

Joanna Pyzel¹

ON THE BANDKERAMIK ON THE LOWER VISTULA RIVER

ABSTRACT

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The Vistula River is the most important river in Polish history and culture. This paper discusses whether this could influence the hypothesis regarding the crucial role of this river for the Early Neolithic colonization of the Polish lowlands. It presents an overview of the Linear Pottery culture settlement on the lower Vistula River. The main sources of information are broad-scale survey programmes, which provide an impressive number of sites, while the extent of large-scale excavations is very limited. This is an important caveat with respect to statements on similarities and differences in occupation between the lowlands and other regions. Nevertheless, according to the present state of research, the lower Vistula region can be regarded as a remote, but important settlement area of the LBK.

Keywords: LBK, Polish lowlands, early farming occupation

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INTRODUCTION

The title of this volume implies the existence of two distinct parts of the Neolithic world: those to the west and to the east of the Vistula River. As a person who grew up on the right bank of this river, in Warsaw Praga, which has by no means been as a fashionable district as it is nowadays, I learned from an early age about the symbolic power of rivers to

¹ Institute of Archaeology and Ethnology, University of Gdańsk, Bielańska 5, 80-851 Gdańsk, Poland; joanna.pyzel@ug.edu.pl

separate worlds and people. The Vistula River is one of the few European rivers representing a symbolic boundary separating the supreme western civilization from the under-developed, barbarian east (the location of this boundary depends strongly on the place of birth and residence of the person involved). However, in the history of Poland, the Vistula River was an important waterway running almost without exception through purely Polish territories. Thus, it played a uniting role, connecting the west with the east and the south with the north – not only literally, but also metaphorically, thereby contributing to the sense of common national identity. This modern integrating role of the river influences archaeological interpretations (Kostrzewski 1933). In this paper, I focus on the first farming communities of the Linear Pottery culture (LBK) living on the Vistula River in the Polish lowlands, especially in the lower course of this river. I present an overview of their occupation and pay special attention to the issue of the Vistula River as a potential south-north communication route for different groups of the LBK.

REGIONAL SETTING

The Vistula River flows through the territory of modern Poland, from the western Carpathians in the south to the Gdańsk Bay in the north. The approximately 1000-kilometer-long river can be divided into three parts: the upper Vistula to the confluence with the San River (or to Zawichost), the middle Vistula to the confluence of the Narew River, and the lower Vistula to its estuary in the Baltic Sea. The upper Vistula River flows mainly through loess areas of western Lesser Poland, which were a key region of LBK settlement in Poland and were extensively studied by A. Czekaj-Zastawny (2008). Loess uplands extend slightly over the middle Vistula boundary and LBK settlement is registered there even in marginal areas, previously regarded as uninhabited (Szeliga *et al.* 2020).

Further to the north stretches the vast area of the Polish lowlands. The strong relationship between loess and the settlement of the LBK has been emphasized up until now (*e.g.* Hofmann 2020), and this heavily influences the interpretation of any traces of occupation outside this area – a perfect example of which being the Polish lowlands stretching along the middle and lower Vistula River. Up until now, opinions regarding the special function of lowland sites, diminishing new discoveries and stressing any hint of a temporary and ephemeral character, have been prominent in the discussion (Grygiel 2004; Bogucki 2020), which leads to the necessity of emphasizing the opposite – the similarity of these sites with the LBK loess norm (Pyzel 2010a; Płaza and Papiernik 2020). Similar discussions take place regarding the LBK further west, for example in Brandenburg (Cziesla 2008; Ismail-Weber 2017).

STATE OF RESEARCH ON THE LBK IN THE POLISH LOWLANDS ON THE VISTULA RIVER

Slightly more than 50 years ago, A. Kulczycka-Leciejewiczowa published a map with a catalogue of all known LBK sites from the territory of Poland (Kulczycka-Leciejewiczowa 1968). It included 150 sites, 28 of them located in the lowlands on the Vistula River: six in different parts of Mazovia, 20 in Kuyavia and Pałuki, two in Chełmno Land. Since that time, an impressive increase in data has taken place: in Lesser Poland itself, the number of sites has increased by more than 11-fold (Czekaj-Zastawny 2008). Lowland sites are depicted in Fig. 1, and they will be briefly presented to the following regions:

Mazovia

In this region, the growth in data is very limited. There are no new sites in the south of the region, in the vicinity of old discoveries from Śniadków Górny and Świdry Małe (these sites are not considered on the map (Fig. 1), as they belong to the middle Vistula area) nor in the north, near Lubiejewo. However, surveys of the Polish Archaeological Record (AZP) and later field surveys by M. Bednarz from the University of Warsaw confirmed the existence of a settlement micro-region between the Vistula River and the Kampinos Forest, in the Warsaw Basin meso-region, within the flood plain of the river. A. Kulczycka-Leciejewiczowa mentioned three sites from this area, all registered in the early 20th century (Kulczycka-Leciejewiczowa 1968, 117, pt 68-70). Surveys in the last two decades of that century revealed the existence of 10 new sites located within a total area of 70 km². It is an agricultural region of diverse conditions, mainly covered by poor, sandy soils, but also heavy alluvial and till soils. On two sites, small rescue excavations have recently been conducted (Cząstków Polski, Comm. Czosnów, site. 12, excavations by M. Czarnecki; Łomna Las, Comm. Czosnów, site 4, excavations by M. Hrynczyszyn Archaioi Sp. z o.o.), which revealed the existence of typical LBK settlement pits and artefacts such as pottery and chipped and ground stones, which can be dated to the middle LBK with some archaic elements (LBK IIA according to Pyzel 2010a; LBK pottery analysed by author, publication in preparation). These data argue for a relatively stable and quite early LBK occupation in this region, which definitely deserves more attention in the future.

Kuyavia

Intensive archaeological research in this showcase region of the lowlands confirmed the existence of a compact settlement group extending throughout Kuyavia to Pałuki and eastern Greater Poland. It consists of at least 453 sites: apart from the 388 published in my Ph.D. catalogue (Pyzel 2010a), 46 sites discovered around Wietrzychowice (Papiernik

et al. 2017; Papiernik *et al.* 2020) and 19 new sites registered during excavations on the A1 motorway route (Pyzel 2017; catalogue by Pyzel 2010a includes only sites on this route discovered during previous surveys) were considered on the map (Fig. 1) as well. Sites are clustered along water courses, glacial tunnel valleys and kettle lakes. Most of them are lo-

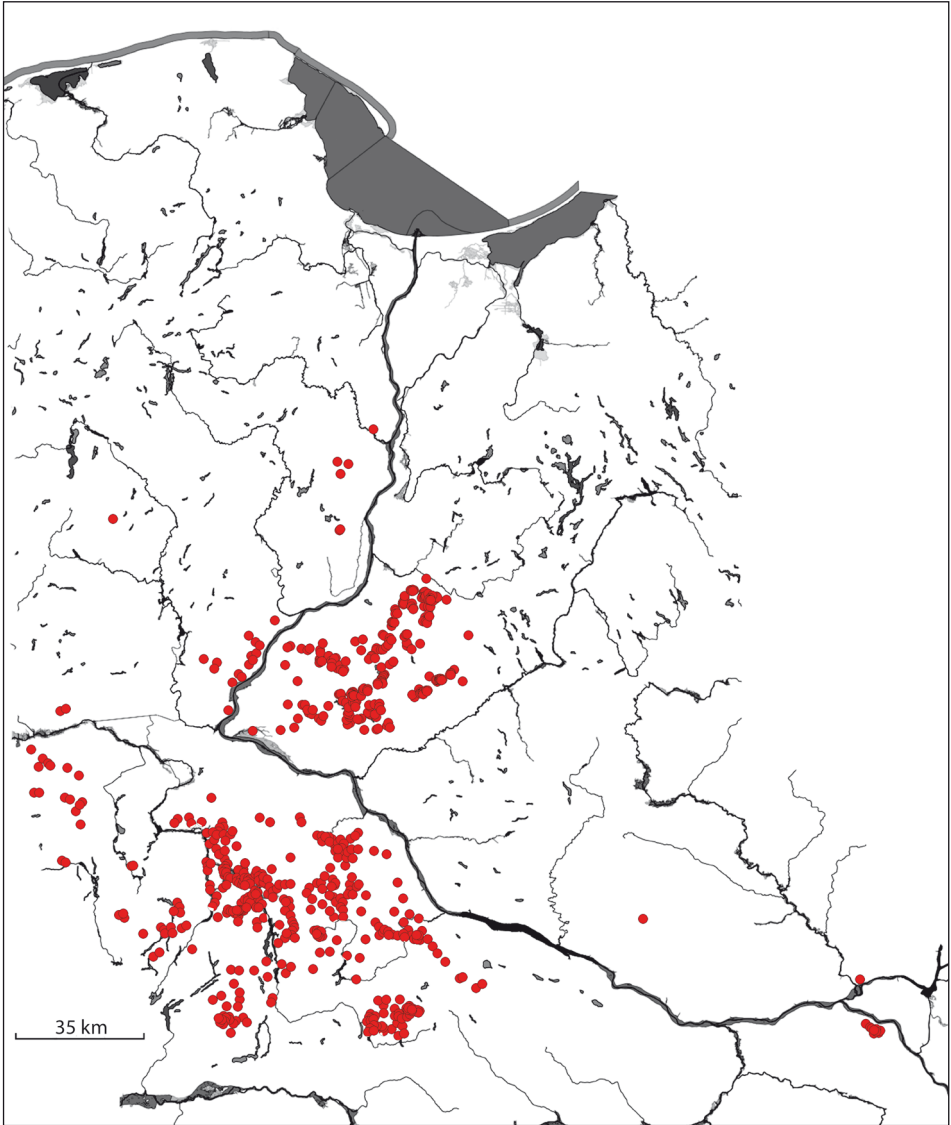


Fig. 1. LBK sites on the lower Vistula river. According to: Kulczycka-Leciejewiczowa 1968; Pyzel 2010; Werra 2013; Gackowski and Białowarczuk 2014; Czerniak *et al.* 2016; Papiernik *et al.* 2017, modified

cated on or in the vicinity of fertile soils developed on ground clay moraine: famous Kuyavian mollic gleysoils, but also cambisols and others (Pyzel 2010a; 2010b; Jankowski and Sykuła 2020).

Pomerania

The map published by Kulczycka-Leciejewiczowa includes only two sites from this region, both in Chełmno Land (Kulczycka-Leciejewiczowa 1968, 117, pt 79, 84). In this area, the greatest increase in the number of LBK sites within the lowlands can be observed. A recent catalogue by D. Werra (2013) lists 279 sites, which confirms previous conclusions by R. Kirkowski that Chełmno Land belongs to one of the key regions of the LBK in modern Poland (Kirkowski 1994). Most of the sites cluster in small valleys and on lakes, and the majority of them are located on moraine upland covered by fertile cambisols.

On the other side of the Vistula River, some hitherto unknown enclaves have been discovered recently in the Kociewie region. The first one is a group of 15 sites from the Świecie Plateau (Gackowski and Białowarczuk 2014). I excluded the site Gądecz listed by Gackowski and Białowarczuk (2014) from this figure, as the dating was based only on stone artefacts. Sites of this kind (loose stone artefacts), known, for example, from Mazovia (Sałacińska and Sałaciński 2010), were also not considered in this paper. These 15 sites belong to two separate clusters located on small tributaries of the Vistula River. About 30 km further to the north, on the eastern edge of the Tuchola Forest, two traces of occupation were discovered at Warlubie, Comm. loco. Both sites are from rescue excavations on the A1 motorway route: Warlubie site 3 – two pieces of pottery, Warlubie site 4 – one piece of pottery (Gackowski and Białowarczuk 2014). Another three sites – Kościelna Jania site 13, Barłożno site 15, Bobrowiec-Kornatka site 5, are located ca. 40 km to the north (Czerniak *et al.* 2016). A small campsite at Brody Pomorskie, site 20, Comm. Gniew, situated at a distance of 20 km from this cluster, remains the northernmost undoubted LBK settlement (Felczak 1987). In the case of Bielawki, site 32, Comm. Pelplin, which is sometimes mentioned as belonging to the LBK (Ratajczak and Ostasz 2010; Kozłowski and Nowak 2019, 48), the very few Early Neolithic pottery fragments found there represent post-LBK communities (personal communication L. Czerniak 2020). According to it, Brzeźno, site 13 was also excluded from the map in Fig. 1). A similarly misleading attribution to the LBK (even in the title of the publication Przybył 2011), unfortunately even more broadly repeated (*e.g.* Czerniak *et al.* 2016, 194 fig. 1), occurred in the case of Juszkowo-Rusocin, site 28, Comm. Pruszcz Gdański, located 20 km further to the north of Brody Pomorskie, on the boundary of the Vistula fens (Żuławy Wiślane) and the Kashubian Lake District. A single Neolithic potsherd, found during a rescue excavation on the A1 motorway, dates to the post-LBK cultures (Przybył 2011).

In the case of the whole region of the Vistula fens, suggestions about the existence of LBK sites have been repeated for many years (*e.g.* Kulczycka-Leciejewiczowa 1993, 44

footnote 15). The AZP data mention one site at Giemlice, site 2, Comm. Cedry Wielkie, dated according to a single potsherd (personal communication A. Gackowski 2020). Taking into account its location in a peatland not suitable for a stable occupation during the Atlantic period (Rosa 2000), it needs a re-examination, and thus it was not considered on the map (Fig. 1). However, the AZP data also include a newly discovered LBK site at Ostrowite, site 2, Comm. Chojnice, in the north-eastern part of the Krajna Lake District, where traces of a stable settlement were excavated (Sikora *et al.* 2018), raising hopes of further finds in the future in this hitherto unexplored region.

Most of the sites illustrated in Fig. 1 are known only from surveys, mainly (but not solely) conducted as part of the AZP project. So far, it has covered *ca.* 90% of the Polish territory, but the state of research is not uniform. Unfortunately, Pomerania, excluding Chełmno Land, has most of the blank spots on its maps, although the regions close to the Vistula River can be regarded as the best studied (Niedziółka 2018). Without a doubt, the AZP project was the largest contributor to the increase in the data, and thus to the changes in prehistoric settlement maps, even if the research was far from ideal, which has been discussed many times (*e.g.* Barford *et al.* 2000). The results are influenced not only by the experience of the archaeologists who conducted the surveys themselves, but also those estimating the chronology of the finds. It can be concluded that LBK sites are more likely to be discovered in regions where they had been expected because of the existing knowledge of the LBK settlement patterns. But even there the results may not necessarily have been very representative. For example, thanks to an intensive systematic survey conducted recently in southern Kuyavia near Wietrzychowice, 45 LBK sites were discovered in an area where, according to the AZP data from the 1980s, only two sites had existed (Papiernik *et al.* 2017; Papiernik *et al.* 2020). Similar observations could be made for eastern Kuyavia on the A1 motorway route: here also, the repeated survey conducted as a part of the rescue excavation programme added 11 new sites to the four known from the AZP. Subsequent rescue excavations additionally verified these estimations. The dating of 14 sites could be confirmed, but 19 new ones were discovered as well. It is also worth mentioning that the number of surface finds does not necessarily correlate with the size of a site (Pyzel 2017). Recent research results clearly demonstrate that although the number of LBK sites known from the AZP survey is astonishingly high, it is clearly lower than the true number of settlements.

SETTLEMENT

Summing up all of the regions presented above, one obtains the number of 767 LBK sites on the lower Vistula River, which is very impressive. It is almost as many as for the whole of Lesser Poland (Czekaj-Zastawny 2008). Seven hundred thirty-two of them concentrate in the two core areas of Kuyavia and Chełmno Land, and 35 are scattered outside of them. This total number of LBK sites on the lower Vistula River indicates that this was

a remote, peripheral but nevertheless important region, which cannot be regarded as an ephemeral, failed occupational experiment of the first farmers.

It needs to be stressed that on both the lower and upper Vistula River, similar research methods (mainly the AZP survey) were applied. However, in the case of lowland peripheries such as Pomerania (excluding Chełmno Land) or Mazovia, one can expect that some small and undiagnostic find assemblages could not be classified properly, which was due to the fact that not all local archaeologists were familiar with LBK material there. The state of research is thus not always comparable, and conclusions from the core areas of Kuyavia and Chełmno Land influence the interpretation of the whole lower Vistula region.

The LBK settlement there follows patterns known from other regions of this culture. Its insular character is striking: the first farmers settled selected enclaves, preferring moraine uplands with fertile soils developed on tills. It did not necessarily have to be the most fertile mollic gleysols, characteristic especially for Kuyavia, which were traditionally regarded as a crucial factor attracting the farmers (Pyzel 2010a; 2010b). Their origin and age are controversial, and it is not clear if they were readily developed in the Early Neolithic (*e.g.* Szmyt 1996, 92, 93, further references therein). There is also a correlation of LBK settlement with cambisols and albeluvisols, and in the case of young glacial landscapes of the lowlands with a great variability of soils, it is sometimes difficult to estimate such a relationship, as demonstrated by debates about LBK sites located on sandy soil (called Podgaj-type sites: Domańska and Rzepecki 2009; Rzepecki 2013).

Not all suitable enclaves were occupied by LBK communities (Kukawka 1997), as was evidenced by a linear project running through Kuyavia, which did not reveal the existence of LBK sites there (Pyzel 2010a, 172-173). Certainly not all enclaves have been discovered so far, as the example of an incidental discovery of an LBK site at Ostrowite, site 2, perfectly indicates.

LBK sites cluster, not only in a linear order along water courses, but also in the lowland landscape around kettle valleys and lakes. Not in every case could such clusters be detected: on peripheries at Brody Pomorskie and Ostrowite, single sites were detected, and further intensive surveys are required in their vicinities to trace potential neighbouring sites. For example, the cluster south of Brody Pomorskie, excavated due to the construction of the A1 motorway, consists of three sites: a stable settlement at Kościelna Jania 13 (Czerniak *et al.* 2016) and two other sites – Borowiec-Kornatka 5 and Barłożno 15, where loose finds of LBK provenance were found, indicating that activity in this area was not restricted solely to Kościelna Jania. In general, as far as location of settlements is concerned, patterns from other regions were also followed in the lowlands.

Character of settlement

The A1 motorway running from the north to the south, to a large extent close to the Vistula River, forced rescue excavations of many sites, and their large scale brought new information on settlement structures of LBK communities in the lowlands.

In the case of Kuyavia, the motorway route cut through numerous micro-regions located directly on the edge of the upland, on its boundary with the Vistula River valley, which was a very favourable location. Large settlements (Ludwinowo, site 7, Kruszyn, site 10, Wieniec, site 10: Pyzel (ed.) 2019; Płaza 2016, Maciszewski 2015) occupied continuously during the whole Kuyavian LBK could be detected for the first time. In the case of Smólsk, site 2/10, a shift of occupation took place in the late LBK (Muzolf *et al.* 2012). Areas of more scattered settlement with many individual houses could be identified as well.

On the A1 route further to the north, similar, smaller settlements consisting of a few houses were registered in Chełmno Land (Bocień, site 5: Małecka-Kukawka 2012; Werra 2013) and in Kociewie (Kościelna Jania, site 13: Czerniak *et al.* 2016).

No large settlements were detected there, and it is not clear if they existed there at all. For Chełmno Land, it has been suggested that one settlement could be located on some neighbouring hills. This hypothesis was connected with the concept of a shifting occupation (Gurtowski and Kirkowski 1994) and needs to be re-examined. In general, more detailed research can reveal some occupational changes within and among micro-regions. Probably not all micro-regions were inhabited during the whole LBK. The existence of some clusters with such stability has so far been demonstrated only for Kuyavia (Grygiel 2004; Pyzel 2010a) and Chełmno Land (Kirkowski 1994).

On all sites excavated to a large enough extent to enable any kind of spatial analysis, evidence of stable LBK settlement features was registered: large, clay extraction pits, typical lateral pits, sometimes with remains of houses among them, etc. For the most part, these are poorly preserved, which makes their typological classification difficult, but the fact that lowland houses follow the general patterns of iconic LBK longhouses is unquestionable. Definitive examples of sunken-floor buildings are very seldom found (*e.g.* Werra 2010b), and it is not clear if they occur on typical or atypical sites. There are very few certain sites of other functions, such as temporary camp sites (*e.g.* Domańska and Rzepecki 2010), although new data from the intensive survey near Wietrzychowice suggest a relative high percentage of this type among all LBK sites (Papiernik *et al.* 2020). Macro-botanical and faunal remains indicate a farming economy (*e.g.* Mueller-Bieniek *et al.* 2016) with an emphasis on cattle (Gillis *et al.* 2017; Marciniak 2020).

CHRONOLOGY

The lowlands as a whole were settled from the early to the late LBK. This whole chronological sequence can be seen in Kuyavia and Chełmno Land. The situation in other regions is not clear, as such continuity is not self-evident (*e.g.* Pechtl 2020).

The earliest assemblages dated to the Kuyavian phase I (typologically, with elements of the oldest LBK associated with some early music note, *i.e.*, LBK IIA, traits) occur close to

the Vistula River valley, and the occupation later spreads to other regions, especially to the west (Pyzel 2010a; 2014).

All these estimations are based on pottery typology, which is key for the relative chronology. The uniformity of the music note stylistics makes such divisions difficult, and the issue of potential stylistic stagnation must be also considered (Werra 2013).

The absolute time span for the LBK occupation in Kuyavia lies between 5300 and 5050-5000 calBC according to recent estimations (Marciniak *et al.* in preparation), which is much shorter than previously assumed for the lowlands, especially for the end date, formerly thought to be even as late as 4850 calBC (Czerniak 1994). Nonetheless, this chronology definitely needs to be studied more extensively, as in general, there are very few absolute dates for the LBK in the lowlands.

ORIGIN AND CONTACTS

There are two potential origin areas for the lowland LBK. An origin in Lesser Poland has been the dominant hypothesis since the beginning (*e.g.* Kostrzewski 1933), but the role of Lower Silesia has been stressed for at least 50 years now (Kulczycka-Leciejewiczowa 1979). The oldest lowland LBK assemblages, known since the 1980s, are distinguished by a high proportion of Cracow Jurassic flint, which was interpreted as an indication of the importance of the Warta River as a route of the first farming migration (Kozłowski 1988; Czerniak 1994; Kirkowski 1994). In general, a hypothesis of many migrations from different regions, lasting through the whole lowland LBK, has prevailed in the scientific discourse for many years. This polygenesis should be visible on a large, regional level (Czerniak 1994; Kirkowski 1994), but even within small micro-regions as well (Grygiel 2004). My settlement analysis demonstrates that the colonization was quite rapid and in fact completed during the early music note phase (LBK IIA: Pyzel 2010a). I also argue that the very first settlers came from western Lesser Poland, where local communities cultivated intensive contacts with Moravia, as indicated by the characteristic Zofipole style of pottery (Pyzel 2014). In the case of some sites from Chełmno Land, D. Werra suggests some relations with Lower Silesia on the basis of mineral pottery temper (Werra 2013), and this hypothesis definitely deserves more thorough studies.

Although there are almost no human remains of the LBK farmers and local hunter-gatherers, which makes DNA and other analyses impossible, one can assume on the basis of estimations for other regions that lowland LBK communities were also of migrant origin. There are very few indications of relations with the local Mesolithic communities (Plaza 2015) still inhabiting the lowlands during this time. From the middle LBK, lowland communities become more autonomous, and traditional connections with their areas of origin grow weaker. Instead, east-west relations become more and more important, which can be connected with migrations towards Western Pomerania.

Lowland communities on the lower Vistula River maintained diverse contacts with other groups, which are exemplified, for example, by items made of rare and exotic raw materials such as obsidian, Volhynian flint or more common Cracow Jurassic flint (Kabaciński *et al.* 2015; Pyzel and Wąs 2018). The first farmers belonged to a very broad LBK circle of exchange, visible through stone artefacts made from amphibolite (Szydłowski 2017). There are also foreign elements in the pottery, even from the Eastern Linear cultures (Pyzel 2009; Werra and Sobkowiak-Tabaka 2017). Apart from connections with the south, which used to be favoured in the archaeological discourse on the lowland LBK, there are close links with western Pomerania and even with the Elster-Saale region (Kirkowski 1993; Czerniak 1994; Grygiel 2004). Western influences can also be seen in house architecture (Werra 2010a).

DISCUSSION: THE ROLE OF THE VISTULA RIVER IN THE LIFE OF LBK LOWLAND COMMUNITIES

Rivers were important communication routes in prehistory (Haughey 2016). The Vistula River has always been regarded as a major connection between Lesser Poland and the lowlands, and this perspective has influenced interpretations of the first farming communities (*e.g.* Kostrzewski 1933). South-north contacts were crucial not only for the original movement of LBK communities into the lowlands, but also later for the supply with flint raw materials. Chocolate flint played a major role for the communities on the lower Vistula River: its outcrops are located not far from the western bank of the river, at the beginning of its middle course. Irrespective of the unresolved issue of exactly how it was obtained – through exchange or directly from the source (*e.g.* Pyzel and Wąs 2018) – the interesting question is whether it occurred along the Vistula River or not. K. Adamczak, S. Kukawka and J. Małecka-Kukawka raised doubts about this possibility for the time of the Funnel Beaker culture. In their opinion, this assumption is based on the mythos about the special role of the Vistula River in Polish history and culture. In reality, the banks of the river were swampy and overgrown with shrubs and weeds, and thus difficult to access and to follow (Adamczak *et al.* 2017). Historical sources inform that conditions on the banks of the Vistula varied through time; for example, between the 10th and 13th century AD, floodplains were broadly used for cultivation, but afterwards they became swamped and partially flooded (Gieysztor 1982). The distribution of LBK sites, with a significant concentration of the earliest ones close to the Vistula River, indicates, however, that the river must have played an important role in the original colonization of the lowlands by LBK communities. This correlation is even more striking if one compares two linear projects cutting through the region of Kuyavia, which offered a random sample of excavated sites. On the Jamal and PKN Orlen gas pipelines, which ran from the east to the west, there were no sites of LBK I; on the A1 motorway cutting through eastern Kuyavia from the north to the

south, finds from this phase were registered in almost every micro-region (Pyzel 2010a, 172-173; 2014).

Sites located in the peripheries – Kościelna Jania in Pomerania and Cząstków Polski in Mazovia – yield material quite early within the LBK II, and in both cases the excavations confirmed the existence of regular occupation with settlement pits and ground stone finds such as grinders, which is an argument against their interpretation as a kind of way station on the way to major settlement areas. However, these remote peripheries definitely deserve more attention in future research, which may help to estimate their relationships with core settlement regions such as Kuyavia or Chełmno Land (and others in the south).

LBK people could have travelled over long distances without leaving any archaeological traces, and colonization may not necessarily have taken the form of a regular wave of advance, in which one region is settled after another. It could have been much more of a leapfrog colonization, such as in Bavaria, where sites located more in the west (thus further from the origin) are older. Interestingly, the migrants did not always follow the Danube, sometimes taking inland routes (Pechtl 2009). However, there are no inland sites in Central Poland, on the Pilica or Warta rivers. S. K. Kozłowski and M. Nowak have recently suggested that the so called “Wrocław-Poznań corridor” was important for the LBK migration from Lower Silesia (Kozłowski and Nowak 2019). This connection actually played a crucial role in the post-LBK time, and with regard to the majority of sites dated to this period (Jankowska 1999). For the LBK, most of the sites lie close to the Vistula River, which is an argument for the role of this river as a route of colonization as well as later communication, even if contacts with the south grow weaker with time as the lowland communities became more and more independent.

LBK sites cluster around traditional fords across the Vistula River known from historical sources, such as Włocławek, Nieszawa, Toruń, Fordon and Chełmno (Gieysztor 1982). This supports the argument that the river was not an impenetrable barrier in the Neolithic.

The distribution of flint raw materials confirms this view and indicates the role of the river as a communication route. J. Kabaciński distinguished three zones of supply with chocolate flint in Kuyavia. Only in zone I, stretching some dozen kilometres along the Vistula River, was the full technological process from natural nodules to ready tools carried out, and some specialized flint workshops could be found there (Kabaciński 2010; 2018).

It is not clear how the LBK people travelled. There are no dugout canoes or raft finds from the LBK milieu, but wells, for example, showcase the skills of craftsmen, which were advanced enough to produce them. Apart from the waterway, travel along the well-developed valley was also possible. Recent investigations reveal that the landscape in the Early Neolithic could have been more open than previously assumed (Moskal del-Hoyo *et al.* 2016; Marciniak 2020), which made orientation easy. The whole colonization process strongly indicates that LBK communities had an astonishingly deep knowledge of the landscape, and that the Vistula River was an important element on their mental map.

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