Research Article

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Early Neolithic Settlement Patterns in the Polish Lowlands – A Case Study of Selected Micro-Regions in Eastern Kuyavia

<https://doi.org/10.1515/opar-2020-0173>

received October 31, 2020; accepted June 20, 2021

Abstract: The purpose of this paper is the presentation of the settlement of the first farming communities of the Linear Pottery culture in the Polish lowlands. A case study of three neighboring micro-regions excavated on a large scale in eastern Kuyavia was conducted, which offered the possibility of analyzing various levels of the settlement. Based on the results obtained a local model of the LBK occupation in Kuyavia could be reconstructed. I argue that despite some regional variability a very general common settlement pattern existed for the whole LBK consisting of an iconic longhouse as the basic unit, the presence of micro-regional clusters of more or less contemporary sites, and the preference for regions with optimal environmental conditions. However, a detailed comparison within and between separate sites in the study area revealed some degree of variability inside this supposedly homogeneous pattern which can indicate the existence of different social units among small regional communities and their changes over time.

Keywords: LBK, Polish lowlands, Kuyavian prehistory, Neolithic settlement, settlement system

1 Introduction

The first farmers of Central Europe belonged to the Linear Pottery Culture (LBK), which is broadly regarded as one of the best-studied entities of European prehistory. This statement refers especially to the settlement system of these early farming communities, recognized due to abundant large-scale excavations conducted throughout Europe which revealed numerous prominent settlements. The settlement pattern of the LBK can be best described by applying the hierarchical model of Zimmermann with different scales of analysis (Zimmermann, 2002; Zimmermann, Wendt, Frank, & Hilpert, 2009). On the regional level, a strong correlation with fertile soils, mainly loess is visible, which is often visualized as an insular character of the LBK settlement. On the micro-regional scale, characteristic clusters of sites located mainly along watercourses are typical for this culture. Settlements constituting such clusters were at least partially contemporary and were connected through various ties with each other. Single settlements could be of very different size and duration of occupation, ranging from a relatively short-lived single household to large multi-generational villages, but they always consisted of iconic longhouses with their associated features.

Special Issue: THE EARLY NEOLITHIC OF EUROPE, edited by F. Borrell, I. Clemente, M. Cubas, J. J. Ibáñez, N. Mazzucco, A. Nieto-Espinet, M. Portillo, S. Valenzuela-Lamas, & X. Terradas

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The size, duration, and spatial arrangement of settlements can vary significantly within the very large LBK occumene but the above-mentioned main features of this model could be found everywhere where the scale of excavations and surveys conducted was large enough.

In the case of the Polish lowlands, a region located outside the loess belt, it has long been debated whether the LBK settlement was different, of a more preliminary character, and not so stable as in the core areas. The arguments of both supporters (Bogucki, 1988; Grygiel, 2004) and opponents (Pyzel, 2009, 2010) have long been uncertain due to the lack of sufficient large-scale excavations. This paper presents three selected micro-regions from Kuyavia, which allows this discussion to be taken up again.

2 The Region of Kuyavia

Kuyavia is a distinct region in northern Central Poland, on the left bank of the River Vistula. Due to fertile heavy soils of a quality comparable to upland loess areas and a favorable location at the crossroads of natural communication routes, it has an exceptional position within the Polish lowlands and it has always attracted not only prehistoric occupants but also archaeologists from many parts of Poland who made it one of the best-studied regions in the Polish archaeology. Its focus and specialty had long been the field survey, especially due to a unique research program of the Polish Archaeological Record (AZP), consisting mainly of fieldwalking and registering all known sites within the whole territory of Poland. In contrast, other non-invasive methods such as magnetic surveys, etc., have not been applied as widely as in other countries.

Kuyavia has been surveyed almost completely, in parts repeatedly. Altogether more than 400 LBK sites are known from this region (Pyzel, 2010, 2021); the compact cluster of them stretches also toward neighboring eastern Great Poland (Figure 1). According to comparisons of results of emergency excavations with preceding surveys, it could be estimated that even in the best-surveyed regions, the real number of sites is at least double but the existence of most sites detected through fieldwalking could be confirmed, and thus the occupation map can be regarded as representative, although underestimated (Pyzel, 2017).

Figure 1: LBK settlement in Kuyavia. (1) Smólsk microregion, (2) Kruszyn microregion, and (3) Ludwinowo microregion.

Smaller clusters of sites are visible on this map (Figure 1), similarly to other regions. However, these groups occur not only on river banks. Kuyavia, especially in its southern part, is a lake plate, strongly transformed since the Neolithic and LBK sites are also detected in the vicinity of tunnel valleys and kettle lakes at boundaries of glacial relict forms.

Almost one-quarter of sites were excavated, mainly on a small scale. This enabled the construction of a very simple local relative chronology based on the pottery decoration. Three main phases were distinguished: early (LBK I), corresponding to the end of älteste and the beginning of the middle LBK; middle (LBK II), divided into subphases IIA and IIB, corresponding to the Music Note Phase in the South; and late (LBK III) when local, lowland decorations prevail (Czerniak, 1994; Grygiel, 2004; Pyzel, 2010). Absolute dating of the LBK occupation in Kuyavia ranges between ca. 5300 and 5000 calBC (Pyzel, 2019b, further references therein).

As mentioned earlier, very few large-scale excavations have taken place in Kuyavia so far, which is why the presence of a typical LBK settlement system on a micro-regional level remains neglected (Bogucki, 1988, 2020; Grygiel, 2004). The only exception is the A1 motorway route running through eastern Kuyavia, where emergency excavations were conducted in the first decade of the twenty-first century (Wiśniewski & Kotlewski, 2013). Altogether 34 LBK sites of various sizes were excavated within the 120 m wide strip, none of them completely. In this paper, a 6-km-long section including three neighboring LBK micro-regions located in the vicinity of the province capital Włocławek (Figure 1) will be presented as a selected case study. The motorway route runs here on the edge of the Kuyavian Plateau, very close to the Vistula River Valley which is a very favorable location for the occupation. Despite previous field surveys of AZP, no other LBK sites are known outside the motorway route so the analysis will be limited to results obtained during excavations. Both fieldwork and analysis were conducted by different teams mainly from Łódź and Poznań; some sites are already published but the main source of information is unpublished reports prepared and stored at the National Heritage Board in Warsaw. The analytical methods and thus results obtained are not always comparable. When necessary, I tried to re-evaluate and adjust some interpretations on the basis of these reports, paying special attention to the reconstruction of houses based on the layout of associating pits and the relative dating of artifacts. It was not always easy, which is why the conclusions must be regarded as preliminary and treated with caution.

3 LBK Micro-Regions in Eastern Kuyavia

3.1 Smólsk Micro-Region (Figure 2)

It is the northernmost of the presented micro-regions. The motorway route runs here along the slope of the Kuyavian lake plate physical-geographical mesoregion, on its boundary with the Płock Basin mesoregion. It is an area of a moderately differentiated relief, with numerous inclinations. The largest one, a former lake, is located to the west of the motorway route. Five sites were excavated here, building a chain separated in the middle by a glacial tunnel valley dividing sites Smólsk 2 and Nowa Wieś 4.

3.1.1 Smólsk 2/10

It is located in the north of the micro-region on the flat top and upper slopes of a plateau. It consists of two separate archaeological sites: smaller no. 10 in the north and larger no. 2 in the south. They were excavated together by the Konrad Jażdżewski Foundation of Archaeological Research in Łódź, a total area of 86,740 m² was unearthed within the motorway route which runs through the western part of site 10 and the middle of site 2.

Altogether 114 pits and numerous postholes dated to the LBK were registered in two clusters separated by a distance of ca. 500 m. The southern group (site 2) consisted of traces of 20 longhouses with adjacent

Figure 2: LBK settlement in the Smólsk microregion. Red area – LBK occupation, blue lines – boundaries of sites according to survey, dotted area – motorway route.

features, located around small depressions. Most of the houses are dated to the earliest phase – LBK I, some to LBK IIA, and few to the following phase LBK IIB, when the northern cluster on the site Smólsk 10 consisting of 3 houses was established as well (Muzolf, Kittel, & Muzolf, 2012).

3.1.2 Nowa Wieś 4

The site is located on an edge of the plateau, with a small elevation in its southern part. The motorway route destroyed its western part where an area of 34,425 m² was excavated by the University of Łódź Foundation.

About 124 features dated to the LBK concentrate in the south, stretching in a strip of ca. 100 m × 30 m running along the slope of the plateau. According to Rzepecki and Michałowicz, who analyzed the LBK remains from this site, the remains of five houses dated to the middle LBK (IIA and IIB) can be reconstructed there (Rzepecki & Michałowicz, 2010a).

3.1.3 Nowa Wieś 6

The site is located on the upper northern and eastern slope of the plateau and is separated from site 4 by a chain of small depressions. The whole range of this site, as estimated by the survey, lies within the

motorway route. A total area of 34,680 m², which included also a small neighboring site 5, was excavated by the University of Łódź Foundation, and a consortium of Pracownia Archeologiczna Dariusz Majewski and “Archeo Explorers” Wiesław Koszkuł. Altogether 53 features of the LBK were found, forming small clusters spread over the whole excavated area. At least four houses can be reconstructed there: two forming a parallel row and two others located separately in the south, ca. 20–30 m from each other. All date to the early phases of the LBK: LBK I and IIA (Rzepecki & Michałowicz, 2010b).

3.2 Kruszyn Micro-Region (Figure 3)

It is located about 1 km to the south and separated from the Smólsk micro-region by an area where no LBK traces were recorded. The motorway route runs here on the edge of the Kuyavian Lake Plate, directly over the slope of the Płock Basin (Vistula River Valley). Altogether five LBK sites building a chain along the slope were excavated in this area.

3.2.1 Nowa Wieś 8

It is the northernmost site of this micro-region. Its northern boundary is marked by a small tunnel valley crossing the plateau from the east to the west. The motorway destroyed the western part of the site and a total area of 15,775 m² was excavated by the University of Łódź Foundation.

LBK artifacts were found in 80 features, several others, mainly postholes, were also dated to this culture. Most of them probably represent the remains of a parallel row of three houses stretching from

Figure 3: LBK settlement in the Kruszyn microregion. Red area – LBK occupation, blue lines – boundaries of sites according to survey, dotted area – motorway route.

the north to the south across the western part of the site. Some other features were loosely dispersed over the excavated area and are probably not connected to a house. The LBK settlement at Nowa Wieś 8 dates to the LBK IIB (Rzepecki & Michałowicz, 2010c).

3.2.2 Kruszyn 3

The site is located in the central part of a large, gentle elevation, and it is separated by a natural form from neither Nowa Wieś 8 nor Kruszyn 10. A total area of 35,800 m² covering according to the survey data almost the whole range of the site was excavated by the University of Łódź Foundation and a consortium of Pracownia Archeologiczna Dariusz Majewski and “Archeo Explorers” Wiesław Koszkuł.

About 117 features dated to the LBK IIB/III were registered in three clusters probably representing three houses, located along the slope on the north–south axis, separated by ca. 100 m from each other. Among them were dispersed other features: pits and two wells were also detected (Rzepecki, 2014).

Figure 4: LBK settlement at Kruszyn 10. Blue – LBK pits, red – LBK houses, grey – hypothetical LBK houses. After Siciński, Płaza, & Papiernik, 2016, modified.

3.2.3 Kruszyn 10 (Figure 4)

It abuts directly from the south to the site Kruszyn 3. It covers the plateau sloping to the east towards the Płock Basin as well as toward the valley of a small stream in the south. The motorway route runs through the central and western part of the site where an area of 27,590 m² was excavated by the Konrad Jażdżewski Foundation of Archaeological Research in Łódź as well as the Archaeological and Ethnographical Museum in Łódź.

It is the largest LBK settlement of this micro-region consisting of about 100 pits and numerous post-holes. They concentrate in the southern part of the site, where two rows of at least three parallel houses run along the slope of the valley, followed by a more random layout in the south-east. The houses cover the whole temporal range of the Kuyavian LBK. In the later phases (LBK IIB and III), three separate clusters of features appeared, each of them representing a single household, similarly to Kruszyn 3, which is most probably a part of the same settlement (Płaza, 2016; Płaza & Papiernik, 2020).

3.2.4 Kruszyn 11

This site is located on the southern side of a small stream, which separates it from the site Kruszyn 10. The motorway runs through its central part where an area of 36,300 m² was excavated by a private company of A. Jankowski on behalf of the Institute of Archaeology and Ethnology Polish Academy of Sciences (PAS), Łódź Branch.

About 14 features dated to the LBK were registered in two clusters separated by ca. 60 m. They can be connected with separate households erected in the LBK IIB/III, maybe connected with longhouses, although D. Werra, who analyzed this site, interpreted two features as semi-subterranean dwellings (Werra, 2010b).

3.2.5 Kruszyn 13

The site has a similar location to all others from this micro-region: on the edge and on the upper gentle slopes of the plateau. The motorway route destroyed its eastern part where an area of 71,231 m² was excavated by the Institute of Archaeology and Ethnology PAS Poznań Branch and a consortium of Pracownia Archeologiczna Dariusz Majewski and “Archeo Explorers” Wiesław Koszkuł.

About 46 LBK features were registered in the northern part of the site. They stretch in a row running from the northwest to the southeast, which can be divided into four clusters, three of which represent longhouses with adjacent pits. They date to the middle phase of the LBK (IIA/IIB) and constitute the eastern range of a larger settlement (Czekaj-Zastawny, 2011c).

3.3 Ludwinowo Micro-Region (Figure 5)

It is located about 1 km to the southeast of Kruszyn. It is the longest section of the motorway where LBK traces were recorded. It runs through the eastern part of the Kuyavian Lake Plate, close to its boundary with the Płock Basin but not directly on its edge as in the case of the other two micro-regions. The plateau (Figure 6) is cut by valleys of tunnels and small streams as well as depressions separating five neighboring sites where traces of LBK occupation were recorded. They will be presented starting from the north.

3.3.1 Ludwinowo 4

It is located on the top and slopes of a large promontory that elevates over the Płock Basin in the east and a small stream in the south. At this place, a junction with a local road was constructed, and the excavated

Figure 5: LBK settlement in the Ludwinowo microregion. Red area – LBK occupation, blue lines – boundaries of sites according to survey, dotted area – motorway route.

Figure 6: Kuyavian landscape near Ludwinowo. Photo: J. Pyzel.

area of altogether 5,423 m² was only 40 m wide. Excavations were conducted by a private company of A. Jankowski on behalf of the Institute of Archaeology and Ethnology PAS, Łódź Branch.

Within this area, a part of a larger LBK settlement was registered: 75 features in two clusters located ca. 20 m from each other can be interpreted as remains of at least two parallel longhouses located in a row running from the west to the east along the slope. They can be dated to the early LBK (I and IIA; Werra, 2010a).

3.3.2 Ludwinowo 3

The site stretches over a flat plateau, sloping gently in the south toward a small kettle valley. The motorway route runs through its central part where an area of 85,560 m² was excavated by the Konrad Jażdżewski Foundation of Archaeological Research in Łódź as well as the Archaeological and Ethnographical Museum in Łódź.

Traces of LBK settlement were registered in two clusters separated by 80 m in the center of the site. Both can be interpreted as remains of single households dated to the middle LBK (LBK IIB; Nowak, 2017).

3.3.3 Ludwinowo 6

The site is located on a small hill surrounded by wetland depressions. Its western part of a total area of 13,500 m² was endangered by the motorway construction and excavated by the Institute of Archaeology and Ethnology PAS Poznań Branch.

About 55 LBK features stretched over a wide strip running from the northwest to the southeast. Three main clusters of features representing up to five longhouses could be registered. They are dated to the middle phase of the LBK (IIB; Czekaj-Zastawny, 2011a).

3.3.4 Ludwinowo 2

The site is located on a flat plateau, separated in the north through small depressions from the site Ludwinowo 3.

About 5,500 m² in the western part of the site were excavated by the Institute of Archaeology and Ethnology PAS Poznań Branch.

About 14 LBK features stretch over an area of 4,000 m² in the southeastern part of the site. Three clusters probably representing separate households could be registered. They are dated to the middle phase of the LBK (IIA and IIB; Czekaj-Zastawny, 2011b). They belong to the much larger settlement discovered on the neighboring site 7 (Pyzel, 2019d).

3.3.5 Ludwinowo 7

The site is located on a vast smooth promontory. The motorway route runs through its western part, where an area of 111,920 m² was excavated by the Institute of Archaeology and Ethnology PAS Poznań Branch and a consortium of Pracownia Archeologiczna Dariusz Majewski and “Archeo Explorers” Wiesław Koszkuł.

Altogether 871 features could be dated to the LBK. They represent a part of a larger LBK settlement stretching further toward the west, north (site 2), and south. Only the eastern boundary could be established within the excavated area, where at least 33 longhouses can be reconstructed. The settlement is divided into two distinct parts: in the east houses were arranged in more or less regular horizontal rows; in the west, they cluster around small depressions; some of them form a longitudinal row as well. The site was occupied during the whole duration of the LBK communities in Kuyavia (Pyzel, 2019c).

3.3.6 Ludwinowo 1

The site is located on the top and gentle northern slopes of a small smooth hill within the plateau. Its eastern 15,887 m² large part was excavated by Ośrodek Naukowo-Konserwatorski Pracownia Konserwacji Zabytków in Poznań.

Two clusters of altogether 35 LBK features were registered. The larger one, found in the middle of the site, consisted probably of two longhouses. About 50 m to the west remains of a single household were detected. Some clay extraction pits were located 10 m to the south of it. The LBK settlement at Ludwinowo 1 dates to the middle and late LBK (LBK II and III; Retkowska, 2012).

4 Discussion

Conclusions on the settlement structure at the micro-regional level in the Polish lowlands presented here have a preliminary character. It is not only because excavations did not cover the whole area settled by the LBK communities and were reduced to a 120 m wide strip located regardless of research interests and thus arbitrary. Also, results of analysis of settlement traces on separate sites are not always comparable and are of a very different quality. It refers to relative dating, which sometimes could not be revised in any way. Chronological estimations were mainly very general and limited to established LBK phases and the issue of temporal relations between particular houses within sites has not been taken up, with the only exception of Ludwinowo 7, where six occupational phases could be distinguished (Pyzel, 2019a). Also, the interpretation of features and their assignment to longhouses and households was not uniform and I tried to re-evaluate it when possible. But even on this imperfect basis, it became very clear that a longhouse was a fundamental unit of the LBK settlement also in the lowlands. Postholes from such timber constructions were detected on all large settlements: at Smólsk 2/10, Kruszyn 10, and Ludwinowo 7, and apart from them also at Nowa Wieś 4 and 6. Houses were mainly very badly preserved, the recognition of postholes demanded experience and knowledge and some suggested plans definitely need some revision (as it was in the case of Ludwinowo 7: see Pyzel, Pilarski, & Cyganiewicz, 2019) but architectural details of Kuyavian LBK houses is another topic and will not be addressed in this paper. What is more important, due to a characteristic layout of lateral pits, it was possible to reconstruct houses even if postholes were not preserved. It was the case on almost every presented site. However, the example of sites with postholes, such as Ludwinowo 7, demonstrates that also some atypical layouts were possible where associated features did not resemble classical lateral pits but were irregular and placed only on one side of a house (Pyzel, 2019a). Without postholes, it is not possible to recognize them, and thus, one can assume that the number of identified houses is indeed lower than the real number.

All houses were located along the north–south axis, often across the slope, although the top (northern end) could be placed either in the lower (Nowa Wieś 4, Ludwinowo 7) or upper part (Kruszyn 10, Ludwinowo 4) so it does not necessarily confirm the thesis of the raised floor of LBK houses in the south or south-east part of a house postulated by Rück (2004). Besides, the differences in altitude were not large as the landscape in this part of Kuyavia is relatively flat (Figure 6).

All analyzed micro-regions were of comparable size: traces of LBK settlement were registered over a distance of 1.5–2 km, separated by a ca. 1 km long unoccupied area. All micro-regions were settled through the entire chronological range of the Kuyavian LBK and in all remains of regular, stable occupation concentrated around longhouses prevail. Only in the case of the site Kruszyn 11 was the presence of semi-subterranean dwellings suggested in the preliminary report (Werra, 2010b), though it needs exact examination. Within the excavated motorway route, it was difficult to differentiate between separate settlements. It is trivial to state that the boundaries of archaeological sites do not correspond to boundaries between LBK settlements, but in most cases, it was almost impossible to draw any boundaries; areas of various occupational density could be distinguished instead.

Three models of spatial organization could be registered in all three micro-regions.

First rows of vertically arranged houses, often running along the slope were present, for example, at Nowa Wieś 4, south-western part of Kruszyn 10 (Figure 4), or the eastern part of Ludwinowo 7. In most cases, it is difficult to estimate the temporal relations of houses in such a row. At Ludwinowo 7, they represent a sequence of different occupational phases (Pyzel, 2019d).

A possible variation of this model is pairs of houses, registered at Nowa Wieś 6 or Ludwinowo 1. Based on the available data, it is difficult to say if they constitute only a part of a larger not fully excavated row and how they were chronologically related.

Apart from that, a model of a settlement with houses clustered around small depressions was also registered at Smólsk 2/10 (Muzolf et al., 2012, p. 46, Figure 4), the south-western part of Kruszyn 10 (Figure 4), and western part of Ludwinowo 7 (Pyzel, 2019d). It is difficult to estimate if these different arrangements were caused only by different natural conditions (slope vs flat plateau with depressions). Considering the fact that at Ludwinowo 7, an alternative model of house succession – a vertical row of succeeding houses – could be observed for the cluster of houses, opposed to a horizontal sequence in a longitudinal row registered on the same site (Pyzel, 2019d), it seems that these arrangements could also serve to express different identities.

The third model of spatial organization represents single houses located at a certain distance from other buildings. Interestingly, with the exception of Nowa Wieś 6, dated to LBK I and IIA, all other examples are late. The spatial expansion of previously much denser settlement can be best observed at Kruszyn 3 and 10 (but see also Smólsk 2/10). The latter site represents an interesting case where all these three models occur within the same settlement (Figure 4).

In every micro-region one large settlement, densely occupied over a long period of time could be registered: Smólsk 2/10 for the Smólsk, Kruszyn 10 (Figure 4) for the Kruszyn, and Ludwinowo 7 for the Ludwinowo micro-region. Despite incomparable results of their analysis, all can be regarded as multi-generational villages with more than one house occupied at the same time. All start quite early within the micro-regions (although in all of them there are also other early sites) and last for a long time. Only in the case of Smólsk 2/10, there is a shift of occupation in the late LBK (starting from the phase LBK IIB) when a new settlement was established in the vicinity, and the old settlement was abandoned. It is an interesting period because at the same time the previously mentioned separate households become more important. They do not only reflect an economic change – the establishment of more independent, autonomous households. They are an expression of a social transformation as well, when not only ties with the living but also with the dead and future members of the larger community became looser. It is striking that all of these newly established households do not develop into a village but were abandoned.

Maybe it is an expression of the crisis at the end of the LBK, however, it is not possible to determine this without more precise dating. Within the frame of general LBK phases, the occupation in the later LBK does not seem to diminish – traces of settlement dated to LBK IIB and or LBK III were registered at 11 of 14 analyzed sites. At the current state of knowledge, it seems that these autonomous households existed contemporarily with groups that continued the older model of a denser occupation and stressing the spatial links with the neighbors and with the ancestors. Such variability is visible at Ludwinowo 7, where two different communities organizing their occupation in different ways lived very close to each other. All analyzed micro-regions are inhomogeneous in this respect, and in all of them, similar patterns can be found. It is a strong argument that their inhabitants, living relatively close to each other represented a common, larger, regional community.

We do not know how large it was and if the settlement pattern was typical only for eastern Kuyavia or maybe for a larger area. A recent intensive survey program conducted on two LBK sites in southern Kuyavia near Wietrzychowice revealed the existence of two various settlement types located ca. 3 km from each other. At Osiecz Wielki, 33 traces of numerous lateral pits of various dating could be registered over a vast area, while at Pawłówek 1, two separate clusters representing single households were identified (Papiernik, Wicha, & Płaza, 2020). This demonstrates that a variability in settlement patterns visible in eastern Kuyavia was not limited to this area.

Clustering of sites, irrespective of their layout, is typical for all LBK regions. However, only where large-scale excavations and/or intensive surveys took place, we can analyze internal temporal and spatial relationships within such microregions. The best-known example is the famous Merzbach river valley, where a cluster of seven LBK settlements of various sizes located on both sides of the river at the distance of ca. 2 km was completely excavated. One central, largest, oldest, and longest inhabited site as well as some smaller hamlets of maximal eight and minimum one house were registered there. However, in neighboring valleys, some variations from this pattern are visible (Zimmermann, Meurers-Balke, & Kalis, 2006). In the eastern Aisne valley, LBK settlement clusters at the distance of 25 km, with single sites of various sizes located ca. 1 km from each other (Allard et al., 2013). Much closer to Kuyavia, in the western Lesser Poland, a similar pattern is visible in the western Tuszyn river valley with three separate settlements, while in its east, five sites of various size cluster at ca. 2.5 km (Czekaj-Zastawny, 2014, p. 99, Figure 58). In Saxony areas settled by LBK farmers are much bigger, it is difficult (and probably not at all reasonable) to find boundaries between single settlements but also here different densities of occupation could be registered (Stäubli, 2014). In Kuyavia, we can also find these differences, even if on a smaller scale and we can distinguish quite clear micro-regions. We still do not know how they developed and what kind of communities occupied them. More precise analysis of temporal, spatial, cultural, and social relations on this micro-regional level should be a focus of future research.

5 Conclusion

The LBK occupation of the Polish lowlands reflects settlement patterns typical for this culture in other areas. All crucial elements on all levels of analysis could be confirmed, irrespective of some regional variability. A longhouse was a basic unit of occupation, even if there are some architectural differences between LBK regions. The presence of so many households consisting of a single house in Kuyavia is a strong argument that a house with adjacent features represents the major (but not necessarily unique), smallest social, and economic entity (a household). The occupation clusters in micro-regional groups and their form can vary, but they are comparable within one region, such as eastern Kuyavia. And finally, the preference for regions of optimal natural conditions such as heavy, fertile soils distinguishes the LBK settlement all over Central Europe. The main difference is the size of single settlements: in Kuyavia only relatively small ones have been detected so far whereas in the south some very large villages appeared. It can be due to different population densities but also to varying development through time. The presented case study suggests that after some generations instead of agglomeration visible in some regions (e.g. Furholt, Müller-Schneeßel, Wunderlich, Cheben, & Müller, 2020) a contrary trend with the dispersion of settlement took place in Kuyavia, leading finally to the demise of the LBK social and economic system.

Acknowledgments: I thank A. Czekaj-Zastawny, S. Rzepecki, and D. Werra for additional information on presented sites and four anonymous reviewers for their comments which helped me to improve the manuscript.

Funding information: Author states no funding involved.

Conflict of interest: Author states no conflict of interest.

Data availability statement: All data generated or analyzed during this study are included in this published article.

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