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THE NEOLITHIC VS. THE MESOLITHIC IN SOUTHERN POLAND: IS EVERYTHING KNOWN YET?

ABSTRACT

According to a common belief, southern Poland was a typical area of Early Neolithic settlements which was rarely exploited and even ignored by Mesolithic communities. However, the prehistoric reality was more complex. Indeed, the zones largely omitted by the hunter-gatherers were fertile loess uplands and foothills settled by the first Neolithic farmers (Linear Band Pottery culture) in the third quarter of the 6th millennium BC. However, such ecological zones are by no means the only or even predominant zones within the territory in question. Areas with other ecological conditions, mainly those close to the Polish Lowland, yielded surprisingly numerous remains of Mesolithic settlements, including late Mesolithic ones. Radiocarbon data makes it clear that the Late Mesolithic communities coexisted with their Neolithic counterparts. However, the temporal dimension of this coexistence remains a debatable and

controversial issue. Nevertheless, it is highly probable that the late hunter-gatherers would use 'their own' pottery also in southern Poland. Similarly to many other European regions, the anthropological and historical interpretations that describe and explain the interactions between early farmers and late hunter-gatherers in southern Poland (as well as archaeologically discernible transformations within the latter group) are difficult to construct. It is even more difficult to assess the role played by hunter-gatherers in the neolithisation of this territory. This paper presents and analyses the relevant chronological, chorological, settlement, and typological data. As a result, the hypothesis that the hunter-gatherer communities were but 'passive' witnesses to the first neolithisation and functioned independently at least throughout the entire Neolithic period was considered most probable.

Keywords: southern Poland, Late Mesolithic, para-Neolithic, Neolithic, cultural interactions

Introduction

According to a common belief, southern Poland (Fig. 1) was an area of classical early Neolithic settlements which was rarely exploited and even ignored by Mesolithic communities. Therefore, if the role of the Late Mesolithic is considered in the debate on neolithisation at all, it usually

concerns primarily the lowland zone. However, as will be demonstrated, the Mesolithic in southern Poland is by no means represented poorly. Therefore, the Mesolithic factor should be considered in the discourse on neolithisation and Neolithic development in both the lowland (northern) and the upland (southern) territories, as well as from a general perspective.¹

¹ Kozłowski, Nowak 2019.



Fig. 1. Location of the investigated territory in the central part of Europe and basic geographical and historical regions of southern Poland against hypsometry and the main rivers.

The southern part of Poland is characterized by much greater diversity in the natural lie of the land² than the central and northern parts of the country, and uplands, submontane, and mountainous areas constitute a significant proportion of it. At the same time, there are surprisingly large areas with a lowland landscape. These are mainly fragments of the Central Polish Lowland cutting in from the north, as well as a range of submontane basins. Smaller areas of lowland character (basins, river valleys) are also located in zones where the dominant lie of the land is upland. Finally, the specific landscape of carbonate, gypsum, siliceous, and aluminosiliceous uplands is a separate type of upland natural environment according to A. Richling.³ It is found in larger patches in the Kraków-Częstochowa Upland and in some parts of the other upland regions neighbouring the Kraków-Częstochowa Upland from the north and east. The less compact coverings, separated mainly by loess uplands, are located in Volhynia Polesie, Roztocze, the Lublin Upland, the south-western part of the Kielce Upland, and in the western part of the Silesian Upland.

The beginnings of the Neolithic in southern Poland

As in other parts of Central Europe, the origins of the Neolithic in southern Poland are associated with the appearance of communities whose archaeological reflection is the Linear Band Pottery culture (LBK). At the moment, the exact number of LBK sites in this area would be difficult to calculate, but it would certainly exceed one thousand.⁴ Similarly to other parts of its Central European range, this culture is distributed in an island-like manner. Such 'islands' of 'Linear' settlement are located in areas covered by the most fertile soils, developed on loess substrate or black earth soils, as is the case with Lower Silesia. Nevertheless, single LBK sites are known in other ecological zones, however it is worth noting that even these cases are located in the immediate vicinity of loess areas.⁵ The remains of material culture recorded at such sites generally do not show any differences from sites situated in 'ordinary' fertile areas; usually they are only poorer quantitatively as such sites are relatively small (Fig. 2).

² Richling, Dąbrowski 1995; Wojciechowski *et al.* 2004; Chmielewski *et al.* 2015.

³ Richling 1992.

⁴ For instance, Kulczycka-Leciejewiczowa 1993; Furmanek 2004; 2010; Czekał-Zastawny 2008; 2009; 2014; Pelisiak 2018.

⁵ For instance, Nowak, Rodak 2015; Szeliga *et al.* 2019.

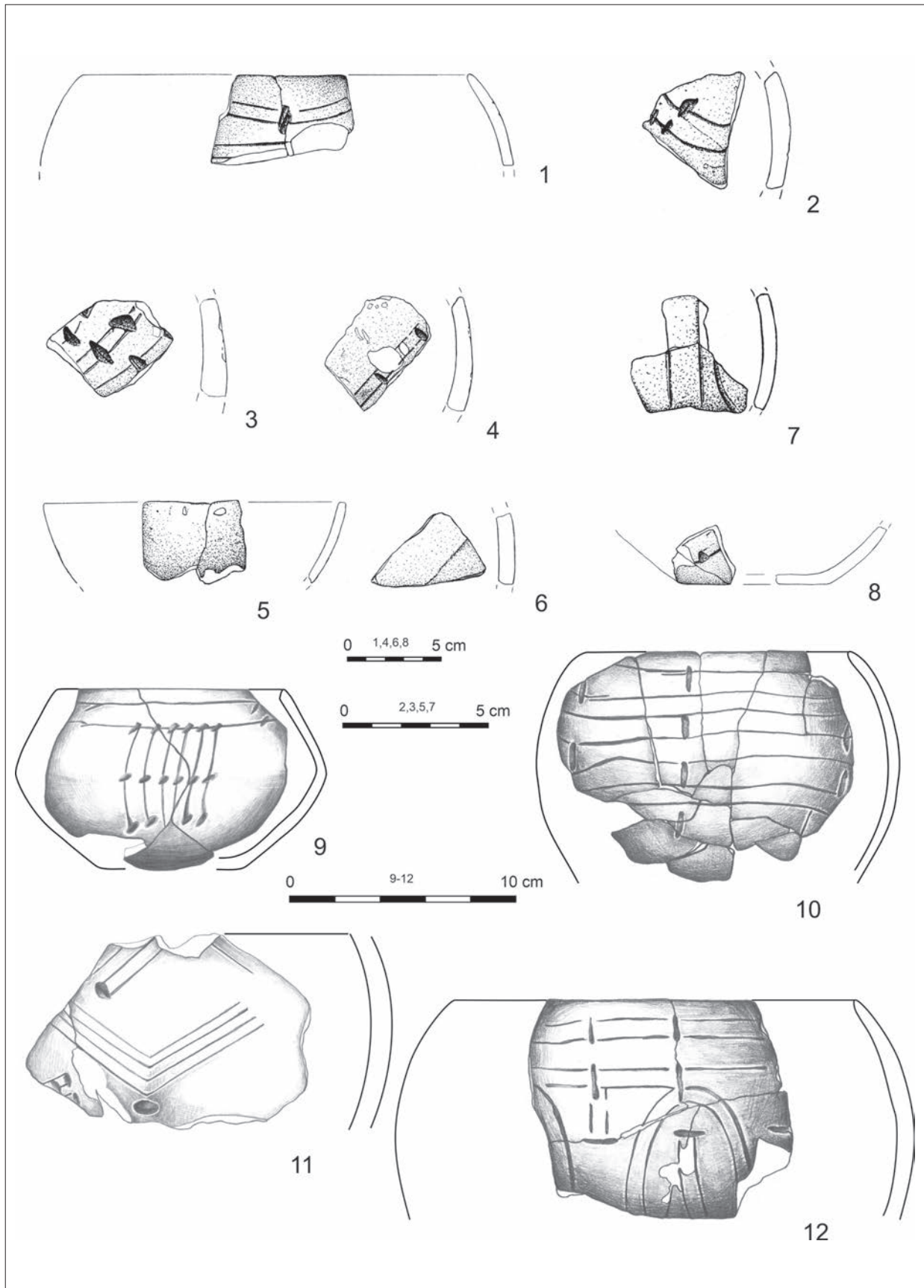


Fig. 2. Pottery of the LBK from southern Poland; 1–8 – Stanisławice 9 ('alluvial' zone), 9–12 – Miechów 3 ('loess' zone); drawings by A. Kluzik and S. Krishnevskaya, respectively.

Based on interpretations using, among others, Bayesian modelling of available ^{14}C datings⁶ and ceramic typological data, we believe that the beginnings of the LBK should be dated a little later than previously assumed⁷ (Fig. 3). Namely, the first signs of the LBK are estimated at around 5400 BC at the earliest, and located in western Małopolska.⁸ From this region, the culture spread along the upper Vistula river, more or less in the second quarter of the 54th century BC, to finally reach the upper Bug river basin around 5350 BC. Considering the recent publication of the Brunn 2 site located near Vienna,⁹ which is crucial for the chronology of the origins of the LBK, it is even possible that the above dates could be moved forward by about 50 years.

The LBK in Lower Silesia would have appeared no sooner than at the turn of the 54th and 53rd centuries BC,¹⁰ which suggests that this must have happened earlier in Upper Silesia. Also, probably not earlier than ca. 5300 BC, another settlement enclave of this culture emerged which was located along the northern border of the eastern part of the Polish Carpathians,¹¹ although this view is not necessarily shared by all researchers.¹²

So far, we have only one identification of fossil DNA for the LBK in southern Poland, from the site at Samborzec. Moreover, it is an mtDNA and not whole-genome identification.¹³ Significantly, however, a haplogroup that is very typical and even specific for the LBK, N1a, is represented here.

Nevertheless, genetic data from nearby Hungary, Austria, and Germany,¹⁴ including whole-genome identifications, indicate clear differences between the LBK and Mesolithic populations. The aforementioned Samborzec mtDNA identification is also consistent with this conclusion. It is therefore safe to suppose that this state of affairs could also be extrapolated to the LBK in areas to the north of the Carpathians and the Sudety Mountains. Consequently, the genesis of the LBK in southern Poland should be regarded in terms of population movements, similarly to other regions of Central Europe inhabited by representatives of this culture.

On the other hand, it is worth emphasizing the very modest but quite ubiquitous proportion of hunter-gatherer ancestry that has been demonstrated in the quoted publications. This phenomenon has also been

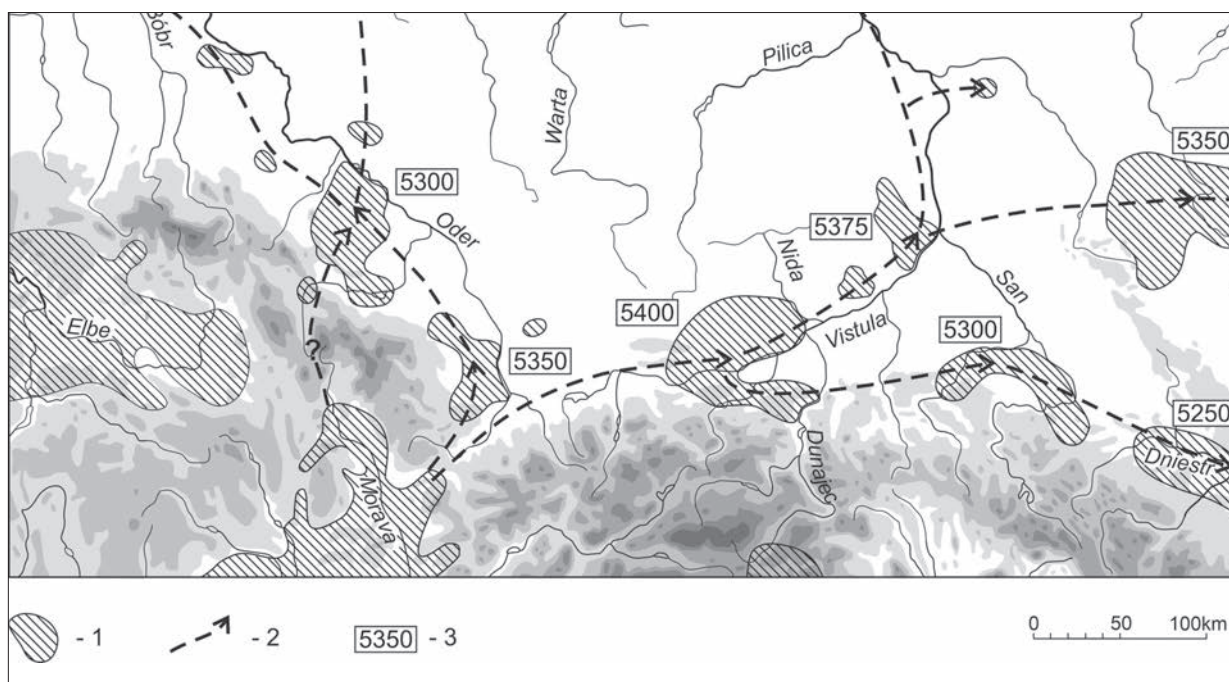


Fig. 3. Main LBK 'enclaves' during its maximal territorial extent ca. 5100–4900 BC (1), the main 'routes' of the LBK spread (2), and averaged dating of the earliest appearance of the LBK in southern Poland (3) (after Kozłowski, Nowak 2019, fig. 4).

⁶ Kozłowski, Nowak 2019.

⁷ For instance, Czekał-Zastawny 2008; 2014.

⁸ Czekał-Zastawny *et al.* 2020.

⁹ Stadler, Kotova 2019.

¹⁰ Grześkowiak *et al.* 2016; Furmanek *et al.* 2019.

¹¹ For instance, Dębiec 2014; 2015.

¹² Kadrow 2020.

¹³ Chyleński *et al.* 2017.

¹⁴ Brandt *et al.* 2014; Haak *et al.* 2015; Hofmanová *et al.* 2016; Lipson *et al.* 2017; Mathieson *et al.* 2018.

confirmed by a very recent publication of three skulls from the already-mentioned Brunn am Gebirge 2 site.¹⁵ At least one skull has a very distinct Mesolithic component. Interestingly enough, the strontium values for this individual demonstrate a non-local origin. Hence, some contacts between incoming early farmers and local hunter-gatherers must have taken place, even if these were only casual sexual contacts. Consequently, a similar possibility can also be applied to the LBK spread in southern Poland.

In the 5th millennium BC, Neolithic groups of post-Linear character still concentrated within the same 'fertile' settlement enclaves, at least in principle. Thus, until the beginning of the 4th millennium BC, at least 60 to 70% of the discussed area remained beyond the boundaries of dense Neolithic settlement.¹⁶

The Late Mesolithic in southern Poland

In fact, the aforementioned "60 to 70%" of the area of southern Poland was not necessarily unpopulated and unexploited by humans. Obviously, the Late Mesolithic hunter-gatherer communities are the most plausible inhabitants.

As already indicated, the number of Mesolithic sites in southern Poland is quite significant (Fig. 4). Over one thousand and six hundred sites belonging to this period are known from the area. Among these, over five hundred can be categorised as Late Mesolithic. Their largest clusters can be identified in the eastern part of the Nida Basin,¹⁷ Lublin Upland, Roztocze, western Polesie, southern Podlasie Lowland, Sandomierz Basin,¹⁸ Brama Krakowska,¹⁹ the upper Warta River basin,²⁰ between the Vistula and Pilica rivers,²¹ and in the Kraków-Częstochowa Upland.²² On the whole, it seems that the density of Late Mesolithic settlement in Lower Silesia was lower.²³ Data on Late Mesolithic materials seem to be less well-recognized in the case of the Silesian Upland and the eastern part of the Silesian Lowland (few Mesolithic sites are known especially from the latter area, contrasting with the relatively numerous para-Neolithic sites).²⁴

Of the Late Mesolithic sites, about 40% are campsites, while the remaining ones are only single isolated finds. The only sepulchral finding from southern Poland, from Site 2 in Brzegi on the upper Nida river is worthy of a mention,²⁵ and the fact that single artefacts from that period were found only in two caves (Duża Cave in Mączne Skały²⁶ and Dr Majer's Cave).²⁷ The Mesolithic materials from another seven caves are either dated to the Early Mesolithic or their chronology is not certain.

Of course, the term 'Late Mesolithic' is not unambiguous, for various reasons. It is most often used in both the chronological and typological sense. In the authors' opinion, given the place and time that we are interested in, it should be understood as an expression of a number of changes, starting from the turn of the 7th and 6th millennia BC, that occurred in the material culture of hunter-gatherer groups. The association of the Late Mesolithic with the Atlantic period (in the sense of the chronozone²⁸ or Blytt-Sernander's climatic period), which has often been expressed in literature, is erroneous, even for a small area such as southern Poland. One should keep in mind the asynchronicity of changes in different areas. Another issue is the possible link between climate, and environmental and cultural changes; these should be followed by high-precision dating, on a local geographical scale.²⁹

The first of the noticeable changes is the spread of the Sauveterrian typological forms in the inventories of the Komornica culture. The 'Sauveterrisation' of the Mesolithic industries of Europe began as early as in the first half of the 7th millennium BC, and by its end reached the cultures of the so-called Northern Technocomplex.³⁰ According to the current state of knowledge, it seems most likely that this trend "found its way" into the Komornica culture through the Maglemose circle.³¹ Growing Maglemosian influences led to the evolution of the Komornica culture which continued in the Atlantic period. In addition to the microliths known from the earlier stages of this culture, narrow scalene triangles appear (Fig. 5: 4–25), as well as less numerous triangles with a re-

¹⁵ Nikitin *et al.* 2019.

¹⁶ Kulczycka-Leciejewiczowa 1993; Kaczanowska 2006; Nowak 2009; Zakościelna 2010; Czarniak 2012; Pelisiak 2018; Furmanek *et al.* 2019.

¹⁷ Kozłowski 1969.

¹⁸ Libera *et al.* 1992; Libera 1995; 1998; Wawrzczak 2006; Mikulski 2012.

¹⁹ Sachse-Kozłowska 1969; Dagnan-Ginter, Drobniewicz 1974; Chochorowska 2007; Klimek, Peschel 2009; Klimek, Stefański 2012; Zakrzeńska 2016.

²⁰ Ginter 1969; Niesiołowska-Śreniowska, Cyrek 1975; Cyrek 1980.

²¹ Ciepiewska 2006.

²² Zając 2001; 2006; Zakrzeńska, Zając 2018.

²³ Bagniewski 1979; 1982; 1987; Kendelewicz 2002; Masojć 2004; 2007; 2014.

²⁴ Łęczycki 2014.

²⁵ Przeździecki 2015.

²⁶ Dagnan-Ginter *et al.* 1992.

²⁷ Zakrzeńska, Zając 2018.

²⁸ Mangerud *et al.* 1974.

²⁹ Birks *et al.* 2015.

³⁰ Kozłowski 1976; 2009.

³¹ Bagniewski 1973; Ginter 1973; Kozłowski 1989; 2009; Kobusiewicz 1999; Galiński 2002; Kendelewicz 2002; Masojć 2016.

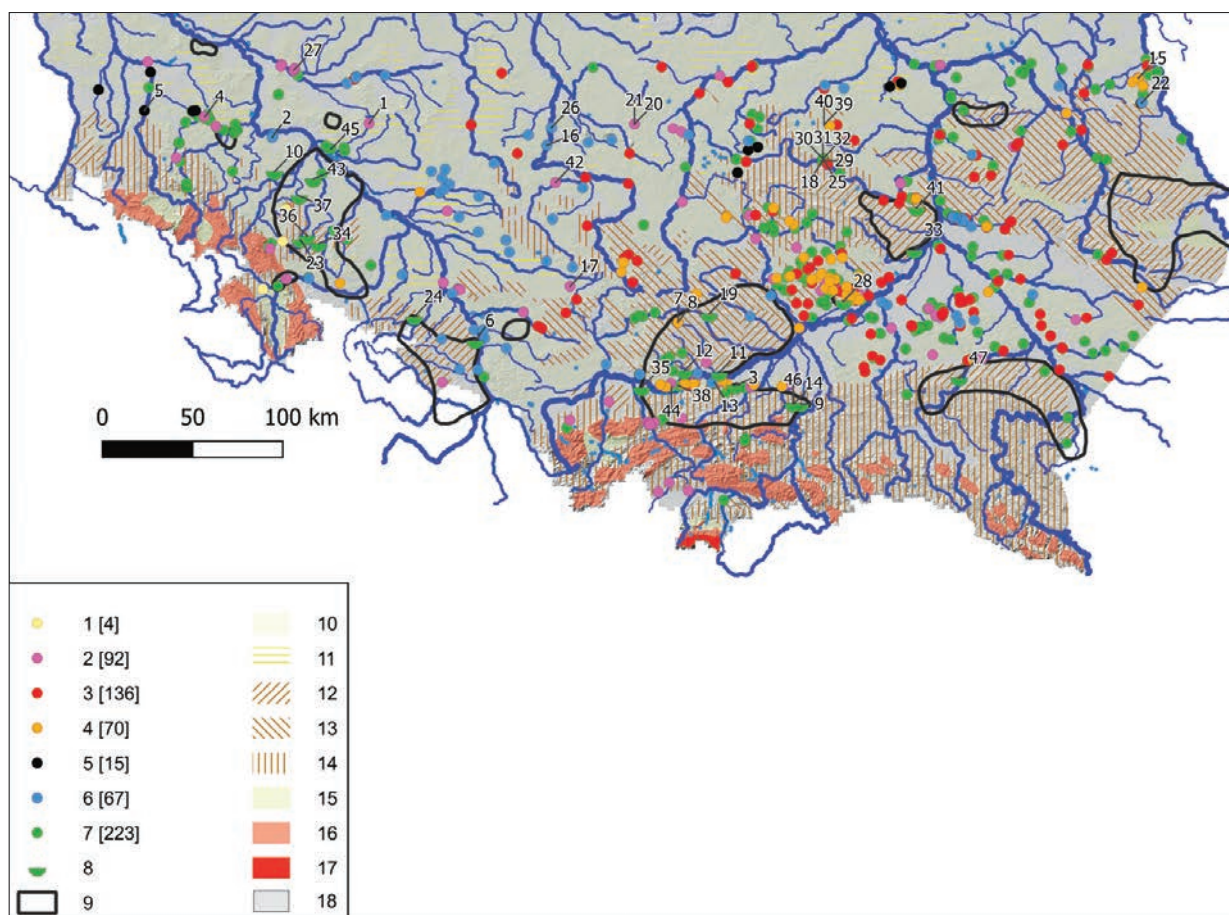


Fig. 4. Late Mesolithic, Early Neolithic, and para-Neolithic in southern Poland against the background of the basic types of natural landscapes.

Archaeological phenomena: 1 – Beuron, 2 – Komornica, post-Maglemose, 3 – Janisławice, 4 – Komornica, post-Maglemose, Janisławice, 5 – Bóbr group, Kokry industry, Janisławice of the Baraki Stare 13 type, 6 – para-Neolithic, 7 – Late Mesolithic in general (1–7 – number in parentheses [] represents the number of sites), 8 – LBK sites with ^{14}C dates, 9 – range of the LBK during its maximal territorial development.

Types of Polish natural landscapes (according to Richling, Dąbrowski 1995, modified): 10 – lowland periglacial landscapes, 11 – lowland glaciofluvial landscapes, 12 – upland loess landscapes – aeolian, 13 – upland carbonate and gypsum landscapes – erosive, 14 – upland siliceous and aluminosiliceous landscapes – erosive, 15 – denudation and basins in the upland and mountainous landscapes, 16 – medium mountainous landscapes – erosive, 17 – high mountainous landscapes, 18 – valley landscapes.

Late Mesolithic and LBK sites with ^{14}C dates (number on the map): 1 – Bartków 7 (Bagniewski 1976), 2 – Brodno E (Bagniewski 1991), 3 – Brzezcie 17 (Czekaj-Zastawny 2008; 2014; Mueller-Bieniek *et al.* 2019), 4 – Bukówna 5 (Masojć 2003), 5 – Dąbrowa-Krępnica 5 (Bagniewski 1982), 6 – Dzielnica (Furmanek 2010), 7 – Głanów 2 (Pazdur *et al.* 2003), 8 – Głanów 3 (Pazdur *et al.* 2003), 9 – Gwoździec 2 (Mueller-Bieniek *et al.* 2019; Czekaj-Zastawny *et al.* 2020), 10 – Kostomłoty 1 (Furmanek 2010; Furmanek *et al.* 2014), 11 – Kraków-Nowa Huta-Pleszów 17, 18, 20 (Godłowska *et al.* 1987), 12 – Kraków-Olszanica 4 (Milisauskas 1986), 13 – Kraków-Bieżanów 34 (Klimek, Stefański 2012), 14 – Łoniowa 18 (Valde-Nowak 2009), 15 – Luta I (Więckowska, Chmielewska 2007), 16 – Łykowe 1 (Kanwiszer, Trzeciak 1984; 1986; Cyrek 1990), 17 – Miasteczko Śląskie 2 (Foltyn *et al.* 2018), 18 – Michałów-Piaska I/1996 (Schild *et al.* 2011), 19 – Miechów 3 (unpublished), 20 – Mokracz 1 (Niesiołowska-Śreniowska 1990; Kanwiszer, Trzeciak 1991), 21 – Mokracz 1 (Niesiołowska-Śreniowska 1990; Kanwiszer, Trzeciak 1991), 22 – Nieborowa I (Boroń 2014), 23 – Niemcza (Kulczycka-Leciejewiczowa 1993), 24 – Nowy Browiniec (Kulczycka-Leciejewiczowa 1997), 25 – Nowy Młyn III/1989 (Schild *et al.* 2011), 26 – Osjaków 3 (Kanwiszer, Trzeciak 1991), 27 – Pobiel 10 (Bagniewski 1990), 28 – Podlesie 6 (Szeliga *et al.* 2019), 29 – Rydno I/1976 (Schild *et al.* 2011), 30 – Rydno I/1978-79 (Schild *et al.* 2011), 31 – Rydno I/1981 (Schild *et al.* 2011), 32 – Rydno XI/1960 (Schild *et al.* 2011), 33 – Samborzec (Kulczycka-Leciejewiczowa 2008), 34 – Skoroszowice (Kulczycka-Leciejewiczowa 1997), 35 – Spytkowice 26 (unpublished), 36 – Strachów 2 (Kulczycka-Leciejewiczowa 1997), 37 – Stary Zamek (Kulczycka-Leciejewiczowa 1993), 38 – Ściejowice 1 (Chochorowska 2001), 39 – Tomaszów I (Schild *et al.* 1985), 40 – Tomaszów II (Schild *et al.* 1985), 41 – Tominy 6 (Szeliga 2017), 42 – Troniny 5 (Cyrek 1996), 43 – Tyniec Mały (Kulczycka-Leciejewiczowa 1993), 44 – Wołowice (Bańdo *et al.* 1993), 45 – Wrocław-Polanowice 8 (Masojć 2007), 46 – Żerków 1 (Valde-Nowak 2009), 47 – Zwiężczyca 3 (Dębiec, Dzbyński 2007).

touch of the third side and narrow backed pieces (Fig. 5: 29–33) and Sauveterian points. In addition, there are forms of truncations (Fig. 5: 26–28) known from the Maglemose assemblages. The changes also affected the production technology of bladelet blanks. Slender and very slender microlithic blades started to appear which were detached from single-platform, mostly handle or coniform cores of triangular flaking surfaces (Fig. 5: 1–3). The late Komornica inventories containing these elements are referred to in literature as Pieńki or post-Maglemose³² or as containing Style C elements.³³ More than 90 late Komornica / post-Maglemose sites have been found in the upland belt, in the lowland areas neighbouring to the north, as well as in the Sandomierz Basin.

Further cultural stimuli were reaching southern Poland and changing the image of the local Mesolithic probably as late as during the evolution of the Komornica culture towards a unit with post-Maglemose features. This time the stimuli came from the south and were related to the process of ‘Castelnovisation’ of the Late Mesolithic (and – to some extent – Early Neolithic?) industries of Europe. This is a supra-regional horizon³⁴ associated with the idea of producing relatively large (for Mesolithic standards) and regular blades, which were obtained from standard, single-platform cores (plank-shaped or handle ones that took the form of a cone or a bullet in the final phase of exploitation). These cores were exploited using either the pressure or punch technique. Technological change was accompanied by typological changes – trapezes and rhomboids, as well as other tools made of regular blade blanks (points, end-scrapers, truncations, retouched blades) appeared in the Late Mesolithic and Early Neolithic inventories. The so-called Trend K (or Style D) spread in south-western Europe since the mid-7th millennium BC, covering Western Europe by the mid-6th millennium BC.³⁵ Probably a little earlier, in the second half of the 8th millennium BC, this horizon appeared in the Black Sea zone.³⁶ It reached the Mesolithic communities living in southern Poland by about 6,000 BC.³⁷ The idea of large, straight blades with almost perfectly parallel side edges is visible in the flint industry of the Janisławice culture which appeared at that time in the eastern part of the discussed area. Although the most obvious route through which the idea of ‘Castelnovisation’ penetrated into the terri-

tory of Poland leads through the territory of present-day Ukraine and Moldova, it should also be remembered that the south-western road was also used to some extent. This is indicated by the late Beuronian assemblages with trapezes, discovered in the Sudety Mountains and in the Sudety Foreland.³⁸ Moreover, later influences from the north, from the ‘Castelnovised’ Late Mesolithic groups of the Baltic zone until the end of the Atlantic Period (?)³⁹ cannot be excluded either. ‘Castelnovisation’ also encompasses the late Komornica or post-Maglemose groups. Their inventories included larger and more regular blades (Fig. 6: 1–2), trapezes (Fig. 6: 10–24), as well as wider types of truncations (Fig. 6: 3–7) and triangles (Fig. 6: 8–9). A particularly intense occurrence of these elements can be observed in the central part of southern Poland (the valley of the upper Vistula near Kraków, the Kraków-Częstochowa Upland, and the Nida Basin), where post-Maglemose groups must have been influenced by the Janisławice culture.⁴⁰ A fully Castelnovised industry, derived from the Komornica tradition, can be found in the 5th millennium BC in the so-called Bóbr group in Lower Silesia.⁴¹

The third change in the material culture of Mesolithic communities in southern Poland involves the adoption of pottery without altering the entirely hunting and gathering lifestyle. Nearly seventy sites are known from the area in question in which ceramics with para-Neolithic attributes (see below) were discovered (Fig. 4). Their distribution generally coincides with the zones of occurrence of post-Maglemose and Janisławice sites, except for the groupings in the inter-river region of Mała Panew and Stobrawa, on the Stobrawa River, on the upper Barycz River, and in the southern part of the Silesian Lowland. However, it is very likely that this is merely an effect of the state of research. The findings of pottery under consideration are by no means imitations or imports from local Neolithic groups, but refer technologically and stylistically to the pottery of Eastern European ‘Neolithic’ phenomena. They may be dated to the 5th millennium BC at the earliest, or most likely to the 4th and 3rd millennia BC, judging by analogies from the Central and Eastern European Lowland zone.⁴² Flint inventories accompanying this pottery are still poorly examined by archaeologists. However, the current state of knowledge indicates⁴³ that they are of Mesolithic

³² Kozłowski 1989; 2009.

³³ Galiński 2002.

³⁴ Gronenborn 2017.

³⁵ Marchand, Perrin 2017.

³⁶ Biagi, Starnini 2016.

³⁷ Galiński 2002; Kozłowski 2009; Kozłowski, Nowak 2019.

³⁸ Masojć 2016.

³⁹ Galiński 2002.

⁴⁰ Ginter 1975; Niesiołowska-Śreniowska, Cyrek 1975; Kozłowski 1989.

⁴¹ Bagniewski 2001; Masojć *et al.* 2009.

⁴² Józwiak 2003; Nowak 2009; Gumiński 2011; Kozicka 2017; Wawrusiewicz *et al.* 2017; Kozłowski, Nowak 2019.

⁴³ Mitura 1994; Górski, Zając 2001.

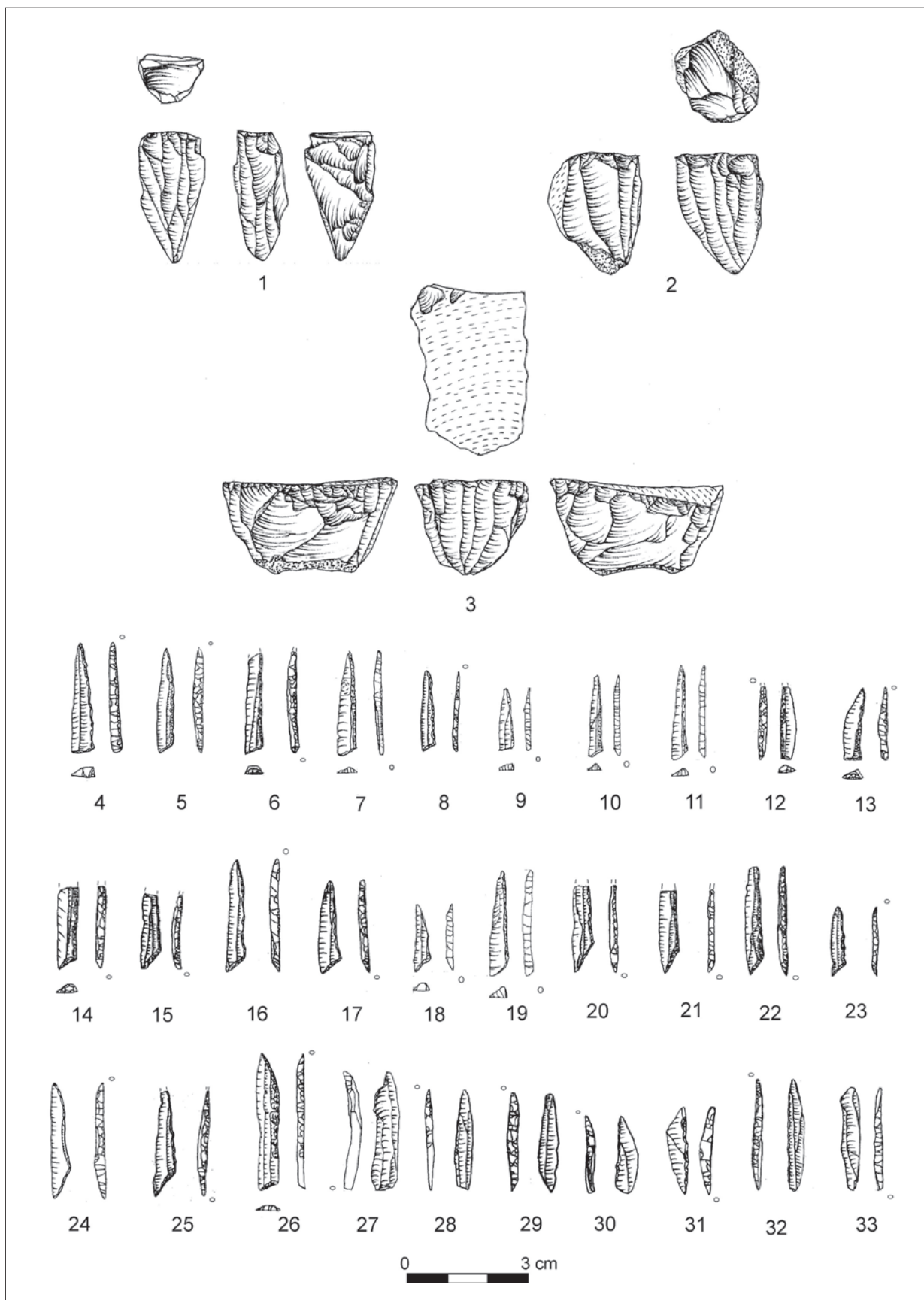


Fig. 5. Post-Maglemosian component from the site of Glanów 3; 1-3 cores, 4-25 – triangles, 26-28 – truncations, 29-33 – backed pieces.

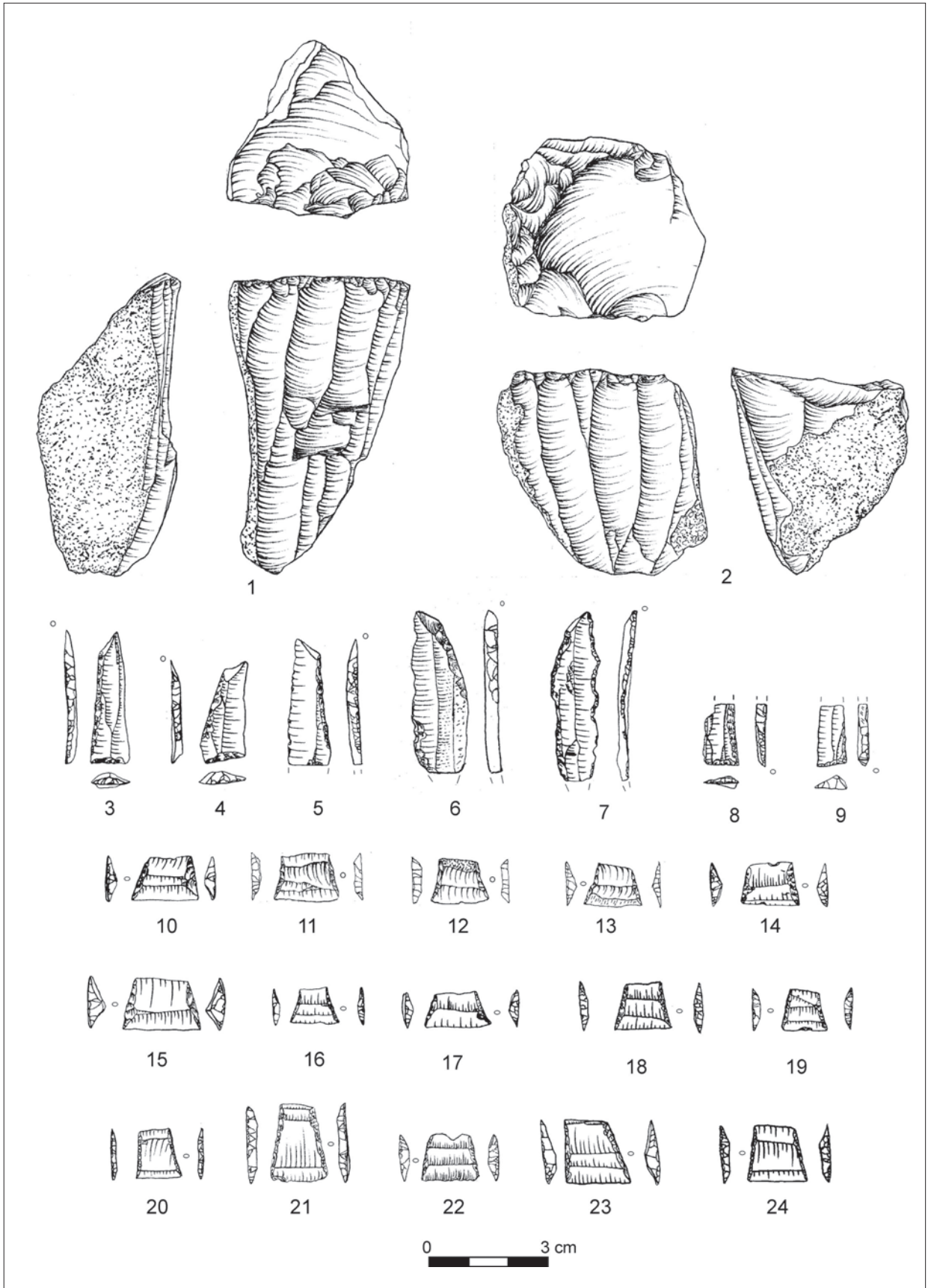


Fig. 6. Janisławician component from the site of Glanów 3; 1-2 – cores, 3-7 – truncations, 8-9 – triangles, 10-24 – trapezes.

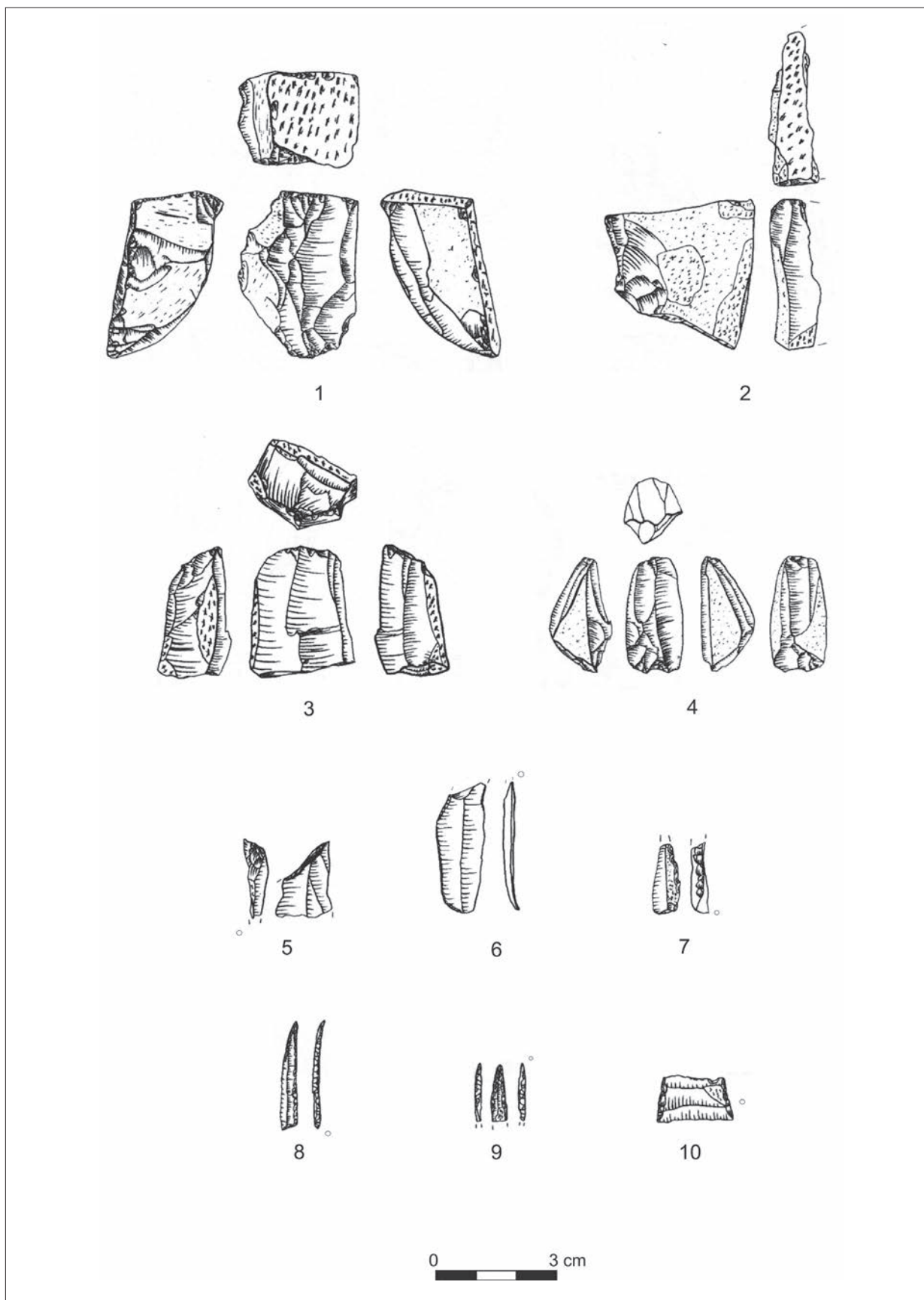


Fig. 7. Para-Neolithic flint artefacts from the site of Modliszewice (after Górski, Zając 2001); 1-4 – cores, 5-7 – truncations, 8 – triangle, 9 – double backed piece, 10 – trapeze.

character. They are characterised by a peculiar eclecticism, i.e. a combination of Janisławice (Fig. 7: 1–3, 5–6, 10) and post-Maglemoste elements (Fig. 7: 4, 7–9), perhaps with a predominance of the former.⁴⁴ At the same time, there are features similar to those of the so-called Kokry industry (post-Janisławician), which has been dated to the 5th/4th millennia BC, such as the use of the splintered technique, very numerous side-scrapers, or microlithisation (when compared to Janisławice standards).⁴⁵ To sum up, we consider such ceramics to be a marker of the hunter-gatherer communities, which are a continuation of the classic ceramic-free Mesolithic communities. The use of the term ‘para-Neolithic’ to denote this state of the Late Mesolithic with pottery may be justified,⁴⁶ although of course there are many more alternative denominations.⁴⁷

Fortunately, one hundred and fourteen radiocarbon dates are known from the area of southern Poland which may be associated with the Late Mesolithic. They come from twenty-six sites. Single dates were obtained in twelve of these. There are larger series of dates from the Głanów 3 W (34 dates), Łykowe 1 (13 dates) and Mokracz 1 (10 dates) sites. Most of the dated sites are situated in the northern part of the area under consideration, in the lowland landscape zone. Most dates were obtained from charcoal.

At this point, we would like to clearly emphasise that we are fully aware of the controversies concerning the reliability of the early and mid-Holocene dates acquired at the sites of hunter-gatherer communities. These controversies are mainly due to the origin of almost all such dates from open, sand sites. Obviously, this fundamental problem has been extensively discussed in Polish literature.⁴⁸

This problem applies in full to southern Poland as well. As a matter of fact, the only exception is the site of Pobel 10,⁴⁹ where dating material comes from stratified peat layers. In many other sites, e.g. those containing materials from several settlement phases (such as Głanów 3, Ściejowice, Mokracz 1, Nieborowa, or Łykowe 1), traces of features were very poorly visible and the processes of multidirectional charcoal movements had undoubtedly taken place. Furthermore, this problem is multiplied by the state of publications which do not always allow a critical analysis of dates and their relation with flint (or ceramic) material. On the other hand, critical analyses and evaluations of the relation between radiocarbon dates

(and pottery) and the Mesolithic archaeological contexts have been carried out despite all difficulties.⁵⁰

While repeating, to a large extent, the arguments raised by one of the authors of the present paper,⁵¹ we would still like to make some points of a more general nature which may be a defence of sorts of the dating in question (obviously not only in regard to southern Poland).

Firstly, a certain arbitrariness of the scientific reasoning in this matter should be noted. Namely, objections to homogeneity are articulated only in relation to the late-Atlantic and later contexts. But why are earlier situations not considered suspicious? As we believe, this is the result of our linear vision of cultural development in prehistoric times, derived from archaeological education. As a result, one even subconsciously recognises that hunter-gatherer communities developed in the pre-Boreal, Boreal, and early-Atlantic periods, perhaps without paying so much attention to their contexts. In practice, dates within these periods are automatically accepted. On the other hand, later dates, parallel to the Neolithic phenomena, are considered suspicious and unreliable from the outset.

Secondly, we believe that the supporters of the ‘short chronology’ of the Mesolithic do not give much thought to the rather fundamental question of what actually happened to the hunter-gatherer populations after the emergence of the early Neolithic. In fact, it is difficult to propose any real reasons for the possible disappearance of hunter-gatherer communities until the spread of the Funnel Beaker culture, outside ‘old-agricultural’ enclaves. Otherwise, it should be considered that these areas were essentially uninhabited and only sporadically penetrated by the Neolithic, ‘Danubian’ groups. The absorption of such Mesolithic populations, or their extermination, is of course possible, but these constructs are even riskier.

Thirdly, there is the statistical value of a large series of dates which form a dense cloud. In short, more than a hundred dates for southern Poland are a fairly large number – do all of them erroneously date the contexts in which they were found?

We would also like to add that, in our opinion, the link between charcoal (and the date received) and human activity from the Holocene period remains open. As far as radiocarbon dates are concerned, a radical standpoint assumes that dates should be acquired only from hazelnut shells or charcoal from fires, preferably from pits.

⁴⁴ Kobusiewicz 1999; 2006; 2016.

⁴⁵ Cyrek *et al.* 1985; Górski, Zajac 2001.

⁴⁶ Kobusiewicz, Kabaciński 1993; Kobusiewicz 2006; 2016; Nowak 2009; 2019; Kozłowski, Nowak 2019; Gumiński 2020.

⁴⁷ For instance, Kempisty 1982; 1983; Gronenborn 2003; Nowak 2009, 216; Piezonka 2015.

⁴⁸ For instance, Schild 1989; 1998.

⁴⁹ Bagniewski 1990; Masojć 2007.

⁵⁰ For instance, Galiński 1991; Masojć 2005; Nowak 2009, 244; Galiński 2016; Kozłowski, Nowak 2019, 179, see further references therein.

⁵¹ Nowak 2009, 244–245; Kozłowski, Nowak 2019, 178–181.

⁵² Crombé *et al.* 2013.

Dates from other charcoal samples are erroneous.⁵² This approach assumes that natural fires could occur in the early Holocene forests,⁵³ and is also represented by some biologists⁵⁴ who indicate the possibility of natural fires in dry, mainly cold phases, in pine-dominated stands. However, Central European literature assumes that early Holocene forest fires were mainly man-made.⁵⁵ This is confirmed by palaeobotanical⁵⁶ and archaeological studies,⁵⁷ which even point to the existence of intentional forest management during the Mesolithic period. In this paper it is therefore assumed that Holocene charcoal is essentially a trace of deliberate human activity. Consequently, a number of 'young' dates have been taken into account (e.g. from Brodno E and Bartków 7),⁵⁸ since they were considered to reflect the 'young', hunter-gatherer settlement episodes that were not necessarily caught in the flint material.

All of the Late Mesolithic/para-Neolithic dates that we took into account have been calibrated in OxCal v4.3.2.⁵⁹ In six cases, a combined calibration ('R_Combine') was used for dates derived from a single piece of wood or a compact fireplace. If samples were derived from a dispersed fireplace (four cases from Głanów 3 W), the dates were grouped into phases. For multiple date sites, where a priori data were not clearly readable, non-parametric 'KDE' (Kernel Density Estimation) modelling was used for each site.⁶⁰ This made it possible to distinguish specific groups of dates at a given site which were then used for parametric Bayesian analysis, i.e. for defining the boundaries of the dates that had been grouped this way. The date distribution boundaries were also modelled for single dates. For comparative purposes, similar procedures were also performed for the available LBK dating results. Forty-seven settlement episodes ('phases') were generated using such modelling (Fig. 8). Moreover, KDE modelling was carried out for all of the Mesolithic/para-Neolithic and LBK dates (Fig. 9), as well as for three geographical regions (Figs 10–12), which were of course distinguished somewhat arbitrarily. The modelling of the 'hunter-gatherer' dates for the regions did not include data from the upper Warta River area (Fig. 4, nos. 16, 20, 26, 42); it was decided that this area was too distant from both the western Małopolska and the Lower Silesia regions.

As can be seen in Figures 8 to 12, there are sites dated to the 6th and 5th millennium BC in every part of southern Poland. What is more, there are also dates that indicate the 4th millennium BC, or even the 3rd and the first

half of the 2nd millennium BC. Consequently, the Late Mesolithic and para-Neolithic dates represent all of the above-mentioned phases of cultural and stylistic transformations evidenced in the hunter-gatherer contexts in southern Poland. Younger dates include determinations from para-Neolithic sites on the Warta River (Osjaków 3, Łykowe 1, and Mokracz 1); their chronology is, therefore, supported by the presence of pottery. Besides these, this group includes dates from Głanów 3 and single dates from other sites. Because of the above claims concerning the credibility of the 'non-Neolithic' Holocene dates, we assume that a connection between the discussed dates and the youngest developmental phases of the hunting and gathering communities of southern Poland cannot be excluded.

The radiocarbon data also clearly show that Late Mesolithic/para-Neolithic communities functioned simultaneously with 'Linear' communities (Figs 8–12). What is more, as we already know, the hunter-gatherer groupings, both without ceramics and 'ceramicised', lived in southern Poland for a longer period of time, parallel not only with the 'post-Linear' units in the 5th millennium BC, but also with later Neolithic or even Early Bronze Age groupings.

Zones of the Mesolithic and Early Neolithic settlement

As is known, the LBK and 'post-Linear' sites were very clearly concentrated on the fertile 'islands' located mainly in the upland and submontane areas. The Mesolithic sites, including Late Mesolithic/para-Neolithic sites, on the other hand, are located mostly outside such islands and on their outskirts. It seems that one of the characteristics of the Mesolithic settlements in southern Poland was the avoidance of areas with large differences in elevation, i.e. areas for which the standard deviation of relative heights in fields with an area of 3 sq. kilometres was over 15 metres.⁶¹ Preference was given to areas for which the standard deviations of relative altitudes were within the range of 4 to 10 metres. Most of the sites are located in the landscape zones of periglacial lowlands and terraces exposed over floodplains. Thus, the model known from the lowland areas is repeated. On general maps, this gives the impression that – in some regions, such as western Małopolska – the Late Mesolithic sites are situated in the 'loess' zone, but this is not the case. They are still located

⁵³ For instance, Crombé 2016.

⁵⁴ Daniau *et al.* 2010; Dreibrodt *et al.* 2010; Marlon *et al.* 2013.

⁵⁵ Dietze *et al.* 2018.

⁵⁶ Wacnik *et al.* 2011; Wacnik *et al.* 2020.

⁵⁷ Bishop *et al.* 2015; Kuosmanen *et al.* 2018.

⁵⁸ See Masojć 2005.

⁵⁹ Bronk Ramsey 2009; Reimer *et al.* 2013.

⁶⁰ Bronk Ramsey 2017.

⁶¹ Śleszyński 2012.



Fig. 8.a. Modelling of ¹⁴C dates from the Late Mesolithic, para-Neolithic, and Early Neolithic sites in southern Poland (see text, p. 58).

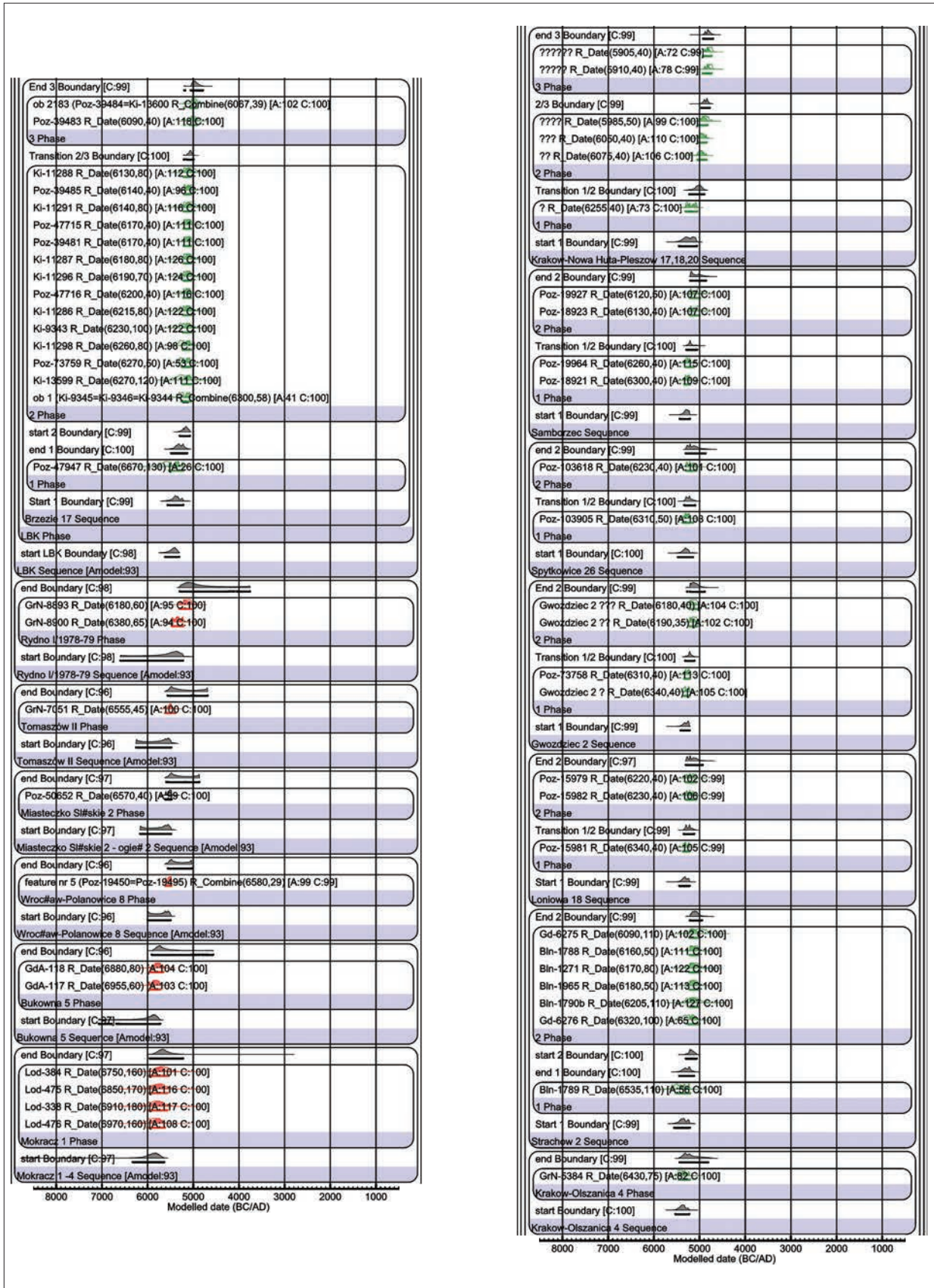


Fig. 8.b. Modelling of ¹⁴C dates from the Late Mesolithic, para-Neolithic, and Early Neolithic sites in southern Poland (see text, p. 58).

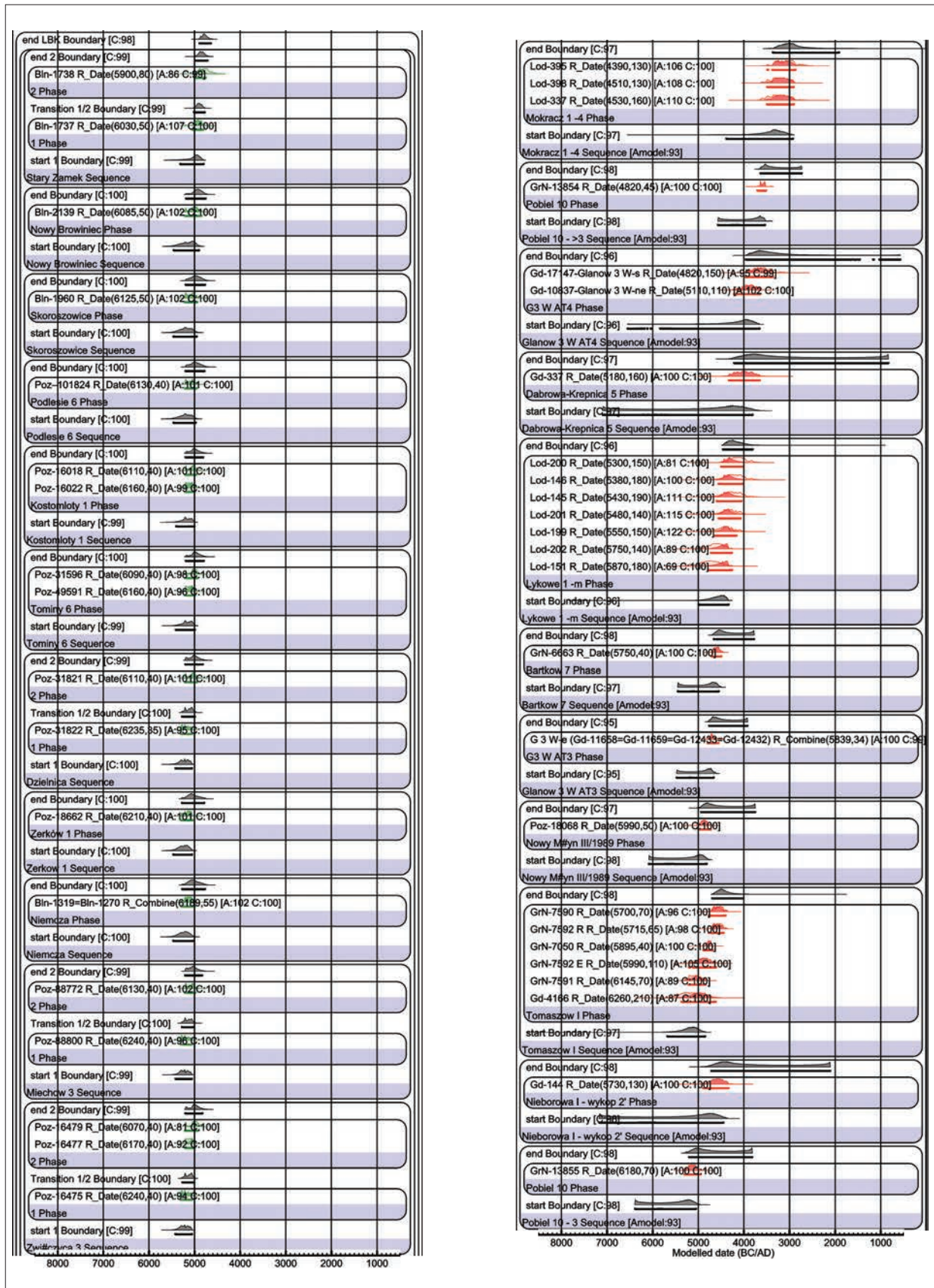


Fig. 8.c. Modelling of ¹⁴C dates from the Late Mesolithic, para-Neolithic, and Early Neolithic sites in southern Poland (see text, p. 58).

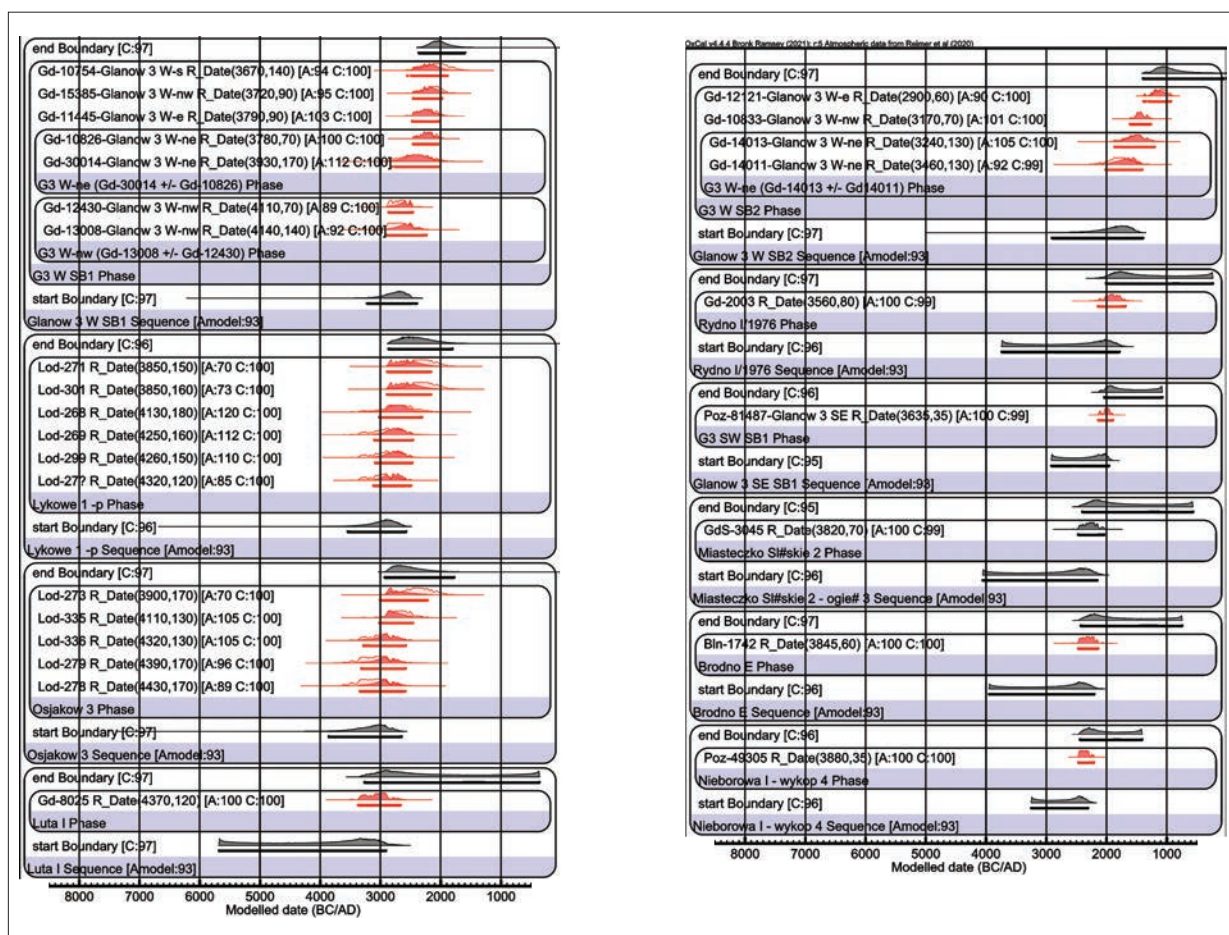


Fig. 8.d. Modelling of ^{14}C dates from the Late Mesolithic, para-Neolithic, and Early Neolithic sites in southern Poland (see text, p. 58).

other, topographically and ecologically distinct zones. In the region mentioned above, the sites are related to the alluvial environment of the upper Vistula River basin in the Kraków region (Fig. 13). A similar picture has been demonstrated for Lower Silesia.⁶²

In the upland landscape zones, carbonate as well as siliceous and aluminosiliceous highlands were preferred by Mesolithic settlements. A closer analysis of the location of the camps indicates that the areas with upland landscapes were 'entered' through the valleys that cut them off. This is visible both on a regional scale in southern Poland and when studying smaller areas, e.g. the Tenczynek Hummock⁶³ or the Ojców Plateau.⁶⁴ Areas covered by loess formations are not occupied by Mesolithic settlements. The few Mesolithic sites formally located within the loess formations are also almost always associated with valleys that cut them off.

To sum up, the Late Mesolithic and the LBK/post-Linear settlement zones differed topographically and ecologically.

Comparison of chipped lithics

Let us contrast chipped lithic inventories of both formations (Figs 14–15).

As far as raw material issues are concerned, the Early Neolithic saw a specialized extraction of good quality flints (Jurassic flint near Kraków, chocolate flints) and the existence of an organized network of their distribution.⁶⁵ The Late Mesolithic groups still relied on local raw materials. Although progressive 'Castelnovisation' undoubtedly involved the search for flint concretions of certain qualities, this does not mean that in the case of their shortage Mesolithic flint workers were unable

⁶² Masojć *et al.* 2009.

⁶³ Zakrzewska, Zajac 2018.

⁶⁴ Zajac 2006.

⁶⁵ Balcer 1983; Ehlert 2014.

to access and use suboptimal sources (e.g. alluvial concretions of erratic origins). There are also no indicators of a wide exchange network. Generally speaking, when comparing the raw material economy of the Early and Late Mesolithic, there are no major changes. Only the range of chocolate flint seems to increase slightly.⁶⁶

As regards the cores, there are similar single-platform specimens for relatively regular, slender blade blanks in both LBK and Late Mesolithic sites (Figs 14: 1–4; 15: 1). However, in the Late Mesolithic, smaller single-platform cores used to produce bladelets (Fig. 15: 2–4) and cores for flakes were also relatively frequent. Actually, even the similarities between these cores for larger blades are rather formal. Among other things, there are technological differences in platform preparation. The Late Mesolithic specimens have retouched platform edges much more frequently. Differences of this type can also be noticed in blanks. Finally, in general, Late Mesolithic blade blanks tend to be a bit smaller than the ‘Linear’ ones.

In the case of LBK, important tool groups include blade end-scrapers (Fig. 14: 16–21) and blade truncations, usually with silica gloss (Fig. 14: 8–15). In the Late Mesolithic, such tools were not so frequent; certainly, truncations do not bear traces of silica gloss (Fig. 15: 33–39), and end-scrapers were most often made on flakes (Fig. 15: 45–46). Overall, in the Late Mesolithic inventories, side-scrapers (Fig. 15: 40–44) and geometric microliths still predominate among the tools (Fig. 15: 5–24), whereas trapezes are important or predominant in the latter group.

Of course, trapezes are known from both the Late Mesolithic and the LBK. However, in the LBK they are very rare and consist mainly of standard high trapezes (Fig. 14: 5–7). The Late Mesolithic trapezes are much more diversified due to, among others, the greater diversity of blank forms (Fig. 15: 19–24). In addition, the microburin technique is not present in the LBK, contrary to the Mesolithic (Fig. 15: 25–32).

Other tools, such as burins or perforators (Figs 14: 22–25; 15: 48–50), are less common in both the LBK and the Late Mesolithic industries. Elements of the bipolar flaking technique are rare in both cases (Figs 14: 26; 15: 51).

The finds of unpolished axes/adzes are known only from Late Mesolithic sites (Fig. 15: 47).

In general, it is our belief that clear differences are visible in flint inventories and it is impossible to demon-

strate any exchange of flint artefacts between the Late Mesolithic and the LBK groups.

A glimpse at the 4th millennium BC (and beyond)

The cultural situation in southern Poland changed radically in the first half of the 4th millennium BC. The ‘new’ Neolithic archaeological unit, i.e. the Funnel Beaker culture (TRB), was spreading at the time. This process embraced both ‘old-agricultural’ enclaves and – to a large extent – the ‘Mesolithic’ areas outside them. There are clearly more TRB sites when compared to the ‘Danubian’ Neolithic, not only in the latter areas but also within the former ones.⁶⁷

Theoretically, therefore, it may seem that – similarly to the lowlands⁶⁸ – the genetic pool of the southern TRB groups consisted of a late post-Linear and Late Mesolithic component. Currently, however, it is difficult to support this hypothesis with a specific rationale. The ceramics of the southern TRB certainly has some elements in common with the late Lengyel-Polgár complex (L-PC). This includes both the technology (temper of broken sherds) and some vessel proportions,⁶⁹ but one should always bear in mind the risk that it could be a formal similarity. If, however, it is not an accidental and formal issue, this situation may be a sign of a quite rapid cultural change – at least in terms of the pottery repertoire. By the way, there are also signs of ceramic exchange between these two cultural circles.⁷⁰ Of course, such an exchange may not necessarily prove genetic dependence but only parallel development and some interactions.

Flint inventories of the TRB in southern Poland are certainly very diverse. In other words, not only the state of lithics, which B. Balcer⁷¹ described as the “Małopolska industry”, is typical for this branch of the TRB.⁷² It can be assumed that this industry originates from the pattern of flint industry typical for the late L-PC groups, that is, primarily the Lublin-Volhynian culture and the Wyciąże-Złotniki group. However, it would be difficult to point out any obvious similarities of TRB flint materials other than from the Małopolska industry to those of the Late Mesolithic, with the exception of certain features such as small blades, single trapezes and side-scrapers, and splintered pieces,⁷³ which again, unfortunately, may be of formal character (but not necessarily!). Another matter

⁶⁶ Cyrek 1981.

⁶⁷ Kruk *et al.* 1996; Nowak 2009, see further literature therein; Król 2018; Pelisiak 2018; Kozłowski, Nowak 2019.

⁶⁸ Nowak 2009; Kozłowski, Nowak 2019.

⁶⁹ Nowak 2004.

⁷⁰ Kulczycka-Leciejewiczowa, Noworyta 2009; Kruk, Milisauskas 2018, 65.

⁷¹ Balcer 1983; 1988.

⁷² Kozłowski, Nowak 2018; 2019, 194–198, 217–218.

⁷³ Nowak 1994.

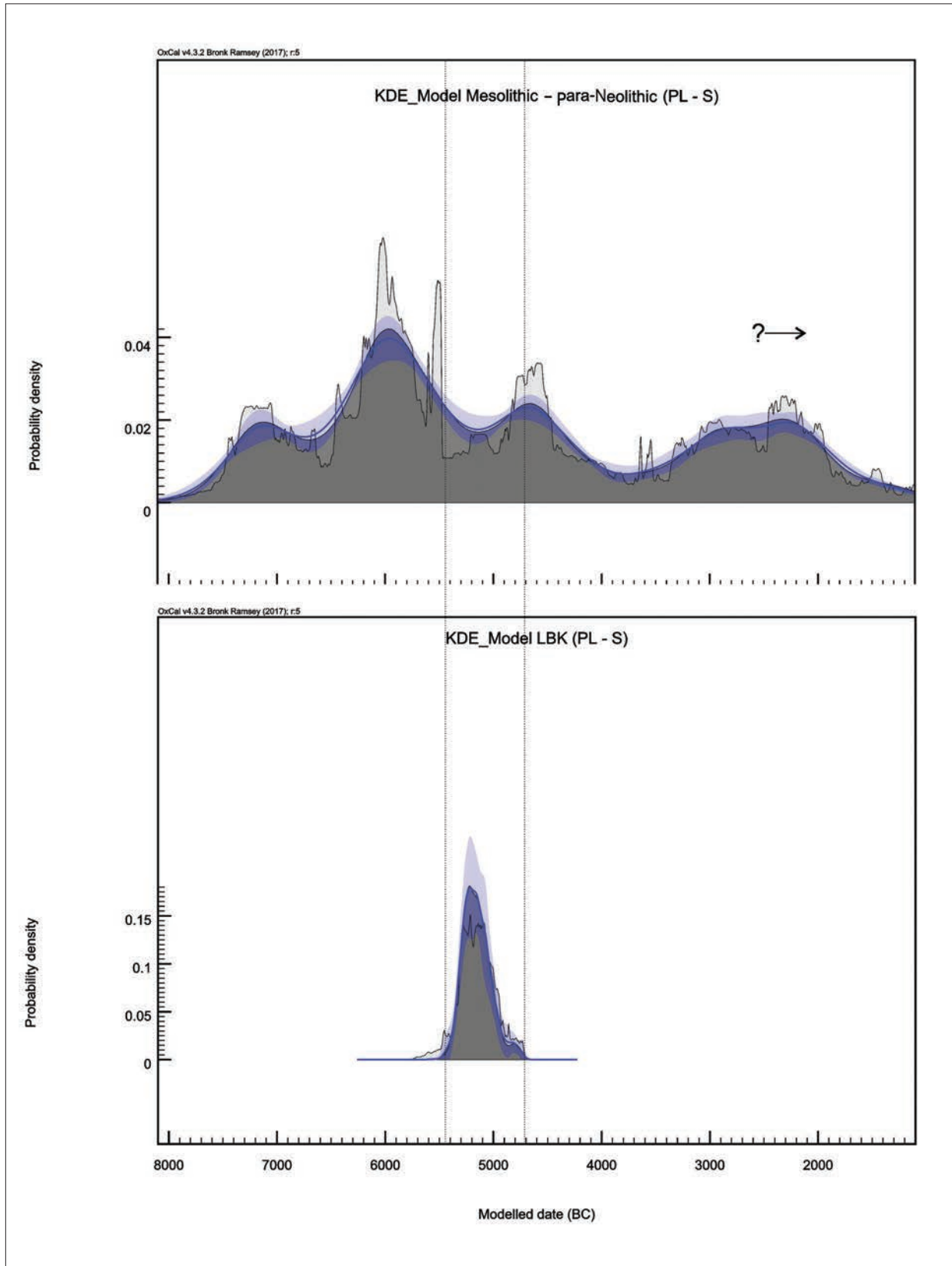


Fig. 9. KDE modelling of all ^{14}C dates from the Late Mesolithic, para-Neolithic, and Early Neolithic sites in southern Poland.

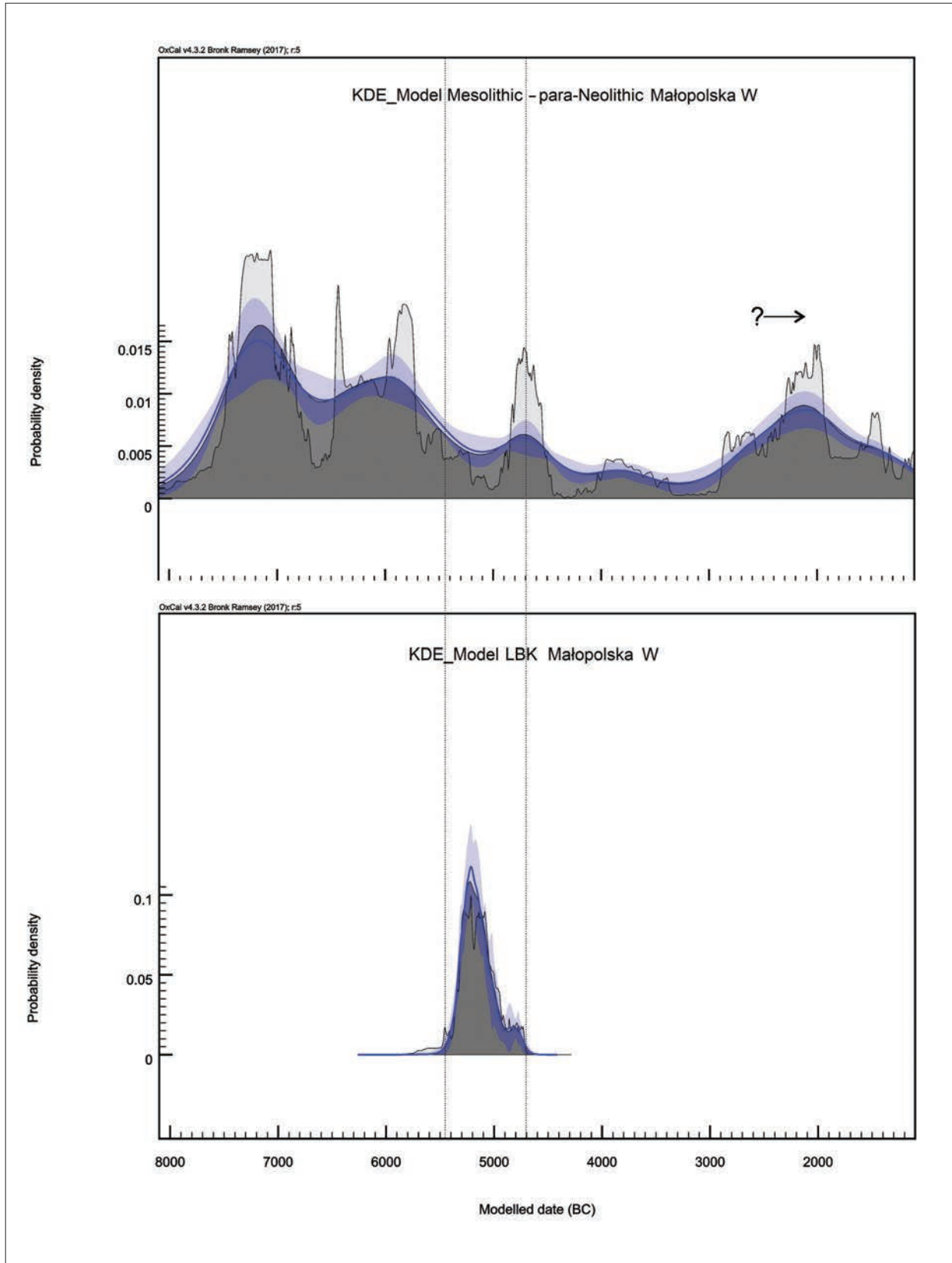


Fig. 10. KDE modelling of ^{14}C dates from the Late Mesolithic, para-Neolithic and Early Neolithic sites in western Małopolska.

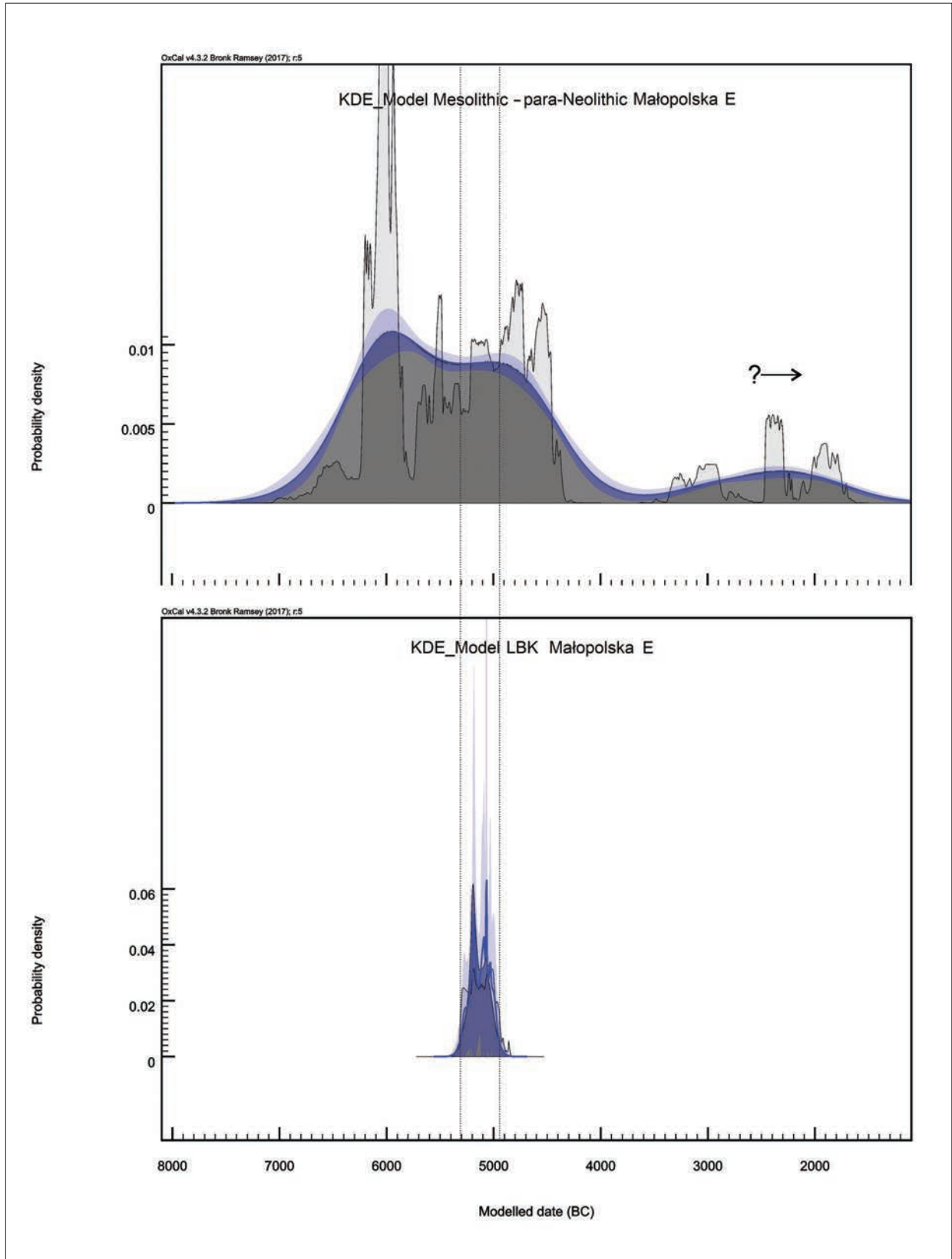


Fig. 11. KDE modelling of ^{14}C dates from the Late Mesolithic, para-Neolithic, and Early Neolithic sites in eastern Małopolska.

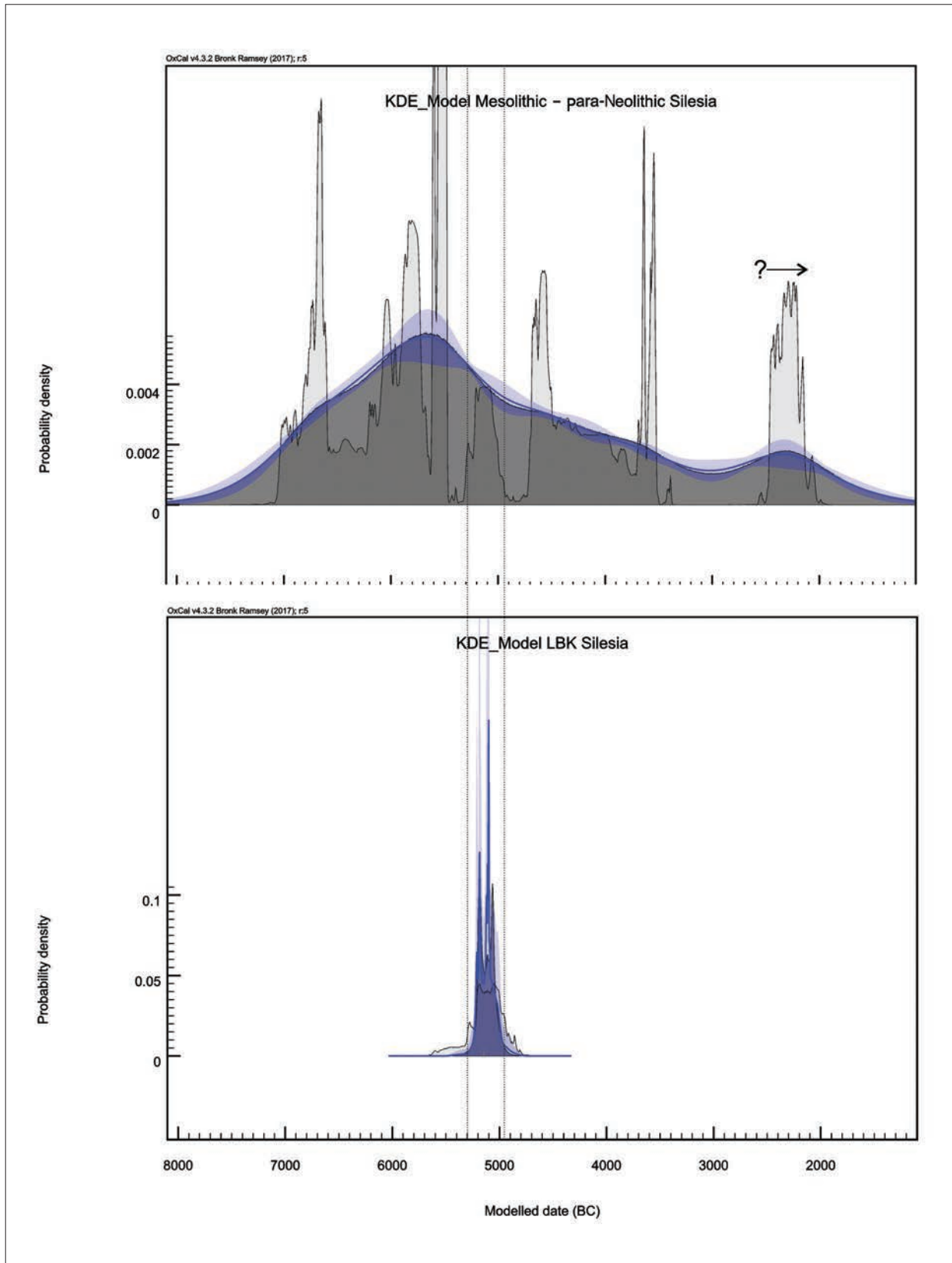


Fig. 12. KDE modelling of ^{14}C dates from the Late Mesolithic, para-Neolithic, and Early Neolithic sites in Silesia.

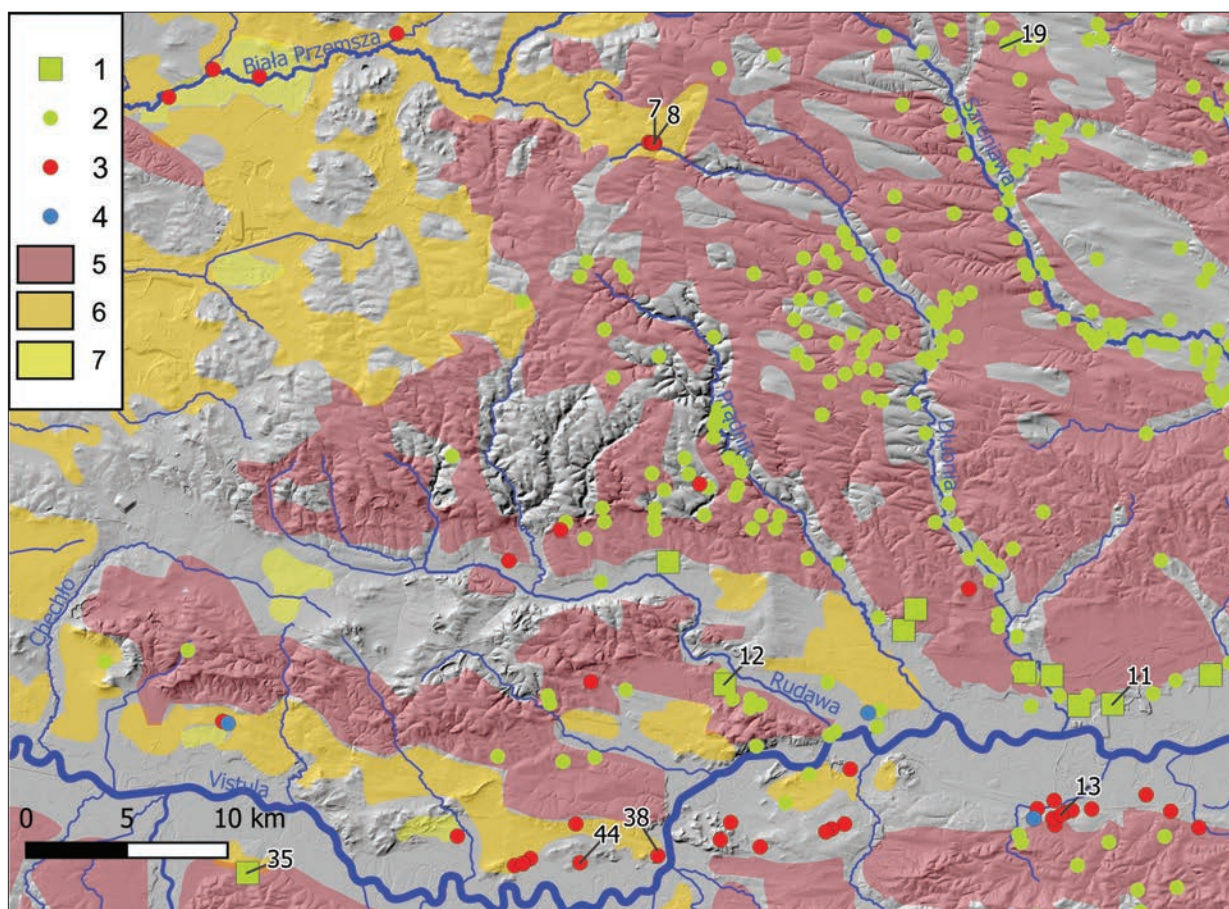


Fig. 13. Late Mesolithic and Early Neolithic settlement in the southern part of the Kraków-Częstochowa Upland and the neighbouring areas; 1 – LBK sites with long houses, 2 – LBK sites, 3 – Late Mesolithic sites, 4 – para-Neolithic sites, 5 – loess covers, 6 – sands, 7 – aeolian sands. Numbers refer to sites as in Fig. 4.

is that ‘sand’ chipped lithics of the southern TRB are very poorly recognized.

One way or another, the problem in question is open, although it is our belief that the previously suggested scenario remains an acceptable working hypothesis.

However, regardless of that, it should be emphasised at this point that apparently not the whole Late Mesolithic entered the TRB, or was eliminated by the TRB, because – as already mentioned – there are ^{14}C dates from hunter-gatherer contexts parallel to the TRB, and even later ones since the TRB existed in southern Poland only until ca. 2800 BC. Also, para-Neolithic pottery testifies to this late chronology of the hunter-gatherer groupings.

Conclusions

Summarising the facts presented above and the proposals for their interpretation, we believe that the following points should be highlighted:

- Migration, perhaps in the form of leapfrog colonisation,⁷⁴ is the most likely scenario for the emergence and spread of the LBK in southern Poland.
- Neolithic farmers coexisted in this territory with the Late Mesolithic or para-Neolithic hunter-gatherers throughout the whole Neolithic period.
- Until the beginning of the 4th millennium BC, hunter-gatherers and farmers essentially inhabited and exploited different ecological zones; the former

⁷⁴Zvelebil 2001.

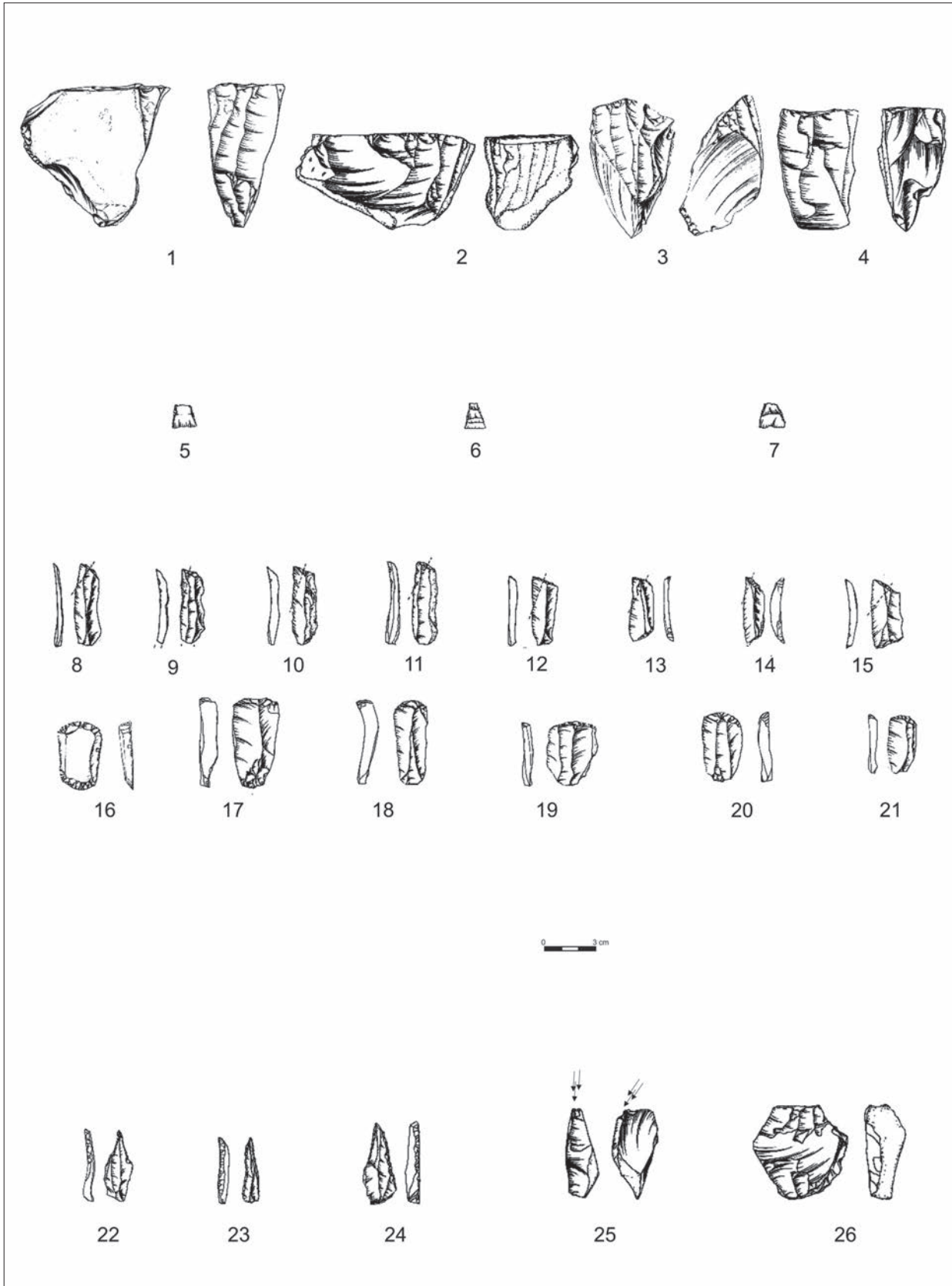


Fig. 14. Selected LBK chipped lithics from the site of Brzezcie 17 (after Wilczyński 2014); 1–4 – cores, 5–7 – trapezes, 8–15 – truncations, 16–21 – end-scrapers, 22–24 – perforators, 25 – burin, 26 – splintered piece.

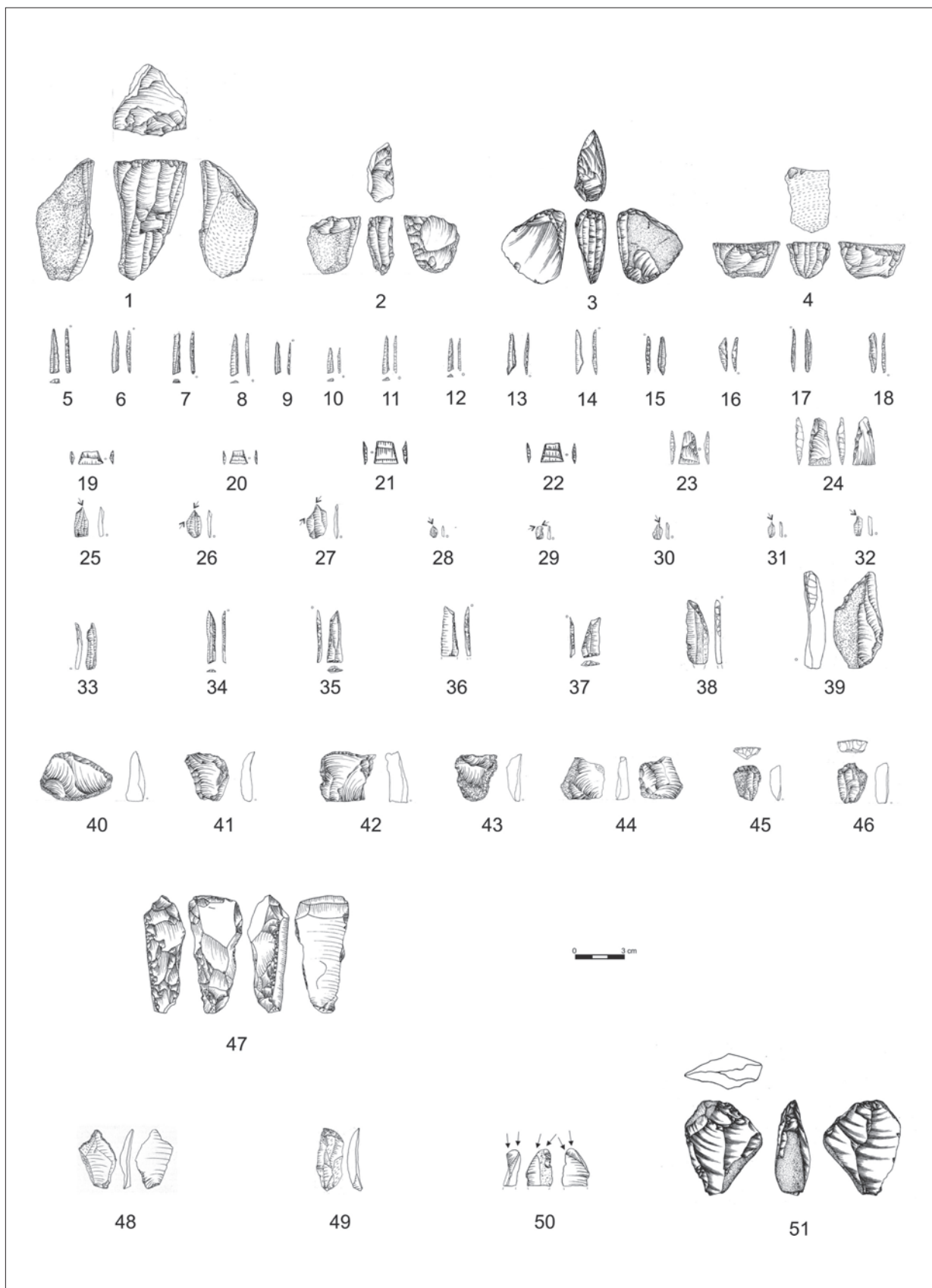


Fig. 15. Selected Late Mesolithic chipped lithics from the site of Glanów 3; 1–4 – cores, 5–15 – triangles, 16–18 – backed pieces, 19–24 – trapezes, 25–32 – microburins, 33–39 – truncations, 40–44 – scrapers, 45–46 – end-scrapers, 47 – unpolished axe/adze, 48–49 – perforators, 50 – burin, 51 – splintered piece.

would prefer 'sandy' and 'alluvial' zones, whereas the latter – the 'loess' zone. However, the areas that may conventionally be called 'sandy' and 'alluvial' were incomparably smaller than in the lowland zone and in many regions mixed with the loess areas. It is therefore possible that the vicinity of agricultural and hunter-gatherer groups was very close, sometimes even within sight (see the upper Vistula or Widawa rivers).

- The concept of a single, uninterrupted front between the Neolithic and Mesolithic populations, running across all of Central Europe,⁷⁵ at least in the case of southern Poland in the 6th and 5th millennia BC, is incorrect, although it appears attractive and has repeatedly been presented in many general studies. The symbolically-treated notion of a 'CHESSBOARD'

seems more appropriate to describe the spatial relationship of these formations.

- Contacts and interactions between the Late Mesolithic and the LBK/post-LBK were quite limited. The Late Mesolithic communities, in essence, did not participate in this stage of neolithisation. We do not claim that there were absolutely no contacts between these cultural formations. For instance, they seem to be traceable in the single haplotype U5b identification from the skeleton of the Malice culture at the site of Kazimierza Mała.⁷⁶
- Certain late Mesolithic populations underwent 'Beaker' acculturation, but some continued to function in undisturbed form (including the para-Neolithic form), at least until the end of the 3rd millennium BC.

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⁷⁵ For instance, Fernández *et al.* 2014; Silva, Vander Linden 2017.

⁷⁶ Chyleński *et al.* 2017.

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