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FIELD SURVEY AND MATERIALS

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# TRANSCARPATHIAN INTERCULTURAL RELATIONSHIPS OF THE LBK COMMUNITIES FROM THE SANDOMIERZ SETTLEMENT CLUSTER IN THE LIGHT OF NEW FINDINGS

**ABSTRACT**

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The article is an attempt to characterize and assess the intensity of far-reaching, intercultural contacts of the LBK community from the Sandomierz Upland and its northern foreland with the Eastern Linear cultural groups from the northeastern part of the Carpathian Basin. The basis for these considerations was the discovery of diagnostic material (pottery, obsidian products) from the Sandomierz region – in particular, from one of the largest inventories of this type in the Vistula basin: the settlement site Tominy 6. Important data in this context were also provided by products made of Chocolate and Świeciechów flints from the Świętokrzyskie Mountains Region discovered within the Transcarpathian zone. The entire collection of findings reveals the previously unknown and very large-scale bilateral, intercultural relations between the LBK communities of the Sandomierz settlement cluster and the younger phase of Alföld-LBK groups, especially the Bükk culture, settled in eastern Slovakia, or more precisely in the Košice Valley and East-Slovak Lowland.

Keywords: LBK, Alföld-LBK, Bükk Culture, intercultural relationships, pottery, obsidian, Chocolate and Świeciechów flints

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## INTRODUCTION

The permeation of Transcarpathian cultural interactions into areas located in the basins of the Vistula and Odra Rivers in the early Neolithic has been discussed in the literature on numerous occasions. Scholarly treatment of these interactions has ranged from cursory mentions or detailed source materials studies in publications about LBK sites (e.g. Kamieńska 1964, 138-139; Milisauskas 1986, 36, 145-150; Kadrow 1990a, tab. 1; Czekaj-Zastawny 2014, 68-72; Sebők 2014; Pelisiak 2014, 118-120; Tunia 2016) to discussion in literature on more extensive regional studies (Kulczycka and Kozłowski 1960; Kaczanowska 1976; Grygiel 1978; 2001; Godłowska 1982; Kadrow 1990b; Michalak-Ścibior 1992; Kaczanowska, Godłowska 2009; Szeliga 2009; Furmanek 2010; Czekaj-Zastawny and Rauba-Bukowska 2014; Kozłowski *et al.* 2014; Dębiec 2015; Kabaciński *et al.* 2015). The basis for consideration in this respect was the presence in LBK inventories of: ceramics ornamented in a stylistic convention typical of the Alföld-LBK and Bükk cultures and, on the other hand, artefacts made of imported obsidian. By far, the largest concentration of this type of finds has been recorded at sites located in the southern areas of the LBK settlement, in particular in the Rzeszów-Przemyśl clusters of settlement (e.g. Kaczanowska and Godłowska 2009, fig. 1; Szeliga 2009, fig. 1-4). Despite the considerable frequency of the mentioned elements in these areas, their presence within particular inventories was limited to usually several and only sporadically more numerous (Czekaj-Zastawny 2014, 68; Sebők 2014, Abb. 19-20) fragments of vessels, decorated in Eastern Linear style (mainly that of the Bükk Culture) and a small amount of obsidian, which generally did not exceed a few percent of the collective raw material assemblages of which it was a part (e.g. Kozłowski 1970, tab. 1; Balcer 1983, tab. 4; Kaczanowska 1985, Abb. 22; Milisauskas 1986, 145; Kaczanowska *et al.* 1987, 95). Only some inventories known from the Rzeszów region differ in this respect, often revealing much higher shares of this raw material (Kulczycka-Leciejewiczowa 1979, tab. 5, fig. 26; Kadrow 1990a, fig. 24: a-e; 1990b, fig. 14b; Szeliga 2009, tab. 1).

## ANALYSED AREA

In the Sandomierz Upland and its northern foreland, several dozen LBK sites are currently known, mainly concentrated within the central part of this mesoregion and in the areas extending along the edge of the Vistula valley (Fig. 1: C). The presence of the mentioned categories of findings in the local inventories was already noted a few decades ago, but until recently it was represented by a very small series of artefacts, acquired only on several such dated settlement sites (Podkowińska 1953, tabl. XVI: 6; Kamieńska 1964, tabl. XI: 1-11; XXX: 1; Rauhut 1970, fig. 3; Kowalewska-Marszałek 1993, tab. VI; 1996, tabl. III: 1-4, 6; Michalak-Ścibior and Taras 1995, ryc. 27: 21; Kulczycka-Leciejewiczowa 1973, 83; 1979, tab. 5, fig. 26; 2008, ryc. 18: 10; 28: 22; 41: 21). This picture is undoubtedly

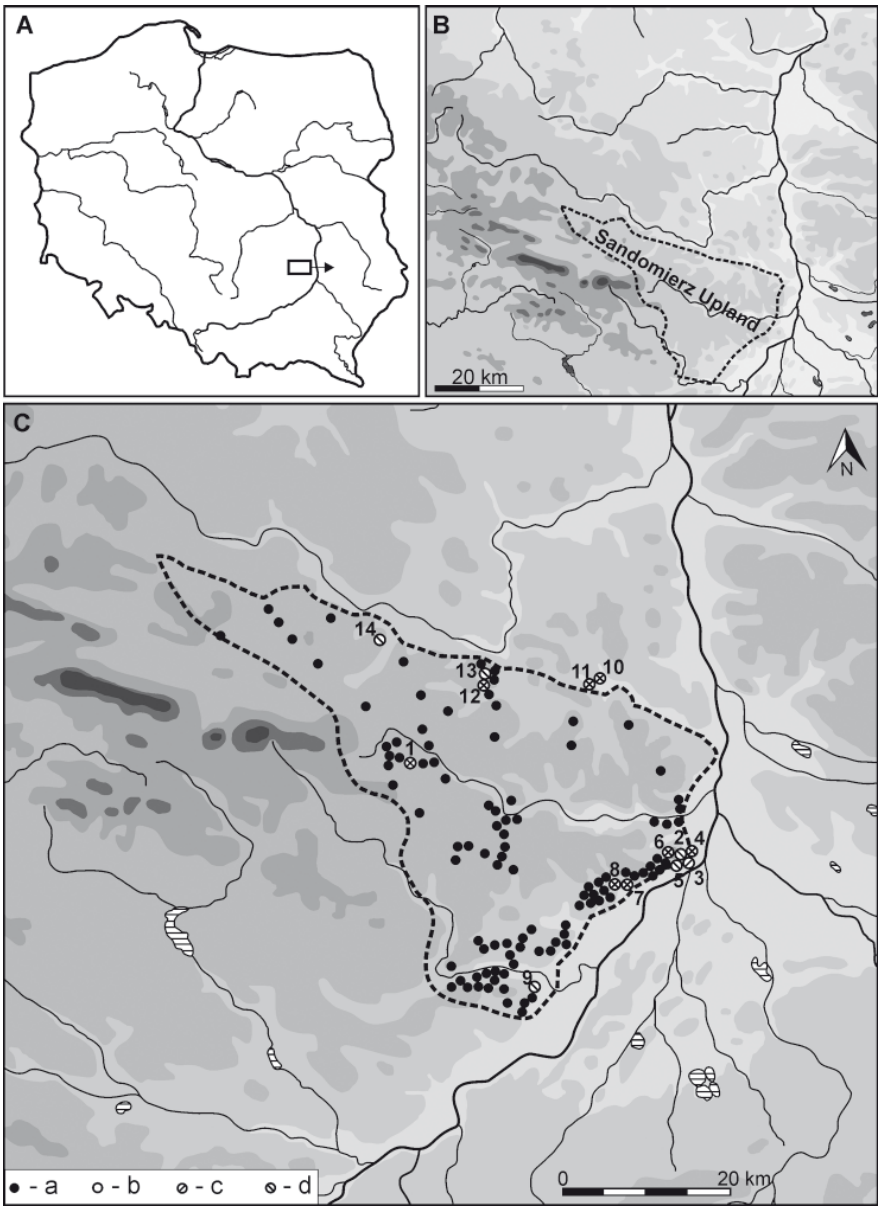


**Fig. 1.** Analysed area: A – general location; B – location and range of the Sandomierz Upland (by Kondracki 2002); C – location of the LBK sites within the Sandomierz Upland (after Czekaj-Zastawny 2008 with modifications): a – surface finds; b – excavated sites (1 – Jurkowice, site 1; 2 – Sandomierz, site 1; 3 – Sandomierz, site 3 (*Collegium Gostomianum*); 4 – Sandomierz, site 5 (*Żmigród*); 5 – Sandomierz, site 8 (*Krakówka*); 6 – Sandomierz, site 20 (*Kruków*); 7 – Złota, Grodzisko I site; 8 – Samborzec, site I; 9 – Trzebiesławice, site 1; 10 – Tominy, site 6; 11 – Tominy, site 12; 12 – Wólka Wojnowska, site 33; 13 – Jastków, site 46; 14 – Szewna, site 6); c – pottery of Eastern Linear groups; d – obsidian artefacts. Drawn by M. Szeliga

incomplete and, as it seems, understated, due to the small number of LBK sites excavated in this area (fig. 1: C). This is unequivocally confirmed by the results of excavations conducted in recent years within the northern part of the Sandomierz Upland. A particularly large collection of materials indicating intensive relations with the Eastern Linear cultural circle was acquired during the excavation research conducted at site no. 6 in Tominy (Ożarów municipality, Opatów district). The materials originating from this site will constitute an essential reference level during the considerations undertaken in this article.

## LBK SETTLEMENT IN TOMINY

Site 6 in Tominy is situated within the northern foreland of the Sandomierz Upland, about 1 km northeast from the edge of its compact loess cover (Fig. 2: A). In terms of physical geography, this area is a part of the Iłża Foothils mesoregion (Kondracki 2002, fig. 38). The range of the site covers the culmination and gentle, southwestern slope of small sandy-clay promontory, located on the eastern edge of the valley of the so-called Wyszmontowski Stream, a small watercourse escaping into the valley of the Czyżówka River (Fig. 2: A).

Rescue excavations on the site were carried out between 2006 and 2017 and led to the identification of an area of over 1ha and to the discovery of rich relics of diverse human activity from the Middle Palaeolithic up to modern times (Szeliga and Zakościelna 2007; Szeliga 2008; Szeliga *et al*. 2018). The most intensive phase of settlement at the site was connected with the LBK and represented by dozens of features, including relics of at least two longhouses (Fig. 2: B). Within these features, a very rich inventory of various kinds of artefacts was discovered – especially flints, the collective material structure of which revealed a definitive preponderance of local Turonian flints (especially Świeciechów flint) over other kinds of raw materials (Szeliga 2018, fig. 2). Based on the structure and abundance of this flint inventory, the site was interpreted as the first LBK production settlement, centered on exploitation of the local deposits of Turonian flints (Szeliga 2014, 87-88). This assemblage reveals a very clear similarity to the structure of collections known from other flintworking settlements, such as those in Kraków-Olszanica and in Vedrovice-Zábrdovice (e.g. Lech 2008, fig. 26). This functional interpretation of settlement in Tominy is also very important in the context of the issues discussed in the present article.

Among the remaining findings from Tominy, the most numerous category was definitely that of ceramic materials, which at the moment are represented by a collection of several thousand fragments of vessels. The stylistic variation of pottery ornamentation ranges from the early stage of the music-note phase (phase NI) to the classical stage of the *Želiezovce* phase (phase ŽII). The most dominant group of ceramics are decorated in the style of the late music-note phase (phase NIII), as well as in the style distinctive for the transition stage, between the classical and late LBK phases (corresponding to the diagnostic ceramic materials of the NIII/Ž1 phases; see Kadrow 1990a, 62; Dębiec 2015, 35-41).

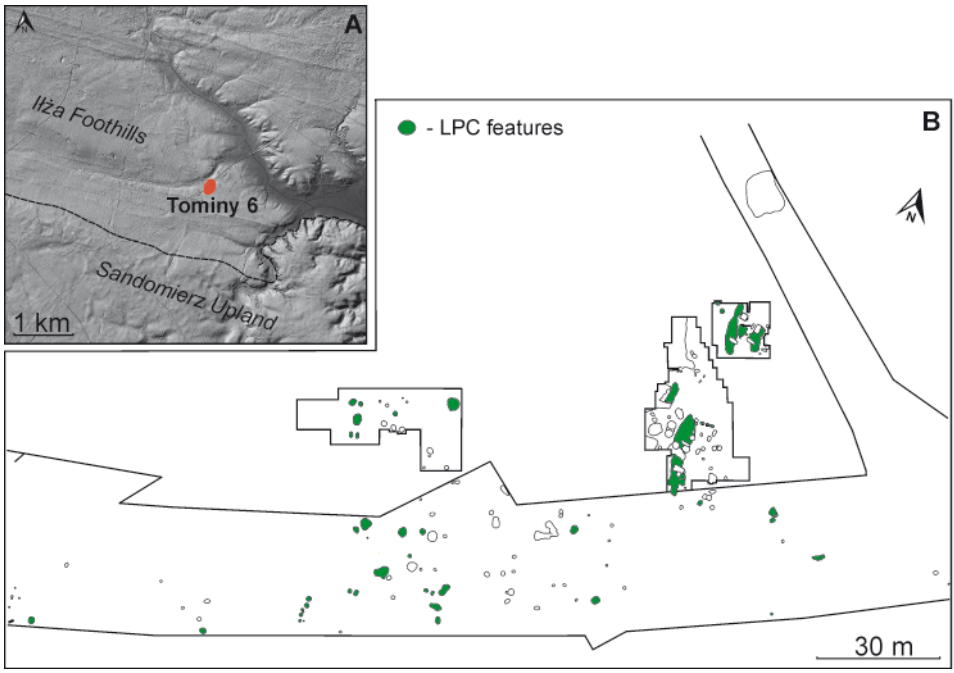


**Fig. 2.** LBK site no. 6 in Tominy: A – location of the site in relation to the northern edge of the loess cover of the Sandomierz Upland; B – area of site excavated in 2006-2017 and location of discovered LBK features. Drawn by M. Szeliga

The results of previous radiocarbon analyses from Tominy suggest settlement occupation by LBK communities between at least 5100 and 4800/4700 BC (Szeliga 2017, 441-444). It should be emphasized that in the light of data regarding the LBK chronology in Central Europe (e.g. Dolukhanov *et al.* 2005, 1448), the upper caesura of the quoted time interval is quite controversial, especially considering the only radiocarbon determination obtained for the wood tar sample from feature no. 105 (Szeliga 2017, tab. 1, fig. 6: 2). Regardless, the stated time interval partially corresponds with the late stage of development of this culture in Central Europe, together with the late stage of the music-note phase and the *Želiezovce* phase of its development in southeastern Poland (Kulczycka-Leciejewiczowa 2008, 106-108; Czekaj-Zastawny 2008, 116; 2014, 94, 104).

## POTTERY FROM TOMINY

The existence of intense contacts between the inhabitants of the settlement in Tominy and the areas of the Carpathian Basin are indicated by a large set of obsidian artefacts, and a collection of ceramic materials ornamented in a style typical for the Eastern Linear cultural circle. Such pottery is represented in total by a collection of 87 fragments and – along

with the inventories from Brzezie 17 (Czekaj-Zastawy 2014, 68) and Rzeszów 16 (Kadrow 1990a, tab. 1) – is one of the largest series of this type of finding currently known from the areas on the north side of the Carpathians. The variety of decorative motifs and techniques of their implementation bears the closest resemblance to the ornamentation style typical, first of all, for the Kapušany-Tiszadob group of the Alföld-LBK and the Bükk culture from eastern Slovakia and northeastern Hungary. The vast majority of such decorated ceramics (67 fragments) was discovered in the secondary bed, in the humus and deluvial layer, covering the majority of the site area (Szeliga and Zakościelna 2007, 11), and sporadically also in the fills of modern features. Only 20 pieces were discovered within the LBK features – as single artefacts (features no. 45, 50, 52, 53 and 94) or in a group of a maximum of 3 to 5 fragments (features no. 105, 107, 119, 164) jointly with the ceramics decorated mainly in the late music-note and/or early-*Želiezovce* style.

The first group of the discussed ceramics from Tominy includes the few fragments originating from various parts (mainly bodies) of very delicate, thin-walled vessels (mainly cups), presumably decorated on their entire surfaces with densely arranged, subtle engravings (Fig. 3: 1-11). These fragments reveal a large diversity of ornamental motifs typical for the Bükk culture, also within particular vessels. The preserved ornaments are represented by a variety of compositions of (usually co-occurring) straight, arched, wavy and zigzag incised lines (Fig. 3: 1-7, 9-11), and sometimes with the motif of an oblique grid (Fig. 3: 8). They find many exact analogies in the inventories of the pre-classical and classical phases of the Bükk culture (e.g. Aggtelek, Ardovo, Domica and Herman Ottó Caves, Borsod, Büdöspester, Hodejov, Košice part Šaca; see Tompa 1929, fig. III-V; Lichardus 1974; fig. 12: 1-6; 13: 1-6; Šiška 1999, fig. 2: 1-20).

Another group of findings includes the bottom parts of thin-walled vessels, ornamented with solid or dotted incised lines and combined techniques of rinsing and piercing placed just above the bottoms of the vessels in singular (Fig. 4: 5-7; 6: 11) or group (Fig. 4: 2-3, 8) arrangements. The bottom fragment of a thin-walled bowl discovered in feature No. 53 stands out among this category of ceramic finds; its decorations were made entirely of very delicate and thin dotted, incised lines (Fig. 4: 5). The bottom of the vessel was separated by a line, above which geometric patterns of straight and angular motifs – possibly including zigzags – were applied, though they are difficult to reconstruct. In turn, on the fragment from feature no. 52, the incised line was replaced with a row of quite deep, round pits, located on the edge of bottom (Fig. 4: 6). Similar compositions, in which ornamentation sequences were terminated above the bottoms of vessels or at their edges by ambient dotted lines or rows of punctures and pits, were also recorded on other fragments discovered outside features. In some cases they were accompanied by decorative layouts typical for LBK motifs, including various compositions of incised lines, supplemented with a few music-note pits located within the upper parts of the vessels (Fig. 4: 2, 4).

The termination of ornamental sequences above the bottoms of vessels by ambient incised lines, rows of punctured pits or incisions, placed on the bottom bend – as documented

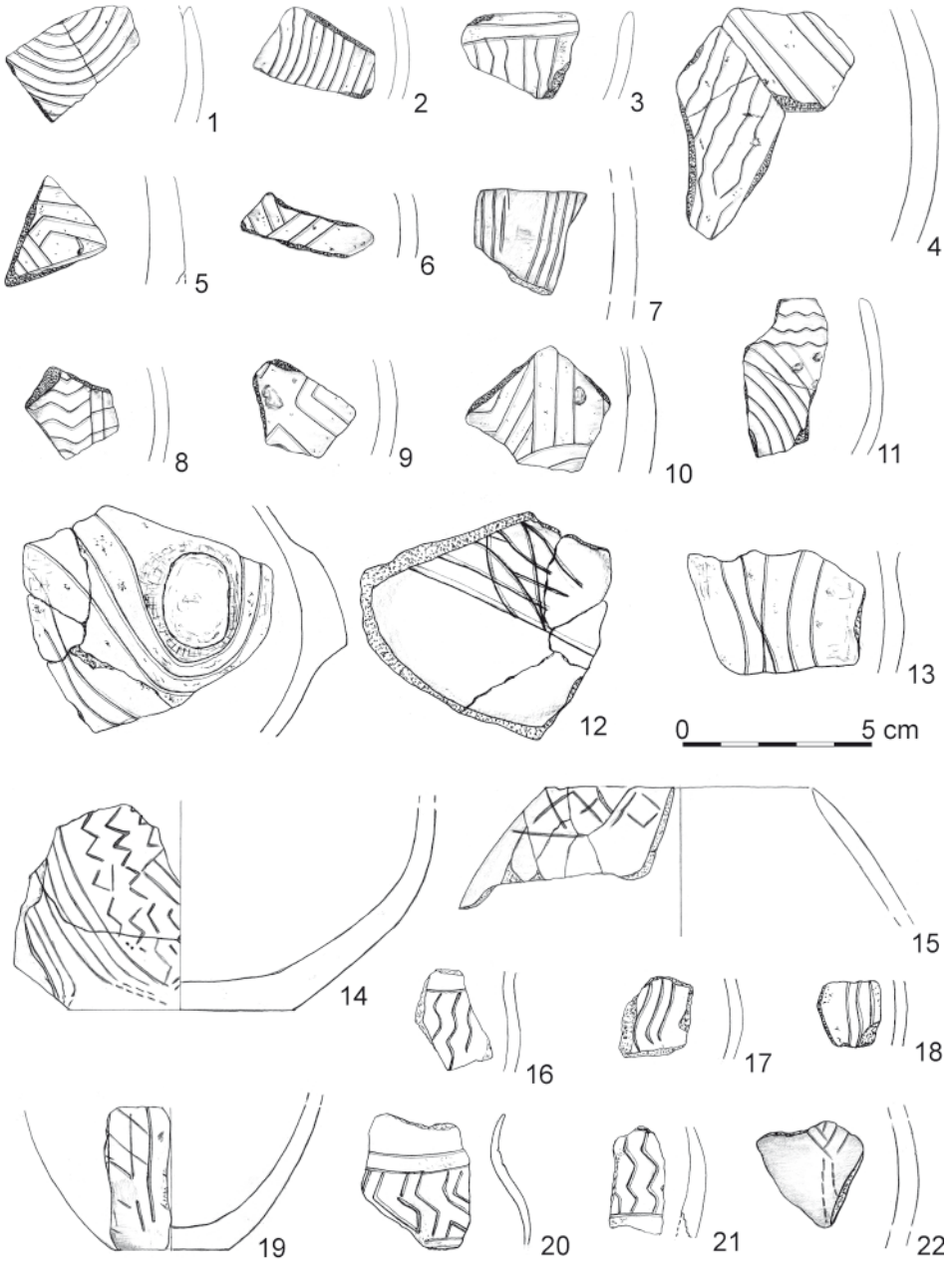


**Fig. 3.** Tominy, site no. 6: 1-22 – selection of ceramics decorated in the Eastern Linear style: 1, 5, 7, 9, 14-16, 19-22 – non-feature layers (14 – by Szeliga and Zakościelna 2007); 2, 8, 11 – feature no. 164; 3-4, 6, 10 – feature no. 119; 12-13, 18 – feature No. 105; 17 – feature no. 107. Drawn by K. Gawryjołek-Szeliga (1-13, 16-21), W. Zieliński (14-15, 19) and R. Joć (22)

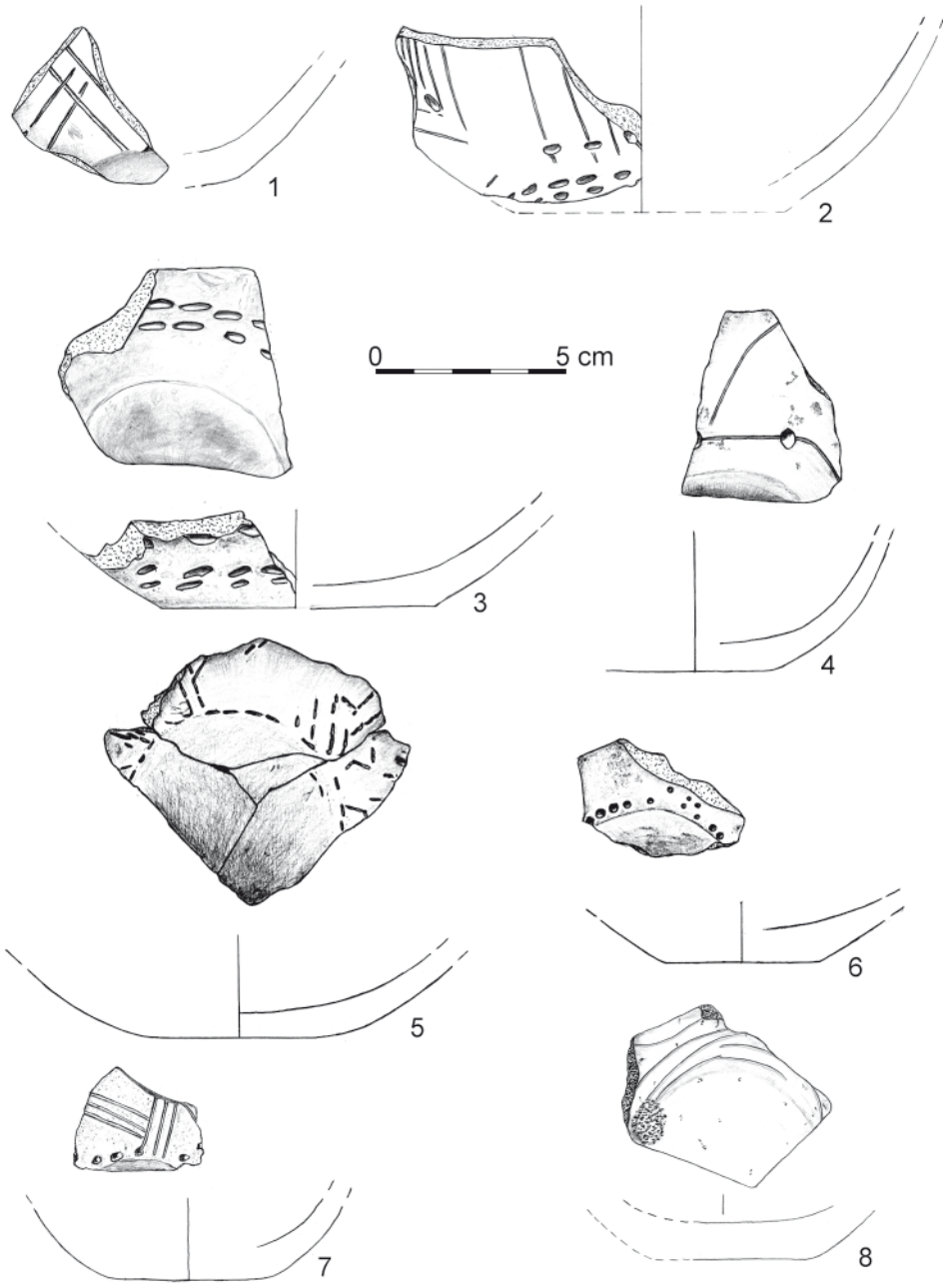


**Fig. 4.** Tominy, site No. 6: 1-18 – selection of ceramics decorated in the Eastern Linear style: 1-3, 7 – non-feature layers (2-3 – by Szeliga and Zakościelna 2007); 4 – feature no. 50; 5 – feature no. 53; 6 – feature no. 52; 8 – feature no. 119. Drawn by R. Joć (1, 3-6), W. Zieliński (2, 7) and K. Gawryjołek-Szeliga (2, 8)

in the Tominy collection – was a very characteristic way of composing decorations among the younger Eastern Linear groups. Ornamental examples analogous to the those from Tominy are known from numerous inventories of the Kapušany-Tiszadob and Raškovce groups (e.g. Lúčky-Pláne, Miskolc, Šarišské Michal'any, Smižany, Tiszavasvári – Keresztfal, Tiszavasvári – Paptelekhát; see Kalicz and Makkay 1977, fig. 35: 15-16; 60: 9; 79: 10; Šiška 1989, tab. 32: 10; 33: 15; 37: 9; Soják 1998, tab. 7: 6-8, 10; 8: 1, 6, 8), as well as from the pre-classical phase of the Bükk culture (e.g. Aggtelek, Ardovo Cave, Borsod, Büdöspester, Hnojné, Hodejov, Kopčany; see Tompa 1929, fig. III: 12, 16-17; XV: 5, 16, 22; Lichardus 1974, fig. 10: 10-12, 11: 6, 8; Šiška 1979, fig. III: 2, 7, 9-10, 15-16, 25-27; V: 18-19; VII: 15; VIII: 11-12; 1999, fig. 2: 8). In this cultural environment there are also numerous analogies to the other group of findings from Tominy, represented by fragments of the spouts of thin-walled vessels, decorated with various horizontal zigzag motifs. These motifs appear both in the form of single, continuous zigzag lines (Fig. 5: 6, 8-11, 15-17), as well as in the form of single, double or even triple zigzags composed of short, oblique incised lines (Fig. 5: 1-5, 7, 14; 6: 2). In some cases, horizontal zigzag motifs coexist with rows of dense and short, vertical incised lines located directly under the edge of the spout (Fig. 5: 6, 8), as well as horizontal, vertical or diagonal sequences of dotted lines, usually located below them (Fig. 5: 1, 6, 8-9; 6: 1), or with rows of punctures placed on the bodies of the vessels (Ffig. 5: 7, 9, 11). As in the case of the previously discussed bottoms, each of the above decorative arrangements of sub-spout vessel parts are also very characteristic for the Eastern Linear groups, and analogous to numerous inventories of both the Kapušany-Tiszadob group and the Bükk culture (e.g. Aggtelek, Ardovo Cave, Bodrogkeresztúr, Boldogkováralja – Tekeres-patak, Borsod, Büdöspester, Kenézlő, Kopčany, Prešov-Šarišské Lúky, Smižany, Spišský Hrhov – Kaštiel'; see Tompa 1929, Taf. VI: 6-14; VIII: 1-2, 5, 14; XII: 20; XIX: 1; XXIX: 6; XXXIV: 15; Lichardus 1974, Taf. 8: 1-6; 10: 1-2, 11: 3-4; Kalicz and Makkay 1977, fig. 99: 1, 36, 41; 100: 1; Šiška 1979, fig. VII: 3-4, 7; VIII: 3; X: 1; XIII: 5; 1989, tab. 21: 3; 22: 4; 23: 8; Soják 1998, tab. 1: 5; 2: 2, 5, 7). The same can be said for the infrequent fragments decorated with horizontally or vertically oriented rows of punctures, placed usually between single incised lines (Fig. 6: 9, 11). Occasionally, rows of punctures create independent linear compositions on the bodies of the vessels (Fig. 6: 8, 10, 12, 14). There are numerous fragments of vessels decorated in a similar way known from the Kapušany-Tiszadob group and the Bükk Culture (e.g. Ardovo Cave, Borsod, Boldogkováralja – Tekeres-patak, Büdöspester, Čierne Pole, Gánovce, Spišská Nová Ves; see Tompa 1929, fig. III: 11, 13; IV: 17; VI: 23; VII: 7; Lichardus 1974, fig. 10: 10; Kalicz and Makkay 1977, fig. 99: 24, 38, 47; 100: 13-14; 111: 8, 10-12; Šiška 1979, fig. III: 2, 7, 9-10, 15-16, 25-27; Soják 1998, tab. 14: 5, 8; 24: 7-9, 13), as well as the inventories of the Szarvas Érpart group (e.g. Szarvas-Érpart, Tarnabod-Templomföld, Tiszavasvári-Paptelekhát; see Kalicz and Makkay 1977, fig. 185: 7-9, 42-44). On one of these types of body fragments, the ornament covered not only the outer but also the inner surface of the vessel (Fig. 6: 13), which is also a frequent manner of ornamentation in the Eastern Linear

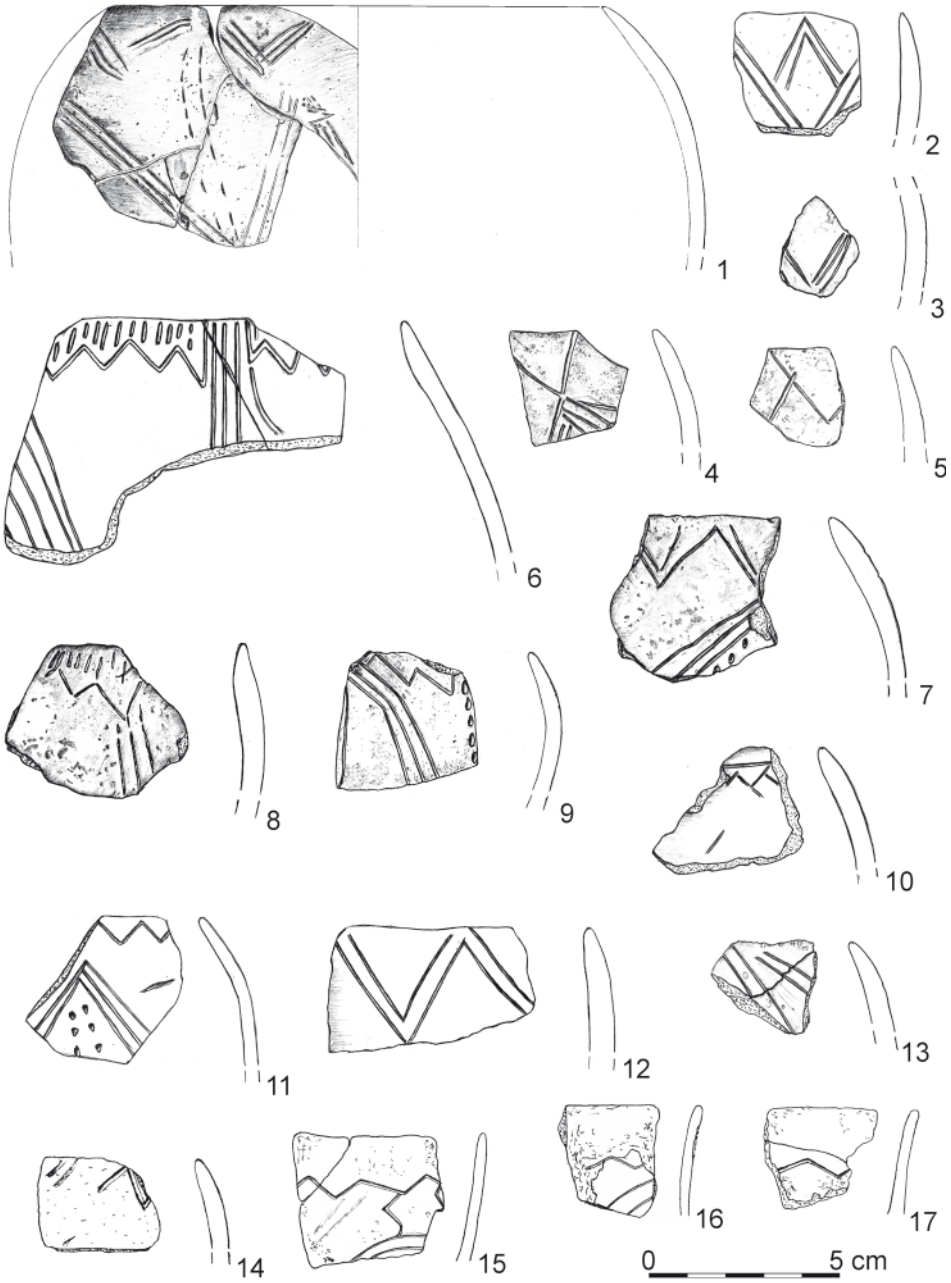


**Fig. 5.** Tominy, site no. 6: 1-17 – selection of ceramics decorated in the Eastern Linear style: 1 – feature no. 94 (after Szeliga 2008); 2-14, 17 – non-feature layers; 15 – feature no. 105 (by Szeliga 2017); 16 – feature no. 107. Drawn by R. Joć (1, 3-5, 7-9, 13), W. Zieliński (2, 6, 10, 14) and K. Gawryjołek-Szeliga (11-12, 15-17)

circle groups, including the Kapušany-Tiszadob group (e.g. Polgár-Kenderföldek; see Kalicz and Makkay 1977, fig. 90: 1-3).

In the context of the discussed issue, a similar, though quite peculiar example is the ornamentation of one of the partially reconstructed vessels, probably a cup. On this artefact, below the horizontal band of double incisions, encircled with single incised lines, a more complex vertical composition is visible, comprising on the one hand a triple row of punctures, and on the other, adjacent strips filled with alternating inclined, incised lines (Fig. 7). The occurrence of analogous bands of double incisions is quite common in inventories of the Kapušany-Tiszadob group (for example from the Miskolc, Prešov-Šarišské Lúky and Tiszavasvári – Keresztfal settlements; see Kalicz and Makkay 1977, fig. 31: 3, 5; 44: 4; Šiška 1989, tab. 23: 16; 25: 16). In turn, quite close analogies to the presented "herringbone" ornamental composition (very rare in the Tominy inventory; see Fig. 6: 13; 7), can be found among some fragments of vessels known from inventories of the Bükk culture (e.g. Borsod, Fuljanka, Kapušany, Smižany; see Tompa 1929, fig. III: 5; Šiška 1993, fig. 2: 6; 3: 13; Soják 1998, tab. 9: 4).

Another group of ornaments includes motifs of vertical zigzags (Fig. 3: 14, 20-21) or wavy lines (Fig. 3: 16-18) and an oblique chequered pattern (Fig. 3: 15, 19; 4: 1), located mainly on the bodies, and less frequently the spouts of thin-walled vessels. Very numerous analogies to these characteristic ornamental methods are known especially from inventories of the Kapušany-Tiszadob group (e.g. from Kenézlő, Miskolc, Prešov-Šarišské Lúky, Tiszadob-Ókenéz or Zemplinské Kopčany; see Kalicz and Makkay 1977, fig. 34: 1-2; 37: 1-3; Šiška 1989, fig. 23: 4, 7, 11; 24: 13, 17; 34: 6-7, 15). As it seems, this interpretation also concerns a fragment of a cup decorated with a motif of a closed oval field, made with an incised ornament (fig. 6: 16). Analogies to these decorative motifs, as well, are known from the inventories of the Kapušany-Tiszadob group (e.g. from Prešov-Šarišské Lúky or Miskolc; see Šiška 1989, fig. 22: 2; 25: 4; tab. 24: 4, 16; Kalicz and Makkay 1977, fig. 31: 23; 34: 5-9). Eastern Linear stylistic connotations cannot be entirely ruled out in the case of single fragments of bodies with knobs surrounded by a single incised line (Fig. 6: 17), as well as fragments of vessels decorated with a fairly simple composition consisting of a few crudely made incised lines, emphasizing the knobs located on the greatest body convexity (Fig. 1: 12). The relation between the first decorative motif with Eastern Linear circle influences was noted for the first time by Marta Godłowska (1982, 148), regarding this type of materials from Nowa Huta. Both decorative motifs are known from sites of the Kapušany-Tiszadob group and of the Bükk culture (e.g. from Aggtelek, Peder or Zemplínske Kopčany; see Tompa 1929, fig. XXIX: 3; Šiška 1989, fig. 28: 12, 32: 13).

The last group of ceramic findings includes the few fragments of cups decorated on their entire surfaces with small, conical knobs – that is, with a pseudo-barbotine ornament (Fig. 8: 1-5). In older literature, this type of ceramics was considered a characteristic element of the early stage of LBK development (e.g. Kulczycka-Leciejewiczowa 1979, 49-50). Among other things, materials from Tominy indicate a much longer chronology of this

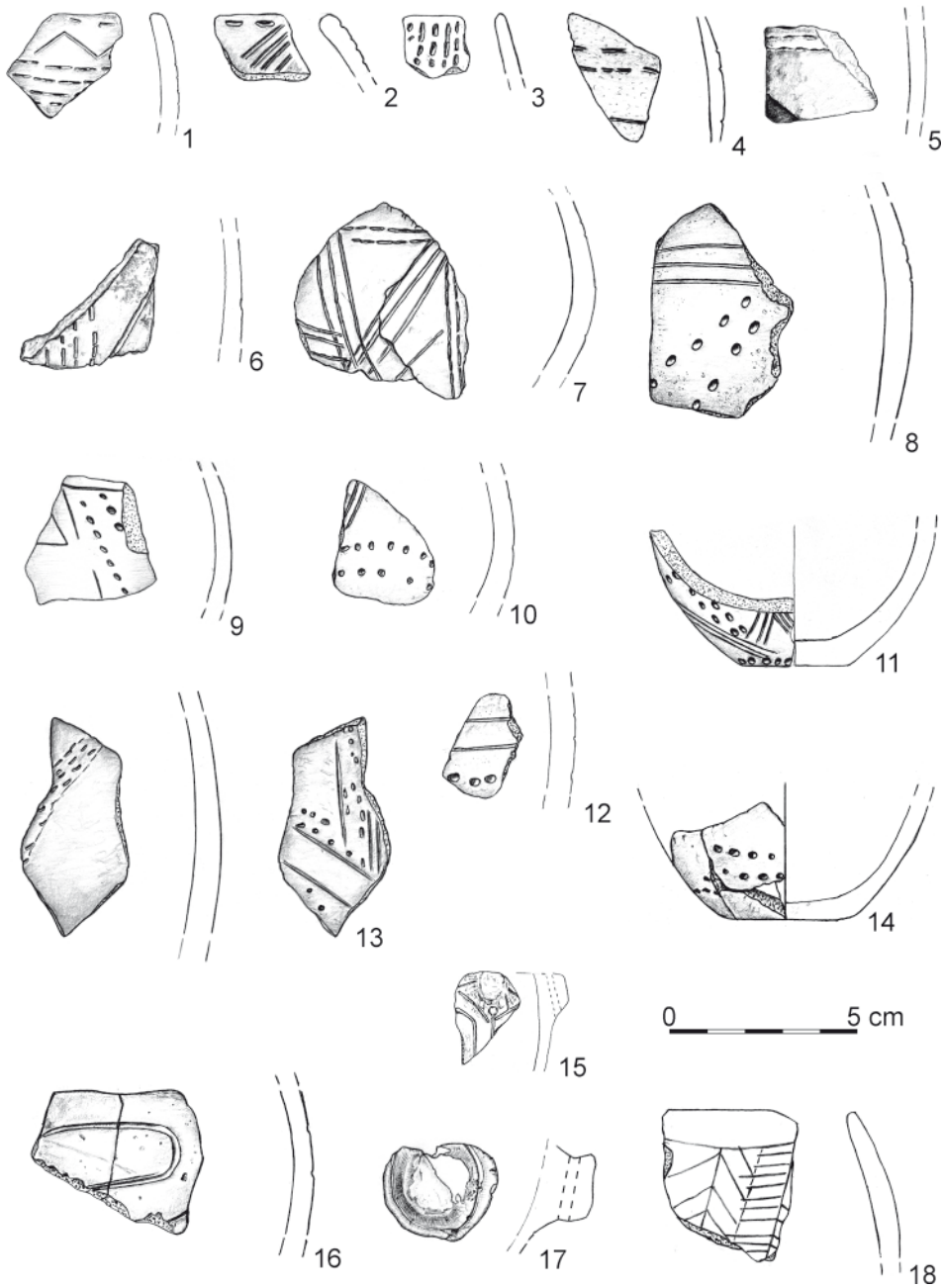


**Fig. 6.** Tominy, site no. 6: 1-18 – selection of ceramics decorated in the Eastern Linear style: 1 – feature no. 45; 2-14, 16-18 – non-feature layers (17 – by Szeliga 2008); 15 – feture no. 107. Drawn by R. Joć (1-2, 4-5, 12-14, 16), W. Zieliński (3, 10-11, 18) and K. Gawryjołek-Szeliga (6-9, 15, 17)

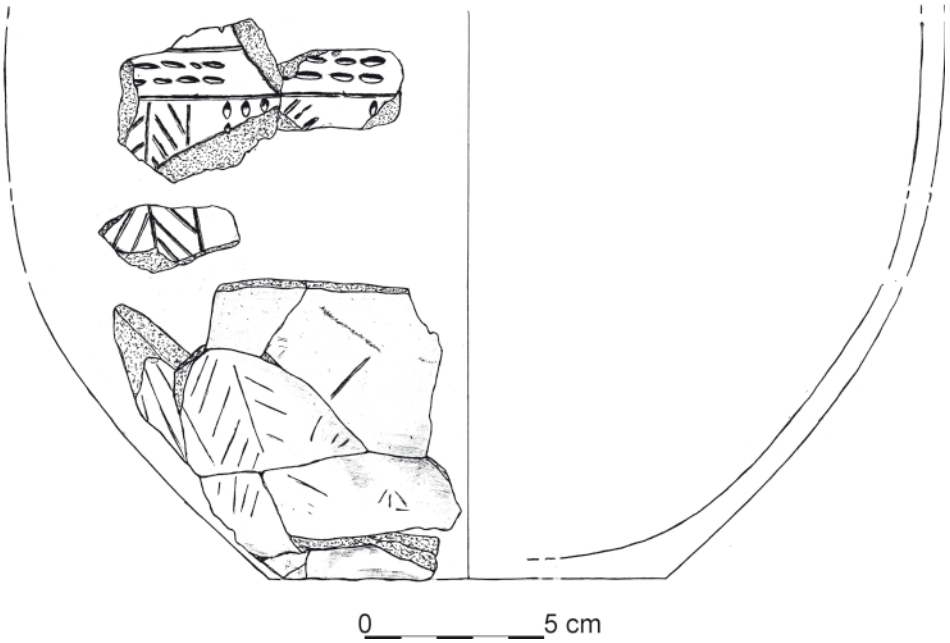


**Fig. 7**. Tominy, site no. 6: partially reconstructed vessel decorated in the Eastern Linear style, discovered outside the features. Drawn by W. Zieliński

type of decorations. Perhaps the same should also be considered with regard to the aforementioned influences of the Eastern Linear environment, as indicated by similar findings from sites of the Kapušany-Tiszadob group and Bükk culture (e.g. from Kapušany, Nagyecsed-Péterzug, Michalovce, Miskolc, Šarišské Michaľany, Tiszasas-Rév I; Váncsod; see Kalicz and Makkay 1977, fig. 2: 16; 36: 24; 120: 16; 148: 3; Šiška 1989, tab. 27: 10; 33: 6, 35: 12), as well as the Szakálhát group (Hódmezővásárhely – Szakálhát; see Kalicz and Makkay 1977, fig. 160: 12). The range of co-occurrence of such vessels with the note pottery is very wide, as evidenced by, among others, findings from Moldova (e.g. from Denchen'; see Larina 1999, fig. 63: 14). Incidentally, they originate from sites where the presence of pottery decorated in the Eastern Linear style was also found. (Larina 1999, fig. 74: 2; 76: 2: 80:1)

The briefly described collection of pottery from Tominy is supplemented by the much smaller series of ceramic findings acquired at other sites of the Sandomierz cluster of LBK settlement (fig. 1: C), or more precisely from Samborzec, site no. I (Kulczycka and Kozłowski 1960, fig. 5; Kamieńska 1964, tabl. XI: 1-11; XXX: 1; Kulczycka-Leciejewiczowa 2008, fig. 18: 10; 28: 22; 41: 21), Sandomierz, *Kruków* site (Michalak-Ścibior and Taras 1995, fig. 27: 21), Sandomierz, *Collegium Gostomianum* site (Kowalewska-Marszałek 1996, tabl. III: 1-4,

6), Złota, *Grodzisko I* site (Podkowińska 1953, tabl. XVI: 6; Rauhut 1970, fig. 3) and Jurkowice, site no. 1 (Podkowińska 1959, tabl. II: 5; VI: 1, fig. 8: a). In addition, this list should be supplemented with an indeterminate number of vessel fragments obtained from recently excavated sites in Szewna (site no. 6), Wólka Wojnowska (site no. 33) and Tominy (site no. 12), located at the northern edge of the Sandomierz Upland. These materials have not been published yet and are currently being developed, but on the basis of verbal information from the authors of the research, it is known that in all cases there are very few fragments of the vessels.

Compared to the collection from site 6 in Tominy, the presented findings reveal a much smaller diversity of the motifs characteristic of the Eastern Linear provenance. They are dominated by a variety of wavy and zigzag motifs, as well as straight or arched compositions of densely arranged incised lines (Fig. 9), revealing the greatest resemblance to the

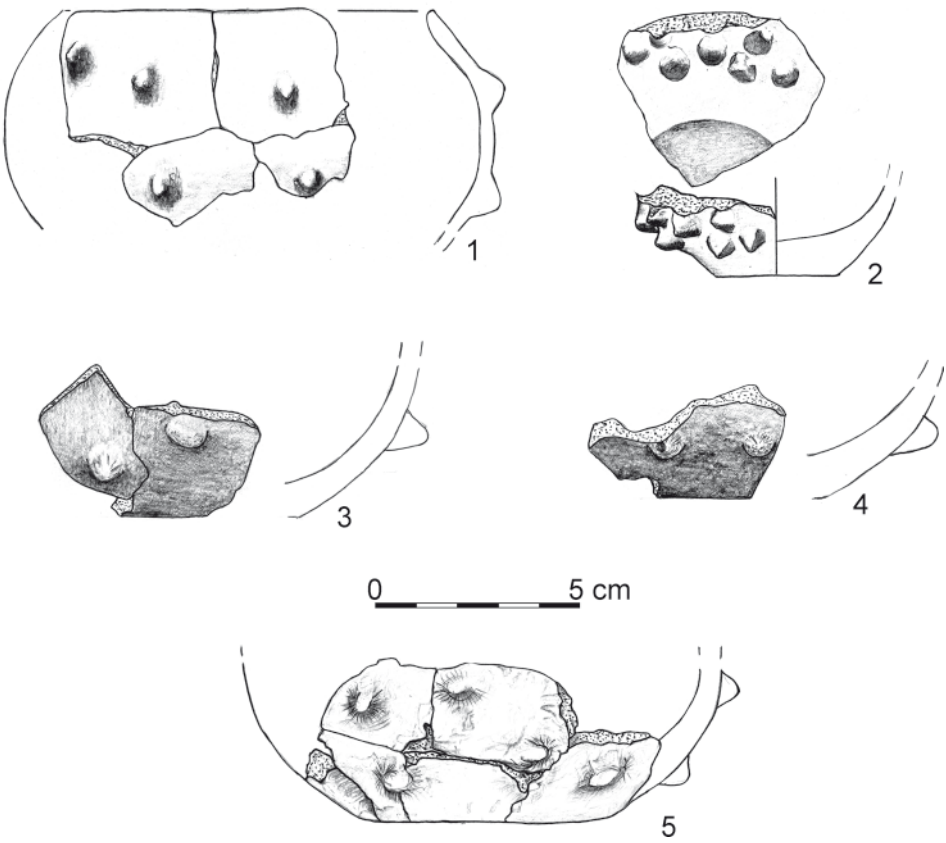


**Fig. 8.** Tominy, site no. 6: 1-5 – selection of vessel fragments with a pseudo-barbotine ornament from non-feature layers. Drawn by W. Zieliński (1-2, 5) and R. Joć (3-4)

ornamentation typical for the pre-classical and classical phase of the Bükk culture. The exception is a fragment of a vessel spout from Jurkowice (fig. 9: 1), having close analogies in the inventories of the Kapušany-Tiszadob group (e.g. Prešov-Šarišské Lúky, Tiszavasvári-Paptelekhát; see Kalicz and Makkay 1977, fig. 70: 8; Šiška 1989, fig. 25: 11.). This also applies in the case of shards with the ornament of wavy lines from Samborzec (Fig. 9: 10, 12, 15).

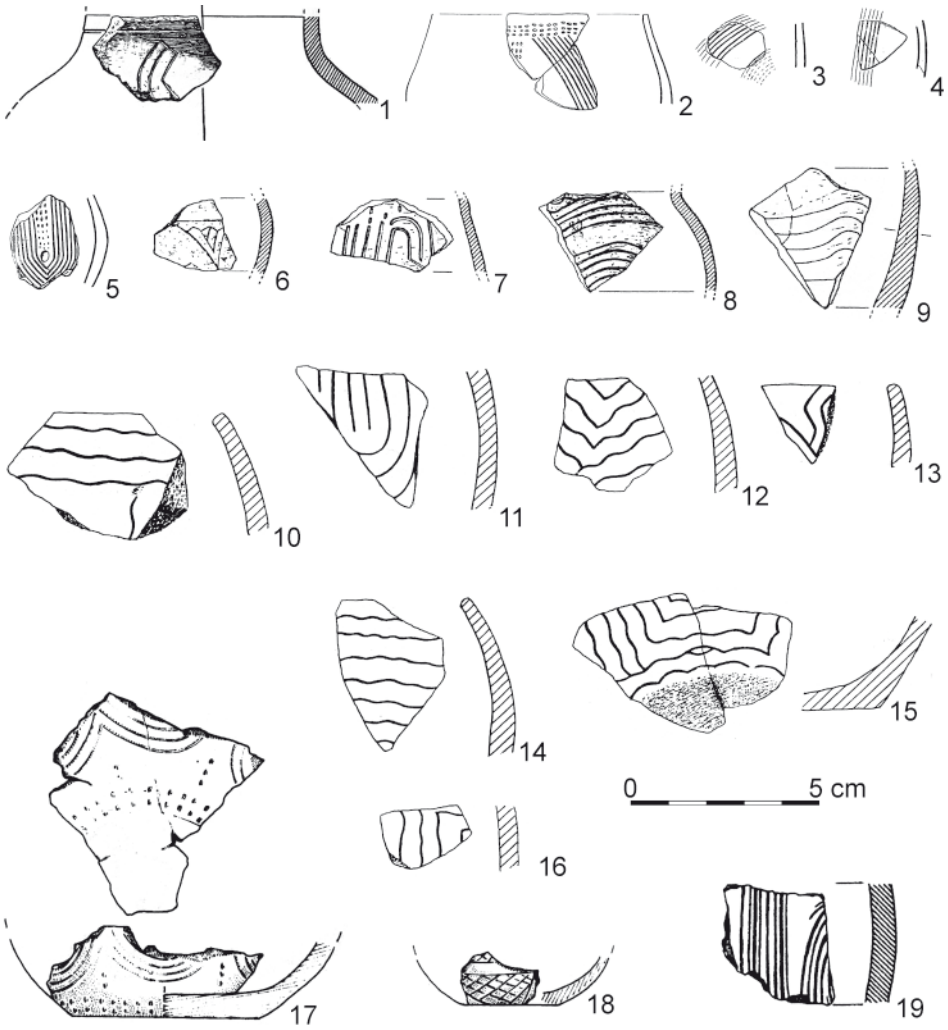


**Fig. 9**. Selection of ceramics decorated in the Eastern Linear style from the Sandomierz Upland LBK sites: 1 – Jurkowice, site 1 (after Podkowińska 1959); 2-5 – Złota, *Grodzisko*, site I (after Rauhut 1970); 6-9 – Sandomierz, site 3 – *Collegium Gostomianum* (after Kowalewska-Marszałek 1996); 10-18 – Samborzec, site I (after Kulczycka and Kozłowski 1960 and Kulczycka-Leciejewiczowa 2008); 19 – Sandomierz, site 20 – *Kruków* (after Michalak-Ścibior and Taras 1995)

## THE PROBLEM OF THE ORIGIN OF CERAMICS

Among the ceramic findings decorated in a manner characteristic for Eastern Linear groups, the presence of both fragments of vessels imported from Carpathian areas, as well as numerous local imitations created in the environment of music-note and *Želiezovce* LBK phases is pointed out in the literature (e.g. Kadrow and Rauba-Bukowska 2016, 66). The imported nature of some of the findings is indicated by their stylistic and aesthetic premises (e.g. Godłowska 1982, tabl. II: 23-24; Kaczanowska and Godłowska 2009, fig. 3: 3; 4: 4, 9-10; Tunia 2016, fig. 11-12), and especially the results of a few mineralogical and petrographic analyses made for pottery samples obtained on the settlements excavated in Lesser Poland (Kozłowski *et al.* 2014, 67-71; Rauba-Bukowska 2014, 462-463). The presented findings, originating from the Sandomierz cluster of LBK settlement, do not provide an unambiguous answer to the question of whether they can be interpreted as imports or only local imitations of the Eastern Llinear decorative methods. At the macroscopic level, the vast majority of the Tominy findings do not reveal any distinct technological differences in relation to the remaining LBK ceramics collections. In terms of their quality and accuracy of performance, some of the recorded ornaments clearly diverge from their Carpathian prototypes (e.g. Fig. 3: 12-15; 4: 8; 5: 7), which may indicate their local production. On some fragments, the presence of ornamental motifs typical for LBK and Eastern Linear groups was also recorded. Among them are a small number of fragments of vessels, the bottoms of which were surrounded by a single row or double rows of solid or dotted incised lines, and the bodies were decorated in the convention typical for the music-note style (Fig. 4: 2, 4).

The observations made on the collection from Tominy seem to reveal the clear preponderance of imitations of the Eastern Linear decorative style, as opposed to fragments of imported vessels. The possible presence of ceramic imports can be indicated, to the greatest extent, by a few fragments of thin-walled vessels, differing from the local LBK ceramics in terms of their production technology (lack of intentional temper) and their method of surface finishing (sometimes precise polish), as well as the quality and regularity of their decoration (sometimes very delicate, subtle incised lines). However, the question of the correct interpretation of the presented ceramic materials is still open. Perhaps it will be possible to resolve it by specific specialized, mineralogical and chemical analyses, the implementation of which is planned for the near future.

## OBSIDIAN

The second category of findings indicating contacts between the Sandomierz region LBK community and the Carpathian regions includes obsidian products. Their presence was recorded within the vast majority of excavated sites of this culture, and generally those with ceramics referring to the Eastern Linear style (Fig. 1: C). However, the number of

obsidian products within particular sites is generally very small and ranges from one (Jurkowice 1; see Podkowińska 1959, tabl. I: 1) to a maximum of a dozen (e.g. Sandomierz, site *Żmigród*; see Kowalewska-Marszałek 1993, tab. I) pieces. At the moment, the largest collection of obsidian artefacts was obtained at site 6 in Tominy and includes a total number of 118 pieces. Only 23 of them were discovered in the LBK features. The remaining ones were found within non-feature layers, as well as in the fillings of younger objects, related to the Bronze and Iron Age settlements. Despite this quite numerous series of findings, the share of obsidian in the collective raw material structure of feature materials has been estimated at less than 1% (Szeliga 2018, fig. 2), which indicates its minimal, and practically irrelevant, importance in the processing and production of tools. This low content corresponds to the frequencies of this raw material in most LBK inventories known from western Lesser Poland and Podkarpacie (e.g. Balcer 1983, tab. 4; Kozłowski 1985, 56-60; Milisauskas 1986, 145; Kaczanowska *et al.* 1987, 95; Kadrow 1997, fig. 18; Wilczyński 2014, 500). Only the shares recorded within certain sites known from the Rzeszów and Przemyśl regions diverge from these general trends (e.g. Kozłowski 1970, tab. I; Kulczycka-Leciejewiczowa 1979, tab. 5, ryc. 26; Kaczanowska 1985, Abb. 22; Kadrow 1990a, fig. 24: a-e; 1990b, fig. 14: b; Pelisiak 2014, tab. 14). This applies to inventories from both the music-note and the *Želiezovce* phase.

As regards the origin of the obsidian raw material known from the LBK sites in the Upper Vistula basin, the few previous analyses done have indicated the inflow of both the Slovak variety, Carpathian 1, and the Hungarian variety, Carpathian 2 (Milisauskas 1983, 172; 1986, 145, table 92). In the case of the Sandomierz region, only the Carpathian 1 variety was revealed by the analysis of the few obsidian artefacts from Tominy made by Prof. Maciej Pawlikowski. This suggests the relationship of the raw material with its outcrops located in the Slanské Hills and the Zemplén Mountains (Pawlikowski 2006). This is confirmed in an indirect way by the Prompt Gamma Activation Analysis (PGAA) conducted for the series of obsidian artefacts originating from Tominy (Z. Kasztovszky's analysis, in preparation), as well as from two LBK sites of Greater Poland (Kowalewko, site 14, Oborniki district) and Podkarpacie (Rudna Wielka, site 5, Rzeszów district), which identified its origin in an outcrop from a region close to Cejkov and Kašov in eastern Slovakia (Kabaciński *et al.* 2015, 10-12). This corresponds with the most recent assertions of A. Přichystal and P. Škrdla, indicating the location of the main Carpathian obsidian prehistoric outcrop in the area between Brehov, Cejkov and Zemplén (Přichystal and Škrdla 2014, 224). The dominant role of the *Carpathian 1* obsidian variety in the Neolithic, and at the same time the slightly lower importance of obsidian originating from outcrops in the Tokaj region (*Carpathian 2*), is also indicated by the results of geochemical analyses of a series of artefacts from LBK and STK sites from the Czech Republic (Burgert *et al.* 2016, 234).

The diversity of available obsidian finds allows us to assume an inflow of obsidian into the Sandomierz cluster of LBK settlements, at least in the form of pre-prepared blade cores. An example of this can be found in a single platform blade core with a circumferential flaking face and a carefully prepared striking platform found in Tominy (Szeliga 2009,

tabl. I: 6). Despite many attempts, no refittings have been obtained with the remaining obsidian products discovered at the site. This allows us to assume with a high probability that this piece arrived in the settlement in Tominy in that form. However, the lack of obsidian concretions within the LBK inventories from the Sandomierz Upland does not preclude the possibility of an influx of obsidian in this form as well. It is indirectly indicated, on the one hand, by finds from not-so-distant clusters of LBK settlement in western Lesser Poland and Podkarpacie (e.g. Kozłowski 1970, 89; 1974, 9; Kaczanowska 1971, 14; 1985, 65; Kadrow 1990a, 49), and on the other hand, by the presence of completely cortex blades and flakes, and the state of preservation of some of the blade cores (Michalak-Ścibior 1992, fig. 8: 16; Szeliga 2009, 298, tabl. II: 8).

The concretions and cores were subjected to basic processing on site, focused primarily on the production of small-sized blades (Kozłowski 1970, 79-81; Balcer 1983, 70; Szeliga 2009, 292-294). This is indicated by the collective morphological structure of the Tominy inventory. The blank blades are a dominant category within it, which is represented primarily by various fragments, and to a much lesser extent, by whole pieces. This suggests that at least some of the blades were intentionally broken, analogously to the case of blades obtained from flint cores (e.g. Kaczanowska 1971, 11; Balcer 1983, 74). The entirely preserved blades are usually small and only occasionally longer than 40 mm. This corresponds closely with data from other LBK sites of southern and southeastern Poland (e.g. Kaczanowska 1971, 14; Milisauskas 1983, 172; 1986, 145; Pelisiak 2014, 118-119). The second largest group of finds are flakes and chips, mostly remnants of various repairs or preparatory works undertaken on blade cores, and only sporadically intentionally obtained blanks, acquired only during the secondary exploitation of blade cores (Szeliga 2009, 294). Blades, and sometimes also flakes, were only sporadically transformed into morphological tools. In the collection from Tominy, 15 retouched tool forms were recorded, represented mainly by retouched blades, endscrapers and truncated pieces, and to a much lesser extent by retouched flakes and a single perforator (Szeliga 2009, tabl. III: 5-6, 9-13, 18). Paradoxically, this is a very large series of such products in comparison with other LBK sites from the areas on the north side of the Carpathians, where retouched tools are usually represented by a maximum of several pieces (e.g. Balcer 1983, 70; Kadrow 1990a, fig. 26: a; Gruszczyńska 1992, 123; Pelisiak 2014, tab. 14-15; Wilczyński 2014, 500), and very rarely by more numerous collections (Milisauskas 1986, tab. 93-94).

## FLINTS FROM THE ŚWIĘTOKRZYSKIE MOUNTAINS REGION

At present, obsidian products round off the list of finds of Carpathian provenance known from the area of the Sandomierz cluster of LBK settlement. However, this is not the only proof of intense contact between the local music-note and *Želiezovce*-phase LBK communities with the Transcarpathian groups of the Eastern Linear cultural circle. This is

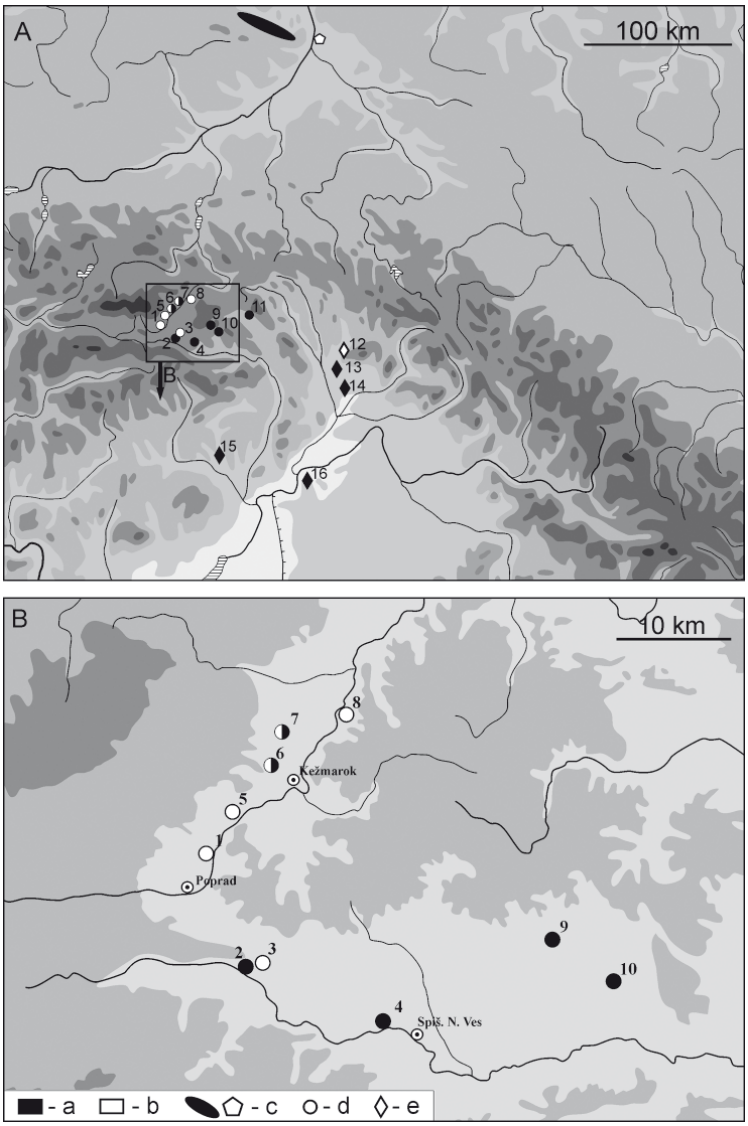


**Fig. 10.** Dispersion of artefacts made of flints from the Świętokrzyskie Mountain Region in E Slovakia and NE Hungary (A) and within the Spiš region (B): a – chocolate flint; b – Świeciechów flint; c – outcrops of both flint raw materials; d-e – archaeological sites (d – LBK, e – Alföld-LBK and Bükk cultures): 1 – Poprad-Matejovce, *Nad kopčekom I* site; 2 – Spišský Štiavnik, *Sedliská I* site; 3 – Spišský Štiavnik, *Nad rybníkom* site; 4 – Spišská Nová Ves/ Smižany, *Smižanska roveň* site; 5 – Vel'ká Lomnica, *Na Kopci* site, *(Šibeničná Hora)*; 6 – Strané Pod Tatrami, *Pod Kamenným vrchom I* site; 7 – Rakúsy/Spišská Belá, *Kahlenberg (Stirn)* site; 8 – Krížová Ves, *Družstevné lúky* site; 9 – Jablonov, *Rybník* site; 10 – Žehra, *Hlinky I* site; 11 – Šarišske Michal'any; 12 – Humenné, *Pod Sokolom* site; 13 – Moravany; 14 – Male Raškovce; 15 – Borsod-Edeleny; 16 – Balsa-Fecskepart. After Kaczanowska 1985; Kaczanowska *et al*. 1993; Biró 1998; Soják 1999; 2000a, 2000b; 2001; 2003; Kaczanowska *et al*. 2002; Kaczanowska and Kozłowski 2002

clearly indicated, albeit in an indirect way, by artefacts made of flints from the Świętokrzyskie Mountains Region discovered in eastern Slovakia and northeastern Hungary. Currently, at least a dozen sites are known in this region, where the presence of Chocolate or Świeciechów flint products were recorded, both in the context of LBK ceramics as well as ceramics from groups of the Eastern Linear cultural circle (Fig. 10: A-B).

The region of the highest concentration of this type of find is the area of Spiš. At least ten LBK sites are known from this area, on which products made of both mentioned raw materials were obtained (Fig. 10: A). Only a small fraction of them were discovered during archaeological excavations, while the vast majority were collected during surface surveys conducted in recent years by F. Javorski and M. Sojak in the Poprad, Kežmarok, Spišská Nová Ves i Levoča districts (Fig. 10: B). Despite this, the relation between particular sites and the LBK is not in doubt. This is indicated by both the morphological and metric features of the distinct products, as well as the accompanying ceramic materials. At the majority of the sites, ceramic imports of the Kapušany-Tiszadob group and the Bükk culture were present, in addition to the dominant ceramics decorated in the music-note and (to a lesser degree) *Želiezovce* styles (e.g. Soják 1998, 111-115; 2000a, 252-261).

Four sites located in the eastern part of Slovakia and the northern part of Hungary, within the settlement zones of the Alföld-LBK and the Bükk culture, complete the list of discused Carpathian discoveries (Fig. 10: A). A few collections of Świeciechów and Chocolate flint products – containing from 1 to a maximum of several pieces – were obtained from particular Slovak-Hungarian sites of various archaeological cultures. The total share of both types of flint in the collective raw material structures of particular inventories has never exceeded 3% (Soják 1999, tab. 1; 2000a, 211). This indicates the minimal, and virtually irrelevant, importance of both raw materials in the local processing and production of tools. Within the Spiš cluster of LBK settlement, Jurassic-Cracow flint is the preferred material for basic production. This is very well illustrated by the inventory from Strané pod Tatrami, where the total share of this raw material was estimated at over 70% (Soják 1999, 96-97, tab. 1). On the other hand, in the areas occupied by the Eastern Linear groups (for example at the site in Humenne), local raw materials, especially obsidian, cherts and sometimes radiolarites, are the dominant materials of production (e.g. Kaczanowska 1985, 47; Kozłowski 1989, tab. 1, 8). In addition to the minimum percent frequency, in the discussed areas a current findings of Świeciechów and Chocolate flints revealed a very small degree of morphological diversity, limited almost exclusively to blades, flakes and retouched tool forms (Kaczanowska *et al.* 1993, fig. 9: 4; Biró 1998, 38, 49; Soják 1999, fig. 1: 17, 27; 5: 230; 6: 231; 2000a, 252-261, tabl. LIV: 14; LVI: 1; LVIII: 15, 30; LX: 8; Kaczanowska and Kozłowski 2002, Pl. 4: 16; Kaczanowska *et al.* 2002, tabl. V: 3).

Obviously, the presence of Chocolate and Świeciechów flint products in eastern Slovakia and northeastern Hungary does not prove the existence of direct contact between

local communities and communities of the Sandomierz LBK groups who are settled near outcrops of both these raw materials. The current understanding of the distribution of both types of flints in the early Neolithic suggests that the inflow of products made of these materials to the Carpathian areas was mediated by much closer LBK settlement regions. A leading role was probably played by the communities of the Rzeszów cluster. Previous data indicate that these communities were the most important (and the only ones in SE Poland) direct recipients of flint raw materials from the Świętokrszyskie Mountains Region, (especially Świeciechów flint), as well as intermediaries who controlled their redistribution to more distant areas, including Transcarpathian ones (Szeliga 2014, 97-98, fig. 8). This also applies to the inflow of Carpathian obsidian to the northern foreland of the Carpathians. In the case of this raw material, the Rzeszów cluster of the LBK is also the zone of its most intense inflow, while at the same time it is the primary hub for the further distribution of this flint to more distant areas in the upper and middle Vistula basin (Szeliga 2009, 305). The issue of the possible role of the Spiš LBK community in the distribution of the Chocolate and Świeciechów flints into the areas of Eastern Linear settlement in the Eastern Slovak Lowland on the one hand, and in the distribution of obsidian to the Podkarpacie area on the other hand, is obviously open, but nevertheless seems to be minor compared to dominant role of the Rzeszów region.

Recognition of the Rzeszów LBK cluster as the (intermediary) origin of the raw materials from the Świętokrzyskie Mountains Region discovered at Transcarpathian sites is most probable in the light of the current state of research, both in relation to the Spiš area and the Eastern Slovak Lowland. However, the main and stimulating role in the distribution system of Świętokrzyskie Mountain flints was played by the communities of the Sandomierz cluster, or more precisely the communities inhabiting the northern part of the Sandomierz Upland, and especially the areas of its northern foreland. This is indicated by the presence in these areas of production centres, similar to the settlement in Tominy, which are situated in the direct vicinity of the outcrops, and by the processing of local raw materials (especially Turonian flints) on a mass scale, not seen anywhere else (Szeliga 2014, 97-98; 2018, 378-381). These communities played a dominant role in the distribution of all possible production surpluses (among others: pre-cores, cores, blades or tools) to groups inhabiting clusters more distant from the outcrops – mainly, but not only, to the aforementioned Rzeszów cluster (Szeliga 2014, 97). At the same time, the north-Sandomierz LBK cluster was in a very high position as part of an extensive system of territorial distribution of flint and obsidian raw materials, functioning from the music-note phase on both sides of the Carpathians, and based on exchange conducted within a few basic intermediary stages (e.g. Lech 2003, fig. 5-6). This position is very clearly confirmed, on the one hand, by the largest concentration of obsidian artefacts, as well as potential imports and stylistic imitations of Eastern Linear ceramics at Tominy, and on the other hand, by their widespread, though not so numerous occurrence in the other sites of this region (Fig. 1: C).

## CONCLUSIONS

The data provided above allow us to make a few of the most important conclusions on the interregional and intercultural contacts of the Sandomierz cluster of LBK settlement with the groups of the Eastern Linear cultural circle:

Products made of Carpathian obsidian and/or ceramics bearing ornamentation styles typical for the Eastern Linear cultural groups have been found at nearly all currently excavated LBK settlements from the Sandomierz Upland and its northern foreland (fig. 1: C). At the moment, the highest concentration of both these categories of findings has been recorded at the settlement in Tominy. Diversification of the ornamentation style on ceramic materials from the Sandomierz cluster of settlement allows for their connection with a relatively narrow horizon of the Eastern Linear influences, running – as it seems – with varying intensity within two consecutive stages. The older, initial episode – correlated with the NII and NIII phases of local LBK stylistic development – included fairly weak influences of the Alföld-LBK younger phase, or more precisely the Kapušany-Tiszadob and Raškovce groups, manifesting in the small amounts of obsidian inflow and the presence of a few, unambiguous stylistic references in the ornamentation of vessels. This stage is most clearly visible in the case of finds from Jurkowice (Fig. 9: 1), and to a much lesser extent, from Samborzec (fig. 9: 10, 12, 15). Significant intensification of contacts with the Transcarpathian zone took place from the turn of the music-note and *Želiezovce* phases (NIII-ŽI) and in the early and classical *Želiezovce* phases (ŽI-IIa), relating with the Bükk culture pre-classical and classical phases (A/B and B according to Lichardus 1974). The vast majority of finds of Transcarpathian provenance at Tominy, as well as at other LBK sites in the Sandomierz region, is related with this stage. This identification corresponds very well with the assessments made for the remaining areas of southern and southeastern Poland (e.g. Kadrow 1990a, 61-63, fig. 26: c; 1990b, fig. 14; Czekaj-Zastawny 2014, 100; Kozłowski *et al.* 2014, 70-72; Sebők 2014, 80).

Regardless of the different dynamics of the Transcarpathian influences over the LBK development, the scope of the diversity of Eastern Linear ornamental motifs from the Sandomierz sites enables us to identify their "starting area" primarily with the areas of eastern Slovakia, or more precisely the Košice Valley and the Eastern Slovak Lowland. Such identification, of course, does not exclude the possibility of impacts of other Eastern Linear cultural groups from the northeastern part of the Carpathian Basin, as postulated for other LBK clusters in the upper Vistula basin. (e.g. Esztár, Szakálhát, Szamos, Szarvas-Érpart, Szilmeg; see Zakościelna 1988, 9, fig. 2; Kadrow 1990a, 62-63; 1990b, 55-56; Kozłowski *et al.* 2014, 71; Sebők 2014, 80-81). At the moment, however, the analysis of the diagnostic materials from the sites in the Sandomierz region justifies linking the main zone of impact primarily to the above-mentioned lowland areas of eastern Slovakia. This interpretation remains in line with previous suggestions for materials from western Lesser Poland, including those from Brzezie or the Nowa Huta region (Godłowska 1982, 148; Czekaj-

Zastawny 2014, 72). This is also confirmed by the results of the latest PGAA obsidian analyses (Kabaciński *et al.* 2015, fig. 3), as well as by the pattern of dispersion of products of Chocolate and Świeciechów flints in the northeastern part of the Carpathian Basin (Fig. 10: A).

The presence of vessel fragments imported from the Carpathian area among the discussed ceramic materials cannot be excluded. This applies above all to the forms clearly deviating, in terms of the production manner and the style of decorating, from the local LBK ceramics. We are optimistic that this problem may be solved through the use of detailed chemical and mineralogical analyses of in the near future. Irrespective of this, some of the presented ceramic materials are probably "only" local imitations of the Eastern Linear ornamentation style. This applies in particular to the sherds ornamented with motifs typical of both cultural circles (Fig. 4: 2, 4), as well as those ornamented in a much less careful manner in relation to analogous prototypes from "genetic" areas, and at the same technologically identical to the local LBK ceramics (e.g. Fig. 3: 12-15). However, this is only a general and subjective evaluation of the available materials. The presence of potential vessel ornamentation imitations in the Tominy collection may indicate a more complex nature of Transcarpathian intercultural relations, taking place in the music-note and *Želiezovce* phases of the LBK development. Bearing in mind the relatively dominant role of women in vessel production, as suggested for non-literate societies (e.g. Vincentelli 2000, 170-175), the occurrence of Eastern Linear motifs in the LBK decoration style may indicate the presence of individuals (especially women) from the northeastern part of the Carpathian Basin, as a result of migration and/or marriage exchange. M. Furmanek (2010, 192) also drew attention to the possibility of such an interpretation based on the analysis of ceramic materials from site no. 17 in Dzielnica. Regardless of this, the number and diversity of presented finds indicates the existence of strong and lasting cultural ties between the communities of the Sandomierz LBK cluster and the Eastern Linear communities at the turn of the 6$^{th}$ and 5$^{th}$ millennia BC. These interactions and interregional contacts were bilateral in nature, running under a system of far-reaching and multi-stage distributions of goods, functioning from the music-note phase in vast areas on both sides of the Carpathians, including southeastern Poland and neighbouring areas. An overriding and inspiring role in these relations was played by production centres concentrated in the vicinity of outcrops of raw materials (Chocolate flint and Świeciechów flint within the northeastern margin of the Świętokrzyskie Mountains, as well as *Carpathian 1* obsidian in the area of Kašov-Cejkov-Brehov-Zemplin), simultaneously with the great importance of LBK settlement clusters located between them (especially clusters near Rzeszów and in Spiš).

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## References

Balcer B. 1983. *Wytwórczość narzędzi krzemiennych w neolicie ziem Polski*. Wrocław, Warszawa, Kraków, Gdańsk, Łódź: Zakład Narodowy im. Ossolińskich.

Biró K. T. 1998. *Lithic implements and the circulation of raw materials in the Great Hungarian Plain during the Late Neolithic period*. Budapest: Hungarian National Museum.

Burgert P., Přichystal A., Prokeš L., Petřík J. and Hušková S. 2016. Původ obsidiánové suroviny v pravěku Čech. *Archeologické rozhledy* 68, 224-234.

Czekaj-Zastawny A. 2008. *Osadnictwo społeczności kultury ceramiki wstęgowej rytej w dorzeczu górnej Wisły*. Kraków: Instytut Archeologii i Etnologii PAN.

Czekaj-Zastawny A. 2014. *Brzezie 17. Osada kultury ceramiki wstęgowej rytej* (= *Via Archaeologica. Źródła z badań wykopaliskowych na trasie autostrady A4 w Małopolsce* 9). Kraków: Krakowski Zespół do Badań Autostrad, Instytut Archeologii Uniwersytetu Jagiellońskiego, Instytut Archeologii i Etnologii PAN O/Kraków, Muzeum Archeologiczne w Krakowie.

Czekaj-Zastawny A. and Rauba-Bukowska A. 2014. Technology of the earliest vessels in the upper Vistula river basin – Imports against Local Production. In T. L. Kienlin, P. Valde-Nowak, M. Korczyńska, K. Cappenberg and J. Ociepka (eds), *Settlement, Communication and Exchange around the western Carpathians. International workshop held at the Institute of Archaeology, Jagiellonian University, Kraków October 27-28, 2012*. Oxford: Archaeopress, 95-107.

Dębiec M. 2015. Zur relativen Chronologie der Linienbandkeramik in Südostpolen, *Sprawozdania Archeologiczne* 67, 31-56.

Dolukhanov P., Shukurov A., Gronenborn D., Sokoloff D., Timofeev V. and Zaitseva G. 2005. The chronology of Neolithic dispersal in Central and Eastern Europe. *Journal of Archaeological Science* 32, 1441-1458.

Furmanek M. 2010. Wczesnorolnicze społeczności dorzecza górnej i środkowej Odry i ich związki kulturowe z obszarami zakarpackimi (ok. 5500/5300 – 4600/4500 BC). In J. Gancarski (ed.), *Transkarpackie kontakty kulturowe w epoce kamienia, brązu i wczesnej epoce żelaza*. Krosno: Muzeum Podkarpackie w Krośnie, 175-202.

Godłowska M. 1982. Nowohucki zespół osadniczy na tle wpływów południowych we wczesnym i środkowym neolicie Małopolski. *Wiadomości Archeologiczne* 47, 143-159.

Gruszczyńska A. 1992. Sprawozdanie z badań wykopaliskowych na osadzie neolitycznej w Łańcucie w latach 1985-90. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego za lata 1985-1990*, 119-130.

Grygiel R. 1978. Z problematyki oddziaływań zakarpackich we wczesnym neolicie. Pochodzenie i chronologia ornamentu wstęg wypełnianych nakłuciami w kulturze ceramiki wstęgowej rytej na Kujawach. *Acta Archaeologica Carpathica* 18, 75-99.

Grygiel R. 2001. Wpływy wschodniolinearnego kręgu kulturowego w kulturze ceramiki wstęgowej rytej na Kujawach. In B. Ginter (ed.), *Problemy epoki kamienia na obszarze Starego Świata. Księga Jubileuszowa dedykowana Januszowi K. Kozłowskiemu*. Kraków: Uniwersytet Jagielloński, Instytut Archeologii, 297-310.

Kabaciński J., Sobkowiak-Tabaka I., Kasztovszky Zs., Pietrzak S., Langer J. J., Biró K. T. and Maróti B. 2015. Transcarpathian influences in the Early Neolithic of Poland. A case study of Kowalewko and Rudna Wielka sites. *Acta Archaeologica Carpathica* 50, 5-32.

Kaczanowska M. 1971. Krzemienne materiały kultur neolitycznych pochodzenia południowego z terenu Nowej Huty. In J. K. Kozłowski (ed.), *Z badań nad krzemieniarstwem neolitycznym i eneolitycznym*. Kraków: Polskie Towarzystwo Archeologiczne i Muzeum Archeologiczne w Krakowie, 10-24.

Kaczanowska M. 1976. Uwagi o kontaktach między terenami Małopolski i Słowacji w neolicie i eneolicie w świetle importów surowców kamiennych. *Materiały Archeologiczne* 16, 37-41.

Kaczanowska M. 1985. *Rohstoffe, Technik und Typologie der Neolithischen Feuersteinindustrien im Nordteil des Flussgebietes der Mitteldonau*. Warszawa: Państwowe Wydawnictwo Naukowe.

Kaczanowska M. and Godłowska M. 2009. Contacts between the Eastern and Western Linear cultures in South-Eastern Poland. In J. K. Kozłowski (ed.), *Interactions between different models of Neolithization north of the Central European agro-ecological barrier (=Prace Komisji Prehistorii Karpat* 5). Kraków: Polska Akademia Umiejętności, 137-149.

Kaczanowska M., Kaminská L., Kozłowski J. K., Nowak M. and Vizdal M. 2002. Badania wykopaliskowe na wczesnoneolitycznej osadzie w miejscowości Moravany we wschodniej Słowacji w latach 1998-2001. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 23, 173-197.

Kaczanowska M. and Kozłowski J. K. 2002. Bükk culture Lithic Assemblage from Humenné, Eastern Slowakia. *Študijné Zvesti Archeologického Ústavu SAV* 34, 65-90.

Kaczanowska M., Kozłowski J. K. and Šiška S. 1993. *Neolithic and Eneolithic chipped stone industries from Šarišské Michal'any, eastern Slovakia. Linear Pottery, Bükk and Baden cultures*. Kraków: Uniwersytet Jagielloński, Instytut Archeologii.

Kaczanowska M., Kozłowski J. K. and Zakościelna A. 1987. Chipped stone industries of the Linear Band Pottery culture settlements in the Nowa Huta region. *Przegląd Archeologicz*ny 34, 93-132.

Kadrow S. 1990a. Osada neolityczna na stan. nr 16 w Rzeszowie na Osiedlu Piastów. *Sprawozdania Archeologiczne* 41, 9-76.

Kadrow S. 1990b. The Rzeszów settlement microregion in Neolithic. *Acta Archaeologica Carpathica* 29, 33-70.

Kadrow S. 1997. Osada kultury ceramiki wstęgowej rytej na stanowisku 3 w Rzeszowie-Staromieściu. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 18, 5-27.

Kadrow S. and Rauba-Bukowska A. 2016. Ceramics technology and transfer of ideas in the West Carpathian region in Neolithic. In S. Țerna and B. Govedarica (eds), *Interactions, changes and meanings. Essays in honour of Igor Manzura on the occasion of his 60th birthday*. Kishinev: University of High Anthropological School, 65-72.

Kalicz N. and Makkay J. 1977. *Die Linienbandkeramik in der Grossen Ungarischen Tiefebene* (= *Studia Archaeologica* 7). Budapest: Akadémiai Kiadó.

Kamieńska J. 1964. Osady kultur wstęgowych w Samborcu, pow. Sandomierz. In S. Nosek (ed.), *Studia i materiały do badań nad neolitem Małopolski*. Wrocław, Warszawa, Kraków: Zakład Narodowy im. Ossolińskich, 77-189.

Kondracki J. 2002. *Geografia regionalna Polski*. Warszawa: Wydawnictwo Naukowe PWN.

Kowalewska-Marszałek H. 1993. Wzgórze Żmigród. Sandomierz-Żmigród. In S. Tabaczyński (ed.), *Sandomierz: badania 1969-1973*. 1 *(= Polskie Badania Archeologiczne* 31*)*. Warszawa: Wydawnictwo Instytutu Archeologii i Etnologii PAN, 323-361.

Kowalewska-Marszałek H. 1996. Faza I: relikty osadnictwa pradziejowego. In S. Tabaczyński (ed.), *Sandomierz: badania 1969-1973* 2 (= *Polskie Badania Archeologiczne* 32). Warszawa: Wydawnictwo Instytutu Archeologii i Etnologii Polskiej Akademii Nauk, 50-83.

Kozłowski J. K. 1970. Z badań nad wytwórczością krzemieniarską w kulturze ceramiki wstęgowej rytej. In J. K. Kozłowski (ed.), *Z badań nad kulturą ceramiki wstęgowej rytej* (*Materiały Konferencji w Nowej Hucie dn. 22 IV 1969*). Kraków: Polskie Towarzystwo Archeologiczne, Oddział w Nowej Hucie, 73-94.

Kozłowski J. K. 1974. Über die Untersuchungen der östlichen Peripherien der Linien-Bandkeramik-Kultur. *Acta Archaeologica Carpathica* 14, 5-56.

Kozłowski J. K. 1985. The eastern areas of the Linear Band Pottery culture. In A. Kokowski (ed.), *Memoires Archeologiques*. Lublin: Wydawnictwo UMCS, 51-70.

Kozłowski J. K. 1989. The lithic industry of the Eastern Linear Pottery culture in Slovakia. *Slovenská Archeológia* 37, 377-410.

Kozłowski J., Kaczanowska M., Czekaj-Zastawny A., Rauba-Bukowska A. and Bukowski K. 2014. Early/Middle Neolithic Western (LBK) vs. Eastern (ALBK) Linear Pottery cultures: ceramics and lithic raw materials circulation. *Acta Archaeologica Carpathica* 49, 37-76.

Kulczycka A. and Kozłowski J. K. 1960. Pierwsze materiały kultury bukowogórskiej na północ od Karpat. *Acta Archaeologica Carpathica* 2, 41-54.

Kulczycka-Leciejewiczowa A. 1973. Niektóre problemy osadnictwa kultury ceramiki wstęgowej rytej w dorzeczu górnej Wisły. *Archeologia Polski* 18, 73-90.

Kulczycka-Leciejewiczowa A. 1979. Pierwsze społeczeństwa rolnicze na ziemiach polskich. Kultury kręgu naddunajskiego. In W. Hensel and T. Wiślański (eds), *Prahistoria ziem polskich* 2. *Neolit*. Wrocław, Warszawa, Kraków, Gdańsk: Zakład Narodowy im. Ossolińskich, 19-164.

Kulczycka-Leciejewiczowa A. 2008. *Samborzec. Studium przemian kultury ceramiki wstęgowej rytej*. Wrocław: Instytut Archeologii i Etnologii Polskiej Akademii Nauk.

Larina O. W. 1999. Kultura lineyno-lentochnoy keramiki pruto-dniestovkogo regiona. *Stratum plus* 2, 10-140.

Lech J. 2003. Mining and siliceous rock supply to the danubian early farming communities (LBK) in eastern central Europe: a second approach. In L. Burnez-Lanotte (ed.), *Production and Management of Lithic Materials in the European Linearbandkeramik* (= *British Archaeological Reports. International Series* 1200). Oxford: Archaeopress, 19-30.

Lech J. 2008. Materiały krzemienne społeczności kultury ceramiki wstęgowej rytej z Samborca, pow. Sandomierz. In A. Kulczycka-Leciejewiczowa (ed.), *Samborzec. Studium przemian kultury ceramiki wstęgowej rytej*. Wrocław: Instytut Archeologii i Etnologii Polskiej Akademii Nauk, 151-204.

Lichardus J. 1974. *Studien zur Bükker Kultur* (= *Saarbrücker Beiträge zur Altertumskunde Band* 12). Bonn: Dr. Rudolf Habelt Verlag.

Michalak-Ścibior J. 1992. Nowe znaleziska obsydianu na Wyżynie Sandomierskiej. *Acta Archaeologica Carpathica* 31, 35-53.

Michalak-Ścibior J. and Taras H. 1995. Wczesnoneolityczna osada w Sandomierzu-Krukowie, stan. 20. *Sprawozdania Archeologiczne* 47, 69-134.

Milisauskas S. 1983. Bandkeramische Obsidianartefakte aus Olszanica. *Archäologisches Korrespondentzblatt* 13, 171-175.

Milisauskas S. 1986. *Early Neolithic settlement and society at Olszanica* (= *Memoirs of the Museum of Anthropology. University of Michigan* 19). Ann Arbor: Regents of the University of Michigan, Museum of Anthropology.

Pawlikowski M. 2006. Wyniki badań mineralogiczno-petrograficznych materiałów ze stan. 6 w Tominach, gm. Ożarów. In A. Zakościelna and M. Szeliga, *Opracowanie naukowe wyników badań ratowniczych na stanowisku 6/161 w Tominach, gm. Ożarów, przeprowadzonych w okresie 10 IV-VII*. 1 (typescript stored in Institute of Archaeology of MCSU in Lublin).

Pelisiak A. 2014. Steinfunde. In M. Dębiec (ed.), *Zwięczyca 3. Eine bandkeramische Siedlung am Wisłok*. Rzeszów: Oficyna Wydawnicza Zimowit, 110-135.

Podkowińska Z. 1953. Pierwsza charakterystyka stanowiska neolitycznego na polu Grodzisko I we wsi Złota, pow. Sandomierz. *Wiadomości Archeologiczne* 19, 1-53.

Podkowińska Z. 1959. Osada neolityczna kultury starszej ceramiki wstęgowej (rytej) w Jurkowicach, pow. opatowski, (Z zagadnień gospodarki plemion kultury starszej ceramiki wstęgowej w Polsce). *Archeologia Polski* 3, 7-50.

Přichystal A. and Škrdla P. 2014. Kde ležel hlavní zdroj obsidiánu v pravěku střední Evropy? *Slovenská Archeológia* 62(2), 215-226.

Rauba-Bukowska A. 2014. Wyniki badań mineralogiczno-petrograficznych naczyń importowanych kręgu wschodniolinearnego, odkrytych na stanowisku Brzezie 17, gm. Kłaj. In Czekaj-Zastawny (ed.), *Brzezie 17. Osada kultury ceramiki wstęgowej rytej* (= *Via Archaeologica. Źródła z badań wykopaliskowych na trasie autostrady A4 w Małopolsce* 9). Kraków: Krakowski Zespół do Badań Autostrad, Instytut Archeologii Uniwersytetu Jagiellońskiego, Instytut Archeologii i Etnologii PAN O/Kraków, Muzeum Archeologiczne w Krakowie, 459-468.

Rauhut D. 1970. Materiały kultury ceramiki wstęgowej rytej ze Złotej, pow. Sandomierz. In J. K. Kozłowski (ed.), *Z badań nad kulturą ceramiki wstęgowej rytej (Materiały Konferencji w Nowej Hucie dn. 22 IV 1969)*. Kraków: Polskie Towarzystwo Archeologiczne, Oddział w Nowej Hucie, 29-36.

Šiška S. 1979. Die Bükker Kultur in der ostslowakischen Tiefebene. *Slovenská Archeológia* 27(2), 245-290.

Šiška S. 1989. *Kultúra s východnou lineárnou keramikou na Slovensku*. Bratislava: Slovenská Akadémia Vied, Archeologický ústav.

Šiška S. 1993. Poznámky k neolitickým osadám v Kapušanoch a Fulianke, okr. Prešov. *Východnoslovenský Pravék* 4, 37-40.

Šiška S. 1999. Výšinné sídliská bukovohorskej kultúry na Slovensku. *Sborník prací Filozofické fakulty brněnské univerzity. Řada archeologická* 48(M4), 47-60.

Sebők K. 2014. Bükk-Keramik in Zwięczyca. In M. Dębiec (ed.), *Zwięczyca 3. Eine bandkeramische Siedlung am Wisłok*. Rzeszów: Oficyna Wydawnicza Zimowit, 80-83.

Soják M. 1998. Kontakty východnoslovenských regiónov s územím Spiša v období stredného neolitu. *Východnoslovenský Pravék* 5, 105-143.

Soják M. 1999. Analýza kamiennej siepanej industries zo Strání pod Tatrami z výskumu r. 1996 (severovýchodné Slovensko). *Pravék* 9, 81-106.

Soják M. 2000a. Neolitické osídlenie Spiša. *Slovenská Archeológia* 48, 185-314.

Soják M. 2000b. Výskum a prieskumy na trase dial'nice. *Archeologické Výskumy A Nálezy na Slovensku v roku 1999*, 110-113.

Soják M. 2001. Terénny prieskum na Spiši. *Archeologické Výskumy A Nálezy na Slovensku v roku 2000*, 175-185.

Soják M. 2003. Prieskum a výskum v oblasti Spiša. *Archeologické Výskumy A Nálezy na Slovensku v roku 2002*, 132-142.

Szeliga M. 2008. Kontynuacja badań wykopaliskowych na wielokulturowym stanowisku 6 w Tominach, pow. opatowski, w latach 2006-2007. *Archeologia Polski Środkowowschodniej* 10, 9-27.

Szeliga M. 2009. Znaczenie obsydianu karpackiego w gospodarce surowcowej najstarszych społeczności rolniczych na ziemiach polskich. In J. Garncarski (ed.), *Surowce naturalne w Karpatach oraz ich wykorzystanie w pradziejach i wczesnym średniowieczu*. Krosno: Muzeum Podkarpackie w Krośnie, 287-324.

Szeliga M. 2014. The distribution and importance of Turonian flints from the north-eastern margin of the Holy Cross Mountains in the flint raw material economy of the earliest Danubian communities. *Acta Archaeologica Carpathica* 49, 77-112.

Szeliga M. 2017. The First Chronometric Marings of the Late Stage of the LBK in the northern foreland of the Sandomierz Upland. *Analecta Archaeologica Ressoviensia* 12, 431-447.

Szeliga M. 2018. Flint raw material economy among the earliest Danubian communities from the Sandomierz Upland area (south-central Poland). In. P. Valde-Nowak, K. Sobczyk, M. Nowak and J. Źrałka (eds), *Multa per Gentes et Multa per Saecula. Amici magistro et collegae suo Ioanni Christopho Kozłowski dedicant*. Kraków: Uniwersytet Jagielloński, Instytut Archeologii, 375-383.

Szeliga M., Dobrowolski R., Chodorowski J., Pidek I. A. and Mroczek P. 2018. Zapis geoarcheologiczny działalności człowieka w neoholocenie w południowo-wschodniej części Przedgórza Iłżeckiego (centralna Polska). *Acta Geographica Lodziensia* 107, 155-173.

Szeliga M. and Zakościelna A. 2007. Wstępne sprawozdanie z ratowniczych badań wykopaliskowych na wielokulturowym stanowisku 6 w Tominach, pow. opatowski, w 2006 roku. *Archeologia Polski Środkowowschodniej* 9, 9-23.

Tompa F. 1929. *Die Bandkeramik in Ungarn. Die Bükker- und die Theiss-Kultur* (= *Archaeologia Hungarica* 5/6). Budapest: Franklin-Társulat Nyomdája.

Tunia K. 2016. Early Neolithic Bükk culture vessel from Kazimierza Wielka, southern Poland. Preliminary report on the find and its context. In J. Kovárník *et al.* (eds), *Centenary of Jaroslav Palliardi´s Neolithic and Aeneolithic Relative Chronology (1914-2014)*. Hradec Králové – Ústí nad Orlicí: University of Hradec Králové, Philosophical Faculty, 217-228.

Vincentelli M. 2000. *Women and Ceramics: Gendered Vessels*. Manchester: Manchester University Press.

Wilczyński J. 2014. Krzemienny i obsydianowy inwentarz kultury ceramiki wstęgowej rytej ze stanowiska Brzezie 17, gm. Kłaj. In A. Czekaj-Zastawny (ed.), *Brzezie 17. Osada kultury ceramiki wstęgowej rytej* (= *Via Archaeologica. Źródła z badań wykopaliskowych na trasie autostrady A4 w Małopolsce* 9). Kraków: Krakowski Zespół do Badań Autostrad, Instytut Archeologii Uniwersytetu Jagiellońskiego, Instytut Archeologii i Etnologii PAN O/Kraków, Muzeum Archeologiczne w Krakowie, 499-546.

Zakościelna A. 1988. Wielokulturowe stanowisko 28 w Świerszczowie Kolonii, gm. Hrubieszów. In J. Gurba (ed.) *Sprawozdania z badań terenowych Katedry Archeologii UMCS w 1988 roku*. Lublin: Katedra Archeologii Uniwersytetu Marii Curie-Skłodowskiej, 6-11.