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REVIEW

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The Environmental Context of the Early-Slavic Culture Settlement at Zofipole, Site 1, Kraków District

Abstract

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The paper presents the settlement of the Early-Slavic culture on site 1 at Zofipole, Kraków district, framed in the context of changes of natural environment from the 5th to the 7th century AD. The Zofipole site belongs to the group of nine small settlements from that period located on the left-hand side loess terrace of the Vistula River. This area is well recognized from both the archaeological and the paleographic points view. Despite unfavorable climatic changes, life there was facilitated by the natural advantages of the place. The location of settlements on the border of two different ecosystems – a loess terrace and a floodplain – was convenient for land cultivation and stock breeding. The floodplain was also the source of raw material for pottery production. In such conditions, elementary agricultural activities were possible and secured the basic needs of the inhabitants of the small settlements in that zone, such as that at Zofipole.

Keywords: Early-Slavic culture, Zofipole settlement, environmental conditions, climatic impact, subsistence strategy

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1. Introduction

The multi-culture site 1 at Zofipole, Igołomia-Wawrzeńczyce commune, is located in the Vistula River valley, on its left-hand loess terrace, ca 28 km east of Kraków (Fig. 1). The traces of settlement discovered over the course of many years of field research have been dated from the Early Neolithic to the Late Middle Ages. The site in question was first excavated already in 1934–1935 by Jan Bartys, but mainly in 1946–1949 by the team led by Tadeusz Reyman from the Archaeological Museum of the Polish Academy of Arts and Science, with the participation of Stanisław Buratyński and Andrzej Żaki. Archaeological excavations were carried out on approximately 30 ares of the site. This place, referred in the literature as site 1, was recognized as an important production center of wheel-made grey pottery (Nosek 1967, 117–118). In the 1980s the area of the village of Zofipole was surface surveyed. As a result, the site was augmented with the area to the east of the unnamed creek that flows nearby. Altogether, archaeological materials are distributed over an area of ca 18 ha (Fig. 1, 2). In 1986, the eastern part of the site was rescue excavated by Halina Dobrzańska, with the participation of Władyslaw Morawski, from the Institute of the History of Material Culture of the Polish Academy of Sciences, Kraków Branch (*Informator* 1987).

In the years 1995–1999, studies on the Zofipole pottery production center were carried out as part of the multidisciplinary project funded by the Polish Committee of Scientific Research, no. 1 H01G040 09. It included the surface and geophysical survey of the Zofipole site. In 1997 two pottery kilns from the Roman Period were excavated (Dobrzańska 2000; 2020).

In the course of the elaboration of materials of the Przeworsk culture obtained over the years, the presence of traces of the settlement from the Early-Slavic Period was confirmed.

Over a 30-km-long section of the Vistula River valley to the east of Kraków is an area well recognized in

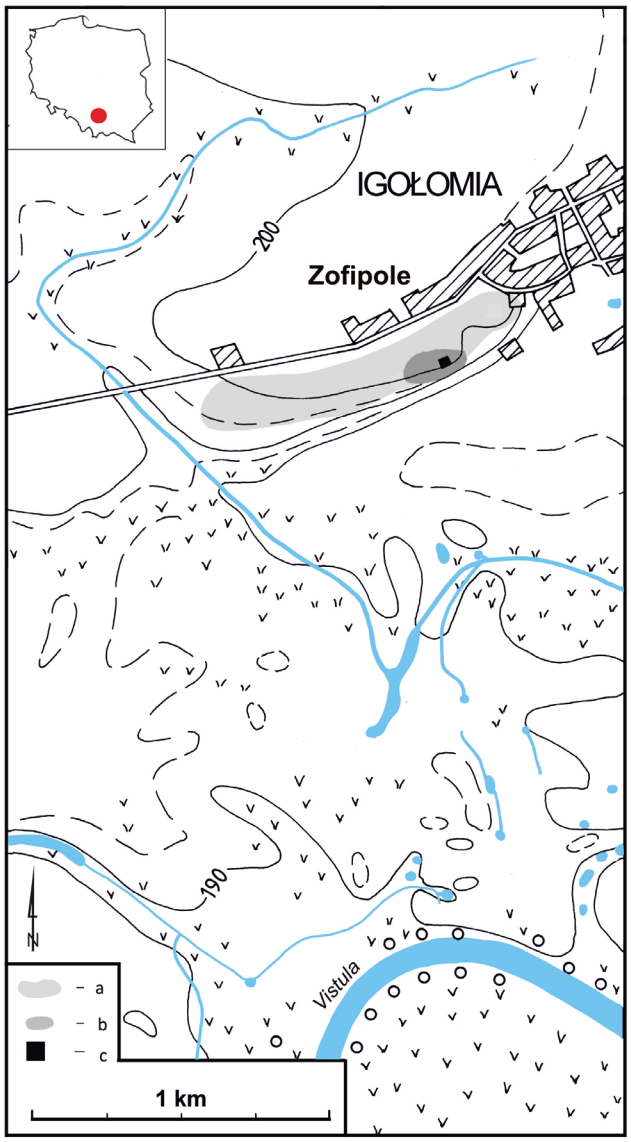

Fig. 1. Zofipole, site 1, Kraków district.
a – location of the site with its range marked according to the documentation of the Polish Archaeological Record Project, b – Early-Slavic settlement, c – archaeological reserve (drawn by I. Ściana).

the scope of archaeology and paleogeography (Kalicki 1991; 2006; Starkel *et al.* 1991; Kalicki *et al.* 1996; 2005). Settlement evidences from this area provided the basis for an interdisciplinary project focused on man-natural environment relations from the La Tène period to the Early Medieval Time, carried out by the Institute of Archaeology and Ethnology, Polish Academy of Sciences, in 2001–2008. It included geomorphologic studies and ^{14}C analyses of samples from the area of Zofipole and Igołomia, crucial for questions related to the functioning of the Zofipole settlement and the exploitation of the natural environment (Dobrzańska and Kalicki 2003; 2004; 2015; Dobrzańska *et al.* 2009; 2013).

2. Modern geographical environment

The settlement of the Early-Slavic culture at Zofipole, site 1, is situated in the Vistula River valley on a loess terrace ca 10 m above the bottom of the river floodplain and 1.8 km from its modern channel (Fig. 1).

Beneath the Kraków Gate, the Vistula flows through the western part of the Sandomierz Basin. Among the most distinctive features of this area is the erosional relief developed on Miocene clays covered with various Quaternary sediments. To the north, the valley is bordered by the erosional edge of the Proszowice Upland (Strzyż 2021), to which two Pleistocene Vistula terraces (8–12 and 15–25 m) are adjacent, covered by the Vistulian loess (Tyczyńska 1968; Gębica 2004). These terraces are drained by a few permanent streams from the upland and by a network of dry valleys (dellen).

The three-to-seven km wide floodplain, rising 4–5 m above the level of the Vistula River, has a very complex composition (Kalicki 1991a; 1991b; 2006; Gębica 2004). The floodplain is composed of a wide range of multi-age segments with numerous paleomeanders preserved in its relief. They testify to the lateral displacement and avulsions of the river channel (Starkel *et al.* 1991; Kalicki 1991a; 2006; Kalicki *et al.* 1996).

The alluvia of the floodplain are 4–15 m thick and are channel deposits – sands with gravels at the bottom, sands in upper parts, and higher up in the profile by overbank deposits of sandy silts, silts, and clayey silts (Kalicki 1991b; 2000).

On the loess fertile lessive soils developed, while alluvial and hydromorphic soils occur on the river floodplain and, on the valley bottom, mada are dominant (*Atlas* 1979, 16). The natural vegetation there (Fig. 3) has been almost completely destroyed by human activity. Potential natural vegetation consists of oak-hornbeam forests within higher and drier habitats, willow-poplar and elm, with alder-ash riverside forest in the bottom of the valley (*Atlas* 1979, 17). At present, this area is being cultivated and used agriculturally.

3. Changes of the natural environment at the turn of the Antiquity and the Early Medieval period in the upper Vistula basin

Development of the Early-Slavic culture corresponds with strong climatic cooling in the northern hemisphere known as the Dark Age, recently referred also as the Late Antique Little Ice Age (LALIA). Its beginning is dated by K. Harper (2021) to ca AD 530–

680. Among the evidence confirming climatic cooling at that time are tree-ring data which are the effects of three subsequent volcanic eruptions in the 6th century, as well as information in written sources. A characteristic element of this process, one not registered in the preceding two thousand years of the Holocene is its rapidness that led to the widespread crop failures. It was accompanied by a large scale outbreak of bubonic plague (Burroughs 2005, 258–260; Harper 2021).

Slow aggradations can be observed during the time in question in the Vistula River valley below Kraków, a process initiated already during the Roman period. Vertical accretion of mada on the floodplain occurred simultaneously with the channel aggradation. It is confirmed by the discovery at the Kraków Wyciąże site 6 of a layer with artefacts dating from the 4th century AD covered with clayey over bank deposits (Dobrzańska *et al*. 2013, 361). Climatic cooling and increased humidity have been registered in the Vistula alluvia. They caused intensive bank erosion, testified by increasing numbers of oak tree trunks in Vistula alluvia, dated to the period between AD 425 and 575 or 625 (Krąpiec 1996a; Kalicki and Krąpiec 1996, 82–85, fig. 25, 26, further references there). The severity of the winters is reflected by the appearance of moon rings in black oak trunks found in the river alluvia in southern Poland dated to ca AD 490 and 533. It is significant that they have not been registered in black oaks from the Roman period (Krąpiec 1998, 112, 124).

4. Materials

Materials from the Early-Slavic period from the Zofipole settlement, site 1, were spread over an area ca 3.5 ares (Fig. 3). Before their correct chronological recognition had been recognized (see unit 1), only one vessel referring to this period had been known – that from feature 16 (Zoll-Adamikowa 1985, 169, fig. 4: b), classified by Michał Parczewski as Type 4 (1988a, 199, 200, 294, pl. XXXII: 1).

Field documentation of excavations from the years 1946–1949 has not survived. Presently at our

Fig. 2. Zofipole, site 1, Kraków district. Early-Slavic features (drawn by A. Krzywda).

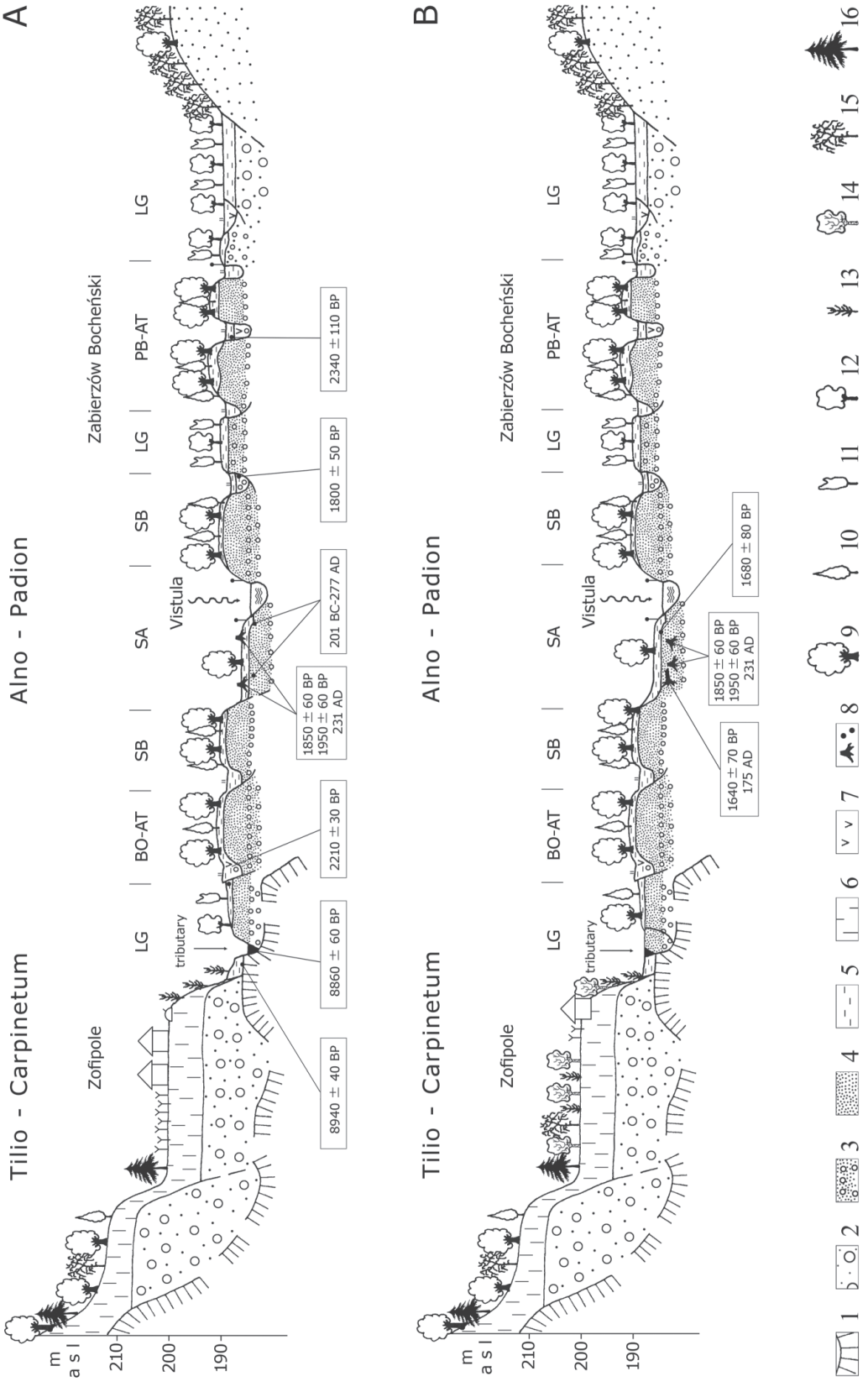

Fig. 3. Schematic palaeogeographical section across the Vistula River valley (after: Dobrzańska, *et al.* 2013, fig. 3).

A – Roman period; B – Early-Slavic period. 1 – Miocene clay, 2 – Pleistocene gravels with sands, 3 – Holocene gravels with sands, 4 – sands, 5 – silts (overbank deposits), 6 – loess, 7 – peats, 8 – trees and trunks cut by man, 9 – Quercus sp., 10 – Carpinus betulus, 11 – Alnus sp., 12 – Salix sp., 13 – Corylus avellana, 14 – Betula sp., 15 – Pinus sylvestris, 16 – Picea excelsa, 17 – Carex sp., 18 – meadows, 19 – cereals, 20 – dwelling zone of the settlement, 21 – production zone of the settlement. Age designations: AT – Atlantic, BO – Boreal, LG – Late Glacial, PB – Preboreal, SB – Subboreal, SA – Subatlantic. Radiocarbon and dendrochronological dating in boxes. Dating of redeposited detritus in brackets.

disposal there is only an incomplete outline plan of the site. From the very beginning, the research was focused on pottery kilns from the Roman period and those were documented by drawings and descriptions, unfortunately of low quality. Materials from Zofipole, site 1, are preserved in the Archaeological Workshop in Igołomia, Igołomia-Wawrzeńczyce commune, belonging to the Center of Mountain and Upland Archaeology in Kraków, Institute of Archaeology and Ethnology PAS.

In the Zofipole settlement at least 12 features and ceramic artefacts without context have been recognized as Early-Slavic (Fig. 2). They mainly came from the excavation trenches from the years 1946–1948. The stray finds are represented by pottery and clay roster discovered in house 19.

The analyzed pottery was made without using a potter's wheel, from potters paste of the first group according to the classification of Michał Parczewski (1988a, 28–29; 1988b, 14, 15). Its characteristic feature is the presence of crushed rock, gravel, or grog, occasionally all together. One can observe a high degree of diversity in terms of grain size and temper, and an uneven mix of their components. It makes it difficult to assess the size and amount of grains, especially in strongly fragmented vessels. Vessel surfaces were often coated with clay or smoothened with fingers. Nonetheless, temper grains are often visible or – beneath the clay layer – produce the effect of a slightly grainy surface. The composition of the pottery paste indicates a knowledge of the means to prevent the destruction of vessels during the firing process and their utilization. Early-Slavic pottery, apparently made without much care, in fact confirms the considerable technological expertise of their producers (more information: Dobrzańska 1998, 90, 91). For their classification, the criteria proposed by Michał Parczewski (1988a; 1988b) have been adopted.

Trench 1948 (Fig. 4)

Feature 2. Pit, partially explored
41 belly part fragments.

Feature 3. Hearth, partially explored
Pot 10.3 with drilled hole beneath rim Fd (Fig. 5: 1); fragment of pot, rim Fd (Fig. 5: 2); 3 small fragments (1 bottom and 3 rims).

Feature 7. Rectangular house, 2 × 1.2 m
Lower part of pot, gravel grains on the bottom surface.

Feature 9. Pit, circular outline, diameter ca 2 m
Rim Fe (Fig. 5: 3); 1 bottom fragment.

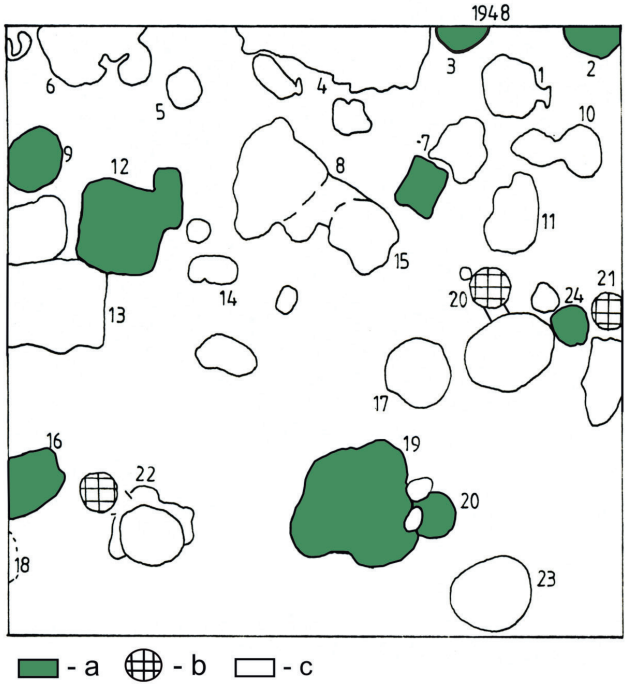

Fig. 4. Zofipole, site 1, Kraków district. Trench 1948: a – Early-Slavic features, b – Roman period pottery kilns, c – prehistoric features (drawn by A. Krzywda).

Feature 12. Rectangular house, 3 × 2.60 m, entrance in form of rectangular corridor, 2 × 1 m, orientation NW–SE
Depth 60–90 cm
Rim Fg (Fig. 5: 4); 2 bottom parts Kb2, Kc2 (Fig. 5: 5, 6); pot with proportions close to type 5.2, rim Fg (Fig. 5: 8).

Feature 16. Partially explored
Depth 40–60 cm
Bottom close to type Kd (Fig. 5: 7).
Depth 60–80 cm
Pot 4, rim Fg (Fig. 6); 1 belly fragment of pot.

Feature 19. Remains of irregular house, partially explored, dimensions ca 4.8 × 4.2 m
Depth 40–60 cm
2 rim fragments Fg; 2 bottoms Kc and Ke (Fig. 8: 2–4); 14 belly fragments; 12 clay roaster fragments (Fig. 7); 3 daub lumps; 2 iron slag lumps.

Feature 20. Kiln, circular outline, diameter 1.4 m, adjacent from E to feature 19
Depth 20–40 cm
Bottom Kc (Fig. 8: 5); 1 bottom fragment; 13 belly fragments.

Feature 24. Circular outline, diameter 1.2 m
Depth 160–180 cm
Rim Fd (Fig. 8: 6).

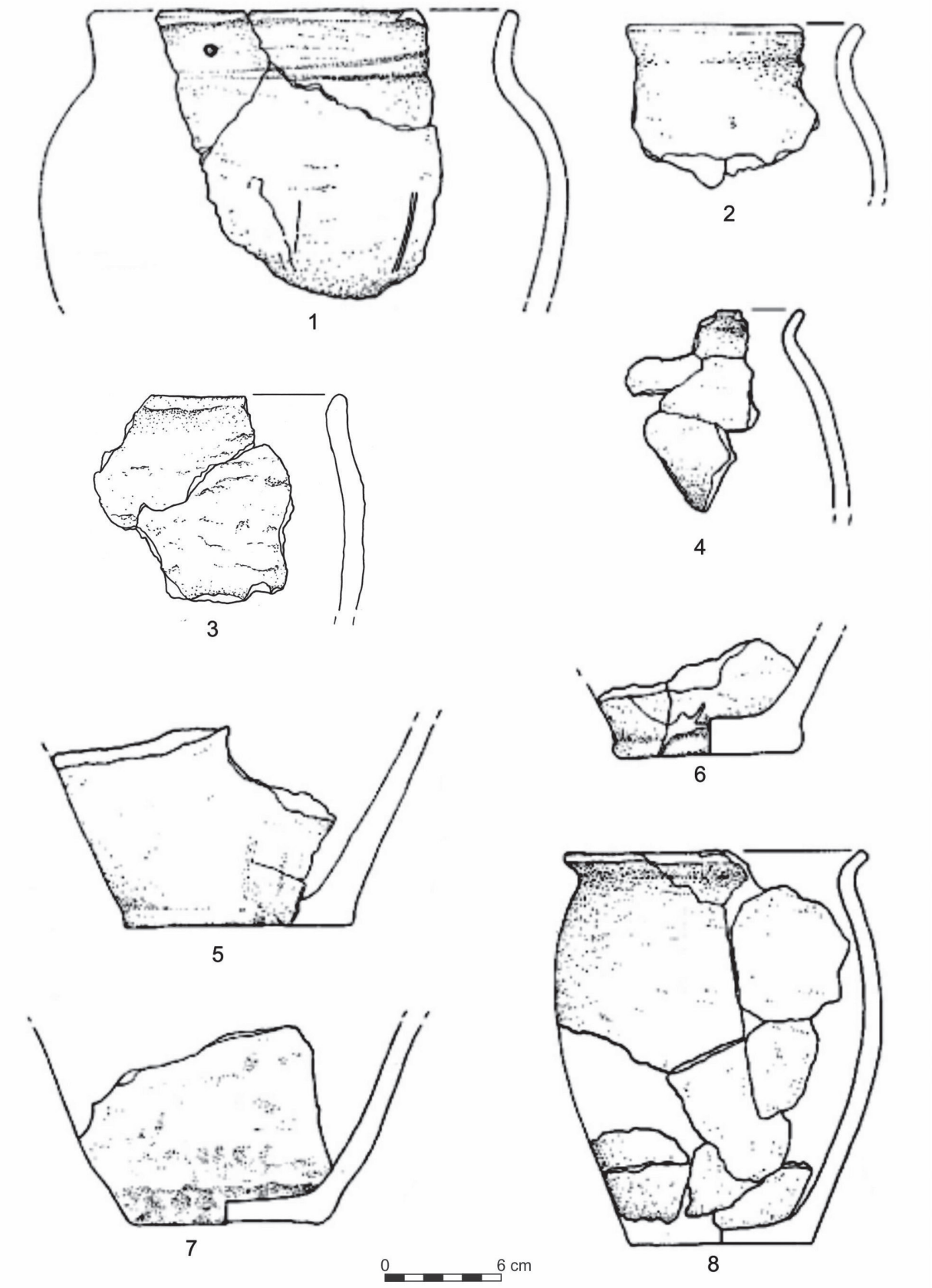

Fig. 5. Zofipole, site 1, Kraków district. Pottery. Feature 3 – 1, 2; feature 9 – 3; feature 12 – 4, 5, 6, 8; feature 16 – 7 (drawn by B. S. Szmoniewski and J. Ożóg).

Fig. 6. Zofipole, site 1, Kraków district. Ceramic vessel. Feature 16 (photo Oleksy).

Fig. 7. Zofipole, site1, Kraków district. Clay roaster. Feature 19 (photo M. Należny).

Depth 180–200 cm

Bottom Ka (8: 1); 3 damaged rims; 24 belly fragments.

Feature 25. No location information

Pot 4, rim Db (Fig. 8: 7).

Trench 1946 (Fig. 2)

Feature 52. Pottery concentration

Depth 20–40 cm

Pot type 2, rim Ba (Fig. 8: 8); pot type 2 or 3, rim Ba or Ca (Fig. 9: 1); upper part of pot (Fig. 9: 2); lower part of pot, bottom Kd (Fig. 9: 3); 1 belly fragment; 2 bottom fragments.

Feature 70. Circular outline, diameter 1.4 m

Rim Fc (Fig. 9: 4); 1 fragment of flat bottom, gravel grains on the surface.

Feature 72. Pottery concentration

Depth 40–60 cm

2 rims of pots Fc (Fig. 9: 5, 6); 1 rim Fa (Fig. 9: 7); 2 rims, burnt; 5 belly fragments.

Pottery from upper cultural layer of the fill of pottery kiln 20 from the Roman period (phases C1b–C2)

Depth 20–40 cm

2 rims of vessels Db and 1 Dc.

Pottery from the cultural layer of the settlement found outside features, with no precise location within excavation trenches

3 belly fragment Fc, Fa?, Bb (Fig. 9: 8–10); rim fragment Fc of small vessel 11; pot fragment, rim Fd (Fig. 9: 11); bottom Ka (Fig. 9: 12); 1 rim Db; 2 rim fragments Db of the same vessel; 2 rim fragments Db of the same vessel; 1 rim fragment Fd; 2 rim fragments Fd of the same vessel; 1 rim fragment Fe; 2 rim fragment Fg of the same vessel; lower part of pot, with bottom fragments with slightly visible plait impression (?); 6 pot belly fragments; 1 bottom fragment with gravel grains on the surface.

Conclusions

One can attribute 12 features to the Early-Slavic settlement at Zofipole, three of which (2, 3, 16) have been partially explored and two others (52, 72) are only represented by pottery concentrations. Feature 25 has not been plotted on the settlement plan. Three features were recognized as houses (7, 12 and 19).

Feature 19, sunken in the loess bed, had an irregular outline, possibly resulting from wall slides. At the time of exploration its surface was ca 20 sq m and adjacent to the east of it is feature 20 – a circular oven. Two analogous structures are known from the settlement in neighboring Igołomia. Feature 38/53 is irregular, with a circular oven to the NW, representing the remains of a house which probably had a square outline (Cygan 2006, 29). Feature 32/53 is smaller. In both cases, circular ovens situated to the NW and crossing the outlines of both structures, may illustrate a certain construction detail of the building. Due to safety reasons, the length of the wooden walls was limited by the ovens, and they did not extend beyond the oven domes (Dobrzańska 1998, 97, there further analogies). A similar wall construction was applied to house 19 at Zofipole, possibly squared.

Feature 12 is the rectangular house built on the area ca 8 sq m, with an entrance in the form of a corridor to the sunken structure. The absence of a heating device makes it difficult to attribute a domestic function to it. Houses with a corridor are known from the territories of the Early-Slavic culture in its European extent (Cygan 2006, 41, 42).

Irregular feature 7, of an rectangular outline and a surface area of ca 2.5 sq m, probably served as a utility structure. From the Zofipole settlement there are known 3 circular pits – nos. 9, 24 and 70, diameters 1 to 2 m, also probably of a similar use.

The pottery material from the Zofipole settlement is very fragmented. Pots prevail, but their forms can only be determined in 5 cases. There are vessels: 10.3 (Fig. 5: 1), 5.2 (Fig. 5: 8), 4 (Fig. 6), 4 (Fig. 8: 7) and 2 (Fig. 8: 8). A rare find is the clay roaster from domestic structure 19. It was made of yellow loess with no visible temper, slightly burnt. It has the form of rectangular plate ca 2 cm thick, with edges raised to ca 5 cm (Fig. 7). Artefacts of that type, used for drying and roasting grain, became common in the 7th–8th century AD (Parczewski 1988a, 66, 75, 76).

The most archaic material comes from feature 52, as testified by pot 2 with rim Ba, rated among the earliest (Parczewski 1988a, 61–63). The presence of the clay roaster in domestic feature 19 may indicate its younger age, probably the 7th century. A similar chronology can be attributed to feature 12 with a pot close to type 5.2 and rim Fg (Fig. 5: 8). As other types of rims are either long lasting (Fa, Db, Fg, Fc, Fd) or more often present in the younger horizon of the Early-Slavic culture (Fb and Dc), the remaining part of the material should be dated to the 6/7th century AD.

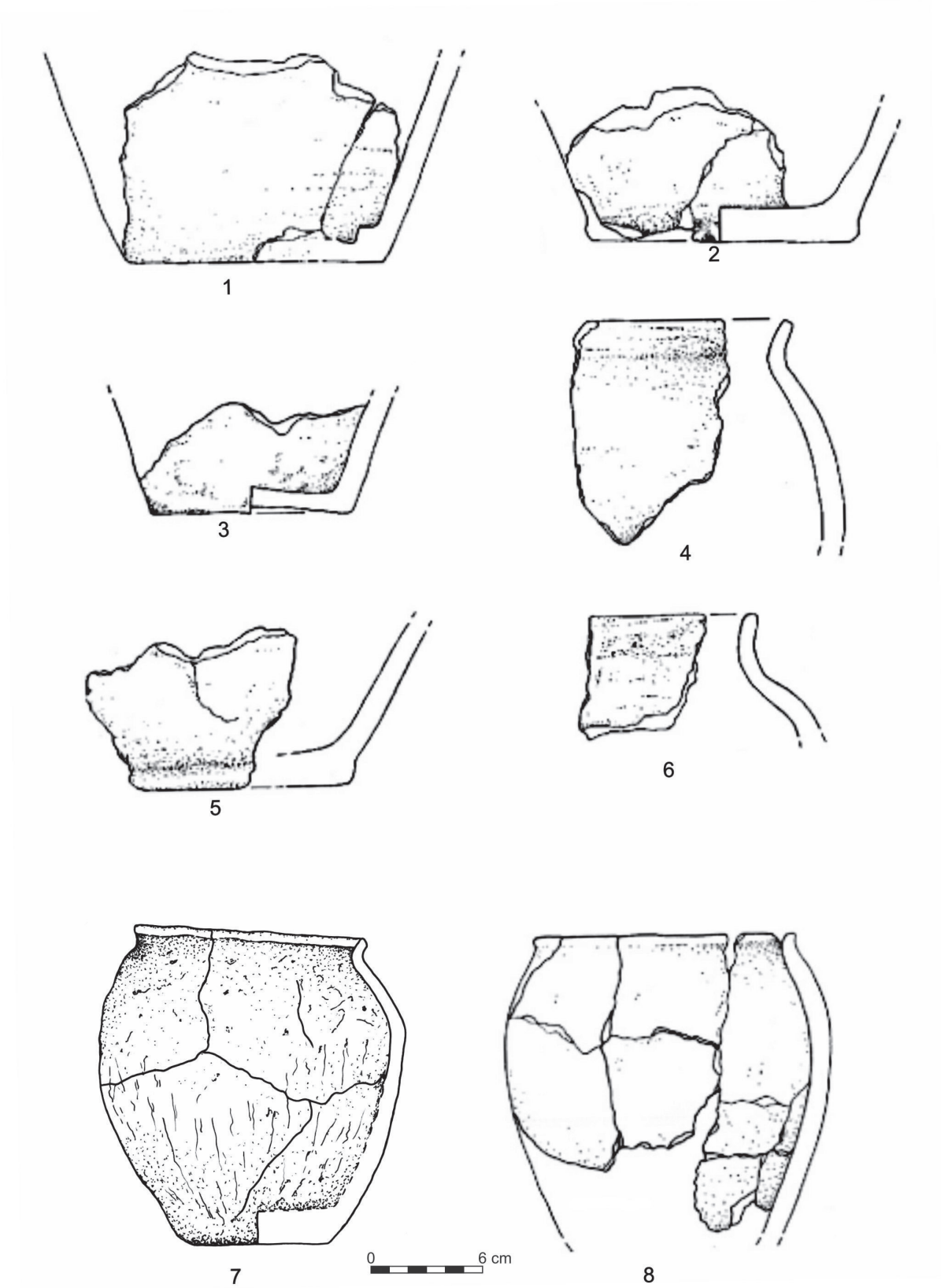

Fig. 8. Zofipole, site 1, Kraków district. Pottery. Feature 19 – 2, 3, 4; feature 20 – 5; feature 24 – 1, 6; feature 25 – 7; feature 52 – 8 (drawn by B. S. Szmoniewski and J. Ożóg).

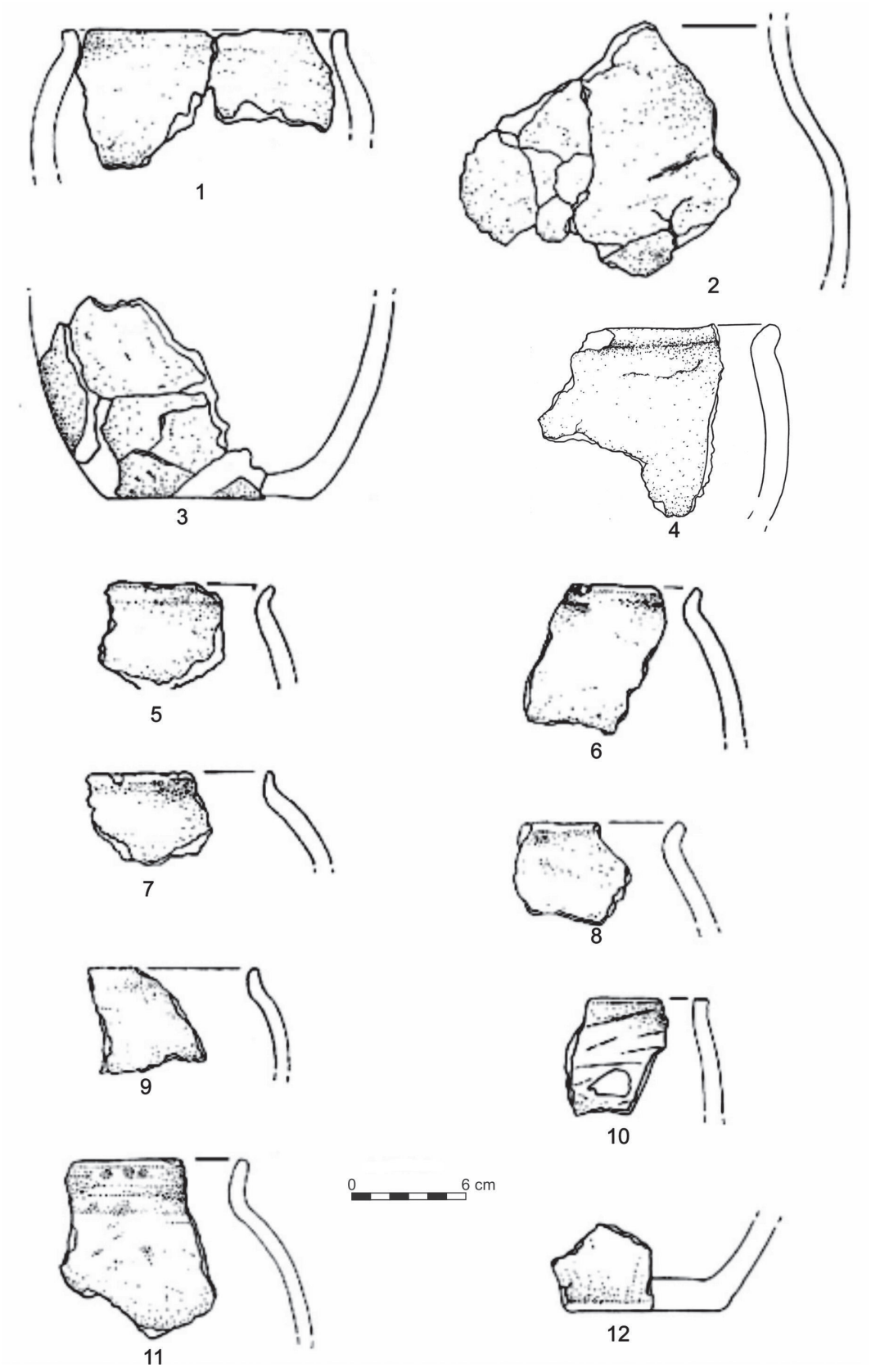

Fig. 9. Zofipole, site 1, Kraków district. Pottery. Feature 52 – 1, 2, 3; feature 70 – 4; feature 72 – 5, 6, 7; stray finds – 8, 9, 10, 11, 12 (drawn by B. S. Szmoniewski and J. Ożóg).

5. Final remarks

The Early-Slavic settlement in Zofipole, site 1, is one of nine sites of that type located over a well preserved 30-km-long section of the left-hand side of the Vistula River terrace, between Kraków-Nowa Huta and Nowe Brzesko. The settlements in question form a chain and are spread 1–3.5 km one from another (Dobrzańska 1998, 101, 102, fig. 11; Madyda-Legutko *et al.* 2005, fig. 6).

People of the Early-Slavic period living in the Vistula River basin preferred the promontories of the loess terraces, already intensively used in the Roman period. The decline of the settlement of the Przeworsk culture falls into the last quarter of the 4th century AD, as indicated by both archaeological and natural sources. The main reason for this crisis was the appearance of the Huns (Dobrzańska and Kalicki 2004, 120; 2018, 132). The Przeworsk settlements survived longer in interiors of the western Lesser Poland loess upland, until the beginning of the 5th century (Dobrzańska 1997, 359). The presence of the Huns on the territory of our interest has been confirmed by recent archaeological discoveries (Niebylski *et al.* 2024).

In comparison with the Roman period, Early-Slavic settlement sites in the Vistula River basin are much smaller, with infrequent traces of houses and utility structures. Their location was greatly influenced by hydro-morphological conditions (Dobrzańska *et al.* 2009, 170). The loess terrace edges were preferred (according to the geographical definition, this term refers to the area between the terrace edge and the terrace foot). The production zones of the Przeworsk culture settlements were previously located in this place (Fig. 10: A). The dry areas of the terrace were convenient for constructing sunken dwellings, structures typical in cold and wet periods (Fig. 10: B). A local stream flowing at the foot of the terrace provided water to the inhabitants of the settlement (Fig. 3: B).

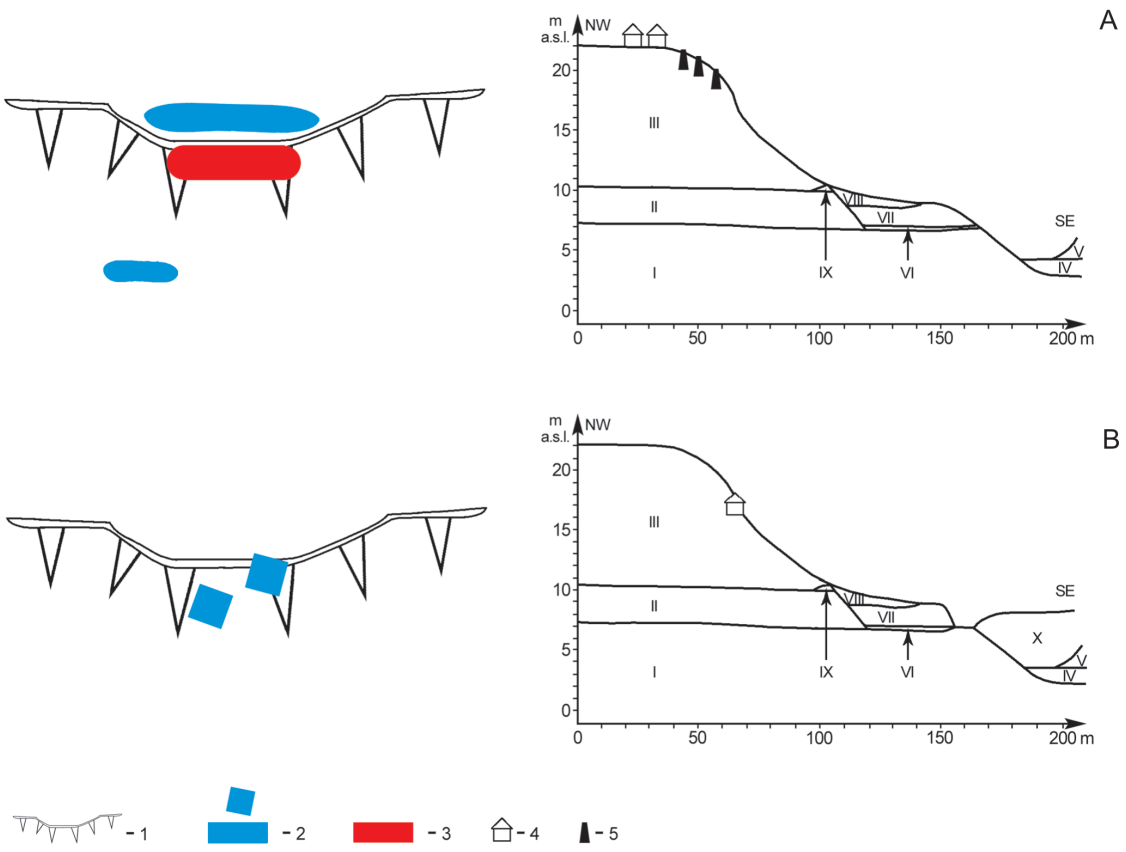

Fig. 10. Settlement models and changes of terrace edge in the Vistula River valley downstream of Kraków in the Roman (A) and Early-Slavic (B) periods (after: Dobrzańska *et al.* 2013, fig. 9).
1 – loess terrace plateau and edge, 2 – dwelling zones of settlements, 3 – production zone of the settlement, 4 – dwellings, 5 – pottery kilns; I – Miocene clay, II – Pleistocene channel alluvia, III – loess, IV – sandy-gravel alluvia of Young Pleniglacial/Late Glacial braided river, V – sandy alluvia of Young Pleniglacial/Late Glacial braided river, VI – lag deposits, VII – Neo Holocene overbank deposits, VIII – Neolithic (?) colluvia, IX – meadow ore, X – Roman/Early Medieval sandy alluvia.

The existence of people was based on cultivating the soil, growing crops, and raising livestock (Parczewski 1988b, 69f.; Szmoniewski 2016, 35f.).

Important from the economic point of view was the location of settlements on the border of two adjacent ecosystems (loess terrace and floodplain) of high biodiversity. For land cultivation, the flat part of the terrace with its fertile lessive soils was ideal. Geomorphologic research around the Zofipole settlement revealed the presence of fertile diluvia on the higher part of the floodplain at the terrace foot. They were convenient for garden crops cultivated not far from houses and close to creeks (Dobrzańska *et al*. 2009, fig. 3: B). With the intensive deforestation of the loess terrace, forest habitats of the floodplain, abundant with various plants, was a good source of fodder, also in winter. Especially remarkable is the presence of oak, as its acorns could be used as both food and as forage for pigs. The bones of these animals (4 individuals) were discovered in house 2/82 on the settlement at Igołomia next to Zofipole (Dobrzańska 1998, 100). Constructional wood came also from the floodplain, a good example of which is the house from Kraków Wyciąże, site 5b, built with wood from a 200-year-old oak (Poleska and Bober 1996; Krąpiec 1996b).

Birch used for making wood-tar probably came from the same environment (Fig. 3: B), the production of which was confirmed on the Igołomia settlement (Dobrzańska *et al* 2005). It was widely used as a medicinal agent, especially in the treatment of animals (Szmoniewski 2016, 42, 43, there further references). The floodplain was also the source of gravel, sand, and clayey silts, recognized in the pottery paste of the vessels produced in Zofipole.

The discovery of fishhooks in the settlements located in the zone in question may indicate that the floodplain was utilized as an additional food resource in the form of fishing places (Szmoniewski 2021, 181).

Despite the rising ground water level and local flooding, the floodplain remained accessible for people settling higher grounds (cf. discussion: Dobrzańska *et al*. 2009, 169, 170; 2013, 374). Increased river activity in the mid-5th century AD to the 6th century AD (resulting e. g. in massive oak felling) was not an obstacle that could not be overcome.

It should be underlined that climatic fluctuations AD 450–700 might have had various impacts on local Early-Slavic communities in Europe, depending on the local environmental conditions. Settling the border zone between two different ecosystems – those of the loess terrace and the floodplain, was advantageous for groups struggling to secure alimentary needs. As Przemysław Urbańczyk notices (2023) people of the 6th and 7th century AD, living in the difficult conditions of abrupt climatic cooling, were forced to turn to simpler forms of the rural economy.

Translated by Jerzy Kopacz

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