



## ARCHAEOLOGICAL AND ARCHAEOBOTANICAL DATA FROM MALICE AND LENGYEL CULTURE SITE NO. 8 IN KRAKÓW-GÓRKA NARODOWA (SOUTHERN POLAND)

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**Abstract.** Preliminary data from newly excavated archaeological site no. 8 in Kraków-Górka Narodowa (southern Poland) show that two main phases of Early Neolithic occupation can be distinguished based on pottery finds, one associated with the Malice culture and the other with the Pleszów-Modlnica group of the Lengyel culture. These data are presented along with lithic materials and discussed in the context of the results of the archaeobotanical analysis. Charred plant macro-remains obtained from 18 samples coming from five archaeological features showed that the only cultivated plants documented were two species of cereals: *Triticum dicoccum* and *Triticum monococcum*. Wild herbaceous plants were represented by several taxa such as *Chenopodium* type *album*, *Bromus* sp., *Echinochloa crus-galli*, *Sambucus* sp. and *Fallopia convolvulus*, among others. In addition, a single nutshell of hazel *Corylus avellana* appeared. Among wood charcoal remains, only two taxa were found: *Quercus* sp. and *Fraxinus excelsior*.

**Key words:** macroscopic plant remains, pottery, Malice culture, Lengyel culture, Neolithic

### INTRODUCTION

Site no. 8 in Kraków-Górka Narodowa is located within the borders of the city of Kraków (AZP 101-56/111). It lies within the Małopolska Upland, more precisely in the area of the Witkowiec Watershed<sup>1</sup> (Fig. 1). The area rises approximately 240 m above

<sup>1</sup> Witkowiec Watershed is built of Upper Jurassic limestones, marls, chalk conglomerates and Miocene clay covered with a layer of loess between 1–15 m thick (DEGÓRSKA 2010: 24).



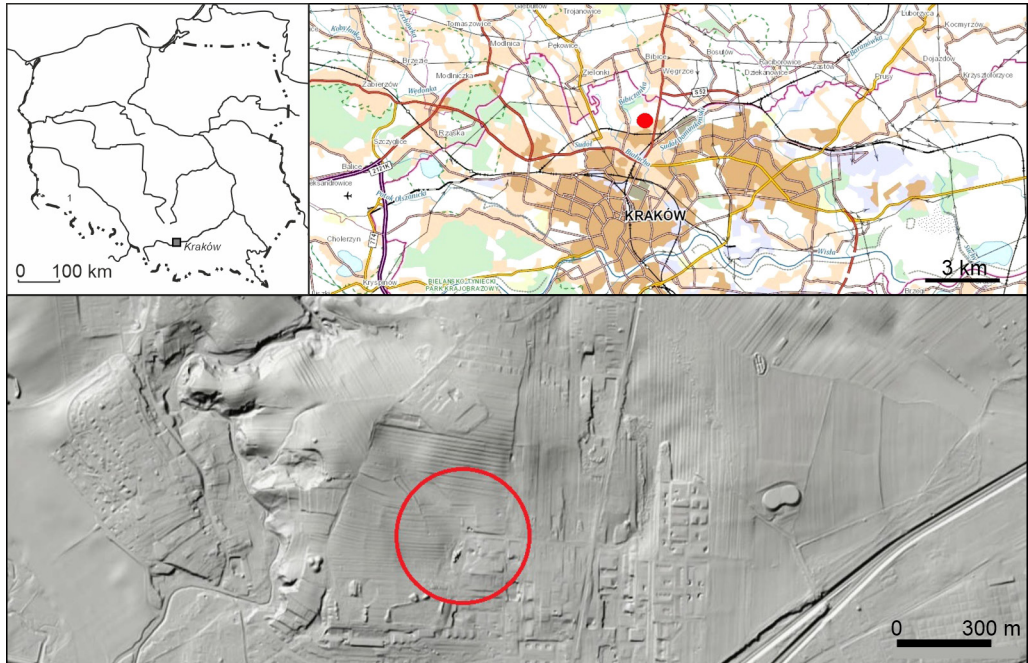


Fig. 1. Location of the site (after WWW.mapy.geoportal.gov.pl)

sea level on average. The settlement occupies the south-eastern slope of a limestone hill, between two left-bank tributaries of the Prądnik (Białucha) River: the Bibiczanka<sup>2</sup> and the Sudół Dominikański. The area in question is covered with brown and podzolic soils (RYDLEWSKI, VALDE-NOWAK 1980: 103).

Minor excavations were carried out at site no. 8 and the adjacent site no. 9 at Kraków-Górka Narodowa by A. Tyniec-Kępińska and A. Dagnan-Ginter between 1998 and 2000 (DAGNAN-GINTER, TYNIEC-KĘPIŃSKA 1998; TYNIEC-KĘPIŃSKA 2000). Moreover, there is a site complex in Witkowice (sites 1 and 2) in the vicinity of the settlement in Kraków-Górka Narodowa, with remains of Early Neolithic occupation (RYDLEWSKI, VALDE-NOWAK 1980). It is likely that all these sites in fact belong to one large multicultural settlement complex.

During the rescue excavations conducted at site no. 8<sup>3</sup> in 2019 and 2020 by M. Ostrowski, an area of over 1.2 ha was explored, which resulted in the discovery of 145 features. The collection of pottery totalled over 3,700 fragments. Besides pottery, over 1,500 flint and stone artefacts were found.

During the excavation, archaeobotanical samples were collected from a group of selected archaeological features (E44, E49, E54, E70, H5). Features H5 and E70 were

<sup>2</sup> Sometimes referred to as *Garliczka* (RYDLEWSKI, VALDE-NOWAK 1980; DAGNAN-GINTER, TYNIEC-KĘPIŃSKA 1998), although according to Geoportal, the name “*Garliczka*” is incorrect.

<sup>3</sup> Precisely on the south side of Banacha Street, Kraków.

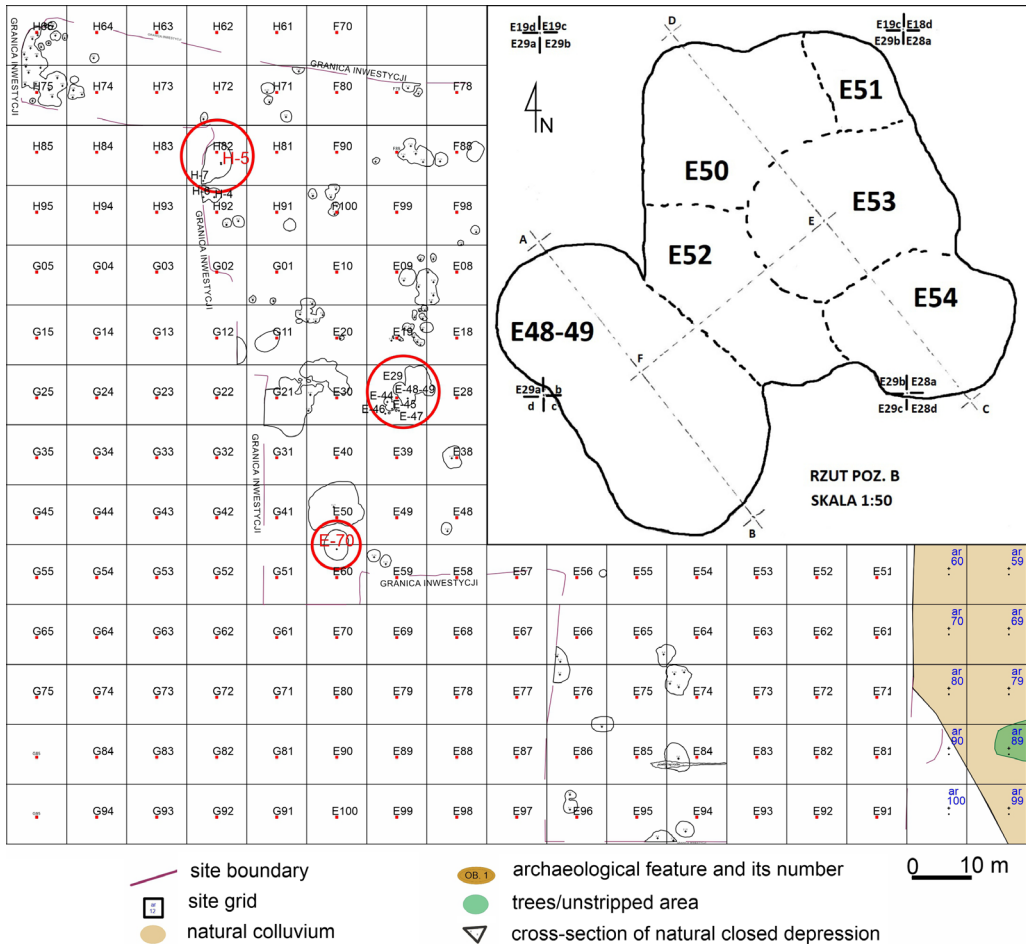


Fig. 2. Plan of the site with the locations of the analysed features marked. Drawn by M. Ostrowski

sampled due to the richness of their archaeological finds, as the former provided a huge amount of pottery, while the latter yielded a great number of lithic materials. Features E49 and E54 were sampled because they represent a complex of storage pits. This paper only presents the analysis of the artefacts from those five pits.

Storage pits, often occurring in clusters of several features, prevail among the archaeological features uncovered at site no. 8 in Kraków-Górka Narodowa. They were unevenly distributed, which suggests they were connected with individual households (Fig. 2). Storage pits were trough-shaped, less often trapezoidal in cross-section, and differed little from each other in terms of their fills and stratigraphy. The fills consisted of layers of black humus, with layers of loess visible in the side parts of the profile. Features E49 and E54 were located one next to another, in one small complex of storage pits (Fig. 2). Feature E49 was in stratigraphic relation

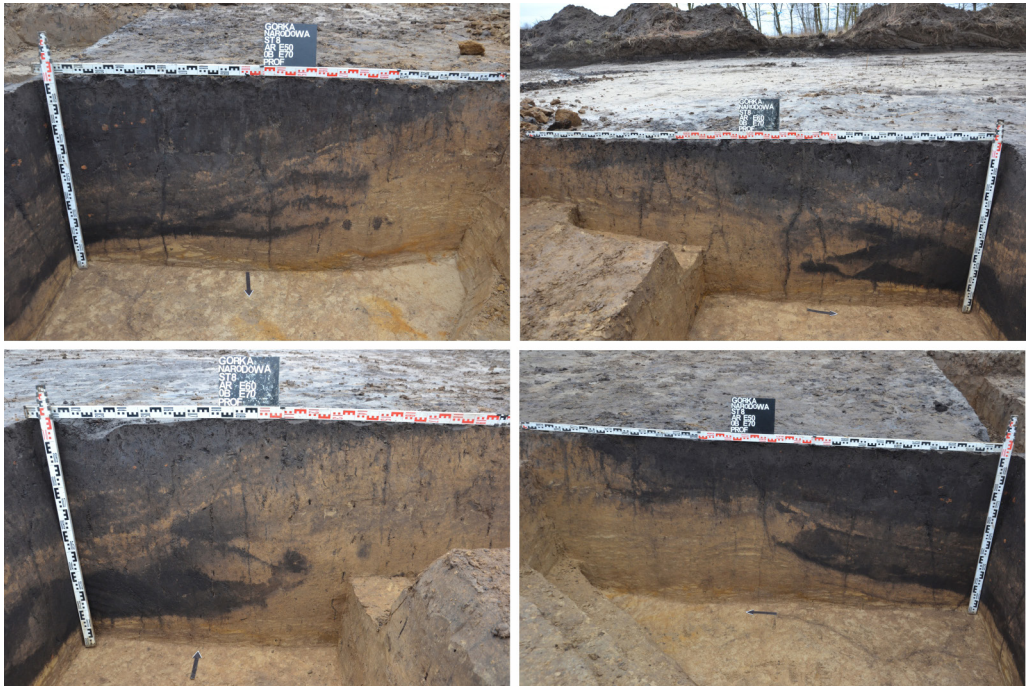


Fig. 3. Cross-section of feature E70. Photo by M. Ostrowski

with feature E48, although with no clear border between them visible, the nature of this relation remains uncertain. Features E44 and E45 were in similar juxtaposition. Features E70 (Fig. 3) and H5 can be described as large clay pits<sup>4</sup>.

## MATERIALS AND METHODS

Feature E44 bore 27 fragments of pottery and 13 flint artefacts. In feature E49, there were 13 fragments of pottery and 10 flint artefacts found, whereas in feature E54 it was 44 fragments of pottery, 20 flint artefacts, and one grinding stone. In feature E70, 22 fragments of pottery and 177 flint artefacts occurred. The richest feature was H5, from which over 980 fragments of pottery, 167 flint artefacts, and some stone axes and grinding stones were recovered. After cleaning and reconstruction of pottery forms, the obtained materials were subjected to stylistic and technological analysis.

From the five archaeological features, 18 samples of a total volume of about 120 litres were taken (with sample volume varying between 3.5 and 9 litres; Table 1). Samples were floated through sieves with mesh sizes of 1 mm and 0.5 mm in the laboratory of the W. Szafer Institute of Botany of the Polish Academy of Sciences (IB

<sup>4</sup> Dimensions of pits: E44 – 120×136 cm, 114 cm in depth; E49 – 225×420 cm, 84 cm in depth; E54 – 210×250 cm, 134 cm in depth; E70 – 400×504 cm; 102 cm in depth, H5 – 466×600 cm, 142 cm in depth.

PAS). After drying, the material suitable for taxonomic identification was examined under a stereoscopic microscope and divided into seeds/fruits and charcoals. Charred plant macro-remains were recorded in 16 samples, while two samples, from feature E44, were empty.

Plant remains were classified based on morphological features discernible under a stereoscopic microscope at 10× and 16× magnification. The seeds were identified using keys, atlases, other publications (e.g. KULPA 1974; RUTKOWSKI 1998; LITYŃSKA-ZAJĄC, WASYLIKOWA 2005), a reference collection of contemporary diaspores, and the fossil flora collection of the National Biodiversity Collection of Recent and Fossil Organisms at the W. Szafer Institute of Botany, Polish Academy of Sciences (herbarium

Table 1. Results of archaeobotanical analysis from Kraków-Górka Narodowa site no. 8. Explanations: c – caryopsis, gb – glume base, s – seed, f – fruit, wch – wood charcoal

Feature number	Kind of remains	E44	E70	E70	E70	E70	E49	E49	E49	H5	H5	H5	H5	E54	E54	E54	E54
Depth		F	B-C	C-D	D-E	F	B-C	C-D	D-E	D-E	E-F	F-G	G-H	C-D	B-C	D-E	F-G
Volume (l)		9	7	7	9	9	5	9	7	4	9	4	9	3.5	8	8	5
Culture		Malice culture					Pleszów-Modlnica Group							Lengyel culture			
Plant name																	
Herbaceous plants																	
Cultivated																	
<i>Triticum dicoccum</i>	gb		1				2										1
<i>Triticum dicoccum</i>	c						1										
<i>Triticum monococcum</i>	c												1				
<i>Triticum</i> sp.	c																
<i>Triticum</i> sp.	gb												1		1		
Cerealia	c						2	2	2		4	1	12		2		
Ruderals / Segetals																	
<i>Bromus</i> sp.	c												1				1
<i>Chenopodium t. album</i>	s		2			1	1	2									
<i>Echinochloa crus-galli</i>	s											1					
<i>Fallopia convolvulus</i>												1					
<i>Galium aparine</i>	s				1												
cf. <i>Galium</i> sp.	s				1												
<i>Sambucus</i> sp.	f												1				
Meadow/pastures																	
<i>Silene</i> cf. <i>vulgaris</i>	s							1									
Underdetermined																	
Unidentified stem fragment							1			2							
Unidentified nut shell											1						
Unidentified			7	1		1	1				1	1		1			2
Total			10	1	2	2	8	5	2	2	6	4	15	2	3		4
Woody plants																	
<i>Corylus avellana</i>	nut										1						
<i>Fraxinus excelsior</i>	wch		9	4													
<i>Quercus</i> sp.	wch	1	11	4			11		1	5	1		2	8		4	7
Deciduous	wch	1	1		1		1					1					
Total of charcoal fragments		2	21	8	1		12		1	5	1	1	2	8		4	7

KRAM) in Kraków. Only charred plant remains were taken into account, as they can usually be considered contemporaneous with their archaeological contexts, while un-charred botanical material may represent modern contamination, for example derived from the seed bank (LITYŃSKA-ZAJĄC, WASYLIKOWA 2005). All determined plants were assigned to three ecological groups: 1) cultivated crops, 2) weeds/ruderal plants, and 3) meadow/pasture plants (MUELLER-BIENIEK, WOCH 2012). Plant remains were divided by ecological groups following monographs and articles on archaeobotanical finds (LITYŃSKA-ZAJĄC, WASYLIKOWA 2005; MUELLER-BIENIEK, WOCH 2012).

For anthracological analysis, a reflected light microscope Zeiss Axio.Lab.A1 with magnifications of up to 500 was used to observe the wood anatomy in three anatomical sections of the wood in freshly broken charcoal fragments. Taxonomical identifications were made by comparing the specimens with the modern wood collections of the IBPAS and wood anatomy atlases (SCHWEINGRUBER 1990). The charcoal fragments are usually identified to the genus level, but species names of trees and shrubs are given for the taxa represented in present-day regional flora by only one native species (LITYŃSKA-ZAJĄC, WASYLIKOWA 2005), such as *Fraxinus excelsior*.

## RESULTS AND DISCUSSION

Two of the analysed archaeological features can be linked with the Malice culture (E44, E70) and three with the Pleszów-Modlnica group of the Lengyel culture (E49, H5, E54). Feature E54 contained some Malice culture artefacts as a secondary deposit.

### *Pottery*

#### Pottery of the Malice culture

The vessels of the Malice culture were made of clay with an admixture of chamotte, sand and, less frequently, crushed stone. The only vessels with no admixture are some of the pear-shaped beakers. Their walls are relatively soft and the surfaces are often abraded (originally covered with angobe).

The material from features E44 and E70 included almost all of the characteristic forms of Malice culture pottery: biconical vessels, pots, bowls, pedestalled bowls, pear-shaped beakers (Fig. 4: 1, 2), and troughs (Fig. 4: 3).

Pear-shaped beakers are small, rather stocky vessels, often of a distinct biconical shape with a low shoulder, or with a spherical body. They have no necks. The pear-shaped beakers are decorated with a stroked motif made with a two-, three-, or four-pronged tool. Due to the rather poor preservation, it is usually impossible to fully recreate the ornamental patterns, and the remains of the decoration are sometimes visible only when looked at from a specific angle. The bodies are usually decorated with diagonal rows of strokes, sometimes forming the letter V, while circumferential motifs composed of several rows of parallel incisions were executed under the rims. Some vessels have more elaborate ornamentation, with the stroked decoration on the

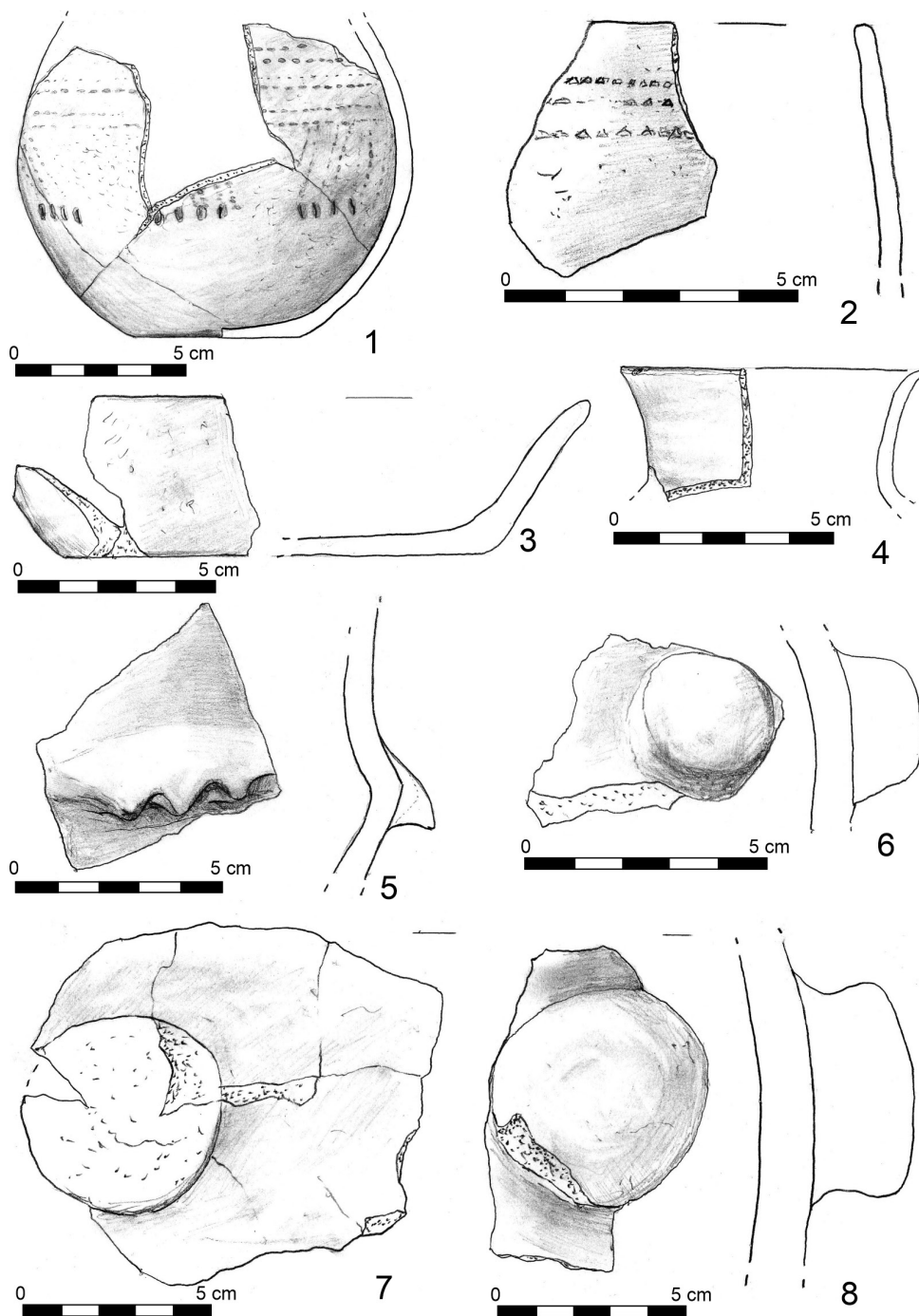


Fig. 4. 1–3. Pottery of the Malice culture (1 – feature E49, 2 – feature H5, 3 – feature E70); 4–8. Pottery of the Pleszów-Modlnica group of the Lengyel culture, feature H5. Drawn by Ł. Szarek

shoulder accompanied by a row of fingernail impressions (Fig. 4: 1). A few fragments of this kind of vessel were also found in feature H5 (Fig. 4: 2).

All of the troughs have oval bases, but they differ in ornamentation. One vessel, from feature E70, is undecorated (Fig. 4: 3). Among the decorated specimens, the most frequent motif is fingernail impressions on the rim. The height of the vessels is in the range of 3–9 cm.

Biconical vessels are the most common form. They have a distinct shoulder, usually decorated with fingernail impressions, sometimes supplemented with small knobs: single, double or, less often, triple.

Pots are vessels with distinct necks and bulbous bellies. They often feature extensive decorations under the rim. The pots preserved in the rim part are also decorated with multiplied, circumferential rows of fingernail impressions.

All the vessel forms discussed above have analogies at site 5 in Modlnica (GRABOWSKA, ZASTAWNY 2011: fig. 15); at Kraków-Nowa Huta Mogiła, sites 48 and 53; and at Kraków Nowa Huta-Wyciąże, site 5 (KACZANOWSKA 1996).

#### The Pleszów-Modlnica group of the Lengyel culture

The pottery of the Lengyel culture is characterized by a greater share of chamotte as an admixture.

The following vessel forms are represented: amphorae, bowls, pedestalled bowls, and pots<sup>5</sup>; “sandy” pottery was also found (Figs 4–6). Thin-walled pottery is only represented by small amphoras, while all other forms are medium- and thick-walled (including the bigger amphoras).

Ornamentation is limited to various types of knobs (oval or round) (Fig. 4: 5–8, Fig. 5: 1, 3, 4, Fig. 6: 5, 6), with the largest of them, round and flattened, reaching 5 cm in diameter (Fig. 4: 7, 8). One knob stands out: it is oblong, with sharp “teeth” (Fig. 4: 5).

In features E49 and H5 more than 20 fragments of thin-walled vessels (3–5 mm thickness) were found, including a characteristic top part of a small amphora (Fig. 4: 4). Compared to the total number of sherds derived from these features, the collection of thin-walled pottery is small. As shown by the results of research on other sites, the share of thin-walled ceramics is relatively low in the Pleszów phase and even lower in the Modlnica phase (KACZANOWSKA 2006; NOWAK et al. 2020).

Few of the amphorae (especially the thick-walled ones) are preserved in larger fragments. More frequently, the remains of this type of vessel are horn-shaped handles (Fig. 5: 1, 2). One handle is accompanied by tiny, rounded knobs (Fig. 5: 1). This kind of ornamentation is characteristic of the Malice culture, but it appears in the early Lengyel culture as well. In some cases, the edges of handles have been smoothed, most likely as a result of them being used as pottery polishing tools or loom weights. Identically prepared handles were found in sites like Kraków Nowa Huta-Pleszów (KACZANOWSKA 2006: 43) or Radziszów (NOWAK et al. 2020).

<sup>5</sup> At this archaeological site four troughs also appeared (including one with a square bottom), but all of them come from features that provided no palaeobotanical data and are not analysed in detail here.



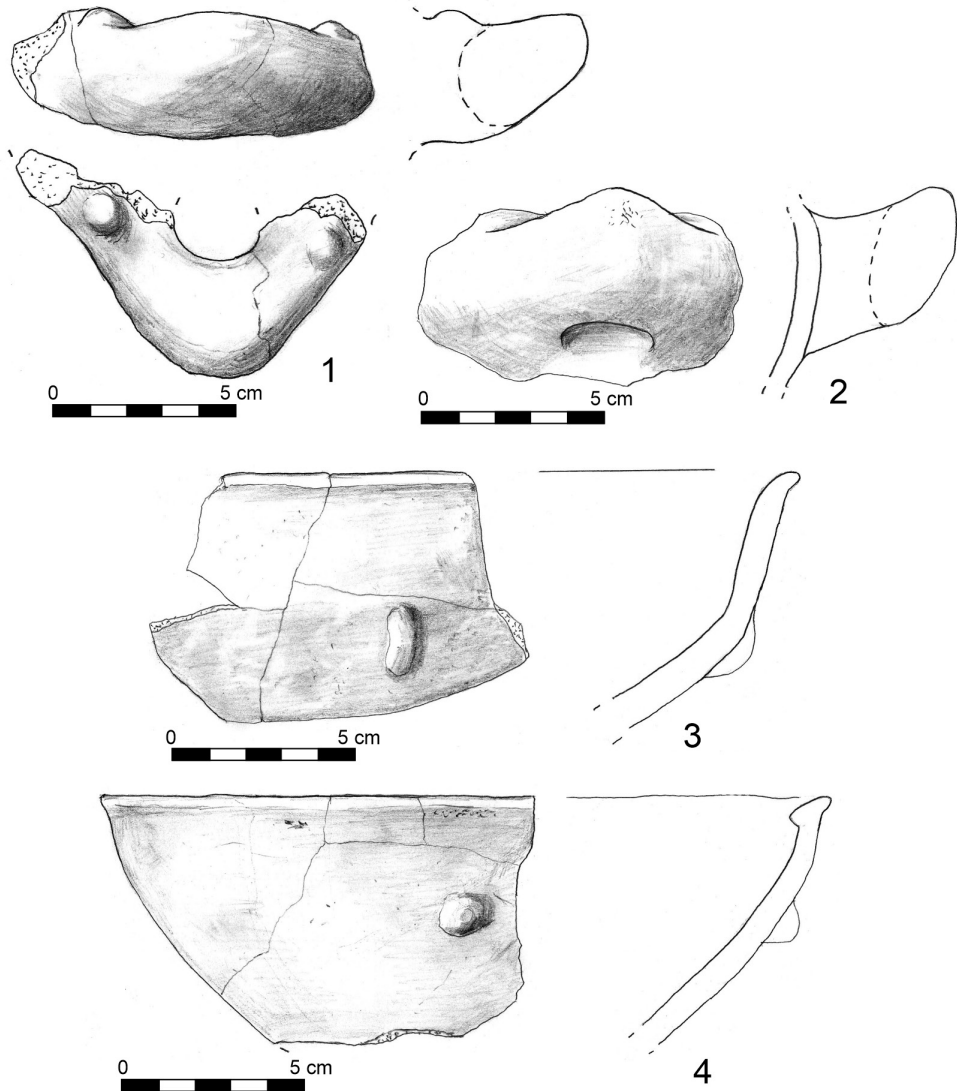


Fig. 5. Pottery of the Pleszów-Modlnica group of the Lengyel culture, feature H5. Drawn by Ł. Szarek

Among the bowls, profiled forms dominate (Fig. 5: 3), while a few can be described as hemispherical (Fig. 5: 4). Some are provided with small handles. Small bosses were placed on the shoulder. Some of the vessels are preserved only in the part with the transition from the bowl to the pedestal, and sometimes only the pedestal survives (Fig. 6: 1). The pedestals differ in height: some are slender and quite tall, while others are low and more massive. One bowl has a low, ring-shaped pedestal (Fig. 6: 2).

With short, flaring necks and globular bellies, pots are the most common form (Fig. 6: 4). They have small, vertical knobs or relatively massive vertical lugs placed below the rims and round knobs on the bellies.

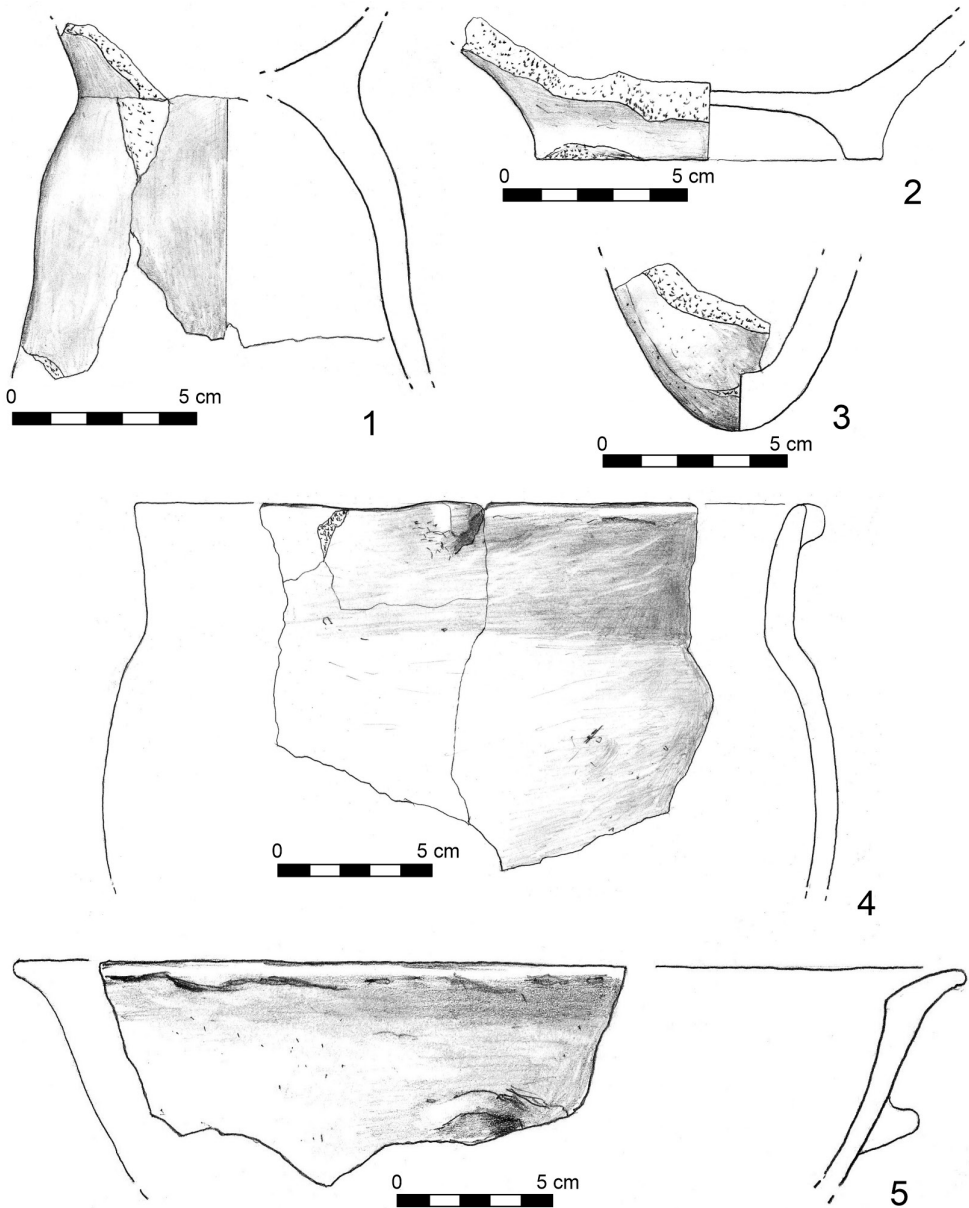


Fig. 6. Pottery of the Pleszów-Modlnica group of the Lengyel culture, feature H5. Drawn by Ł. Szarek

As in the case of the Malice culture, analogies for all the types of vessels are known from sites in Kraków Nowa Huta (KULCZYCKA-LECIEJEWICZOWA 1969).

What is quite surprising in the Lengyel culture assemblage from site 8 is the presence of the so-called “salt/sandy pottery” used in the salt-making process. In total, about 170 sherds were found (fragments of rims, bodies, and bases), almost all in one feature (feature H5) (Fig. 6: 3, 5).

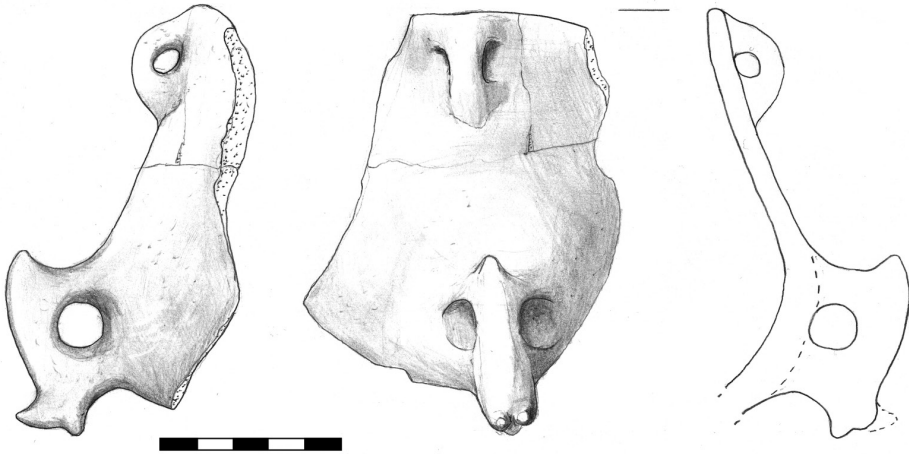


Fig. 7. Vessel with a zoomorphic decoration, Pleszów-Modlnica group of the Lengyel culture.  
Drawn by Ł. Szarek

In some studies, this kind of pottery is called “sandy” pottery (KACZANOWSKA 2006: 45). The rims are strongly everted, and sometimes slightly thickened, with a rim diameter between 40–50 cm. Below the rim are knobs – usually conical and upturned (Fig. 6: 5). The bases are pointed (Fig. 6: 3). Salt-making ceramics are characterized by a high hardness. They are made of clay with a dense admixture of fine sand. The surfaces of the vessels are abraded and sometimes secondarily burnt, with the original layer of clay (usually without admixture) preserved only in places. The pottery in question was fired to orange, red or brown colour. Wall sections vary from single-colour to tri-colour. The wall thickness is in the range of 8–12 mm, so these vessels can be classified as thick-walled ceramics. Similar vessels were found in Zakrzowiec (JAROSZ et al. 2012: 308–309), Barycz (SZYBOWICZ 1981: fig. 4.2–23), Wieliczka (FRAŚ, PAWLIKOWSKI 2007: fig. 2c, e), and Kraków Nowa Huta-Pleszów (KULCZYCKA-LECIEJEWICZOWA 1969: Pl. XIX.1). In site 8 it is quite an interesting find as there are no salt springs in the area, and such springs do not occur in Kraków-Nowa Huta area either. As shown by mineralogical research, the vessels found in the settlement in Kraków-Nowa Huta were made on site and then used to transport salt/brine from areas where salt springs occur (KACZANOWSKA 2006: 45).

Apart from typical vessel forms, it is worth noting a fragment of a vessel with a zoomorphic decoration (Fig. 7). An almost identical fragment was found at site 6 in Zakrzowiec (JAROSZ et al. 2012: fig. 11.3). Other vessels with zoomorphic motifs are known from the sites in the settlement complex in Kraków-Nowa Huta (KACZANOWSKA, KOZŁOWSKI 2002).

The materials represent both the Pleszów (older) and Modlnica (younger) phases of the Lengyel culture, but they do not allow for delineating clear boundaries between them. Feature H5 is a good example here, as it provided vessels distinctive for the Pleszów (small amphoras, lugs with bosses) and Modlnica phases (massive round knobs) along with some fragments of vessels typical of the Malice culture.

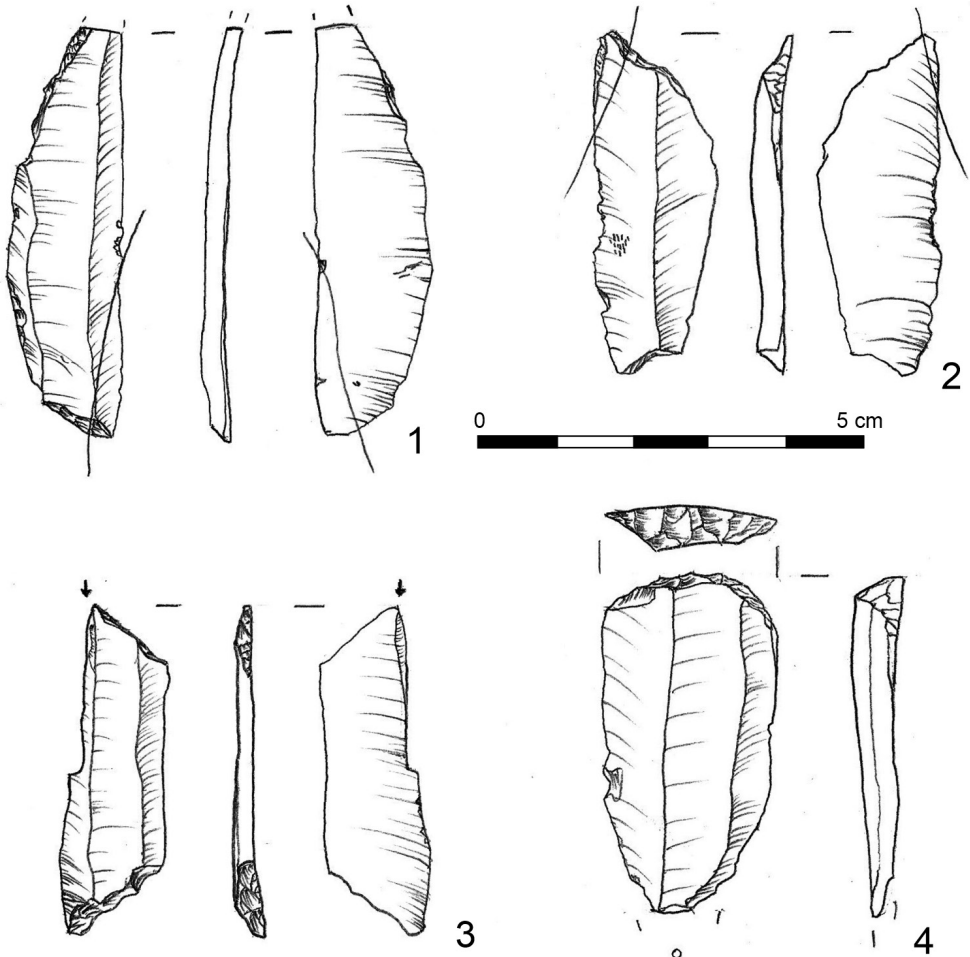


Fig. 8. Flint artefacts (1, 2 – feature H5; 3, 4 – feature E44). Drawn by Ł. Szarek

### *Lithic assemblage*

#### Flint artefacts

The vast majority of the artefacts from features E44, E49, E54, E70, and H5 were made of Jurassic flint with dull, brown, light brown or grey-brownish siliceous mass and white cortex. Over half of them have cortex.

This assemblage (both Malice and Lengyel) contains cores (initial cores, cores in advanced and residual phases of exploration) and other materials of a workshop nature: hammerstones, blades, flakes, chips and tools. Feature E70 (linked to the Malice culture) contained a kind of “hoard” of over 130 flakes, blades, chips, chunks, waste products and cores,<sup>6</sup> indicating it may have been a flint workshop.

<sup>6</sup> The mentioned artefacts have been excavated at one level of exploration, in one part of the pit.



Fig. 9. Stone axe, feature H5. Photo by P. Kowalczyk-Matys

The inventories of both the Malice and Lengyel cultures represent the standard Neolithic tool-kit, where end scrapers (Fig. 8: 4) generally predominate (KACZANOWSKA 2006; WILCZYŃSKI 2018). Besides end scrapers, in feature E44 (linked to the Malice culture) one combined tool was found (Fig. 8: 3). The set of tools found in Lengyel culture features is more diverse, and the following categories can be distinguished: truncated blades (used as sickle inserts, with harvesting polish – Fig. 8: 1, 2) retouched blades, retouched flakes, borers/perforators, and a single burin.

#### Stone axes

Two small stone axes were found in feature H5. Both are made of laminated silica slate from the Carpathians (the raw material was identified by M. Pawlikowski). One is distinguished as most likely being made of a re-worked axe or another tool, as it has traces of a drilled hole (Fig. 9).

#### Grinding stones

Five damaged grinding stones were found in pits E54 (one specimen) and H5 (four specimens).

#### *Macroscopic plant remains*

Among the charred herbaceous plants, 11 taxa were found in samples from Kraków-Górka Narodowa site 8, and these were identified to the levels of genus (*Bromus* sp., *Galium* sp., *Sambucus* sp., *Triticum* sp.) and species (*Triticum dicocum*, *Triticum monococum*, *Chenopodium* type *album*, *Fallopia convolvulus*, *Echinochloa crus-galli*, *Galium aparine*, *Silene* cf. *vulgaris*). Due to their poor preservation, several specimens could not be identified (Table 1: unidentified). Summarized quantitative data from Kraków-Górka Narodowa site 8 are presented in Table 1.

Cultivated plants were represented by finds of caryopses and chaff of emmer wheat (*Triticum dicocum*), einkorn wheat (*Triticum monococum*), wheat (*Triticum* sp.) and cereals (Cerealialia) (Table 1). Among the 27 caryopses, one originated from einkorn (feature E54; Fig. 10: 1) and one from emmer wheat (feature E49; Fig. 10: 2), while the rest belonged to a wheat, probably einkorn or emmer, or another kind of cereal

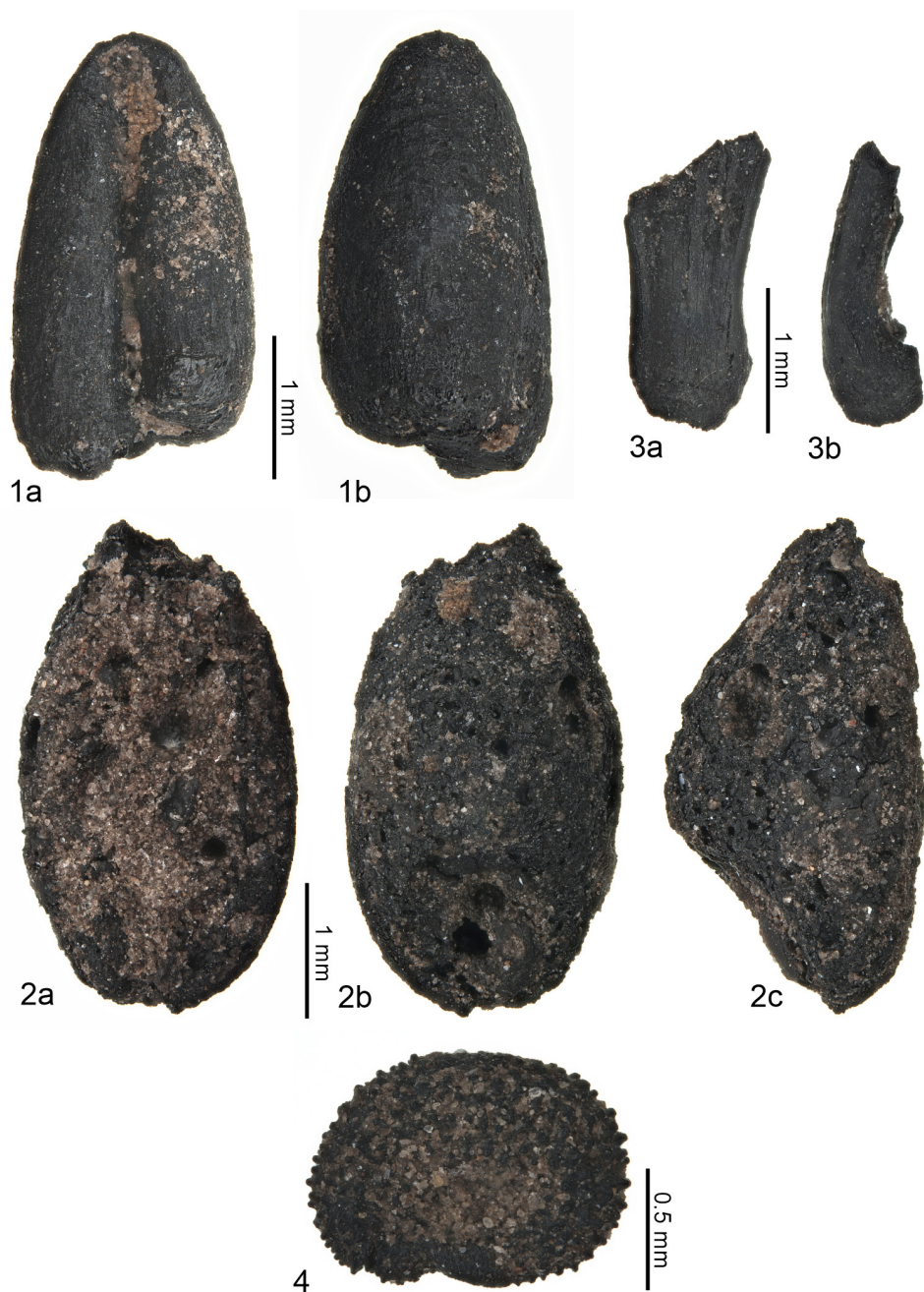


Fig. 10. Neolithic charred plant macroremains from Kraków-Górka Narodowa site 8. 1. Einkorn caryopsis (*Triticum monococcum*), ventral side (1a), dorsal side (1b) from feature E54; 2. Emmer caryopsis (*Triticum dicoccum*), ventral side (2a), dorsal side (2b) from feature E49; 3. Emmer glume base (*Triticum dicoccum*) from feature E49; 4. Similar to bladder campion (*Silene cf. vulgaris*) from feature E54

(Cerealia), the lack of distinctive features making precise identification (to species or genus level) impossible. Four chaff remains representing glume base of emmer wheat (*Triticum diccocum*) were found in features E49 (Fig. 10: 3), E54 and E70. In feature E54 two glume bases of wheat (*Triticum* sp.) were identified as well.

Ruderal and/or segetal plants were represented at Kraków-Górka Narodowa site 8 by several taxa (Table 1), such as single seeds of fat-hen (*Chenopodium* type *album*), black-bindweed (*Fallopia convolvulus*), cockspur grass (*Echinochloa crus-galli*), cleavers (*Galium aparine* and *Galium* sp.), brome grass (*Bromus* sp.), and a small fragment of elderberry (*Sambucus* sp.). The most numerous species from this group was fat-hen (*Chenopodium* type *album*) represented by six seeds found in samples from features E49 and E70. Only one seed similar to bladder campion (*Silene* cf. *vulgaris*) could be assigned to the meadow/pasture crops category (Fig. 10: 4; Table 1). In addition, one fragment of a nutshell of hazel *Corylus avellana* and another one of an unidentified nutshell were found. Undetermined stem fragments were found as well.

The charcoal assemblage is very scarce, as only 73 charcoal fragments were documented in 13 samples. Only two taxa of woody plants were identified to the genus and species levels: oak (*Quercus* sp.) and ash (*Fraxinus excelsior*). Also, a few fragments represented undetermined deciduous plants (Table 1). The charcoal fragments were very small, as they usually did not exceed 2 mm in transverse section. This made simple dendrological observations, which might determine whether the fragment belonged to a branch or a trunk, impossible.

Cultivated plants belonging to cereals found at the Kraków-Górka Narodowa site 8 suggest that people of this settlement used them in their diet. Both species of glume wheats, emmer and einkorn, were the first cereals cultivated in Poland since the appearance of the first Neolithic culture, namely the Linear Pottery culture, in the second half of the 6<sup>th</sup> millennium BC (KLICHOWSKA 1975; BIENIEK 2007; LITYŃSKA-ZAJĄC 2007). In general, very few archaeological sites are known with archaeobotanical assemblages from various cultural units representing the post-linear Young Danubian tradition, such as the Lengyel (including the Pleszów-Modlnica group), Malice and Lublin-Volhynian cultures, which mostly developed in the 5<sup>th</sup> millennium BC and at the beginning of the 4<sup>th</sup>. However, in all the studied macroscopic plant assemblages it was observed that glume wheats were the dominant crops. Emmer and einkorn wheats were identified at sites located in southern Poland, such as Radziszów site 10 (NOWAK et al. 2020), Miechów site 3 (MUELLER-BIENIEK et al. 2018), Kraków-Mogiła (GLUZA 1984), Sadowie (MUELLER-BIENIEK et al. 2022) and Iwanowice-Klin (LITYŃSKA 1990). Both species also appeared in the Lublin-Volhynian uplands in a storage pit found in Las Stocki (LITYŃSKA-ZAJĄC 2001). Remains of both species were documented in the Kuyavia region, including at Oślonki site 1, Konary sites 1 and 1a, Miechowice sites 4 and 4a, and Zagajewice site 1 (BIENIEK 2007). Single finds of emmer appeared in southern Poland in Targowisko sites 10–11 (LITYŃSKA-ZAJĄC et al. 2014a) and in Guźlin site 2 in Kuyavia (BIENIEK 2007), whereas in the Lublin-Volhynian uplands at Wąwolnica a storage pit with almost six thousand caryopses was found (LITYŃSKA-ZAJĄC 2001). Fragmented parts without the

furrow or embryo preserved were identified as cereals (Cerealia), most likely belonging to emmer and einkorn wheats, but possibly also to another glume wheat species that was confirmed in the Kuyavian sites (e.g., in Miechowice site 4; BIENIEK 2007), a so-called “New Glume Type” recently associated with *Triticum timopheevii* Zhuk (CZAJKOWSKA et al. 2020) and documented in southern Poland in Sadowie, a site of the Lengyel-Polgar culture (MUELLER-BIENIEK et al. 2022). Another possibility is that they were the remains of barley, which was recorded at other Lengyel culture sites like Kraków-Nowa Huta Mogiła site 62 (GLUZA 1983/84) and Łysokanie (LITYŃSKA-ZAJĄC et al. 2014b).

The taxonomic list of wild herbaceous plants found in Kraków-Górka Narodowa included typical plants found in Early Neolithic sites associated with the Linear Pottery culture and the post-linear Danubian cultures (BIENIEK 2007; LITYŃSKA-ZAJĄC 2005, 2007; LITYŃSKA-ZAJĄC, WASYLKOWA 2005). Although these plants are categorized as segetal and/or ruderal plants, it was demonstrated that *Bromus* sp., *Chenopodium type album*, *Fallopia convolvulus*, and *Echinochloa crus-galli* were consumed by people in prehistory (BEHRE 2008), and thus their presence in Early Neolithic and Bronze Age sites has recently been interpreted as a possible part of the ancient diet (KAPCIA, MUELLER-BIENIEK 2019; MUELLER-BIENIEK et al. 2020).

The charcoal assemblage from Kraków-Górka Narodowa site 8 likely represents charcoal fragments originating from long-term deposits of fuel wood, as they were found dispersed within archaeological features (e.g. *sensu*: KABUKCU, CHABAL 2021). However, due to the scarcity of the charcoal fragments typical of so-called “charcoal scatters”, little diversity of woody taxa was detected. Such scarcity is unusual even for Neolithic anthracological assemblages from the loess areas of southern Poland, where low numbers of charcoal fragments were usually documented (MOSKAL-DEL HOYO 2021). This characteristic of the charcoal assemblage from Kraków-Górka Narodowa site 8 means that it cannot be used as representative material for palaeoenvironmental interpretations, as it does not contain at least 250 charcoal fragments per archaeological layer (e.g. CHABAL 1997; KABUKCU, CHABAL 2021; MOSKAL-DEL HOYO 2021).

Remains of oak prevailed, as they were found in 11 samples from all the archaeological features studied. Fragments of ash appeared in two samples coming from feature E70. Oak was also a dominant taxon in various charcoal assemblages from the loess areas of southern Poland dated to various phases of the Lengyel-Polgar cultural complex (MOSKAL-DEL HOYO 2021). Oak was mostly accompanied by pine (*Pinus sylvestris*) and birch (*Betula* sp.), and it is likely that they formed mainly oak-dominated open-canopy woodland resembling present-day thermophilous oak forests, pine-oak forests or lime-oak-hornbeam forests (MOSKAL-DEL HOYO 2021). Ash was also frequently found at these archaeological sites, but it reached a higher share at sites located in the vicinity of the river valleys, for example in Staniątki and Podłęże site 17 (LITYŃSKA-ZAJĄC et al. 2012a, b), Kraków-Pleszów sites 17 and 18 (GLUZA et al. 1988) and Spytkowice site 26 (MOSKAL-DEL HOYO 2021). This is due to the ecological requirements of ash, which usually prefers habitats characterized by wet soil conditions. Nonetheless, *Fraxinus excelsior* can also grow in oak-dominated forests (SENETA, DOLATOWSKI 2004; TOBOLSKI, NALEPKA 2004).



## CONCLUSIONS

In general, the chronology of the settlement can be defined as the 5<sup>th</sup> millennium BC. Site 8 in Kraków-Górka Narodowa is an important site on the map of Neolithic settlement. Traces of the presence of various communities were found, including the Samborzec-Opatów group. Settlements of the Malice culture community were recorded at Modlniczka site 2, Modlnica site 5, Kraków-Olszanica and in the Prądnik valley. A large complex also existed in the area of Kraków-Nowa Huta (KULCZYCKA-LECIEJEWICZOWA 1969; GRABOWSKA, ZASTAWNY 2011: fig. 34).

The archaeological record shows very intensive settlement of communities linked with the Pleszów-Modlnica group of the Lengyel culture. Artefacts associated with that group were found in Modlnica site 5 (GRABOWSKA, ZASTAWNY 2011) and Modlniczka site 2 (CZEKAJ-ZASTAWNY, PRZYBYŁA 2012). Another large group of finds comes from cave sites (ROOK 1980) and from the Kraków Nowa-Huta area (KULCZYCKA-LECIEJEWICZOWA 1969).

The number of artefacts from site 8 proves that it was a long-lasting and stable settlement. Throughout its entire period of existence, the settlement itself may have acted as a kind of link between the settlement points in the territory of the Kraków-Częstochowa Upland and the settlements in the area of today's Kraków Nowa Huta and the Wieliczka-Bochnia cluster, as it is located between these clusters (GRABOWSKA, ZASTAWNY 2011: fig. 34).

The plant assemblage found at Kraków-Górka Narodowa site 8 confirmed the use of two wheat species during both occupation phases: the Pleszów-Modlnica group of the Lengyel culture and the Malice culture. The cultivation of plants could have been supplemented by the gathering of wild plants, as suggested by the occurrence of herbaceous plants with edible fruits and seeds such as *Bromus* sp., *Echinochloa crus-galli*, *Chenopodium* type *album* or *Fallopia convolvulus*. It is also likely that hazelnuts were consumed. However, some plant remains could have been accidentally deposited in archaeological features. The relatively low number of the archaeobotanical samples makes it impossible to comprehensively reconstruct the plant economy of this settlement. Based on archaeobotanical analysis, it can be stated that oak was the most frequently found taxon, which is in agreement with other wood-charcoal assemblages known from the Lengyel-Polgar cultural complex. This may suggest that oak-dominated woodland could have developed near the site in both occupation phases.

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