

Longhouses and long-distance contacts in the Linearbandkeramik communities on the north-east border of the oecumene: “à parois doubles” in Chełmno Land (Poland)

Dagmara WERRA

Abstract

The LBK longhouses and the construction methods used to build them have been a research topic in European archaeological literature since the interwar period. In the Chełmno Land single examples of such houses have been found. At one of the sites (Lisewo 31), several years ago, the use of the double post construction technique was discovered. Archaeological literature gives different reasons for the use of double posts in external load-bearing walls. The occurrence of this building method at the Lisewo 31 site permits us to enter the discussion as to its origin and chronology. Longhouses built using the double post method support the thesis that this building technique was not only a characteristic feature of the last phase of LBK and Stroke-Ornamented Pottery communities. Amendments in the dating of this construction method may indicate that contacts between the Chełmno Land and the western range of LBK settlement were already established during the classic phase.

Keywords: longhouses, Early Neolithic, Linearbandkeramik, double post construction, Chełmno Land Poland.

Résumé

Les maisons longues du Rubané et les méthodes de construction afférentes ont été des thèmes de recherche dans la littérature archéologique européenne depuis l'entre-deux-guerres. Dans la région de Chełmno, quelques exemples ont été mis au jour. Sur l'un des sites (Lisewo 31), la technique de construction à paroi double fut mise en évidence il y a plusieurs années. La littérature fournit différentes hypothèses à l'utilisation d'une double rangée de poteaux pour dresser les murs porteurs. La présence de cette technique à Lisewo 31 nous a permis d'initier une réflexion notamment sur son origine et sa position chronologique. Les maisons longues attestant la mise en œuvre de la paroi double étayent la thèse que cette technique n'est pas seulement une caractéristique du Rubané récent/final et de la culture de la Céramique Cordée. L'apport de dates liées à cette méthode de construction suggère l'existence de contacts entre la région de Chełmno et la sphère occidentale du Rubané dès la phase classique de son développement.

Mots-clés : maisons longues, Néolithique ancien, Rubané, construction à double rangée de poteaux, région de Chełmno, Pologne.

The subject of longhouses of the Linear Pottery culture (LBK) communities and the methods used in their construction has been present in European archaeological literature since the interwar period. When, in 1936, W. Buttler and W. Haberey published their findings from the excavations at Köln-Lindenthal, they introduced the question of the function served by these elongated wooden post structures (Buttler & Haberey, 1936: Tabl. 30, 31, 34).

Since then, numerous features associated with LBK buildings have been discovered. The view that the houses were used as living quarters is generally accepted (Soudský, 1966;

Modderman, 1970; 1986; Milisauskas, 1976, 1986; Coudart, 1998; Hauzeur, 2006; Czekaj-Zastawny, 2008). Nevertheless, questions concerning the technology used in their construction and their appearance still remain the subject of discussion (see Startin, 1978: 143f; Masuch & Ziessow, 1985). One of the issues is the use of double posts in the construction of the external walls. The technology was first determined at the Köln-Lindenthal site (Buttler & Haberey, 1936: pl. 76). Several years ago, it was discovered that the same construction method had been used in LBK buildings in the Chełmno Land in Poland (Fig. 1A).

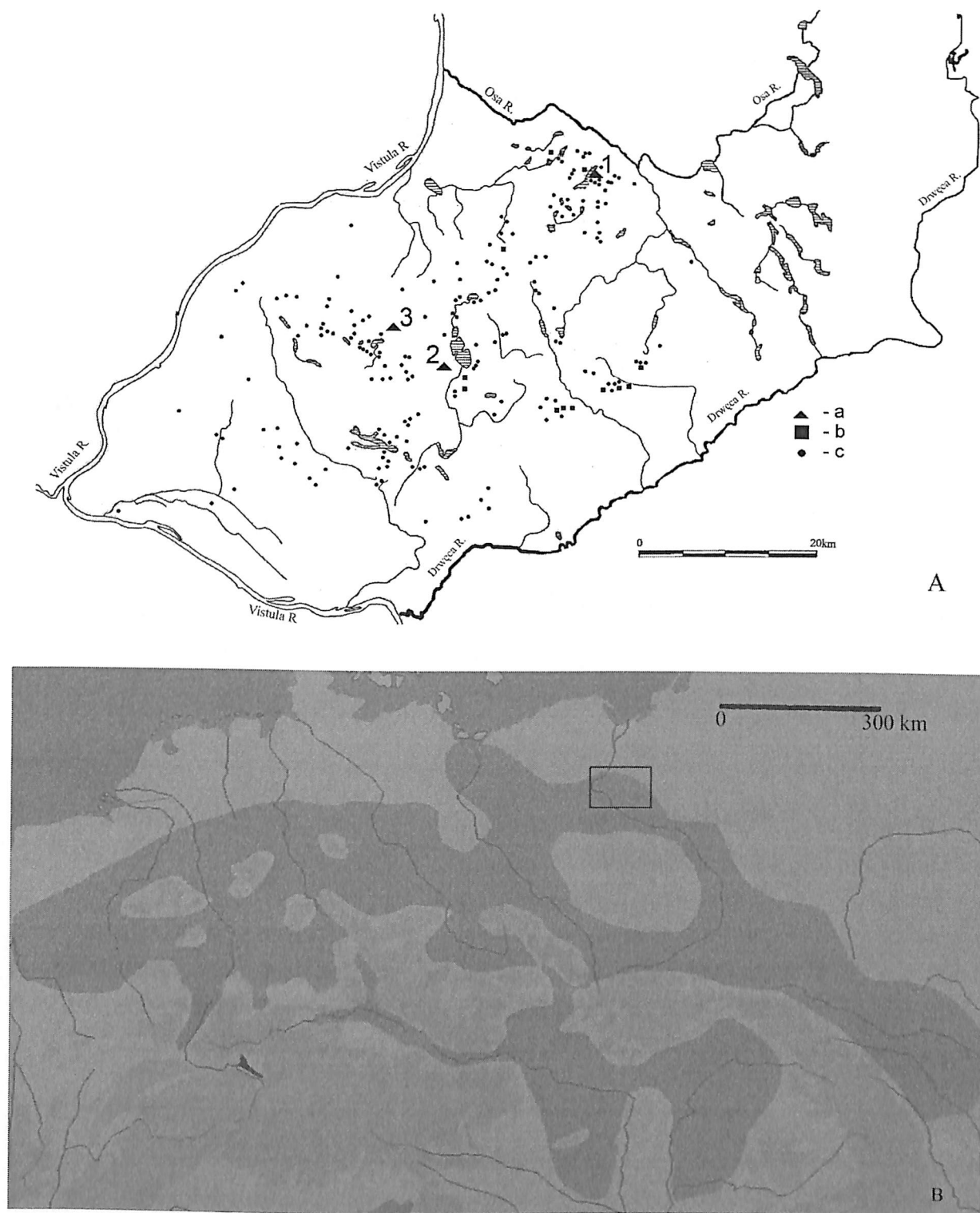


Fig. 1 — Chełmno Land (A) and the oecumene of communities of Linear Pottery culture (LBK) in Europe (B). a — sites in Chełmno Land discussed in the text; b — single LBK sites; c — complexes of LBK sites. 1 — Boguszewo; 2 — Bocień; 3 — Lisewo. A — after Kukawka *et al.* (2002) with changes; B — after Price, Bentley (2005).

1. CHEŁMNO LAND

Chełmno Land lies in the eastern part of the Central European Lowland, in the lake region, which stretches along the south coast of the Baltic Sea (Fig. 1B). It includes part of the Lower Vistula Basin, on the right side of the river, and its borders are formed by the Vistula itself in the West and two tributaries of the Vistula: the Osa in the North, the Drwęca in the South-East. The area has a geomorphologically varied landscape, quite different from the loess uplands settled by LBK communities in the South (Milisauskas, 1986; Kulczycka-Leciejewiczowa, 1993; Czeka-j-Zastawny, 2008). It was shaped in the older phases of the last glaciation and is built primarily of flat or undulating moraine plateaus formed from younger glacial drift. The land is cut across by numerous postglacial channels with lakes. There are also many proglacial stream valleys and river valleys with sandy terraces, as well as the extensive valley of the Vistula. Moraines do not rise more than 150 m above sea level (Kondracki, 1978: 288; Galon, 1984: 11).

2. LBK COMMUNITIES IN THE CHEŁMNO LAND – STATE OF RESEARCH

The first known archaeological material associated with the LBK from Chełmno Land came from excavations carried out near Grudziądz (German *Graudenz*) and

Chełmża, Toruń district (Kossinna, 1910: 61; Kozłowski, 1924: 53; Kostrzewski, 1928: 100). Over the next decades, there was no further research devoted to the Early Neolithic in the area, as archaeologists were convinced the region lay on the periphery of the oecumene of the Danubian communities (Kulczycka-Leciejewiczowa, 1979: 46).

Then, in 1987, excavations at site 43a in Boguszewo, Grudziądz district, revealed the first features associated with dwellings of Danubian communities, numerous LBK pottery sherds and, more rarely, flint artefacts. An analysis of the pottery showed (Kirkowski, 1990: 12) that the assemblage was distinguished by ornamentation characteristic of the oldest phase of LBK culture in the Vistula river basin (phase Ib), according to A. Kulczycka-Leciejewiczowa (1983a: 47-61; 1983b: 67-97; 1988, 2008: 70-81). Its early chronology was confirmed by radiocarbon dates for site 43a (Tabl. 2; see also Kirkowski, 1990: 13; Jadin & Cahen, 2003: 660).

The Boguszewo discovery meant that this part of the Central European Lowland could be included in the oecumene of LBK communities in the earliest phase of their settlement north of the Carpathian and Sudeten mountains. Thus, the beginnings of LBK culture settlement in the Chełmno Land can be dated to around 5400 BC, using a calibrated radiocarbon chronology (Gronenborn, 2003: 80).

In the last two decades of the twentieth century, systematic surface collections and

Site	Feature	Material	Lab. No.	Conv. bp	Age in calibrated years (BC) at two levels of probability*	
					68.2%	99.7%
Boguszewo 43b**	Ob. 24	charcoal	Gd-4757	6660±120	5666-5484	5921-5301
Lisewo 31	Ob. 3	charcoal	Poz-24735	6240±40	5303-5207	5310-5199
Lisewo 31	Ob. 181	charcoal	Poz-24734	6180±40	5178-5066	5226-5002

* Calibrated according to OxCal v. 4,1 (<https://c14.arch.ox.ac.uk/oxcal/OxCal.html>).

** After Kukawka *et al.* 2002.

Tabl. 2 — Radiocarbon Dating of LBK sites from Chełmno Land discussed in the article.

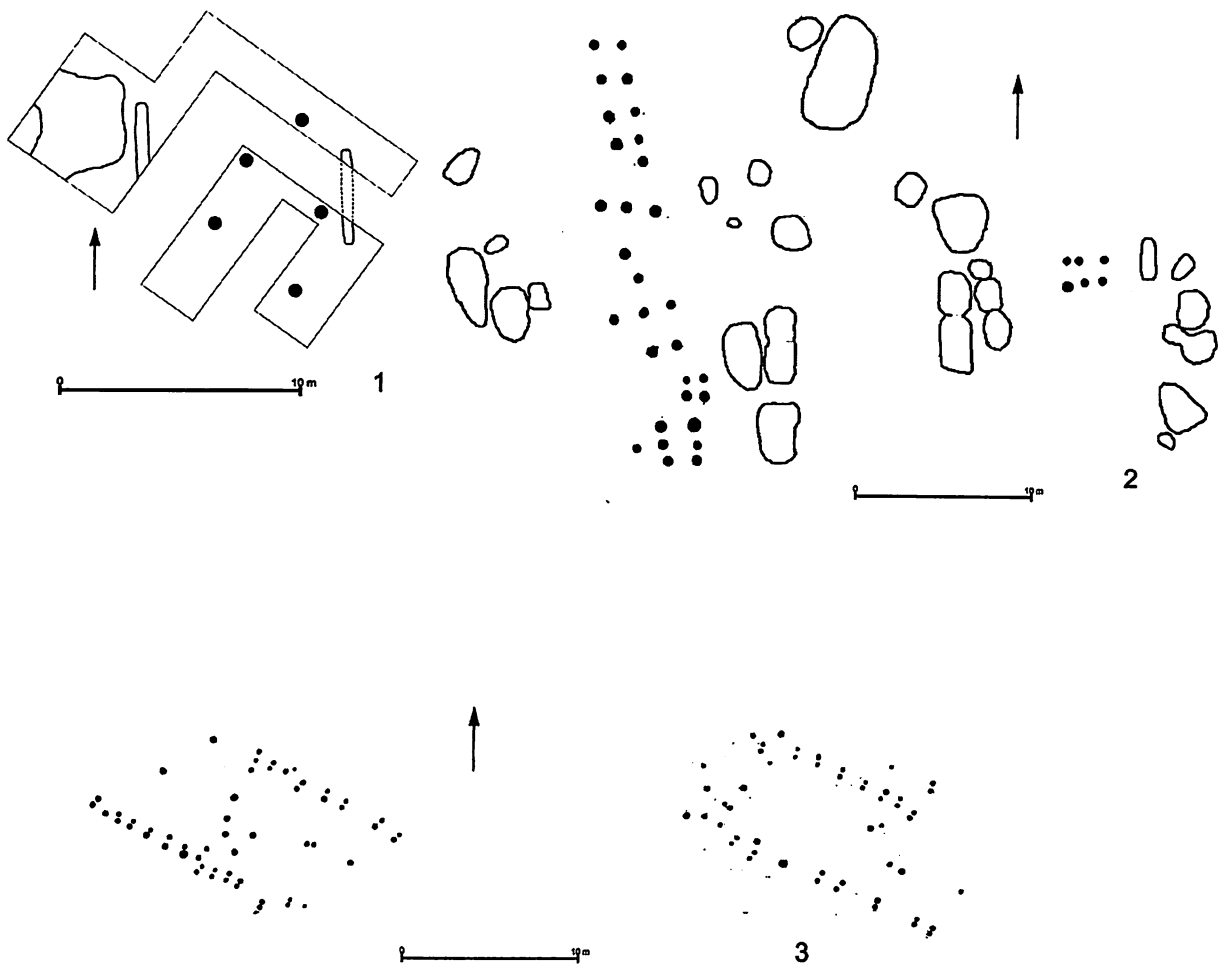


Fig. 2 — Features associated with LBK longhouses in Chełmno Land.
1 – Boguszewo, site 43a (after Kirkowski 1994); 2 – Bocień, site 5; 3 – Lisewo, site 31.

Situation of site in relation to valley		Situation of site in relation to other morphological features of terrain		Size of settlement		Exposition of settlement		Soil today	
Slope of small valley	48%	Edges concave and straight slopes	48%	Very small	11.5%	N	24.4%	Brown soils	72.2%
Edge of small valley	45.6%	Undulating terrain	36.9%	Small 2-4 m	35.4%	S	21.8%	Podsolich soils	10.5%
Bottom of small valley	1.1%	Ridges and humps	3.2%	Moderate 4-8 m	34.1%	E	27.3%	Black soils	14.1%
Area outside valleys	4.2%	Rounded hills	8.8%	Large 8-15 m	16.5%	W	8.6%	Others	3.3%
Vicinity of large valley	1.1%	Large hills	2.9%	Very large over 15 m	2.5%	SE	2.2%		
		Flat terrain	0.2%			SW	6.8%		
						NE	5%		
						NW	3.9%		

Tabl. 1 — Situation of LBK sites in Chełmno Land. After P. Malak (2005) with supplements by D. Werra.

test excavations were carried out in the area under discussion and today we know 250 settlement points associated with LBK communities in the Chełmno Land (Kukawka *et al.* 2002: 92; Fig. 2). Further permanent LBK settlement forms were discovered during rescue excavations carried out in connection with the construction of the A-1 motorway, at site 5 in Bocięń, Toruń district and site 31 in Lisewo, Chełmno district (Tabl. 1).

3. LBK ARCHITECTURE IN THE CHEŁMNO LAND

Considerable attention has been devoted to LBK longhouses (see Modderman, 1970; Coudart, 1998; Brandt, 1988; Hauzeur, 2006). The typology introduced by P. J. R. Modderman (1970: 104-120) for the first time embraced both the diversity and homogeneity of LBK buildings over the whole area of its settlement. Modderman's proposal includes three types of features and their chronology. Type I – *Grossbauten* – the house comprises three basic sections. Two sub-types are distinguished: Ia with a foundation trench around the whole house and Ib with a trench only along the north-western walls of the building. Type II – *Bauten* – is characterized by the lack of a south-eastern section and type III – *Kleinbauten* – in which only the central section exists (Modderman, 1970:106, 1986: 383). In contraposition to Modderman's typology and basing on new research, A. Coudart (1998) proposed her own classification. Coudart's main objection to Modderman's proposal was based on the conviction that his typology was "ineffective" (Coudart, 1987) and that the omission of archaeological features from the vicinity of the longhouse caused deficiencies in the classification and decreased the opportunity to obtain additional information about the functioning of the household cluster (Coudart, 1987: 200). Coudart departs from the rigid framework of house types and sub-types, introducing into the description of

features a number of attributes. The basic attributes distinguished by Coudart are: form of house plan, internal differentiation of space, internal arrangement of post holes, division of space inside the house (front, central and end part) and mutual correlation between internal sections in each type of house, walls, clay pits and other pits accompanying the houses, dimensions and mutual correlations and relations between the different sections and the surface area (Coudart, 1998: 24-34). Her proposal systematizes the description of those archaeological features which constitute the remains of the LBK houses, and extends the potential for their analysis (Coudart, 1998:24-34).

For investigations of LBK longhouses both of the above typologies are useful; Modderman's typology especially for carrying out a chronological analysis. However, it is no longer effective when the discovered features cannot be attributed to a concrete type of house. The typology proposed by Coudart is more comprehensive and adapted to present day investigations. Its application allows us to gain much information concerning the social and economic organization of the household. It therefore seems that Coudart's proposal is better in practice.

Features associated with LBK houses have been found at the three already mentioned sites in the Chełmno Land: Boguszewo 43a, Bocięń 5 and Lisewo 31. The state of preservation of the excavated houses is too poor to allow for a definite attribution to one or other of the types distinguished in Modderman's typology. For the same reason, unfortunately, most of the attributes listed by Coudart cannot be determined.

Boguszewo, Grudziądz district, site 43a (Fig. 2: 1)

The site lies on a plateau on the east side of Lake Melno, about 500 m from its shore (Kirkowski & Kukawka, 1990: 26). Excavations revealed the remains of a building with a post structure. What remained

were two parallel trenches, 4.5 m long and 0.60 m wide, placed 8.50 m apart. Between them, traces of five posts were found. The postholes were no more than 0.01 m deep (Kirkowski, 1994: 58). The pottery and the remains of the house are dated to phase Ib of the oldest LBK development phase in Poland (Fig. 5; Tabl. 2; Kirkowski, 1994: 58). A full reconstruction of the house was not possible owing to the poor state of preservation, but the excavated remains suffice to determine the type of building.

The house at Boguszewo site 43a represents the so-called Mohelnice type, associated with settlement of the oldest LBK communities. The traces left by posts indicate that the house plan was an elongated rectangle. The roof was probably double-pitched, resting on posts founded in narrow trenches running along the longer parallel walls (Kulczycka-Leciejewiczowa, 1988: 144-146). Such a house had characteristic overhanging eaves along the longer walls (Kreuz, 1990: 34; Kulczycka-Leciejewiczowa, 1993: 88). Apart from Mohelnice in Moravia (Tichý, 1962: 252), the remains of this type of house were found in Bylany, in the Czech Republic (Pavlů, 1981: 538-540), as well as in Eilsleben and Schwanfeld in Germany (Kulczycka-Leciejewiczowa, 1993: 88; Kaufmann, 1984: 180; Lüning, 1986: 10; Lenneis, 2004: 151).

Bocień, Toruń district, site 5 (Fig. 2: 2)

The site lies on glacial till, on an undulating moraine plateau, where the average elevation is 100 m above sea level. In its southern part, there are sands and gravels. Around the site, differences in relative elevation are no greater than 5 m. To the North, South and West of the site the terrain falls away. To the South and South-West, there is a depression of 5.4 ha, now taken up by a biogenic plain which in some places takes the form of a lowland bog. A stream flows out of the depression. Most of the ground is made up of brown soils formed from clays and sandy clays. The lowest part of the depression is taken up by peat (Bienias, 2000).

As a result of rescue excavations in 2000, a total area of 96.75 ha was examined (Chudziak, 2000: 14). Three cultural layers and 165 archaeological features, including 102 LBK features, were discovered, as well as over 6000 pottery sherds (Fig. 6, 7). Layer II was most probably Neolithic, but had been destroyed. Its upper part contained Neolithic features.

House I. Five features can be associated with this building. The orientation of the "house" was NNW-SSE. Within the boundaries of the building, four partially preserved rows of post holes were found, two of which were 26.50 m long. The preserved traces of posts are part of the house interior. The width of the house could not be determined owing to its poor state of preservation. The post holes had diameters ranging between 0.38-0.40 m and 0.76-0.80 m and depths of 0.06-0.26 m. The distance between the posts in the south-eastern part of the house was about 0.50 m along its longer axis and 0.60-0.70 m along the shorter one. In the remaining parts, the distances were 1.20 to 1.60 m (Gurtkowski & Gleński, 2000: 76).

House II. Eight features can be associated with this building (household pits). Traces of the structure were even more badly destroyed than in House I. Two rows of three oval shaped outlines were discovered at the bottom of the cutting, 0.32 to 0.60 m in length and 0.30 to 0.60 m wide. The longitudinal section of the post holes was rectangular and had left an impression in the undisturbed soil 0.16 - 0.26 m in depth. Distances between holes were from 0.50-0.80 m to 1.10 m along the East-West axis and from 0.90 to 1 m along the North-South axis. As the feature was only partly excavated there was no possibility of determining its length and width. A similarity between this house and the one described earlier is suggested by the similar distances between the clay pits belonging to the household cluster (Gurtkowski & Gleński, 2000: 76). The remains of houses II and I can be attributed to the earlier periods of the classic LBK phase ("music note" phase).

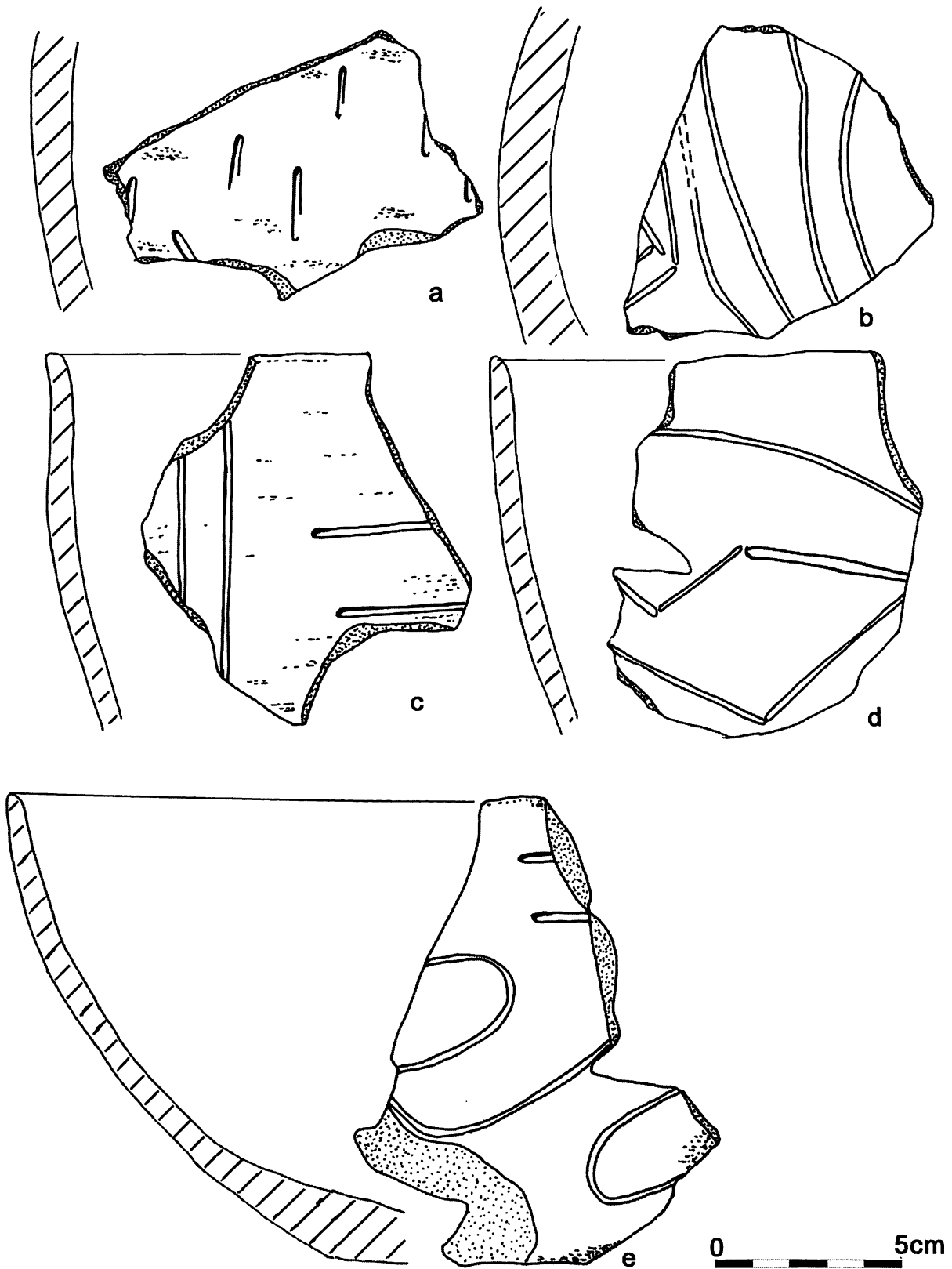


Fig. 5 — Boguszewo, Grudziądz district. LBK sherds. Phase Ib.

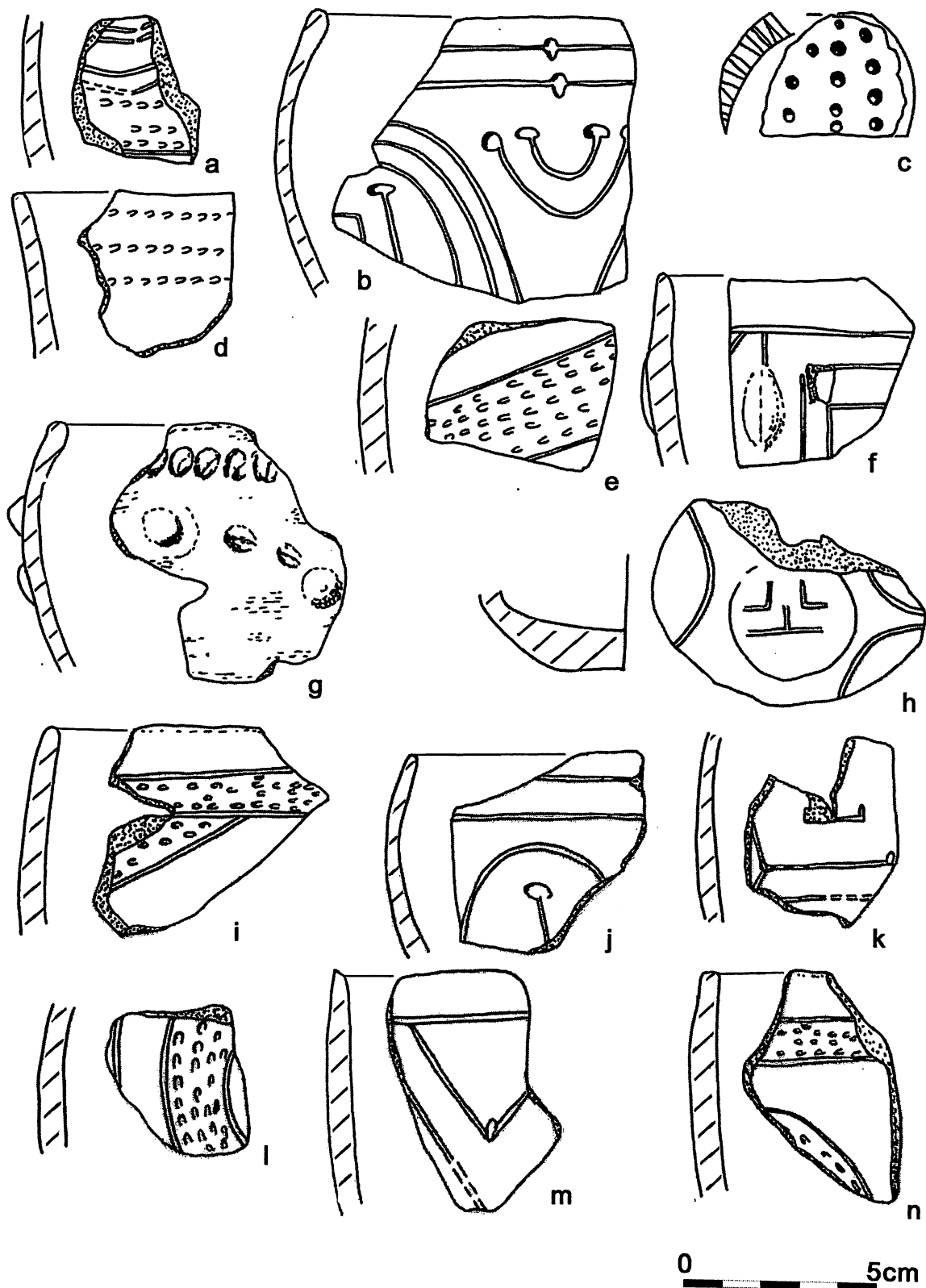


Fig. 6 — Bocień, Toruń district. LBK sherds. Phase IIa.

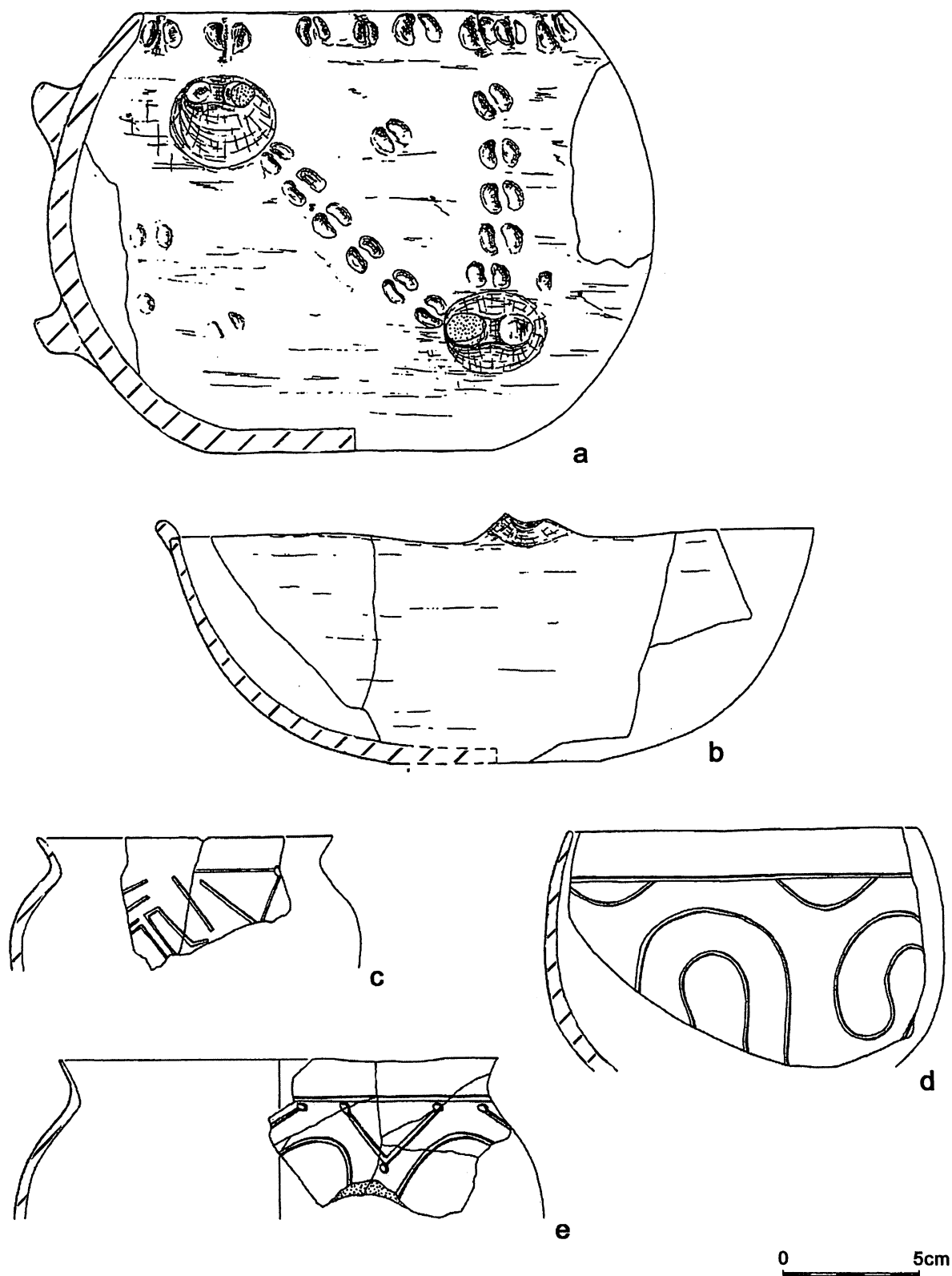


Fig. 7 — Bocień, Toruń district. LBK pottery. Phase IIa.

As only parts of both the houses at Bocię were found, it was not possible to describe many of the attributes distinguished by Coudart. The construction of the houses differed from the one in Boguszewo. The lack of trenches along the load bearing walls may suggest a different roof construction and therefore no overhanging eaves. Probably both houses had a classic form. In each case the interior had thick load bearing posts placed in three rows. The walls were built of posts joined by a lattice of branches. The whole was probably covered with clay, as suggested by the fragments of daub with impressions of branches and strips of wood found near the houses (Kulczycka-Leciejewiczowa, 1993: 89). Unfortunately, the features preserved in Bocię are insufficient to determine the plan and size of the building, the structure of the walls, the location of the post holes in the interior and exterior rows, or to distinguish the sections inside the building. Only the surroundings of the house can be determined, and only to a limited extent.

Lisewo, Chełmno district, site 31 (Fig. 2: 3)

The site is located on a small hump of land with a height difference of 3-4 m. It is surrounded by depressions in which there were lakes, at the time of LBK settlement. The site was orientated NW-SE. In the vicinity, there is a variety of Pleistocene deposits. The uplands have a predominance of clay formations, while the sandar and dunes have a sandy covering. Most of the area is covered by heavy, fertile soils, brown earth and lessive soil from glacial till on the moraine plateaus. The natural environment created favourable conditions for early farming settlement.

During rescue excavations carried out in the years 2004 and 2005, an area of: 0.163 ha was excavated. 14 features associated with the LBK communities were discovered and about 1200 sherds. Pottery analysis indicates an early chronology of the site (phase IIa, Fig. 8). The radiocarbon dates which have

been obtained, make it possible to attribute the Lisewo 31 site to the classic phase, especially in the end phase IIb (Tabl. 2).

House I was situated on a slope in the central part of the site. It was possible to distinguish external walls, 28 m long and built of double posts. Inside, between the load-bearing walls (8 m in width), a few post holes had been preserved. They had a diameter of 0.30-0.60 m, were rectangular in section and had a depth of 0.05-0.20 m. House II was also situated on a slope in the central part of the site. The complete structure was not excavated and the length of the building could not be determined. The house was orientated NW-SEE. The external walls also had a double post structure. There were few traces of interior posts. The post holes were 0.30-0.60 m in diameter; in vertical section, the features were rectangular with a depth of 0.05-0.20 m. A cultural layer associated with the dwellings was not determined.

The limited data from Lisewo means that a full reconstruction of the houses is not possible. An interesting concern is the method used to build the walls. On these north-eastern outskirts of the LBK oecumene the same double post method of constructing the external walls, known as "eine doppelte Reihe" after Modderman (1970: 107) or as "avec pseudo-contreforts symétriques" after Coudart (1998: 31), was used as in Western Europe.

4. DOUBLE POST CONSTRUCTION

The use of the double post technique was not a typical method of building the walls of houses in LBK communities. We have found only individual instances of such buildings in the West and South. They are shown in table 3 and in figures 3, 4a and 4b. Since the descriptions of the geographical situation of the sites are not clear and often are not given in available publications, the situation of houses built using the double post structure is not indicated in the tables. The method was

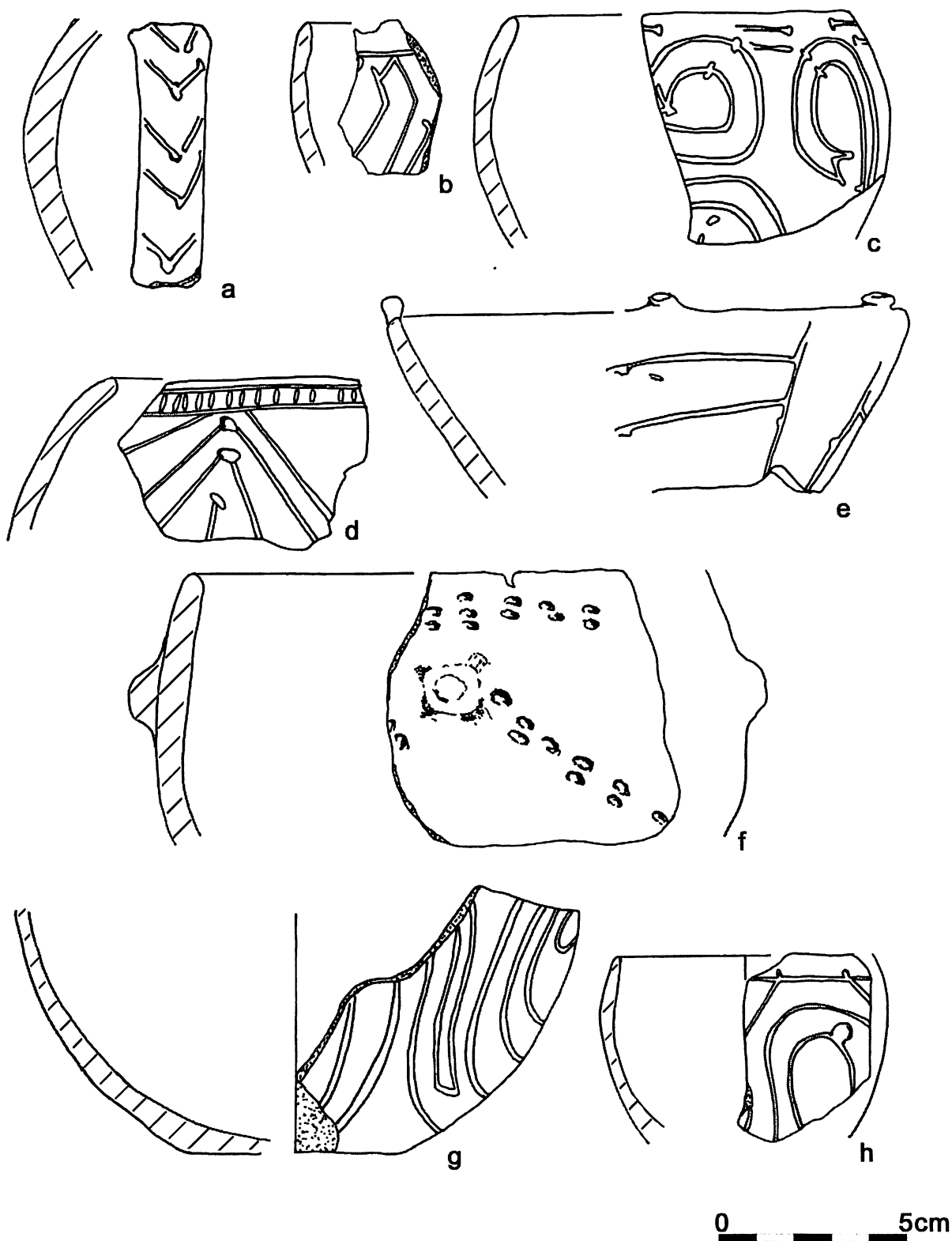


Fig. 8 — Lisewo, Chełmno district. LBK pottery. Phase IIb.

No.*	Site	Orientation	Chronology	Fig.	Literature
1	Elsloo	W-E	Late phase	4a: 4	Modderman 1970: Pl. 28; Coudart 1998: 141; Hauzeur 2006: 83
2	Stein	NW-SE	Late phase	4a: 6	Coudart 1998: 187
3	Langweiler 8	NW-SE	Undetermined	—	Brandt 1988: 77; Jeunesse <i>et al.</i> , 2007: 51
4	Hambach 21, Jülich-Weldorf	NW-SE	Undetermined	—	Coudart 1998: 147; Jeunesse <i>et al.</i> , 2007: 51
5a	Köln-Lindenthal	NNW-SSE	Late phase	—	Buttler & Haberey 1936: Pl. 76
5b	Köln-Mengenich	NW-SE	Late phase	4b:1	Coudart 1998: 153
6a	Bochum-Hiltrop	NW-SE	Late phase	4a: 2	Stieren 1951: 63, Fig. 9; Schlette 1952: Pl. 29; Gabriel 1979: 81; Hodder 1990: 120-121; Coudart 1998: 125
6b	Bochum- Altenbochum	NW-SE	Late phase	4a: 3	Coudart 1998: 124; Jeunesse <i>et al.</i> , 2007: 51
7	Daseburg Kr. Marburg	?	Late phase	—	Jeunesse <i>et al.</i> , 2007: 51
8	Arnsbach, Kr. Fritzlar- Homburg	NWW-SEE	Late phase	4a: 1	Sangmeister 1937: 214-215; Schlette 1952: Pl. 27;
9	Rosdorf	NW-SE	Undetermined	4b: 4	Coudart 1998: 178; Jeunesse <i>et al.</i> , 2007: 51
10	Ulm-Eggingen	NN-SSE	Undetermined	—	Coudart 1998: 192; Jeunesse <i>et al.</i> , 2007: 51
11	Hienheim	NW-SE	Late phase	4a: 7	Modderman 1977: 18, 21, 25; Coudart 1998: 149
12	Hrdlovka- Liptice	NW-SE	Late phase	4b: 5	Beneš 1991a: 33; 1991b: 77; 1995: 65
13	Zwenkau	NW-SE	Late phase	4a: 5	Quitta 1958: 178-179; Coudart 1998: 195
14	Straubing- Lerchenhaid	N-S	Late phase	4b: 2, 3	Coudart 1998: 189
15	Štúrovo	NE-SW	Late phase	4b: 6	Pavúk 1982: Fig. 1
16	Lisewo, Chełmno district	NW-SE	End of "music note" phase	2: 3	

*No. refers to number on map in Fig. 3

Tabl. 3 — Occurrence of LBK longhouses and the double post technique.

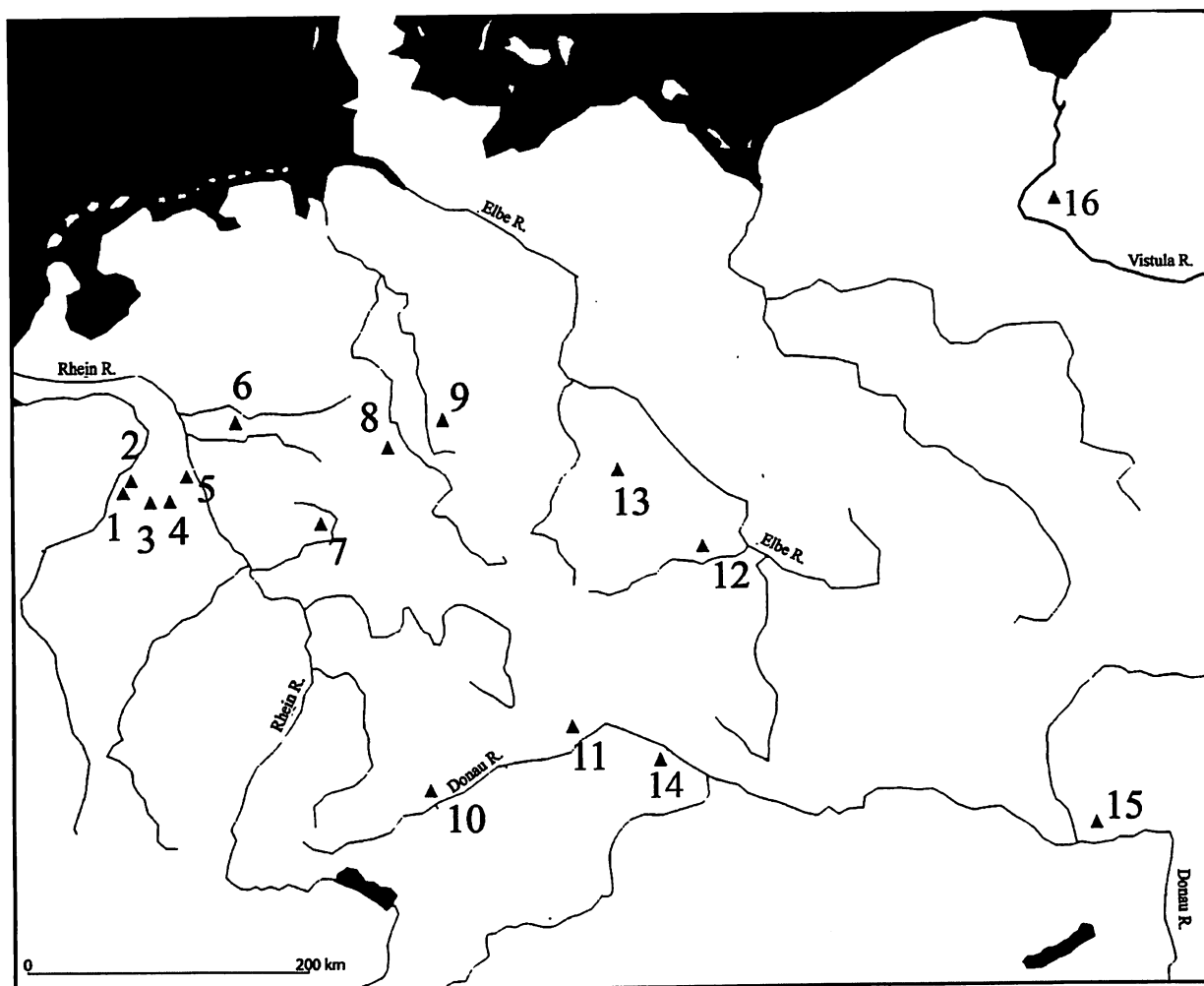


Fig. 3 — LBK sites with longhouses built using the double post construction method (see Tabl. 3): 1 — Elsloo; 2 — Stein, 3 — Langweiler; 4 — Hambach 21 (Jülich-Weldorf); 5 — Köln (5a and 5b); 6 — Bochum (6a and 6b); 7 — Daseburg; 8 — Arnsbach; 9 — Rosdorf; 10 — Ulm-Eggingen; 11 — Hienheim; 12 — Hrdlovka-Liptice; 13 — Zwenkau; 14 — Lisewo; 15 — Štúrovo; 16 — Straubing; after Jeunesse *et al.* (2007) with changes.

mentioned in earlier cited works devoted to architecture. External walls constructed of double posts arranged in pairs represent type I, distinguished by Modderman (1970: 108) or type 2, distinguished by Coudart (1998: 31: Fig. 18).

Modderman distinguishes three types of buildings with a double post construction of load bearing walls, taking into account a chronological division. In the first type, the posts are arranged in pairs. The second type occurs when the number of posts on the outside is smaller than the number of posts inside (Modderman, 1970: 108). In the third type, the number of inside posts is even greater than the number of those on the out-

side (Modderman, 1970: 109). Modderman associates each type with a specific development phase of Danubian communities. The first type was correlated with the youngest LBK phase, the second type with communities of the Stroke-Ornamented Pottery culture and the third type with people of the Rössen culture. However, since only a small number of buildings constructed in this way have been discovered so far, one needs to be careful when suggesting associations (Modderman, 1970: 109).

Archaeological literature gives various interpretations as to the reasons for using the double post method for constructing load bearing walls. The most extensive publication

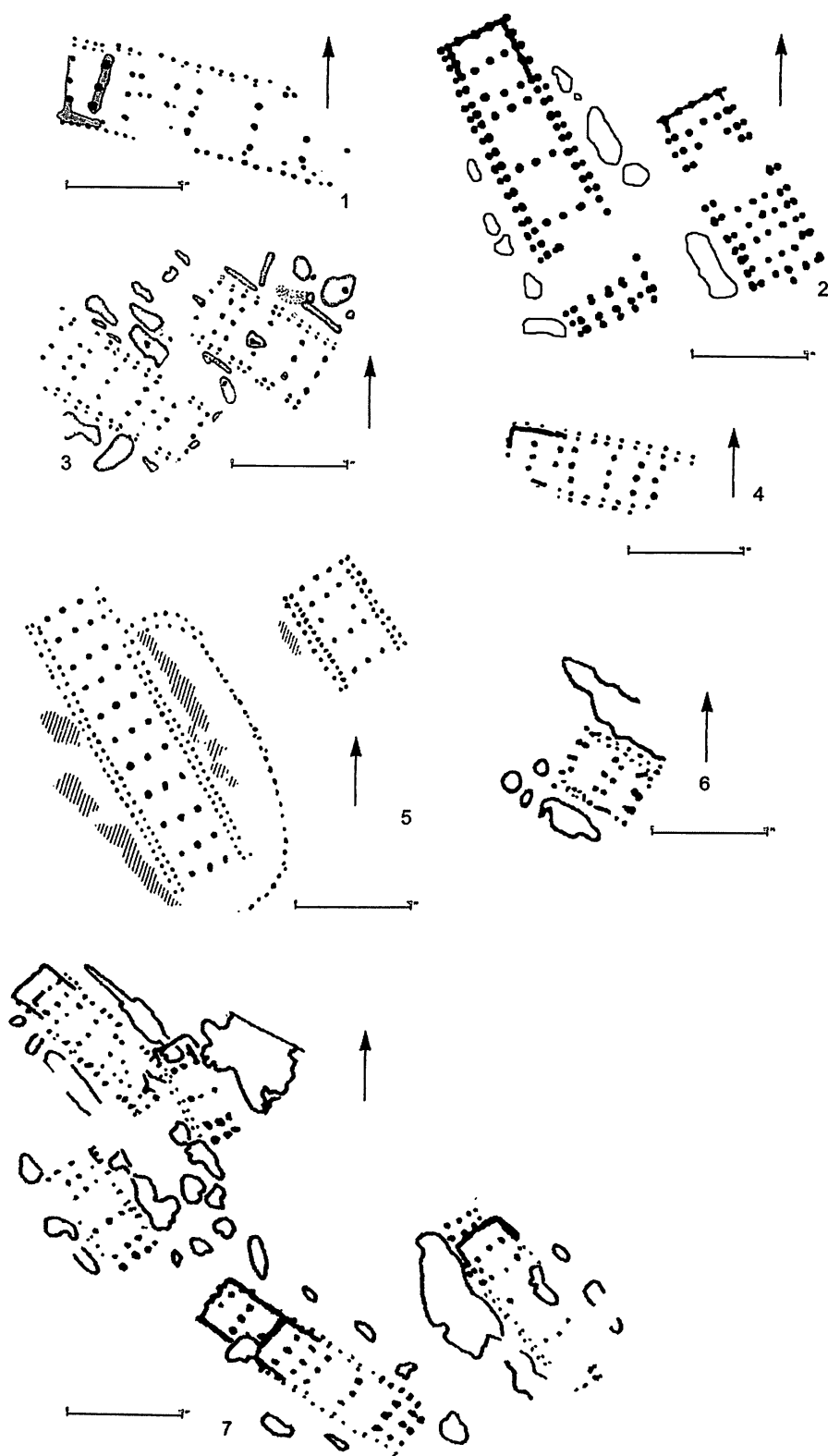


Fig. 4a — Examples of LBK longhouses built using the double post construction method: 1 – Arnsbach (after Schlette 1952); 2 – Bochum-Hiltrop (after Gabriel 1979); 3 – Bochum-Altenbochum (after Coudart 1998); 4 – Elsloo (after Modderman 1970), 5 – Zwenkau (after Quitta 1958); 6 – Stein (after Coudart 1998); 7 – Hienheim (after Coudart 1998).

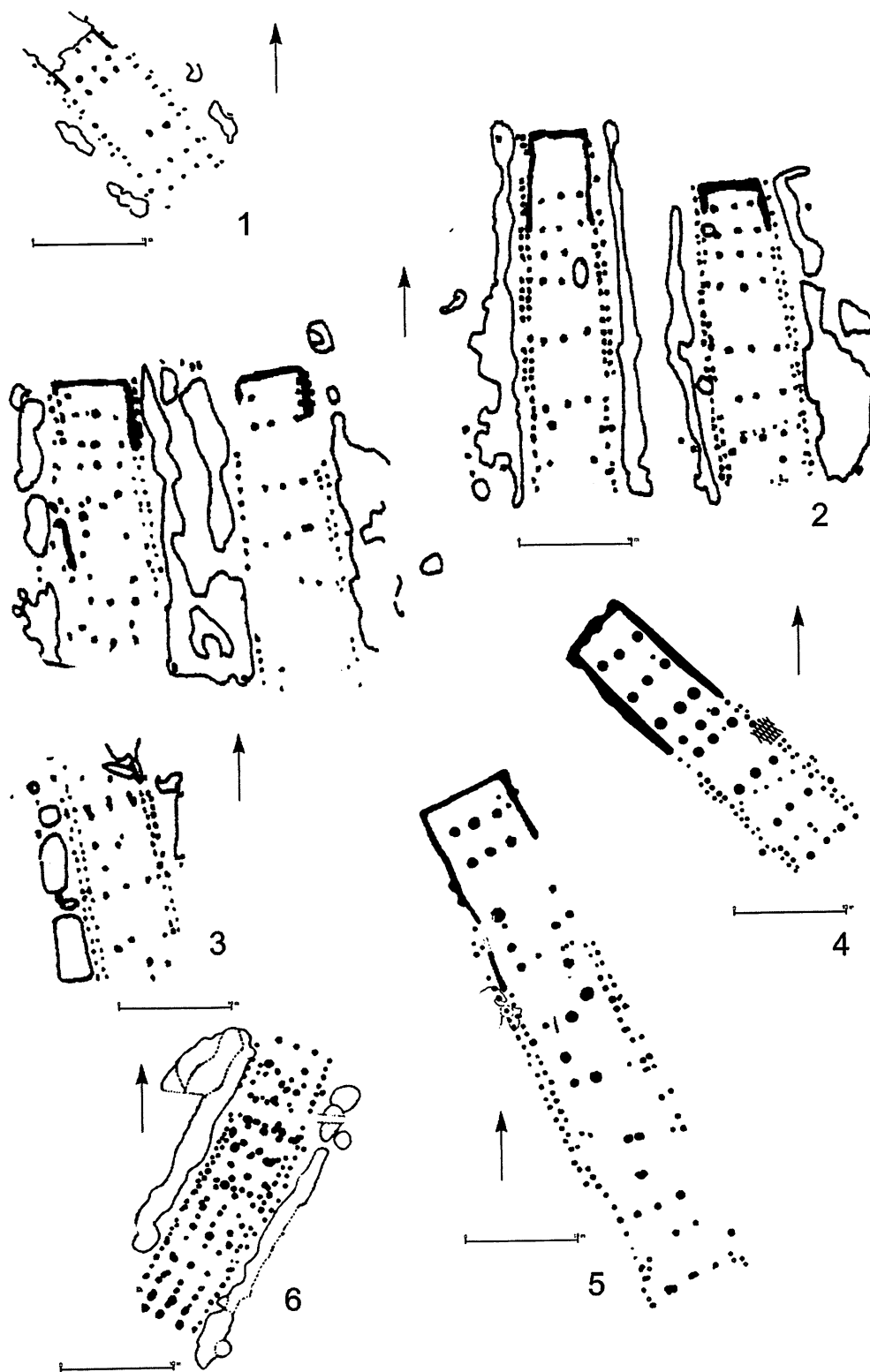


Fig. 4b — Examples of LBK longhouses built using the double post construction method: 1 – Köln-Mengenich (after Coudart 1998); 2, 3 – Straubing-Lerchenhaid (after Coudart 1998); 4 – Rosdorf (after Jeunesse *et al.*, 2007 – authors did not indicate North direction); 5 – Hrdlovka-Liptice (after Beneš 1991b); 6 – Štúrovo (after Pavúk 1982).

dealing with the technological aspect of this type of construction is W. Meyer-Christian's (1976) work analyzing roof structure. The presence of double posts in the external walls of houses from Elsloo, Stein and Bochum-Hiltrop is considered from the point of view of the roof structure (Meyer-Christian, 1976: 13 and 15). The author also considers what may have filled the space between the posts (Meyer-Christian, 1976: 5) and suggests planks hammered vertically into the ground, which would have left traces in the form of trenches. Such trenches, forming part of the structure of the external walls were discovered, for instance, in house no. 29 at Stein (Meyer-Christian, 1976: 13). However, the plans of most houses do not have a trench with double post holes. Most probably, in such cases the filling was organic (for instance a wall made of branches and filled in with clay), and left no noticeable traces. The larger number of posts may have served to strengthen the structure of the southern part of the house (Lenneis, 1997: 144; 2002: 10), which is thought to have been used as a "granary"; there may also have been a second level above the floor (a type of attic). The weight of the "stores" would warrant the need for an additional strengthening of this section of the house.

Construction issues connected with the use of an additional row of posts in houses of Danubian communities is also discussed by J. Romanow (1977). His analyses are concerned with houses of the Stroke-Ornamented Pottery culture, but some of the conclusions can also refer to older houses. According to Romanow (1977: 42), in the case of constructions with double posts, the inside row constituted a wattle and daub wall and did not have a load bearing function. Only posts of the outer wall served this purpose. The presence of a foundation trench in some of the houses is thought to be connected with the use of the palisade method of wall building, in order to create insulated spaces and improve living conditions (Romanow, 1977: 52). This construction method would help

in maintaining the right temperature inside the house (Romanow, 1977: 52; Masuch & Ziessow, 1985: 91).

It seems that traces of the double post construction should not be associated with reconstruction work on the walls or changes in the structure after the building was completed. The remains of longhouses built using this method, show great regularity in the arrangement of the traces left by the load bearing posts. The plans of those houses which show signs of having been repaired, do not reveal such a regularity. It is assumed that a house would have been dwelt in for twenty-five to fifty years (Lüning, 1982: 18). During this time, it probably underwent repair work. Evidence of such repairs can be seen, for instance, in the house at the Brzezcie 17 site, Wieliczka district, in Little Poland, where there are traces of an additional post being put up, probably to strengthen one which broke (Czekaj-Zastawny, 2008: 49). Another example comes from Bukowiec, Brodnica district, in the Chełmno Land, from the Stroke-Ornamented Pottery phase. In this case, an irregular arrangement of post holes was discovered (Kukawka & Małecka-Kukawka, 1999: 76-78). The additional posts, indicated by the presence of double post holes, may have served to support and strengthen (Romanow, 1977: 40). It seems that walls and roofs were repaired and whole posts may have been replaced. Unfortunately, it is not easy to determine whether such work was done. The use of the double post method in the construction of long houses by Danubian communities sometimes may have resulted from constraints of location and the type of ground on which the buildings were raised. An additional pair of posts improved the stability of the structure and provided better isolation from strong winds (Startin, 1978: 149; Marschall, 1981: 112).

5. DISCUSSION

The results of rescue excavations at the Lisewo 31 site allow us to discuss the origin and chronology of the double post technique

in the construction of the external walls of houses by LBK communities. The double posts placed along the load-bearing walls, as noted in Lisewo, combined with the NWW-SEE orientation of houses, indicate connections with the western and southern LBK oecumene (Kuper, 1977: 19-40; Modderman, 1988: 93). A direct analogy for the Lisewo houses can be found at Bochum-Hiltrop (Gabriel, 1979: 81; Fig. 5: B) and Zwenkau-Harth (Quitta, 1958: 178-179; Fig. 5: E). Both sites revealed two houses orientated NWW-SEE and arranged parallel to each other. They are dated to the youngest LBK period (Quitta, 1957: 179; Hodder, 1990: 120). While the 14C dates (Tabl. 2) obtained from charcoal found in pits located in the neighborhood of the post structure at Lisewo, indicate that an LBK settlement of the classic (music note) phase existed there. It needs to be stressed that the pottery material from this site is uniform and there is no foundation for different dates. Among the more than one thousand fragments of pottery, an ornament of possibly younger date was found in only one case (Fig. 8: 5). This type of dating is not confirmed by Modderman's (1970: 109) typology.

The occurrence of the double post construction method, allows us to discuss the issue of far-reaching contacts and the possibility of observing changes in the direction of information flow among LBK communities in the Lower Vistula Basin, from longitudinal to latitudinal (Kirkowski, 1994: 67).

Analyses of LBK sherds from the Polish Lowland, mainly from Kuyavian region (Pyzel, 2006) and from the Chełmno Land (Kirkowski, 1994), indicate that the first LBK communities arrived here from southern Poland (Little Poland). Examination of flint inventories from the Chełmno Land shows that permanent contacts with LBK settlement regions in the basin of the Upper and Middle Vistula existed (Małecko-Kukawka, 2001: 36-37, 88-89; Lech, 2003: 21-27). This is evidenced by the import of flint from Little Poland and changes in the style of pottery decoration. The direction of contacts, to be

seen in the decoration of pottery, underwent a change towards the end of the music note phase and in the youngest period of LBK communities in the Polish Lowland. The fact that there are no elements of the Želiezovce style of western Slovakia in Kuyavia region and the Chełmno Land, suggests limited contacts with Little Poland in this late LBK phase. While the dominance, in the same period, of the Praha-Šárka style from Bohemia suggests the existence of contacts with LBK communities in the South-West or in the West, from the Elbe basin (Vencl, 1961; Hoffman, 1963, Tabl. 4; Dohrn-Ihmig, 1974, Fig. 3; 1976; Gabriel, 1979: Tafel. 66; Kozłowski, 1988: 47; Kirkowski, 1994: 66). As only a single site is known in the South (at Štúrovo, Slovakia; Pavúk, 1982) with traces of the double post building technique, links with the West are more probable.

The longhouses from Lisewo, built using the double post construction method, seem to support the hypothesis that this building technique was a characteristic feature not only for the final phase of LBK and communities of the Stroke-Ornamented Pottery culture. Changes in the dating of this technique may show that contacts with LBK communities to the west were already established in the classic phase.

The results of LBK excavations in the Chełmno Land bring to mind recent discoveries in the Paris Basin (Jeunesse *et al.*, 2007). The region, like the Chełmno Land, is situated on the periphery of the LBK oecumene. Excavations carried out at sites in Ecriennes (Marne) and in Sierentz (Haut-Rhin) have undermined the earlier view that the oldest trapeze-shaped dwellings should be associated with the final period of LBK communities and with communities of the Stroke-Ornamented Pottery culture (Jeunesse *et al.*, 2007: 44 and 50-51). We can draw similar conclusions from the discovery of houses in which the double post building technique was used. It seems that also in this case the accepted chronology will have to be reviewed (see Jeunesse *et al.*, 2007: 45).

The present state of research does not exclude the possibility that the "à parois doubles" technique appeared in various regions of the LBK oecumene independently, *ad hoc*. In this case, it would result from the application of similar solutions to similar problems which arose during the building, or use, of long houses and were caused by the type of ground or the need to repair walls.

So far, in literature on the subject, the "à parois doubles" is viewed as a technique occurring specifically in LBK architecture. The author shares this view. Nevertheless, its validity should continue to be verified during further research, since there is always a risk of error in the reading and interpretation of archaeological features.

Acknowledgements

I would like to express my gratitude to the Editor for help with correcting and smoothing the English text. Valuable comments on a draft of this article were kindly provided by Prof. Jacek Lech and by two referees, whom I also wish to thank. I am also obliged to Alicja Petrus-Zagroba for the translation of this text into English.

References

- BENEŠ J., 1991a. Neoliticke sídliště v Hrdlovce-Lipticích Předběžná zaprava o výzkumu v letech 1987-1989. *Archeologické Rozhledy*, 43 (1) : 29-46.
- BENEŠ J., 1991b. A neolithic settlement site at Hrdlovka-Liptice (Excavations of 1987-1990). *Archaeology in Bohemia* : 75-79.
- BENEŠ J., 1995. Deset let výzkumu zemědělského pravěku v povodí Lomského a Loučenského potoka v sesrozápadních Čechách (1983-1992). In : J. BŘEZÁK (ed.), *Archeologické výzkumy v severozápadních Čechách v letech 1983-1992* : 63-80.
- BIENIAS D., 2000. Charakterystyka fizjograficzna stanowiska. In : *Opracowanie wyników ratowniczych badań archeologicznych na odcinku A1 planowanej autostrady w województwie kujawsko-pomorskim, Bocień, gm. Chełmża, stan. 5*. Toruń (Computer printout from archive of Institute of Archaeology UNC in Toruń) : 8-9.
- BRANDT D. V., 1988. Häuser, In : *Der bandkeramischen Siedlungsplatz Langweiler 8, G. Aldenhoven, K. Düren*. Rhenische Ausgrabungen, 28 : 36-290.
- BUTTLER W. & HABEREY W., 1936. *Bandkeramische Ansiedlung bei Köln-Lindenthal*. Berlin-Leipzig.
- CHUDZIAK W., 2000. Wyniki prac terenowych. In : *Opracowanie wyników ratowniczych badań archeologicznych na odcinku A1 planowanej autostrady w województwie kujawsko-pomorskim, Bocień, gm. Chełmża, stan. 5*. Toruń (Computer printout from archive of Institute of Archaeology UNC in Toruń) : 13-16.
- COUDART A., 1987. Tradition, uniformity and variability in the architecture of the Danubian Neolithic. In : J. RULF (ed.), *Bylany Seminar 1987* : 199-223.
- COUDART A., 1998. Architecture et société néolithique. L'unité et la variance de la maison danubienne. *Documents d'Archéologie française*, 67.
- CZEKAJ-ZASTAWNY A., 2008. *Osadnictwo społeczności kultury ceramiki wstęgowej rytej w dorzeczu górnej Wisły*. Kraków.
- CZERNIAK L., 1990. First settlement of the oldest phase of the Linear Band Pottery Culture of the Polish Lowland: Grabie 4, Włocławek voivodeship. In : T. SZELĄG (ed.), *Interregional cultural relations between Polish territories and adjacent regions of Central and Eastern Europe*. *Archaeologia Interregionalis*, 11 : 49-62, Warszawa.
- DOHRN-IHMIG M., 1974. Untersuchungen zur Bandkeramik im Rheinland. *Rheinische Ausgrab*, 15 : 51-142.

- DOHRN-IHMIG M., 1976. "Kölner Typ", spatter "Šárka-Typ" und ältere Stichbandkeramik. *Jahresschrift für mitteldeutsche Vorgeschichte*, 60 : 109-116.
- GABRIEL I., 1979. Studien zur Tonware der Bandkeramik in Westfalen und Nordhessen. *Bonner hefte zur Vorgeschichte*, 19, Bonn.
- HAUZEUR A., 2006. *Le Rubané au Luxembourg. Contribution à l'étude du Rubané du Nord-Ouest européen*. Mersch-Liège.
- GALON R., 1984. *Województwo toruńskie: przyroda-ludność i osadnictwo – gospodarka*. Warszawa.
- GRONENBORN D., 2003. Migration, acculturation and culture change in western temperate Eurasia, 6500-5000 cal. BC. *Documenta Praehistorica*, 30 : 79-91.
- GURTKOWSKI P. & GLEŃSKI G., 2000. Opracowanie materiałów ceramicznych związanych z Kulturą ceramiki wstęgowej rytej na stanowisku Bocień, gm. Chełmża, stan. 5. In : *Opracowanie wyników ratowniczych badań archeologicznych na odcinku A1 planowanej autostrady w województwie kujawsko-pomorskim, Bocień, gm. Chełmża, stan. 5*, (Computer printout from archive of Institute of Archaeology UNC in Toruń) : 74-108.
- HODDER I., 1990. *The Domestication of Europe*. Oxford.
- HOFFMAN E., 1963. *Die Kultur der Bandkeramik in Sachsen*. Berlin.
- JADIN I. & CAHEN D., 2003. Datations radiocarbones et Rubané : Pour un mariage de raison. In : I. JADIN (ed.), *Trois petits tours et puis s'en vont... La fin de la présence danubienne en Moyenne Belgique*. Liège : 523-696.
- JEUNESSE Ch., WOLF J.-J., LEFRANC P. & SCHALTENBRAND K., 2007. Rubané du sud-ouest et maison trapéziforme : l'exemple de la maison 11 de Sierentz (Haut-Rhin). In : O. AGOGUÉ, D. LEROY & Ch. VERJUX (ed.), *Camps, enceintes et structure d'habitat néolithiques en France septentrionale. Actes du 24^{ème} Colloque interrégional sur le Néolithique, Orléans, 19-21 novembre 1999, 27^{ème} supplément à la Revue archéologique du Centre de la France*. Tours : 39-54.
- KAUFMANN D., 1984. Die ältestlinienbandkeramischen Funde vor Eilsleben, Kr. Wanzleben und der Beginn des Neolithicums im Mittelelbe-Saale-Gebiet. *Nachrichten aus Niedersachsens Urgeschichte*, 52 : 177-202.
- KIRKOWSKI R., 1990. Boguszewo, gm. Gruta, województwo toruńskie, stanowisko 41, obiekty 3 i 5. In : D. JANKOWSKA (ed.), *Z badań nad chronologią absolutną stanowisk neolitycznych z ziemi chełmińskiej*, Toruń : 9-14.
- KIRKOWSKI R., 1994. Kultura ceramiki wstęgowej rytej na ziemi chełmińskiej. In : L. CZERNIAK (ed.), *Neolit i wczesna epoka brązu na ziemi chełmińskiej*, Grudziądz City : 57-73.
- KIRKOWSKI R. & KUKAWKA S., 1990. Boguszewo, gmina Gruta, województwo toruńskie, stanowisko 43b, obiekty 11 i 23. In : D. JANKOWSKA (ed.), *Z badań nad chronologią absolutną stanowisk neolitycznych z ziemi chełmińskiej*. Toruń : 26-31.
- KONDRACKI J., 1978. *Geografia fizyczna Polski*. Warszawa.
- KOSSINNA G., 1910. Der Ursprung der Urfinnen und Uridogermanen und ihre Ausbreitung nach dem Osten. *Mannus*, 2.
- KOSTRZEWSKI J., 1928. Osada starszej ceramiki wstęgowej w Chełmży w pow. toruńskim na Pomorzu. *Roczniki Muzeum Wielkopolskiego*, 4 : 100-128.
- KOZŁOWSKI J. K., 1988. Z problematyki interregionalnych powiązań Kujaw w młodszej epoce kamienia. In : A. COFTA-BRONIEWSKA (ed.), *Kontakty pradziejowych społeczeństw Kujaw z innymi ludami Europy*. Inowrocław : 45-54.
- KOZŁOWSKI L., 1924. *Młodsza epoka kamienna w Polsce (Neolit)*. Lwów.

- KREUZ A.-M., 1990. Die Osten bauern Mitteleuropas – eine archäobotanische untersuchung zu umwelt und Landwirtschaft der Ältesten Bandkeramik. *Analecta Praehistorica Leidensia*, 23.
- KUKAWKA S. & MAŁECKA-KUKAWKA J., 1999. The "Long House" of the Late Band Pottery Culture from Bukowiec, Chełmno Land. *Sborník Prací Filozofické Fakulty Brněnské Univerzity, Řada Archeologická (M)*, 48 (4) : 73-80.
- KUKAWKA S., MAŁECKA-KUKAWKA J. & WAWRZYKOWSKA B., 2002. Wczesny i środkowy neolit na ziemi chełmińskiej. In : B. WAWRZYKOWSKA (ed.), *Archeologia toruńska. Historia i terażniejszość. Materiały z konferencji naukowej zorganizowanej z okazji 140-lecia muzealnych zbiorów archeologicznych w Toruniu, Toruń 16-17 maj 2002*. Toruń : 91-107.
- KULCZYCKA-LECIEJEWICZOWA A., 1979. Pierwsze społeczności rolnicze na ziemiach polskich. Kultury kręgu naddunajskiego. In : T. WIŚLAŃSKI & W. HENSEL (ed.), *Prahistoria ziem polskich, tom 2 Neolit*. Wrocław, Warszawa, Kraków : 19-164.
- KULCZYCKA-LECIEJEWICZOWA A., 1983a. The Oldest Linear Pottery Communities and their Contribution to the Neolithization of Polish Territories. *Archaeologia Polona*, 21-22 : 47-61.
- KULCZYCKA-LECIEJEWICZOWA A., 1983b. O zofipolskim stylu ceramiki wstęgowej rytej w Polsce, *Archeologia Polski*, 28 (1) : 67-97.
- KULCZYCKA-LECIEJEWICZOWA A., 1988. Erste Gemeinschaften der Linienbandkeramik-kultur auf polnischem Boden. *Zeitschrift für Archäologie*, 22 (2) : 137-182.
- KULCZYCKA-LECIEJEWICZOWA A., 1993. *Osadnictwo neolityczne w Polsce południowo-zachodniej. Próba zarysu organizacji przestrzennej*. Wrocław.
- KULCZYCKA-LECIEJEWICZOWA A., 2008. *Samborzec. Studium przemian ceramiki wstęgowej rytej*. Wrocław.
- KUPER R., 1977. Bauten. In : J.-P. FARRUGGIA, J. HAHN, K.-H. KNÖRZER & J. SCHALICH (ed.), *Der Bandkeramische Siedlungsplatz Langweiler 9, Gemeinde Aldenhoven, Kreis Düren*. Rheinische Ausgrabungen, 18. Bonn.
- LECH J., 2003. Mining and siliceous rock supply to the Danubian early farming communities (LBK) in eastern central Europe: a second approach. In : L. BURNEZ-LANOTTE (ed.), *Production and Management of Lithic Materials in the European Linearbandkeramik (Gestion des matériaux lithiques dans le Rubané européen, BAR International Series, 1200* : 19-30.
- LENNEIS E., 1997. Houseforms of the Central European Linearpottery culture and of the Balkan Early Neolithic – comparison. *Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji*, 24 : 143-149.
- LENNEIS E., 2002. Ein bandkeramischer Großbau aus Mold bei Horn, Niederösterreich. *Gedenkschrift für Viera Nemecková-Pavúková, Studia Honoraria*.
- LENNEIS E., 2004. Architecture and Settlement Structure of the Early Linear Pottery Culture in East Central Europe. In : A. Lukes, M. Zvelebil (ed.), *LBK Dialogues Studies in the formation of the Linear Pottery Culture, BAR International Series, 1304* : 151-157.
- LÜNING J., 1982. Research into the Bandkeramik settlement of the Aldenhovener Platte in the Rhineland. *Analecta Praehistorica Leidensia*, 15 : 1-29.
- LÜNING J., 1986. Die Ausgrabungen zum Neolithicum in Schwanfeld, Landkreis Schweinfurt. *Aus Frankens Früzheit*. Würzburg, 9-16.
- MADEJSKI S., 1938. Czym były wielkie budowle z młodszej epoki kamienia odkryte w Brześciu Kujawskim. *Z otchłani wieków*, 13 (1-2) : 1-14.
- MALAK P., 2005. *Zasiedlenie ziemi chełmińskiej przez społeczności kultury ceramiki*

- wstęgowej rytej. Toruń (Computer print-out of MA thesis from archive of Institute of Archaeology UNC in Toruń).
- MAŁECKA-KUKAWKA J., 2001. *Miedzy formą a funkcją*. Toruń.
- MASUCH A. & ZIESSOW K.-H., 1985. Reconstructing Linear Culture house: theoretical and practical contributions. *Helinium*, 25 : 58-93.
- MARSCHALL A., 1981. Environmental Adaptation and structural designing Axially-Pitched Longhouses from Neolithic Europe. *World Archaeology*, 13 : 101-121.
- MEYER-CHRISTIAN W., 1976. Die Y-Pfostenstellung in Häusern der Älteren Linearbandkeramik. *Bonner Jahrbücher*, 176 : 1-25.
- MILISAUSKAS S., 1976. *Archaeological Investigations on the Linear Culture Village of Olszanica*. Wrocław.
- MILISAUSKAS S., 1986. Early Neolithic Settlement and Society at Olszanica. *Memories of the museum of anthropology University of Michigan*, 19.
- MODDERMAN P. J. R., 1970. Linearbandkeramik aus Elsloo und Stein. *Analecta Praehistorica Leidensia*, 3.
- MODDERMAN P. J. R., 1977. Die neolithische Besiedlung bei Hienheim Ldkr. Kelheim. *Analecta Praehistorica Leidensia*, 10.
- MODDERMAN P. J. R., 1986. On the typology of the houseplans and their European Settings. In : I. PAVLŮ, J. RULF & M. ZÁPOTOČKA, *Theses on the Neolithic site of Bylany. Památky Archeologické*, 77 (2) : 383-394.
- MODDERMAN P. J. R., 1988. The Linear Pottery Culture: Diversity in Uniformity. *Berichten van de Rijksdienst voor het Oudheidkundig Bobemonderzoek*, 38 : 63-139.
- PAVLŮ I., 1981. Altneolithische Häuser in Böhmen. *Archeologické Rozhledy*, 33 (5) : 534-543.
- PAVŮK J., 1982. Vorbericht über die Ausgrabung der neolithischen Siedlung in Štúrovo. In : *Siedlungen der kultur linearkeramik in Europa. International Kolloquium Nové Vozokany 17-20 november 1981*. Nitra: 207-225.
- PRICE T. D. & BENTLEY R. A., 2005. Human Mobility in Linearbandkeramik: An Archaeometric Approach. In : J. LÜNING, Ch. FRIRDICH & A. ZIMMERMANN (ed.), *Die Bandkeramik im 21. Jahrhundert. Symposium in der Abtei Brauweiler bei Köln vom 16.9-19.9.2002*. *Internationale Archäologie*, 7 : 203-215.
- PYZEL J., 2006. Die besiedlungsgeschichte der Bandkeramik in Kujawien. *Jahrbuch des Römisch-Germanischen Zentralmuseums Mainz*, 53 : 1-57.
- QUITTA H., 1958. Die bandkeramische Siedlung Zwenkau-Harth, Kr. Leipzig. *Ausgrabungen und Funde*, 3 : 177-179.
- ROMANOW J., 1977. Trapezowate budowle naziemne ludności kultury ceramiki wstęgowej klutej na Dolnym Śląsku. *Silesia Antiqua*, 19 : 27-55.
- SANGMEISTER E., 1937. Eine bandkeramische Siedlung bei Arnsbach im Regierungsbezirk Kassel. *Germiania*, 21 : 213-217.
- SCHLETTE F., 1958. Die ältesten haus- und Siedlungsformen des Menschen auf Grund des steinzeitlichen Fundmaterials Europas und ethnologischer Verleiche. In : K.-H. OTTO (ed.), *Europas und ethnologischer Vergleiche*, 5. Berlin.
- SOUDSKÝ B., 1966. *Bylany osada nejstarších zemědělců z mladší doby kamenné*. Praha.
- STARTIN W., 1978. Linear Pottery Culture Houses: Reconstruction and Manpower. *Proceedings of the Prehistory Society*, 44 : 143-159.
- STIEREN A., 1951. Bandkeramische Großbauten bei Bochum und ihre Parallelen in Mitteleuropa. *Bericht der Römisch-Germanischen Kommission*, 33 (1943-1950) : 61-88.

TICHÝ R., 1962. Osídlení s volutovou keramikou na Moravě. *Památky Archeologické*, 53 (2) : 245-305.

VENCL S., 1961. Studie o Šáreckém typu. *Sborník Národního Muzea v Praze Řada A – Historie (Acta Musei Nationalis Pragae Series A – Historia)*, 15 (3) : 93-134.

Author's address:

Dagmara WERRA
Institute of Archaeology and Ethnology
Polish Academy of Sciences
Al. Solidarności 105
00-140 WARSZAWA (Poland)
dagmarrawerra@yahoo.com