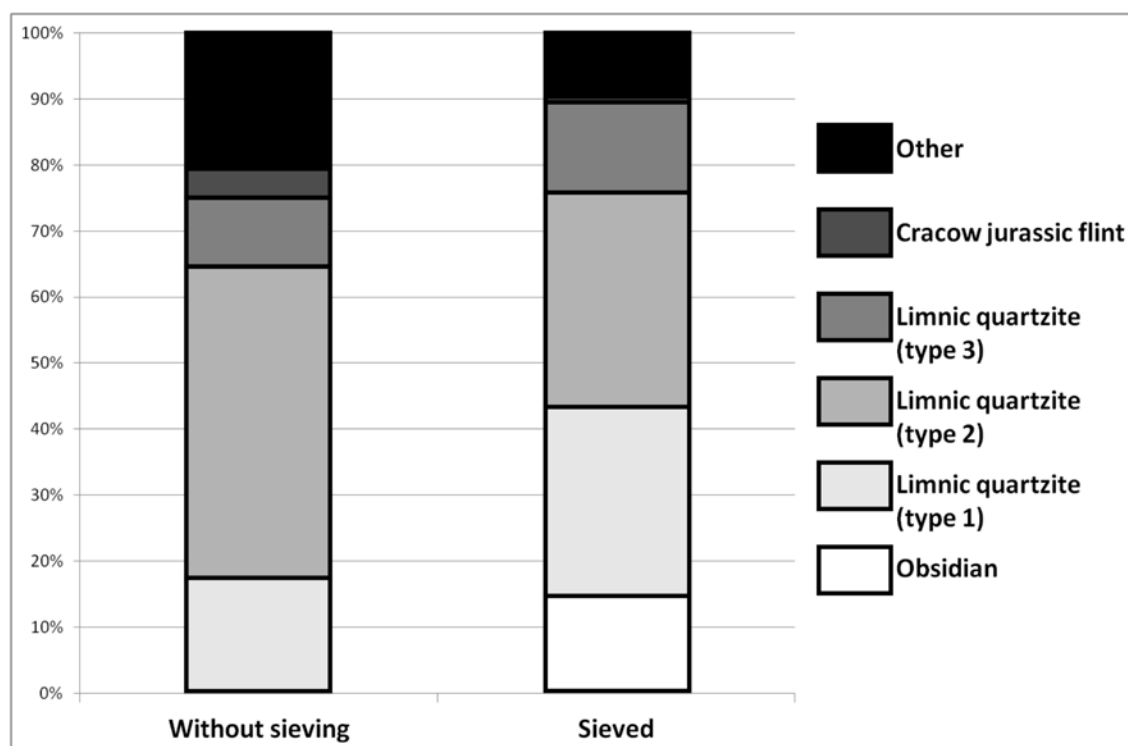


Fig. 19. Ratio of different raw materials from stratigraphic unit 205 before and after sieving

Обр. 19. Съотношение на различните суровини от стратиграфска единица 205 преди и след пресяване

knapped pieces without use of sieving. In short, the main tendencies are evident even in the hand-collected series; however, finer resolution is achieved when more precise recovery techniques (especially sieving) are used.

Some data on this topic have already been published, including the question of the different excavation techniques and their effectiveness (Bertrand et al. 2012, 3154). The ratio of the different size classes reflected the diameter of the mesh used. A fine mesh with a diameter of 2–4 mm recovered more than 70% of pieces. The difference between the bigger size classes is less striking, numbers recovered with a mesh of 4–5 mm are similar (10–20%) to those recovered using a 5–10 mm mesh. The bigger pieces become less and less abundant with decreasing mesh size; so, the larger the diameter of the mesh, the more even the distribution of the different size classes. In archaeozoological research, taphonomic loss due to inappropriate recovery methods is rather more critical (Reitz, Wing 2008, 147-149). The difference between the two archaeological sources (faunal remains and lithics) is that evaluation of lithics can often be reliable even when small pieces are missing.

Conclusions

The analysis of the lithic raw material assemblage from Polgár-Csőszhalom was conducted from four different aspects, with the aim of looking more closely at the differences between the two parts of the settlement. Knapping activity relied heavily on raw materials from the Tokaj Mountains, which is 50–70 km distant from the site. Evaluation of the horizontal settlement showed that the chipped stone artefacts are distributed evenly through

space and time. The question of the possible reconstruction of households and activity zones has been discussed in an earlier paper (Faragó 2016), so it is not necessary to go into more details here.

Based on our results, it seems more likely that knapping activity was undertaken at the level of individual households. There is no sign of any special workshop of artisans or any raw material distribution centre. However, the great mass of chipped stone finds comes from only three subvariants, the balanced ratio in the raw material composition and the lack of unworked chunks in the assemblage leads to the conclusion that raw material acquisition took place communally. On the other hand, the tell part of the site showed an uneven distribution both spatially and temporally. Analysis of one particular building and its debris showed that the ground floor had been emptied before the building was destroyed by fire; moreover, the chipped stone finds from the upper levels of the building did not show any extraordinary heat shock. This suggests either that knapping activity normally took place outside the buildings, or that thorough cleaning removed the remains from the house before its destruction. The temporal distribution of the tell showed more irregularities; it seems that at the beginning of the settlement the connections with distant regions were not very strong or important. As time passed by, the frequency of Volhynian flint, chocolate flint and Cracow Jurassic flint increased. In contrast, there is no detectable change in the composition of the assemblage from the outer part of the settlement. Evaluation of finds connected to ritual activities shows that the distant raw materials were not connected to special activities in any extraordinary way. If we consider funerary activity as a rite on the personal level, or the filling of a well as a rite on the household level, no role for special raw materials can be detected. However, the tell, as the monument of the entire settlement, shows the signs of piling up of precious, rare raw materials. In this sense, these pieces could symbolize wealth and power, but only at the level of the whole community.

Last, but not least, a fortuitous opportunity allowed us to check our excavation methods on a specific feature in the horizontal settlement. From this, the main conclusion about the raw material assemblage is that the frequency of distant raw materials remained roughly the same despite the more precise recovery methods. However, the ratio of obsidian increased, which suggests that the analysis of this raw material should be done with greater care.

As for archaeological parallels for our results, there is already some relevant research from Hungary (Starnini et al. 2007; Kozłowski et al. 2009), but still not much is known about the inner structure of prehistoric life of this period. Similar complex methods of analysis are being applied outside Hungary, for example at Pietrele in Romania (Reingruber 2011; 2012; Hansen, Toderăş 2012) and Okolište in Bosnia (Müller et al. 2011). The common denominator in these investigations is that they are venturing into new territory in respect of lithic analysis, which promises to produce ground-breaking results.

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Селективен подход към суровините в селището Полгар-Чосхалом, Североизточна Унгария

Норберт Фараго

(резюме)

Полгар-Чосхалом е един от ключовите къснонеолитни обекти в Унгария. Селището се намира в район с интензивни и многостранни културни влияния (fig. 1). Тук археологическите материали на културата Ленгел и комплекса Тиса-Херпай не просто се смесват, но и създават едно ново културно явление. Наличието на едно и също място на селищна могила и система от концентрични ровове показва сливането на различни традиции от Балканите и Централна Европа. С разкопана площ от 3,5 ха, този обект е един от най-големите проучени хоризонтални/площни селища от неолитния период в Унгария. Това, заедно с огромното количество археологически материал, дава възможност да се проведе комплексен анализ на системата от домакинската дейности (household).

Проектът, чиито резултати са дискутирани в настоящата статия, започна през 2012 г. с цел обработка на материала от Полгар-Чесалом и реконструкция на общността, обитаваща обекта, с помощта на пространствен анализ на селището. За изпълнението на тези задачи бяха избрани многостепенна статистика и географска информационна система – ГИС (Faragó 2015). Макар работата да не е напълно завършена, анализът на суровинната база на кремъчната индустрия от Полгар-Чесалом предостави интересни резултати.

В рамките на откритото селище са намерени 12 276 кремъчни артефакта, докато откритите в селищната могила са 6650. Повечето от артефактите са изработени от лимно-силицитни видове и обсидиан, произхождащи от Токайските възвишения, които отстоят на 50–70 км от обекта (fig. 2, Table 1). Останалата част от ансамбъла показва контакти с територии на 250–400 км от Североизточна Унгария (Трансданубия, Карпатите, платото Краков-Ченстухова, планината на Светия кръст, Волиния и Подолието).

Четири различни аспекта са в основата на подробния анализ, чиято цел е да обясни съществената разлика в количественото съотношение на суровините от отдалечени източници между двете обитаеми части на селището. Производствените дейности и на двете места се основават предимно на суровини от Токайските възвишения. В откритото селище кремъчните изделия се разпределят равномерно в пространствено-времеви аспект, което прави възможна една по-правдоподобна реконструкция на производствения процес на домакинствата. Разпространението на сечива на селищната могила е неравномерно както в пространството, така и във времето. Анализът на една от изследваните сгради с прилежащите ѝ материали показва липса на кремъци на приземния етаж, а артефактите, открити в горните нива, не показват следи от топлинно въздействие. Следователно производството е ставало или извън сградата, или тя е била старателно почистена преди опожаряването ѝ. В началото на формирането на селищната могила, връзките ѝ с отдалечени райони не са били толкова силни и значими. С течение на времето се увеличава вносът на Волински и 'шоколадов' кремък, и на кремък от юрски депозити край Краков. Анализът на находките, свързани с ритуални дейности (погребения и запълване на кладенци), не показва обвързаност с употреба на екзотични/специфични суровини. Селищната могила, обаче, в ролята си на представител на цялото общество, показва признаци на натрупване на престижни и редки суровини. Тези изделия биха могли да символизират богатство и власт в контекста на цялата общност. Имахме възможността да приложим модерни методи на разкопаване на избрани структури в площното селище и установихме, че честотата на изделия от отдалечени източници там е същата, въпреки по-прецизните методи на експлорация. Прецизното пресяване доведе до нарастване процента на обсидиан, което предполага бъдещ, по-задълбочен анализ на тази суровина.